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CIRCULATION.

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CONCERNING GEOLOGICAL REPORTS.

A preliminary report on Gowganda Mining Division has been issued by the Geological Survey of Canada. It embodies the results of Mr. W. H. Collins' work during the field season of 1908.

Mr. Collins sketches carefully the general geology of the district. The typical rocks of each formation are discussed. Diabase and aplite come in for a full share of attention. An abstract of some of these pages will be found elsewhere in this issue of the Canadian Mining Journal. We wish to develop a few thoughts inspired by Mr. Collins' remarks on the economic geology of the region.

The field geologist of to-day is expected to keep ever before him the economic side of his work. It is not intended that he should usurp the functions of the prospector or of the mining engineer. Nor can he. Usually in Canada his field is so large and so new that his first few seasons must be devoted to topographic observations, rather than to pure geology.

After determining the topographic features the geologist begins to distinguish, differentiate, and correlate the formations into which the rocks of the region are resolvable.

When the geologist precedes the prospector he is too much absorbed in his duties to permit himself the relaxation of prospecting. When he follows the prospector he must regard the richest silver veins as decidedly of less value to him than a good rock exposure. Veins and other vanities must wait until the broad geological history of his territory has been ascertained. This, at least, was the attitude of the last generation of geologists. We do not mean to imply that commercial phases were totally overlooked. But the purely academic predominated.

Whilst it is apparent that the old order is changing, the readjustment is slow. Habits of thought are persistent. The geological reports of yesterday were strongly academic. To-day they are only less so. Yet the tendency to investigate and emphasize more and more the commercial potentialities of our country has been plainly evident in the operations of the Canadian Survey during the last few years. This does not mean that pure geology is being neglected. There is little danger of that. It does mean that the younger generation of geologists is being trained to correlate geological data and commercial possibilities, that a closer bond is being formed between the Survey and the mining industry.

The effort to develop the economic geology of fields old and new has brought with it complications. Canada is lustily prosperous. It is passing through a period of easy money. Mining enterprise, some of

which are sound, some that are doubtful, and many that will never go farther than the flotation stage, are being put before the public every day. Every prosperous camp or promising new region attracts its quota of reckless promoters, men willing and anxious to use any avenue to wealth. Hence it is imperative that the geologist walk with utmost circumspection when he deals with the geological economics of a new district. He may depend upon it that favourable statements will be separated from their context, that his written opinions will be garbled, and that in every way possible, his report will be used to boom the projects of fakirs.

That this has been recognized is evident from the extreme caution that marks and, possibly, mars the publications of the Ontario Bureau of Mines. It is difficult to say just how far the geologist should go. In our own opinion, while we defer to no one in our appreciation of the Bureau's thoroughgoing honesty and high technical efficiency, we believe that it could have done and can yet do much more towards exposing fraud.

We have alluded to the need of caution and to the undesirability of overmuch caution. It is pertinent to remark here that the official geologist is in danger of becoming proverbial for his skill in hedging. It is pleasing, therefore, to observe that Mr. Collins has said something definite concerning Gowganda. In this he has defied tradition. He has boldly, almost baldly, committed himself to the statement that Gowganda is a district worthy of attention. This is well.

But, while we may justly appreciate Mr. Collins' moral backbone, we may be pardoned if we qualify our appreciation by suggesting that he has fallen into one error. Several of his sentences, if quoted alone, give a quite false impression. These sentences grouped together, could be used to prove that Mr. Collins is highly enthusiastic about Gowganda—which is, of course, not the case.

This all goes to prove that the geologist, when his work impinges directly upon mining, must keep his weather eye open.

It is but fair to say in conclusion that Mr. Collins' report is singularly well written. We do not intend our mild comments to be mistaken for harsh strictures. Our purpose is rather to indicate a dangerous tendency than to exploit a fault.

PERMISSIBLE EXPLOSIVES.

The Technologic Branch of the United States Geological Survey is getting down to business. In addition to its labours in the direction of rescue work, it has begun to take up the question of explosives. In Great Britain and on the Continent only such explosives as appear on the "Permitted List" are used in collieries. Permitted explosives are those that give favourable results when subjected to certain tests. On the Continent, especially in Belgium and Germany, these tests are more rigid than those used in Great

Britain. But the general effect is the same. Carelessness is checked, both in the manufacturer and in the user, and human lives are saved.

Now the United States Government has waked to a sense of its duty. It has erected and equipped an Explosives Testing Station at Pittsburg. Here samples, furnished by manufacturers, are tested. A list of explosives that passed the set tests has just appeared. Seventeen brands, tested before May 15, 1909, have met with the approval of the Technologic Branch. Varying the British phrase, the United States authorities have designated these "Permissible Explosives." "Explosives Circular No. I," published by the Technologic Branch of the U. S. Geological Survey, sets forth the conditions and details of tests.

These activities are to be commended unreservedly. It would not be distasteful to us were the Canadian Mines Branch to take up this supremely important line of investigation and regulation. Canada is sadly behindhand.

AMALGAMATED ASBESTOS.

The public very rarely learns the full truth concerning mergers. This is especially true of mining mergers.

Shares in Amalgamated Asbestos are now being placed in the principal money markets of the world. The promoters of this particular merger claim that it controls 80 per cent. of Canada's present supply of asbestos. The facts seem to indicate that the merger actually controls less than 50 per cent.

Further inspection points to the probability that costs will be higher and dividends lower than the figures advertised.

But more serious are the indisputable facts that Russia is fast becoming a strong competitor in the production of high-grade asbestos, and that Quebec's output of high-grade is not increasing.

A careful presentation of present conditions will be found elsewhere in this issue. We bespeak for this the closest attention. Unless the statements and logic here set forth can be successfully refuted, there seems to be small hope for the ultimate success of Amalgamated Asbestos. Indeed, to the disinterested observer the whole structure appears top-heavy.

However, the reader may judge for himself.

A WESTERN INVASION.

An attempt is being made by the United Mine Workers of America to bring under their control the coal mines of Vancouver Island. The Victoria Daily Colonist earnestly urges the local miners to walk warily and to be sure of their ground before taking a step that would certainly disturb their present peaceful condition.

With the efforts of the United Mine Workers, in so far as these efforts are directed towards Canada, we have absolutely no sympathy. Canadian miners are perfectly able to take care of themselves. Compared

with the labour organizations of the United States, Canadian bodies are cleaner, more independent, and; consequently, much less open to the nefarious manipulation of hired agitators.

Strikes are bad enough, even when there is an honest grievance or a serious difference of opinion as between employee and operator; but when thousands of Canadian miners surrender themselves to a foreign organization that will order wholesale strikes for reasons having not the remotest bearing upon Canadian conditions, then indeed they may expect loss, humiliation, and endless strife.

ARITHMETIC.

Our industrious contemporary, the Monetary Times, in an idle moment compiled a summary of Cobalt promotions. The totals that it arrived at were only less alarming than its own conclusions.

Records for the past four and one-half years show that 602 companies have been organized, having an aggregate capital of \$504,202,000, and an average capital per company of \$837,544. Dividend returns over the same period represent about 2 per cent. on the total authorized capitalization.

Why the Monetary Times has allowed arithmetic to smother its common sense, we know not, and we regret that some of our English contemporaries have been misguided enough to take the Monetary Times seriously.

The total capitalization shown above has no bearing whatever upon Cobalt. It would easily be possible for promoters to organize Cobalt companies whose total capitalization would run up into billions. The arithmetic employed by the Monetary Times would then bring dividend returns down to some tenuous decimal.

If the figures quoted show anything, they demonstrate the need of closer governmental control of company charters. A large majority of the companies organized to exploit Cobalt's silver never got beyond mere organization. Many of them are merely names. Only a small minority have acquired mining properties. A still smaller proportion are shipping ore and paying dividends.

All of which is so obvious that we apologize to our readers for touching on the matter at all. Our excuse is that Cobalt does not deserve the implied aspersion.

A little arithmetic is a dangerous thing.

BRITISH COLUMBIA ZINC ORES AND THE U. S. TARIFF.

The provision of the Payne tariff that places a cent a pound on the contained zinc ores carrying 40 per cent. and over, has aroused much adverse comment in British Columbia.

A tariff reduction has been made on low-grade Canadian ores. But is impossible for British Columbia producers to ship ore carrying less than 40 per cent.

zinc at a profit. It is claimed, therefore, that the new tariff simply closes the United States markets to our western producers.

The remedy, as pointed out by Mr. Louis N. Pratt, is the erection of Canadian smelters. The only existing Canadian zinc smelter is the electric plant at Nelson. This has not yet got beyond the experimental stage. While it is hoped and believed that the plant will be successful, yet it is not proven. Meanwhile the province will have to face resolutely the problem of treating its zinc ores.

"WHICH."

It is no longer fashionable for the mining engineer to be careless as to the language in which he clothes his reports. The time has passed when orthographic solecisms and errors in grammar reflect anything but discredit upon the writer. Yet the majority of technical men fail to pay attention to certain small but important items.

We have not time to elaborate this theme. One example will illustrate our meaning amply. Most writers, technical and otherwise, use the words "which" and "that" interchangeably, or almost so. Preference is generally given to the former word. As a matter of fact, correct usage demands the use of the latter pronoun much more frequently. As pointed out by Mr. T. A. Rickard, a safe rule is to use "that" in every possible case, using "which" only when "that" is obviously unsuitable.

EDITORIAL NOTES.

Of fourteen representative Welsh, English, and Scotch collieries, eleven reported decreased net profits during the year 1908. The Welsh collieries suffered least. The wide foreign market that they serve placed them above the vicissitudes that hampered and distressed the Scotch producers.

Our Cobalt letter, in the Special Correspondence section, is of more than usual interest. The notes on the power developments are significant. Cobalt is entering upon a new phase of her career. The industrial element is slowly ousting the speculative.

Amongst the British Budget proposals is one imposing a tax on the owners of mining royalties. During a late debate, the Chancellor of the Exchequer pointed out that in most cases land owners demand ten times more money for surface damage than the land is worth for agricultural purposes. The mine owner and the miner contribute to many taxes. The former bears the whole responsibility in the event of failure, accident, or loss from any cause. The royalty owner escapes all risk. Even if the mine is closed he still insists on exacting a dead rent. Hence it is thought perfectly fair to call upon him to make his contribution towards the expenditure of the nation.

In the article entitled "Coinage in the British Empire" which appeared in our issue of May 15th, the author desires to explain that the gold values have been computed at the legal rate of £3 17s. 10½d. per Troy ounce standard, and the silver values at the coinage value of silver in the United Kingdom, namely, £5-6s. per Troy ounce standard. We also wish to point out that through a clerical error the sign of dollars was placed before the figures representing the number of nickel, copper, and aluminium coins turned out of the Royal Mint in 1907.

The action of Minerals Separation, Ltd., against the Ore Concentration Company, Ltd. (Elmore Vacuum),

was discontinued last month. The discontinuance was due, so the former company states, to the fact that the Ore Concentration Company's process is not now being worked commercially at any mine in Great Britain. Minerals Separation, Ltd., is, on the other hand, preparing to proceed against those who are using its processes on a commercial scale in other countries. Against these contentions the Ore Concentration Company, Ltd., advances the statements that three separate Elmore plants are working commercially in Great Britain, treating a total of 40,000 tons of ore per annum, that all the foreign patents purchased by Minerals Separation, Ltd., have lapsed, and that the latter company lost practically every step in its suit and had to pay all costs.

THE AMALGAMATED ASBESTOS CORPORATION, LIMITED.

(Written for the Canadian Mining Journal by J. J. Harpell.)

From time to time mines and mining prospects in different parts of the world have been subjected to periods of excessive capitalization, flotation and speculation, but probably at no period has any country been so thoroughly given over to the promoter as is Canada at the present time. As soon as one section of the country is "capitalized" until the people are tired reading the advertisements and inspired articles, another section is taken up, in a manner sufficiently different to throw the unsuspecting public off their guard.

During the last few weeks the press has been giving much attention to the "Amalgamated Asbestos Corporation, Ltd." The very glowing accounts of the dividends to be earned by this venture are sufficient to inspire the uninitiated with a desire to subscribe his last dollar; while the statements setting forth how thoroughly the whole asbestos industry of the world will be in the grip of this corporation should fill the user of this material with apprehension of the prices he will have to pay in the future for his supplies.

The following is a quotation taken from one of our soberest publications, "The Financial Post of Canada":—

"... It is understood that the Canadian underwriting of the Amalgamated Asbestos Corporation is closed. The amount subscribed in Canada is over \$2,200,000. England took \$2,000,000 of the underwriting. The American lists will be closed this week.

"In a report made by Mr. Fritz Cirkel, the Government asbestos expert, he estimates the earnings at an amount equivalent to over 14 per cent. on the common stock, giving the figures as follows:—

Receipts for 74,550 tons at \$42.50 per ton.....	\$3,168,375
Cost of production at \$20 per ton.....	1,491,000

Total profit for the year.....	\$1,677,375
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"He adds: 'Knowing from personal investigation in the district the great possibilities of the properties under consideration. I must state that the above

statement of receipts and expenditures is a conservative one, and I am sure that if full advantage is taken of the splendid physical conditions which present themselves for the economical operation of the British-Canadian, the Standard, and the Dominion, and if, furthermore, operating engineering skill were displayed, the cost of production per ton, which I have set down as \$20 in the above statement, will be considerably reduced.

"As to the market for the Canadian article, I may say that I have recently investigated this subject, and I find that since the year 1904 the uses for asbestos—more particularly in the United States—have been almost trebled, especially in the application for building material. This necessitated an increase in the production of all the properties in the district for the last four years of 75 per cent., while the value of the product increased almost 100 per cent. for the same period.'"

The four-page prospectus that is being circulated by the "Amalgamated Asbestos Corporation, Ltd.," contains little or none of the information that the public should have before it is asked to subscribe for stock or bonds in such a corporation. The four pages are filled largely with general statements concerning the asbestos industry and the prospective earnings of the corporation, which, in many instances are misleading.

The capitalization of the corporation is \$25,000,000, made up as follows: \$15,000,000 first mortgage 5 per cent. bonds, of which \$7,500,000 are being offered to the public for immediate subscription, the balance being retained for further requirements; and \$10,000,000 stock, of which \$1,875,000 is preference bearing 7 per cent. cumulative, and the balance being common stock. Annual payments to a sinking fund for the redemption of the bonds are to begin in 1913, and to be equal to 2 per cent. of the par value of the bonds. Thus, the fixed annual charges on the bonds now being issued will amount to \$375,000, and after 1912 to \$525,000. On the preferred stock there will be \$131,250 interest, or alto-

gether \$656,250 will have to be distributed annually before any dividends can be paid on the common stock.

The Board of Directors is composed of sixteen gentlemen, of whom three may be said to be men who have been interested in the production of asbestos. The others are mainly bankers and brokers. One of the above-mentioned three is Dr. R. V. Mattison, of Ambler, Pa., whose interest in the corporation will be referred to subsequently.

The asbestos companies that have been purchased by the Amalgamated corporation, and for which the proceeds of the \$17,500,000 of the capitalization, less \$900,000, which is to be retained as working capital has been given, are as follows:—

The Kings Asbestos Mines, Thetford Mines, Quebec.
Beaver Asbestos Company, Thetford Mines, Que.

The British-Canadian Asbestos Co., Lt., Black Lake, Que.

The Standard Asbestos Co., Ltd., Black Lake, Que.
The Dominion Asbestos Co. Ltd., Black Lake, Que., and the

Bell Asbestos Mines, Thetford Mines, Quebec, by a contract for the entire production of the property over and above the manufacturing requirements of the Keasby & Mathison Company, manufacturers of asbestos products, and of the affiliated companies controlled by Dr. R. V. Mattison.

In an interview which the writer had with Dr. Mattison a few days ago he was told that for some time this gentleman has been a greater purchaser than he had been a seller of raw asbestos, and that he had no intention of materially increasing the output of the Bell Asbestos Mines, but on the contrary expected to increase very largely his purchases in the future due to the requirements of the new manufacturing plant he is putting up at Shawinigan, Quebec. It would thus seem that the Amalgamated Corporation must count only on the first five companies mentioned above for their profits.

The bonds alone represent capital invested, all the stock, both preferred and common, being given away either to the promoters or underwriters. Those underwriting the bonds require to deposit only 20 per cent. of their bond subscription with the Royal Trust Company, of Montreal, which company holds in trust all the bonds and stock. The remaining 80 per cent. is evidently provided in some other way. In other words the Trust Company, either alone or with the assistance of banks or other financial institutions, has undertaken to carry these bonds on margin until they can be unloaded on the public, in the same way that a broker would carry the stock of a client who was speculating in the stock market on margin.

The prospectus further states that according to the statement of a firm of chartered accountants who have examined the books of the companies acquired by the Amalgamated corporation, the aggregate net earnings of these companies for the last year were \$556,000. These profits, it must be remembered, are bookkeeping profits, which are often very different from profits that may be paid out to liquidate fixed charges or to pay dividends.

The remainder of the prospectus is taken up with general statements concerning the asbestos industry and the prospective earnings of the Amalgamated corporation, and winds up as follows:—

“There are three factors in this consolidation which are unique and without parallel:

“1st. There is no known substitute for asbestos.

The demand is constantly increasing and at increased prices.

“2nd. Ninety per cent. of the world's supply of asbestos comes from the Province of Quebec, and principally from Black Lake and Thetford.

“3rd. The Amalgamated Asbestos Corporation, Limited, will control 80 per cent. of the asbestos of these districts, and 70 per cent. of the world's supply.”

The writer has recently returned from a trip to Europe where he spent the greater part of two months in studying the markets for Canadian ores and minerals. Since returning he has visited the asbestos districts of Quebec. On both these trips much information and many statistics were gathered concerning the markets, uses, sources, cost of production, transportation, etc., of asbestos. In the light of these data let us examine some of the above statements of the Asbestos Corporation, as well as the figures advanced by Mr. Cirkel.

Almost every country in the world claims to have asbestos deposits, and from time to time most countries have sent more or less into the market. But the regular producers of appreciable quantities, outside of Canada, have been Italy, Russia, and South Africa. Italy has been a regular producer for years of a superior quality of asbestos. But at no time has her production been large. During the last seven or eight years the Russian asbestos deposits have experienced a very rapid development, due to the advance in the price of the crude article. The cost of production is much less in Russia than in Canada; wages are lower and the percentage of asbestos to a given area is higher. But the cost of transportation is so great that only the superior grades can be shipped. The cost of carrying the Russian material to market is from \$22 to \$25 a ton, as compared with from \$5 to \$7 for marketing the Canadian. In 1908 Canada produced 65,157 tons, of which 47,574 tons was material that on the average was worth less than \$24 a ton. This low-grade material could not have been marketed from the Russian mines. Considering these facts, there is no asbestos district in the world that has increased in the production of the superior grades during the last seven or eight years as have those in Russia. Previous to 1900 the annual output of Russian asbestos was about one thousand tons. In 1907 the output was 10,331 tons. During the same period the output of similar grades of the Canadian material has practically remained the same. In 1900 the output of Canadian No. 1 and No. 2 crude and fibre was 21,613 tons. In 1907 Canada produced 23,830 tons of these grades. In 1908 only 16,582 tons of these grades were produced by Canada—a heavy falling off. (These figures are taken from the Government returns.)

The larger increase in the demand for asbestos during recent years has been in the low grades that are generally known as “paper stock,” and that sell for from \$10 to \$30 a ton. For the uses to which these grades are put there seems to be no material that suits the European manufacturer so well as the South African article. It is of lower specific gravity, and the fibre is longer and tougher. These features make it most suitable for mats, etc., for boiler and pipe covering. Owing to the constant and rapid increase in the demand for this article the development of the South African areas, in which it is found, is bound to receive special attention during the next few years and a corresponding increase in the output may be looked for.

