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## COLLEGE EDUCATION OF MINING ENGINEERS

Mining is one of Canada's greatest industries. We might therefore expect that the education of men to take charge of and operate mines would be an important feature of our educational system. Is it?

Professor J. C. Gwillim of the School of Mining, Kingston, in a contribution to the November bulletin of the Canadian Mining Institute states that the number of students in mining in Canadian colleges is very small, and he points out some of the reasons. One of these is the standard of admission, which, however well it may meet the requirements of other professions, is likely to prove a bar to the young men who are most familiar with and are most interested in mining owing to their living in mining districts.

It is quite evident that in drafting requirements for admission to Canadian Universities the profession of mining engineering has been either ignored or misunderstood. Those who have the best interests of the profession at heart will read with interest Professor Gwillim's letter.

In order to bring about any important change we must know the opinions of many members of the profession.

It is not a difficulty with which the professors of mining at the several colleges should be left to struggle alone. They recognize the unsuitability of the present requirements for admission, but they have not themselves the power of changing them. If men who have taken the mining courses in Canadian Universities can be prevailed upon to give their opinions of such courses, and if men who would like to take such courses but are not allowed to do so because of inability to pass examinations in subjects in which they are not interested will make their desires known, steps can be taken to bring the matter before the proper authorities. We hope to see further discussion of the subject in future editions of the Bulletin of the Institute. We will be pleased also to publish in the "Canadian Mining Journal" the views of any who are interested in the subject. It would be especially useful if young men who are prevented from availing themselves of college training by inability to pass the present admission examinations would state their case. Mining men who have such ambitious men in their employ can help them by urging them to write or by stating the case for them. To get what we want we must know what we want. We must have also a clear view of the chief difficulties to be encountered.

The price of silver has been a little higher recently and is encouraging producers in their hopes of a better market in 1916.

## PRACTICAL MINING FOR MINING ENGINEERS

It has been a very common practice in Canada to urge graduates in mining engineering to forget the fact that they are graduates and to go to one of the mining camps and take employment as unskilled laborers. They are advised that they cannot hope to be successful unless they spend a few months shoveling broken rock into tramcars. When they have done this they are supposed to be better able to appreciate how much inferior they are to the average laborer. They are then to approach the superintendent and ask to be given some other kind of work, anything being preferable to "mucking". Then after spending a few weeks dragging logs up into stopes for the timbermen, carrying steel for the machine runners, or helping disabled tramcars back onto the track, they may be given jobs as helpers on drills. After a period as helpers they may be allowed to run the machine themselves. Then while the miners take their places as helpers, they may place or misplace a few holes themselves. The attempt at placing the holes is not unlikely to meet with the disapproval of the miners and to lower the latter's opinion of college graduates to the level of the sump, if it is not there already. In case one-man drills are used the college graduates may be put in working places by themselves, but in this case the proper amount of criticism is not obtained, being limited to the lunch hour visits of the nearby workers. A greater variety of holes is often obtained in this way however as the restraining influence of a partner who does not like to see work wasted is lacking.

There is good reason for advising college graduates to gain some experience at the work of the various employees of a mining company. This is especially true of the underground work, for nothing is more vital to the successful operation of a mine than a very intimate knowledge of what is going on below the surface. It is well to impress this fact, for it is sometimes lost sight of by others than novices.

But should experience in the work of underground laborers be sought after graduating from college? Is it not better to do such work at an earlier stage? We agree with Professor Gwillim when he says: "practical mining should be seen and known before entering and during college years, not learnt at a rock pile or roast heap after one's brains have been trained to do better work."

The time honored custom of advising graduates to spend a period as laborers doubtless arose from the fact that Canadian mining colleges are not located in mining districts. It was not impossible a few years ago for a student to graduate from a mining course without having had any experience in a mine. Those who lived in mining districts or who found employment in mines during vacations were prepared for more important tasks, but those who neither lived in nor visited the mining districts had to learn a great deal about mining that is not taught in colleges. The difficulty has been partially overcome by refusing to grant degrees to students who have not worked for a certain period in mines or metallurgical plants.

It is not essential to the success of a mining engineer that he should be able to shovel as much broken rock per

day as does a common laborer, be able to drill as many holes per day as the average miner, slide ladders as quickly as the drill boy, sharpen drills as well as does the blacksmith, nor even to understand foreigners as well as does the mine captain; but it is essential that he should have an intimate knowledge of what the various employees are doing and what they are capable of doing. A little time spent at each of the underground tasks should prove useful in later years to any engineer.

## SERVIAN COPPER

The newspapers recently printed a despatch describing the Servian copper mines captured by the Germans as "probably the best copper mines in Europe." There is one important copper mine in Servia, the Bor, which produced in 1912, 16,500,000 pounds copper. Such a production is exceeded by only a few mines in Europe. In 1912 Europe's premier copper mine, the Rio Tinto, Spain, produced 89,432,000 pounds, the Mansfield, Germany, 45,200,913 pounds and the Kyshtim, Russia, 16,812,000 pounds.

The Bor mine ranks fourth among European copper mines in production and is a prize of very considerable value to the Germans. Aside from the Bor there are no important producers of copper in Servia.

In 1912 the copper production of Germany was 53,581,500 pounds, and of Austria-Hungary 8,820,000 pounds. The Bor mine production is therefore equal under normal conditions to about one quarter the combined output of the central powers.

It would be folly to suppose that the Bor mine was left in working condition by the Servians. It was doubtless, as has been reported, flooded and the machinery destroyed. The Huns will of course make heroic efforts to get it into operation quickly; but it may easily be at least a few months before the mine is again making a large production.

The Glace Bay collieries of the Dominion Coal Company produced 408,200 tons in October, an increase of 40,184 tons over 1914. The coal and steel industries of Nova Scotia have made a grand recovery from the depression which followed the outbreak of war. The closing months of this year will probably be very busy ones.

Few companies can show a better record of enlistments for military service in this war than the Dominion Coal Company. Nearly 1,500 men, most of whom had worked underground, have gone to the front from the Glace Bay mines, or are on the way. These men should prove specially useful in tunneling operations and their services are doubtless being turned to good account. The loss of so many good miners must seriously embarrass the mine operators.

The Orillia Molybdenum Company announces that its concentration process has worked out satisfactorily. The company is now making weekly shipments of concentrate to the Imperial Government brokers at Liverpool, and is in the market for molybdenite ores.

## NEUTRAL RIGHTS

In the recent note to Great Britain, Secretary Lansing says that the United States "unhesitatingly assumes the task of championing the integrity of neutral rights." Maybe the people of Belgium will derive some comfort from that statement. Possibly however they prefer the aid given them by Americans through the Belgium Relief Commission to that which they can find in the American note. Possibly also they are convinced that the champion of neutral rights is now fighting for them and has been fighting for them since the Huns invaded Belgium.

We are advised that membership in the International Engineering Congress will be open until the close of the year. Members will receive copies of the transactions on the subject they are most interested in. The Secretary calls special attention to the great value of the papers on the Panama Canal. In the mining and metallurgical sections several important papers were presented.

The Porcupine district has now to its credit another gold producing mine, the Schumacher. The Schumacher property has been developed by Mr. F. W. Schumacher and his associates in a somewhat leisurely manner and without attracting much public attention. Mr. Jos. Houston, the superintendent, has carried on development as extensively as a very limited monthly expenditure would allow. A mill has recently been built and began treating ore in September. The October production is reported at \$20,000.

It is with regret that we notice the conclusion of the long and honorable career of the "Colliery Engineer," a periodical that is perhaps better known to the present generation of mining men under the name of "Mines & Minerals." The "Colliery Engineer" has been purchased by the publishers of "Coal Age," and the two papers consolidated. It is a sign of the times and of the far-reaching influence of the metropolis of New York. The "Colliery Engineer" was above all a students' paper, and its history has been largely bound up with that of the International Correspondence Schools of Scranton. It may be presumed that the unfortunate position of the I. C. S. brought about by a departure from its legitimate activities has had something to do with the sale of the "Colliery Engineer." However this may be, there is a large circle of readers that will miss the more scholastic and literary *format* of the older periodical, and will not find in the up-to-date and somewhat commercialized characteristics of "Coal Age" the same sense of interest and familiarity they used to feel towards the "Colliery Engineer."—F. W. G.

Iron and steel are in great demand, both for war purposes and for domestic purposes. The change in the market during the past few months has been wonderful. It is comparable with the great improvement which in the case of nickel, copper, lead, zinc and minor metals showed itself early in the year.

Copper production of the Granby Consolidated Mining Smelting and Power Co., British Columbia's premier copper mining company, is reported to have been 4,119,389 pounds last month. This is a new high record.

Increase in wages has been announced by the nickel-copper mining companies of the Sudbury district. The companies are doing an exceptionally large and profitable business this year and it is only fair that the employees should not be forgotten.

Messrs. Davis and Steindler, who purchased the Dobic-Leyson claims in Munro township have named their company the Croesus. If such ore as has been mined in development work is found in large quantity the mine will prove to be very well named.

The paying of a dividend of over \$65,000 by the Tough-Oakes mining company will probably help to attract to Kirkland lake and other districts along the Temiskaming and Northern Ontario Railway some of the attention which the numerous promising gold discoveries deserve.

Pacaud township seems destined to be included among Ontario gold producing areas. A discovery made by J. Macdonough early in the fall has been found very promising and it is said that development work will be started at an early date.

## POTASH FROM FELDSPAR

Several new methods of increasing the supply of American potash have recently been brought to the attention of the U. S. bureau of foreign and domestic commerce, of the department of commerce. One of the most promising is a patent taken out a few weeks ago by a Canadian for a method of using the potash in ordinary feldspar.

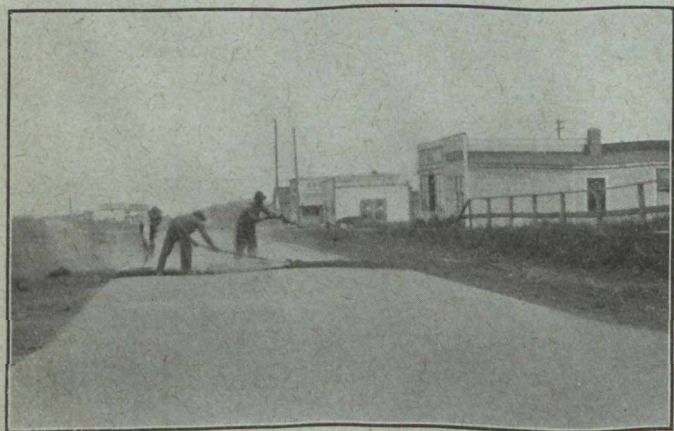
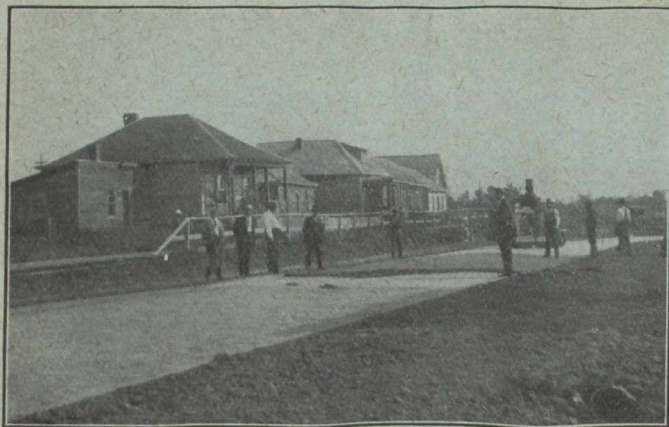
The process is simple, consisting of heating the feldspar with limestone and iron oxide at a temperature of about 2,200 degrees Fahrenheit, which produces a partly fused mass that is easily decomposed by a weak acid. From this product the potash salts can readily be extracted for further purification. It seems very possible that a greatly simplified method of transforming feldspar into fertilizer will soon be available.

A practical try-out for another method will soon take place at a New Orleans distillery where molasses is used in large quantities. It is a fact that 106 tons of potash are wasted daily by the 25 or more distilleries in this country that subject molasses to processes of fermentation. The New Orleans company is planning to install the process of saving the potash in distillery waste recently brought to the attention of the public by the bureau of foreign and domestic commerce. It should be possible to make fertilizer from this otherwise worthless material at a price that will meet competition even after the war is over.

## SEPARATION OF COPPER AND NICKEL

Mr. N. V. Hybinette of Christiansand, Norway, has patented a process for separating copper from copper-nickel solutions by using as anode a copper-nickel alloy containing 4 to 8% sulphur. The anode must be previously corroded in an electrolytic bath.

National Trust Co., Toronto, is named as assignee in the application for this patent in the United States.



Experimental pavement at Edmonton, laid under direction of S. V. Ells, of the Mines Branch, to demonstrate use of Alberta's bituminous sand deposits.

## ELECTRIC FURNACES FOR HIGH TEMPERATURE WORK\*

By F. T. SNYDER

Substantially all industrial chemical reactions are conditioned and limited by the factor of time. Time stands for interest on investment, the wages of workers and the counterbalanced factors of quantity of output and quality of product. The speed of most chemical reactions increases rapidly with temperature. If conditions are such as to permit a reaction being carried on at a higher temperature, the time factors, interest and wages, may be greatly reduced. In a case recently investigated, the projected plant investment was reduced by two-thirds by changing the reaction from one in aqueous solution to the corresponding reactions in fusion. There are, however, various commercial limitations to this easy way of cutting costs. The temperature may not be raised above the point that injures the product. Frequently more important, from a time standpoint, is the fact that the same rise in temperature that speeds the original and desired reaction, also speeds the reverse reaction. When two elements or compounds react to form a product which is not removed, this product begins to break up again into its originating parts at a speed which is usually as sensitive to rise of temperature as the original reaction. In addition, as more and more of the product is formed, more is available to break up, until eventually the speed of the reverse reaction catches up with the original reactions, and

an apparently static condition exists with both elements and products present in equilibrium.

While this static condition always eventually occurs as the result of the law of mass action, the percentage of product in the equilibrium conditions is conditioned by the relative temperature law of the elements and of the product or products. If a high temperature speeds the break-up of the product less than it does the original reaction, increasing the temperature of operation will help the commercial factors of time. In many reactions rise of temperature so speeds the reverse breakup of the product, that little or no commercial gain is to be obtained by higher operating temperatures.

If the speeds of various related reactions be plotted as lines against varying temperatures, the results are curves which, in general, are not parallel and consequently cross. This crossing means that reactions which tend to run one way at lower temperatures, may, and frequently do, tend to run the other way at sufficiently higher temperatures. The familiar illustration is that manganese may be burnt out either before or after the carbon in a steel converter, depending upon the temperature of the bath. From this it follows that command of higher temperatures may make some practical reactions that would not occur at commercial speeds at lower temperatures.

Fuel heating itself is the result of one or several chemical reactions, which running to the limits indicated, release a fixed amount of energy. This definite amount of energy can raise the products of combustion to a definite temperature and no further. With direct fuel heating the reaction temperature to which this fuel heat may be applied is necessarily somewhat lower, as part of the temperature has to be used as a thermometric head to transfer the heat from the products of combustion to the reagents of the chemical operation. By heating the fuel and air before combustion, the resulting flame may be carried to higher temperatures, as in the regenerative open hearth. The limit in this case is the destruction temperature of the apparatus for preheating the fuel and air; the checker work of the regenerative chambers. At this place it may be well to point out that the regenerators of an open hearth furnace do not add seriously to the thermal efficiency of the furnace, but only serve to enable a high temperature to be reached. At best the thermal efficiency of even the most modern open hearth is very low. In making steel from hot mixer metal probably 9% is the best published result.

With an electric furnace the heat is obtained by the molecular agitation of a resistor, either solid, liquid or gaseous, caused by the passage of an electric current. As now generally understood, this electric current consists of a number of moving electrons. These electrons collide with the molecules of the resistor and put the molecules in the condition of violent agitation which is commonly stated as "being hot." No reverse reaction speed is involved, so that there is no limit to the temperature that may be obtained in this way by the passage of an electric current, other than supplying the requisite amount of electrical energy to correspond to the heat radiated or otherwise carried away. It is this fundamental difference between fuel and electric heat, that makes the latter pre-eminently the agent for high temperature work.

To prevent a commercially prohibitive loss of heat, the material being treated must be surrounded by a container of relatively low thermal conductivity. The inner lining of this container or furnace shell must reach the desired reaction temperature of the charge. The success of any high temperature furnace is today largely a matter of developing and properly using materials for such linings. For temperatures above 2,000°C. such linings are themselves electric furnace products, frequently forced in place in the furnace.

\* Extracts from a paper presented before Pittsburg section, American Chemical and Electrochemical Societies.

## THE TREATMENT OF MOLYBDENITE ORES

From the results obtained in treating several tons of 2½ per cent. molybdenite ore from the Chisholm mine, Ontario, Mr. George C. Mackenzie, of the Mines Branch, Ottawa, outlines a process for treatment of molybdenite ore, containing other sulphides and mica, etc., as follows:—

Crush to 1 in. Dry in a cylindrical drier which does not allow the furnace gases to come in contact with the ore. Pass dried ore to ½-in. rolls and thence to a Newago screen making over ¼-in. to a picking belt, over ⅛-in. to another picking belt and under ⅛-in. to a Keedy sizer.

The picking belts should be at least 30 ft. long. Boys and girls were found better than men for picking. Men working on 2½ per cent. ore picked 2/3 lb., worth about \$1, per hour.

The picking belts carry the ore to ¼-in. rolls. It then passes over a single Newago screen. The material under ⅛-in. goes to a Keedy sizer and over ⅛-in. to ⅛-in. rolls. The product is screened again and the oversize returned to rolls.

The ore, finally all under ⅛-in. goes to a Keedy sizer, which is simply a large flour bolter made exceptionally strong for ore sizing. The sizer makes 10 sizes, each of which goes to its own water flotation machine. The dust goes to waste or oil flotation, depending on its content of MoS<sub>2</sub>.

Tails from water flotation go to waste. They contain no molybdenite.

Heads, containing 20 to 30 per cent. molybdenite go to a Wilfley roaster, where they are subjected to a slightly oxidizing roast at about 1,000 deg. F. Careful roasting is necessary to obviate any partial oxidation of molybdenite.

The roasted concentrate, which now contains oxidized pyrite and pyrrhotite as well as some mica and gangue, is re-floated on another set of water flotation units. The oxidized sulphides and the major portion of the gangue sinks while the unaltered molybdenite floats. This product is about 80 per cent. molybdenite. A richer concentrate can be obtained by drying and re-floating it.

The tailings from the roasted ore contain some molybdenite. This can be recovered by grinding and oil floating or by drying and returning to the Keedy sizer.

In treating the Chisholm ore 50 per cent. of the molybdenite was recovered by crushing in steps and picking out the coarse flake. Over 50 per cent. of the total molybdenite is recovered from material coarser than 1/6-in.

To test the flotation machine patented by Mr. Henry Wood, of Denver, one of these machines is being installed in the Ottawa testing laboratory to run in competition with the Mines Branch process. Mr. Wood claims that his machine will separate molybdenite from gangue, without preliminary sizing, and yield a high grade product, recovering 80 to 90 per cent. of the molybdenite.

Mr. Mackenzie considers the preliminary sizing essential for the making of a high grade product. He thinks that the roasting operation may, however, be dispensed with.

### The Market For Molybdenum.

According to Mr. Mackenzie the market for molybdenum is likely to be brisk for the duration of the war

owing to the scarcity of tungsten. Molybdenum can be used for many of the purposes for which tungsten has been used.

The British Government have appointed Messrs. H. A. Watson & Co., Liverpool, Eng., as brokers to requisition at a price of 105 shillings, on a basis of 90 per cent. MoS<sub>2</sub> content, all shipments of molybdenite arriving in the United Kingdom.

In molybdenite ores compounds of antimony, bismuth, arsenic and copper are very objectionable and must be removed.

Molybdenite is being used in large amounts in the United States in the manufacture of so-called tungsten lamps.

Molybdenite ore may be exported to the United States for treatment in reduction works provided a guarantee is given for the return of the product to Canada or for re-exportation to the United Kingdom.

### THE PRICE OF COPPER

An authority on copper says:

"In spite of the large production which manifested itself for several years prior to the war, it was established that hardly more copper appeared on the market than was actually necessary to supply the needs of the world. In the year 1912 there was an increase in the world's production of 267,000,000 pounds over 1911, and still the average price of copper in 1912 was 16.3 cents per pound and in 1913, 15.2 cents per pound. The average price of copper for the past 30 years has been over 14 cents per pound. For the past 15 years the price of copper has been slightly in excess of 15 cents per pound. This is a good indication of the price at which the producer in the long run can afford to sell his product. For protracted periods it may be recalled that in the year 1906 copper averaged 19.7 cents per pound and that in the year 1907 the price of copper averaged 20.8 cents per pound.

"Even setting aside the abnormal amount of copper required for export on account of the war, which it should be pointed out is to a large extent actually destroyed, we have a condition calling for a high average price of copper, because all signs point to greater activity in industrial lines generally than existed during the period when the 15-cent and 16-cent averages obtained."

### SWASTIKA

Swastika, Nov. 6.—Actual mining operations are now being carried on at the Swastika mine by Frank Culver and his associates, who purchased it recently. Drifting has been started on the main vein on the 200-ft. level, and the ore is being hoisted.

Although little information has been given out, it has been stated on good authority that extensive development work will be done and a thorough test made of the property.

The Swastika was the first mine in the Kirkland lake section. A small mill of five stamps was operated successfully for some time. When the mill capacity was increased there was not sufficient ore to keep it running, and the company at that time was not in a position to carry on development work.

