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The Canadian Mining Journal

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CIRCULATION.

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THE STRIKE AT GLACE BAY.

That a foreign labour organization should be permitted to proselytize Canadian workmen by means of specious promises and baseless agitation is creditable neither to the good sense of the workmen themselves nor to the Canadian nation generally. But when foreign demagogues, in their desire to crush a Canadian labour party, incite some thousands of Canadian workmen to strike, then conditions have indeed become intolerable.

The Canadian Mining Journal has placed itself on record before now as being radically opposed to the encroachments of United States labour federations. The history of these bodies shows nothing that recommends either their aims or their methods. Their aims are inordinately selfish; their methods obnoxious to right-minded men. There is need for neither in this country.

From all that we can learn before going to press, it is probable that the United Mine Workers will be defeated in their attempts to cripple the Dominion Coal Company and to destroy the Provincial Workmen's Association. Their defeat will be due to the sane conduct of the P. W. A. members who refused to strike without honest cause. While we believe that this will quicken the P. W. A. into stronger life, it must be understood that the U. M. W. is a relentless and persistent enemy. Its resources are large, far larger than are those of the P. W. A. It never scruples to engender strife between capital and labour, and its policy is to precipitate strikes whenever possible. Its present action entails loss upon Canada as a whole, upon the Dominion Coal Company, and, most grievous of all, upon many hundreds of misguided workmen.

It is high time that Canadians recognized the absolute necessity of controlling their own affairs. The Lemieux Conciliation Act, an admirably designed piece of legislation, is intended to do away with the barbarous strike. It is a Canadian Act, drawn up for the benefit of Canada. If agitators from the United States, or from any other country, are allowed to foment trouble, the Conciliation Act becomes a superfluity. We heartily approve of the refusal of the Dominion Coal Company to treat with the U. M. W. In this it has established a precedent that will, we sincerely hope, be followed by all Canadian companies. But we would go further than this. To give to foreigners the right to invoke the interposition of a Conciliation Board is to invite constant trouble. This privilege must be confined to Canadian citizens. For their protection the Act was formulated.

Canada looks after the interests of the foreigner within her gates as well as, if not better than, most

other countries. But her duty is first to protect her own citizens. Canadian labour can best be protected by measures that will eradicate the imported agitator who makes the Conciliation Act a stumbling-block and arbitration a vain thing.

Our newly appointed Minister of Labour could signalize his advent to office most fittingly by restricting the application of the Act to Canadians.

The Dominion Coal Company never had a strike, never erected fences for protection, never called in the police until the U. M. W. made it appearance in Nova Scotia.

ASBESTOS ONCE AGAIN.

Quebec asbestos mining is suffering more than its fair share of promotion. On the heels of the huge Amalgamated flotation comes news of a new "merger" —the Black Lake Consolidated Asbestos Company, capitalized at $5,000,000. The holdings of the latter concern cover some 5,000 acres of territory, only a small fraction of which is developed. Not one of the properties has been worked at a profit. Further, development so far has given little indication that the properties are valuable.

We believe that shares in neither Amalgamated nor Consolidated will find a ready market in this country. If they are placed successfully in London it will be due to the ignorance of trans-Atlantic investors as to the condition of affairs in Quebec.

The asbestos industry of Quebec is, per se, a vigorous, sound, and progressive branch of mining. Until recently, Canadian producers have been able practically to control the market. As mentioned before, however, Russia is becoming a formidable competitor. South Africa will sooner or later enter the field with a high-grade article. Other countries will also take their quota of the trade.

Quebec producers will continue pre-eminent for some time. They have reached a stage of development and equipment that new districts cannot approach for several years. We hope that Quebec will always maintain a leading position. But it is futile to ignore the developments that are taking place in other lands; and it is criminal for promoters to discount the future with no regard to the inevitable competition of foreign producers.

It is justifiable, then, to look upon the present asbestos flotations as untimely, unprofitable, and inflated to a degree that will do positive and immediate injury to the industry. Consolidation is often wise. Often it is necessary to the reduction of working and administrative costs. We do not believe that working costs in the Quebec asbestos mines will be lowered one cent under the control of the new corporation. We know that fixed charges will be very considerably increased. The new organizations have been called into being not to cheapen production, but to line the pockets of promoters. Not consolidation, but inflation, is the keynote of the Amalgamated Asbestos Corporation and of the Black Lake Consolidated.

It is pertinent to add here that within the past quarter there has been a notable reduction in the selling price of all grades of asbestos. Overproduction, a deliberate preliminary to promotion, has surfeited the market. Information has reached us from producers and from consumers signifying that the drop has been heavy, in some instances amounting to more than 25 per cent., a reduction that will wipe out all profits. Production is being increased, despite this falling market. The object of this is clear. It is literally manipulation to aid in the disposal of Amalgamated shares, by giving a false colour of activity.

SCOTCH OIL-SHALE COMPANIES.

The present condition and future prospects of mining companies operating the oil-shale deposits of Scotland are noteworthy. Of late the large possibilities of the New Brunswick oil-shales have received wide advertisement. It is probable, indeed, that, ere long, capital will be supplied for the purpose of mining these shales and marketing their diversified products. The Scotch oil-shale industry, as it stands to-day, is a monument of persistent, intelligent, and successful endeavour. Its history will afford guidance and encouragement to those who undertake the exploitation of the New Brunswick deposits.

The past financial year was one of general prosperity for the five companies engaged in the Scotch mineral oil trade. The lower prices obtained for their products were offset by lessened cost of production, due largely to cheaper coal and lower wages. Thus, in spite of keener competition on the part of the Standard Oil Company, aggregate profits amounted to £380,207, as against £372,343 for the preceding year. In addition to profits earned, the plants of the various companies have been enlarged and improved.

The strong financial position of the leading concern, the Pumpherston Company, is noteworthy. Although there was a slight falling off in its profits last year, yet it has been able to maintain its dividend of 50 per cent., to carry forward a larger balance, and to write off the sum of £41,758, the amount expended in improvements. This company has built up a reserve fund of £100,000, and a fire insurance fund of £10,000.

The other companies report increased profits and growing reserves. In every case ample amounts have been allotted to cover depreciation and to build up reserves.

Heretofore, the oil companies have relied upon wholesale dealers to market the oil. One company, the Oakbank, is now attempting to undertake its own marketing. The experiment, if successful, will lead to the organization of a central selling agency that will market the products of all the companies.

The immediate future is clouded by the renewed hostility of the Standard Oil Company, a recent reduction of ½d. per pound in the price of paraffin wax, a drop that will have to be met by the Scotch producers. As paraffin wax is their principal source of profits, the reduction is most unwelcome. On the whole, however, the Scotch companies appear to be entirely able to meet competition. On the other hand, there is little reason to believe that the present rate of dividends can be maintained for an indefinite period.

A MIGRATING FAKIR.

Last year we were constantly being regaled with blood-curdling stories about what a certain Mr. J. H. Brown, expert, was to do at the Trout Lake Smelter. Between promise and performance there is a vast gulf fixed in Mr. Brown's case. Having exhausted the patience of his shareholders and the resources of his own vocabulary, Mr. Brown looked round for pastures fresh. North Sydney, Nova Scotia, an inoffensive town that has much quiet ambition, appealed to Mr. Brown. Its emerald hue was soothing to his eye. So Brown polished up his intimate "John Hayes Hammond" anecdotes, and blew into North Sydney.

The man who designedly imposes upon a trusting town council is a heartless wretch. Mr. Brown did impose upon North Sydney. The councillors opened their arms and Mr. Brown did the rest. Strange to relate, he got no cash out of his victims—merely concessions of land and certain immunities. But the way in which he mesmerized the local papers was sinful—only less sinful than the stories that he told of his dear friends, Cecil Rhodes and "John" Hammond.

Perhaps Mr. Brown will have vamoosed before this reaches his unregenerate eye. There is in every Nova Scotian community a leavening sense of humour that would prove Brown's undoing. Only it is not easily aroused. But it will be safer for Mr. Brown to purchase a ticket—single fare—for some Pacific port at a very early date.

Fie, fie, Mr. Brown! robbing North Sydney is worse than striking a woman!

INVESTMENT.

The ideal conditions for mining investment are not those that obtain most largely in Canada. Canadians are yet too anxious to make "turnovers" and "rake-offs" and "commissions." Cobalt is answerable for a good deal of this.

Obvious facts are consistently overlooked. Before a mining prospect can be priced, its future earning capacity as a mine must be indicated. Mining costs are of prime importance; but the net profit on each ton of ore is the vital consideration. Every cent spent in prospecting, in developing, in advertising, in commissions, must ultimately come out of the mine.

Hence the prospecting and development stage is precisely the stage at which expenditure must be most carefully controlled. Otherwise a cumulation millstone is placed on the neck of the venture.

Mining investment is not the purchase of undeveloped property. That is mining venture. The outlay of money to develop known ore bodies, to provide equipment for a mine, and to establish market connections, is investment.

With proper precautions there is no cleaner, more attractive, and more remunerative form of investment, and legitimate opportunities exist all over Canada.

There are many objections to syndicated or incorporated enterprises. Owing to prevalent misconceptions, the average director or syndicate member may always be counted upon to kick at the critical moment when more money is needed to make his mine productive. Only experience will remedy this.