From the above figures it will be seen that Russia is at present supplying over fifteen per cent. of the world's output of asbestos. All other countries outside

of Canada are supplying from five to seven per cent. So that Canada supplies the balance, or between 75 and 80 per cent., of which by far the larger part is made up of low-grade material.

New let us see how much of the Canadian output will be controlled by the new merger. For this purpose we will take the actual shipments made by the companies included in the merger during the last three years. These are as follows:—

	1906. tons.	1907. tons.	1908. tons.
Kings Asbestos Mines....	16,328	16,273	15,291
Beaver Asbestos Company	1,598	1,901	2,705
British-Canadian	3,155	4,070	6,327
Standard	2,406	2,373	2,323
Dominion .....	.....	.....	87
Total	23,487	24,617	27,733

The total production of Canadian asbestos in 1906 was 61,675 tons; in 1907 it was 61,985 tons, and in 1908 it was 65,157 tons. So that the companies now included in the merger controlled 38 per cent. of the Canadian output in 1906. They controlled 40 per cent. in 1907, and in 1908 they controlled 42½ per cent. The Amalgamated thus occupies a position quite different from that which its promoters have claimed for it.

Now let us analyze some of Mr. Cirkel's statements. He assumes that the new merger will produce 74,550 tons. To increase their present production to this figure they will require to do one of two things; they will either have to acquire control of the whole of the Canadian output or else increase their own output up to this point. If they increase their own output and find a market for it, no doubt, in the natural course of events the other companies that are now in the field will be doing likewise, so that when the Amalgamated reaches Mr. Cirkel's figures, the whole of the Canadian output will be over twice that tonnage. To market such an output would be an impossibility for some time to come. The output has always kept pace with the demand. In fact, it has kept slightly ahead of it. Very frequently mills have had to be closed earlier in the season than they might, because of the fact that their storehouses were full, and to attempt to empty them by forcing the material on the market would mean a reduction in price below the point at which there would be a profit. The only other way by which the Amalgamated can reach Mr. Cirkel's estimate is by acquiring control of the balance of the Canadian output. But here again Mr. Cirkel's figures are upset. It requires \$7,500,000 of bonds and \$10,000,000 of stock to control 42½ per cent. of the Canadian output; how much will it take to control the whole of it? If it takes annual fixed charges amounting to \$656,250 to control 42½ per cent. of the output, it will require over a million and a half of annual fixed charges to control the whole of it. Then again his price of \$42.50 per ton is too high when it is remembered that any material increase in tonnage will be in the grades averaging under \$24 per ton. On the other hand, his cost of production is very much too low. In 1903 the cost per ton during the month of August in one of the best mines in the district was \$18.56. Considering that this was for a month which would have the maximum output of any month in the year, as well as the minimum cost, and also considering that this was for one of the best mines and mills in the district it is reasonable to expect that the average cost per ton for all the mines over the whole of 1903 was more than this. Since 1903 the cost

of production has considerably increased, largely due to the increased cost of labour.

The writer has before him sheets showing the cost of production during a number of periods. From these figures he finds that in every case the item of "wages and salaries" equals a little more than half the total cost of production. According to the returns made to the Quebec Government, the wages paid by all the asbestos mines in 1908 amounted to \$1,066,774. Twice this would bring the total cost of production in 1908 up to \$2,133,548. According to the same report, the total was \$2,577,302. On this basis the net profit on the whole of the Canadian asbestos industry would be somewhere between four hundred thousand and half a million dollars. Of this profit the companies now in the merger would receive in the neighbourhood of \$200,000.

The asbestos industry of Canada is no mint. It is only sufficiently profitable to make a good healthy business. It is true that during recent years there has been a decided increase in the demand for asbestos and a corresponding increase in the price. But the main advance in price has been for the superior grades, such as crude No. 1 and No. 2 and fibre, in which grades, it must be remembered there has been no increase in the Canadian production. All the increase in the Canadian production has been in the lower grades of "paper stock," as may be seen from the following figures taken from the Government returns:—

	No. 1 Crude.	No. 2 Crude.	Fibre.	Total Superior grades.	Paper stock.
1900...	1,755	3,490	16,368	21,613	.....
1901...	2,083	2,660	14,639	19,382	14,054
1902...	1,319	3,131	15,502	19,952	10,682
1903...	930	2,354	9,150	12,434	16,327
1904...	1,646	2,727	7,771	12,143	23,336
1905...	1,640	2,253	10,707	14,600	34,655
1906...	1,477	2,450	18,542	22,469	39,306
1907...	1,487	2,938	19,905	24,330	37,655
1908...	900	2,771	13,911	17,582	47,574

In 1903 the average prices of the different grades were as follows:—

Crude No. 1, \$126.50; crude No. 2, \$110.40; fibre, \$34; paper stock, \$16.

In 1908 the average prices were:—

Crude No. 1, \$290.00; crude No. 2, \$160.00; fibre, \$52.00; paper stock, \$23.86.

These figures will indicate the cause for the very rapid increase in the production of the Russian material. The Russian deposits are extensive and exceptionally rich, but the material is not so good as is the Canadian for textile purposes. At the prices that prevailed previous to five or six years ago it could not be marketed in competition with the Canadian article. But as soon as the prices went up the Russian article began to come into the market in large quantities, and in eight years the output increased about ten times. At present the Russian No. 1 crude is selling at from \$200 to \$225 a ton. The same thing is likely to happen in the lower grades as soon as the prices of these grades reach a figure at which the Russian article can be marketed profitably. The prices for these grades will not need to advance much farther before this point is reached; because the lower grades of the Russian article compare more favourably with the lower grades of the Canadian article than do the higher grades. Then, of course there is the South African article, which seems to be better adapted for the uses to which the so-called

“paper stock” is put than any other class on the market. Already the increased prices and the demand for this material are quickening the activities in the South African asbestos industries. These are features which the Canadian producers must take into consideration.

During the last eight or ten years the cost of production in Canada has very materially increased, and through no fault of the asbestos producers. The whole cause lies in the phenomenal advance there has been in the cost of living, until now the cost of living in Canada is the highest of any country in the world. This is plainly due to national causes, both economic and sociological, which will be discussed in another article in a subsequent number of this journal. The labourer in the asbestos districts of Canada gets \$1.75 cents a day, and he cannot live on less. Similar labourers in the United States, we are credibly informed, receive \$1.50 a day.

In Russia they get from 30 to 40 cents a day. This is the one feature of the Canadian asbestos industry that deserves attention.

The prices that have been paid by the promoters of the Amalgamated Asbestos Corporation, Ltd., for the properties they have acquired are exorbitant. In order to meet the excessive fixed charges many expedients will require to be resorted to which will both retard the production of Canadian asbestos and encourage the production of other countries. If there should be a failure to meet these fixed charges, of course, the corporation goes into the hands of a receiver and possibly into liquidation. In this way large producing areas will become tied up in litigation, and the industry will be seriously injured. From every point of view it would be a sad mistake if any such fate should befall the asbestos industry of Canada.

MINING OPERATIONS IN THE PROVINCE OF QUEBEC FOR THE YEAR 1908.

Abstract of the Official Report of Superintendent of Mines J. Obalski, M.E.

Notwithstanding the financial depression, the Province of Quebec did not fall off in mineral production during 1908. Instead of a falling off, a gain of nearly half a million dollars was made. The output of Quebec mines for 1907 was valued at \$5,019,932; for 1908 the corresponding figure is \$5,493,664.

Iron.

The charcoal blast-furnaces of the Canada Iron Furnace Company, Ltd., and of John McDougall & Co., at Radnor and Drummondville respectively, have been purchased, and are being operated by the Canada Iron Corporation, Ltd. They are now units in an organization that extends over practically the length of Canada.

Local bog ore is used exclusively at Drummondville. At Radnor, as a mixer with bog ore, Ontario magnetite is utilized. Ore is also imported in small quantities from the United States.

The output of the furnaces is reported as follows:—

Ore charged, 15,493 short tons, worth.....	\$60,020
Limestone charged, 2,887 short tons, worth....	1,337
Charcoal, 977,840 bushels of 20 lbs., worth....	85,738
Pig iron produced, 5,989 gross tons, worth....	171,286

The furnaces employ hot blast. Wood charcoal is manufactured on the spot in close kilns. Limestone is obtained from local sources.

Mr. Obalski makes his annual reference to the magnetic sands of the North Shore. “Experiments [in electric reduction] . . . have been made by the Federal Government, which attest the value of the process, but do not seem to demonstrate its industrial utility.” Mr. Obalski is of opinion that the Grondal process may be commercially applicable.

OCHRE.

The working of ochre at St. Malo and at Champlain, in the neighborhood of Three Rivers, has been continued. The operating concerns are the Canada Paint Company, Champlain Oxide Company, and S. W. Argall. The output for 1908 was 1,500 tons of crude ochre worth \$4,500, and 1,346 tons of calcined and

ground ochre worth \$15,440. Sixty-one men are employed, and work is carried on for about seven months of the year.

Chrome.

Only two companies produced chrome ore during 1908. These were the Dominion Chrome Company, at Little Lake St. Francis; and the Black Lake Chrome and Asbestos Company, at Black Lake. Both properties are under the same management. The concentration mills worked seven to ten months of the year.

The mills and mines of the American Chrome Company and of the Canadian Chrome Company were idle. These will probably resume work during this year.

A new company, D’Israeli Chrome Mines, Ltd., is exploiting a deposit in Lot V., 37, of Garthby. Prospecting has been done with encouraging results in Coleraine and Bolton.

The production of chrome in 1908, in long tons, was:—

Second-class in lumps.....	3,754 tons, worth	\$38,740
Concentrates	3,000 “ “	45,000
Total	6,754	\$83,740

Seventy men were employed, and received wages totalling \$32,000. Work occupied only half the year.

Copper.

The Eustis mine, at Capelton, was the only producer of copper. The Nichols Company’s mines were shut down. The last-named company has been reorganized and has assumed a new name, the Albert Copper Company. The manufacture of sulphuric acid and other chemical products still continues.

Mr. Obalski advocates the establishment of a copper smelter at a central point in the Eastern Townships.

Copper ore shipped during 1908 amounted to 26,598 short tons, worth \$159,588. One hundred and twenty-two men were employed. They received \$50,030 in wages.

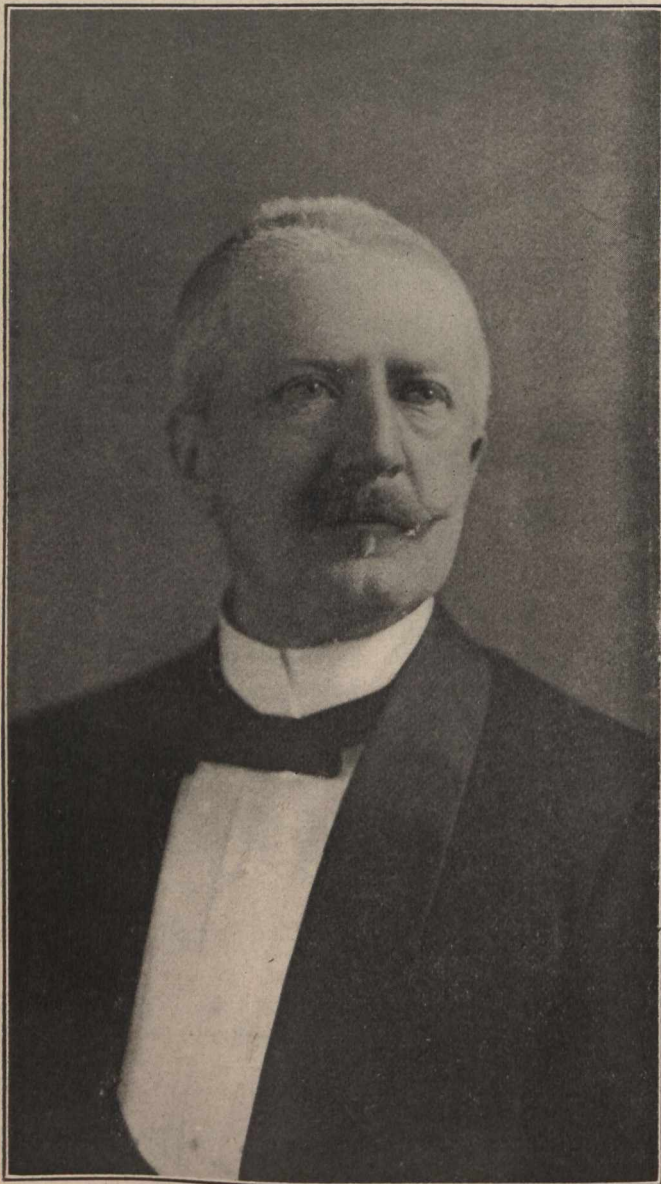
Lead, zinc, cobalt, silver, showed no further devel-

opment, although in the Township of Fabre prospecting results are encouraging.

Gold.

At Lake Megantic the Marsboro Gold Fields Company continued to sink a shaft on Lots V., 19 20, of Marston. The shaft is now 50 feet deep, and tests are being made. Definitive results have not been obtained as yet.

The Compton Gold Dredging Company proposes to dredge the gravel deposits in the valley of the Moe's River. Future results can only be guessed at.



J. OBALSKI.
Superintendent of Mines for the Province of Quebec.

Asbestos.

Work was continued as usual in the asbestos districts.

At Thetford the Bell, King, Johnson, and Beaver mines were in regular operation. At the Beaver a new electric plant was erected. The Thetford Asbestos Exploration Company is preparing to work its property on Lot 28, Range VI., of Thetford. On Lot 16, Range IV., three miles from Robertson Station, the Robertson Asbestos Mining Company has done sufficient prospecting to encourage the erection of a mill.

On Lot 17, Range IV., some good prospects of excellent asbestos have been found. There is also a vein of chrome iron ore on this lot. There are many other partly developed prospects.

The American Asbestos Company, at Black Lake, has changed its name to the British-Canadian Asbestos Company, Limited. The Union mine resumed work. This company does not ship its crude asbestos, but runs it all through the mill, and prepares a special quality of fibre.

Further notes of progress, discoveries, and additions to plants are given by Mr. Obalski. In his opinion, the asbestos industry gave good results during 1908.

The production for 1908 was as follows:—

First-class crude	900 tons,	worth \$261,216
Second-class crude	2,771 " "	438,305
Fibre	13,911 " "	716,811
Paper stock	47,574 " "	1,135,264
Total		\$2,551,596
Asbestic	24,011	34,660
Total value		\$2,577,302

Four thousand two hundred and eighty-four workmen received \$1,066,774 in wages. It is noted that the increased output is chiefly paper stock.

Reference is made to the possibility of Russian Asbestos entering into strong competition with the Canadian article. In 1907, the production of the Ural region was 10,000 tons.

Mica.

A bad market influenced this branch of the industry adversely. Only a few mines were worked. Amongst the principal shippers were Blackburn Brothers, H. E. Flynn, Kent Brothers, W. Argall, and the Calumet Mining Company. A large quantity remains on hand for this year's shipments. The total shipments of thumb-trimmed mica was 106 tons, worth \$95,311. One hundred and eighty-four men were employed. Work was intermittent. The amount expended in wages was \$47,724.

Phosphate.

The Chemical and Fertilizer Company, of Buckingham, used 90 tons of phosphate. The Electric Reduction Company, of the same place, used tons. The whole amount, 175 tons, was worth \$1,610.

Graphite.

Practically no graphite was mined during 1908.

Magnesite.

In the year 1900 a considerable deposit of magnesite was found in the northern half of Lot 18 Range XI., Grenville Township, Argenteuil County. Very little attention was attached to it. Samples from this and other contiguous localities ranged from 74 per cent. to 99.92 per cent. carbonate of magnesia.

In 1907, the lot mentioned above was acquired by Mr. T. J. Waters. A 200-ton test shipment was made, and a quantity was calcined by the Canadian Carbonate Company, of Montreal.

The crude magnesite showed thus:—

Carbonate of magnesia	84.50 per cent.
Carbonate of lime	15.00 " "

The calcined product gave on analysis:—

Magnesia	74.84 per cent.
Lime	10.84 " "

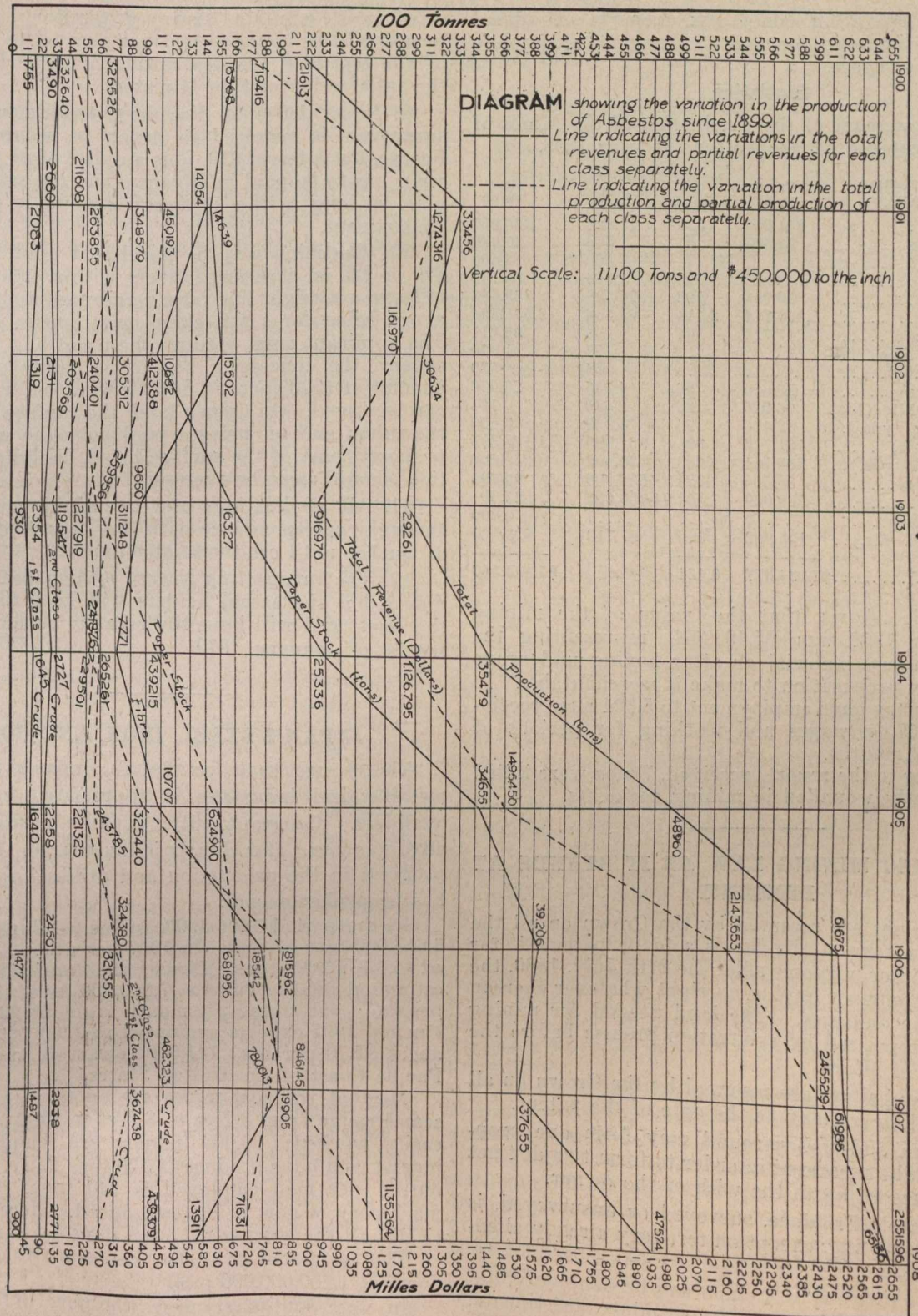


DIAGRAM OF QUEBEC ASBESTOS PRODUCTION.