A rich gold discovery is said to have been made on the claim of Joseph McDonough at Mindoka, about 48 miles north of Cobalt, on the T. & N. O. Railway in Pacaud township.

## IRON ORES PRODUCED BY MOOSE MOUNTAIN, LTD., ONTARIO

The mines owned by Moose Mountain, Ltd., are located at Sellwood, Ontario, about twenty-five miles northwest of Sudbury, on the Canadian Northern Ontario Railway. The shipping port is Key Harbor, on Georgian Bay.

There are two different grades of ore produced at the mine; first, the cobbled ore. This ore is magnetite, and of non-Bessemer grade. Complete analysis of this ore is as follows:

	212°F.
Iron.....	54.45
Phosphorus.....	.105
Silica.....	14.55
Manganese.....	.07
Alumina.....	2.09
Lime.....	4.00
Magnesia.....	2.83
Sulphur.....	.036
Loss by Ignition.....	.75
Moisture.....	.63

The selling price for season 1915 is \$2.85 per gross ton, delivered at Lake Erie ports, with a guarantee of 54.00% iron in natural condition.

The other grade of ore produced by the Moose Mountain Limited, is briquettes. These briquettes are made from ore running about 38.00% iron as it is found in the ground; it is crushed down practically to dust, and then, together with the screened dust from the cobbled ore, is concentrated by means of the Grondal wet process, and raised from about 38.00% iron to approximately 63%, and the phosphorus is lowered from about .070% to approximately .025%. This ore in the fine state is then pressed into the form of bricks and run through gas heated kiln, from which it comes out as the finished material.

Before the briquettes have passed out of the kiln and while still in a white heat, air is admitted and the oxygen is absorbed by the briquettes, which changes them from magnetite to hematite.

A complete analysis of the finished briquettes is as follows:

	212°F.
Iron.....	63.02
Phosphorus.....	.025
Silica.....	6.66
Manganese.....	.08
Alumina.....	1.00
Lime.....	1.50
Magnesia.....	1.53
Sulphur.....	.012
Loss by Ignition.....	.50
Moisture.....	.50

On a guarantee of 62.84% iron natural and .025% phosphorus, the price of the Briquettes at lower Lake Erie ports for season 1915 is \$4.78 per gross ton.

Oglebay, Norton & Co. are the selling agents of only Moose Mountain cobbled ore and the Moose Mountain briquettes.

The Moose Mountain, Limited, also supplies standard crushed stone, or trap rock.

The rock is hard, dense, durable, tough, and free from sulphides. Among its qualities are the following:

Density 3.08; Hardness, above 8, or approximately 80% of diamond (very hard); Color, dark greenish blue; Fracture, sharp and crystalline; Breaks into good cubical shapes; Water absorption, practically none; Affect of acid test, practically none; Adhesion of bituminous or asphalt-cements to this stone is good.

This stone will make a good crush stone aggregate for concrete construction with Portland cement, or with bituminous or asphalt cements, for many purposes, in-

cluding road and pavement construction. The rock is offered in the following sizes:

Through 5" ring and on 2" ring; Through 2" ring and on 1½" ring; Through 1½" ring and on ¾" ring; Through ¾" ring and on ¼" ring.

## A CUSTOM CONCENTRATING MILL IN SLOCAN DISTRICT, B.C.

About a year ago Mr. J. P. Keane, who had been for some time engaged in developing the Wonderful mine, near Sandon, Slocan, British Columbia, undertook what was regarded by many as a doubtful enterprise, namely the operating of concentrating plant on custom lead-zinc ores. He succeeded much better than had been thought likely by most mining men in the district, but unfortunately, just at a time when he was obtaining all the ore that could be treated at it, fire destroyed the mill and left its energetic lessee seemingly without the facilities for continuing to carry on the industry he had launched and brought to a successful stage. However, little daunted, he cast about for a way out of the difficulty he had so unexpectedly become involved in, and in the course of a few weeks he had made tentative arrangements for the use of a concentrating plant situated near Rosebery, Slocan lake, and within two months of the burning of the Ivanhoe mill he was producing zinc concentrate from ore from the Lucky Jim mine. The following description of the mill now being operated by Mr. Keane was included in a report on Slocan district made by the Provincial Mineralogist of British Columbia after his visit to that region in 1911:

"The zinc-concentrating mill at Rosebery was erected a few years ago by the owners of the Monitor and Ajax, primarily for the treatment of ores from those mines, but also with the expectation of doing business as a custom concentrating plant in handling lead-zinc ores of Slocan district. The plant was designed and erected by Mr. J. C. Fernau (general manager for the Canadian Metal Co.), who at that time was associated with an attempt to devise some method of utilizing the zinc contents of these ores. The plant was started, but did very little work, the Monitor and Ajax mines having been closed, and later having had their entire plants destroyed by fire, while the custom work expected did not materialize.

"The site of the plant is at Rosebery, near the northern end of Slocan lake, adjacent to the tracks of the Canadian Pacific Railway branch line from Nakusp to Sandon, and on the shore of the lake. The site chosen is almost level, there being only an elevation sufficient for the railway-siding going over the top of the receiving-bins, which are on the ground. The mill building is excellently built, and the machinery is good of its kind, but the design of the mill is such as to entail an undue amount of handling and elevating of material.

"The plan of handling the ore was as follows: The ore was received by train on the Canadian Pacific Railway and dropped into the receiving-bins, of which there is a row 250 ft. long, the bins and track being covered by a well-constructed building. The ore from the receiving-bins was discharged by chute-gates into 2-ton cars standing on a track outdoors; these cars were shoved by hand into the mill building, and there hoisted on a platform elevator to the upper floor of the mill and run off to the Blake jaw-crusher. The crusher discharged on to a travelling picking—or sorting—belt 20 ft. long by 2 ft. wide, which, in turn, discharged into a Gates fine crusher, the discharge from the Gates crusher passing into the boot of a bucket elevator, by which the ore was again raised to the upper story of the mill. The falling ore passed through a Snyder sampler into a bin, the sample going to a Gates sample-crusher.

"From this ore-bin the ore was fed by an automatic feeder to a pair of Hadfield rolls, which discharged into the boot of a second bucket elevator, by which it was again elevated to the top of the mill. This second elevator discharged into a series of four trommels with 12, 8, 4, and 2-mm. screens, respectively, the undersize of each passing to the next of the series, and from the 2-mm. on to a Culver classifier, which, in turn, discharged into a settler 40 ft. long. The overflow from the settler went to the tailing-dump and the settlings to the tables, of which there are two Wilfleys and six Luhrig vanners of a type selected by Mr. Fernau. It is said that there were formerly 18 of these vanners.

"The oversizes of the 12, 8, and 4-mm. trommels each passed on to a 4-compartment jig; the oversize from the 2-mm. trommel and from the three compartments of the Culver classifier each passed on to a 5-compartment jig. The middling of all the jigs was sent to the bucket elevator and returned to the rolls and trommels. The products of the jigs and tables passed to a 3-compartment bucket-elevator and were hoisted and deposited in bins.

"The power for the mill is provided by water-wheels, a 5-ft. Pelton driving the rough crushing plant and another the remainder of the machinery.

"The object of the plant was to make a separation of galena, zinc-blende, and iron-pyrites, making a zinc-blende product that would be sufficiently high grade to be marketable."

Changes made by Mr. Keane provide for the discharge of the ore from hopper-bottom railway cars on to a floor on a level with the top of the jaw-crusher, so that it is easily shovelled into the crusher; also the substitution of six Wilfley tables for the Luhrig vanners. Other improvements include the putting in of a small Pelton wheel for driving the dynamo for providing for electric lighting of the mill, and of large stoves and drums for heating purposes in cold weather.

It is of interest to add that the first car of concentrate, containing 42 per cent. zinc, was loaded and billed out on October 30th, consigned to zinc smelting works at Kenosha, Kansas, U.S.A.

### MONARCH MINE

The Golden Star, published at Golden, Northeast Kootenay, British Columbia, recently printed the following information relative to the Monarch lead-zinc mine, on Mt. Stephen, near Field:

As soon as the steam plant is completed at the Monarch mine 60 tons of ore will be treated daily. This plant will be of 100 h.p. and will take the place of the hydro power used heretofore.

It is hoped with this improvement to be able to ship high-grade concentrates regularly, and work is progressing with a view to opening new ore bodies and keeping a good reserve blocked out. The mine and mill employ about 25 men and this number will soon be added to.

The Monarch has been worked with indifferent success for a number of years and appears now to be coming into its own.

The region in which the mine is situated gives promise of developing other good properties, included among which is that of W. T. Oke, located three-quarters of a mile across the Kicking Horse river. This property has a tunnel about 100 ft. into the hill, which has disclosed some high-grade ore. Picked samples from the dump run 70 per cent in lead and 20 per cent in zinc. The material is a good concentrating ore, and may be put through the same process as that of the Monarch using Huntington mills and Wilfley tables.

### PROFIT SHARING

Charles M. Schwab is a great believer in profit sharing as between money power and brain power. Capital is much more in need of brain power than brain power is of capital.

It was brain power, and capital sharing with brain power, that drove the Carnegie Steel Co. to the head of the steel industry of the world, under Andrew Carnegie and Charles M. Schwab, in a comparatively few years. Carnegie was the salesman and financier. Schwab was the ever-expanding maker of steel. Carnegie and Schwab so thoroughly understood each other in constructive development and profit-sharing that it was not necessary for them to confer more than once or twice a year.

Schwab planned the Homestead steel works, to cost \$10,000,000, an enormous undertaking for that period. The first that Carnegie heard of it was when he arrived in Pittsburgh from Scotland one morning and Schwab laid the plans before him.

"Charlie," he gasped, "where would we ever sell the entire output of such a plant?"

"Look here, Mr. Carnegie, at these statistics showing the annual consumption of steel in this country. See in how few years the demand doubles."

"Never in the world could we sell such an output," responded Mr. Carnegie. "Charlie, put those plans right in your drawer and keep them there. Don't show them to anybody."

The great general is first a great soldier and Schwab was Carnegie's most loyal soldier. Without a word those plans were laid away and soon forgotten. Within two years the cable came from Scotland: "I have borrowed the money here. Build the Homestead."

It took all the organization ability of Schwab to rush those works to completion in time to meet the rising American demand for steel. In a few years the Homestead was but a small part of the Carnegie works whose total annual net earnings were four times the construction cost of the Homestead. Today the entire Carnegie works are but a minority in the United States Steel Corporation where the units of construction are now \$100,000,000 as in the Gary plant at Chicago.

But Schwab never could be converted by Morgan or his associates in the United States Steel from the profit sharing plan—the union of brain and capital—that made the Carnegie works. He was never again comfortable in the steel business until he had the Bethlehem Corporation well in hand, and a free field on the old Carnegie basis.

Schwab's system is quite the reverse of the usual division. If a manager gets 5% of the gain in his department he does not get a lessened proportion for any additional gains; he gets an added proportion on the whole. Where there is a million dollars gain and a manager gets 5%, or \$50,000, if he makes a \$2,000,000 gain he may get 7½% upon the total, or \$150,000. In some cases this bonus starting at 5% runs in increasing ratio to 15% on the entire gain, so that the manager has the stimulus, not of working for the first gain and being satisfied, but the stimulus of burning his brain tissue every day and every minute of the day from the beginning to the end of the year, for an ever increasing percentage of reward.

Last January Mr. Schwab sent his engineers from the Bethlehem Company's works in California, Massachusetts and Pennsylvania over the Canadian line to do a rush order for the British government. The bonus on the time contract was one million dollars divided between the Electric Boat Co. and Bethlehem. That bonus was won in a few months and the men who directed the work in Canada got the Bethlehem half of it.—Boston News Bureau.

# THE ELECTROLYTIC PRECIPITATION OF GOLD, SILVER AND COPPER FROM CYANIDE SOLUTIONS\*

By G. H. CLEVENGER

The present unsettled condition of the metal market, more particularly as regards zinc, which is used now almost exclusively as a precipitant in the cyanide process, makes a consideration of electrolytic precipitation, which is apparently the most feasible substitute, of particular interest at this time.

The electrolytic precipitation of gold, silver and copper from cyanide solutions in connection with the cyanide process of gold and silver extraction, has frequently been the subject of satisfactory laboratory experiment, but much less frequently of successful commercial application. This comes about through the fact that experiments carried on for a few hours in the laboratory give no true indication of the life of anodes, formation of by-products, etc., to be expected in continuous operation.

The solutions which are precipitated in present-day cyanide practice may contain a great variety of compounds arising from the decomposition of the cyanide, as well as from its combination with elements occurring in the ore treated, or introduced by chemical methods of precipitation. The principal constituents of such solutions, if zinc precipitation were not used, would be: Simple alkaline cyanides, alkaline hydrate, gold and silver, and copper if it occurs in a soluble form in the ore undergoing treatment. The proportion of these various constituents present, particularly of the gold and silver, is extremely small compared with the amounts of metal present in solutions made by extraction processes in other industries.

In general the simple alkaline cyanide, as indicated by the Liebig titration test, will range in present-day practice from a trace to 0.25 per cent, or a maximum of 1/400 of the solution. In certain cases of sand treatment of silver ores stronger solutions are used, but in general the cyanide strength of the solutions precipitated will fall well below the upper limit given. The alkali generally added is lime, although caustic soda has been used. There is rarely over 100 points present and most generally much less than this, and in some cases practically no protective alkalinity. (One hundred points of alkali correspond to a saturated solution of lime in distilled water at 20° C., i.e., 0.13%). The proportion of alkali present is therefore in many cases less than the cyanide.

The gold present will range from nothing to 0.5 ounce per ton, and the silver from a trace to 10.0 ounces per ton. In general the proportion of gold and silver in solution is much less than the upper limits given.

The grade of the ore treated does not always form a safe criterion of the gold and silver content as the solution, for the reason that the ratio of the weight of solution used to the weight of ore treated, or, as it is generally termed, "the dilution," varies greatly, but in general, as might be expected, is greater with high-grade ores. Thus, if three tons of solution are used in treating one ton of ore, we have a 3 to 1 dilution, and the recoverable value of the ore has been transferred to three parts of solution, the average value of which would be one-third of the recoverable value of the ore treated; or, to take the concrete case of an ore assaying 0.50 oz. of gold per ton (approximately \$10 per ton) from which 90% of the gold can be extracted by cyanide solution, there would be dissolved by the solution 0.45 oz. per ton of ore treated. With a 1 to 1 dilution the average content of the solution per ton would be 0.45 oz., with a 3 to 1 dilution the average content of the solution per ton would be 0.15 oz., with a 5 to 1 dilution the average content of the solution per ton would be 0.09 oz.

It will, therefore, be apparent that this stage of the cyanide process, the transference of the gold and silver from the solid state as occurring in the ore, to the liquid state as dissolved in the cyanide solution, is unlike most other steps in metallurgy, which are in general to successively concentrate the metal sought into a smaller weight of material. Exceedingly small as is the proportion of gold and silver present in ores which it is possible in present-day practice to profitably treat by cyanidation, the proportion of gold and silver in the solutions requiring precipitation are generally still smaller.

Perhaps a clearer idea of the small amount of metal involved, particularly in the case of gold, will be obtained by expressing the proportion fractionally. In solutions containing 0.50 oz. of gold per ton, an unusually high proportion, the gold would form only 14.6/1,000,000 or 1/58,332 part of the solution. In the case of waste solutions, which are or should be precipitated before they are discarded, it is not unusual to deal with solutions containing less than 0.01 oz. of gold per ton, or only 1/2,916,600 of the total weight of the solution. Tail solutions containing only 1 or 2 cents values per ton are regular practice at many mills using zinc dust precipitation.

At the present market price of silver (about 50 cents per ounce) there would be required about forty times the weight of gold present to give an equivalent value in silver. Therefore, in the treatment of silver ores a much greater weight of metal would be involved, but still the relative proportion of metal to the total weight of solution is small. As gold and silver most frequently occur associated, the absolute weight of metal to be precipitated will depend upon the ratio of these two metals in the ore treated. The greater weight of metal involved in the treatment of silver ores or ores in which silver predominates, perhaps in a certain measure explains the greater ease with which solutions resulting from the treatment of such ores are handled by all precipitation processes.

Copper in solution is an incident of gold and silver extraction, as at present there is no effort made to recover copper in this way; however, this is an interesting possibility, and would be feasible provided the cyanide combined with the copper could be economically regenerated. In many cases the proportion of copper in solution will be less than that of the gold and silver, and, so far, even with electrolytic precipitation, there has been no serious attempt to treat gold and silver ores by the cyanide process unless the proportion of readily soluble copper was considerably below 1.0 per cent. The interference of copper with other methods of precipitation, as well as its prejudicial effect upon extraction, make a consideration of its behavior with electrolytic precipitation of particular interest, but beyond the province of the present paper.

The electrolytic precipitation of gold and silver from cyanide solutions, therefore, involves the practically total precipitation of an extremely small weight of metal from solutions containing a comparatively small proportion of soluble salts, and which are therefore poor electrical conductors. The fact that the alkaline cyanides are readily decomposed by electrolysis and that the economy of the cyanide process depends upon the continued re-use of the solvent make it imperative to precipitate with the minimum decomposition of cyanide, and preferably with a regeneration of cyanide. The difficulty of the problem at best will therefore be apparent.

\* Extracts from a paper presented at the 28th general meeting of the American Electrochemical Society, in San Francisco, Sept. 16 to 18, 1915.



# ILLUMINATION OF COAL MINES\*

By ROBERT P. BURROWS, Cleveland, Ohio

In preparing this paper the object has been to set forth facts relating to illumination problems, which, judging from the results realized in the iron and steel and other industries somewhat similar to mining, will tend toward furthering safety, production, and contentment of employees, as well as economy of operation in mines. By applying the principles of illumination with the assistance of modern appliances, the full benefits in efficiency may be derived from improvements already made in other details of mine operation.

The lighting of a typical coal mine may be divided into four distinct parts: (1) The lighting of the buildings about the top; (2) the lighting of the working faces; (3) general illumination at the bottom; and (4) special applications of lighting.

The lighting of buildings about the top may be treated in the same manner as that of any other industrial plant, for we have a boiler room, an engine and generator room, a forge, a machine shop, and a hoist room. These can be well and efficiently lighted by the use of 100-watt tungsten-filament multiple lamps with proper reflectors so spaced and suspended that a power consumption of from  $\frac{1}{4}$  watt per square foot in the boiler room to 1 watt per square foot in the machine shop is obtained. The methods that apply to this kind of lighting have been ably treated by a number of authors, and for this reason a detailed discussion is unnecessary.

**The lighting of the working faces** is usually done by means of portable lamps, of which there are four types in use: The oil torch, the acetylene lamp, and the oil and the electric safety lamps. The different types have been fully described in numerous papers and articles and will not be covered here, although a few figures on the cost of operation will no doubt be of interest. In attempting to obtain cost figures, one is impressed with the fact that apparently very few such data have been obtained in this country. It would seem that such data would be of particular benefit at this time, with the advent of the electric safety lamp.

The oil torch is without question the cheapest source of light. The acetylene lamp, at a cost of 6c. to 10c. per lamp per week, gives far superior illumination, but the characteristics of this source of light as well as any other open-flame lamp will bear careful consideration in view of the ever-present desire for industrial efficiency and safety. It is the opinion of many that the greater percentage of disastrous explosions in the United States have resulted from the use of open-flame lamps in the so-called non-gaseous mines. This question of safety, of course, merits serious consideration.

The oil safety lamp has a distinct advantage in that it gives an indication of the presence of gas. Its development marked one of the greatest advances in mine lighting, although in most cases at the present time it is not considered a guarantee against explosion when in the presence of gas. Figures obtained from foreign countries indicate the cost of using oil safety lamps is from 7c. to 9c. per lamp per week.

The electric lamp gives a steady and readily directed light, free from gases, soot, and large chances of outage. A large proportion of the generated light is directed on the working face. It is sometimes considered a disadvantage that the electric safety lamp does not give an indication of gas as does the oil safety lamp. The trend of opinion in England, however, is toward choosing a lamp for the light it gives and to use some other means for gas indication. There is no question that an electric lamp passing the

tests of the U. S. Bureau of Mines will give more light on the working face than any of the three previous illuminants, because it has been scientifically designed with that end in view.

Foreign practice has shown that electric light costs from 12c. to 17c. per lamp per week. This cost is about twice that of the oil safety lamp. The light on the "face," however, is materially increased by the use of the electric lamp. One foreign electric-lamp manufacturer places the cost of electric light at 2 $\frac{1}{2}$ c. per lamp per shift. This figure, though it seems low, can well be realized in this country with a large installation and proper care. In this connection, it is very necessary to have proper housing and proper attention for electric lamps, more so than with the oil safety lamps. It has been found in foreign practice that this care and attention is very little, if any, more expensive than the attention that is given to oil safety lamps even though more expensive help is needed, because fewer men are required to care for the electric outfits. This country has been slow in taking up the electric lamp. It has been said that in Belgium alone there are 12,000 outfits in use. The excellent work done by the U. S. Bureau of Mines to obtain the highest efficiency for this new source of illumination has accomplished what years of competition among electric mine-lamp manufacturers could hardly have brought about.

The application of the principles of industrial illumination to the general lighting of mines must be made in the face of conditions difficult to overcome. In fact, all the conditions the illuminating engineer considers most difficult are present: low ceilings, black walls, dust, smoke, and dampness but in spite of these, satisfactory results have been obtained.