The ideal condition is provided when one or two keen business men employ a competent engineer to develop for them a mineral deposit at a minimum of cost, and when development has proved successful come forward with ample working capital. In a case of this kind no undue risk need be taken, operations may be dropped at any time without serious loss, and the enterprise is pushed only if success is practically assured.

ROYAL RECOGNITION.

A significant incident is mentioned in a late cable from England. On the occasion of laying the foundation stone of the new buildings of the Imperial College of Science and Technology at South Kensington, King Edward emphasized the supreme importance of technical education. The King referred especially to the function of specialized scientific instruction in fitting England to cope with her industrial competitors, and signified his belief that herein lay her best safeguard in the future.

This is perhaps the most pregnant feature of the wave of industrial change and reform that has been sweeping over Great Britain. Better than warships, more effective than all the artillery in the world, is the protecting power of industrial supremacy. Germany is industrially efficient—more efficient than most people know, less efficient than her panegyrists would have us believe. Commercially, the United States is enormously rich, enterprising, active, and wasteful. Nature has endowed her with marvellous resources. These resources have been exploited recklessly.

Great Britain, as the keystone of the British Federation, must become the developing agent for the outlying members of the Empire. Great Britain has the money, the Empire has the men. Direction and co-operation are needed.

Technically trained men, more especially trained mining engineers, are the missionaries of industrial development. Their work calls them all over the world.

The results of their work will always be the principal factor in fusing and uniting the British Empire.

England is equipping herself to train her youth. The enthusiasm manifested by King Edward is symbolic of the ardent ambition that is permeating the nation and the Empire. We must make ourselves fit if we are to survive in the race.

THE NEW TIPPLE AT MICHEL.

The new tipple erected for the Crow's Nest Pass Coal Company at Michel, B.C., is worthy of comment. It was working within six months from the date on which the contract was signed. It is now, eleven months from that date, completed.

Although the plant was assembled and erected 3,000 miles from the place of manufacture, and the construction done during the winter season, no delay occurred. As the tipple has a capacity of 1,000 tons of run-of-mine coal per hour, the largest capacity of any single tipple on the continent, its rapid completion is somewhat of an engineering feat.

The tipple structure is of steel throughout. Approximately 600 feet long, it crosses the C. P. R. right of way by a clear span of 105 feet. The equipment includes a self-dumping car haulage system. The tracks are superposed, the haul utilizing the upper and lower runway principle of the bucket conveyor. The driving mechanism is practically identical with that utilized in conveyors, the mine cars taking the place of buckets. With the super-posed track system the tipple requires only width for one track and walkways on both sides. Thus through the machinery section it is only 14 feet wide, and 12 feet wide at the approaches.

The erection of this tipple, which is apparently the last word in modern tipple construction, will set a standard of excellence for the Western coal mines. We congratulate the Crow's Nest Pass Coal Company on the prevision that has animated this progressive step.

VON HAGEN.

We shall consider it a favour if any of our readers who have been induced to purchase stock in the concerns promoted by "Dr." Hugo Von Hagen will send us, confidentially or otherwise, a clear statement of their transactions. "Dr." Von Hagen is a cheap charlatan, and his mining schemes are fraudulent. The Canadian Mining Journal wishes to secure the specific evidence that is necessary to institute criminal proceedings against Von Hagen. Owners of shares in the Great Northern Coal Company, the Northern Coal Company, the Kent Coal Company or the Maritime Coal Company (New Brunswick) will be doing the country a service if they aid us in putting an end to Von Hagen's career.

EDITORIAL NOTES.

In 1907 the deaths resulting from falls of roofs and coal in Westphalian collieries numbered 223. The death-rate was 0.953 per 1,000 persons employed. The average death-rate for the period 1885-898 was 1.170; for the period 1899-1907, 0.984.

Our contemporary, The Mining Journal, has decided to decrease the size of its page. No one will question the wisdom of this decision. Notwithstanding the valuable and interesting character of the pages of our London contemporary, the leaves are irritatingly hard to turn, and copies do not fit into any ordinary scheme of filing. Therefore the change will be welcomed.

The statement made by the promoters of the Black Lake Consolidated Asbestos Company to the effect that the new concern will have "friendly relations" with the Amalgamated Asbestos Corporation, has been contradicted unqualifiedly by Mr. E. B. Greenshields. It is unfortunate that a like regard for exact truth has not been evident in the matter published by Amalgamated itself.

Through error the review of Skinner's "Mining Manual" for the year 1909 was given as for the year 1908 in a recent number of the Canadian Mining Journal. The 1909 edition of this invaluable handbook was published on February 8, 1909. This was the edition reviewed. We may add that, for office reference, this volume is in constant requisition. In fact, it is practically impossible to get along without it.

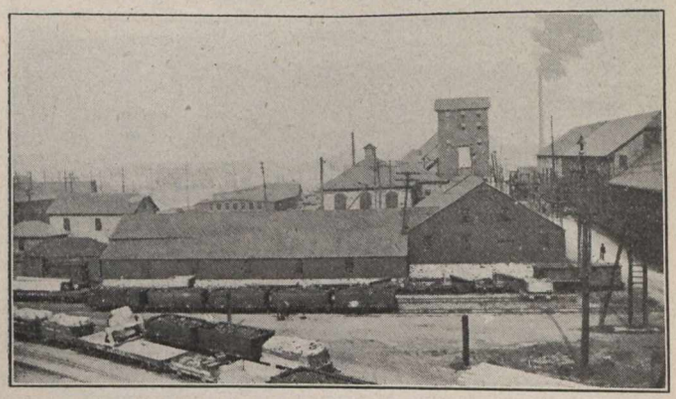
Through the efforts of the West African Chamber of Mines during the past twelve months, the railway rates on the Gold Coast Government Railway were reduced by about 30 per cent. These reductions covered nearly all the important items that went to make up the supplies in constant use by the mining companies. From the Elder-Dempster Line, a shipping company that enjoys a monopoly of West African trade, no concessions were obtained.

At the Robinson mine, on the Rand, a large new mill engine is being installed. It will be of 2,000 hp. Its arrangement is novel. The high and low pressure cylinders, which are 33 inches and 66 inches diameter respectively, by 54 inches stroke, are not coupled in tandem. The crank shaft is coupled direct to the line shafting of the battery. A 1,350 kilowatt A. C. generator is placed on this shafting, so that when electric power is supplied by either of the new power supply companies this generator will be used as a motor, and the mill engine will be disconnected, at the coupling provided, and used as a standby. For the concrete foundations of the engine an excavation into the rock has been made, and about 16 feet of concrete will be put in place.

IN THE MICHIGAN COPPER COUNTRY.

Written specially for the Canadian Mining Journal by R. E. Hore.

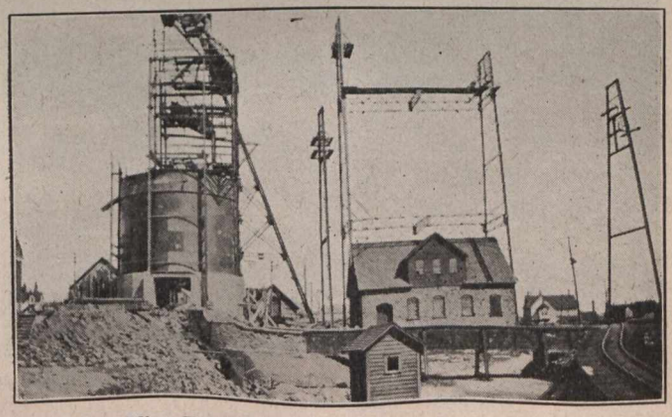
The copper deposits of Michigan present many points of interest. The profits derived from mining operations have been enormous, and in addition to making several great fortunes, are directly or indirectly the support of some thousands of people. The peculiar nature of the deposits, their great extent, the depths to which they have been worked, the heavy machinery



Calumet and Hecla Mines, Calumet—Looking north along one of the lines of shafts.

demanded, are some of many features which attract the attention of mining men. The extensive mining operations have afforded unusual opportunities for accurate determination of the character of the ore deposits.

In Canada there are known to be large areas of rocks similar to the copper-bearing series. In the greater number are on Keweenan Point, the others on the extension of the Copper Range westward. The western group has not reached the importance of those in the vicinity of Calumet and Houghton.
Lake Nipegon region and at intervals along the north shore of Lake Superior there are formations which have been correlated with those of Keweenan Point. Explorers of the far north have described copper deposits in rocks which are apparently identical with the Keweenawan. The information obtained in the ex-



Quincy Mine, Hancock—A new shaft-house; concrete and steel

tensive development of Michigan deposits will be invaluable to those who exploit similar resources in Canada.

Location and Nature of Deposits.

The accompanying map (Fig. 1) shows the location of the chief mines of the Keewenan Range. The

The copper-bearing series is largely made up of lava flows, with which are interbedded some conglomerates and sandstones. The sedimentary rocks form only six or seven per cent. of the total thickness of the Keweenawan. The beds dip under Lake Superior, as indicated in Fig. 2. At Calumet the dip is 38 to 41 degrees, at Houghton about 56 degrees.