The mine lies 14 miles from the C. P. R. station, Calumet. Magnesite crops out over a length of from 400 to 500 feet, showing a width in one place of 60 feet. It has a snow-white crystalline form. A sample analyzed by Dr. Milton L. Hersey showed 86.60 per cent. carbonate of magnesia, and 11.43 per cent. carbonate of lime. The mineral can be used as a source of carbonic acid gas, and of magnesia. It also is easily worked for ornamental purposes. It has many other commercial uses, including the manufacture of

floor material. This is one of the very few large occurrences in Canada.

In Montreal, the Canadian Carbonate Company makes liquid carbonic acid out of European magnesite. Crude magnesite is worth about \$8 per ton. The calcined product fetches from \$30 to \$35 per ton. There is no duty on the entry of this product into the United States.

There appears to be the basis of a sound industry provided here.

Lists of operating companies, reports of official explorations in Labrador and Chebougaman complete Mr. Obalski's report.

Statistics.

Summary Statement of the Production of the Mines of the Province of Quebec for the year 1908.

NATURE OF MINERALS. (Tons of 2000 lbs.)	Wages paid.	Number of workmen	Quantities shipped or used	Gross value
Bog iron ore	\$41,054	170	11,628	\$30,957
Calcined ochre	12,596	61	1,346	15,440
Raw ochre .....	.....	...	1,500	4,500
Chrome iron	32,000	70	7,564	83,740
Copper ore	50,030	122	26,598	159,588
Asbestos	1,006,774	2,484	65,156	2,551,596
Trimmed mica	47,724	184	106	95,311
Phosphate of lime.....	.....	...	175	1,610
Magnesite .....	.....	...	65	520
Slates (squares)	15,000	50	4,335	20,056
Prepared graphite (lbs)	6,920	22	2,640	165
Flag-stone (sq. yds.)..	2,400	50	4,335	3,600
Cement (barrels)	151,716	395	801,695	1,127,335
Granite (cubic yds.)..	238,761	653	30,000	250,000
Lime (bushels)	33,500	124	556,000	96,000
Bricks	300,000	1,462	94,000,000	525,000
Tiles and pottery .....	.....	.....	.....	270,000
Lime stones (c. yds.)..	155,882	515	97,710	223,580
Totals	\$2,094,357	6,324	.....	\$5,493,580

This table shows that the value of the mining products for 1908 was \$5,493,664, representing the value of the raw material or after having undergone the necessary preparation to make it merchantable.

This industry gave employment to 5,324 men, receiving \$2,094,357 in wages and working for periods of from 4 to 12 months.

According to the reports received, 7 men were killed and 5 seriously wounded in mining accidents.

THE QUEBEC MINING LAW AS IT STANDS AT PRESENT.

1. The mines are reserved by the Crown on all the Crown lands and on the lands sold or patented for farming or other purposes after the 24th July, 1880, the owner of the surface having no right whatever thereon except to the damages. The land needed for mining may be expropriated by arbitration process before the Department of Mines.

2. Gold and silver are reserved by the Crown on all the lands, whatever may be the date of the patent.

3. Surface and underground may form one property, but can be separated in order to form two distinct properties, according to the wish of the owner.

4. The whole Province, surveyed or unsurveyed, is open for prospecting, except on territory already alienated for mining.

5. The staking out of a claim can be done only and personally by a prospector holding a miner's certificate. The cost of such certificate is \$10, good until the 31st December.

6. The staking out can be done on claims having an area varying from 40 acres to 200 acres in unsurveyed territory and on specified lots from one to two lots, forming a maximum of 200 acres. Within four months of the staking out, a mining license must be taken (a) on surveyed territory for the claim as staked out; (b) on unsurveyed territory for lots or fractions of lots, containing an area of from 1 to 200 acres.

7. In unsurveyed territory the claim must be rectangular in form, with north-south and east-west

orientation, and in surveyed territory the mining license will be bounded by lines parallel to the outlines of the lots, and the description must be furnished to the satisfaction of the Minister.

8. No evidence of discovery, assessment works or surveying is required in order to secure a mining license, but a fee of \$10, plus a rental of \$1 per acre per year, has to be paid in advance, and the same is renewable, so long as the necessary amount is paid to this Department.

10. The mine may be purchased upon payment of \$10 or \$20 an acre respectively within or outside of 20 miles in a straight line from a railroad in operation, the above being for a full claim or an entire 100-acre lot. The applicant must produce the proof of a mineral discovery, the concession has to be surveyed, and an amount of \$500 spent in mining work before the patent can be issued. On Crown land, the surface is sold with the mine, and on private land only the underground property, part of the surface being liable to expropriation, should same be necessary.

11. All applications and recording must be made through correspondence with the Department of Mines at Quebec until otherwise announced.

12. The prospecting license system has been abandoned, but the actual holders will keep the benefit of the same, and will have the right to renew them until the 1st of January, 1910.

JAPAN'S STEEL, IRON, AND COAL.

The future that lies before Japan's mining and metallurgical industries is appreciated by very few outsiders. Geographically, Japan's position is most advantageous. Her climate is favourable. Her national progress in the production and utilization of minerals has been phenomenal.

In the period 1896-1900, inclusive, Japan produced 6,613,000 tons of coal. In 1907 her production amounted to 13,716,000 tons. During the first half of 1908 her estimated production was 7,000,000 tons. The average price of coal at the pit mouth is about \$2.25 per ton. During 1907 exports amounted to 2,922,000 tons, being about \$2.70 per ton; 141,000 tons were shipped to the Pacific Coast of the United States.

Most of the coal mines are on the seaboard. The seams range from 3 feet to 8 feet in thickness, and are easily worked; 60,000 miners are employed. The largest coal mine produces 1,100 tons daily. The yearly output per man employed is 240 tons. Coal-cutting machinery is now being introduced. Heretofore practically all the cutting has been done by hand.

The estimated available deposits of coal are put down at 1,200,000,000 tons.

In the southwest near the port of Sakai, rich deposits of iron ore have been found. Other deposits are known. Apparently none of these is yet worked. For the production of pig iron—42,919 tons in 1907—Chinese ore is imported. The Chinese ore is very rich. It is said to average 65 per cent. of iron. Domestic pig iron and steel sell at about \$24.50 and \$37 per ton respectively. Every effort is being made to increase production and to cheapen costs.

The Government steel works, at Yawata, employs 7,000 men. Three blast furnaces turn out a combined daily output of 450 tons. All branches of the steel industry are included in the establishment.

LIST OF PERMISSIBLE EXPLOSIVES.

Tested prior to May 15, 1909.

As a part of the investigation of mine explosions authorized by Congress in May, 1908, it was decided by the Secretary of the Interior that a careful examination should be made of the various explosives used in mining operations, with a view to determining the extent to which the use of such explosives might be responsible for the occurrence of these disasters.

The preliminary investigation showed the necessity of subjecting to rigid tests all explosives intended for use in mines where either gas or dry inflammable dust is present in quantity or under conditions which are indicative of danger.

With this in view, a letter was sent by the Director of the United States Geological Survey on January 9, 1909, to the manufacturers of explosives in the United States, setting forth the conditions under which these explosives would be examined and the nature of the tests to which they would be subjected.

Inasmuch as the conditions and tests described in this letter were subsequently followed in testing the explosives given in the list below, they are here reproduced, as follows:—

(1) The manufacturer is to furnish 100 pounds of each explosive which he desires to have tested; he is to be responsible for the care, handling, and delivery of this material at the testing station on the United States arsenal grounds, Fortieth and Butler Streets, Pittsburg, Pa., at the time the explosive is to be tested; and he is to have a representative present during the tests, who will be responsible for the handling of the packages containing the explosives until they are opened for testing.

(2) No one is to be present at or to participate in these tests except the necessary government officers at the testing station, their assistants, and the representative of the manufacturer of the explosives to be tested.

(3) The tests will be made in the order of the receipt of the applications for them, provided the necessary quantity of the explosives is delivered at the plant by the time assigned, of which due notice will be given by the Geological Survey.

(4) Preference will be given to the testing of explosives that are now being manufactured and that are in that sense already on the market. No test will be made of any new explosive which is not now being manufactured and marketed, until all explosives now on the market that may be offered for testing have been tested.

(5) A list of the explosives which pass certain requirements satisfactorily will be furnished to the state mine inspectors, and will be made public in such further manner as may be considered desirable.

Test Requirements for Explosives.

The tests will be made by the engineers of the United States Explosives Testing Station at Pittsburg, Pa., in gas and dust gallery No. 1. The charge of explosive to be fired in tests 1, 2, and 3 shall be equal in disruptive power to one-half pound (227 grams) of 40 per cent. nitroglycerin dynamite in its original wrapper, of the following formula:—

Nitroglycerin	40
Nitrate of sodium	44
Wood pulp	15
Calcium carbonate	1
	—
	100

Each charge shall be fired with an electric fuse of sufficient power to completely detonate or explode the charge, as recommended by the manufacturer. The explosive must be in such condition that the chemical and physical tests do not show any unfavorable results. The explosive in which the charge used is less than 100 grams (0.22 pound) will be weighed in tinfoil without the original wrapper.

The dust used in tests 2, 3, and 4 will be of the same degree of fineness and taken from one mine.*

Test 1.—Ten shots with the charge as described above, in its original wrapper, shall be fired, each with 1 pound of clay tamping, at a gallery temperature of 77 degrees F., into a mixture of gas and air containing 8 per cent. of methane and ethane. An explosive will pass this test if all ten shots fail to ignite the mixture.

Test 2.—Ten shots with charge as previously noted, in its original wrapper, shall be fired, each with 1 pound of clay tamping at a gallery temperature of 77 degrees F., into a mixture of gas and air containing 4 per cent. of methane and ethane and 20 pounds of bituminous coal dust, 18 pounds of which is to be placed on shelves laterally arranged along the first 20 feet of the gallery, and 2 pounds to be placed near the inlet of the mixing system in such a manner that all or part of it will be suspended in the first division of the gallery. An explosive will pass this test if all ten shots fail to ignite the mixture.

Test 3.—Ten shots with charge as previously noted, in its original wrapper, shall be fired, each with 1 pound of clay tamping at a gallery temperature of 77 degrees F., into 40 pounds of bituminous coal dust, 20 pounds of which is to be distributed uniformly on a horse placed in front of the cannon and 20 pounds placed on side shelves in sections 4, 5, and 6. An explosive will pass this test if all ten shots fail to ignite the mixture.

Test 4.—A limit charge will be determined within 25 grams by firing charges in their original wrappers, untamped, at a gallery temperature of 77 degrees F., into a mixture of gas and air containing 4 per cent. of methane and ethane and 20 pounds of bituminous coal dust, to be arranged in the same manner as in test 2. This limit charge is to be repeated five times under the same conditions before being established.

Note.—At least 2 pounds of clay tamping will be used with slow-burning explosives.

In response to the above communication applications were received from 12 manufacturers for the testing of 29 explosives. Of these explosives, the 17 given in the following list have passed all the test requirements set forth, and will be termed permissible explosives.

Subject to the conditions named below, a permissible explosive is defined as an explosive which has passed gas and dust gallery tests Nos. 1, 2, and 3 as

*With a view to obtaining a dust of uniform purity and inflammability.

described above, and of which in test No. 4 1½ pounds (680 grams) of the explosive has been fired into the mixture there described without causing an ignition.

Permissible Explosives tested prior to May 15, 1909.

Aetna coal powder A. Aetna Powder Co., Chicago, Ill.
 Aetna coal powder B. Aetna Powder Co.
 Carbonite No. 1. E. I. Du Pont de Nemour Powder Co., Wilmington, Del.
 Carbonite No. 2. E. I. Du Pont de Nemours Powder Co.
 Carbonite No. 3. E. I. Du Pont de Nemours Powder Co.
 Carbonite No. 1 L. F. E. I. Du Pont de Nemours Powder Co.
 Carbonite No. 2 L. F. E. I. Du Pont de Nemours Powder Co.
 Coal special No. 1. Keystone Powder Co., Emporium, Pa.
 Coal special No. 2. Keystone Powder Co.
 Coalite No. 1. Potts Powder Co., New York City.
 Coalite No. 2 D. Potts Powder Co.
 Collier dynamite No. 2. Sinnamahoning Powder Co., Emporium, Pa.
 Collier dynamite No. 4. Sinnamahoning Powder Co.
 Collier dynamite No. 5. Sinnamahoning Powder Co.
 Masurite M. L. F. Masurite Explosive Co., Sharon, Pa.
 Meteor dynamite. E. I. Du Pont de Nemours Powder Co.
 Monobel. E. I. Du Pont de Nemours Powder Co.

Provided:

1. That the explosive is in all respects similar to the sample submitted by the manufacturer for test.
2. That double-strength detonators are used of not less strength than 1 gram charge consisting by weight of 90 parts of mercury fulminate and 10 parts of potassium chlorate (or its equivalent), except for the explosive "Masurite M. L. F.," for which the detonator shall be of not less strength than 1½ grams charge.
3. That the explosive, if in a frozen condition, shall be thoroughly thawed in a safe and suitable manner before use.
4. That the amount used in practice does not exceed 1½ pounds (680 grams) properly tamped.

The above partial list includes the permissible explosives that have passed these tests prior to May 15, 1909. The announcement of the passing of like tests by other explosives will be made public immediately after the completion of the tests for such explosives.

A description of the method followed in making these and the many additional tests to which each explosive is subjected, together with the full data obtained in each case, will be published by the Survey at an early date.

Notes and Suggestions.

It may be wise to point out in this connection certain differences between the permissible explosives as a class and the black powders now so generally used in coal mining, as follows:—

(a) With equal quantities of each, the flame of the black powder is more than three times as long and has a duration three thousand to more than four thousand times that of one of the permissible explosives, also the rate of explosion is slower.

(b) The permissible explosives are one and one-fourth to one and three-fourths times as strong, and are said, if properly used, to do twice the work of black powder in bringing down coal; hence only half the quantity need be used.

(c) With 1 pound of a permissible explosive or 2 pounds of black powder, the quantity of noxious gases

given off from a shot averages approximately the same, the quantity from the black powder being less than from some of the permissible explosives and slightly greater than from others. The time elapsing after firing before the miner returns to the working face or fires another shot should not be less for permissible explosives than for black powder.

The use of permissible explosives should be considered as supplemental to and not as a substitute for other safety precautions in mines where gas or inflammable coal dust is present under conditions indicative of danger. As stated above, they should be used with strong detonators; and the charge used in practice should not exceed 1½ pounds, and in many cases need not exceed 1 pound.

Inasmuch as no explosive manufactured for use in mining is flameless, and as no such explosive is entirely safe under all the variable mining conditions, the use of the terms "flameless" and "safety" as applied to explosives is likely to be misunderstood, may endanger human life, and should be discouraged.

JOSEPH A. HOLMES,

Expert in Charge Technologic Branch.

Approved, May 18, 1909:

Geo. Otis Smith, Director.

ERNEST LEIGH FRALECK.

Ernest Leigh Fraleck died at Cobalt on Friday, May 27, 1909. Mr. Fraleck was recovering from an attack of typhoid fever. Death came unexpectedly.

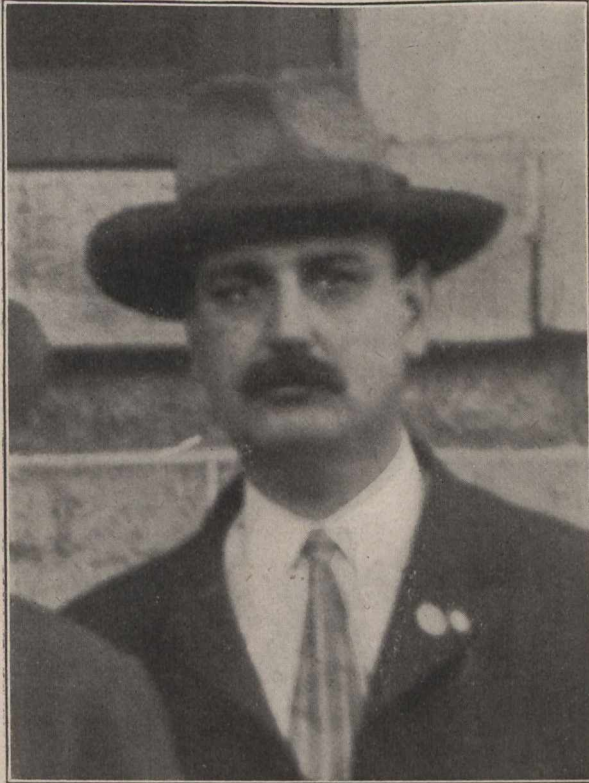
E. L. Fraleck was born in Belleville, Ont., thirty-four years ago. His early education was acquired there. At an early age he entered Queen's University as an Arts student. After securing his B.A., he took a mining course in the Kingston School of Mining. Throughout his university career he was one of the outstanding figures in college politics. If I remember aright, "E. L." was never elected to office in the Alma Mater Society—an organization that governs the whole body of students—mainly because he was an out-and-out radical. But, whatever may have been his relation to college affairs generally, "E. L." had always a band of retainers who followed him implicitly.

I can recall, with absolute clearness, several occasions on which Fraleck spoke at Alma Mater gatherings. Frequently these meetings were stormy. Often a surprising amount of feeling was displayed by the speakers. I cannot remember one instance in which Fraleck either lost his head or made a false move. He was calm, forceful, and deliberate in his speech. It appeared to matter little to him if he lost an election. He always fought for some principle. Indeed he was essentially a fighter, and a constructive, clear-headed debater.

Fraleck's detached manner and his judicial attitude towards questions of the hour were apt to give the impression that his was a phlegmatic temperament. Such was by no means the case. Fraleck, as his professional work showed, was a man capable of profound and disinterested enthusiasm. His record in Cobalt is eloquent proof of this.

Because his strong character and vigorous mind were but beginning to be recognized more widely, and because his friends believe that a large sphere of usefulness lay before him, there is little necessity of detailing minutely the events in Fraleck's professional life. One paragraph will suffice.

After taking his mining course at the School of Mining, Kingston, he accepted a position as superintendent of a pyrite mine at Queensboro, North Hastings, Ont. While holding this post he followed and advised upon the development of other neighbouring properties. Later he joined the staff of the Ontario Bureau of Mines, and acquired an intimate knowledge of many of the mining districts of the Province. Early in the



ERNEST LEIGH FRALECK.

year 1907 he was appointed superintendent of the Cobalt Lake mine, Cobalt, Ont. This position he occupied until the day of his death.

Of Fraleck's efficiency as a mine manager there is no room for doubt. His work was neither erratic nor spectacular. It was carefully planned, thoroughly executed, and led always to definite results. His influence with the directors of his company was large. This influ-

ence he exercised wholesomely. The problems that confronted him in the development of the Cobalt Lake mine were intricate. The peculiar financial conditions under which the company had been organized did not make these problems easier. But Fraleck cheerfully met every difficulty, moulding and carrying out a wise policy of development, a policy that had absolutely no reference to the stock market.

In the last two years Fraleck was fast becoming a strong factor in Cobalt affairs. An earnest and whole-hearted citizen, he never spared himself in his efforts to rectify wrongs. On all matters of civic interest he was exceedingly well informed and constantly active.

But it was in his capacity as a member of the Canadian Mining Institute that Fraleck was best known. At the recent annual meeting he took a prominent part in the more important discussions. He was easily among the most effective speakers.

Recognition from his professional brethren came rapidly after his arrival in Cobalt. This year he was elected a member of the Council of the Canadian Mining Institute. The office of President of the Cobalt Mine Managers' Association he accepted and filled most efficiently. His advice and assistance were never denied to any worthy cause.