An ordinary coal mine, from a lighting standpoint can be considered as composed of at least six parts: the bottom, the run-around, main entry, side entries, mule stables, and small rooms, such as offices, pump rooms, storage rooms and first-aid rooms. The bottom, being the entry and exit for both men and coal accommodates more traffic than any other part of the mine and should be especially considered from the standpoint of both convenience and safety. The lighting of the shaft in one well-lighted mine was accomplished by the use of 40-watt tungsten-filament lamps equipped with angle reflectors, placed above and across the shaft opening so as to direct the light on the cages. The maximum intensity is at the near edge of the cage, and the eyes of the workmen on the side of the shaft toward the observer are not subjected to the glare of the lamps.

That portion of the bottom leading into the mine, where cars are directed on to the cages, can be well lighted with 40-watt tungsten lamps in shallow dome reflectors placed above and between the tracks. These units, spaced at about 6 ft. intervals and hung about 8 ft. above the floor, will give satisfactory distribution of light. The car wheels are thus well illuminated and there is practically no glare. It would be well to design the lighting of this part of the mine on a basis of 4 to 5 foot-candles at the floor, not because the work demands this intensity, but because of the greater safety which results from ample illumination and because dust collecting on the lamps and reflectors decreases the amount of light delivered.

The run-around should require only sufficient light to make visible any obstructions in the path of the empties as they leave the cages. This part of the mine may be illuminated with 25-watt tungsten lamps equipped with shallow dome reflectors, spaced 15 ft. apart and suspended

\* Extract from a paper to be presented at the New York meeting, American Institute of Mining Engineers.

8 ft. above the floor. In the main entry, the function of light is not so much to illuminate as to silhouette objects which may obstruct the passageway. With silhouette lighting a comparatively small amount of light is needed to obtain the effect desired, which is to see objects outlined against something that is lighted. For instance, white-washed doors or walls reflecting the light toward the observer's eye are excellent backgrounds against which objects form silhouettes when in the line of vision of the observer. The glint of the light on the rails forms another good surface from which silhouette lighting may be obtained. With 25-watt tungsten lamps in shallow dome reflectors, spaced at intervals of about 300 ft., the height depending upon the height of the entry, the silhouette lighting is excellent. Two units, one to illuminate the switch and the junction and the other illuminating a portion of both the main and side entries, help to eliminate collisions and by the increased light warn the trip driver that his train is approaching such a junction.

The mule stables with their low roofs may be effectively lighted with 40-watt tungsten lamps equipped with angle reflectors placed along the back wall and as high as possible one unit to each two stalls. In front of the stalls and opposite the angle units, 25-watt tungsten lamps with deep bowl reflectors may be used to illuminate the feed boxes and passageway.

The mine offices need but one 25-watt tungsten lamp equipped with a shallow dome reflector. The fireboard at the bottom should be well illuminated with one or more 25-watt lamps of this type equipped with angle reflectors, depending upon the size of the board, while the pump rooms and storage rooms may be lighted in the same manner as offices. The first-aid rooms, in order that the best attention be given the injured, should not only be well lighted, but should have the walls well whitewashed, thereby obtaining well diffused and distributed light. Frequent whitewashing of the walls of the bottom, offices, mule stables, etc., and the walls of the entries for 20 ft. each side of the units, will greatly increase the illumination in these parts of the mine. Carbon lamps are generally used in mines, but to keep the load on the generator as low as possible and maintain the most constant illumination in spite of voltage fluctuation, and to direct the light where wall and ceiling reflection cannot be relied upon, tungsten-filament lamps with weatherproof enameled reflectors in my opinion will be found most satisfactory.

A few comparative cost figures in connection with the problem of more efficient illumination follow. Consider for example, an installation where twenty-six 40-watt tungsten lamps and reflectors and thirty-one 25-watt tungsten lamps and reflectors are to replace the same number of 32-cp. and lamps, respectively. During a period of 300 days, at 10 hr. a day, the tungsten lamps would consume about 5,440 kw-hr., while the carbon lamps would consume about 14,940 kw-hr. With the cost of current at 0.5 c. per kilowatt-hour, the saving in cost of power with the use of tungsten lamps would be about \$50 a year. From this must be subtracted about \$17 for the difference between the cost of the carbon lamps and the tungsten lamps. This will leave about \$23 net saving. With the reflectors costing \$60, the installation would be paid for in three years.

These figures tend to show that if dollars and cents alone were considered, it would be more profitable to use the higher efficiency lamps. This is even more marked when the illumination of the working place is considered, because with the use of reflectors this illumination is more than double that obtained with carbon lamps.

There are many other places where special applications of lighting would tend to increase efficiency and convenience; for instance, trip-lights—now as a rule simply oil torches on the end of the train—could be easily replaced

by small storage-battery outfits showing a red light. Locomotive headlights can be equipped with low-voltage concentrated-filament tungsten lamps in parabolic reflectors, with a decrease in trouble, increased light, and decreased breakage over the present carbon or regular tungsten filament. Two 30-volt, 100-watt tungsten-filament locomotive-headlight lamps can be burned in series with a resistance. The loss in current through the resistance is a small factor as compared with the gain in steadiness and brilliancy of illumination from the parabolic headlights. The construction of this lamp is such that maximum strength of filament is obtained, which is an essential feature where the service is as severe as on a locomotive. Another possible consideration is the placing of distinctive lights where telephones are located, or where first-aid equipment may be obtained. This could be accomplished by the use of red lights on the power circuit installed in connection with a small primary-battery system, which would operate a miniature lamp in place of the large lamp should the power circuit for any reason fail. This system has been successfully worked out in theatres where the same principle is involved.

It is hoped that, from the few figures given in this paper, it will be seen that the application of the latest scientific knowledge to the lighting of mines is not so expensive as it is generally thought to be, and should be considered as a means of increasing safety, bettering working conditions, increasing production, and at the same time decreasing the cost of operation.

### THE NOVA SCOTIA MINING SOCIETY

The Council of the Nova Scotia Mining Society have decided not to hold the Annual Meeting and Dinner in April of next year. The decision of the Council not to hold the Annual Meeting last April met with the general approval of the members. It was then felt that a meeting without the usual social functions and without the dispensing of the usual hospitality to the Society's guests would not be as successful as could be wished, and these reasons appear not less cogent at the present time. In lieu of expenditure on the Annual Dinner the Council decided to make a donation of one hundred dollars to the Nova Scotia Red Cross Society. Since the last annual meeting a welcome change has come over the mining industry of Nova Scotia. A year ago, trade conditions were gloomy, and the mines were working irregularly. The prospect for the future both in the coal and iron industries was uncertain. Today, however, the members of the Society are all hard at work producing coal and making steel to help the general cause. The membership and finances of the Mining Society are in excellent condition. The decision to defer the holding of functions of a semi-festive nature, such as the annual dinner of a healthy mining society, is in consonance with the action of other mining societies throughout the Empire, and is commendable.—F. W. G.

### NOVA SCOTIA STEEL

Nova Scotia Steel & Coal Co., Ltd., has sold to New York interests \$1,500,000 of its common and \$1,000,000 of its 6% debenture stock, according to an official announcement.

The new working capital obtained by the sale of the securities will greatly strengthen the financial position of the company and permit it to accept business which it is not able now to take care of. Nova Scotia Steel already has large orders for munitions and other material on hand.

Nova Scotia Steel & Coal's capital is now as follows: Common stock, \$7,500,000; Preferred stock (8%), \$1,030,000; Debenture stock (6%), \$4,000,000; Bonds (5%), \$5,873,809; Total, \$18,403,809.

## THE EARLY BIRD

By J. HARMON PATTERSON

The tide of discovery was moving westward and wherever prospectors foregathered that winter the same vague rumor was afloat. Nothing definite of course. No one even so much as gave a hint of where he intended to strike in the Spring. Each had a definite plan, but this was more than I had. I was already hired for the season by a good syndicate and on very generous terms—but where was the new field? The country was large and no detailed map of it was in existence. I wanted one badly, but no government explorer had given it his attention. Well if he had not, some Indian trapper had. I would hunt up Fred my Indian guide. He would know.

I had trouble in locating Fred, but after a three days' journey into the wilderness I came to his shack. He and Indian Charley were trapping together. They were very glad to see me and for the next day we ate much of beaver and moose and of the good things I had brought with me.

The Indian who was my guide I did not trust, but the next day I got him out with Indian Charley and came to the point.

"Why yes," Fred replied in answer to my questions. "Charley trap there all one winter, know all the country, make a good map."

"And does he know diabase when he sees it?" I asked.

"Oh yes, he know diabase. Pretty nearly all rock he know," was his reply.

I made up my mind at once. "My idea is this," I told him. "You come with me of course and if Charley is willing I will hire him for a month or two to get in supplies. We will not wait for Spring but strike in about the middle of March, find the best place, get in plenty of grub and stay on the job. But I don't want anyone to know where I am going."

"Good," was his reply, "can go in from here, only about thirty miles and good trail. Charley will go, not getting any fur worth while."

Next day I had a long talk with Charley.

"Coshawong lake place to go," he said. "Lots of diabase there, plenty big rocks. I see some calcite there too," he added, proud to show his knowledge of geology.

I went out next day, after arranging that they were to meet me at the railway with toboggans two weeks later. I gave Fred the money and he purchased the necessary supplies. Three days later we arrived at their camp with over two hundred pounds of provisions. I stayed in while they went out for another load. To the inquisitive merchant they explained that a fool white man who was not well was to stay with them for a month and was afraid that he might starve.

Then we made our way up to Coshawong Lake, arriving there after a hard trip of four days. Here we pitched our tent, set up the sheet iron stove we had brought with us and made everything comfortable. Then Fred and Charley went out for another load. During the week they were absent I made short trips around the lake and was much encouraged by what I saw. To the south and west the rock looked favorable wherever exposed. When they returned we had four hundred and fifty pounds of supplies, but I sent Charley back to the camp again for a lot of moose meat they had left, though he suggested that it would be easier to kill another moose. The meat at this time of the year is very good to eat and is a pleasant change from salt pork.

We then made long trips in every direction, often taking provisions and a fly with us and remaining over night but no place I saw could at all compare with Coshawong Lake, and I was soon satisfied to confine my attention to it.

It was now the last of March and the weather was quite mild at times, so I sent Charley out for his canoe which I purchased from him. I paid him liberally for his time and he left us well satisfied.

One afternoon while walking along the shore of a small lake about a mile from camp I saw a piece of calcite and soon uncovered a vein about six inches wide. It was almost pink in places with cobalt bloom. I traced it for about twenty feet, but the snow was deep and I could not do much. We held a feast that night in honor of the discovery. We had moose soup with dumplings, boiled moose meat, boiled rice with apple sauce, real biscuits with butter and tea. Next day we carefully staked the claim. Then Fred found another good vein which we also staked.

As the snow melted more and more rock was exposed, and by the first of May we had five good claims, all adjoining. Though we had looked over the country pretty well we saw nothing else worth taking up, so a week later we decided that it was possible to get out to record the claims. That trip was a hard one. The rivers were open but nearly all the lakes were yet full of ice and there was much snow in the bush. We dragged the canoe across many a lake on the ice and over many a portage where the snow was still deep.

I was very glad at last to see the houses of the village in the distance. It is pleasant to sit up to a table again with a white cloth and eat a real meal from real dishes. Fred and I certainly enjoyed it though the food was no better than we had ourselves.

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Ten days later I met Fred and we returned to our camp. The second day after our arrival we made a trip around the lake. Stakes everywhere. Not an inch of diabase left. We went back half a mile, still stakes. There were five tents and twelve men at the south end of the lake. Coming back we met four canoes and nine men who had just arrived. We went back to a ridge which we had seen in the spring, it was all staked.

The country was simply blanketed. The men did not grub around till they made a discovery and then stake a claim. They staked first and prospected later. Two young fellows who were prospecting found out that while they were at work other men had run lines around them.

That night when we got in we found seven men at our camp. They were all old hands and a hard bitten bunch they were. Most of them had been staking all day with no discovery. Just getting some ground as one expressed it. I gave them all the information I thought wise and a rough plan of the country. Each man made a copy.

We now got down to hard work on our claims grubbing away among the roots and gravel to find other veins. We had visitors every day who examined our showings and all pronounced them very promising.

We had been at work a week when we made the big find. I had walked over the place several times. It was a small calcite vein about an inch wide. I knocked a piece out with the pick. The silver showed plainly in sprays like moss. We borrowed a drill and a stick of dynamite, as we had none with us, and put in a shot. The vein was full of silver and a thin leaf lay along one wall. No more work that day. The news spread like a forest fire.

I did not know that there were as many men on the lake as came to see our find next day. They swarmed over that little vein like bees around a piece of honey. Every man picked away till he got a sample and all were greatly excited. They talked of another Cobalt and were loud in their congratulations.

Good old Fred went about with a smile that stayed. I really believe that he was as pleased as I was over my good luck. "Yes," I heard him say, "We find it, come here in the winter. Stay on the job, pick the best, then go out and record it."

A crowd of prospectors gathered in our camp that night. Nothing was talked of but our discovery. Everyone who had claims staked around the lake suddenly saw visions of great wealth before him. I determined not to get enthusiastic. I owned a one fourth interest in any property discovered and this might turn out to be a bonanza. Of course the vein was small but it was very rich, and there must be more. I could not help having a sort of opulent feeling. Anyway we could have a larger house and my wife could keep a servant and have more money to spend on dress, and have, perhaps, her heart's desire, an automobile, just a small one. We might find a large vein as rich as the small one. We'll dig in and try. I might get fifteen or twenty thousand, ten at least. It makes me dizzy.

I had written the syndicate telling the good news and asking them to send a man in at once. I sent the letter with a couple of prospectors who were going to record.

Day after day we worked hard stripping and trenching. We found another vein, narrow but as rich as the first and traced it for some distance.

Langton, one of the syndicate, arrived one day about noon very much fly bitten. After we had lunch we took him over to the claim, put in another shot and blew out a lot of silver.

"You certainly have the goods," he said eagerly examining piece after piece. "Do you realize that there is a bunch of money in this for us all?"

"I've had a few pipe dreams about it," I replied, "but the vein is narrow."

"What do you want, a mint?" he asked. "As soon as we got your letter the boys asked me to come up and see just what you had, but we had no idea that it was as rich as this. They will be pleased I can tell you."

"Now listen," he continued, "you know well that this looks fine. These claims may be worth a lot of money or we may spend a lot on them and lose it all. I am going to make you a sporting offer. We will give you five thousand dollars cold cash and cancel the contract."

I did not expect anything like this. I knew the game and knew the chances even on a showing as good as ours, and I had a dread of joint stock companies.

"Tell you what," I replied, "You have only seen one vein. We have another as rich. I will take six thousand five hundred and get out." We had not mentioned the other vein which we were keeping as a surprise.

"Another vein! Great Scot! Let's see it," he exclaimed.

We went over and examined it. Then he held out his hand.

"Done," he said, "Shake on it."

#### ACCIDENTS AT METALLURGICAL WORKS

The first report of the United States Bureau of Mines on accidents at metallurgical works has just been issued by the bureau and includes the calendar years 1913 and 1914. The figures, compiled by Albert H. Fay, engineer, show that 119 men were killed during the two years; 2,285 seriously injured; and 11,046 slightly injured at smelters and mills, representing fatality and injury rates of 1.55, 29.67, and 143.44, respectively, per 1,000 men employed. The report includes the returns of 79 smelting plants in 1913 and 94 in 1914, including copper, lead and

zinc, and quicksilver smelters, as well as refineries. The iron blast furnace figures are not included. The number of ore-dressing plants in 1913 was 311, and in 1914, 484. These represent concentrating plants of copper, lead and zinc ores, stamp mills, cyanide plants, and iron-ore washers.

The total number of men employed in the metallurgical plants, both smelters and ore-dressing plants, was 35,549 in 1913, and 41,461 in 1914.

In the ore-dressing plants machinery was responsible for 25.6 per cent of all fatalities, 28.9 per cent of the serious injuries, and 16.5 per cent of the slight injuries. Similar figures for smelting plants are much smaller, for the reason that there is more machinery in use in ore-dressing plants than in smelters, and the men are usually in closer contact with the machinery, as, for example, at jigs, tables, stamps, rolls, and crushers. There are many revolving shafts, a large number of which have projecting keys, moving belts, wheels, and cams within the reach of the operator. The machinery at smelting plants is usually confined to the power house, where the blowers, engines, and dynamos are placed, and to overhead cranes, most all of which are entirely out of the reach of the regular employees.

The percentage of accidents due to "falls of persons" and "flying and falling objects" is 15.4 per cent for each in ore-dressing plants, whereas at the smelters the fatalities due to falls of persons represent 20 per cent of the total, and those due to flying or falling objects represent 5 per cent.

Haulage systems claim 25 per cent of the fatalities at smelting plants, and about half this percentage at ore-dressing plants. The difference is largely due to the type of material handled and to the larger number of cars in operation around smelter yards than are at ore-dressing plants. In many ore-dressing plants the ore is brought to the bins in railroad cars or aerial trams, and often there is no other haulage system in connection with the plants, the tailings usually being disposed of by launders or flumes, whereas at smelting plants the molten slag is handled in slag cars and the bullion has to be handled on trucks.

At smelting plants burns from hot metal, slag, etc., claim the largest percentage of serious and slight injuries and 11.3 per cent of the fatalities.

#### IRON AND STEEL

Iron Age says: October goes down as the month in which United States iron yield reached 3,000,000 tons and daily output crossed the 100,000-ton mark. When war order tonnages of six figures are bandied about so commonly, it is hard to believe that the year opened with a daily pig iron production of only 51,000 tons, or half what it is now.

More furnaces are preparing to go in blast, but some of the steel companies' furnaces that have been hard driven for months must soon go out for repairs.

An extraordinary situation exists regarding prices of finished steel. Orders have been sent in with request that they be entered and buyer notified of price. In most lines it is a question of finding a mill that can make delivery desired. Mills are holding back demand for next year. Only the largest buyers seem able to get protection on manufacturing costs for 1916, and some manufacturing consumers may find output curtailed by lack of steel.

Cabled statements that the allies will cut down purchases of American steel because of high prices need not be taken seriously. Such buying has been, and is still, insistent. American steel makers have really been slow to believe what is now plain, that the dominant factor in the domestic situation is sheer tonnage of steel to be fired out of guns. In Great Britain government requirements for shell steel are beginning to occupy exclusive attention, new inquiry there amounting to 2,000,000 tons.

# GRANBY CONSOLIDATED MINING, SMELTING AND POWER COMPANY, ANNUAL REPORT

In a letter dated September 30th, 1915, to Granby shareholders, President Wm. H. Nicols says:

The results so far attained during the year ending June 30th, 1915, confirm our belief previously expressed that no insoluble problems exist with respect to operations of the new properties, and while those results are highly gratifying, it is reasonable to expect that considerable progress will yet be made in the line of further reduction of costs. Fundamental conditions both as to property and organization continue to be highly satisfactory.

The treasurer, G. W. Wooster, reports for the year as follows:

during the year were less than usual. The shipments for the year were 611,000 tons, the development work for the year added to the tonnage reported last year, 152,872 tons, the reserve tonnage in these mines at the end of the year showing 4,232,405 tons. The cost of 85 cents per ton of ore shipped is about 5 cents per ton higher than the average for the previous five years. This is due partially to the shut-down of last fall, and subsequent starting of operations in the winter, but it also reflects the increasing expense of extraction attending decreasing ore reserves, and wherever possible this tendency is being offset by improving and cheapening the methods of extraction.

## Mineral Bearing Ores Treated.

Ores of	Ore smelted dry tons	Lbs. Cu. recovered per ton ore	METALS RECOVERED AND SOLD			Value silver and gold per ton ore
			Copper lbs. fine	Silver ozs. fine	Gold ozs. fine	
Phoenix Mines .....	611,097	16.12	9,850,302	116,752	23,355	\$0.857
Anyox Mines .....	462,340	34.58	15,895,757	142,725	3,581	0.308
Both Plants .....	1,073,437	23.99	25,746,059	259,477	26,936	\$0.621
Foreign Ores Purchased	24,583		892,853	118,404	4,452	
Total .....	1,098,020		26,638,912	377,881	31,388	

## Blister Copper Account—Costs.

Ores of	Copper	Per lb.	Silver	Gold	Total	Per ton Ore
Phoenix Mines..	\$1,141,413.79	\$0.1159	\$ 56,483.94	\$467,396.39	\$1,665,294.12	\$2.725
Anyox Mines....	1,604,469.34	0.1009	70,340.32	72,266.49	1,747,076.15	3.778
Both Plants....	\$2,745,883.13	\$0.1066	\$126,824.26	\$539,662.88	\$3,412,370.27	\$3.179
Foreign Ores Purchased....	150,752.83	0.1688	62,108.17	88,097.60	300,958.60	
Total .....	\$2,896,635.96		\$188,932.43	\$627,760.48	\$3,713,328.87	

## Blister Copper Account—Sales.

Ores of	Copper	Per lb.	Silver	Gold	Total	Per ton Ore
Phoenix Mines..	\$1,588,176.97	\$0.1612	\$ 56,483.94	\$467,396.39	\$2,112,057.30	\$3.456
Anyox Mines....	2,498,263.82	0.1571	70,340.32	72,266.49	2,640,870.63	5.711
Both Plants....	\$4,086,440.79	\$0.1587	\$126,824.26	\$529,662.88	\$4,752,927.93	\$4.427
Foreign Ores Purchased....	150,752.83	0.1688	62,108.17	88,097.60	300,958.60	
Total Received..	\$4,237,193.62		\$188,932.43	\$627,760.48	\$5,053,886.53	

## Profit and Loss Account.

To Blister Copper Account—Costs.....		\$3,713,328.87
Less value gold and silver.....	\$816,692.91	
Less value foreign copper purchased.....	150,752.83	
		967,445.74
Cost of Granby copper .....	25,746,059 lb.	0.1066
To interest on bonds .....		0.0105
To extraordinary expenditures .....		0.0055
		\$3,157,275.91
By copper sales .....	25,746,059 lb.	0.1587
		4,086,440.79
Net Profit for year .....		0.0361
Surplus carried over from last year .....		
		\$ 929,164.88
		2,738,921.91
Total Surplus at Credit, June 30th, 1915.....		\$3,668,086.79

The general manager, F. M. Sylvester, reports as follows:

The operations at Phoenix and Grand Forks, B.C., were discontinued for four months after August 7th, 1914, and the output of ore from the Phoenix mines was curtailed after starting again in December, until April, 1915, so that the shipments from these mines

The first full year of operation of the Hidden Creek mine at Anyox, B.C., has been effective in leveling and ironing out the peaks and extremes of operation and cost of production incident to breaking in a new property, and putting it on a productive basis, and has shown conclusively that the general layout and development of the mine will afford and permit the output

of any reasonable tonnage required by the smelter, at a cost per ton well within the economic limits for such work. The shipments from this mine for the year were 477,435 tons. Very little development work was undertaken, but this work for the year on ore showing 2.2 per cent. copper added to the tonnage reported last year about 187,500 tons. The reserve ore (having 2.2 per cent. copper) at the end of the year was 9,205,837 tons. There is a further reserve of low grade (.63 per cent. copper) ore of about 8,628,000 tons. The cost of mining per ton of ore shipped for the year was \$1.03.