The tops of the numerous lava flows are generally amygdaloidal, and the bottoms show similar structures much less pronounced. Vesicular cavities have been filled with secondary minerals, salcite, quartz, and hydrous silicates being the most common. In some

"Blow off," Victoria Mine, on Ontanogan River. The Victoria is one of the pioneers to use hydraulic compressed air. The photo shows a column of water and air escaping from twelve inch pipe, shooting over one hundred feet above the opening.

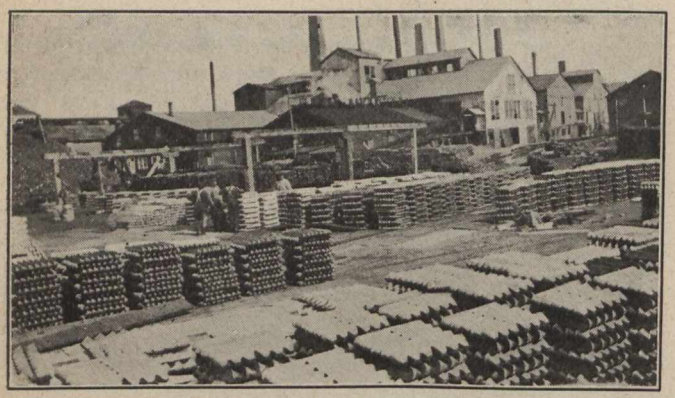
cases the secondary filling is native copper, and this is one of the most important types of deposits—copper "amygdaloid." The "Kearsarge amygdaloid" is a very extensive lode of this nature.

The conglomerates are made up largely of material are very abundant in some of the beds. In some cases similar to the lava flows, but reddish felsite pebbles part of the cementing material is native copper, and this has afforded the richest of the ore deposits—

"copper conglomerate." The "Calumet conglomerate" is a good example of this class.

A third class of deposit is that of veins traversing the bedded rocks. These are yielding very little of the present output.

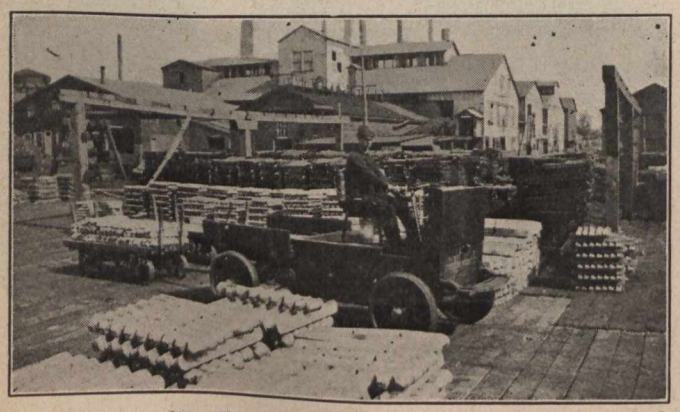
In working the conglomerates, owing to the loose nature of the material, a large amount of worthless rock has to be mined with the pay rock. The trap underlying amygdaloidal beds is of dense, compact character, and need not be removed. Consequently an "amygdaloid" lode may be mined with greater profit than a lode of same values in a conglomerate bed.



Dollar Bay Smelter—Showing piles of ingots ready for shipment.

While a general plan like Fig. 2 indicates simple structure in the deposits, the workings are complicated by the occurrence of innumerable faults and changes in dip of the beds.

The great extent of the lodes is indicated by long lines of shaft-houses, which in some cases extent great distances. The "Kearsarge amygdaloid" is cupriferous in paying quantities for eleven miles, although everywhere the copper is irregularly distributed. The inclined beds have been followed down in some mines for eight or nine hundred feet. Some vertical shafts, including the famous "Tamarack" and C. & H. "Red Jacket." which cut obliquely across the beds, are one mile in depth.



Dollar Bay Smelter—Showing methods of hauling ingots from casting machine to dock.

While copper is found at these great depths, the deposits are as a rule less rich than those nearer the surface. Mining at the lowest levels has in many cases been carried on with but little profit, and at present the amount of ore which is raised from them is very small.

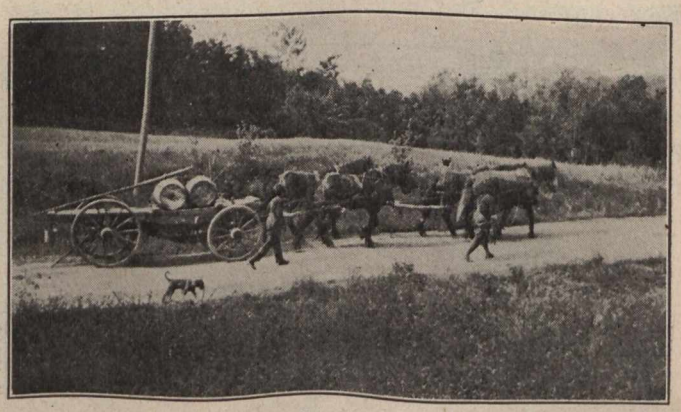
It is well known that the temperature in these lower levels is high enough to cause inconvenience to workmen, even when scantily clad. The loss of values, however, has apparently been the only reason for the discontinuance of the work at great depths.

The low price of copper has seriously affected the mining of lower grade lodes in the last two years. Some of the companies operating on lodes yielding a very slight margin of profit had to close down. Others are drawing on their reserves of capital to further explore their deposits, while they wait for the price to rise again. Thousands of feet of diamond drilling has been done, thereby adding much to the knowledge of the deposits, and making a few important discoveries.

Dollar Bay Smelter—Showing "mass" copper, which is brought directly from mine to smelter. Comparatively little of the copper mined is in such large nuggets.

The Mines and the Geological Survey.

Iron and copper are the chief of the metals mined in Michigan. The iron deposits are largely controlled by one corporation that has a number of geologists in its employ. The copper mines are owned by a large number of independent companies, large and small, and these find a connecting link in the State Geological Survey. The survey maintains a branch office at Houghton in the midst of the mining activities. State Geologist Lane is ever busy examining mine workings and drill cores in the endeavor to correlate beds and find lost lodes. From the information and the facilities for personal examination given him by intelligent, far-seeing mine managers he accumulates a host of data useful both to miner and to pure science.



Hauling concentrates four miles to railroad. Steep hills materially increase transportation expenses of some of the mines.

Director Brock, of the Geological Survey, is suffering from a diphtheretic sore throat. He has been in hospital for a week. The case is not serious.

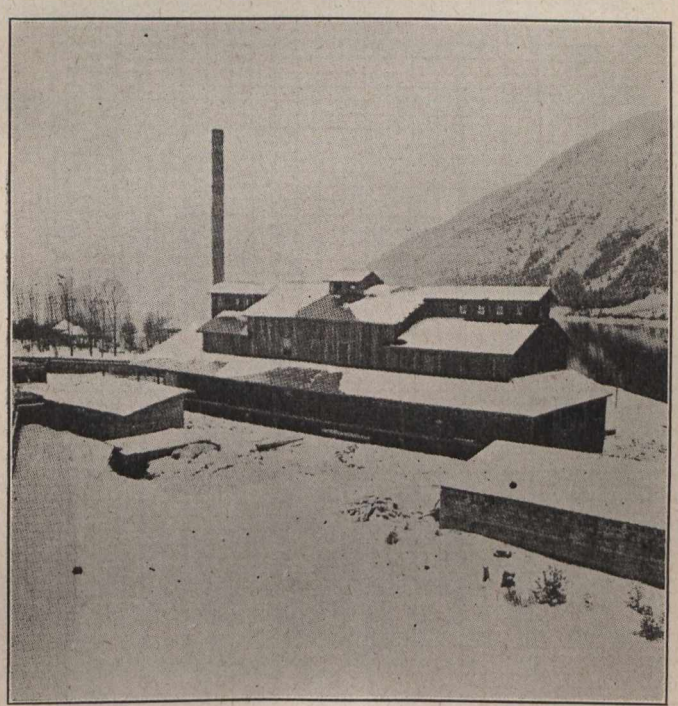
Annual Report of the Provincial Mineralogist for the Year Ending 31st December, 1908, Being an Account of Mining Operations for Gold, Coal, Etc., in the Province of British Columbia.

Like its predecessors, the Annual Report of the British Columbia Bureau of Mines ranks easily as the most complete and best arranged provincial publication.

Progress of Mining.

The value of the mineral products of the Province for the year 1908 amounts to $23,851,277, which is less than that of 1907 and 1906, but still considerably greater than that of any previous year.

The tonnage of ore mined in 1908 was the largest on record, and the average assay of the ore was slightly greater than that of 1907. But the average market value of the various metals for the year was much



Canada Zinc Co.'s Plant, Nelson, B.C.

lower. The effect of this drop in market price meant a decrease of $3,966,826 in the total value of ore mined.

The tonnage of ore mined during the year 1908, exclusive of coal, was 2,083,606 tons, an increase over the preceding year of 279,492 tons, or 15.5 per cent.