I think that it can be said of Fraleck that he was a sane, courageous, clear-headed Canadian. In any profession he would have won distinction. In the profession of mining engineering, a profession in which distinction is particularly hard to gain, Fraleck had already emerged from the rank and file. I am convinced that he would have accomplished great things had his life been spared.

Fraleck is dead. Many of his more intimate friends will never forget him, for he himself was a loyal and true friend. The Institute has reason to keep his memory green, for he laboured in season and out of season to aid and strengthen it.

To his bereaved family I believe a large measure of comfort must lie in the fact that Fraleck held and deserved the steadfast respect of his many acquaintances, and the abiding affection of his friends and associates.

J. C. MURRAY.

MINERAL DEPOSITS OF THE SERPENTINE BELT OF SOUTHERN QUEBEC.

By John A. Dresser, McGill University, Montreal.

(Continued from last issue)

IV. Chromite.

Chromic iron, valuable not for its iron but for its content of chromic oxide, occurs very generally in the peridotite and the serpentine of the Thetford, Black Lake and Danville type. The chief production is as yet from the Counties of Megantic and Wolfe, the former producing much the greater amount.

The placing of the industry on a substantial commercial basis has been largely due to the vigorous operations of the Black Lake Chrome and Asbestos Company, who are as yet the principal producers.

1. Production.—As early as 1861 samples of some tons' weight were shipped from Ham, in the County of Wolfe, to London and Glasgow, but no mining resulted, probably owing to the undeveloped state of the country, as the price of chromite was at that time four or five times higher than at present. In 1886 and 1887 another attempt was made to exploit the chromite ores of Quebec by Dr. James Reed, who shipped 100 tons from Wolfestown, Leeds and Thetford to Philadelphia. No further shipments seem to have been made until 1894, when operations were begun at several points, and

1,000 tons of ore were shipped. The returns of the Geological Survey record a production since that date valued at over \$600,000. The output of the last six years is as follows:—

Production.	Value.
1903—3,500 tons.....	\$51,121
1904—6,074 “	67,146
1905—8,528 “	104,565
1906—8,750 “	92,100
1907—7,196 “	72,091
1908—7,225 “	82,008

Canada, the total production of which is from this district, stands fourth among the countries of the world in the production of chromic iron, and furnishes about 10 per cent. of the world's output. The three leading countries are:—

New Caledonia	51,000 tons
Russia	20,000 “
Greece	15,000 “

of chromite are frequently scattered through all parts of these rocks. The general dissemination of ore throughout the rock, together with the highly altered and disturbed condition of the latter, would suggest that the ore bodies have been formed by concentration of ore from the surrounding rock, but detailed examination does not support this view.

The walls of the ore bodies are not usually well defined, and grains of chromite are quite as plentifully disseminated in the wall rock near the ore bodies as elsewhere. The deposits are irregular in shape, though they commonly have an approach to ellipsoidal outlines in a surface section, indicating that they are more or less lens-shaped. The longer axes lie parallel to the lines of fracture or cleavage in the country rock, that is, in a northeast and southwest direction, and so the form may be due to regional pressure which has been exerted on the ore bodies since they were formed. The majority of the ore bodies yet found are near, but rarely at, the contact of the serpentine, or peridotite,

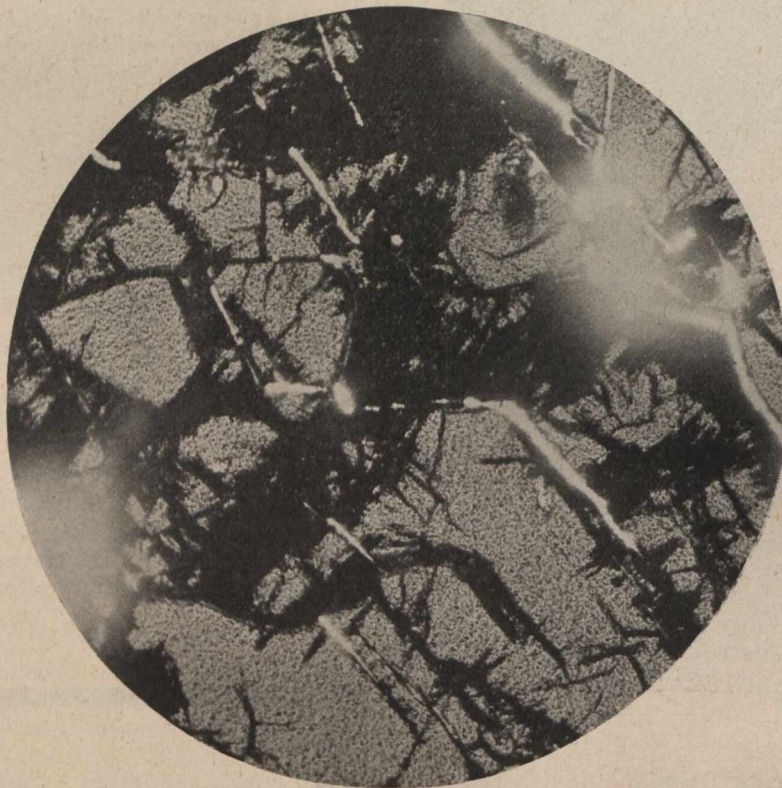


Fig. VI.—Photomicrograph of Chromite Ore.

Turkey, the United States and New South Wales produce smaller amounts. Turkey is reported to have large deposits of a good quality of ore, but the lack of railway or water transportation makes mining practically prohibitive at present prices.

A limited quantity of the Canadian ore has been used by the Electric Reduction Company of Buckingham, Quebec, in the manufacture of ferro-chrome. The remainder, except for occasional shipments to Europe, is shipped to the United States. It is there used for the manufacture of bichromates for use in dyeing textiles, tanning leather, for pigments in printing and painting; in making chrome steel; and lower grades for furnace linings.

2. Distribution of the Deposits.—The ore is found in the serpentine and peridotite, in some parts in large bodies of ore, in others, in mere nodules, while grains

with adjacent rocks, and none of importance are far from the contact. There appears to be no definite order in the distribution of the ore bodies, they being separated by bands of the country rock from a few inches to many feet in thickness.

3. Origin of the Ore Bodies.—These observations seem to indicate that these ores have originated by primary segregation from the peridotite magma, as was first suggested by Dr. F. D. Adams in a paper presented to the Province of Quebec Mining Association in 1894 (“On the Igneous Origin of Certain Ores”—Trans. Prov. Que. Mining Association, Montreal, 1894). A similar origin has since been established for the chromite ores of the Eastern United States by J. H. Pratt (Trans. A.I.M.E., 1899), while J. H. L. Vogt (Zeitschrift für Praktische Geologie, Oct., 1894) had previ-

ously shown the chromite of Hestmandø, Norway, to be due to primary segregation.

4. Character of the Ore.—Chromic iron consists theoretically of an equal number of molecules of chromic and ferrous oxide, answering to the formula FeO, Cr_2O_3 , but ore of such purity has not been found in nature except in meteorites. Alumina and magnesia seem to be invariably present, replacing the Cr_2O_3 and the FeO in varying proportions. Following are two analyses by T. Sterry Hunt of specimens regarded by him as typical of the Quebec deposits. (Geology of Canada, 1863, p. 479.) They are from the Township of Bolton, in the County of Brome, a locality which, although it has not yet produced ore on a commercial basis, seems likely to do so with proper development. Two analyses of chromite, one from Turkey, the other from New Caledonia, are also given for comparison:—

Cr_2O_3	45.90	49.75	51.70	55.70
Al_2O_3	3.20	11.30	14.10	16.20
FeO	35.38	21.28	14.20	16.20
MgO	15.03	18.13	14.30	9.80
	99.51	100.46		

While the higher magnesia accompanies the lower percentage of iron, as would be expected in a simple replacement of the latter by the former, the higher alumina accompanies the higher chromic oxide. Hence the molecular combinations are more complex than might at first appear.

In discussing the ores of the Eastern United States, Mr. Pratt (op. cit.) has suggested that chromite is an isomorphous mixture of three distinct molecules, $FeO, Cr_2O_3; MgO, Cr_2O_3;$ and MgO, Al_2O_3 . This hypothesis seems both necessary and sufficient to explain the variations in composition that are found in these ores.

In microscopic sections of ore from Black Lake the chromite is found to consist of two parts—a reddish-brown, translucent substance, and a black, opaque material (Fig. 6). Separations of these, which were effected by means of the Wetherill magnetic, and an hydraulic separator with ascending current, showed on analysis of the products a higher percentage of Cr_2O_3 and FeO in the black portion than in the reddish part. Further investigation is being made by the writer on these, and on ores from other parts of the world.

The price of chromite is based on a standard of 50 per cent. chromic oxide, lower grades being penalized and those of higher quality being at a premium. Ores carrying less than 40 per cent. and as much as 10 per cent. are concentrated to 50 per cent., or a little higher. The first-class crude ores, or concentrates, rarely exceed 55 per cent., while theoretically pure chromite of the formula FeO, Cr_2O_3 should yield 68 per cent. The difference is evidently due not to defective ore dressing, but to the composition of the ore, which in Southern Quebec seems unlikely to be found to contain much above 55 per cent. of chromic oxide. As the analysis given above shows, ore from New Caledonia may have a somewhat higher percentage of Cr_2O_3 , but is, as might be expected, lower in magnesia. While these features may make the New Caledonia ore more desirable for the bichromate industry, the higher magnesia probably favors the Quebec ores for use in the manufacture of alloys of steel.

V. Talc.

Talc and soapstone are practically undeveloped resources of the serpentine belt. Many portions of the intrusive rock, being originally rich in pyroxene, have

altered to steatite or soapstone, and frequently to a purer variety of talc. These are found principally in connection with the older serpentine of the Broughton series. On Lot 2, Craig's Road Range, of the Township of Ireland, in the County of Megantic, there is apparently a large deposit of talc of excellent quality. Unfortunately for the development of the property a little copper ore was found on it, and the prospectors' attention was turned from opening a promising talc deposit to selling a copper "mine." The property is eleven miles from the Quebec Central Railway at Black Lake.

Within one or two miles of the Quebec Central Railway, between Robertson and Broughton stations, there are several small hills of soapstone, some of which probably reach the quality of talc.

Several soapstone quarries have been opened at various times, chiefly for local use, in many parts of the serpentine belt, but no steady industry has as yet resulted.

From the Township of Potton, Brome County, a specimen of soapstone was taken which gave the following results in an analysis by T. Sterry Hunt:—

	Potton	Pure Talc (Theoretical Composition)
SiO_2	59.60	62.8
MgO	29.15	33.5
FeO	4.50	Usually contains a little iron replacing MgO .

A comparison with the composition of the theoretically pure talc, as cited here, indicates a comparatively high grade for the Potton deposits.

VI. Copper.

Copper occurs in three classes of deposits in the Eastern Townships of Quebec:—

1. In the limestones where they are invaded by dykes of igneous rock, as at Acton.
2. In a volcanic series—the porphyries and andesites of Capelton and Harvey Hill.
3. In the diabase of the serpentine series.

It is with this last only that this paper is concerned. These ores occur in pyrrhotite, while those of the Capelton and Harvey Hill series are in pyrite. In both cases the ore is chalcopyrite, and seems to have been introduced later than the pyrite or pyrrhotite bodies that contain them.

The largest of these bodies of copper have been found in the County of Brome, especially in the Townships of Potton and Bolton. The best known is the once famous Huntingdon mine in Lot 8, Range VIII of Bolton, which was vigorously operated between 1865 and 1873, while some work has been done more recently. During this period it is reported to have yielded from 200 to 400 tons per month of ore carrying between 7 and 10 per cent. of copper. The principal ore body lies in the diabase along its contact with Ordovician slates through which it is intruded. The width of the deposit mined is from eight to fourteen feet. Two miles north of the Huntingdon, on Lot 2, Range IX, of Bolton, is the Ives mine, which was worked for upwards of ten years. Similar ore bodies have been disclosed by smaller workings between these properties and to the north and the south of them. At the time of working the nearest railway was some twenty-four miles distant, but within the past three years the Orford Mountain Railway has been extended so as to pass in the immediate vicinity of these properties, all of which lie in the valley of the Missisquoi River.

Also in the same vicinity and within a little more than a mile from the railway is the Lake Memphremagog mine, on Lot 28, Range IX, of Potton. This property is on the west slope of Hog's Back Mountain, a diabase hill on the west shore of Lake Memphremagog. The ore is chalcopyrite and pyrrhotite, and probably ranges from 1 to 9 per cent. copper, with about 35 to 40 per cent. iron, and nearly the same amount of sulphur. After a period of disuse, this property is now being equipped with plant, and will soon again be worked. It is doubtless one of the largest ore bodies in the district.

A deposit of somewhat similar character is found to the northeast of the last in Garthby, near Lac Coulombre, in the County of Wolfe. The ore body here is so covered that its full extent could not be seen, but it is evidently of important size. In the interval of forty-five miles between this and the Lake Memphremagog deposits, several occurrences of similar ore are known. Probably the most important are in the Townships of Orford and Brompton, in the Counties of Sherbrooke and Richmond.

At a distance of one hundred miles northeast of Garthby, blocks of diabase carrying pyrrhotite and chalcopyrite were recently found in the Counties of Montmagny and L'Islet. Here the rocks of the serpentine belt occupy some twenty square miles of country, generally wooded, and in which probably no prospecting has ever been done. It is near the line of the projected extension of the Quebec Central Railway from St. George de Beauce to Temiscouata.

VII. Antimony.

Antimony is found in the diabase of the serpentine belt on Lot 28 of the first range of South Ham, Wolfe County. It was discovered here in 1863, and has been worked at two periods since that time, first by Mr. W. Russell, of Quebec, and later by the present owner, Dr. James Reed. No statistics of production are available. Two shafts have been sunk, one to a depth of one hundred feet, the bottom of which is reached by an adit some three hundred feet in length. At present no work is being done.

The ore consists of native antimony, valentite or oxide of antimony, and a little kermesite, the oxysulphide. It occurs in small veins, the largest about a foot wide, near the contact of diabase with sedimentary slates.

VIII. Nickel.

Nickel was mined for a time about 1882 on the sixth lot of Range XII., of Orford, in the County of Sherbrooke, by the well-known Orford Nickel Company, which was organized to operate the property. No records of these operations are available, but the quantity of ore was probably insufficient to make the work successful. Millerite, the sulphide of nickel, occurs here in calcite, but I have not been able to learn whether any other ore of nickel was obtained or not. The locality is now important chiefly for its excellent mineralogical specimens—millerite, ouvarovite and pyroxene—which are to be found in collections in many parts of the world.

Conclusion.

There is little detailed information available regarding the serpentine belt in the Shickshock Mountains. The explorations of Dr. A. P. Low and Dr. R. W. Ells, as well as of the earlier geologists of the Geological Survey of Canada, have shown that there is a large

development of these rocks. Considerable prospecting for asbestos has probably since been done, but thus far without success. From such information as is available, the district seems likely to contain chromic iron at least, and prospecting for other minerals may yet be attended with success.

Platinum was found in the gravels of the Chaudiere valley many years ago by Sir William Logan. The natural habitat of that mineral is in the peridotites and serpentines, but it has not yet been traced to its source.

As these imperfect notes will have shown, the present knowledge of this complex series of rocks and the minerals they contain is very incomplete. Much remains to be learned and applied before the mineral resources of this area can be developed to the limit of their capacity. It is hoped that enough has been said to show that the serpentine belt is a factor of much present importance and of still greater prospective value to the commercial life of the Dominion.

FIELD WORK, GEOLOGICAL SURVEY, 1909.

The allotment of field parties, so far arranged for, is as follows:—

Mr. D. D. Cairnes will have a party in the Wheaton-Watson Rivers region in Southwestern Yukon.

Mr. R. G. McConnell will complete his examination of the geology and mineral resources of Texada Island.

Mr. F. H. McLaren will finish his topographic map of Texada Island.

Mr. W. W. Leach is engaged in mapping in the vicinity of Hazelton, Skeena River, and will examine in detail the coal area near Telkwa, discovered by him last season.

Mr. C. H. Clapp will continue his geological investigations on Vancouver Island.

Mr. R. H. Chapman will begin a topographical survey of Vancouver Island.

Mr. W. Sutton will report on the coal rocks of the east coast of Vancouver Island.

Mr. Charles Camsell will continue work in the Similkameen district, more particularly the Tulameen River district.

Mr. L. Reinecke will complete the topographical map of the Tulameen and begin a survey of the west fork of the Kettle River.

Mr. George Malloch will make a geological survey of the Fort George region on the Grand Trunk Pacific.

Mr. O. E. LeRoy will study the geology and ore deposits of the Slocan. He is now completing a geological map of the Sheep Creek mining camp.

Mr. W. H. Boyd will make a topographical map of the Slocan.

Mr. S. J. Schofield will be employed in mapping in the East Kootenay district.

Mr. John Macoun is continuing his natural history collecting in the west.

Mr. D. B. Dowling will investigate the coal lands of Alberta west of Edmonton.

Mr. W. McInnes will continue his geological investigations in the district north of Edmonton.

Mr. W. H. Collins is continuing his examination of the Gowganda district.

Mr. W. A. Johnston will resume his mapping of the Lake Simcoe region.

Mr. M. E. Wilson will be working north of Lake Temiskaming.

Mr. G. A. Young will continue his work in the Bathurst district, New Brunswick.

Mr. J. A. Dresser will continue his investigations on the rocks and economic minerals of the Eastern Townships.

Dr. R. W. Ells will complete his investigations of the oil shales of New Brunswick, and examine the shales of Nova Scotia and Gaspe.

Mr. E. R. Faribault will continue mapping the gold-bearing rocks of Nova Scotia.

Mr. H. Fletcher's field season will be spent on the coal formation of Cumberland County.

Mr. H. Ries, accompanied by Mr. Joseph Keele, will begin a study of the clays of the Dominion. The Maritime Provinces will be examined this season.

PLATINUM CONSUMPTION.

England, United States, France, and Germany are the four chief consumers of platinum. The total annual consumption is about 366,000 ounces. One-third of this is scrap platinum, which, every year comes regularly into the market. Russian platinum production is between 200,000 and 300,000 ounces crude. Other producers are Sumatra and Borneo, Colombia, United States, and New South Wales. It is calculated that about 61 per cent. of the world consumption of crude platinum finds its way to the market secretly. This is high-grading with a vengeance. To prevent this in

Russia it has been proposed that the export of crude platinum from Russia shall be absolutely prohibited. A special Commission is to fix every year in advance the quantities and the prices for the platinum to be sold abroad.

Nickel having come into extensive use in the kitchen, it is important to know what action food substances have on it, and how its compounds may affect a person eating food containing them. Late Russian experiments are reassuring on both points. Substances boiled in nickel vessels took up a small quantity of the metal—from 0.0002 with some foods to as much as 2 per cent. when the acid present is excessive; but a solution containing 4 per cent. of citric acid and 5 per cent. of common salt had only 0.144 per cent. of nickel after boiling three hours in a nickel vessel and then standing 11 hours in the same vessel. The physiological effects of nickel salts were slight, while there was no tendency to accumulate in the body after repeated doses. Nickel in quantities up to a quarter of a gram daily, in the form of lactate or butyrate, was given to two dogs for 202 days, with no result; and a dog that died after taking 9.7 grams (about a third of an ounce) in 40 days had no nickel in its body, its death having been due to some other cause. Doses as large as 1 to 2 grams daily were necessary to give any symptoms of poisoning.

GOWGANDA MINING DIVISION, DISTRICT OF NIPISSING, ONTARIO.

Notes from Preliminary Report by W. H. Collins, Geological Survey of Canada.

Location and Area.

The portion of the Montreal River region with which the present report deals lies in the extreme western part of the District of Nipissing, in the neighbourhood of N. Lat. 47.45, and about 85 miles north of the town of Sudbury. It includes an area of 350 square miles, most of which lies between the two large branches of the Montreal River, which empties into Lake Temiskaming on the west side.