At the Bonanza mine, located about 2 miles up Bonanza creek—which is a tributary to Granby Bay, two miles south of the smelter—nothing has been done dur-

Dean mines and has an option to purchase the It mine, adjoining the Dean. Work on all of these properties was discontinued in August, 1914, until April, 1915. These mines are comparatively small. However, the results of the work on them, up to the present writing, give sufficient encouragement to warrant the continuation of this work of prospecting for and seeking an extension and enlargement of the known orebodies. From these mines there has been shipped, during the fiscal year (of a grade of 1.5 per cent. copper), 15,000 tons, the reserve showing at 130,000 tons, with a fair prospect of developing treble this tonnage with future work.

At the Midas mines, Valdez, southwestern Alaska, such work as was necessary to complete the aerial tramway, mine terminal of this tramway, a few buildings at the mine, and to fill in about the pile foundation of the wharf shipping bins—to prevent destruction by teredos—was started in April of this year. At this writing this work is about complete and with the little development work that has been advanced in the mine during the year, this property will be ready to make shipments as soon as arrangements are made for securing power to operate the compressor.

The two reduction works owned and operated by the company are located, one at Grand Forks, B.C., the other at Anyox, B.C. The first named works have been in operation since 1901; the second since 1914.

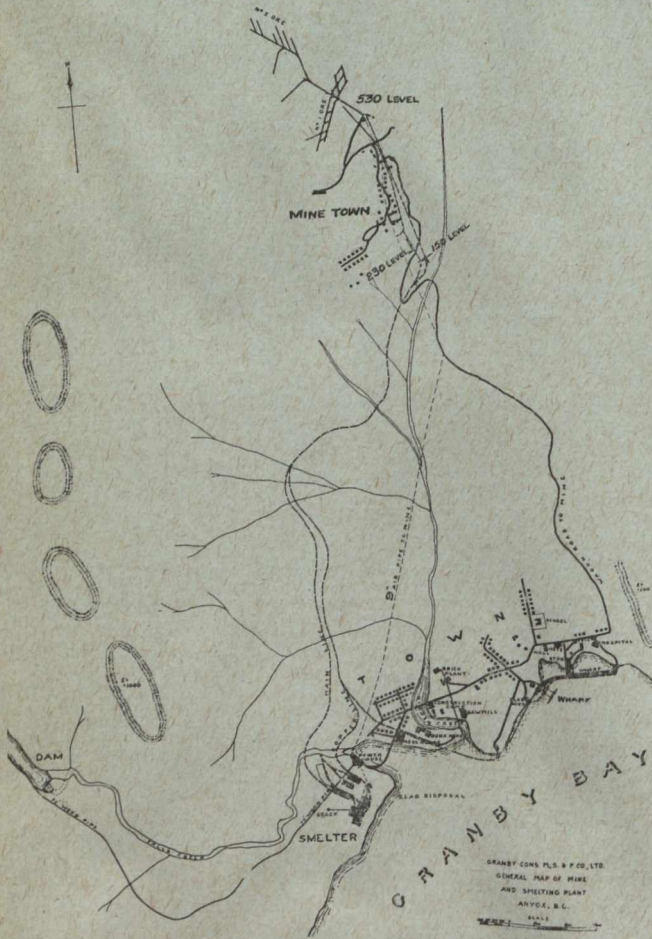
At Grand Forks the operation is a simple one, all of the difficulties of treatment and handling of the Phoenix ores having been solved some years ago. This, with practically no expense for new construction, makes possible costs very substantially under those of recent years at this plant.

The operations of the smelting works at Anyox have been attended with many difficulties of a minor nature, and some of greater degree, resulting in a low tonnage, and, as naturally follows, high costs, particularly for the first eight months of this year. Most of these difficulties are of a nature having to do with establishing the best methods of handling the ores, which vary considerably in their silica, iron and alumina content.

The further difficulties were mechanical, and those inherent to a new plant, beginning its operation with new crews, and, as was the case with the mining operation at this point, the experience of the first year's operation has gone far in securing a condition of smooth running with lengthening campaigns for the furnaces and as a consequence a greater tonnage treated per month with constantly lowering unit costs. In this connection the writer believes that it is fair to assume that during the succeeding years of operation there will be noted the same constant lowering of unit costs as has been shown in the operations of the Grand Forks plant, and that this result will be attained in less time than it was at the older plant.

The plant—originally designed to treat 2,000 tons of Hidden Creek ore per day—has been well arranged and constructed for the economical treatment of these ores. The changes that have been made are minor ones, which actual operation has demonstrated would simplify methods and give greater efficiency. The addition of the fourth furnace and appliances for taking care of fluedust—authorized during the latter part of the fiscal year—will undoubtedly raise the normal output of the plant as first designed, fully 50 per cent. Very little foreign ore has been treated at either plant.

Recoveries, including foreign ore, at the Grand Forks plant were: Copper, 10,041,175 lb.; silver, 180,177 oz.; gold, 27,807 oz.



ing the year, either in the way of development or in preparation for shipping ore. The ore roughly blocked out by the work previously done on this property shows for a grade of 2.6 per cent. copper, 414,775 tons. There is, in addition to the above, a grade of .7 per cent. copper, 489,580 tons.

The quartz claims—consisting of 30 claims, located on Granby peninsula, which forms the easterly shore line of Granby bay—were purchased during the year. The property has been opened up to afford a source of supply for clean quartz when it is required by the furnaces. For this purpose much preliminary work, by way of clearing and stripping the ledges at three different places and constructing rough loading chutes and wharves to load flat-deck scows, has been accomplished, and while at this writing very little quartz is being taken from this quarry, it is in readiness for shipment whenever required in the future.

On the Kasaan peninsula of Prince of Wales island, southeastern Alaska, the company owns the Mamie and

The recoveries at the Anyox smelter were: Copper, 16,597,737 lb.; silver, 197,704 oz.; gold, 3,581 oz.

Mr. W. A. Williams, smelter superintendent, reports as follows on the Anyox smelter:

In its first real year of operation this plant shows, in ores treated and in copper produced, a good healthy progress for the better. Since high water in March, the plant has practically run at full capacity, having changed at that time from the old schedule of always operating two furnaces steady and the third in repair and waiting, as was formerly the practice, to keeping all three in blast as much as possible.

The new charge cars have helped the feeding and the distribution of the ore in the blast furnaces, and the tendency of the furnaces to crust has become less as a result of their installation. With the better understanding which everyone has of both the ores and the operation of the furnaces, the campaigns have lengthened, until campaigns of a month are now the rule. We look for this to improve as time goes on. This will give us more furnace days per year.

The troubles encountered on the lower floor were chiefly with the settlers and spouts, owing to the great amount of low-grade, corrosive matte handled. These have been overcome and we now have few stoppages from this source.

The stoppages of the crane service which troubled us at first have been entirely overcome with the installation of the heavier forty-ton trolleys with which we replaced the twenty-ton trolleys.

A number of improvements have been made in order to lower costs, such as silica bins over the converters, skull grid for ladle skulls, new charge cars and matte digging machine, all of which have been charged to "Operation." The No. 4 furnace and agglomerating plant were purchased this year and are now under construction. The furnace will be ready to put in commission by August 15th, and the agglomerator by September 10th. We are preparing to increase our storage capacity for ore by the erection of more bins. This work is charged to "Operation" and will be finished by November. We have found the plant fairly well designed for economical work and have made very few changes. So far, we have found it to be the better practice to regrade our matte, giving to the converters nothing less than twenty to twenty-five per cent. cu. matte. Everything is in good working condition.

We commenced operations as a pyritic plant, using low coke and very little flux. No. 1 ore being used as a base to melt No. 2 ore. We have been trying to make a converter grade of matte in the first operation. The ores have not come to us as free from inert material such as dyke and schist as we could wish. They have been more or less erratic as to silica content from day to day and the tendency in both ores is to higher silica and alumina. This fact coupled with the shipments of about 100 tons of foreign ore per day has made it hard to operate the furnaces as originally intended, and the coke and flux percentages have risen to some extent. With the greater development of our own ore-bodies, and with the better storage facilities at the mine and smelter, this condition should be materially helped. The making of converter grade of matte in the first smelting, we believe, will eventually be accomplished.

With No. 4 furnace in operation, the agglomerator handling our converter slag and matte cheaper, thus giving us a greater recovery per ton of ore, owing to its handling the flue dust; with a fuller understanding

of our problems; longer campaigns of the furnaces and with the labor-saving installations mentioned above, we should and will make a decrease in our costs during the coming year.

Last year's record, we believe, we will beat this winter, even if identical conditions prevail, as we know better what to expect. With an earlier start in the shipping matte to Grand Forks in order to conserve our water supply, and with steadier campaigns, we should show better results. February is the worst period during the low water season.

Of the Grand Forks smelter, Mr. Williams says:

The Grand Forks plant was completely shut down for one hundred and twenty-two total days. We were enabled to commence operating four furnaces about the first of January, 1915, six in February and March, seven in April, and in May we were able to operate on an eight furnace basis. We smelted 617,544 tons of ore and 648,751 tons of charge.

With this irregular running and small tonnage the smelting and converting costs were the lowest in the history of the plant in the face of the high siliceous ores handled and the very high siliceous slags made. The per pound cost of copper is high on account of the low-grade ore handled.

A great deal of credit is due Mr. Bishop and staff subordinate to him for this remarkable showing. The results go to show that very close attention has been given to detail.

Under an eight-furnace operation the total pay roll is 200 men. This means that 16.6 tons of ore were handled per man.

Mr. A. J. Bone, smelter superintendent at Anyox, reports as follows:

In the year ending June 30th, 1915, considerable advance was made in the metallurgy of Hidden Creek ores at the Anyox smelter. Each month almost without exception showed a natural improvement over the one preceding. We acquired a more extended acquaintance and experience with the ores; the workmen have grown more proficient, and, for the most part, what mechanical difficulties were presented have been overcome. At the conclusion of the year, and barely fifteen and one-half months since the original start was made, it is apparent from all angles that we are approaching that condition of smooth, steady running which characterizes operations of long-established plants.

The ores melted covered a wide range in analysis, from low silica, low alumina, requiring quartz and little coke to smelt, to the other extreme of high silica, high alumina, taking a basic flux and higher coke. Of late the tendency has been toward higher silica content. We are also receiving about 100 tons daily of siliceous custom ore. The result of these conditions is to curtail the use of quartz in the blast furnaces and increase the consumption of lime rock and basic "Mamie ore," and consequently the percentage of coke.

It may be suggested that as our slag is comparatively low in silica, the obvious remedy for increased silica in the ore would be to make slags higher in silica. In this connection it should be remembered that the bulk of the iron which enters the slag is oxidized in the furnace and combines with silica in conformity with the principle underlying slag formation in pyritic smelting, namely, that the temperature prevailing in the focus determines the particular ferrous silicate which results. Working along natural lines, our endeavor would be to make more slag in the furnace—not to alter its character. In other words, by obtain-

ing a greater degree of oxidation, more ferrous oxide will be furnished to slag silica, and at the same time make less matte but of higher grade.

During the last quarter of the year, the first matte, when too low grade, has been re-smelted with siliceous ore and brought up to 20 per cent. to 25 per cent. Even this grade can be considered low as converter mattes go, but with it, the converter department can produce at the rate of three million pounds per month with ease.

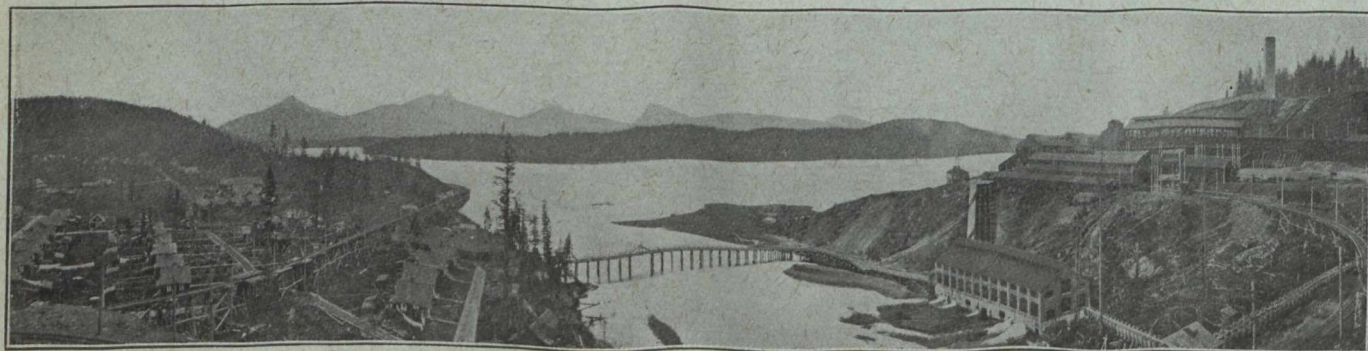
One of our chief concerns is to make matte of suitable converter grade in the first smelting, and, though no permanent success in doing this can yet be recorded, it is not improbable that efforts in this direction will be successful.

Recently the system of feeding the furnaces was improved through the adoption of Anaconda type charge cars. These permit a more favorable placing of the charge, the advantage of which was immediately reflected in a marked decrease in crust formation. Incrustation in the upper part of the furnace shaft has been responsible for terminating fully ninety per cent. of the campaigns. These for the year were very brief,

On account of the high price of copper during the past few months we have shipped about 85,000 tons of ore, from which a recovery of about ten pounds of copper and a correspondingly low amount of gold and silver, has been obtained. This ore was from areas where drill holes had shown the mineral zone to be too low grade to be included in the reserves. It also included sections which had to be mined, but which under ordinary conditions would have been handled as waste. The inclusion of this low grade ore resulted in a reduction in the recovery of total ore shipped from 17 pounds to 16 pounds. On the other hand the ore reserves are increased by this amount. Development work further increased the reserves by 66,872 tons, making a total increase of 151,872 tons. The present condition of the ore reserves is therefore as follows:

	Gold Drop	Ironsides	Total
Ore developed .....	1,431,000	13,853,240	15,284,240
Mine has produced and shipped .....	1,369,600	9,682,235	11,051,835
Remaining ore.....	61,400	4,171,005	4,232,405

From this we estimate that a recovery of seventeen pounds can be maintained. In addition to this there



ANYOX, B.C. GRANBY SMELTER AT RIGHT.

averaging only 13.6 days, but with the new cars, longer campaigns are the rule. A saving of labor on the feed-floor was also made possible by the new cars.

The prolific fall of low-grade, corrosive matte imposes a duty on furnace connections and settlers probably without precedent in the practice of copper smelting. Means to cope with this condition have been devised, and the furnaces are no longer subject to the frequent interruptions by purely mechanical mishaps which proved so embarrassing in the past.

In the converter department new steel silica bins were built and so located as to permit feeding silica to the converters without resorting to the use of cranes.

Mr. W. B. Bishop, smelter superintendent at Grand Forks, reports as follows: The Furnace department smelted:

	Tons.
Granby ore .....	611,007
Foreign ore .....	6,537
Anyox matte .....	6,359
Converter slag and matte.....	23,326
Flue dust .....	1,522

The average percentage of coke used per ton of ore was 13.17. The average smelting cost for the year was \$1,187 per ton as against \$1,217 for 1914 and \$1,214 for 1913. There has been no new construction during the year, but repairs have been kept up and the plant is in first-class operating condition. Our costs are lower this year than any of the years past.

Mr. C. M. Campbell, superintendent of mines at Phoenix, says:

is a considerable amount, perhaps half a million tons, of ore which will average about seven-tenths of one per cent. in copper and forty cents in gold and silver.

While the silver recovery has remained fairly constant the gold recovery has increased about ten cents per ton. This is due to the fact that when the mine was reopened in December the price of copper was low and development was directed towards those areas where better gold values were to be obtained.

With the declaration of war and the resulting low copper prices all operations ceased early in August and the property remained shut down for four months.

During the shut-down the No. 2 crusher, which handles the ore from No. 3 tunnel, was shipped to Anyox. There was little further need for this crusher. Nearly all the virgin ore on this level had been worked out and as the caved ore and pillars remaining could be handled more cheaply and the waste sorted out better by the electric shovel it was decided to wait until No. 2 level had been worked out and then remove the shovel to No. 3 level. Present indications, however, point to the Gold Drop being the first outlet to be worked out and in that case the crusher from there may be the one to be moved.

With the beginning of winter a considerable proportion of the resident population began to show signs of distress and the company were induced to reopen in a small way with a reduced wage scale in force. With the improvement in the copper market more outlets were reopened and more men put on. The loss of No. 3



tunnel ore was, however, a handicap and to overcome this the mine was operated from February 21st to the end of the year without an hour's shut down.

The chief novelty during the year was the satisfactory operation of the new electric shovel purchased during the latter part of the previous period. Considering the large amount of waste to be handled it is no easy task to get ore out at a cost that is attractive. However, during the past three months the ore from this level, considerably over half of which was from the shovel, cost about 75 cents per ton, crushed, in railroad cars, while the cost per ton for handling all material, ore and waste amounted to 40 cents per ton. Attention is now being directed towards improving the ore cars and haulage facilities. Originally five-ton side dump cars were used exclusively. In order to dump large masses of waste, handled by the shovel with chains, side dump cars in which the door automatically dropped were constructed. These cars have given a considerable amount of satisfaction and will be continued in use. An improvement, however, is a car which will hold close to ten tons, with the automatic side dump feature, but with the door so arranged that when open it will allow the passage of a rock four feet in diameter. One of these has already been built and is shown in the left foreground of the general view of the glory hole. Five more are under construction.

During December wages were subject to a reduction of 25 per cent., in January 20 per cent., and in February 10 per cent. The total deductions from the payroll for these months amounted to \$13,482. During March normal wages were paid. With sixteen-cent copper market in April employees received a twenty-five cent daily increase. During May and June, when copper averaged over eighteen cents, the increase amounted to fifty cents per day. These three months, therefore, called for \$16,052 in extra wages or \$2,210 more than the total deductions for December, January and February.

Diamond drilling was mainly responsible for the increase in the ore developed. Underground drifting also added a little. Usually, stoping operations can be depended upon to add to the tonnage of new ore, but during the past year it was a question if the excess of ore in some places was enough to offset the shortage of ore in other places. The work for the year, however, showed a net increase.

A little work was also done on the Bank of England claim. The ore here is one of the footwall type similar to that encountered in drill hole No. 420, referred to in last year's report. Possibly a car load of ore may be obtained, but so far the ore taken out has been worked at a loss, and unless there is an improvement work here will soon cease.

The total ore that has been developed at the Gold Drop property amounts to 1,431,000 tons, but of this there is only 61,400 tons remaining. It is improbable that much more will be opened up, as the entire ground has been pretty thoroughly prospected. We are now able to say that the stoping loss at this property will be very small, probably about 15,000 tons or 1 per cent. This almost complete recovery can be explained by the fact that most of the orebodies have been small or medium sized and the entire tonnage could be extracted by leaving very few or no pillars. The largest orebody, which, not considering the offshoots, contained over 400,000 tons in one central mass, was almost completely extracted. While being mined, pillars were left which were finally blasted. The broken rock was drawn clean, and

almost completely. Owing to the good roof, the stope remained open for several months before it caved.

During the past year the Snowshoe claim has been drawn on heavily for ore. A little ore left there and on the Curlew and part of orebodies 5, 9 and 12 on the Monarch represent the localities where the remnant of ore left is to be found.

Mr. H. J. C. MacDonald, mine superintendent at Anyox, says:

The past year is the first in which the mine has been entirely upon a shipping basis. Some changes, some additions have been necessary, but on the whole the installation has demonstrated that it is well designed for the cheap handling of rock. The year has been one of progression towards smoother operation and lower costs. As the number and sizes of our stopes increased, the amount of powder and labor to break the ore has decreased. As the demands for ore increased, our handling and general charges have shown a corresponding drop. The end of the year finds us in a position to greatly increase our output and to deliver it at a lower cost per ton.