This total tonnage was produced by the various districts in the following proportions:—

Boundary	71.6	percentage	of total
Rossland	14.5	"	"
Fort Steele	7.9	"	"
Coast District	1.7	"	"
All other districts	4.3	"	"

Boundary district shipped ore to the extent of 1,491,063 tons. Next came Trail division with 302,419 tons to its credit, and Fort Steele with 165,313 tons. All other tonnage records were individually below 50,000 tons. There were, all together, 108 shipping mines, of which 59 shipped more than 100 during the year. The total number of men employed in metalliferous mines was 3,537—1,089 above ground and 2,448 below. This total is less than the actual number of men employed. A mine employing 12 men for four months is credited with four men for twelve months, and so on.

In seven mining districts, Coast and Cassiar, East Kootenay, Slocan, Nelson, Trail Creek, Lardeau and Trout Lake, and Bounday, there were 102 non-shipping mines, with a total of 157 men employed.

Coal.

Nearly all of the coal mined during the year was produced by three companies—the Crow's Nest Pass Coal Co. in East Kootenay, and the Wellington Colliery Co. and the Western Fuel Co. on Vancouver Island. Several new collieries are soon to become producers.

Probably the most important of these new collieries is that of the Hosmer Mines, Ltd., at Hosmer, a few miles north of Fernie, in East Kootenay. The seams being opened up here are supposed to be the same series as those worked by the Crow's Nest Pass Coal Co. The plant is most extensive and modern. The company is an offshoot of the Canadian Pacific Railway.

In the same section of East Kootenay the Corbin colliery, at Corbin, on McGillivray Creek, has just been opened up. The company is associated with powerful railway interests.

In the Coast district, the new colliery of the Nicola Valley Coal & Coke Co. shipped 26,227 tons of coal during 1908. This production was limited by the market that the C. P. R. freight rates would allow it to reach, rather than by the capacity of the mines. The adjoining colliery of the Diamond Vale Colliery Co. produced 3,011 tons of coal. It is still in the development stage.

On Vancouver Island, the South Wellington Coal Mines, Ltd., near Nanaimo, and the Gilfillan Colliery at Wellington, produced small quantities of coal.

The gross output of the coal mines of the Province for the year 1908 was 2,109,387 long tons, and as 12,820 tons were taken from stock, it makes the total quantity of coal disposed of during the year 2,122,207 tons. Of this gross amount, 918,872 tons were sold for consumption in Canada; 567,274 tons were exported to the United States, and 29,883 tons were exported to other countries; making a total of 1,516,029 tons of coal sold.

In addition to the sales, 431,538 tons of coal were used in making coke, and 174,640 tons were consumed under colliery boilers.

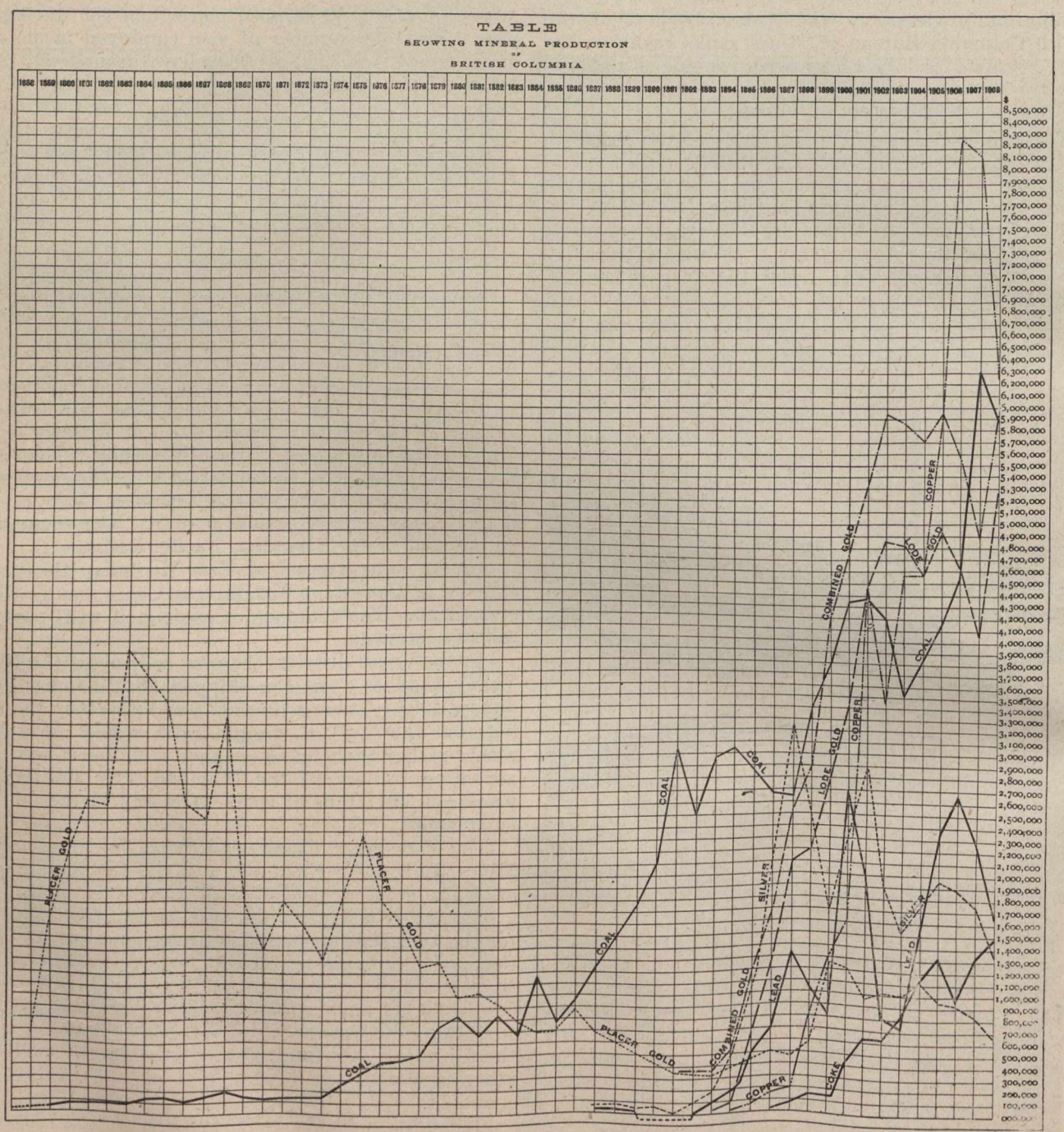
From the 431,538 tons of coal, 247,399 long tons of coke were produced. - Of this amount 768 tons were added to stock. The net coke sales were thus 246,631 tons—209,317 tons sold for consumption in Canada, and 37,319 tons for consumption in the United States.

Coast Collieries.—In 1908 the coast collieries mined 1,226,182 tons of coal, and 13,921 tons were taken from stock, a total of 1,240,103 tons, distributed as follows:

Sold as coal in Canada,.....	717,964	tons
Sold as coal in the United States,	300,445	tons
Sold as coal in other countries,..	29,883	tons
Total sold as coal, ...	1,048,292	tons
Used under companies' boilers,	120,523	tons
Used in making coke, ...	71,288	tons
	1240,103	tons

export sales to the United States, which in 1908 show a dropping off of 59,221 tons, or about 13.7 per cent., as compared with 1907, while, as compared with 1906, the decrease is still greater, amounting to 132,738 tons. These decreased sales are accounted for by the use of oil fuel in California, and, to a less extent, by the importation of coal from Japan.

The Wellington Colliery Co., the only coke producer, made 12,530 tons of coke, of which only 6,022 tons were



As compared with 1907, there is a decrease of 31,453 tons, 2.9 per cent., in the sales of the coast collieries.

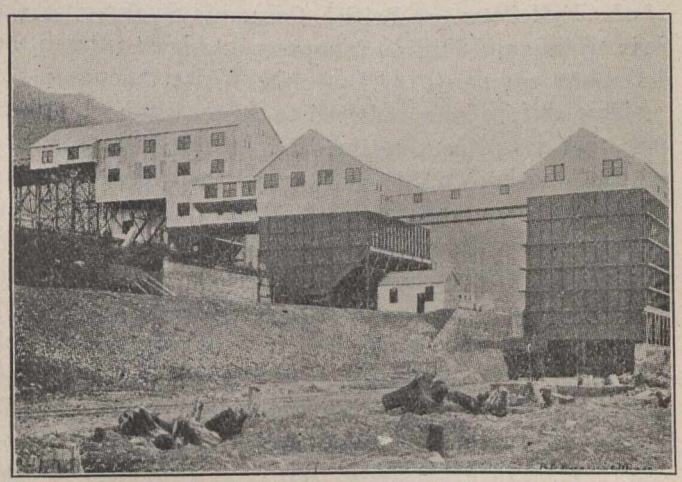
The consumption of coal in that portion of British Columbia served by the coast collieries shows in 1908 an increase of 19,923 tons, equal to 2.85 per cent. The amount sold for export to countries other than the United States, shows an increase of 35.6 per cent.

The decrease seems therefore to be confined to the sold. Of this amount, British Columbia took 2,904 tons, the United States 3,118 tons, and 6,508 tons were added to stock. These figures show a great falling off in the consumption of coke in the coast section.

East Kootenay Coal Field.—In this field the Crow's Nest Pass coal Co. produced 876,467 tons of coal, of which 359,703 tons were used in making 234,098 tons of coke.