Means of Access.

In 1908 the most used route to the Montreal River district started from Latchford, a station on the Temiskaming and Northern Ontario Railway, 93 miles north of North Bay. From this village, situated on the Montreal River, a line of small steamers made daily trips up the river for 56 miles to Elk Lake. This up-river terminus was then a rapidly growing village. In the spring of 1907 it consisted of a single shack and a cluster of prospectors' tents; when seen in October, 1908, it had a population of over 200 people and all the conveniences of a village of that size, including a post-office with regular mail service, a mining recorder's office, lately removed from Latchford, general stores, hotels, etc.

From this point, which forms the headquarters and point of departure for Montreal River prospecting parties, a variety of routes lead westward. The Montreal River may be ascended to the Forks, where its two branches unite, but the stream is rapid, and, especially in high water, difficult of ascent, besides offering a very indirect route to the most frequented districts. The Bloom Lake route, a map of which accompanies the

Report of the Bureau of Mines, Ontario, 1907, was, during 1908, very commonly used. This route, nine miles in length and consisting of a chain of small lakes and portages, leads, from a point on the main river 11 miles above Elk Lake, directly west to the East branch. From the East branch many courses are open. Both East and West branches are easily navigable. Good portages exist at all these places, so that travel either up or down stream presents no difficulty. Numerous good canoe routes connect the two branches and Duncan and Pigeon Lakes, and allow of easy access to the country in the west.

General Geology—Outline of Geological History.

Though the geology of the region presents considerable complexity of detail, the general historical facts are distinct and go to show that the whole complex of formations and systems is capable of separation into four major divisions widely different from one another. The mutual relationships of these divisions, a knowledge of which is essential to a thorough comprehension of the geology, are succinctly expressed by the accompanying diagram.

The oldest division, the Keewatin, comprises a complex association of metamorphosed rocks, principally eruptive, characterized by well-developed, secondary schistosity and prevalently dark colours. They dip at angles approaching 90 degrees, and range in texture from soft, fissile, chlorite schists to fine-grained gneisses or altered diabases. In the Montreal River district the Keewatin areas are not entirely visible, being overlain by other rocks, but they are thought to represent the bottoms of trough-like folds, produced by the upward

intrusion of igneous matter which now constitutes the Laurentian. The latter forms the second division, its origin being apparent from the foregoing statement. It is wholly igneous, consisting of granite and allied coarsely crystalline rocks essentially pale-coloured owing to their richness in quartz and feldspar. Gneissic structure has been developed in varying degrees, so that all gradations between granite and gneisses exist; but it never attains the perfection found in the Keewatin. Near their contacts with the Keewatin, the gneisses are apt to contain dark bands and ribbons of the latter so highly crystalline as to conceal their identity.

Wherever visible the surface of the Keewatin and Laurentian presents an irregular, deeply worn appearance, the result of extremely protracted exposure to erosive agencies. To the best of geological knowledge the same conditions hold where they lie buried under the Huronian, indicating that a great period of denudation separates the latter from the Archaean. The combined Keewatin and Laurentian, or Archaean system, is therefore to be conceived as forming at all points in the district an ancient denuded foundation or floor upon which rests the much younger Huronian system.

This third division is, in the Montreal River district,

Archaean and Huronian, but is ordinarily distinguishable by its unusual freshness, dark colour, and crystalline appearance. In certain cases, to be described subsequently, it may be confused with certain other diabases. Magmatic differentiative processes have evolved diabase types of very dissimilar appearance and mineralogical composition, of which a pink aplite occurring in dike form is the most extreme. Olivine diabase dikes are also present in the region, but in far less abundance.

Of little importance are the sands and gravels of glacial origin which lie thinly in the depressions and lower lands of the present plaiated surface.

Table of Formations.

The geological events may be briefly enumerated in ascending order as follows:—

Deposits of glacial debris and weathering products of present surface.

Erosive period with glaciation.

Diabase intrusions.

Huronian sedimentation.

Erosion period.

Laurentian intrusion.

Keewatin.

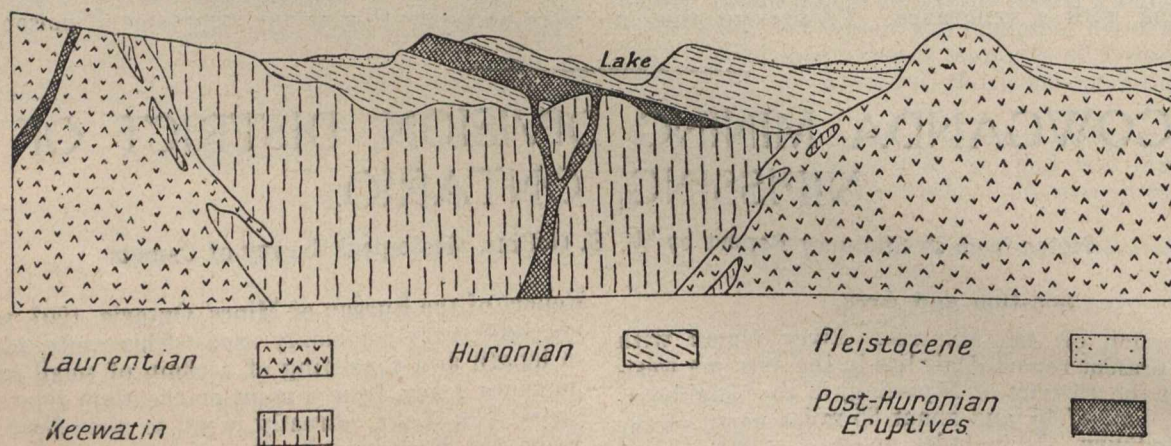


Diagram Illustrating Geological Relationships of Montreal River District.

wholly sedimentary and easily distinguished from the other rocks by its bedded structure and clastic nature. As it is the only sedimentary system represented, its members are not easily confused with any other, especially as their original structure is not obscured by metamorphic alteration. Locally this is not strictly true; in the vicinity of diabase intrusions they have been hardened and shattered so as to simulate the Keewatin, but the zones of alteration are narrow and readily identified by their gradation into adjacent areas of less altered types. At present the Huronian forms a discontinuous rock mantle over the Archaean, formerly more complete, but now worn through in places so as to expose portions of the crystalline basement.

The fourth division includes all eruptives known to be younger than the Huronian. Owing to the discontinuity of the latter it is not always easy to decide what rocks should be included in this group, for in some cases rather fresh-looking eruptives occur in the Keewatin which probably would also intrude the Huronian were it present; lacking the necessary information their chronological position can be only loosely fixed. By far the most extensive and important of the post-Huronian eruptives is the diabase with which the silver deposits are associated. This penetrates both

Economic Geology—Silver—Distribution.

With the knowledge acquired from exploitation of James Township, and other of the more recently discovered silver-cobalt camps, prospectors in the Montreal River district gave exclusive attention to the diabase formation, recognizing it to be closely connected with mineralizations of this kind. Some work was done in 1907, and more in the following season, with the result that on August 4 the first native silver discoveries were made, almost simultaneously and at short distances apart, by Messrs. Mann and Dobie, in the diabase just west of Gowganda Lake. The remarkably rich surface showings at once attracted the attention of the whole prospecting body in the Elk Lake country, and an activity began which, since the spreading of information to outside points, has developed into a "rush" of large dimensions.

The known silver bearing area is restricted as yet to about ten square miles lying between Gowganda Lake and the portage route from Elkhorn to Firth Lakes, and is commonly known as Gowganda. Extensive prospecting only commenced in September, about the close of the field season, so that only the earlier discoveries are known to the writer, and a knowledge of

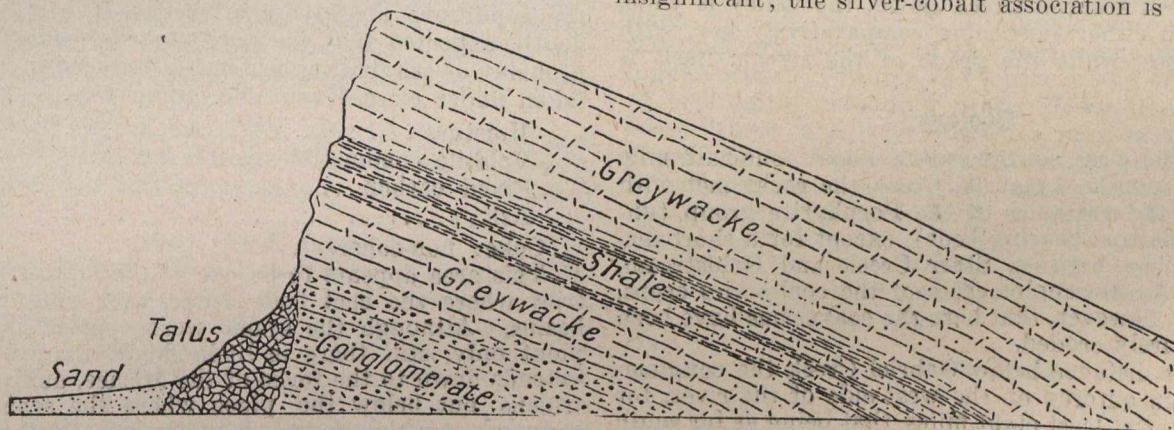
the surface details could only be derived by examination of the few beginnings of patient and continued exploration by claim owners. The present account must accordingly be accepted as incomplete and by no means representing the present status of the Gowganda camp.

Surface Indications.

Conditions in the region are such as to demand exploration of the closest and most intensive order, for the indications of mineralization are negative rather than positive in character. The Gowganda area was entirely forested at the beginning of 1908, and a carpet of moss and vegetable mould covered most of the rock surface. Glacial materials are also fairly abundant, and sometimes thick enough to render surface exploration arduous and expensive. Added to this the veins are eroded more deeply than the country rock, and are represented at the surface by crevices filled with soil, and thereby rendered inconspicuous. Were the country a flat one the difficulties in the way of successful prospecting would be very serious, but fortunately it is rugged, especially near the diabase. Steep ridges of this material are a regular topographical feature. The sides of these ridges are bare or readily exposed, and offer fine opportunities for examination. It is significant that the first silver discoveries were made in the sides of such rock walls.

ture, though not of mineralization, is found to obtain. The whole mineral association is not found in any one vein, nor are the relative proportions either of ore or gangue at all constant. The gangue minerals are quartz and calcite, always mutually arranged in a definite manner. The sides of the veins are composed of white quartz, which may form only an insignificant coating on the walls or may occupy nearly the whole space, but in all cases there remains a central cavity into which the pointed ends of quartz crystals project freely. At the surface this central portion is empty owing to weathering, but farther down it is filled by calcite. Veins with predominant quartz filling seem especially abundant in the Huronian adjacent to the diabase. The rich veins near Gowganda, so far as ascertainable, are poor in quartz.

Practically all of them carry chalcopyrite either as diffuse grains or in considerable amounts. Pyrite is equally abundant, but less constant. Galena is not uncommon. All these occur with the quartz; their presence in the calcite is not certainly known. Many of the veins show diffuse stains of reddish pink colour due to cobalt bloom, which, though not in itself of value, is important as a sign of the existence of smaltite, from which it is formed by oxidation. The minerals enumerated thus far are widespread, but economically insignificant; the silver-cobalt association is present in



Vertical Section Across Huron Ridge, North of Duncan Lake.

Structure of Veins.

The deposits are in the form of well-defined veins occupying fissures in the diabase. The amount of surface work done in September was not enough to throw much light on the continuity of the veins, but a few had been traced for distances of 300 or 400 feet, and in one case across several contiguous mining claims, so that they may be said to occupy persistent fissures. They vary in width from 1 inch up to 20 inches. Little could be learned concerning their attitudes, except where they traverse hillsides; in such cases they are approximately vertical. It is not yet known whether any regularity exists in their arrangement, but some extend east and west, while others are north and south. The diabase shows no signs of extensive deformation, all geological evidence indicating that since its solidification its history has been uneventful, yet the cracks which the veins occupy appear too persistent to be the result of contraction by cooling. Besides the strong veins there are others of the gash type, but the latter are small, not very continuous, and poorly or not at all mineralized.

Composition of Veins.

From comparison of veins at Gowganda, Duncan Lake, and Wapus Creek a general uniformity of struc-

ture, however. Little opportunity existed in 1908 for favourable study of these minerals, so that only a list of those found at the surface can be given. There native silver, argentite, smaltite and cobalt bloom have been found, and a few feet down small lumps of native bismuth. Because they occur either in calcite or in loose decomposition materials filling the space which the calcite formerly occupied they are believed to be associated with that gangue. Infrequently gangue minerals are almost absent and the vein filled by massive ore.

(To be continued.)

Fraser & Chalmers recently gave an exhibition of a new form of tube mill. The new mill, while similar in most respects to the ordinary type, differs in one important feature. An eccentric motion is imparted by attaching the tube to the trunnions off centre. Greater activity is thus transmitted to the pebbles. The degree of eccentricity that will prove most efficient has yet to be determined.

THE BULKLEY VALLEY AND VICINITY.

W. W. Leach.

(From Summary Report of the Geological Survey, 1908.)

During the past season the work undertaken in this district was chiefly in the upper parts of the valleys of the Morice and Zymoetz (Copper) rivers, though some time was spent in collecting sufficient geological and topographical information for the compilation of a new and enlarged edition of the map published last spring.

Morice River District.

As the season was exceptionally late, it was found necessary to spend the earlier part of it in the lower levels; the valley of Clarks fork of the Morice being the first point to be visited. This stream rises with the south fork of the Telkwa, near Howson camp, in a wide, flat pass with an elevation of about 3,600 feet, thence its course is nearly due south for a distance of about 20 miles, when it unites with the main Morice River. Its chief tributaries are Starr Creek, Goldstream, Gabriel Creek, and a large unnamed creek coming in from the east a few miles below Gabriel Creek. From the mouth of Gabriel Creek down, the valley is wide, the hills on either side being comparatively low, with gentle slopes, while the grade of the stream itself is not great.

Geology.

From the pass southward to about one-half mile below the mouth of Gabriel Creek the rocks met with consist of the volcanics of the Porphyrite group (underlying the coal-bearing beds), except for a short distance midway between Starr Creek and Goldstream, where the basal conglomerate of the coal series crops. It appears, however, that here the coal seams have been almost entirely eroded.

A short distance below Gabriel Creek the conglomerates again outcrop on the west side of the river, for a distance of at least eight miles, that being as far south as the valley was explored. Along this stretch the river follows pretty closely the strike of the rocks, near, but usually a little west of a synclinal axis. On the west side the dip of the strata is very low, conforming more or less to the slope of the hills. Practically the whole of the coal measures above the conglomerates has been lost by erosion. On the east side of the valley, however, the hills have a steeper slope; the dips are quite low and the synclinal axis is roughly parallel to, and some distance to the east of, the river bottom. Taking these facts into consideration, it was thought probable that an important coal basin might be found on the east side of the valley. Some days were spent, therefore, in carefully examining a number of small creeks on the east side, with the result that the conglomerates were found outcropping at from one to one and a half miles back from the river, at elevations varying from 400 to 600 feet above it, and with westerly dips. The conglomerate here appears to reach a much greater thickness than where observed elsewhere in this country. Two distinct beds were noted, the lower about 100 feet thick, and the upper probably 30 or 40; they are separated by about 50 feet of soft sandstone. On a small creek, about one mile below Gabriel Creek, and about one mile from the river, the coal-bearing shales were seen overlying the conglomerates. Two coal seams were here found, the lower one show-

ing 3 feet of coal, with no roof, while the upper one gave the following section:—

Clean coal, 12 inches.
Shale, 4 inches.
Coal, 3 feet 6 inches.

Later on in the season this point was again visited, when it was found that during the interim Messrs. C. B. Clark and T. Howson had done considerable prospecting in the vicinity, and staked a number of coal claims. They had opened up what is undoubtedly the upper of the above-mentioned seams, at several points, showing it to be about ten feet thick and dipping to the west at thirty degrees. At none of these openings had they reached below the level of the surface waters, the coal in all cases being wet and decomposed, so that any sample taken at that time would hardly give a fair idea of the character of the coal. The seam, however, appeared to be quite regular, except at one point, where a slight local disturbance was noted.

The following analysis from a sample taken under the conditions already mentioned. It can be confidently expected that the percentage of moisture, and probably of ash, will be materially reduced in a sample taken under more favourable circumstances:—

Moisture	10.81
Volatile combustible matter	31.22
Fixed carbon	48.62
Ash	9.35

Coke: non-coherent.

This area appears to be one of the largest in a district where the coal beds occur, as a rule, in small basins. Although the seams were opened up at one point only, still there is little doubt that this basin extends down to the forks of the Morice, and probably widens out below the place where the seams were stripped, at which point it is approximately three-quarters of a mile in width.

The general attitude of the strata is quite regular; the valley is wide, with an easy grade, and no serious engineering difficulties need be looked for in the construction of a branch line of railway down the Morice River, to connect with the main line of the Grand Trunk Pacific. There is a plentiful supply of timber in the valley for all future mining purposes.

Goldstream Coal.

On Goldstream, to the north-west of this area and separated from it by a short distance only, another important coal basin is found, which was briefly described in last year's Summary. Since then, however, the locator, Mr. F. M. Dockrill, has opened up the seams at several new points, which proves this basin to be at least as large, and probably larger than it was estimated to be last year, viz., two by two and one-half miles.

The following results are from analyses made of samples taken this season:—

	Moisture.	Vol. Comb. Matter.	Fixed Carbon.	Ash.
(1) 8 ft. seam	4.67	30.55	55.23	9.55
(2) 6½ ft. seam	6.36	28.36	58.75	6.53
(3) 3½ ft. seam	6.86	27.24	59.47	6.43

Coke: non-coherent in all cases.

All these samples were from surface coal, so that the percentage of moisture is in all probability higher than what will be found at greater depth.

Zymoetz River District.

Two other coal areas were examined rather hastily, both on that branch of the Zymoetz river which rises with Pine creek near the Hudson Bay mountains.

Glacier Creek Area.

The first of these is situated near the head of the river, which here occupies a wide, marshy valley. The coal-bearing beds were seen cropping in the bed of Glacier creek, a small stream rising in the Hudson Bay mountains and entering the Zymoetz from the east. The contact of the conglomerate and the underlying volcanics is at an elevation of from 500 to 600 feet above the valley, and at this point the strata are very highly flexed and otherwise disturbed, but have general high westerly dips. Following down the creek from the contact, it was seen that everywhere the rocks have been severely folded and faulted till near the flat, where they become more regular, dipping under the valley to the best at about twenty degrees.

Some time was spent here in an endeavor to uncover a workable coal seam, but without success, although a number of small seams, from four to nine inches thick, were stripped. It would appear probable that the large seams of Goat creek are here split up into a number of small ones, though it is possible that larger ones do exist, whose outcrops are covered deeply with drift.

The coal here is very hard, with all the appearance of an anthracite, but the one sample taken showed by analysis such a high percentage of ash as to render it useless.

Coal Creek Area.

About eighteen miles from Glacier creek, down the Zymoetz river on its north-west bank, another area of the coal-bearing beds is met with. The best exposures are seen in a small stream from the north-east, locally known as Coal creek, which cuts the strike of the rocks at a wide angle. The beds here appear in the general form of a shallow syncline, with a general strike nearly north-west and south-east; but there are many minor undulations and the strata were seen to be faulted in a number of places. The width of the basin is probably about two miles, but its extent along the longer axis was not seen, though it is fairly certain that it does not go any great distance south-east of Coal creek. To the north-west the country has a gentle slope, is heavily drift-covered, and for a considerable distance there are no transverse valleys, so that it was found impossible to trace the coal-bearing beds farther in that direction, in the time available.