The shipments totaled 477,435 dry tons of ore. Of this amount 314,043 tons were from the heavy sulphide No. 1 orebody, and 163,392 tons were from the more siliceous No. 2 orebody. The tonnage of ore from the two bodies demanded by the smelter became, towards the end of the year, practically equal, proving that these bodies can be smelted in their developed tonnage proportions. This adds distinctly to the value of the mine.

The copper content in the ore has been 2.18 per cent., with a gold and silver content valued at 34 cents per ton. The monthly ore shipments, during the entire year, have analyzed higher in iron and sulphur, lower in silica and alumina than the average estimated for the orebodies.

The mining costs for the twelve months have been \$1.03 per dry ton landed in the cars on the railroad to the smelter. This amount includes the handling of 29,310 tons of waste, and a development charge of 10 cents per ton. The period has been one in which we have absorbed many charges which would more exactly belong to equipment and capital accounts. The wages paid to employees have been increased in proportion to the market price of copper. This has amounted to 50 cents per man shift, or 7 cents a ton, for the last two months. The costs for the last six months, exclusive of this bonus, have been 89 cents per ton. Basing our estimate upon the actual conditions and upon the results obtained during the year, with wages and supplies at the level they have averaged during the past three years, future mining costs of 81 cents a ton are attainable upon the completion of some improvements now in process of being introduced.

The further exploration of the mineral area by diamond drilling, in and surrounding the mine, was not attempted during the year. The ore reserves, with the deductions of shipments, remain at practically the same figures as reported for the previous year. To the reserves of the Hidden Creek mine should be added at this time the developed tonnage at the Bonanza mine. The latter mine is also in the immediate vicinity of the smelter and can be handled under the same organization. The following is then a summary of our ore reserves tributary to the smelter at Anyox:

	High Grade		Low Grade		Total	
Hidden Creek...	9,205,837	2.17	8,628,000	0.63	17,833,837	1.43
Bonanza...	414,775	2.66	489,580	0.70	904,355	1.60
Total...	9,620,612	2.19	9,117,580	0.63	18,738,192	1.45

The development work has consisted of 1,204 feet of drifting and cross-cutting with 1,732 feet of raising; a total of 2,936 linear feet. The greater part of the work was done on the 385 level in the further blocking out of the No. 1 orebody on this plane. Two new ore passes, one having a capacity of 5,000 tons of broken rock, were driven between the 385 and 530 levels and were among the important pieces of development. Sufficient work was done to make the No. 4 orebody, which is the heaviest sulphide orebody in the mine and valuable as a flux at the smelter, available for shipment. The development work in many cases, especially in the No. 1 orebody, encountered ore of higher grade than would be expected from our previous exploration.

Considerable construction was completed, including a new bunk house, additional cottages and a substantial electric sub-station. There is at the present time in process of erection a second crusher station and ore bins, which will enable us to introduce a more economical system of crushing and shipping. This plant also makes possible a large additional storage of crushed ore. The storage is much needed in order to more closely approach the ideal condition of handling with our mine haulage a fixed number of tons a day. We are now mining and shipping at the rate of 2,000 tons a day, which is our designed output. This we expect to increase to average 3,000 tons a day upon the blowing-in of the recently added fourth smelting furnace.

There has been a gain during the year in the personnel of the employees and in their efficiency in their places. Due credit should be given to all for their interest in the work, through which we have been able to successfully meet many unusual conditions.

The daily shipments have been very irregular in their bulk, through depending on two uncertain factors which controlled the ore demands. These were the metallurgical difficulties in smelting and shortage of power. The former were continually being eliminated, while the latter is a seasonable factor during the winter months that is still to be encountered. To control erratic shipments there was not ample storage capacity between the mine and the smelter to give either protection. The mine difficulties of an internal nature, as crusher troubles for example, have not at any time prevented the shipment of sufficient ore to keep the furnace in blast.

The amount of ore drawn from each mine chute is tabulated on the daily reports. In this manner the amount of ore drawn from the different orebodies, and portions of the bodies, is at all times under supervision. The character of the shipments can be determined and controlled as much as it is possible in the system of mining employed.

Of the ore shipped, 66 per cent. was from the No. 1 orebody, 34 per cent. was from the No. 2 orebody, while no shipments of any amount were made from the No. 3 and No. 4 orebodies, although they are developed for shipment. The No. 1 ore was mined mainly above the 530 level, 77 per cent. of the ore coming from here, while 23 per cent. was mined between the 385 and 530 levels. The No. 2 ore was mined mainly from the 530 and 700 levels; 40 per cent. coming from above the 700 level, 14 per cent. from between the 630 and 700 levels, 38 per cent. from between the 530 and 630, while 8 per cent. came from below the 530 level.

The smelter asked for a further classification of the ore during the year. This involved the screening of the fines from the ore; the selection of the heaviest sulphides from the No. 1 orebody; the shipment of siliceous ma-

terial from the hanging wall of this body, of sacked granular pyrite and of clean pyrrhotite. The two latter came from the surface of the mine hill. These special lots and demands necessitated further outlays in construction, development, alteration and operation to make possible their shipment. They have been discontinued for several months. The ore now shipped is nearer the run of the mine ore in equal proportions from the main orebodies.

The content of the ore in copper, lime and magnesia is very close to the estimated normal. Ore of a low siliceous and heavy sulphide nature has been in demand. We have been able to supply No. 1 ore averaging 4.6 per cent. and No. 2 ore averaging 6.3 per cent. under the estimate in silica, with the sulphur and iron content high and the alumina content low in percentage. This has come through being able to stope in the centre of the bodies rather than along the walls. This condition cannot be regarded as being capable of being maintained in the future, if full advantage is to be taken of the full tonnage in the mine.

With the alteration of the shipping terminal and the building of the second crusher station completed, there will be an ore storage of 6,000 tons above the shipping tunnel. The shipments of ore will thereby be severed from their dependency on the crushing and mine haulage. The train loading which now takes two shifts, can be done on one shift by a loader and two helpers. This takes for granted the supply of a sufficient number of railroad cars.

The haulage throughout the mine is accomplished in self-dumping steel cars of 3.7 tons capacity, hauled by 6-ton locomotives. The locomotives carry headlights of unusual capacity as an aid to the safety of the men and to the ease and safety of the haulage. The switches on the main lines are protected by colored switch lights. This account does not vary directly as to the tonnage, as a variation in the tonnage may signify a train which is not working at its full efficiency. A uniform gauge of two feet, laid with 30-lb. rail is used in all the tunnels and drifts.

There has been considerable alteration and repair work on the cars in excess of that expected in the daily haulage. The maintenance on cars of this type for the duty they will have on our main haulage tunnels (especially if the tonnage is increased) will be severe.

In the first two months of the year ore was crushed and belt conveyed to the shipping pockets. The next month began to develop conveyor troubles and two breaks occurred through inferior steel in the sectionalized Traylor crusher. The second break was serious enough in its effect to leave the plant without a crusher in the next four months. In this time, 169,000 tons of ore were broken by block-holing, bull-dozing and sledging on 90-lb. rail grizzlies having 14 in. spaces. The crusher was re-started in February with the belt-conveying of ore entirely eliminated.

The only timber utilized in the mine is that used in the construction of chutes on the sill floors. These chutes are substantially built in the rock collar of the raises to withstand bull-dozing at the gates without great damage. Where expected to withstand exceptionally heavy duty, the chutes are lined with steel plates, and an iron finger gate operated by an air lift is used instead of the usual type arc gate. Three hundred and fifty-nine chutes have been repaired during the year and 11 new chutes built. The size of the timber crew has to be sufficient to undertake at any time the maximum

repair work. It is possible to keep enough work ahead in chute building and trestle work so that the crew has work blocked out in advance.

The introduction of carbide lamps to replace candles has resulted in a considerable saving in lighting. Each man furnished his own lamp, while the company furnishes the carbide.

The mine is electrically lighted on all main haulage ways.

The development work consisted of 1,204 feet of drifting and cross-cutting with 1,732 feet of raising and sinking—a total of 2,936 feet. About half of this work was done on the 385 level in continuing the blocking out of the No. 1 ore body. Two pocket raises were driven between the 385 and 530 levels; one in each of the two orebodies. The raise in the No. 2 orebody greatly improved the ventilation throughout the 385 level. The No. 4 orebody was developed by driving the 700 ft. adit beneath the body and raising until it was encountered. The year completes the greater part of the development work needed on the ore above the 385 level.

Our estimates given on July 1st, 1914, were very carefully checked during the year by two mining engineers, Mr. C. M. Weld and Mr. F. B. Weekes. The latter gentleman has also checked the estimates on a former occasion. They obtained at the Hidden Creek mine a tonnage of 8,992,275 tons of 2.14 per cent. ore in comparison with our estimate of 9,563,500 tons of 2.17 per cent. ore. This can be considered, under the conditions, a close agreement. We still consider our estimate, on account of close association with the development of the orebodies, as nearer the exact tonnage. Their sampling in the mine arrived at very close figures to those we had obtained at the same points.

The results which they obtained on Bonanza were to estimate practically the same tonnage while reducing the copper content from 2.78 to 2.30 per cent. This was done by the inclusion of waste rock in the form of dykes, which we had omitted in our calculations. These dykes form here about 12 per cent. of the bulk of the developed orebody. Taking into account their highly siliceous and aluminous character, it will be doubtful if they can be smelted with the ore. They will have to be sorted from the ore either in the mining or by selection outside the mine. Therefore in this case we also believe the more exact of the two estimates to be the one made at this office.

The ore estimates remain practically at the same figure this year as last, as no endeavor has been made in the interval to put more ore in sight.

The value of the Bonanza mine, as an addition to the reserves of the Hidden Creek mine, tributary to the smelter at Anyox, has not been sufficiently emphasized in the former reports. This group of claims is located on Bonanza creek, which flows into Granby bay about two miles from the company's dock. The claims lie in the creek valley three-quarters of a mile from the mouth. The distance from the orebody to the smelter in a direct line is 10,000 feet; in a line following Bonanza creek to the mouth and from there to the smelter, 14,000 feet. The method of haulage adopted, whether aerial, tram or railroad, will vary the distance the ore will have to be carried to the smelter between the above limits.

It is said that the control of the Plenaurnum property in the Porcupine district will be sold to the La Rose Mining Company. The directors of Plenaurnum Mines, Ltd., are reported to favor the sale of 53,995 shares of capital stock remaining in the treasury at about \$1 per share.

## A FRENCH VIEW OF THE WELSH STRIKE

The "Colliery Guardian" publishes the following metric translation of a poem by an eminent French poet which has attracted much attention, as showing what our French comrades think of some recent events in South Wales. M. Liseron himself, it is interesting to observe, is an advocate of advanced views on the labor question. The author of the translation is a well-known British mining engineer, who prefers to retain the cloak of anonymity.

### THE WELSH MINERS

[Translation of verses by M. PAUL LISERON, the original of which is published in "The Morning Post," September 29th, 1915.]

Who, miners of Wales, do you think that you are  
That you set yourselves up above all laws of war  
Of duty, of justice, and even humanity?  
What egregious conceit, impudence and vanity!  
When your brothers are fighting for right and for freedom  
You force up your wages you really do bleed them.  
When good British life-blood is soaking the earth  
To safeguard your homes and the land of your birth:  
When Britain is calling on each of her sons,  
To go forth and vanquish the Vandals and Huns,  
Do you miners of Wales take the side of their foes,  
The most brutal and cruel, as all the world knows?  
Have you no other care but inordinate greed  
And your unions promote such base interests indeed?  
Oh, list to the groans of your brothers who fall  
In the midst of the battle by shrapnel or ball!  
Contemptible wretches! 'tis you who for pence  
Commit crimes such as these—'tis a felon offence.  
The Allies are fighting the foes of your class;  
They are striving to subjugate all the whole race.  
You miners, 'tis you who your brothers betray;  
'Tis you who are giving your comrades away.  
May the shillings you've won burn your fingers, that you  
The base bargain you've made in a bad day may rue.  
If I had my will, I would send you to share  
The dangers your comrades are facing out there  
In the trenches, where hailstorms of bullets and bombs  
Are sweeping in thousands our men to their tombs.  
If a soldier deserts he is usually shot:  
And that's what you merit, you grimy-faced lot,  
For you have deserted in face of the foe,  
And the laws of war all the world over, you know,  
Make the penalty death; and the chances are great  
That something like that may e'er long be your fate.  
I don't know if God's absolution, though ample,  
Avails you, you ought to be made an example;  
Your punishment should be severe, for the mud  
Of the battlefield's soaked with your countrymen's blood.  
I know that amongst you false prophets there are  
Who advise you to make your hay during the war.  
You've injured your country and Allies right sore,  
But you've injured yourselves and your calling still more.  
Bad shepherds you have, but the sheep are bad, too;  
The flag is dishonored by fellows like you!  
Your union banner will never again  
Be clean: 'tis disgraced by so nasty a stain.  
For never again can that stain be washed out;  
You may bleach it, but there it will stick without doubt.  
And that stain is for you a symbol of death;  
You miners of Wales, think of Lady Macbeth:  
Like her on your hands there is blood; and you ne'er  
Can wash it away—it will always be there.  
The ill-gotten silver of Judas is yours,  
Who sold his dear Lord, and his sin still endures.  
Go, but remember stern justice will yet  
Requite those who duty and honor forget.

The finger of scorn points at you in despite;  
You have bartered your honour, you've sacrificed right.

# KERR LAKE MINING COMPANY, ANNUAL REPORT

President Adolph Lewisohn reports: During the year ending August 31st, 1915, the Kerr Lake Mining Co. produced 2,036,962 ounces of silver. In spite of the fact that a larger percentage of the production was derived from low-grade ore, the total cost per ounce was considerably lower than for the previous year. This was principally due to the marked reduction in the cost of mining, from \$5.09 to \$4.15 per ton. Due to the lower price of silver the total earnings were somewhat less than last year.

On July 15th, the company acquired a majority interest in the Caribou Cobalt Mines Co., which controls 70 acres adjoining the Kerr lake property.

Manager Robert Livermore reports:

The gross production from all ores, for the year ending August 31st, 1915, amounts to 2,036,962 oz. of silver. This figure includes 60,842 oz. of silver on hand August 31st, 1915, according to inventory. Of the total, 1,198,557.16 oz. was produced from shipping ore, and 838,405.38 oz. from low-grade ore milled by the Dominion Reduction So., Limited, at Cobalt.

## Ore Production, Kerr Lake Mining Co., for the Year Ending August 31st, 1915.

Grade of ore.	Net weight, pounds.	Silver contents, ounces.	Average silver content per ton, ounces.
1st class .....	564,273	954,112.37	3,831.24
Bullion from 1st class .....		126,802.04	
2nd class .....	238,606	103,501.68	867.55
Bullion from metallics .....		14,141.07	
Mill ore .....	23,035 tons	838,405.38	36.396
		2,036,962.54	

**Development.**—Including drifting, cross-cutting, sinking and raising, 4,226.1 ft. was done in development for the year. This compares with 5,399.5 ft. for last year. The decrease in footage was caused by temporary shut-down of No. 3 shaft, and to the fact that there were fewer long drives in which uninterrupted progress could be made. Although a great deal of exploratory work was done in hitherto unprospected blocks, there were few new discoveries of importance during the year. In consequence additions to the reserves were made only through extending the developments on known veins.

Developments given in more detail are as follows:

**No. 3 Shaft.**—Drifts were extended east and west on the Keewatin vein and its branches on the 6th level, but no new ore was found. Owing to the fact that a small but rich ore pocket was found on this level last year, and that the vein was wide and well mineralized, it was decided to prospect at deeper levels in the Keewatin formation below the diabase contact. Accordingly a winze was started, and has to date been sunk to a depth of 64 ft. The 7th level at 50 ft. below the collar, and 370 ft. in all below the collar of No. 3 shaft, has been driven east and west 74 feet. Although the vein is still strong, and contains a quantity of smaltite, it has shown only low-silver values. From this same vein at the 2nd level of No. 3 shaft, a long cross-cut was driven through the south central part of the property directly to the south boundary. This cross-cut is in diabase formation, and has exposed no new veins for its entire 450 ft. in length. The results of this work make it seem unlikely that new ore bodies will be found in this part of the property.

Owing to the advisability of cutting off the high expense of operating during the winter months No. 3 shaft was closed, and development of this section has accordingly been slow. The open headings have now been housed in as a protection against freezing, and it is expected to do continuous development at depth on the Keewatin vein during the coming year.

**No. 7 Shaft.**—The largest amount of development on the 140-ft. level was done on the Fleming and Lake No. 3 vein systems in opening up their extensions and branches, with the result that enough ore was put in sight nearly to maintain the reserves of milling and high grade ore in these veins in spite of the past year's production. A notable discovery was made on the Fleming vein in particular, where a cross-cut north, opened up a branch not known before, which was drifted on for 186 ft., and contained at the level ore averaging 350 oz. over 6.3 inches in width, beside the usual width of milling rock. The distance between the level and the lake bottom is small, and so far the ore has not been found to extend to the 190-ft. level, the next level below. On Lake vein No. 3 extensions on the 140-ft. level did not open much ore beyond that discovered last year, but on the 175-ft. level, drifts showed that the values although spotty and not continuous extended to this depth.

Other drifting in No. 7 shaft opened nothing of great importance. An intermediate on No. 7 vein below the 175-ft. level, opened a small body of milling rock and second grade ore. An intermediate on No. 10 vein below the 140-ft. level extended the orebody for 50 ft.

Cross-cutting has become more a feature of the development, and drifting less, owing to the fact that the known veins have been followed out by drift to their full extent. The larger part of development work in the future will undoubtedly consist of cross-cutting unprospected blocks, especially in the more favorable Huronian formation.

Developments for the coming year will include thorough prospecting of this nature. Further development at depth of the Keewatin vein will be done, and a winze will be sunk on No. 10 vein, where at the lowest level the vein is still strong, though barren of value.

**Stoping** was evenly distributed over the mine, and the veins taken as a whole produced ore well up to the estimated contents for the ground removed.

The largest amount stoped in any single vein was in the Fleming below and for a distance of 28 ft. above the 225-ft. level, where the entire block was stoped and the level covered in. Eleven thousand nine hundred and eleven square feet was stoped which produced 3,000 tons of average grade mill rock, and 38,000 oz. of high grade ore. This block is of lower grade than those above. No stoping has been done above this point, and a better proportional production of both high grade and mill rock may be expected.

The Main East vein was stoped 8,622 sq. ft., through to surface, over a distance of 150 ft., under the former lake bottom, and the opening was covered over. This vein has produced handsomely both in high grade and mill rock, and still contains an excellent reserve of both broken rock and ore in place.

No. 10 vein was stoped for 4,564 sq. ft., mostly above the 140-ft. level. Production of both high grade and mill rock has been good, as the ore zone is from 10 to 40 ft. wide, and contains many stringers of high grade ore.

Production from the old reserves, No. 7 and the Big Chamber, was well maintained, and although it was expected to finish these reserves during the year, a very considerable amount still remains.

On No. 218 vein production was somewhat lower than was expected, as this vein became barren after being stoped for a distance. A side vein has recently been opened up which may make up the estimated contents.

A cutout stope on No. 3 Lake vein produced 49,559 oz. of high grade ore.

Two thousand five hundred and seventy tons of ore was drawn from No. 3 dump. The average grade of this rock after sorting was 30.9 oz. per ton.

One thousand three hundred and fifty-four tons was drawn from No. 7 dump, but owing to a shutdown in the mill 1,673 tons was added, so that the dump has gained 319 tons.

**Total Development and Stopping—September 1st, 1914, to September 1st, 1915.**

	Development.	Stopping.
Drifting ft. ....	1,996.2	
Cross-cutting ft. ....	2,103.4	
Raising ft. ....	59.3	
Sinking ....	67.2	
Stopping sq. ft. ....		48,223
<b>Total</b> .....	<b>4,226.1</b>	<b>48,223</b>
Trenching .....	112.0 ft.	

**Production of Individual Veins, Kerr Lake Mine, for the Year Ending August 31st, 1915.**

Vein. system.	Development oz.	Stopping oz.	High grade
			total production oz.
Big Chamber .....		173,944	173,944
Fleming .....	24,505	38,116	62,621
No. 7 .....		213,929	213,929
Main East .....		289,457	289,457
No. 10 .....		266,807	266,807
No. 8 .....		33,936	33,936
McDonald .....		72,994	72,994
No. 3 Lake .....	5,412	49,559	54,971
Little No. 3 .....		3,091	3,091
No. 218 .....		19,620	19,620
Little No. 7 .....		7,187	7,187
<b>Total</b> .....	<b>29,917</b>	<b>1,168,640</b>	<b>1,198,557</b>
Mill ore .....			838,405
<b>Grand Total</b> .....			<b>2,036,962</b>

**Ore Sorting and Jigging Plant.**—Undersize from the mill was jigged as usual, but no production from this source is listed, since experiments made last year showed that it was advisable to sort the products and add same to the first and second grade shipping ore. Tailings and fines from this plant are of milling grade, and are shipped to the mill. An experimental settling tank was put in the lake bottom to catch the waste water containing a small proportion of slimes. The results show that this saving is worth while, and a larger tank is now being installed.

The machine shop, consisting of lathe, shaper, hack-saw, and emery wheel, installed last year, is operating satisfactorily, and results in a considerable annual saving in time and expense for all kinds of repairs and machine parts.

A pot melting furnace was installed during the year to melt into bullion the rough metallics from the mine, and the ball mill oversize from the sampler. These products were formerly custom melted.

Production of mill ore was 206,382 gross ounces higher than last year, owing to increased milling facilities and slightly better grade of the ore, namely 36.40 oz. this

year against 33.83 oz. per ton last year. Of the 23,035 tons sent to the mill, 2,199 tons was taken from the dumps.