Hosmer Mines produced 2,627 tons of coal and 771 tons of coke; while the Corbin Coal and Coke Co. produced 4,111 tons of coal and no coke.

The gross production of the district was 883,205 tons of coal, of which 1,101 tons were still in stock at the end of the year, making the amount of coal distributed 882,109 tons. Of this amount 360,250 tons were used in making 234,869 tons of coke.



Steel Tipple, Hosmer Mines, Limited, Hosmer, E. K.

Distribution of coal was as follows:

Sold in Canada,.....	200,908	tons
Sold in United States,.....	266,829	tons
Total sold as coal,.....	467,737	tons
Used in making coke,.....	360,250	tons
Used under colliery boilers,....	54,117	tons
	882,104	tons

The total coke sales were made up of the 234,869 tons of coke produced and 5,740 tons taken from stock. 206,413 tons were sold for consumption in Canada, 34,196 tons for export to the United States.

The coke production shows an increase of 28,328 tons, or 13.7 per cent., as compared with the previous year. The total coke sales show an increase of 39,732 tons, or 19.7 per cent.; the coke sales in Canada show an increase of 64,426 tons, or 46.4 per cent.; but the coke sales to the United States show a decrease of 25,694 tons, or 42.9 per cent.

The Fernie fire and radical changes in the system of mine development at the collieries of the Crow's Nest Pass Co. retarded that company's output temporarily. In future, however, the output will be more regular and the mines safer for the workmen.

Gold.

Placer Gold.—The production of placer gold in 1908 was about $647,000, a decrease of $181,000, or 21.8 per cent., as compared with 1907. The principal loss was recorded in the Atlin District, where this year's production was $203,000, only half what it was the year before. In Atlin, the Atlin Consolidated Mining Company failed to operate, and the Pine Creek Power Company was enlarging its ditch, and therefore did no gravel-washing.

The Cariboo District—including Barkerville and Quesnel sections—held its own, and produced over half the placer output of the Province.

Dredging for gold has not been successful; the inland dredges at Atlin have been abandoned, and only a small amount of gold was recovered from the dredging done at Lillooet and Yale on the Lower Fraser River.

Gold from Lode Mining.—The value of gold produced from lode mining during the year 1908 was $5,282,880, an increase of some $1,227,860, or over 30 per cent. This large increase was principally due to Rossland, which produced this year $986,806, or 50 per cent. more gold than in 1907, partly by increased tonnage, but chiefly through increased value of ores.

The Boundary District showed an increase in gold output of $213,583, or about 12.7 per cent. Here the tonnage mined was 27 per cent. greater than in 1907, and the average tenor of ore smelted was slightly lower than in 1907.

Nelson District shows an increase of $82,535, attributable chiefly to the activity of the gold-bearing properties in Sheep Creek camp, in the vicinity of Salmo.

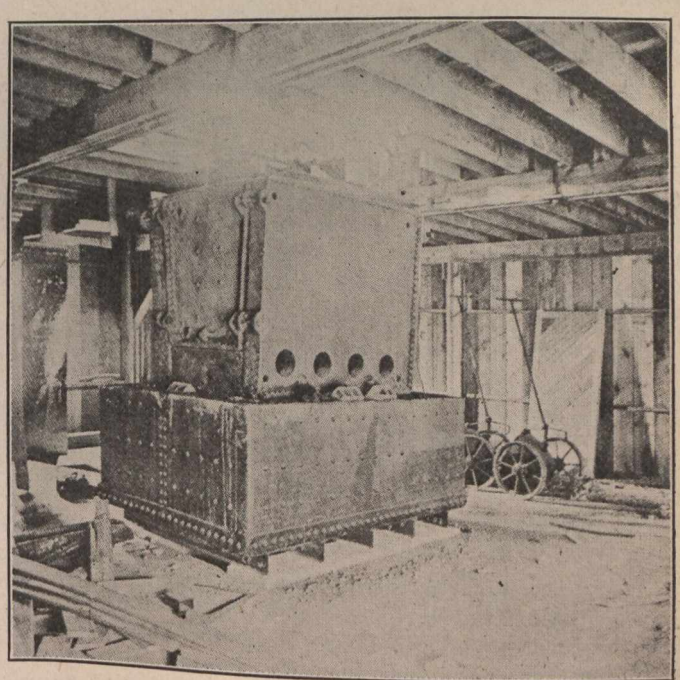
The only district reporting a large deficit in lode gold output was the Coast District, which produced $58,744 less gold than in previous years.

About 87.5 of the lode gold output of the Province was recovered from the smelting of copper-bearing ores. The remaining 12.5 per cent. was recovered by stamp milling, etc.

Silver.

The total amount of silver produced in the Province during the year 1908 was 2,631,389 ounces, valued at $1,321,483, a decrease of 114,059 ounces, and of $382,342 in value.

The average market price of silver in 1908 was 11.84 cents per ounce lower than in 1907, which accounts for $311,556 of the decrease.



Electro-Thermic Furnace, Canada Zinc Co., Nelson, B.C.

About 77 per cent. of the total silver output was obtained from ores in which it was found associated with lead, the remainder being found chiefly in conjunction with copper-bearing ores.

The Slocan District supplied about 50 per cent. of

the total Provincial output, and the Fort Steele Division about 24 per cent., all from argentiferous galena.

The lead production of the Province was 43,195,733 pounds, having a market value of $1,632,799. As compared with 1907 this is less by 4,542,970 pounds, or 9.5 per cent. The decrease in value is $658,659, or 29 per cent.

The average market price for the year 1908 was a little more than one cent per pound lower than during 1907.

Fort Steel M. D. produced....	30,204,788 lbs.	=69.9%
Slocan	6,572,268 lbs.	=15.2%
Ainsworth	4,790,216 lbs.	=11.1%
Trout Lake	873,860 lbs.	= 2.1%
Nelson	345,424 lbs.	= 0.8%
All others	409,177 lbs.	= 0.9%
	43,195,733	100.00

Copper.

The output of copper in 1908 was 47,274,614 pounds, having a gross market value of $6,240,249. This is the largest output ever made. It exceeds last year's production by 6,441,894 pounds, or about 15.7 per cent. The lower average market value of the metal for the year 1908 reduced the market value by $1,926,295, or 23.5 per cent., as compared with 1907.

The average market price for the year was 6.8 cents a pound less than it was in 1907, a direct loss to the producers of $3,214,674.

The great increase in production was made in the Boundary District, due to the increased tonnage of ore mined.

In the Coast districts a decrease of 1,760,630 pounds, or nearly 50 per cent., was reported.

This table of production gives the output by districts:—

Yale (Bonndary) District	40,181,790 lbs.	=85.0%
Rossland	5,042,244 lb.s	=10.7%
Coast and Cassiar	1,997,337 lbs.	= 4.2%
Yale-Kamloops	.....	..
Nelson	53,243 lbs.	= 0.1%
Other districts	.....	..
	47,274,614	100.00

The average assays of the copper ores of the various camps, based upon the copper recovered, were as follows: Boundary, 1.35%; Coast, 2.87%, and Rossland, 0.834%.

Other Minerals.

There was no iron ore shipped during 1908. Only a small quantity of zinc ore was shipped. The favourable final ruling of the U. S. Treasury Board, which will admit zinc ore free into the United States, will mean increased shipments. The saving of platinum from alluvial gold washings is neglected on account of the high cost of operations.

Building stone quarries are few and far between. This industry has great possibilities. Marble, red brick, fire brick and fire clay, lime-silica brick, lime, and cement are attracting more attention.

Further notice of these commodities will appear in a later issue of the Canadian Mining Journal.

STAR VS. WHITE.

Information has lately been received in British Columbia from London, England, to the effect that leave to appeal to the Privy Council against the decision of the Supreme Court of Canada sustaining the judgment of the Full Court of British Columbia in favor of the Star Mining and Milling Company, has been refused the defendant company, the Byron N. White Company.

This action, long referred to as the Star vs. White case, was one respecting the extra-lateral or apex rights of the well-known Slocan-Star silver-lead mine near Sandon, Slocan District, British Columbia, owned by the Byron N. White Company, of Milwaukee, Wisconsin, U.S.A., of which company Byron N. White, of Spokane, Washington, is president and general manager.

The Slocan-Star group comprises a number of mineral claims having a total area of about 500 acres. The Star Mining and Milling Company, of which John M. Harris is president, owns some adjoining mining property, from which the Slocan Star took a quantity of ore, under circumstances stated below.

The action was commenced in July, 1901, at Nelson, B.C., by Mr. Harris in the name of the Star Mining and Milling Company. He sued for the value of all ore taken out of the Heber Fraction and Rabbit Paw mineral claims by the Slocan Star management, and for a declaration of title and an injunction. The action has since been the subject of a number of appeals, both interlocutory and final, and has been before different courts in British Columbia and Ottawa about 74 days in all.

The first trial was held at Nelson, in February and March, 1904, and lasted 23 days. At that trial W. J. Elmendorf and Professor Parks, both prominent mining engineers, of Spokane, were the chief expert witnesses for the White Company, while Frank L. Sizer and R. M. Atwater, also engineers of high standing, of Helena, Montana, gave testimony for the Star Company.