A number of coal claims have been staked here by Mr. J. Ashman, but so far little or no work has been done. Two small seams only were seen outcropping in the bed of Coal creek, about one and a half miles above its mouth. The lower of these showed 3 feet of clean coal, while the upper one was 1 foot 4 inches in thickness. Mr. Ashman has since informed me that he overlooked another seam that had been uncovered a short way from the bank of the creek and farther upstream, which was about 5 feet thick, with a small parting. The following analysis is from a sample from the lower or 3-foot seam:—

Moisture	5.45
Volatile combustible matter	34.03
Fixed carbon	48.17
Ash	12.35

Coke: partly fritted.

On the other coal properties, which have been described in previous reports, no new work has been undertaken during the past year, as all the owners of the lands in question are waiting for railroad construction, before going to the expense of further development.

Mineral Claims.

During the past season comparatively few prospectors were in the district, and new discoveries of importance were rare, while on the older and better known properties little work was attempted, except the annual assessment work required by statute.

On the Hudson Bay Mountains, more particularly on their western slopes, a number of claims are located and a large amount of prospecting has been done. The geological conditions here are very similar to those in the neighborhood of the copper claims of Howson and Scallon creeks, described in previous reports, the ore occurring in dikes from or near the edge of an eruptive area.

The northern part of the Hudson Bay Mountains is composed of rocks of the Porphyrite group, chiefly volcanics (andesites, tuffs, etc.), but including, towards the top of the series, some sedimentary beds. These rocks have been very severely folded and crumpled; some splendid examples of folding on a large scale showing very plainly on the bare rocky walls of the higher peaks. Towards the southern end of this group of mountains, extending nearly down to the Telkwa River, there is a large intrusive area of granite-porphry, which has shattered, diked and altered the volcanics near its edge to a very large extent, thus affording channels for the ascent of mineral-bearing solutions.

Most of the chief showings are on a group of claims which are quite close together, and reached by a number of short branch trails from the main Aldermere trail.

Coronado Group.

On the Coronado group a considerable amount of work has been done, consisting of open-cuts, by means of which the vein can be traced for the length of two claims. The ore occurs in what appears to be a dike from the intrusive porphyry area, striking about north-east, with a nearly vertical dip, the strike conforming very closely to the slope of the mountain, here very steep. At the lowest opening a cut has been made 35 feet long and 12 feet deep at the face, exposing a lens of almost pure galena, varying from 14 inches in width at the face, to nothing, 12 feet back from it. Four and one-half tons of galena were shipped from the opening to a smelter, but the writer was unable to hear with what result. On the western or hanging wall there are about 3 feet of siliceous vein filling, carrying a little pyrites. A specimen of the clean galena gave by assay: gold \$1.20, and silver 62.63 oz., to the ton.

In the other cuts, farther up the mountain, the ore shows much less galena, but the mineralization is fairly heavy as a rule, one opening exposing about 4 feet of ore with no walls, the ore consisting of galena, blende, arsenical pyrites, pyrites, and lead carbonate in a quartzose gangue, but all much decomposed. A sample from this point assayed as follows: gold \$10; silver 3 oz., to the ton.

Near the eastern boundary of the Coronado, on the west bank of Sloan Creek, a similar and parallel ore body has recently been discovered. Here a lens of galena, nearly pure, but carrying a little blende and

chalcopyrite, has been uncovered, the greatest width of solid ore being 14 inches. This vein has been traced about 200 feet along the strike to the north-east; but as only the surface dirt has been removed in two or three small holes, the character of the ore could not be definitely seen. A specimen of the solid galena on assaying gave: gold \$4.40, silver 36.47 oz., to the ton.

Victor Group.

The Victor group, consisting of the Standard, Victor, and Triumph claims, is situated west of the Coronado. The ore occurs in and along the east wall of a dike about 60 feet wide, striking about north-east, and dipping at 80 to 90 degrees southwest. It has been traced by means of open-cuts up the hill for a considerable distance. In the lowest cut about 3½ feet of ore is exposed, consisting of galena, blende and pyrites, irregularly and rather sparsely distributed in a gangue of altered dike rock and a little quartz. The ore appears to follow a line of faulting and shearing parallel to the walls of the dike. Fifty feet up the hill the ore has narrowed down to about 8 inches, with 3 inches of clean galena, a specimen from which assayed: gold, trace; silver, 43.33 oz., per ton.

Continuing up the hill, a number of superficial cuts show the dike rusty and decomposed, and varying from 12 to 60 feet wide, with mineralization strongest along the hanging wall. In one of these cuts about 2 feet of ore was seen, composed of blende, arsenical pyrites, with a little galena and chalcopyrite. At the highest opening up the mountain, about 2½ feet of ore is exposed, here highly decomposed, and consisting of stringers of galena, associated with much lead carbonates. A sample from this point gave the following results by assaying: gold, 20 cents; silver, 39.20 oz., per ton.

Dominion and Newcastle Group.

The Dominion and Newcastle claims are located on the east bank of Sloan Creek, near its head. On this property a dike about 6 feet wide cuts the country rock, consisting of greenish and grayish andesites. The dike, with nearly vertical dip, has the usual northeast strike, and where opened up by means of a shaft and several open-cuts is very heavily mineralized, the chief constituents of the ore being blende, arsenopyrite, iron pyrites, a little chalcopyrite and a very little galena, in a gangue of altered dike rock and much quartz.

Two samples were taken here, the first consisting of the general run of the ore, while the second was from a band of almost pure arsenical pyrites; the results by assay are as follows: (1) gold \$5.80, silver 12.40 oz.; (2) gold \$3.60, silver 0.55 oz.

Humming Bird Claim.

On the Humming Bird claim very little work has been done (by no means sufficient to prove the extent of mineralization) consisting of several small cuts, the chief one of which is about 15 feet wide, with neither wall uncovered. The rock is much decomposed, with a considerable quantity of a black, earthy material on the surface, which in the laboratory was proved to consist largely of pyrolusite. Beneath this decomposed material the ore is composed of blende, arsenical pyrites, galena, and iron pyrites in a felsitic gangue of altered dike rock, much shattered and brecciated; the mineralization being irregular and somewhat sparse. An assay of a sample from this cut gave the following result: gold 60 cents, silver 10.37 oz. per ton.

Limestone.

As limestone suitable for smelting purposes has not before been noted from this district, the discovery of a bed of good quality may be of interest. This limestone occurs on the north side of the pass followed by the old trail from Moricetown to Hankins camp, on the Zymoetz River, and not far from the summit. As the only outcrop seen was in heavy timber, it was impossible to ascertain the thickness of the bed, but it would appear to be of good size. The following analysis was made in this office:—

Insoluble matter	1.31
Fe ₂ O ₃ Al ₂ O ₃	1.30
Ca CO ₃	92.41
Mg CO ₃	3.63

As the writer was on the point of leaving Hazelton for Ottawa, a number of samples of ore were brought in from a reported discovery near that town. The ore consisted chiefly of stibnite, and gray copper. As the snow was then deep in the mountains, it was not possible to investigate this new find at that time.

BOOK REVIEWS.

Electro-Magnetic Ore Separation. By C. Godfrey Gunther. 193 pages. Illustrated, \$3 net. Hill Publishing Company, 505 Pearl Street, New York, 1909.

Searchers after information concerning electro-magnetic ore separation have had to be content with brief paragraphs or chapters in text-books on ore dressing. Mr. Gunther's volume is a compilation of the best available material, supplemented by data gathered by the author himself or submitted by mill managers and manufacturers. One object has been to include only facts which are of present commercial importance. Evidently selection and rejection have been necessary. Mr. Gunther informs us in his "Introduction" that in the United States alone over three hundred patents have been granted on magnetic separators. "The magnetic separator has been developed, in most instances, for the exploitation of individual ore deposits, and the different types and modifications so produced might well form subject matter for a book. . . . In view of the above facts the broad practice of magnetic separation is incapable of monopoly, and its application is not determined by any one machine."

Another paragraph indicates Mr. Gunther's conception of the function of magnetic separation: "In its own field, which will be hereinafter outlined, magnetic separation is a useful adjunct to the specific gravity processes, but it is in no sense a competitor with these processes, except in the concentration of magnetite iron ores, and in this application is a success backed up by many years of profitable operation."

The book is divided into eight chapters. Into each of these we shall glance.

"Magnetism Applied to Ore Dressing" is the caption of the first chapter. Mr. Gunther outlines the whole study of magnetism. The application of magnetism to ore dressing is the phase of the subject with which mining men are concerned. This, then, is what Mr. Gunther proposes to present. Even in ore dressing, magnetic separation has many refined applications that have not yet become commercial. Magnetic concentration has been applied principally to the treatment of magnetic iron ores, eliminating the gangue and partly separating the phosphorus and sulphur minerals. Not

only magnetites, but limonite, chalcopyrite and other minerals are amenable to this treatment. The applications of magnetic separation are much more numerous and complex. After roasting, pyrite and marcasite become magnetic. Calcination transforms siderite and ankerite into magnetic compounds. Thus the separation of these minerals from zinc blende, a wasteful and inefficient process when attempted by wet methods, becomes possible by magnetism. There are other applications too numerous to mention, and, as the richer ores are becoming exhausted, the necessity of attacking lower grades gives more and more importance to magnetic methods.

The difference between specific gravity and magnetic-separation processes is that one utilizes differences in the specific gravities of the minerals to be separated, and the other utilizes the differences in their magnetic permeabilities.

Chapter II. gives the principles of magnetic separation, and preparation of the ore mixture to the magnetic field, attraction of the magnetic particles, removal of the attracted particles from the magnets, necessity of making a middling product, cleaning magnetite concentrate, treatment of fine material, are a few of the stages discussed in this chapter.

Chapter III. describes many types of separators for strongly magnetic minerals. The Grondal, Wetherill, Edison, Wenstrom, and other well-known machines are here illustrated.

In Chapter IV. are presented descriptions of separators for feebly magnetic minerals.

The concentration of magnetite ores is discussed in Chapter V. Results from the concentration of magnetite ores at representative mills, using different kinds of separators, are given. Briquetting of concentrates is touched upon. Several very useful flow sheets are included. This chapter is most instructive.

Chapter VI. deals with the separation of pyrite and blende; Chapter VII. with the separation of siderite from blende; Chapter VIII. with the separation of miscellaneous ores and minerals.

Throughout the book the aim of the author evidently has been to give practical point by taking instances and illustrations from actual practice. Whilst the book is frankly a compilation, the principles that form the basis of magnetic separation and concentration have not been neglected. The author's personal familiarity with his subject has enabled him to weld the various chapters into a coherent whole. His book is timely.

The Mining Manual for 1908. By Walter R. Skinner.

A record of information concerning mining companies, arranged in three sections, Australian, African, and Miscellaneous. Twenty-second year of publication. Price \$5 post free.

There are two manuals that every mining engineer should possess. Skinner's "Mining Manual" is one of them. The other, incidentally, is Stevens' "Copper Handbook."

It is impossible to do more than merely enumerate some of the leading features of Mr. Skinner's wonderfully complete volume. Monthly returns of gold outputs, over a period of years, are given for Australasia, Africa, India, and, in the Miscellaneous Section, for many other countries. In addition, lists of mining company directors, of mining company secretaries, and of

mining and consulting engineers and mine managers are appended.

Not only are the names of directors, amount of capitalization, conditions of flotation, etc., etc., specified for each company; but, so far as possible, the financial and physical conditions of each company's property are indicated.

The "Mining Manual" is a supremely useful work. It is a unique compendium of mining information, a directory, and a statistical and historical review.

EXCHANGES.

Mining and Scientific Press, May 22, 1909.—The evolution of stamp-milling practice on the Rand has been saner, more gradual, and more successful than in the United States. This is the gist of an editorial in the current number of the Mining and Scientific Press. "For about ten years, stretching from 1890 to 1900, a sudden outburst of invention from the United States expended it fury in high-weight stamps. The increase from the old standard 750 to the 900 pounder was mainly promoted by cheaper transportation; the change could be made without altering the lines of mortars adapted to the lighter stamps; but when 1200-pound stamps were tried in the old mortars the output suffered, and costs were not reduced." To remedy this, "everything was done except to work out new mortar-patterns on the old model, adapted in details to the larger mass of pulp and to the altered wave-motion." Contrast this with the steady improvement of practice in South Africa. Here the mill superintendents, "with that spirit of conservatism which is so strong in British people, have been working out this problem according to the true principles of evolution, that of gradual change. . . . The result is that 9 tons of ore per stamp per diem is a common duty to-day on the Rand, obtained with 1,600-pound stamps." United States stamp-milling has not kept pace with the Rand. Nine-tenths of United States mills may be pronounced anachronisms. The cyanide process has advanced faster in the States than in South Africa. But the engineers on the Rand "are coming down the home-stretch at a rapid pace. They have perceived the need and value of co-operation and exchange of ideas as we have not."

The Mining Journal, May 22, 1909.—In a lengthy editorial the Mining Journal animadverts upon the disabilities under which the gold mining industry of Rhodesia suffers. The mining rights are vested in the British South Africa Company, which company administers the law. Recently, ordinances have been promulgated imposing a graduated tax upon the gross output of gold mines. The tax ranges according to the value of the gross output, from 2½ per cent. to 7½ per cent. The tax on base metal claims is lighter. But a property yielding ore from which any gold is extracted must be registered as a gold reef claim, and pay at the above rates for its total production. The Mining Journal quotes an instance in which the value of copper recovered is greater than that of the gold. The royalty in this case would amount to 20 per cent. of the mines' net profit. It is predicted by our contemporary that new enterprises will need exceeding attractive propositions to induce them to face these conditions.

PERSONAL AND GENERAL.

Mr. A. A. Cole, mining engineer to the T. & N. O., was in Toronto on June 7.

Hon. Mr. Templeman, Minister of Mines, is to visit Nova Scotia and New Brunswick some time in June.

Mr. F. G. Stevens, mining engineer, of Etzatlan, Jalisco, Mexico, was in Toronto on June 3rd and 4th. Mr. Stevens is a graduate of the Kingston School of Mining.

The Minister of Labour has appointed Mr. Charles Archibald, of Halifax, N.S., to the Conciliation Board that is arbitrating between the Cumberland Railway and Coal Company and its employees.

Mr. A. H. Brown, of Cobalt, Ont., who has made a specialty of cyaniding and milling, was in Toronto on May 31st. Mr. Brown, after spending a month in Gowanda, will return to Cobalt. His headquarters there will be the Coniagas mine.

Correspondence.**Letter from Sir Henry Mill Pellatt.**

J. C. Murray, Esq.,
Canadian Mining Journal,
Toronto.

Dear Sir.—The death at Cobalt of Mr. E. L. Fraleck, Mining Engineer, after a short illness, came as a great shock not only to the management of the Cobalt Lake Mining Company, but also to his numerous friends throughout the Province.

Mr. Fraleck has been superintendent of the Cobalt Lake Mine since its organization in February, 1907. He always had the support of the directors of the company, as they had absolute confidence in his integrity and ability.

Mr. Fraleck's work was for many reasons one of the most difficult in the camp, but he was able to surmount all obstacles successfully.

The company will have great difficulty in securing an engineer to fill the position left vacant by the death of Mr. E. L. Fraleck.

HENRY M. PELLATT,
President Cobalt Lake Mining Company.

LETTER FROM MR. MARRIOTT TO THE SECRETARY OF THE C. M. I.

1 London Walls Bldgs.,
London, E.C., May 13, 1909

The Secretary, Canadian Mining Institute,
Rooms 3 and 4, Windsor Hotel, Montreal.

Dear Sir,—I beg to thank you for your favour of the 28th ult., containing a circular in connection with the prize offered to your Institute by Messrs. Frecheville, Commans and myself.

We note that, therein, you have further explained the scope of the papers eligible for the prize. Elimination of some sort is doubtless necessary for the guidance of the judges of the papers presented, but it appears to us that the wider the scope of the competition the more competitors will it include and the more valuable will it be to the Institute. Our object in stipulating that the papers accepted shall include the most recent developments was to ensure that they should contain up-to-date matter which would be instructive to us, your guests of last year, and generally useful as containing the most recent information of Canada. If the contributors elect to put in still more work and to enlarge their papers to include history leading up to these recent developments, so much the better.

We trust that the prize will bring forth many competitors, and that it will produce several papers worthy of your country.

Yours faithfully,
(Signed) HUGH F. MARRIOTT.

SPECIAL CORRESPONDENCE**NOVA SCOTIA.**

Glace Bay, June 4.—"Gluckauf" of the 15th May contains a summarized translation of articles which have appeared in the "Canadian Mining Journal" relating to the Dominion Coal Company's Rescue Station, and of a paper describing the use of breathing apparatus at the Sydney Mines Fire, which was recently read before the Institution of Mining Engineers in England. The article is very complete, and is from the pen of Bergassessor Grahn, a prominent German engineer, who has made a specialized study of mine rescue apparatus. An earlier issue of "Gluckauf" contained the first part of a description of Canadian coal and iron mines by Dipl. Ing. Kraynik, one of the gentlemen who visited Canada last summer on the occasion of the joint visit of the Iron and Steel Institute and the Institution of Mining Engineers. Herr Kraynik's article is extraordinarily complete, considering the brief stay he made in this country. "Gluckauf" is the leading mining periodical of Westphalia, and the consecutive appearance of two such complete descriptions relating to our Canadian mining industry is a proof of the useful nature of such visits as that just referred to, and also of the interest that our industries are creating in Europe.

The Board of Conciliation asked for by the U. M. W. A. at Sydney Mines has been granted by the Government, but the Board is not yet constituted. The Nova Scotia Steel Co. refused to appoint a representative, and the Government appointed Judge McGillivray. As at Glace Bay, the U. M. W. A. representative (and incidentally District U. M. W. A. President) failed to agree with the company's representative on a third arbitrator, and this duty will again devolve on the Government. Although this is the second occasion on which the U. M. W. A. President has been accepted by the Government as an "arbitrator" on a Board of Conciliation, it has not become apparent how such an interested person can "arbitrate" on the matters which the Conciliation Board will have placed before them.

At Springhill Mines the same procedure has been gone through as at Glace Bay and Sydney Mines. At this place Messrs. E. P. Paul and Charles Archibald could not agree on a third member and the Government has appointed Judge Longley as chairman.

For a society which has passed a resolution utterly condemning the Canada Industrial Disputes Act, root and branch, the U. M. W. A. nevertheless bids fair to become a record applicant for Conciliation Boards. Three in Nova Scotia, one in Alberta,

and further trouble brewing in British Columbia (where the U. M. W. A. is trying to call out the miners of Vancouver Island in a sympathetic strike with those in the Nicola district) is a fair number of disputes to have going on at once.

One of the pet shibboleths of the U. M. W. A. delegate in Canada is that his society is not here "to make trouble." The facts hardly tally with the expressed aims of this society.

May outputs were a decided improvement on those which have been obtained so far this year, although they were, of course, much less than those of last year. It is probable that although the production of coal will not reach such high figures as it did last year, yet the outputs will be more evenly sustained throughout the late summer and the autumn. There is a distinct optimism in Cape Breton just now, and so far this year more money has been spent on the erection of house property and improvements than has been the case for several years past.

The yearly examination for manager's underground, manager's and overman's certificates of competency has been held in Sydney, occupying three days, beginning June 1st. An unusually large number of persons presented themselves for examination. It is said that this is the last occasion on which the examination will be conducted under the present Board of Examiners, and that shortly the examination of aspirants for certificates will be placed under the direction of the Director of Technical Education.

The limitation of certificates of competency for mine officials by provincial enactments is a matter that we think should be remedied. There does not appear to be any good reason why a man who is considered competent to undertake the direction of a mine in Nova Scotia should not be qualified to act as an official in Alberta or British Columbia. We do not suggest that the provincial governments should not issue such certificates in each province, but it should not be necessary for a fully qualified mining engineer to undergo an examination in every province in which he may happen to be engaged. Some day, no doubt, the Federal Government at Ottawa may see fit to issue a certificate that will cover the whole Dominion. Such a certificate would, of course, require to be surrounded with conditions and safeguards which would prevent any abuse thereof.