**Mining Cost Per Ton of Rock Hoisted—September 1st, 1914, to August 31st, 1915.**

Tons rock hoisted, 47,436.	Ore, 38,286 tons.	Mine Waste 9,150 tons.	Sacking ore—		Tons.
			1st grade .....	282	
	2nd grade .....	119			
			Total .....	401	
			Mill ore .....	20,836	
			Waste from bumping table .....	17,049	
			<b>Total</b> .....	<b>38,286</b>	

The following were the costs: 47,436 tons rock hoisted at a mining cost of \$4.15 per ton; 2,036,962 silver ounces at a mining cost of 9.67 cents per ounce.

**Lake Draining.**—During the year it was found by sounding that a deeper and larger drainage basin existed somewhat to the east of the then location of the pump scow, which by removal of the clay overburden would be available for a better sump than that in use. Accordingly the 20-inch pipe line was shifted and extended, and during the present summer work has consisted of breaking down and pumping out the clay from this drainage area. This has now been finished, and during the coming month a smaller pump unit will be installed to keep the basin free of water, since the large pumps are no longer needed.

**Drummond Fraction.**—This property was worked under separate organization until August of this year, when the only known vein having been worked out and developments to date having disclosed no new ore, in order to do away with top expense, the shaft was closed down. Future developments will be carried on from the adjoining workings of the Crown Reserve and Kerr Lake properties.

The Drummond produced during the year 3,756 tons of mill rock, averaging 24.7 oz. per ton. Besides this 37,918 oz. of high grade was produced, and 11,240 lb. remaining on hand contains by assay 19,600 oz. of silver, so that the production of this property in gross ounces of silver is 150,462 oz. for the fiscal year.

**Ore Reserves.**—Although no important new reserves were added, estimates this year show a diminution of 1,526,300 oz. as against 2,036,962 oz. produced. This is owing to additions to the known reserves above named, and, in some cases, to excess of production over estimated contents. Although owing to the extreme irregularity of the orebody it is not practicable to measure accurately the tonnage of mill rock, an attempt has been made to do so by means of measurement and past production, which can be considered a reasonably close approximation.

Although as in the past the estimates both of high grade and mill ore are liable to variation, either above or below the estimated contents in the separate veins, yet there can be no doubt but that the eventual production taken as a whole will reach the figure given.

Prospects of opening new ore do not seem at the present time very bright, as the lake bottom has been well explored, and the blocks remaining unexplored are all small. Developments in the diabase and Keewatin formations in the south half of the property have so far not been encouraging, since only small patches of ore on the Keewatin and No. 21 veins have been found. Nevertheless, the Keewatin vein is very strong

and régular, and it is hoped that further developments both in sinking and raising will open other ore.

An estimate of ore in reserve follows:

**Estimate of Ore Reserves, Kerr Lake Mine,  
September 1st, 1915.**

Vein system.	Estimated oz. high grade.	Milling ore. Tons. Gross ounces.	Total estimated ounces. of silver.
Big Chamber, Mc-Donald and No. 7 veins .....	895,000	4,000 112,000	1,007,000
Main East, No. 218 veins .....	248,700	2,500 50,000	298,700
No. 10, No. 15, Xmas veins .....	788,300	12,290 407,250	1,195,550
No. 8 vein .....	31,400	1,500 22,250	53,650
Little No. 7 vein...	8,000	540 13,500	21,500
Lake No. 3 and Fleming veins .....	620,000	22,000 686,000	1,306,000
Other veins .....	5,000	2,000 35,000	40,000
Dump ore .....	10,000	250,000	250,000
<b>Total .....</b>	<b>2,596,400</b>	<b>54,830 1,576,000</b>	<b>4,172,400</b>

Average value per ton milling ore 29.3 oz.

Treasurer E. H. Westlake reports:

The shipments for the year amount to 1,992,065 gross oz. The smelter settlements aggregate 1,777,122 oz. The difference is accounted for by the deductions made by the smelting works for losses and in the way of treatment charges.

The costs of production per ounce are as follows:

	Cents.
Mining and development cost.....	9.67
Shipment and treatment charges.....	11.09
Administration and general .....	0.69
<b>Total .....</b>	<b>21.45</b>

There has been included in development expense the sum of \$18,049.68, expended in connection with Kerr Lake-Crown Reserve Drainage Account, leaving a balance of \$27,900.32 in the Drainage Account, as at August 31st, 1915. There has also been written off against the cost of property acquired in connection with the lake drainage, the sum of \$24,589.35.

On July 15th, 1915, the Kerr Lake Mining Co. purchased 837,400 shares of the Caribou Cobalt Mines Co. (out of a total of 1,000,000 shares) for \$50,000.

All construction expenditures during the year have been charged to operation expenses, under the heading of "Repairs to Plant and Buildings."

The total amount of dividends paid by the company to August 31st, 1915, is \$5,820,000.

**Kerr Lake Mining Co., Limited—Operating and Profit  
and Loss Account for the Year Ended  
August 31st, 1915.**

Cost of production and development—	
Stoping .....	\$17,977.32
Development .....	40,074.10
Power, light and heat.....	26,208.77
Ore sorting and jigging.....	11,688.92
Tramming .....	20,023.28
Hoisting .....	6,543.12
Timbering .....	16,854.20
Pumping .....	920.55
Drills and steel .....	6,395.08
Mine expense .....	10,492.31
Repairs to plant and buildings..	3,185.78
Stable expense .....	4,657.79
Office expense .....	4,805.35
Surface maintenance .....	7,398.18
General expenses .....	1,041.45
Taxes .....	18,739.21
Boarding house .....	72.44
<b>Total .....</b>	<b>\$197,077.85</b>

Shipment, treatment and other charges—

Shipment expense .....	\$1,037.23
Milling .....	3,891.08
Freight .....	5,746.67
Ore treatment expense.....	100,895.23
Assaying .....	3,498.36
Insurance .....	4,842.78
<b>Total .....</b>	<b>119,911.35</b>
Administration and general expense—	
Mine manager's salary.....	\$8,400.00
Directors' fees .....	600.00
Traveling expenses .....	330.20
General expenses .....	4,834.82
<b>Total .....</b>	<b>14,165.02</b>
Amount written off cost of property acquired in connection with lake drainage .....	
Exploration on outside properties..	\$24,589.35
<b>Total .....</b>	<b>1,501.00</b>
<b>Total .....</b>	<b>26,090.35</b>
Balance transferred to Profit and Loss Account..	550,774.19
<b>Total .....</b>	<b>\$908,018.76</b>
Proceeds of ore sales .....	
Less: Ore on hand, at smelter and in transit, August 31st, 1914, at estimated value.....	\$893,375.46
<b>Total .....</b>	<b>108,180.38</b>
<b>Total .....</b>	<b>\$785,195.08</b>
Plus: Ore on hand, at smelter and in transit August 31st, 1915, at estimated value.....	
<b>Total .....</b>	<b>104,818.37</b>
<b>Total .....</b>	<b>\$890,013.45</b>
Interest .....	18,005.31
<b>Total .....</b>	<b>\$908,018.76</b>

**Kerr Lake Mining Co., Limited—Balance Sheet,  
August 31st, 1915.**

Assets.	
Mine property .....	\$104,178.70
Buildings, plant and equipment.....	33,351.21
Inventory of materials and supplies.....	7,015.79
Ore on hand, sold and in transit, unsettled for, at estimated value .....	104,818.37
Bank interest accrued .....	808.49
Unexpired insurance .....	2,122.14
Sundry debtors .....	749.85
Cash .....	265,777.55
Short term bonds .....	355,154.00
Kerr Lake-Crown Reserve drainage account....	27,900.32
Kerr Lake Mining Co. of New York.....	58,000.00
<b>Total .....</b>	<b>\$959,876.42</b>
Liabilities.	
Capital stock: 400 shares at par value of \$100 each	\$40,000.00
Accounts payable .....	6,655.64
Accrued wages .....	7,688.51
Reserve for accrued taxes .....	11,164.14
Reserve for outstanding liabilities.....	2,500.00
Surplus—	
Balance September 1st, 1914....	\$961,093.94
Profit for year ended August 31st, 1915, as per Operating and Profit and Loss Account..	550,774.19
<b>Total .....</b>	<b>\$1,511,868.13</b>
Deduct: Dividends paid during the year .....	620,000.00
<b>Total .....</b>	<b>891,868.13</b>
<b>Total .....</b>	<b>\$959,876.42</b>

**Kerr Lake Mining Co. of New York—Income and  
Expenditure Account for the Year Ended  
August 31st, 1915.**

Administration and General Expenses—	
Legal .....	\$3,026.98
Taxes .....	292.43
Officers' salaries .....	6,500.00
General expenses .....	4,774.59
Directors' fees .....	1,160.00
Engineers' services .....	2,500.00
<b>Total .....</b>	<b>\$18,254.00</b>

United States internal revenue.....	5,909.39
Dividends paid during the year, as under—	
No. 36, paid September 15th, 1914	\$150,000.00
No. 37, paid December 15th, 1914	150,000.00
No. 38, paid March 15th, 1915...	150,000.00
No. 39, paid June 15th, 1915.....	150,000.00
	<hr/>
	600,000.00
	<hr/>
	\$624,163.39
Dividends received from the Kerr Lake Mining Co., Limited .....	\$620,000.00
Interest .....	534.06
Balance to Balance Sheet .....	3,629.33
	<hr/>
	\$624,163.39

**Kerr Lake Mining Co. of New York—Balance Sheet, August 31st, 1915.**

Assets.

Kerr Lake Mining Co., Limited, of Ontario, Canada: Shares acquired in consideration of issue of capital stock of this company per contra..	\$3,000,000.00
Wettlaufer Lorrain Silver Mines, Limited: 150,000 shares at 15 cents per share.....	22,500.00
Kerr Lake Majestic Mines: 200,000 shares at cost.	79,548.37
Caribou Cobalt Mines Co.: 837,400 shares at cost.	50,000.00
Cash .....	3,665.88
Accrued interest .....	53.48
Sundry debtors .....	75.00
	<hr/>
	\$3,155,842.73

Liabilities.

Capital stock: 600,000 shares at \$5 each fully paid .....	\$3,000,000.00
Reserve for outstanding liabilities.....	1,250.00
Kerr Lake Mining Co., Limited.....	58,000.00
Sundry liabilities .....	140.00
Unclaimed dividends .....	1,485.10
Profit and Loss Account—	
Balance September 1st, 1914....	\$98,596.96
Less: Transfer from Income and Expenditure Account .....	3,629.33
	<hr/>
	94,967.63
	<hr/>
	\$3,155,842.73

**CANADIAN MINING INSTITUTE**

A regular meeting of the Toronto branch of the Canadian Mining Institute was held at the Engineers Club on October 30th.

Among the guests were Mr. W. F. Green of Crystal Falls, Michigan; H. W. Hardinge of New York; R. J. Ennis, superintendent of McIntyre-Porcupine mines; and Prof. Ledoux, formerly of the University of Brussels, and now on the staff of the mineralogical department of the University of Toronto.

Prof. Ledoux who took part in the early struggles of the brave Belgians against the German invaders gave a very interesting talk on the subject now of most interest to all of us. He spoke highly of the sympathy shown for his people by the Allies and by Americans.

Mr. Hardinge, who has recently visited many mining districts in United States and Canada, talked of the great progress being made by the flotation process. He pointed out that in many districts the flotation process is increasing the percentage recovery of values and decreasing the cost. He predicted successful treatment of the waste sand and slime from the mills at Cobalt.

Mr. Ennis gave some account of the progress at Porcupine. He stated that most of the companies are making arrangements to greatly increase their milling capacity. He is very much in favor of using ball mills instead of stamps, stating that the Porcupine gold ores are so readily fractured into small particles that much better results are obtained by the mills than by stamps.

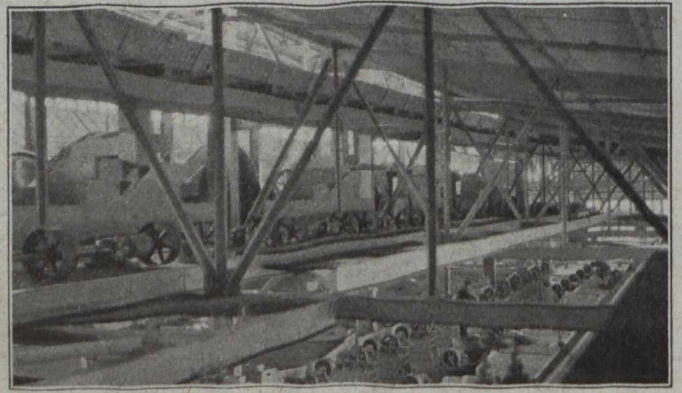
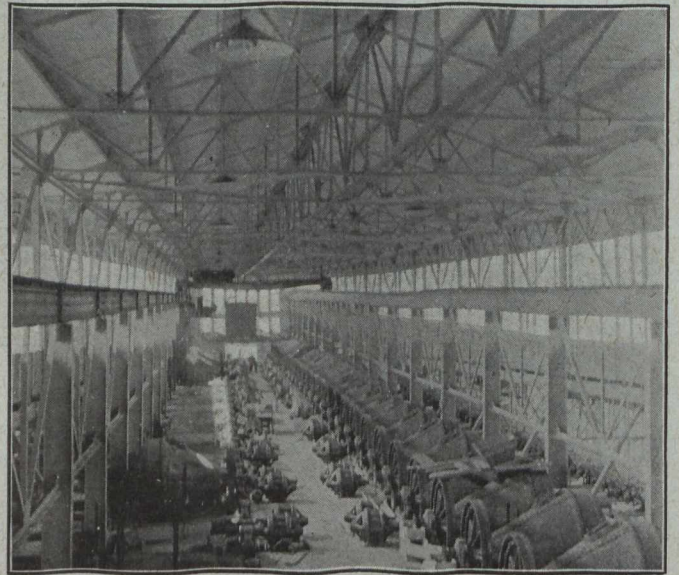
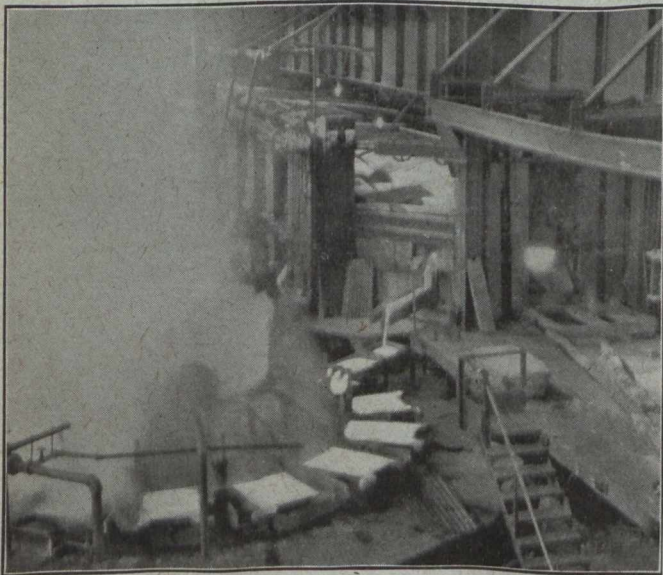
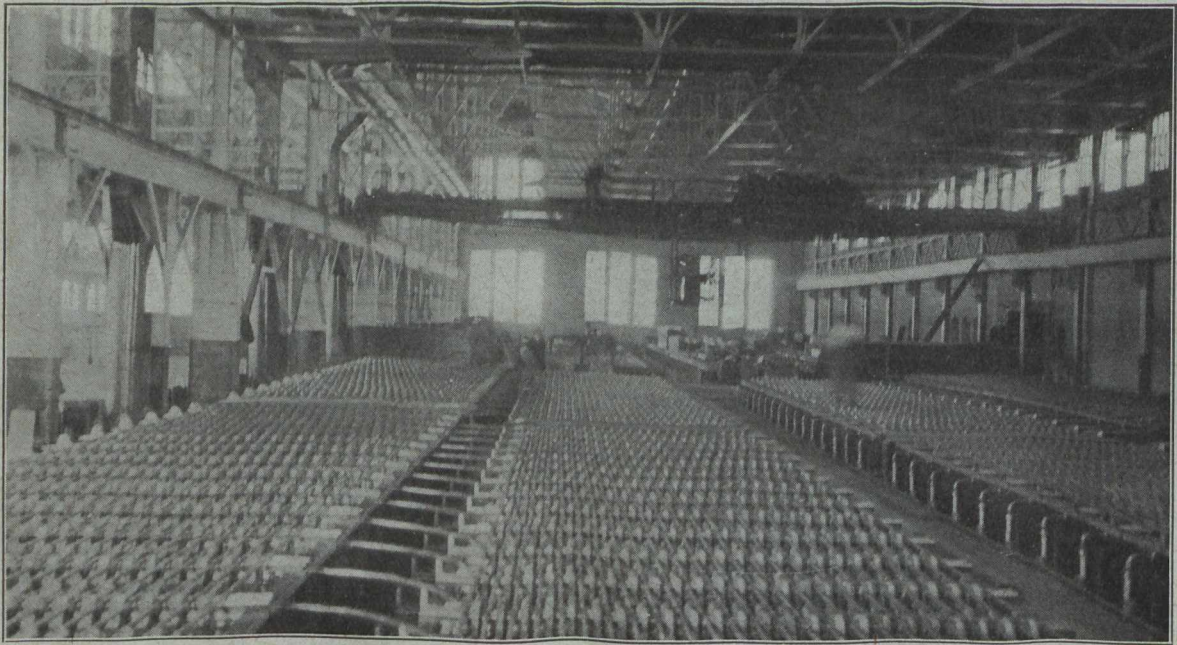
Mr. Green, who has been connected with the development of an iron mine on the Gogebic range, Michigan, gave some account of the discovery and opening up of the Wakefield iron deposits.

The following were appointed an executive committee for the coming year: C. E. Smith, Robt. Bryce, W. E. Segsworth, D. A. Dunlap, Wm. McNeil, H. E. T. Haultain and T. F. Sutherland.

The next meeting is to be held at the Engineers Club, Saturday, Nov. 20th, at 1.15 p.m.

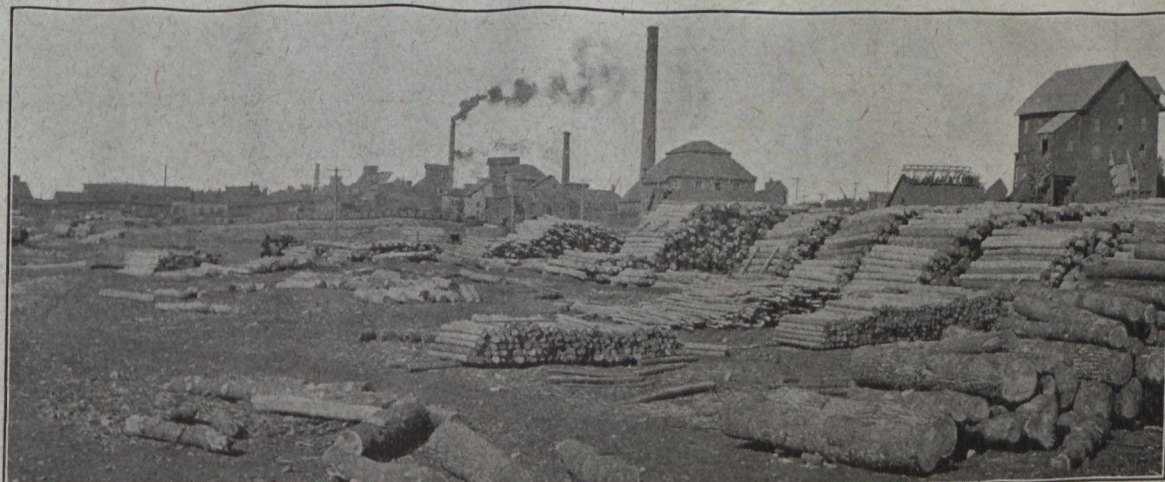


Mineral Court, Canadian Pavilion, Panama-Pacific Exposition



**SCENES IN MICHIGAN COPPER COUNTRY**  
Regrinding Ore, Pouring Copper, and Refining Copper Electrolytically.





SCENES IN MICHIGAN COPPER COUNTRY  
View around Shaft-houses, Calumet and Hecla Mines.

## PERSONAL AND GENERAL

Mr. L. K. Armstrong, of Spokane, Washington, secretary-treasurer of the Columbia section of the American Institute of Mining Engineers, has convened a meeting of the section, to be held at Wallace, Idaho, on November 19 and 20. Several members of the A.I.M.E. resident in Kootenay or Boundary districts of British Columbia will join the excursion party to leave Spokane on the morning of the 19th. The Montana section of the Institute has been invited to attend and take part in the proceedings. The Western Branch of the Canadian Mining Institute will be represented by its secretary, who is one of the invited guests.

Mr. John Bresnahan, of Spokane, is superintending the development of the Galena Farm mine, near Silverton, Slocan lake, B.C., in which two veins of zinc-lead ore are being opened to supply feed for the newly-erected concentrating mill on the property, which was to be started early in November.

Mr. M. S. Davys, managing director of the Silverton Mines, Ltd., operating the Hewitt mine and concentrating mill near Slocan lake, B.C., went to East Kootenay last month to spend a week on a shooting trip.

Mr. Ivan De Lashmutt, superintendent of the Standard silver-lead mine, in Slocan mining division of British Columbia, returned to the mine late in October from a visit to Spokane, Washington.

Mr. R. C. D. Dempster is mining engineer at the Cork-Province mine, on the south fork of Kaslo creek, in Ainsworth mining division of British Columbia.