The defendant company admitted its trespass upon the property of the plaintiff, but endeavored to justify it under its apex rights, claiming that it followed downward from its apex to the ore in question. The plaintiff, on the contrary, contended that near the boundary of its property the White Company encountered a fault fissure and lost the Slocan Star vein, hence the continuity of its vein was destroyed; also, that the apex claimed by the White Company was the apex of the barren fault fissure and not of the Slocan Star vein, and did not connect with the ore in question. In opposition to this contention by the plaintiff company, the White Company maintained that the whole workings were in its vein, that is, the Slocan Star vein. Many samples, models and plans were filed in evidence by both parties to the suit.

The trial was not at that time concluded, but was adjourned to allow of the conflicting theories being put to test by experimental work on the ground. S. F. Parrish, then general manager of the Le Roi mine, Rossland, was chosen by the court to superintend the work ordered, but by reason of his illness another mining engineer was, after many months' delay, required. The

defendant company opposed such a substitute appointment and, through its counsel, urged the Chief Justice to make a personal examination of the mine workings in question. After having examined the mine for himself, the Chief Justice refused to permit any experimental work to be done, as had previously been arranged for at the request of the plaintiff, and directed that the trial be proceeded with, which was done at Nelson, in July, 1905. Much evidence was taken, including that of S. S. Fowler, M.E., of Nelson, for the plaintiff company. Counsel for Mr. Harris pressed their motion for test work, but this motion was dismissed, and in November, 1905, the Chief Justice gave judgment in favor of the defendant, the Byron N. White Company. This was appealed, with the result that, in November, at Vancouver, the Full Court ordered that the test work applied for by the Star Company be done under the direction of court.

W. E. Zwicky, manager of the Rambler-Cariboo Mines, Ltd., of Kaslo, was selected to supervise this work, which resulted favorably for the Star Company. Upon this, counsel for the plaintiff company contended that every test made decisively established the correctness of the theories advanced by Mr. Harris' expert witnesses, and two judges of the court decided in favor of Mr. Harris, while one held an opposite opinion. So Mr. Harris' appeal against the judgment of the Chief Justice was allowed. Thereafter the White Company appealed to the Supreme Court of Canada, and this appeal was heard in Ottawa in October, 1908. The result was that on February 13, 1909, the unanimous judgment of that court was delivered, dismissing the appeal of the White Company and sustaining the judgment of the Full Court of British Columbia, which latter court had reversed the judgment of Chief Justice Hunter at the trial.

The position now is that John M. Harris, who is also largely interested in the valuable Reco mine, near Sandon, has a judgment giving him a clear title to the Heber Fraction and Rabbit Paw mineral claims, a perpetual injunction against the defendant's mining on this property, full damages for all ore taken from these claims and all costs of trials and appeals.

The refusal of the Judicial Committee of the Imperial Privy Council to grant the Byron N. White Company leave to appeal to the highest court in the Empire may be regarded as the last act in one of the most important, hardest fought, and most costly mining trials ever carried through in British Columbia. Its final conclusion will be welcomed in Sandon camp if it leads to a resumption of work on a similar scale to that of and concentrating mill was one of the chief sources of commercial prosperity to the town of Sandon.

While many will heartily sympathize with Mr. Byron White in his eventual defeat after a long fight for earlier years when the payroll of the Slocan Star mine what he regarded as his rights, there is the consolation of knowing that he has been fortunate in another direction, in the discovery on another part of the Slocan Star group last year of the continuation of a fine shoot of ore first opened on the Richmond-Eureka property, which discovery indicates that the Slocan Star possesses probably $500,000 worth of silver-lead ore of shipping grade, the existence of which on the property was not previously known.

SHEEP CREEK, B.C.

During the year 1908 over 200 new locations were made during the summer months in the Sheep Creek camp, Nelson Mining District, B.C. Practically all of these locations were within an area of four square miles.

The gold area extends twenty-five miles northeasterly from the Salmon River, and is approximately five miles wide. The formation is exposed to Mount Laska, ten miles from Proctor, on Kootenay Lake. The mountain range is easily approached by the narrow valleys of the tributary streams of the Salmon River. There is abundance of timber, and an unusually good water supply, furnishing cheap power for mining and milling. Last winter 20 carloads of ore, coming from different properties and from widely separated veins, averaged over $100 per ton. On the north side of Sheep Creek oxidized ores are being produced at a depth of over 100 feet. On the south side unaltered sulphides are being mined at a depth of 300 feet below the creek bed, a total difference in altitude of over 2,500 feet.

The sulphides in the quartz consist of iron pyrites, occasionally a little galena and zinc-blende, and, very rarely, copper pyrite. The ores are treated in stamp-mills and concentrating tables.

Associated with the gold in the veins is the mineral wolframite.

During 1908 four properties on the Sheep Creek gold belt produced $195,000 from a total of 11,600 tons of ore, an average of $17 per ton.

NEW STOPE MEASURE.

Mr. O. S. Tonnesen, of the East Rand Proprietary Mines, has invented an instrument for measuring the stopes, which promises to greatly facilitate the work of the surveyor. Mr. Tonnesen calls it the inclined angle method. By means of this instrument and a tape angles and distances are measured directly on the inclined plane of the reef. The instrument is called the "stereometer," and is so constructed that it will measure the true inclined angle between any three points without observing the horizontal and vertical angles, no reductions or calculations being required. It can be held in the hand when observing, and no cumbersome and difficult setting up is required. It may be used for graphical records or be read by a vernier. As this question of stope measurements has been one causing continual dissatisfaction between the miners and surveyors such an instrument will prevent much friction. This was the main cause of the late strike.

The Book Departments of the McGraw Publishing Company and the Hill Publishing Company have been consolidated under the corporate name of the McGraw-Hill Book Company. This is announced to be a consolidation for the making and selling of better technical books. The new concern will have larger and better printing, distributing, and selling facilities than heretofore.

EUROPEAN COAL MINES.

Address Delivered Before the Coal Mining Institute of America, at Punxsutawney, Pennsylvania.

By J. W. Paul, Mining Engineer, Technologic Branch, United States Geological Survey, in charge of Mine Lighting Investigations and Rescue Work.

The subject, European Coal Mines, is one upon which many volumes have been written, many official reports made, and has been the occasion upon which Royal Commissions have made many inquiries.

Schools, universities, mining institutes, technical societies, testing stations, indemnifying and protective associations in Europe are a few of the institutions resulting directly from the coal industry.

It goes without saying that European mines are much older than mines in our country, and their exploitation has been made largely by native labour, representative of the integral society which furnishes the foundation for their laws and governmental policies with respect to protective measures for all classes of labour, especially mining.

It is not my purpose on this occasion to go into an elaboration covering all the important aspects of the mines in Europe. To do so would necessarily make this paper a lengthy one, and, I fear, somewhat tiresome. Again, the writer has some timidity in endeavoring to enter into a discussion of some important conditions affecting mine safety which have been matters of experimentation and discussion in Europe for the past thirty years.

The first duty of a government is to protect its citizens against all enemies which may cause injury by disease, accident, impairment of health or by attack of foreign foes.

All forms of protective measures entail a pecuniary tax upon the citizens of the government, whether the protection be for naval or miliary work, prevention of disease or accidents.

In the coal-producing countries of Europe special importance has been given to the adoption of measures which have for their purpose the minimizing of accidents of all classes within mines.

These protective measures are the result of many years' study of the conditions under which different classes of accidents occur and the adoption of practical methods for their prevention.

In most cases the adoption of precautionary methods has added to the cost of the production of coal, but by doing so additional people find employment and the accident list is materially reduced.

The question of discipline within the mines of Europe is frequently mentioned as one of the factors of safety which we have in far less degree in this country. In a large measure the discipline in European mines has been the outcome of many years of training the miners to recognize dangerous conditions.

This discipline does not approach the perfection obtained in the military organizations, but it is obtained in the same manner as in a military organization, by having a sufficient number of experienced and trained mine captains, foremen and bosses to frequently see each man while at his work and direct him as to the proper safety precautions to be observed should any dangerous conditions arise.

Such supervision of the mine work necessarily involves additional cost on each ton of coal which the people and the industries of the country seem willing to pay.

In matters of statutory requirements and state or governmental inspection, the European laws are largely in the hands of government officials, who have authority to interpret the laws and promulgate regulations relative to their proper enforcement.

The inspectors, in general, have much authority in preventing dangerous practices, and in some countries they may use their discretion in preventing the use of all types of explosives within mines.

With reference to the installation of mine plants, the equipment and buildings as a rule are quite elaborate and constructed along lines of permanency, being mostly of fireproof material, a building practice quite in harmony with the regulations requiring all classes of buildings to be made of incombustible material.

Mine fires in European mines have in the past been the cause of loss of life, and in England and Germany they have resulted in the taking of many lives. Notably in Germany, at much expense, elaborate fire fighting facilities are provided, resembling in every particular a well-appointed fire brigade station, such as is maintained by some of our cities, having fire engines, horses and a crew of trained men.

For underground work of rescuing miners and combatting fires, many stations are equipped with different types of rescue apparatus and men trained in their use.

In Austria a law requires that each mine shall be equipped with rescue apparatus, and at all times a certain percentage of the underground employees shall be trained in the proper use of the apparatus.