ONTARIO.

Cobalt.—The pipe for the Hydraulic Company is being distributed around the camp, and it is now stated that air will be ready for delivery about the first of August. It is very doubtful, however, if this will be possible, considering the amount of work still to be done. More machine drills have been ordered for the cutting out of the air chamber above the tunnel, it being found that the hammer drills did not give good satisfaction. There are nine miles of 20-inch pipe to be laid between Ragged Chutes and the town, and from the end of this line a 12-inch loop will encircle the town. In addition there will be branch lines out by the Colonial and Kerr Lake Mines. The pressure in the main will be about 110 pounds to the square inch, and the air is to be delivered at the mine at a pressure of 100 pounds. Large users will buy air by meter, while the smaller consumers will pay according to a sliding scale. The terms are as follows:—

For large consumers buying by the meter, twenty-five cents per thousand cubic feet of air at 100 pounds pressure. The following rates per drill per ten-hour shift have been fixed upon for the smaller users:—

1 drill, per 10-hour shift.....	\$5 00
2 drills, per 10-hour shift.....	4 00
3 drills, per 10-hour shift.....	3 50
4 drills, per 10-hour shift.....	3 13
5 drills, per 10-hour shift.....	2 80

In addition, those mines not using more than five or six drills will have to pay for their own connections with the main

line. Figuring on the basis of twenty-five cents per thousand feet, this gives the cost per drill for one shift approximately \$2.50, that is, supposing the drill to be working all the time. In reality, however, the machine is actually drilling little more than half the time, which gives a net cost per shift of about \$1.25. This leaves a very wide margin in favor of the consumption by meter, and it is altogether probable that before anything definite is done in the matter, some concerted action will be taken by the mines to force the Hydraulic Company to give a more uniform rate to all purchasers.

The transmission line for electrical power from Fountain Falls is expected to be completed about July first. The rates are stated to be as follows:—Under 25 h.p., 3 cents per kilowatt hour; between 25 and 50 h.p., 2 cents per kilowatt hour; between 50 and 100 h.p., 1 3-4 cents per kilowatt hour; between 100 and 200 h.p., 1 1-2 cents per kilowatt hour; between 200 and 300 h.p., 1 4-10 cents per kilowatt hour; between 300 and 400 h.p., 1 3-10 cents per kilowatt hour; between 400 and 500 h.p., 1 2-10 cents per kilowatt hour; over 500 h.p., 1 cent per kilowatt hour. In addition to this there will be a service charge of \$1.00 per month per horsepower on the rated capacity of the meters. A discount, with a maximum of 13 per cent., will be allowed, the same to be based upon the load factor.

Progress is being made on the erection of the new concentrator for the Colonial Mine. The framework is being erected and the stamp batteries are already set up. A five by sixteen foot tube mill to be direct driven from a motor has also been ordered. The mill will not turn over until the electric power company have their power ready for distribution, and it is expected that the mill will be completed by then.

The largest float, silver nugget ever seen in this district was found on the property of the Gem Mining Company, situated near the southeast part of Giroux Lake. It measures 5 feet 7 inches in length, is 2 feet 4 inches wide, and about sixteen inches thick. The weight is over a ton. The company will shortly start trenching on the property.

Following the discovery of ore in the Beaver Mine, the company has decided to rebuild their plant, which was burned down some time ago. The new vein is being drifted on, and the values are as good or better than when it was first discovered.

There is a great rush up the Montreal River from Latchford, eight hundred men having made the trip up on the boats in six days, while a great number had to remain behind, failing to get accommodation. Over thirty cars of freight billed up the river are tied up at Latchford owing to the inability of the navigation company to handle them in the present condition of the river.

The opening of navigation has caused increased activity to be displayed in the district of South Lorraine. Among the principal properties in this section are the Keeley, Wettlaufer, Haileybury Silver, Montrose, South Lorraine Development, Harris, Kelley-Jowsey-Wood, and the Great Northern. The majority of these properties are controlled by Buffalo capitalists. The Kelley mine is installing a large plant consisting of a 150-h.p. gas producer and a 12-drill compressor. The Wettlaufer is also installing a plant consisting of two 60-h.p. boilers and a five-drill compressor, which it is expected will be running in about a month's time. The South Lorraine district was located in the fall of 1907, but work was not started until the following spring, and although up to date the amount of ore shipped has been small further development is expected to bring the district well to the front.

Work will be stopped in the drifts of the Station Grounds Mine until the air from the Hydraulic Company is ready for delivery. Previous to this the company had been purchasing air from the Cobalt Lake. In the meantime prospecting will be carried on with a diamond drill.

At the Farah Mine the second discovery within two weeks was made on May 24th, when a new vein carrying silver was

discovered. The shaft, which is being sunk about the middle of the property, has reached a depth of 100 feet, but will be continued deeper before a crosscut is started.

Recently one of the easterly workings of the Nipissing went through the Keewatin formation into the diabase. As it is generally considered that the diabase was the agent that brought up the valuable minerals this discovery will probably have an important bearing on the future development of the mines. More extensive exploration of the Keewatin may be looked for in the future, and the probability is that a good deal of diamond drilling will be done to determine the thickness of this series.

The Crown Reserve now has workings about 60 feet deep in the Keewatin and the values are reported to be fully as good as in the overlying rock. One of the Nipissing veins has also at the present time excellent values in the Keewatin.

On May 28th another new strike was made at the King Edward Mine, on the No. 5 vein. The ore shoot was encountered while drifting west at the 80-foot level, and it is about four inches in width, consisting of calcite and native silver.

One of the finest specimens of silver ore ever produced in Cobalt was taken recently from the Crown Reserve. The piece measured 18 x 22 x 16 inches and is valued at over \$2,000. It has been sent to the Geological Survey at Ottawa and will form a part of their collection.

The Keystone Cobalt Mines, Limited, owning property in South Lorraine, has started work at surface prospecting. This property was purchased last fall by Bradford, Pa., parties.

There are two diamond drills operating at the Foster Mine. One is at the 210-foot level and the hole is now under Glen Lake. The formation is Keewatin and it is desired to ascertain whether or not the Huronian slates come in, as was found to be the case underlying the diabase at the Big Pete. The other drill is working on the surface. Two machine drills are also being worked underground.

The report of the Otisse-Currie shows that up to date the sum of \$31,000 has been spent on the development work, plant, supplies, etc. It is proposed to sink another shaft in the north-east corner of the property on a vein found in that section, and the different shafts will be connected underground. The present shaft is also to be sunk to a depth of 150 feet, at which level a crosscut will be run across the property, after which sinking will be continued to a depth of 250 feet. It is proposed to continue the ore shipments during the summer months by hauling to Elk Lake and from there shipping by boat to Latchford.

At the Big Pete mine of the Cobalt Central about four hundred feet of work has been done in the Huronian slates underlying the diabase and the results are very satisfactory, some of the finest showings in the mine being found at this depth. The shaft which down 260 feet, will be continued another 50 or 75 feet as soon as possible. The diamond drill has shown that all over the property the Huronian slates underlie the diabase, the knowledge of which will be of great value to the Big Pete and the surrounding mines in deciding upon their future development. During the month of May the Cobalt Central Mill treated 750 tons of low grade ore for the Kerr Lake.

The Donaldson claims at Bloom Lake have been sold to New York capitalists. Mr. J. Hermon, formerly of the Progress Mine, will take charge of the property.

Last fall Mr. A. M. Bilsky and his associates in the Jacobs Exploration Company purchased 168 acres adjoining the Nipissing and Chambers Ferland on the north and the Temiscaming and Hudson Bay to the north-east. To operate this property a company, known as the Cable Silver Mines Company, Limited, was formed. This is a close corporation. A considerable force of men are now engaged in trenching and some good indications have been uncovered. As soon as the air from the Hydraulic Company is on the market preparations will be made to sink.

The Silver Nugget is a property that adjoins the Lawson and the University on the south, and it takes in a part of the eastern portion of Giroux Lake, in which there is located an island of considerable size. On this island a shaft was sunk to a depth of 120 feet on a 4-inch vein of calcite, carrying iron, copper and galena, and from the bottom 150 feet of drifting was accomplished. At the time this work was being carried on compressed air was leased from the University Mine, but subsequently when operations commenced on the Lawson the lease for this air expired and now new arrangements will have to be made to secure similar power. In the meantime, while these arrangements are being made, two diamond drills will operate, one to be placed on the island and the other on the mainland, and the holes will be bored to tap the veins at depths of 200 feet from the surface. The indication which will be tested on the mainland is a decomposed calcite vein about nine inches wide. A great amount of interest has been shown in this as it has been traced on the surface from the southern extremity of the famous Lawson vein. This property also belongs to the Jacobs Exploration Company.

A short time ago a number of engineers working for the Provincial Government commenced a resurvey of the 20-acre lots of the Gillies Limit, which have been put up for disposal by private tender. Those best posted say that sale will not create nearly the amount of interest formerly expected. Had it taken place two years ago the Government would have been ahead to the extent of millions of dollars. Lack of interest is due largely to the fact that the Provincial Mine, which is surrounded by the lots to be sold, is so far a flat failure. About \$100,000 has been expended on the mine, while the returns from ore shipments will hardly net a tenth of that amount.

A new record for ore shipments in the Cobalt camp was made in the month of May when 43 cars of high grade, 2 cars of medium, and 35 cars of low grade were shipped. This makes 80 cars of ore, having a total weight of 5,017,433 pounds.

BRITISH COLUMBIA.

Rossland.—The sempiternal optimism of the Rossland mining and business man is once again to the fore and in this district it is felt that there are busy and prosperous days in store for the mines of this camp in the very near future. Well may we feel a little hopeful as we look over the situation at the Centre Star group of the Consolidated Co., working conditions at the mines of the Le Roi 2, Limited, activity in the South Belt, the growing industry of the big smelter and refinery at Trail, a few miles down the hill, and the assurance that a big plan of development from the 1,650 to the 2,650 levels will be begun at the Le Roi mine as soon as a few financial arrangements have been completed by that indefatigable managing director of the Company, Mr. Anthony J. McMillan.

The production of the Consolidated Company's smelter at Trail for the month of April was as follows: This work treated 35,490 tons of gold, copper, silver and lead ore, extracting 410 tons of copper matte and 2,264 tons of lead bullion, which contained in gold, \$214,835; silver, \$101,891; copper, \$44,232; and lead, \$146,110, or a total metallic production of \$507,068. Of this product the refinery turned out metals to the value of \$246,371. From June 30th, 1908, to April 30th of this year the Trail smelting works produced precious and useful metals to the value of \$4,088,940, about \$2,096,461 of which must be credited to work at the up-to-date refinery in operation there. If this rate of production is maintained until June 30th, 1909, this year's product will be worth nearly \$1,800,000 more than that for the last fiscal year. This certainly shows progress.

The gross production of the Le-Roi 2, Limited, for April was \$67,770 for 2,200 tons of gold-copper ore, or something over \$30.80 per ton, making the net profits of the company for that

month between \$35,000 and \$40,000; this spells a magic word to the stockholder—dividends.

The president of the Blue Bird Mining Co., visited the camp a few days ago and looked over the property. Drifting on the ledge is in progress and ore is being got out for shipment. The ore at 40 feet deep in the shaft, where 60 feet of drifting has been done, maintains a width of one to three feet and looks persistent. The reef on which this property is located runs through the south belt and in a westerly direction over the hills to the Southeastern Boundary district; there are mines working at different points along its course and it is probable that this vein will become well known in local mining annals before many years have passed. The present lessees of the Blue Bird may have to give up their lease when it expires, which will be in about five months, as Mr. Carter is trying to work out a plan whereby the Company will take over and operate the property itself after the expiration of the present lease. On this same lead the Hattie Brown and Richmond are also working at present. Shaft work is being done on both properties with a view to developing the vein.

Boundary.—The Boundary ore production for the week ending May 29th (18,377 tons) exceeded that of the preceding week by 4,637 tons, and it is more than likely that next week will see an even greater increase as during the past week the third augmented furnace at the Grand Forks smelter of the Granby Consolidated was put into operation and the next few days will see No. 4 blown in and work resumed at the Gold Drop outlet. The Granby and Snowshoe are the only steady shippers in this district just now, with an occasional shipment from the Golden Eagle and Sally. It is to be hoped that the B. C. Copper Co. will resume work early, now that the Alberta coal miners' strike has been settled, and that the Dominion Copper Mines will be on the shipping list again in the impending future, as present rumor would have it. Of course, this last looks doubtful, there are so many factors in the case, but if some party gets a cinch on the property at the sale in Vancouver, May 28th, then it is likely that work will be started, for it costs too much to let a big mining and smelting property like this lie idle. The mines have been kept unwatered and the machinery in good repair so that it would be no gigantic task to start work.

The Snowshoe Mine is shipping 10,000 tons of ore per month regularly to Trail smelter, where it is valuable as a flux, and is used with the Rossland and Slocan ores. All ore is at present being taken from above the tunnel level in the Snowshoe, there being an abundance for all present requirements, and the mine will not be unwatered below the level of the adit for the present. The report of the Snowshoe Mining Co. shows that that company is making a good profit on its lease of the Mine to the Consolidated Co. and is steadily paying off some of its old debts at the bank.

The Canadian Pacific Railway Co. has commenced surveying the 12-mile branch line that will run south from Hartford to Wellington and Central camps and to the Lone Star Mine in Washington, which the B. C. Copper Co. controls. This will give the Copper Co. railway facilities for its No. 7 mine in Central and its Athelstan Fr. and Jack Pot claims in Wellington. The company has 200,000 tons of ore ready for shipment from the No. 7 and about 80,000 tons from Wellington. This would seem to predict heavy operations for the B. C. Copper Co. during the latter months of this year.

This work of driving the big tunnel at Greenwood is now going along smoothly and the adit has been advanced nearly a hundred feet into the hill already. The operators, the Greenwood-Phoenix Tramway Co., are contemplating the installation of an eight-foot tunnelling machine of the Swiss-Chandler type. This will cost in the neighborhood of \$60,000 but in the end would prove very economical, under good working conditions.

The shaft on the Golden Zone, near Hedley, is now down about 115 feet and at that depth the vein has been proved up ten feet wide and assays of \$20.67, \$45.47 and as high as \$82.68 per ton in gold and \$1.10 silver have been obtained. The five-stamp mill will shortly be put into operation. This mill is equipped with ten-stamp equipment and the other five stamps will be added when required.

Slocan—East Kootenay.—The much jumbled affairs of the Sullivan Group Mining Co., with mines at Kimberley and smelter at Marysville, are again on the carpet and owing to the backwardness of some 35 per cent. of the shareholders, the bondholders are going to take things into their own hands and proceed with reorganization. The latest plan set forth is to issue 1st preferred stock bearing 7 per cent. annual dividend, to cover the amount of the bonded indebtedness, with interest, amounting to over \$400,000. Second preferred stock, bearing same dividend rate, will be issued to cover the other outstanding liabilities, which are over \$60,000. This stock, however, will differ from the 1st preferred in that it will be subject to recall by the company at par. Common stock will be issued to the amount of the 1st preferred stock and this will be divided among the bondholders, as they are, of course, to pay all costs of reorganization, etc. The bonds are at present held by the Federal Mining & Smelting Co. in which the Guggenheims are heavily interested. The Sullivan Company's smelter is said to be worth about \$500,000 and there are about 150,000 tons of ore blocked out in the mine which will average 15 per cent. lead, 6 1-2 ounces silver and a percentage of zinc—and "there's the rub." It is the zinc, probably combined with a little poor management, that has got the company into its present fix. The ore is difficult to treat now that the zinc has come in more plentifully at depth and this problem the new company will have to solve to put the concern on a first-class basis of operation.

The manager and part owner of the rich Westmount claim has just returned from the east where he has made arrangements for a plan of development to be done on that property. The work will be begun at once, on No. 3 tunnel. It will be remembered that Mr. Griffith drove his 1000-ft. prospect tunnel alone in the rugged hills, working sometimes for months at a stretch without hearing the sound of a friend's voice; such pertinacity certainly deserves the reward that Mr. Griffith reaped when he broke into the long-coveted ledge, from which he shipped nearly 400 tons of high-grade silver lead ore last year.

The Dunsmuir interests, whose name is synonymous with big coal mines in this Province, will begin work on the Noble Five group at Sandon in the near future. This is a promising property which local miners have tried in vain to lease lately, knowing its prospective value. Part of the ore is of a concentrating character and there is an old concentrator on the ground that will be fixed up.

A gold strike has been made on the Cascade river near Devil Creek, about three miles from Bankhead, Alta. Samples of the sand submitted for analysis to Dr. Taylor of Bankhead, show coarse-grained gold in good quantities.

The McGillivray Creek Coal & Coke Co., near Coleman, have just about completed arrangements for the installation of 10,000 feet of electric railway from the mines to the track of the C.P.R., also for a new steam power plant and tipples. The stock of the company is heavily held in Spokane, Wash., and B. E. Sharp of that city is secretary and treasurer. The company owns 3,000 acres of promising coal land is forging ahead in good shape.

It is stated that work will be resumed on the Mohican group of the Poplar Creek gold mines in a short time. There is a very good body of concentrating ore in the tunnel on this property. Nine tons have been shipped as a test, but as railway facilities have been lacking it has been difficult to get ore out to the smelter.

May 29th, 1909.

GENERAL MINING NEWS.

NOVA SCOTIA.

Springhill Mines.—One May 28th Tillman White was fatally injured in No. 2 shaft. He was caught by the trip. White was a native of Springhill.

Mabou.—Judge MacGillivray has filed his decision in the matter of the lien for labourers' wages, materials, etc., against the colliery of the Mabou Coal and Railway Company. Two hundred and seventeen claims were filed and proved. Valid liens to the amount of \$7,897.51 were proved. The total amount of claims allowed, including personal judgments, was \$9,908.02.

Sydney.—The Board of Examiners, presided over by Mr. R. D. Anderson, Deputy Commission of Mines, began its session on June 1st. One hundred candidates are taking the mining examinations.

QUEBEC.

Sherbrooke.—The British-Canadian Asbestos Company, Limited, has made many changes in its mill during the past winter. There are now six cyclone pulverizers installed. Mr. E. Slade, the manager, superintended the alterations.

At the Dominion Asbestos Co.'s plant of cyclone pulverizers have been replaced by rolls.

The Suffield copper mine, six miles south of Sherbrooke, is being developed under the management of Capt. Wm. Jenkin.

ONTARIO.

Cobalt.—Cobalt's tonnage for the first five months of 1909 is about 12,400 tons, or practically 5,000 tons in excess of the shipments for the first five months of 1908. Crown Reserve is one of the mines that made a record in May. It sent out eight cars of high-grade ore and two cars of fair ore.

Of the eighty-one cars shipped from the camp during May 43 were high-grade.

Cobalt.—The Beaver mine is shortly to make a shipment of high-grade ore.

During the month of May the silver production of the La Rose will be the result of heavy shipments of high-grade ore. The month's output amounted to 525 tons, of which 297 tons were of high-grade ore, averaging between 2,500 and 3,000 ounces of silver to the ton. On May 31 La Rose sent out 43 tons of high-grade and two tons were made up of metallies, almost bullion.

This was the last month in the company's year; a clean-up was possibly made. However, on June 1 the company had 62 tons of high-grade sacked and three cars of second-grade ready for shipment. A car of high-grade was also ready to be crushed.

Two hundred and seventy-five men are now employed by La Rose Consolidated Co. Trenching will soon be started on undeveloped acreages owned by the company, so that the number of men will be materially increased.

Port Arthur.—The rush for the Sturgeon Lake gold district will begin in the first week of June. Navigation will then be open. A new 100-foot stern paddle steamer has been placed on the lake by the New Ontario Transportation Co. This will connect with the C. P. R.