Mr. J. Cleveland Haas, of Spokane, is consulting engineer for the syndicate that last month commenced to do development work on the Nicollet mineral claim, near Ainsworth, West Kootenay, B.C.

Mr. C. H. Hussey, of Spokane, who is active in the business management of the Standard silver-lead mine and concentrating mill, at the end of October was a visitor to the property which is situated near Silverton, B.C.

Mr. Robert Keffer, son of Mr. Frederic Keffer, formerly of Greenwood, in Boundary district of British Columbia, is now at one of the mines at Butte, Montana.

Mr. John Keen, of Kaslo, Kootenay lake, B.C., well known to many mining men in that province, has been ill with bronchitis, but is now convalescent.

Mr. I. Krikin is superintendent at the Payne silver-lead mine, near Sandon, Slocan district of British Columbia, at which mine important development work has been in progress for some time past.

Mr. Andrew G. Larson, left British Columbia at the end of October to proceed to St. Louis, Missouri, on business connected with the sale of the zinc product of the Lucky Jim mine, in Slocan district.

Mr. A. W. McCune, of Salt Lake City, Utah, was again in British Columbia at the beginning of November, investigating conditions with a view to again working mining properties in which he is interested and which are situated in Ainsworth and Slocan divisions of that province.

Mr. Frank E. Pearce is manager for the company operating the Eureka copper-gold mine, situated about a dozen miles from the town of Nelson, British Columbia. At one time Mr. Pearce was engaged in mining at Baker City, Oregon.

Mr. F. E. Pegg, who several years ago was on the British Columbia Copper Co's assay office staff, is now assayer and surveyor at the Galena Farm mine, near Silverton, B.C.

Mr. F. C. Poss, of New York, president of the Mountain Con. Mining Co., and secretary-treasurer of the Minnesota Silver Mining Co., Ltd., which latter company owned the Ivanhoe concentrating mill at Sandon, Slocan, destroyed

by fire last August, has been visiting British Columbia in connection with the adjustment with the insurance companies concerned in the loss that resulted from the fire.

Mr. W. S. Rugh, for years office manager for the Le Roi Mining Co. at Rossland, B.C., will shortly proceed to Toronto, where he will be sales agent for the Consolidated Mining and Smelting Company of Canada, Ltd. Recently he was in the Coeur d'Alene district, Idaho, arranging for a change in the accounting system of a mining company operating there on a large scale.

Mr. Chas. Simkins, mine superintendent for the Florence Mining Co., which has been engaged during the last two or three years in opening a silver-lead mine on Princess creek, near Ainsworth, B.C., is arranging to pay a visit to Spokane, Washington, and the Coeur d'Alene district, Idaho.

Mr. Alex. Smith, for years manager of the Surprise mine, in Slocan mining division, B.C., has been on a visit to the Coast cities of that province.

Mr. A. D. Wheeler, of Ainsworth, B.C., has been engaged in sampling the Comfort mineral claim, a lead property lying adjacent to the Bluebell mine, near Riondel, on the east shore of Kootenay lake.

Mr. Oscar V. White, manager of the Slocan Star mine and concentrating mill, near Sandon, Slocan, B.C., has been on a visit to Vancouver, for the benefit of his health.

Mr. George W. Wooster, of Vancouver, B.C., one of the directors of the Granby Consolidated Mining, Smelting, and Power Co., Ltd., was in Nelson late in October, to attend a meeting of mine-owners and managers, called to discuss matters of more than ordinary importance to mining companies and other industrial organizations.

Mr. W. E. Zwicky, of Kaslo, B.C., manager for the Cork Province Mines, Ltd., operating in Ainsworth mining division, has been ill in bed, but at last advices he was recovering.

Mr. Bert N. Sharp, at one time assayer and surveyor at the First Thought gold mine at Orient, Washington, owned by Mr. P. Burns and associates, recently left Republic, Washington, for Shamut, California, where he will be assistant superintendent of the Eagle-Shamut mine. After leaving Orient several years ago, Mr. Sharp was interested in mining property in Sheep Creek camp, in Nelson mining division of British Columbia; latterly, however, he had been engaged in connection with the operation of mines in Republic camp.

Mr. B. M. Snyder, who several years ago was chief chemist and afterward smeltery superintendent for the British Columbia Copper Co. at Greenwood, B.C., whence he went to California, recently examined several mining properties in West Kootenay for United States principals. With Mr. George Crerar, who was chemist and assayer at the Boundary Falls copper smeltery during the later activities of that establishment, Mr. Snyder is now engaged in working out a zinc-reduction process at Victor, Colorado.

Mr. Jules Labarthe, for a number of years superintendent of the Consolidated Mining and Smelting Co. of Canada's copper and lead smelting works and electrolytic lead refinery at Trail, B.C., and afterward general manager for the Mason Valley Mines Co. in Nevada and Utah, revisited Trail late in October having gone there from the Coeur d'Alene district of Idaho where he had been in connection with the intended establishment of reduction works for one of the big mining companies operating in that district. Mr. Labarthe is now a member of an engineering firm having its headquarters in San Francisco, California.

Announcement has been made by several Washington State newspapers to the effect that the smeltery at Northport, Washington, on the railway lines between Nelson and Rossland, in British Columbia, and Spokane, Washington, will be ready for operation by January 1st next. The smeltery has been acquired by Coeur d'Alene mining men from the Le Roi Mining Co., Ltd. (in liquidation), and is being thoroughly renovated and improved, among the improvements being the addition of lead stacks and the overhauling of several of the copper blast furnaces. While present preparations are only for the smelting of a few hundred tons each of lead and copper ores, it is planned to eventually enlarge the treatment capacity of the works to 3,500 to 4,000 tons of ore a day.

Mr. Robert Bryce left Toronto last week for Montana.

Mr. H. W. Hardinge was in Toronto two weeks ago.

The 1916 annual meeting of the Canadian Mining Institute will be held in Ottawa March 1, 2, and 3.

Lieut. Alex. Smith, formerly in charge of the Teck-Hughes mine in the Kirkland lake district and now recruiting in Northern Ontario for the Pioneers, is meeting with great success.

Mr. J. A. Wookey, of the staff of the Canadian Mining and Finance Company is sampling the Wright silver-lead mine, Lake Timiskaming.

Mr. R. J. Ennis has returned to Porcupine from Toronto and New York.

Mr. H. A. Kee of the Nipissing staff is in Los Angeles.

Mr. G. C. Bateman is now field engineer, for La Rose mining company.

Lieut Harry H. Yuill has been awarded the Military Cross for conspicuous gallantry and devotion to duty.

Mr. J. Menard, formerly business manager of the West Canadian Collieries at Blairmore, Alberta, has been awarded the Distinguished Conduct Medal for gallantry.

Mr. John Church, chief engineer at the Dome mine has resigned. He will now make his headquarters at Haileybury. Before coming to Canada Mr. Church was chief engineer for the Goldfield Consolidated Co.

The first car of zinc concentrate was shipped on October 30th from Mr. J. P. Keane's custom mill at Rosebery, B.C. A brief account of Mr. Keane's enterprise will be found on another page.

The Sullivan mine of the Consolidated Mining and Smelting Company is now the largest producer of lead ore in Canada, and should in a few months be a large producer of zinc ore.

Mr. Kirby Thomas was in Toronto last week and has gone to Elk Lake to examine a silver property.

Mr. Burr Cartwright is in Toronto.

Mr. D. A. Thomas has returned to New York.

Mr. H. C. Hoover is in New York.

Mr. J. C. Murray is at Renfrew, Ont.

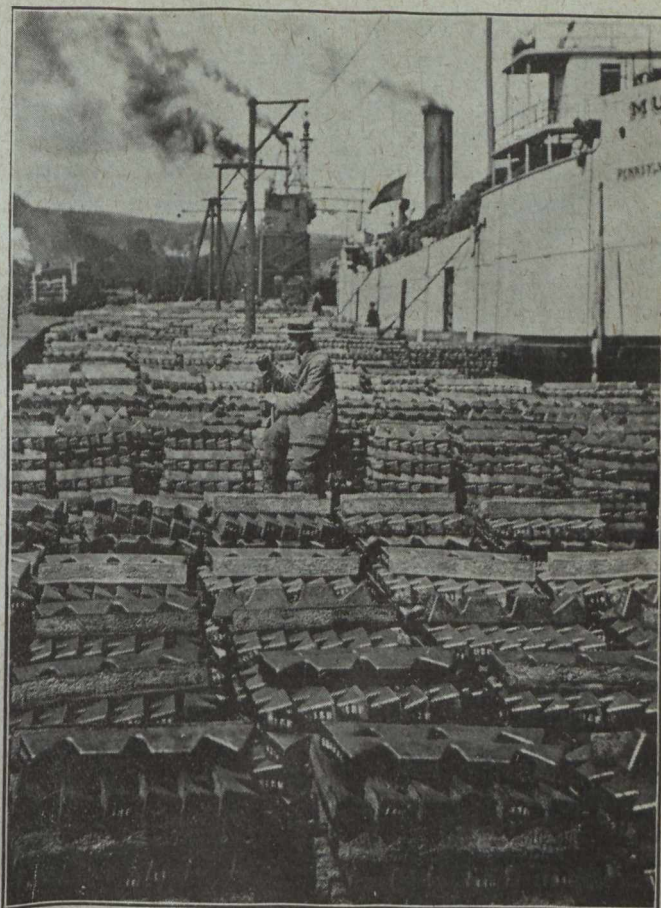
Mr. D. S. Halford, a graduate of Toronto University, demonstrated at the Arizona State Fair a model of the oil flotation machine used at Humboldt smelter.

## NIPISSING

During the month of October the Nipissing company mined ore of an estimated value of \$177,183 and shipped bullion from Nipissing and Customs ores of an estimated net value of \$241,930, according to the monthly statement just issued.

With the exception of one or two small veins nothing new was met with underground.

Preparations are being made to actively develop the Cobalt Lake fault-vein in Nipissing ground. The first work will consist in sinking a nearby shaft another 250 ft. in order to get down to the most favorable level. When this depth has been reached only a small amount of cross-cutting will be necessary to intercept the vein.



Loading a lake steamer with copper ingots at Houghton, Mich.

## ELECTROLYTIC ZINC.

Anaconda Copper Co. produces the only electrolytic zinc in the United States. This ranks as high-grade spelter and commands prices comparable with those of the Horsehead brands of the New Jersey Zinc Co. at 40 cents a pound or better. The company has made good forward sales, although tonnage will not be large from the present equipment with a daily output of ten tons, or 20,000 pounds. The new brick furnace at experimental zinc plant at Washoe smelter will be completed and in operation before the end of the month. This will increase capacity of the plant from 10 to 25 tons of zinc per day, or monthly output of 1,500,000 pounds of zinc.

Eventually a zinc plant with a capacity of 5,000 tons of ore daily will be erected by the company.

## COPPER FOR THE ENEMY

London, Nov. 2.—Germany and Austria are likely to obtain important supplies of copper from Serbia, according to Chedo Miyatovich, former Serbian Minister to London. The Bor copper mine is one of the best in Europe, and a junction recently was made between German and Bulgarian troops operating in the district where they are located. There also are anthracite coal mines in the Timok Valley.

M. Miyatovich in a statement to The Standard says the Serbian army can hold out in the mountains for a month longer, and that the invaders are likely to find little booty in a country exhausted by years of warfare, except what they take from the copper and coal fields.

## SPECIAL CORRESPONDENCE

### BRITISH COLUMBIA

Production of ore is being well maintained on the whole, as may be seen from figures that follow. Development work has been undertaken on a number of mining properties that had been long inactive, notably in the case of the Galena Farm, and several less important mines in Slocan district, while Nelson division is also having increased attention from men from the United States. Published statements that work has been commenced this year on a number of mines in Rossland camp that have lain unworked for years are little more than pleasant fictions, but it is true that in Ainsworth and Slocan divisions mines and mineral claims are now being worked that had not given employment to men over a number of years.

In striking contrast to the seeming indifference of Canadians and other Britishers to the mining possibilities of Kootenay district is the activity of a number of United States mining men, especially from Spokane, Washington. If a list were to be compiled of operating mines and the headquarters of those chiefly interested in them, it would be seen that the proportion controlled by Britishers is small. This comment has force in regard to the working of mining properties in Ainsworth, Slocan, and Nelson divisions, though not to Fort Steele division of East Kootenay nor to Trail Creek (Rossland) division of West Kootenay. In the Coast district, too, the larger metalliferous mines are in the hands of companies having headquarters in the United States. However, the most important thing is to have mining done, so if Britishers will not undertake it, men of other countries are gladly welcomed to do so.

### EAST KOOTENAY

The quantity of ore shipped to Trail during four weeks ended October 21st, was larger by 289 tons, than during the corresponding period ended September 23rd the respective totals having been 3,875 tons and 3586, tons. For the expired sixteen weeks of the second half of the year 1915 the total is 15,261 tons, an average of 954 tons a week, as compared with 834 tons a week for the half year to July 1st. The total for 1915 to October 21st, inclusive, of 36,936 tons, compares favorably with that of 36,784 tons for the whole of 1914, and the expectation is that this year's total will exceed that of last year by 18,000 to 20,000 tons. This considerable improvement is due to the enlarged production of the Consolidated Mining and Smelting Co's Sullivan mine, which is now the largest producer of lead ore in Canada. It is probable that its output will shortly be further increased, for when the company is treating zinc ore at its Trail reduction works, the chief supply of such ore will be obtained from the Sullivan mine in which there is a large quantity awaiting the provision of suitable facilities for its utilization. The erection and equipment of zinc reduction works at Trail are being pushed forward with the object of commencing the production there of refined zinc by the end of the current year.

### WEST KOOTENAY

**Ainsworth.**—There are now three mines in Ainsworth division that are shipping regularly to Trail, namely, the Bluebell, Cork-Province group, and No. 1. In addition, the Utica ships an occasional car of sorted ore, and several small lots of high-grade ore have also been sent to the same destination from properties from which a little ore has been taken in the course of prospecting. Since production was resumed at the Bluebell in September, 352 tons of lead concentrate has reached Trail from that mine, this being

the total amount of the Bluebell product received during five weeks ended October 21st. During eight weeks to the same date the total received from the Cork-Province was 325 tons of silver-lead ore and concentrate, and the Consolidated Co's No. 1 mine shipped 953 tons of silver-lead ore during that period, while the Utica's total was 85 tons. The Florence mine is expected to shortly be on the shipping list, for it has a considerable quantity of ore opened ready for stoping and arrangements are being made for its transportation to the Highland mill for concentration there. Between 20 and 30 tons of ore has been packed down from the Martin mine, situated in the mountains above the Cork-Province group, and some of it has already reached Trail. The property was recently sold for \$40,000 to East Kootenay men, who have paid \$4000 on account of the purchase money.

**Slocan.**—Less silver-lead ore was received at Trail from Slocan mines during the four weeks ended October 21st than in either of two other similar periods ended September 23rd and August 26th respectively. The totals for four periods were as follows: For four weeks ended July 29th, 1,621 tons; ended August 26th, 2,292 tons; ended September 23rd, 1,931 tons; ended October 21st, 1,740 tons. The total for the 16 weeks was 7,584 tons, an average of 474 tons a week which compares with only 92 tons a week for the six months ended June 30th. The resumption of production from the Standard mine is largely accountable for the increased receipts at Trail from Slocan mines during the second half of the year. Silver-lead concentrate was shipped to the United States from the Surprise mine to the extent of 1,415 tons, mostly during the first half of the year. Adding this quantity to that sent to Trail, a total output is obtained of 11,384 tons of silver-lead ore and concentrate shipped to smelteries during 42 weeks of 1915 ended October 21st. Mines that shipped silver-lead ore or concentrate during the last eight weeks of this period were the following: In Slocan division—Standard 2,684 tons, Rambler-Cariboo 356 tons, Slocan Star 195 tons, Hewitt-Lorna Doone (Silverton Mines, Ltd.) 112 tons, Mountain Con 85 tons, Ruth-Hope 61 tons, Wonderful 39 tons, Wakefield 32 tons, and Rio 13 tons; in Slocan City division—Enterprise 43 tons, Ottawa 35 tons, and Alice S 16 tons. No figures are at present available to show the output of zinc ore and concentrate, but it is known that between 2,500 and 3,000 tons of zinc concentrate has been shipped this year by the owners of the Surprise mine, and that the Standard Silver-Lead Mining Co. has lately shipped much of the zinc concentrate produced during the last two or three months. Then there is the output of the Hewitt-Lorna Doone mine, and of several small producers of zinc ore.

Much interest has been taken locally in the recent shipment of two cars of high-grade silver ore from the Mountain Con mine, and of some antimony ore sent to England, from the Alps-Alturus property situated about 13 miles from Three Forks, at an altitude of about 8,000 ft. on mountains above the north fork of Carpenter creek. Of the 85 tons of Mountain Con ore, one car averaged about 1,065 oz. and the other 675 oz. of silver to the ton. The vein of antimony ore on the Alps-Alturus property is stated to be 2 ft. in width, and the ore to be of excellent quality. Some years ago ore was shipped to Trail from this property, but the price of antimony at that time was too low to leave a margin of profit above the cost of mining, transporting, and smelting the ore.

There are now six concentrating mills being operated in Slocan division, namely, those of the Rambler-Cariboo Mines, Ltd., on Seaton creek, above Three Forks; of the

Ruth Mines, Ltd., and the Slocan Star Mines, Ltd., both near Sandon; of the Standard Silver-Lead Mining Co., and the Silverton Mines, Ltd., near Silverton, Slocan lake; and the mill near Rosebery, higher up Slocan lake, recently placed in order by Mr. J. P. Keane and now concentrating zinc-lead ore from the Lucky Jim mine near Bear lake, on the divide between Slocan and Ainsworth mining divisions. The new mill at the Galena Farm mine, two miles south of Silverton, will be running before these notes are published. In all these mills two products are made—silver-lead and silver-zinc concentrates. The mill at Rosebery is a custom plant, and Mr. Keane's enterprise in so quickly arranging for operating this mill, only a few weeks after the destruction by fire of the Ivanhoe mill at Sandon he was previously operating on similar lines is proving of much benefit, since it has prevented the closing of the Lucky Jim mine which would otherwise be without concentrating facilities for its ore.

**Nelson.**—There seems to be promise of more mining activity in this division in the near future than in the earlier part of the year. In the neighborhood of the town of Nelson the outlook is better, for the Granite-Poorman gold mine and stamp mill are being worked at a profit, the Eureka copper mine is being further developed, and it is planned to shortly construct an aerial tramway from the mine down to the C. P. R. Co's railway, across Kootenay river, and a Spokane syndicate is doing development work on the Fern and adjacent property situated a few miles south of Nelson. In Ymir camp, the Yankee Girl lower workings are opening a vein that is expected to yield much ore and towers for an aerial tramway from the mine down to the railway at Ymir station are being erected, while the shipment to a smeltery of ore on the dump at the upper workings is being arranged for. At Deer creek, ten miles from Salmo, the output of oxidized zinc ore from the H. B. mine is being increased, more teams having been put on for hauling the ore to the railway. At the Queen gold mine, Sheep creek, the 700-ft. level is being driven to get under the big shoot of ore that has been mined on the 600-ft. level, along a distance of about 400 ft.; meanwhile the production of gold from other parts of the mine is being steadily maintained. In Erie camp, the Relief mine is continuing to make its customary output of gold. Taken altogether, there is an improvement in mining conditions in this division, as compared with the corresponding period of last year.

**Rossland.**—The weekly average production of the mines of this camp has not been so large during the sixteen expired weeks of the second half of the year as was that of the first half of the year. The total quantity of ore received at Trail from Rossland mines for six months ended June 30 last was 172,856 tons, an average of 6,648 tons a week; for sixteen weeks ended October 21 the total was 102,851 tons, an average of 6,428 tons a week. However, a comparison with last year's production figures is favorable, for while the total for the whole of 1914 was 289,320 tons, an average of 5,564 tons a week, that for the expired part of 1915—42 weeks—has been 275,707 tons, an average of 6,564 tons a week. If this rate of increase be maintained for the remaining ten weeks of this year, as it is quite probable it will be, the total increase in 1915 over 1914 will be about 52,000 tons. By far the greater part of this year's increase has been made by the Le Roi mine, as will be seen by the following figures showing the production for 42 weeks of each year, those in brackets being for 1914: Centre Star group, 150,601 (142,607) tons; Le Roi, 110,858 (69,518) tons; Josie, 14,243 (15,929) tons; sundries, 5 (38) tons; total, 275,707 (228,092) tons.

## NOVA SCOTIA

**Dominion Coal Outputs.**—The production of the Glace Bay collieries of the Dominion Coal Company in September and October compared with 1914 as follows:

	1914 tons	1915 tons	Increase tons
September . . . . .	341,953	419,265	77,312
October . . . . .	368,016	408,200	40,184

The aggregate outputs for the ten months ending October 31st totalled 3,782,008 tons compared with 3,707,993 tons in the corresponding period of 1914, showing an increase of 74,015 tons for the year to date.

The production in November and December 1914, was very small, and it may be anticipated that large increases will be shown in the two remaining months of this year, when compared with 1914. The output for the year 1915 will probably exceed 1914 by well over 200,000 tons. This is a matter for congratulation when it is remembered that up to the middle of September of this year the production was below that of 1914.

The Springhill Collieries, for various causes, have not done so well. The outputs for the ten months ending October, 1915, were 326,500 tons, compared with 343,492 in 1914, showing a decrease of about 17,000 tons.

Although the output figures at Glace Bay show a large increase over the production of the corresponding months of last year, they do not nearly represent the capacity of the mines, which has been greatly reduced by enlistments.