In France, a similar law is going into effect, and in Belgium, after July 1st next, the collieries will be required to be equipped with the apparatus.

In Germany, many rescue apparatus are kept at the mines, and at central stations where men are trained in the use of the apparatus.

In England, Scotland and Wales, mine rescue stations are established, and miners are being regularly trained.

Rescue apparatus in Europe appear to have passed the experimental stage, since in three of the important mining countries their use is required by law.

In Europe there has been much saving of life through the benefits derived from the several explosive-testing stations, where experiments have been conducted upon mine gases, coal dust and explosives.

In the countries of Great Britain, Belgium, Germany, France, Austria and Russia the Mine Inspection Departments, the operators, and manufacturers of explosives have for their guidance the results of tests made at their explosive-testing stations, and operators of mines are restricted to the use of certain types of explosives, while in Belgium and Austria certain classes of mines are prohibited from using explosives for any purpose within the mine.

As early as 1883 a station was constructed at Zwickau, Saxony, for the study of the effect of explosives when discharged in the presence of explosive gas

and coal dust. Since this was inaugurated the other stations in the different parts of Europe have been installed, and in Bohemia a station is installed underground, utilizing an entry in a tunnel which was excavated about the year 1800.

None of the foreign experimenters have as yet arrived at an acceptable explanation of the phenomenon of a coal dust explosion, although at all of the foreign stations coal dust explosions are produced without the admixture of explosive gas.

In those mines in Europe in which explosives are used for blasting the coal or rock, much attention is given to the condition of the part of the mine where a shot is to be fired with respect to the presence of coal dust and its conditions as to moisture.

Watering of the workings of the mines is practised systematically, being applied by specially constructed cars, by hose and nozzle and by spraying devices.

Much faith appears to be entertained in the wetting of the sides and floor at and within a certain minimum radius of the point at which an explosive is to be fired.

Experiments are in progress in England and Austria to determine the retarding of an explosion by the introduction in different parts of a mine of wet zones, inert zones, and dustless zones.

European countries are fully alive in a concerted endeavor to ascertain what additional safeguards may further curtail the loss of life and personal injury within mines.

Not being fully satisfied with the results already obtained, new and more elaborate testing stations are in contemplation in at least three of the European countries.

The safety lamps in use in the European mines and the manner of handling them are worthy of comment.

In England the lamps are carefully inspected before being taken into the pits, and upon reaching the bottom of the pit a mine official makes a careful inspection of the lamp to see that it is in good condition. It is forbidden to set a safety lamp on its bottom in any part of the mine. When a workman wishes to place his lamp to one side, he must hang it in a safe position.

In Belgium the lamps are looked over by an official on the outside of the mine to see that all of its parts are properly assembled, no test being made of the lamp to determine if it is defective.

In Germany the lamps are cleaned and locked and handed to the miners, who examine them to ascertain if they are in condition suitable for use. In Germany all lamps are without bonnets, to enable the miner to observe the condition of the gauze.

In Continental Europe at many of the gaseous mines each workman is his own fire boss or gas tester—that is, he tests his working place for the presence of explosive gas, and, if found, reports to the proper official. In this particular much reliance is placed in the competency of each of the underground men.

A station of much interest is to be seen within the Nordbahn mine at Maehrisch-Austrau, where a retreating chamber is provided capable of accommodating three hundred men. This station is about a mile from the bottom of the shaft, and is so arranged that it may be closed with heavy doors and isolated from the atmosphere of the mine. Food, water, ventilation, light, telephones, rescue apparatus and medicines are provided.

In case of a mine fire or an explosion in any part of the mine which might prevent the escape of any living miner, they may retire to this station and remain until rescued.

With the rescue apparatus in the underground station the men may do much effective work in combatting the fire or recovering miners who may be in irrespirable air and unable without assistance to reach the retreating-gallery. This station is another evidence of the aggressive efforts being made to further reduce loss of life in Europe.

Of recent months it is not uncommon to learn of American mining officials traveling Europe making a study of the conditions pertaining to the safeguarding of life, so that it appears that we are beginning to realize that some of the practices in Europe may, with much profit, be adopted in the operation of our own mines.

POWER AT COBALT.

(Specially Contributed.)

An interesting phase of the situation in Cobalt at the present time is the question of power, and several companies have been formed to supply air and electricity on a large scale to the mines of the district. It is believed that this will mean a great saving, as the present price of steam-generated power is very high. This is due largely to the high price of coal, which averages about $5.50 per ton on the cars at Cobalt.

It is difficult to obtain reliable figures on the cost of power in the camp, but it is estimated that it will run from $135 to $175 per horsepower per year, while the general average will probably be above the $125 mark. The advent of the power companies into the camp is being followed with close interest, as the rates they offer will probably cut present costs about in half.

A company that is attracting a good deal of attention at the present time is The Mines Power, Limited, who are installing a plant situated on the Matabichewan River close to Lake Temiskaming. The requirements of this corporation have been financed by Montreal capitalists, and the head office of the company is in that place. The capital is $3,000,000, and as the money has been advanced by the promoters, there is no stock or bonds on the market for sale. The president is Mr. E. A. Wallberg and Mr. F. J. Bell is the general manager.

The powerhouse will be situated on the river already mentioned, about twenty-five miles from Cobalt, while the company have also obtained the right from the Government to dam up the waters of the lakes above the falls, as they see fit, to supply sufficient storage capacity in case the water in the river should fail. The dam above the powerhouse is being built of solid concrete, and will have a length of eight hundred feet and a height of forty-five feet. There will be two five-foot penstocks, while the working head will be 312 feet. It is estimated that a total of 15,000 horsepower can be generated.

The powerhouse will be a solid concrete building, forty by ninety feet, and will be fitted with travelling cranes. At present there are four separate generating units being installed. Each generator is rated at 1,875 kw., with a large overload capacity, and provision is being made for extensions to the powerhouse equipment. The units that are now being installed will supply the present requirements of the district. The generators are three-phase, sixty-cycle, 2,300 volts. The wheels are spiral case turbines, with a capacity of 2,750

horsepower each. These will be directly connected with the generators. There will be two exciter units,, each with a capacity of 100 kw., and each exciter will be directly connected to a water wheel. To insure perfect regulation, high power governors are being installed. The step-up transformers are also of the three-phase type, and there will be four in the continuous service, with an extra as spare in case of accident. These transformers will increase the pressure to 44,000 volts. Two separate three-phase transmission lines are being constructed, each having a separate circuit. Aluminum is being used for the conductors, and these will be supported by high-tension porcelain insulators.

The right of way is being cut one hundred feet wide through the woods, and also all high trees on either side in close proximity, so that the wires may not suffer. For the delivery of the power three substations will be built. One will be in South Lorrain, with a capacity of 1,000 horsepower; one at Kerr Lake, with a capacity of 2,500 horsepower, while the remaining capacity of the plant will be at the other station at Cobalt. These stations will consist of three-phase step-down transformers, with the usual lightning arrester and switchboard equipments. The distributing system from the different substations will be three-phase sixty-cycle 2,200 volts. At the Kerr Lake and Cobalt stations there will be electrically driven compressor plants, with spare units. At Cobalt the plant will consist of three direct-connected motor-driven three-stage compressors, each having a capacity of 4,200 feet of free air per minute. The plant will have extra large intercoolers and aftercoolers. The air will be delivered at 100 pounds, and atmospheric temperature through radiating pipe lines from the central station to the surrounding mines, and will be sold to the consumer on a meter basis.

On the upper lakes, dams are now being built, while on the powerhouse and the concrete dam there is a force of four hundred men employed. On the right of way three separate gangs are employed. The whole plant consists of practically duplicate units, and every precaution is being taken by the company to insure continuous service. It is expected that power will be ready for delivery by September 30th.

This company also intend to extend their transmission lines to Elk Lake and Gowganda. They also control the Kakake waterpower on the River Quinze, which power is being held in reserve for development as the market extends. This power alone has a capacity of about 40,000 horsepower.

METALLOGENETIC EPOCHS.

By Waldemar Lindgren, Washington, D.C.

Paper Read Before the Canadian Mining Institute, Annual Meeting, Montreal, March, 1909.

The difficulties of a student of mineral deposits are increasing. As in petrography the first descriptive period of the science is drawing to a close. We know the principal types, and, though much remains to be done in detailed accounts, it seems that we are gradually coming to the same "impasse' which confronts the petrologist, who is now turning to the exact experiments of physical chemistry for the solution of the riddles which confront him. And as we transfer some of our most important problems into the same able hands for experimental work at high temperatures and pressures, some of us may confess to a slight feeling of disappointment that inductive work has failed to furnish definite answers to many of our questions. But such a state of mind should only be like the shadow of a passing cloud; for the study of mineral deposits is not a science distinct from others; it leans on all branches of geology as well as on chemistry and physics, and this new development means not only that we have taken a step in advance; that we have aquired a new and powerful collaborator; it means also still further specialization. It does not mean that the scientific services of the mining geologist will be unnecessary or futile. His work will be necessary to assemble and assort the facts, to test the results of the laboratory, to propound new problems, and to generalize from the study of wide areas.