ALBERTA.

Coleman.—At the meeting of the Canadian Mining Institute, held at Coleman, Alta., on the 25th inst., W. A. Davidson, M.E., occupied the chair. Several papers were presented. One of these was by M. J. Powell, mine manager of the International Company's mine, of which a description was given, together with the particulars of the system of ventilation and of haulage; another was by E. Jacobs, on "Notes on Coal Mining, etc., in Alberta," this being a summary of recently published official reports; and a third, by F. W. Gray, of Sydney, B.C., on "Oxygen Breathing Apparatus in Coal Mines."

BRITISH COLUMBIA.

Hedley.—The Nickel Plate mine has been bonded by the Daly estate to M. K. Rogers for a large sum. The Nickel Plate is equipped with a 40-stamp mill, which has been in operation for ten years.

Rossland.—Mr. G. O. Buchanan, lead bounty commissioner, has received the cheques for the lead bounty up to March 31st. The mines entitled to the bounty are as follows: Alpha, American Boy, Arlington (Erie), Arlington (Slocan), Peterborough Trading Co., Banker, Bismarck, Black Diamond, Bluebell, Canadian Group, Cook, Early Bird, Elkhorn, Emerald, Flint, Frances, Hot Punch, Giant (Golden), Jessie, Bluebird, Last Chance, Gallagher, Maestro, Maggie, Niel, Pontiac, Queen Dominion, Rambler-Cariboo, Reco, Richmond-Eureka, Ruth, Sally, Silver Bell, Silver Sovereign, Ruby Silver, Spokane Standard, Sunset, Vancouver, Wellington, Westmount, Whitewater Deep, Hewitt, Wakefield, St. Eugene, Ymir, Blue Bird (Rossland).

Trail.—The value of the B. C. Smelter product of the Consolidated Mining and Smelting Company for April is reported to be \$507,068. For the past ten months it amounts to \$4,088,940. More than half of this came from the refinery. Improvements and enlargements being carried on have not interfered with the output.

Rossland.—Le Roi mine, it is persistently rumoured, is to start again very shortly.

Rossland.—The largest copper furnace in Canada has been blown in by the Consolidated Mining and Smelting Company at Trail. The dimensions of this furnace are 42 inches by 25 feet. The company has now four large copper furnaces, with a capacity of 1,800 tons of ore per day. Mechanical feeders are being installed on the large lead furnace, which now produces more lead bullion than any other lead furnace on the continent.

Vancouver.—On May 28th bids aggregating \$155,000 were made for the Dominion Copper Company's properties. These bids were not sufficient to equal the reserve bids fixed by the court, and the sale was postponed until June 4. The property was offered in two parcels. The Hayden Committee, represented by Samuel Untermeyer, was the only bidder. The Lincoln Committee made no bids whatever.

Victoria.—Working under instructions from the Federal Department of Mines, Mr. R. H. Chapman is about to commence a topographic survey of Vancouver Island.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The directors of the Cape Copper Company, Limited, have announced an interim dividend of 1s. 6d. per share, free of income tax, on the cumulative preference and ordinary shares.

With an eye upon the present strained relations between miners and operators, the Admiralty officials are particularly active in placing orders for steam coal in the Welsh coalfields. In the last week of May, vessels were chartered at Cardiff for the carriage of 50,000 tons of coal for home depots.

The Scottish Coal Miners' Federation refused to go to arbitration over the men's demand for a daily minimum wage of 6s. This has practically dissolved the Scottish Coal Conciliation Board. Nine-tenths of the coalmasters are losing money. Thus both coalmasters and miners are preparing for a crisis. The miners number 80,000 men. They have an accumulated fund of £70,000.

GERMANY.

All the employees of the West Bohemian Mining Association in the district of Mies, Bohemia, have gone out on strike. The men demand a fixed minimum wage.

SOUTH AFRICA.

The long-continued dispute between the Government and the mining companies in regard to their respective rights in the Bewaarplaatsen and water rights areas has been settled. The claim areas will be worked by the companies, the Government taking 40 per cent. of the net profits.

A great extension of deep level movement is taking place. Hundreds of claims are being taken up at points far removed from the outcrop of the main reef.

The successful flotation of the Carolina Asbestos Development Company has been followed by the purchase, for development and

flotation, of several adjoining properties in which the Lydenburg Estates, Limited, and other owners are interested.

The total output of gold from Rhodesia for the month of April was 52,906 ounces, valued at £222,700; as against 48,030 ounces, valued at £202,157 in the previous month. The output of other minerals during April was: Silver, 21,495 oz.; lead, 82 tons; copper, 4 tons; chrome ore, 1,748 tons; asbestos, 28 tons.

AUSTRALIA.

What is claimed to be the largest body of silver-lead ore yet found in South Australia was discovered recently about 23 miles south of the Olary railway station.

The number of men employed last year in the gold mining industry in Western Australia was 16,500. Money expended in wages, stores, and freights, amounts to about \$26,000,000. Dividends paid, totalled \$7,350,000.

UNITED STATES.

The National Mining & Smelting Co., Deming, New Mexico, is to treble the capacity of its plant. Latterly the mine has been closed.

The Butte Central and Boston Copper Corporation is to resume work in the Opir Mine. The corporation has been reorganized and has adopted a new name—the Butte Central Copper Co. A concentrator is to be erected.

Rawhide, Nevada, is soon to have ample mills of its own. The King Heizer mill will be completed early in July. Other mills are projected.

The Miami Copper Co., Globe, Arizona, is erecting the first unit of its overground capacity. The power-house, bins, mill, etc., will be built to a capacity of 1,500 tons of ore daily.

The Interstate Mining Co., Wallace, Idaho, has raised over \$100,000 wherewith to equip its property. The proposed development includes driving a 3,000-ft. tunnel.

COMPANY NOTES.

The Dominion Copper Co. has been purchased by the bondholders' committee, of which Charles Hayden, of Hayden, Stone & Co., is chairman.

The shareholders of the Temiskaming & Hudson Bay Mining Company have empowered the directors to raise the capitalization from \$25,000 to \$3,500,000. It is reckoned that on that basis one share of the old company will be worth 400 of the new, and that on that basis it will be distributed.

The 400,000 shares left in the treasury after the distribution of the stock on the new basis will be used for the erection of a concentrator at the plant on the most northerly lot of the company where the mine is at present, and the development of the south end of the property. The directors believe that there are excellent possibilities at the end near the Silver Queen, and very little has been done there.

Two years ago a shaft was sunk near the line of the Temiskaming & Hudson Bay and the Silver Queen, and mining was in operation there before the big vein was found on the other end of the holdings.

TILT COVE COPPER.

The report of the Tilt Cove Copper Co., Ltd., for 1908, was presented at the meeting on May 25th, and states that the profit and loss account shows a credit balance of £9,107. The Cape Copper Company's Tilt Cove establishment audited accounts for the year show that the mines made a gross profit of £26,627, which, after charging the account with the rent (representing the interest on the debentures), prospecting costs, management, etc., and after adding the balance brought forward, with interest, etc., leaves a net profit of £21,323, with £53,256 to be carried forward to next year's accounts. The balance of profit thus remaining has been dealt with as follows: £10,662 has been retained by the Cape Copper Co. and £10,662 has been received by this company as its moiety of profit, as provided for in the agreement with the Cape Copper Company. Although a profit of £21,323 is shown on the establishment account, that result includes the items of £36 released from the amount of profit spent on buildings and machinery and £944 from the amount retained for working capital. This company's share of the £944, together with the £36, has been deducted from the capital expenditure on the one side of the balance-sheet and from the

reserve for depreciation on the other. Out of the available profit of £12,581 an interim dividend of 1s. 3d. per share was paid on 2nd December, 1908, £1,665 has been paid in income tax, and the committee now recommend a final dividend of 6d. per share, making a total distribution of 1s. 9d. per share, of 4½ per cent. for the year, leaving £3, 127 to be carried forward.

INTERNATIONAL NICKEL CO.

The International Nickel Co. and constituent companies in America, of which the Canadian Copper Co. at Sudbury is one of the chief producers, reports for the fiscal year ended March 31, 1909, as follows:—

Earnings	\$2,162,694	Dec. \$272,259
Administration expenses, etc.	139,393	Dec. 10,191
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Net income	\$2,023,401	Inc. \$262,068
Deductions, depreciation	267,102	Inc. 51,127
Mineral exhaustion	100,205	Inc. 5,853
Bonds sinking fund	177,000	Inc. 8,750
Interest bonded debt	473,500	Dec. 8,550
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Total deduct.	\$1,017,807	Inc. \$57,180

Balance	\$1,005,494	Dec. \$319,248
Preferred dividend	534,734	
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Surplus	\$470,760	Dec. \$319,248
Previous surplus	2,216 799	Inc. 461,182
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Total surplus	\$2,687,559	Inc. \$141,934
Reserves	230,599	Dec. 98,227
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Profit and loss surplus	\$2,456,960	Inc. \$240,161

President A. Monell, in his remarks to the stockholders, says that all construction work has now been completed, with the exception of repair shop and foundry, at Copper Cliff. The report continues:—

“The last fiscal year followed as an aftermath of the panic of 1907, and brought with it all of the depressing conditions incident to such a state of affairs. Many of our customers worked their stocks up very close. As our sales are largely to steel manufacturers, they are susceptible to the influences which govern that industry.”

The balance sheet as of March 31 shows cash on hand amounting to \$436,441; total current assets, \$4,426,574, and total current liabilities \$1,915,574.

At the annual meeting, held yesterday in New York, the retiring directors were re-elected. W. H. Bronson was chosen to fill the vacancy caused by the death of Joseph Wharton.

STATISTICS AND RETURNS.

DOMINION COAL FIVE MONTHS' OUTPUT.

The Dominion Coal Company's output in May was 316,000 tons, against 335,000 last May. The total is behind that of a year ago.

	1909.	1908.	1907.
January	195,971	312,358	231,606
February	206,970	283,358	225,716
March	251,585	344,129	310,220
April	294,934	303,249	316,384
May	306,888	335,829	327,269
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Total	1,263,458	1,578,923	1,411,195

The May output of the Nova Scotia Steel and Coal Co. was as follows:—

Collieries, Sydney No. 1, 20,731 tons; Sydney No. 2, 6,593; Sydney No. 3, 16,619; Sydney No. 4, 5,322; Sydney No. 5, 11,266. Total, 60,531 tons.

Iron, steel and coke: Pig iron, 5,780 tons; steel, 5,486; coke, 1,000.

This compares very favourably with the May output last year, which was 53,588. The gain was made notwithstanding that No. 3 was idle for seven days, while a new condensing plant as being installed. No. 5 also lost three days while a change was made to a new bankhead and new picking belts and screens were put in.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from the Cobalt Camp:—

	May 22.
	Ore in lbs.
Coniagas	64,300
Crown Reserve	126,400
Kerr Lake	203,760
King Edward	43,130
La Rose	291,400
McKinley-Darragh	50,670

Nipissing	453,860
Peterson Lake	67,580
Right of Way	249,130
Temiskaming & Hudson Bay	60,000

Ore shipments to May 22, 1909, from Jan. 1, are: 22,388,023 pounds, or 11,194 tons. Total shipments for week ending May 22 are 1,610,220 pounds, or 805 tons.

	May 29.
	Ore in lbs.
La Rose	195,680
Crown Reserve	161,680
Nipissing	194,146
O'Brien	128,190
Temiskaming	59,000
Nancy Helen	43,400
Trethewey	65 300
Buffalo	43,574
McKinley-Darragh	46,780
Right of Way	81,228
Chambers-Ferland	60,000

Total shipment for year, 23,467,001 pounds, or 11,733 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from the Cobalt camp, and those from Jan. 1, 1909, to date:—

	June 5.	Since Jan. 1.
Buffalo		471,204
Coniagas	126,410	780,930
Crown Reserve	120,613	2,390,728
Cobalt Central	59,650	308,165
Chambers-Ferland		580,440
City of Cobalt		747,522
Kerr Lake	62,125	871,528
King Edward		141,160

La Rose	239,128	5,875,926
McKinley-Darragh	59,460	746,560
Nipissing	325,715	5,324,109
Nova Scotia		480,810
Nancy Helen		480,810
Nancy Helen		83,400
Peterson Lake		200,540
O'Brien		909,976
Right of Way		1,516,030
Silver Queen	127,470	255,335
Temiskaming	60,000	1,292,260
Trethewey	127,000	1,037,928
T. & H. B.		794,800
Muggley Consolidated		72,900

Ore shipments to May 29, 1909, from Jan. 1, are 24,774,572 pounds, or 12,387 tons. Total shipments for week ending June 5 are 1,307,571 pounds, or 653 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The output at the mines for the week ending May 22 has been slightly under the average. The following are the details:

Boundary.		
	Week.	Year.
Granby	17,495	378,049
Snowshoe	1,410	44,342
Other mines		140,871
Total	18,905	563,262
Rossland.		
Centre Star	3,302	62,343
Le Roi No. 2	617	12,251
Le Roi No. 2 (milled)	260	5,040
Other mines		9,409
Total	4,179	89,043
Slocan-Kootenay.		
Queen (milled)	420	8,190
Granite-Poorman (milled)	250	4,850
Whitewater Deep (milled)	700	13,800
Kootenay Belle (milled)	70	1,370
Second Relief (milled)	145	2,830
Nugget (milled)	110	2,150
Bluebell (milled)	900	17,600
Lucky Jim	154	488
Whitewater Deep	150	1,324
Bluebell	139	1,985
Silver King	159	1,657
Van Roi	61	141
Richmond-Eureka	100	1,441
St. Eugene	494	7,305
Yankee Girl	36	339
Other mines		5,722
Total	3,888	71,192

The total shipments for the week were 26,972 tons, and for the year to date, 723,497 tons.

SMELTER RECEIPTS.

	Week.	Year.
Granby, Grand Forks	17,495	378,319
Consolidated, Trail	6,352	138,657
B. C. Copper Co., Greenwood		140,505
Le Roi, Northport		12,761
Total	23,847	670,242

BRITISH COLUMBIA ORE SHIPMENTS.

For the week ending May 29 the following ore shipments are reported:—

Boundary.		
	Week.	Year.
Granby	18,377	396,426
Snowshoe	2,895	47,237
Other mines		140,871
Total	21,272	584,534
Rossland.		
Centre Star	3,559	65,902
Le Roi No. 2	261	12,512
Le Roi No. 2 (milled)	260	5,300
Other mines		9,409
Total	4,080	93,123
Slocan-Kootenay.		
Queen (milled)	420	8,610
Granite-Poorman	250	5,100
Whitewater Deep (milled)	700	14,500
Kootenay Belle (milled)	70	1,440
Second Relief (milled)	145	2,975
Nugget (milled)	110	2,200
Bluebell (milled)	900	18,500
Bounty	18	44
Van Roi	66	207
Granite-Poorman	88	197
Bluebell	89	2,174
Richmond-Eureka	202	1,643
St. Eugene	82	7,587
Yankee Girl	107	446
Queen	49	215
Nugget	15	872
Silver King	39	1,696
Keystone	35	35
Rambler-Cariboo	21	350
Whitewater Deep	177	1,501
Other mines		5,223
Total	3,743	75,075

The total shipments for the week were 29,353 tons, and for the year to date 752,732 tons.

SMELTER RECEIPTS.

	Week.	Year.
Granby, Grand Forks	18,377	396,696
Consolidated, Trail	7,849	146,616
Leo Roi, Northport		12,761
B. C. Copper, Greenwood		140,505
Total	26,226	696,578

The production of metals at the Consolidated Mining and Smelting Company's plant at Trail for April was \$507,068. Following are the figures in detail:—

Tons of ore received during the month of April	35,590
Tons of ore smelter during the month of April	35,490
from which were produced 410 tons of copper matte and 2,264 tons of lead bullion, containing:—	
Gold	\$214,835
Silver	101,891
Copper	44,232
Lead	146,110

Total gross production for April \$507,068

During April the refinery produced: Tons of pig lead, 2,012, valued at \$115,927; ounces fine gold, 2,663, valued at \$54,959; ounces fine silver, 148,128, valued at \$75,485. Total, \$246,371.

For the year beginning June 30th, and up to April 30th, the metals produced are valued at \$4,088,940, of which the refinery has produced \$2,096,461.

TORONTO MARKETS.

Metals—June 8.—(Quotations from Canada Metal Co., Toronto):

- Spelter, 5½ to 5¾ cents per lb.
- Lead, 3½ cents per lb.
- Antimony, 10 cents per lb.
- Tin, 31 cents per lb.

Copper—

- Casting, 14 cents per lb.
- Electrolytic, 14½ cents per lb.
- Lake, 14¾ cents per lb.

Ingot brass, 12 to 14 cents per lb.

Coal—

- Anthracite, \$5.50 to \$6.75.
- Bituminous, \$3.50 to \$4.50 for 1¼ inch lump.

Pig Iron—June 8.—(Quotations from Drummond, McCall & Co.)—

- Summerlee No. 1, \$21.75 (f.o.b. Toronto).
- Summerlee No. 2, \$21.25 (f.o.b. Toronto).
- Midland No. 1, \$17.75 to \$18 (f.o.b. Midland).

An upward tendency is apparent in the iron market.

“ 26.....	52⅞	24¼
“ 27.....	52½	24¼
“ 29.....	53	24⅜
June 1.....	53	24⅜
“ 2.....	52⅞	25 5-16
“ 3.....	52¾	24¼
“ 4.....	53	24⅜

MARKET REPORTS.

Metals.

June 4.—Connellsville coke, f.o.b. ovens:—

- Furnace coke, prompt, ———
- Foundry coke, prompt, ———

Metals.

June 4.—Tin, Straits, 29.30 cents.

- Copper, prime Lake, 13.65 cents.
- Electrolytic copper, 13.45 cents.
- Copper wire, 14.50 cents.
- Lead, 4.35 to 4.40 cents.
- Spelter, 5.30 cents.
- Sheet zinc, 7.25 cents.
- Antimony, Cookson's, 8.25 cents.
- Aluminium, 22 to 24 cents.
- Nickel, 40 to 47 cents.
- Platinum, \$22.50 to \$23.50 per ounce.
- Bismuth, \$1.75 per lb.
- Quicksilver, \$44.50 to \$45 per 75-lb. flask.

MARKET NOTES.

During the month of May, business in copper expanded largely. An advance of half a cent per pound has marked New York transactions, and a corresponding advance of £3 10s. per ton was recorded in London. Surplus stocks are being touched more substantially than has been the case for some time.

Silver Prices.

May 20.....	52⅞	24 5-16
“ 21.....	52¾	24¼
“ 22.....	52½	24¼
“ 24.....	52⅞	24 3-16
“ 25.....	52¾	24¼

MARKET NOTES.

The following table shows the opening, highest, lowest, closing and average prices for the month of May, 1909:—

Domestic—	Opening.	Highest.	Lowest.	Closing.	Average.
Pig tin (Straits), f.o.b. New York	28.85	29.60	28.85	29.00	29.16
Lake copper, f.o.b. New York	13.00	13.50	13.00	13.50	13.28
Electrolytic copper, f.o.b. New York	12.70	13.25	12.70	13.25	13.02½
Casting copper, f.o.b. New York	12.60	13.12½	12.60	13.12½	12.87
Pig lead, f.o.b. New York	4.21½	4.40	4.20	4.37½	4.31
Spelter, f.o.b. New York	5.02½	5.25	5.00	5.25	5.09½
Pig lead, f.o.b. St. Louis	4.10	4.32½	4.10	4.27½	4.22
Spelter, f.o.b. St. Louis	4.90	5.15	4.90	5.15	4.98
Antimony (Cooksons's), f.o.b. New York	8.25	8.25	8.25	8.25	8.25
Antimony (Hallett's), f.o.b. New York	7.75	7.75	7.75	7.75	7.75