Approximately, the enlistments from among the workmen of the Dominion Coal Company at the Glace Bay mines have totalled 1,500 men, the great bulk of which number are men who previously worked underground. The reduction in output has been from 3,500 to 4,000 tons per day, and what this means is apparent when it is known that the production of 408,000 from the mines in October could have been raised to 480,000 if the ordinary working force had been available.

## SUDBURY

**The sulphur smoke question** looks nearer to a satisfactory settlement than ever before. The government has made a move that will be most satisfactory to both sides by withdrawing certain lands from settlement and allowing the mining companies to use these as roasting yards. This will protect the farmers' crops as the selected sites have been chosen in places where the fumes will do little or no harm and it will benefit the residents in general. The mining companies will also derive great benefit as they will not be constantly being sued for damages by the farmers. It is thought that the roasting yards of the Canadian Copper Company will be located near the Vermilion River while those of the Mond Company will be near Coniston, their present smelter town. This in all probability will mean increased business for the Algoma Eastern Railway.

**Creighton mine** had a banner month during October. In development 1,460 ft. was driven while the new shaft was sunk 164 ft., making it the record month. In other months the shaft has gone 146 and 136 ft., which was considered very good for the district. In all for both mining and development 102,000 tons was hoisted and of this 75,000 tons went to the road yards as sorted ore.

**Sudbury-Copper Cliff Railway.**—The principal item of interest in the Sudbury district this week is the starting of the new street railway connecting Copper Cliff with Sudbury. The route takes in some of the principal streets of Sudbury and then follows the Sudbury Copper Cliff road to within a short distance of Copper Cliff, when it runs close to the C. P. R. tracks. In many respects

Cobalt and Sudbury resemble each other and although Sudbury is the older town it was Cobalt which was first to establish a street railway between Haileybury and Cobalt, later running on further north. It was not until this week that the Sudbury district had a trolley line connecting its two chief towns Sudbury and Copper Cliff. Later the line will be extended to Creighton.

Sudbury is this week giving a hearty welcome to the Australian Cadets who after taking in the sights of the Fair at San Francisco made a lecture tour in the States. The cadets number 35 and have several lecturers in their number who addressed members of the upper classes in the Sudbury schools. One day was given over to visits to the various mines and smelters.

**Miners' Wages Increased.**—The men of both the Canadian Copper Company and the Mond Nickel Company are anxiously awaiting to hear what the raise in wages will be. Some few weeks ago both of these companies announced that all men on hourly rate working 8 hours would have their wages increased, while those working longer hours would have their time reduced to 8 hours. The new schedule was introduced on Nov. 1st, but so far the amount of the increase has not been made public. This recalls conditions a few years ago. It is not very long ago when the men were working ten hours underground and the companies of their own will, some time before the 8-hour law was introduced, gave the men eight hours and increased the wage. The present increase makes the second in the year and the company is doing all they can to hold the men and keep a permanent staff. A fine recreation club is in course of construction at Copper Cliff. All this has been accomplished without any union and is a striking example of the good created by the absence of such. In addition the Canadian Copper Company gives its employees an opportunity to buy stock on the instalment plan.

Those who took advantage of the opportunity have already nearly doubled their money and have received large dividends in addition.

## PORCUPINE, KIRKLAND LAKE & MUNRO

**Gold Discovery in Pacaud.**—The announcement of the discovery on the veteran claim belonging to Fred Connell and J. Macdonough brings forward another section of the gold field of Northern Ontario which may yield a mine or several mines with further prospecting. The township of Pacaud and Katherine have for years been considered good prospecting ground by mining scouts but there has been little work done here in as much as not more than one third of the northern half of the Township is open for prospecting. Approximately one third is taken up with mining claims and one third has been homesteaded by settlers who were allowed to homestead these rocky claims for the sake of the wood on them. Two months or more ago J. Macdonough happened to find the vein on a veteran claim belonging to a wealthy British Baronet. Negotiations were opened for the purchase of this veteran claim of 160 acres and its neighbor to the north. The bargain was finally consummated at a very reasonable price and now the value of the discovery is being made known. The vein which is quite well defined has been traced and partly stripped for 15 chains on one property. It runs across the line into another claim which is also owned by Messrs. Connell and Macdonough. The pay streak in the vein varies from two to sixteen inches in width in a quartz gangue of about four feet. There are very rich shoots in a dozen or more places in this pay streak, where free gold can be seen in spectacular quantities and another mineral which is probably a telluride is also discernible. There is also a little molybdenite in the

ore. The 160 acres on which the rich discovery was made has been sold to George Miller of Detroit, who has been manager of the Miracle Mine near South Porcupine. Mr. Miller has bought outright the controlling interest in the property for a reasonable sum and he states it as his intention to proceed with the work forthwith. At the present time he has posted a man with a shot gun near the richest portions of the vein in order that it may not be high graded by wholesale as recent discoveries have been. This discovery is really in the Boston Creek field; it is about five miles south of the Boston Creek settlement but all prospectors go in from that point. It, and the active prospects for further work on the Kenzie claim in Boston Creek make this point a very active one for miners and prospectors.

**Croesus Gold Mines, Ltd.**—The property in Munro township which under the management of the Dominion Reduction caused so much excitement has been incorporated as the Croesus Gold Mines, Limited. The syndicate controlling this and the adjoining claims which they have taken up, consists of Messrs. Mortimer Davis in Montreal, and Mr. D. M. Steindler and his associates in New York.

**Jupiter-McIntyre.**—After a good twelve months of consideration the controlling interests in Jupiter have decided to accept the offer of the McIntyre Porcupine Mines. This, as already fully stated in an earlier issue includes a cash payment of approximately \$60,000 to wipe out bonds and other indebtedness. The other payments will be made monthly to provide working capital for the Jupiter. The ratio of exchange of the Jupiter stock for the McIntyre-Jupiter stock will be at the ratio of two shares of Jupiter for one of McIntyre-Jupiter. Although the sale of control of the Jupiter to the McIntyre group was ratified by the shareholders meeting on October 29th there were still some loose ends of the business to be tied before work could actually be resumed on the Jupiter. It is quite probable that work will be actively undertaken on the Jupiter much before this appears in print. The agreement with the Jupiter provides for the treatment charge at the McIntyre mill which while moderate will leave a good profit for McIntyre shareholders, particularly when the aerial tramway is in operation.

**Plenaureum Mines, Limited,** have pumped out the shaft so that the mine may be sampled by the La Rose and other parties who have made bids for the property. Although the further development of the Plenaureum may be delayed it is most likely that the property will be working this winter. This will assure the Porcupine camp that all the mines and prospects on Pearl lake will be active this winter. The Plenaureum shaft has been full of water since the fall of 1912 when the labor strike took place.

**Tough-Oakes** mine has been running again on electric power for about a month. There is now ample power for both mill and mine at this Kirkland Lake property from Charlton. While it is not anticipated that any further trouble arising out of shortage of water will occur during the spring, nevertheless two big compressors have been ordered and are now being installed at the property. This and the power available will enable the Company to have at their disposal no less than 36 drills.

**Lake Shore Mines** at Kirkland Lake has resumed operations since the beginning of the month. Two drills are now at work, the shaft being sunk from the 200 to the 300 ft. level. Before the plant was shut down this summer some high grade ore was discovered in the west drift, both at the 100 and 200 ft. levels and developed for some distance. It is now proposed to establish another level on these ore shoots as quickly as possible.

**Power from High Falls.**—Negotiations are on foot whereby it is probable that another power will be developed for the use of Boston Creek and Kirkland Lake camps. This power is at High Falls on the North branch of the

White River and it will give 2,000 H.P. at all seasons of the year. This concession was taken up by Messrs. Grover and Hotchkiss and more capital is being found to develop it, by a company that has recently entered the Kirkland Lake field.

**Tough-Oakes Dividend.**—The first dividend declared by any gold mining company in Northern Ontario outside of the Porcupine camp was declared by the Tough-Oakes Gold Mines, Limited, last month. This dividend is for twelve and a half cents a share and will be paid on Nov. 15th, on 521,500 shares issued. It will amount in all to \$65,187.50. The Tough-Oakes has produced in gross, over \$800,000. This year alone it has produced \$400,000. There is every probability that it will go on a regular dividend basis.

**Dome Lake**—Following the circular issued by the Dome Lake Milling and Mining Company allowing that their request that further stock should be taken up, improvements have taken place in the width and grade of the No. 1 vein. The vein in the winze below the 180 ft. level is eight ft. wide of between seven and eight dollar ore for the whole forty ft. on which sinking has been done to date. A raise is now being put through to the 300 ft. level to connect with this winze. The same vein worked in the A shaft has furnished all the ore going to the mill since October 16th. Here a drift has been pushed in both directions for about 75 ft. at the 75 ft. level. For this distance the ore will average about \$7.00 for a width of four to five ft. An inclined raise is to be put through from the end of the drift on the 100 ft. level of the main shaft to connect with the drift on the A shaft; all ore will then be handled from the main shaft. The production for the past two months has been much as usual. All bullion is still being sent to the Ottawa mint.

**Vipond.**—It has been officially stated by the president that there is no immediate prospect of a dividend on the Vipond. Mr. Ward says that during the past eighteen months the company has passed through a period of financing, mill construction, mine operation and mine development which does not permit of immediate disbursement of profits.

**The Excelsior Mining Company**, a syndicate of working miners operating the Gold Reef have pulled out their prospector's plant and five stamp mill from the Gold Reef and taken it down to the Tommy Burns claims in Shaw Township. The Excelsior Mining Company produced regular shipments of bullion from the rich but narrow veins on the Gold Reef. The property has now been taken over by the company itself. The Excelsior will adopt the same methods on the Shaw claims, where it is stated there are also some very rich high grade streaks.

## COBALT, GOWGANDA AND ELK LAKE

**Alien Enemies.**—A revival of the question of the employment of alien enemies in the mining camps of the North has resulted from the action of the Mining Corporation of Canada. The head office of this company which is in England has sent orders to their operating company in Cobalt that all alien enemies on the pay roll of The Cobalt Lake, Cobalt Townsite and City of Cobalt should be fired and men of nationality friendly to the Allies, taken on in their places. This has already been done. The managers of local companies are now urging on the Government the necessity of the internment of these men. By reason of their nationality they cannot get work anywhere in the north and they consequently have grievances against the country of their adoption. The managers of companies naturally consider that it is

likely to make them dangerous citizens, and they urge that they should be interned. For some time no company of standing in the district has hired any man of Austrian, Turk or German extraction, but they did retain the men they had. There were in the summer on the pay roll of the Mining Corporation of Canada 45 Austrians and 6 Germans. They have been thrown out of work and others of friendly nationality taken on in their places. In the Sudbury field registration is compulsory of all alien enemies to the British Empire and the Allies.

**The Peterson Lake Company** has dewatered and is now working from the old Nova Scotia shaft in order to reach the Nova Scotia lease under Peterson Lake. When the Nova Scotia Mining Company had this claim they produced a considerable quantity of high grade ore on a royalty basis and it seems possible that the Peterson Lake may have better success here than on other leases they have taken up and worked themselves.

**Increase in Silver Shipments.**—The arrival of 50 cent silver has seen the shipments of more bullion from the camp. This is particularly the case in regard to the Nipissing Company, which in the month of October shipped twice as much as in the previous month. In the month of November the company is maintaining their full output of bullion and it is probable that the last two months of the year will see a large production of silver from the Cobalt camp. While this may be so it is nevertheless quite true that the dropping off in production for the year will be much more marked than even last year. This is due entirely to the low price of silver and the expectation that it would shortly rise and that better profits could be obtained by holding it.

The following paragraph is from a Vancouver newspaper: Messrs. Richardson and Baird, the British commission appointed to secure coal miners to work in the Old Country left Vancouver on October 19th for Fernie, Crowsnest Pass, where they will endeavor to get more men. During their stay on Vancouver island they managed to get some 240 men, and they expect to considerably augment this number on their return trip to Montreal, as it is their intention to call at Calgary and other places in order to get in touch with miners who had gone to work in the prairie wheatfields, and who may be desirous of returning to England. The men who go to the Old Land will leave Canada in two steamers, one heading for Glasgow and the other for London, and they will take the places of miners who have gone to the front.

Three mines situated in the region around Hazelton, Omineca mining division, have shipped silver-lead ore to Trail during recent months. The Silver Standard shipped 92 tons and the Silver Cup and Sunrise 29 tons each. A very much larger quantity of copper ore has been shipped from the Rocher Deboule mine to the Granby Consolidated Co's smelter at Anyox, Observatory inlet.

The Standard Silver-Lead Mining Co. has declared its usual monthly dividend to be paid in November, the total to be \$50,000. With much ore developed and being mined and concentrated, the prospects are favorable for a maintenance of dividend payments indefinitely.

It is understood that labor difficulties have once more visited the plant of the Nichols Copper Co. at Laurel Hill, Long Island, which refines the Phelps-Dodge product, Long Calumet & Arizona, Shattuck-Arizona, Granby, Old Dominion and some smaller tonnages. The plant has a capacity of more than 1,000,000 pounds of copper daily.

The directors of the Tough-Oakes Gold Mines, Ltd., have declared an interim dividend of 12½c. per share, payable November 15th.

# MARKETS

## NEW YORK STOCKS

NOVEMBER 10th, 1915.	High	Low	Close
Alaska Gold.....	30 <sup>3</sup> / <sub>4</sub>	29 <sup>1</sup> / <sub>4</sub>	30
Alaska-Juneau.....	12 <sup>3</sup> / <sub>8</sub>	12	12 <sup>1</sup> / <sub>4</sub>
Allis-Chalmers.....	31	27	31
Anaconda.....	85 <sup>7</sup> / <sub>8</sub>	82 <sup>3</sup> / <sub>4</sub>	85 <sup>3</sup> / <sub>4</sub>
Dome.....	25	24	25
Inspiration.....	43	41 <sup>1</sup> / <sub>8</sub>	42 <sup>7</sup> / <sub>8</sub>
International Nickel.....	188	180	188
Miami.....	33 <sup>1</sup> / <sub>8</sub>	32 <sup>1</sup> / <sub>2</sub>	33 <sup>1</sup> / <sub>8</sub>
Ray.....	25 <sup>3</sup> / <sub>4</sub>	25	25 <sup>3</sup> / <sub>4</sub>

## STANDARD MINING EXCHANGE

TORONTO, NOVEMBER 11th, 1915

### Cobalt

	Asked	Bid
Bailey.....	5	4 <sup>3</sup> / <sub>4</sub>
Beaver.....	31	30 <sup>1</sup> / <sub>4</sub>
Buffalo.....	65	49
Chambers-Ferland.....	13 <sup>1</sup> / <sub>2</sub>	13
Coniagas.....	375	350
Crown Reserve.....	59	57
Foster.....	..	3
Gifford.....	..	2
Gould.....	..	5 <sup>5</sup> / <sub>8</sub>
Great Northern.....	3 <sup>1</sup> / <sub>4</sub>	2 <sup>2</sup> / <sub>2</sub>
Hargreaves.....	2	1 <sup>1</sup> / <sub>4</sub>
Hudson Bay.....	2300	2000
Kerr Lake.....	390	375
La Rose.....	56	52
McKin. Dar. S.....	31	30
Nipissing.....	680	650
Ophir.....	2	1
Peterson Lake.....	24	23 <sup>1</sup> / <sub>2</sub>
Right of Way.....	..	4
Seneca Sup.....	65	60
Silver Leaf.....	3 <sup>1</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>8</sub>
Timiskaming.....	41 <sup>3</sup> / <sub>4</sub>	41 <sup>1</sup> / <sub>4</sub>
Trethewey.....	16	..
Wettlaufer.....	9	7
York, Ont.....	2	..

### Porcupine.

	Asked	Bid
Apex.....	3 <sup>1</sup> / <sub>2</sub>	3
Dome Exten.....	27	26 <sup>1</sup> / <sub>2</sub>
Dome Lake.....	22	20
Dome Mines.....	2600	2425
Foley O'Brien.....	65	55
Gold Reef.....	3 <sup>1</sup> / <sub>2</sub>	2 <sup>3</sup> / <sub>4</sub>
Homestake.....	..	25
Hollinger.....	2800	2600
Jupiter.....	11	10 <sup>1</sup> / <sub>2</sub>
McIntyre.....	56	55 <sup>1</sup> / <sub>2</sub>
McIntyre Extension.....	25	24
Moneta.....	8	7 <sup>1</sup> / <sub>4</sub>
Porcupine Crown.....	83	80
Porcupine Imperial.....	5	4 <sup>7</sup> / <sub>8</sub>
Porcupine Vipond.....	75 <sup>1</sup> / <sub>2</sub>	74
Preston E. D.....	4	4 <sup>1</sup> / <sub>2</sub>
Teck-Hughes.....	10 <sup>1</sup> / <sub>2</sub>	10
West Dome.....	8	7 <sup>3</sup> / <sub>4</sub>

## TORONTO MARKETS

Nov. 10th, 1915—(Quotations from Canada Metal Co., Toronto)—  
 Spelter, 18 cents per lb.  
 Lead, 6<sup>1</sup>/<sub>2</sub> cents per lb.  
 Tin, 40 cents per lb.  
 Antimony, 45 cents per lb.  
 Copper Casting, 19<sup>3</sup>/<sub>4</sub> cents per lb.  
 Electrolytic, 19<sup>3</sup>/<sub>4</sub> cents per lb.  
 Ignot Brass, yellow, 13 cents; red, 15 cents per lb.

Nov. 10, 1915—(Quotations from Elias Rogers Co., Toronto)—  
 Coal, anthracite, \$7.75 per ton.  
 Coal, bituminous, \$5.25 per ton.

## NEW YORK MARKETS

Nov. 8th, 1915—Connellsville coke (f.o.b. ovens)—  
 Furnace Coke, prompt, \$2.50, \$2.75 per ton.  
 Foundry Coke, prompt, \$3.00, \$3.25 per ton.  
 Nov. 8th, 1915—Tin straits, 36.12<sup>1</sup>/<sub>2</sub> cents.  
 Copper, Prime Lake, 18.00 to 18.25 cents.  
 Electrolytic Copper, 18.00 to 18.25 cents.  
 Copper Wire, 23.25 cents.  
 Lead, 5.00 cents.  
 Spelter, 15.42<sup>1</sup>/<sub>2</sub> to 15.67<sup>1</sup>/<sub>2</sub> cents.  
 Sheet Zinc (f.o.b. smelter), 16.50 cents.  
 Aluminum, 56.00 to 58.00 cents.  
 Nickel, 45.00 to 50.00 cents.  
 Platinum, soft, \$50.00 to \$55.00 per ounce.  
 Platinum, hard, \$55.00 to \$60.00 per ounce.  
 Quicksilver, \$100.00 per 75-lb. flask.

## SILVER PRICES.

	New York. cents.	London. pence.
October—		
26.....	48 <sup>7</sup> / <sub>8</sub>	23 <sup>1</sup> / <sub>8</sub>
27.....	48 <sup>7</sup> / <sub>8</sub>	24
28.....	49 <sup>1</sup> / <sub>4</sub>	24 <sup>1</sup> / <sub>8</sub>
29.....	49 <sup>3</sup> / <sub>8</sub>	24 <sup>1</sup> / <sub>8</sub>
30.....	49 <sup>3</sup> / <sub>8</sub>	24 <sup>1</sup> / <sub>8</sub>
November—		
1.....	49 <sup>1</sup> / <sub>4</sub>	24 <sup>1</sup> / <sub>8</sub>
2.....	..	24 <sup>3</sup> / <sub>8</sub>
3.....	49 <sup>5</sup> / <sub>8</sub>	24 <sup>1</sup> / <sub>4</sub>
4.....	50	24 <sup>7</sup> / <sub>8</sub>
5.....	50	24 <sup>3</sup> / <sub>8</sub>
6.....	49 <sup>7</sup> / <sub>8</sub>	24 <sup>5</sup> / <sub>8</sub>
8.....	50 <sup>5</sup> / <sub>8</sub>	24 <sup>7</sup> / <sub>8</sub>

## WHY NOT A COBALT COIN?

It may be permissible to point out that a still further avenue is open for the employment of cobalt. The 5-cent piece is the least desirable of our Canadian silver coins, mainly because of its smallness in size and the consequent difficulty in handling it, and especially of distinguishing it from the 10-cent piece without ocular examination. Why should it not be replaced by a coin made of pure cobalt, intermediate in size between the 10-cent piece and the 25-cent piece? Such a coin would have many advantages. It would be readily distinguishable from all other coins. It would be attractive in color, pure cobalt being similar in appearance to pure nickel, but somewhat more silvery, and tarnishing slowly, if at all. Being very hard, it would be difficult to counterfeit. Lastly the chief source of cobalt being for the present in Canada, a cobalt coin would be distinctively Canadian, and its introduction would strike a chord to which the national consciousness would readily respond. The coin could be called a "cobalt," just as the U. S. 5-cent piece of copper-nickel alloy is called a "nickel." By comparison, however, a pure cobalt coin would be greatly superior in appearance and every other respect to the so-called "nickel," which contains only 25% of that metal.—T. W. GIBSON, in Annual Report of Bureau of Mines, Ontario.

## LAND \$300,000 CONTRACT

Mr. Warren R. Roberts, president, and Mr Edward E. Barrett, vice-president, of the Roberts & Schaefer Co., engineers and contractors, Chicago, have just returned to Chicago after securing in Canada a contract with a large coal company for the designing and construction of an electrically operated anthracite coal dock bridge, and storage plant. This will be one of the most modern installations of its kind in Canada.