This critical examination of mineral deposits over wide areas is a work which now confronts us. It is the geographic and historical side of our science. With some hesitation I venture to place before this Institute an epitome of the principal epochs of the segregation of metals over our continent. Many of the facts are well known to you and the only feature of this paper which can possibly merit your attention is the summarizing of these well known facts.

This continent of North America is rich in metallic wealth; its total production exceeds that of any other equivalent division of the earth. Gold and silver come from the Cordilleran belt and also from the eastern margin of the continent. Copper in ever increasing quantities is derived from the Central Basin and from deposits in the west extending from Sonora to British Columbia. Lead and zinc are produced from our vast Mississippi basin and from the ranges of the Rocky Mountains. Half of the world's nickel is drawn from Ontario and a large part of the tungsten comes from Colorado. The total value of the metallic product of the continent in 1908 was about $1,000,000,000.

In some measure we have succeeded in classifying the vast number of deposits, not only with reference to their mineralogical and structural characteristics, but also with reference to their age. We find that metal liferous deposits have been formed since the earliest times of geological history. We find also that they are not equally distributed over the continent, but occur in metallogenetic provinces of greatly different form and extent. Moreover, these metallic concentrations have not been going on at equal rates throughout geologic time, but the formation of each group corresponds to a fairly brief epoch which, with few exceptions, is also an epoch of vulcanism. No fact is better established than this, however much we may differ in details of genetic history. On the other hand, regions of vulcanism do not necessarily contain ore deposits. Naturally we find the ores in regions of uplift and erosion, for here the rocks are best exposed, but they are not necessarily connected with such warpings and corrugations, as is

illustrated by the oft-cited poverty in metalliferous deposits of the Appalachian ranges of sedimentary rocks.

Since the earliest times, then, metallogenetic epochs have recurred on the North American continent, and, comparing it with others, we must conclude that either the original sources from which the ores have been concentrated have been richer than elsewhere or the conditions for their formation have been more favourable than elsewhere.

Metallogenetic Epochs.

In describing these epochs it will be convenient to separate the eastern and the western halves of the continent for, with exception of the earliest part of their history, they have little in common.

Epochs of Ore Deposition in the Eastern Part of the Continent.

1. The Pre-Cambrian Period.—The Pre-Cambrian period embraces a very long time and many different epochs of ore formation; but for our present purposes it will be necessary to consider it as a whole. Ages of sedimentation alternated with violent igneous action. At many places long erosion preceded the deposition of the Cambrian. The Pre-Cambrian deposits form a belt along the southern Appalachians, extending northward into Canada, where they are found over a wide area. They occupy parts of Michigan, Wisconsin, and Minnesota, and re-appear in the west, in South Dakota, Wyoming, Colorado, New Mexico and Arizona; possibly also in south-western California, but with less of the diversity characterizing the Lake Superior region. In the latter region there is a great succession of igneous rocks, effusive as well as intrusive, ranging from granites to basalts, diabases and gabbros. In the Cordilleran region the intrusives are almost exclusively represented and the prevailing type is the normal red granite contrasting strangely with the later intermediate type of intrusives. Smaller amounts of intrusive diorite, gabbro and diabase are present.

The metals characteristic of this period are iron, copper, nickel, gold and silver. Lead and zinc appear to be present in far smaller quantities than in later periods. Quicksilver and antimony are rare. The iron ores are, as well known, of several types; the ilmenites and the magnetites are chiefly of igneous origin; the hematites of Lake Superior, according to Leith, of partly igneous, partly sedimentary origin, and ultimately oxidized and concentrated by surface waters. It is believed that this concentration took place mainly in Pre-Cambrian time. The copper and nickel ores are connected with basic igneous rocks, in part intrusive, in part, as in the Michigan copper region, of effusive type. The concentration of the copper of this latter region into workable deposits also seems to have taken place chiefly, if not wholly, in Pre-Cambrian time, and probably followed the close of the igneous activity in Keweenawan time. The silver veins of Cobalt, which have proved so rich, are likewise Pre-Cambrian and some writers are inclined to connect them with Keweenawan basic intrusives into Huronian rocks.

In the Southern States the deposition of the gold-bearing quartz veins in most cases directly followed granitic intrusions in various sedimentary schists. The assertions of earlier writers, that these veins are genetically connected with basic intrusives, are not supported by recent work. Some silver and copper are associated with these gold-bearing veins. It should be added that some writers assign a Cambrian or even later age to the southern grantes. Minor copper deposits in the same region are chiefly derived from intrusions of diabase or allied rocks. Pre-Cambrian gold-quartz veins are also known from Western Ontario.

2. Epoch of Paleozoic Intrusives.—From New York and New England northward into Quebec and Nova Scotia granitic intrusions took place at various times during the Paleozoic as late as the carboniferous and were accompanied by some metallization. The gold-quartz veins of Quebec and Nova Scotia were in part, at least, formed after these intrusions and various small deposits in New England have a similar origin.

3. Epochs of the Sedimentary Iron Ores.—Processes of sedimentation under favourable conditions lead to concentration of iron ores. During the long period of unbroken Paleozoic sedimentation in the Appalachian region there were at least two epochs which are characterized by such iron ores. During the Clinton stage of the Silurian, persistent beds of low grade hematite were formed; and during the Carboniferous less important layers of carbonate black band ores were deposited.

4. Epochs of the Triassic Traps.—The important period of the history of the igneo-genetic ore deposits of the eastern part of the continent closed in the late Paleozoic and the majority of these deposits had been formed much earlier. A feeble recurrence of ore formation took place during the early Mesozoic, when the traps of the Eastern States were injected as sheets or overflowed as lava streams. Smaller masses of iron and copper ores developed along the igneous contacts, in part as veins, in part as contact meta-morphic deposits.

5. Cretaceous, Tertiary, or Later Epochs of Zinc and Lead Concentration.—Since the Triassic, vulcanism has rested and in the eastern part of the continent metal deposits have formed only by the concentrating power of flowing surface waters or of ground-water in decaying rocks, or of ascending waters of atmospheric origin.

In the central valleys, such ore concentration has been effected in comparatively late time, apparently independant of vulcanism, and has resulted in the most important lead and zinc deposits on the continent. Regarding the mode of origin of these deposits opinions differ widely, but most observers believe that the lead and zinc has been leached by surface waters from Paleozic limestones which derived their sparsely disseminated content from the Pre-Cambrian northern continent. Some regard the process as a simple affair of downward percolating surface waters. Others attribute it to vigorous ascending circulation of atmospheric origin. The time of this concentration is thought to range from the establishment of a circulation dependent upon uplift, perhaps from the Cretaceous to the present time; but some geologists have not hesitated to say that ore concentration began in late Paleozoic or in Mesozoic time. Further discussion cannot be attempted here, but with reference to the theories just indicated it may be worth while to point out that lead and zinc deposits are very scarce in Pre-Cambrian rocks and the latter would hardly seem to be an adequate primary supply. There is undoubtedly much evidence in favor of concentration by ordinary surface waters, but the lead-zinc deposits in Kentucky and Arkansas certainly show transition into types, which closely resemble western types of veins, attributed to hot waters. The ores in the more important districts appear to convey the impression of sharply defined

depositional epochs, rather than of long continued action of cold waters descending from the surface.

Epochs of Ore Deposition in the Western Part of the Continent.

The metallogenetic history of the Cordilleran region is more complex than that of the eastern half of the continent, but it is in some respects easier to interpret.

1. The Pre-Cambrian Period.—The Pre-Cambrian Period, as already mentioned, was productive of gold and copper deposits scattered from South Dakota through Wyoming, Colorado, New Mexico, and Arizona. South and west of this area the Pre-Cambrian is lacking; north of it, these old formations are present in places, but appear to contain no ore deposits formed during that period. In the Black Hills of South Dakota and in New Mexico some deposits referred to this group have been clearly shown to antedate the Paleozoic, and others in Arizona give strong inferential evidence of as great geologic age.

The Pre-Paleozoic gold deposits are generally lenticular quartz veins in schists, associated with heavy gangue minerals like tourmaline, garnet, etc. The copper deposits which usually contain chalcopyrite, are veins or irregular masses, the latter often of magmatic origin, but modified by dynamo metamorphism. Zinc blende is sometimes found with the chalcopyrite. Lead is almost wholly absent.

Throughout the Paleozoic, and the larger part of the Mesozoic the great interior province, now occupied by the Rocky Mountains, was the scene of almost uninterrupted sedimentation. Land areas existed here and there, but the igneous forces, so active over the whole country in pre-Cambrian time, were quiet for ages.

Not so along the Pacific coast; for here we find in places evidence of intrusions and lava flows dating back to the early Paleozoic. As yet it has not been shown that mineral deposits of that date exist along the coast.

2. The Early Mesozoic Epoch.—Between the Carboniferous and the Triassic, uplifts and folds had raised the Paleozoic sediments and the early Mesozoic beds were deposited uncomformably on the older rocks. Some time during the Triassic an epoch of intense igneous activity began and continued through the Jurassic. Basic lavas, mainly of the types of diabases and andesites, were erupted, largely as volcanic flows, from California to Alaska. A distinct epoch of metallization, principally yielding copper deposits, accompanied or followed these eruptions. We shall not err greatly in ascribing some copper deposits of California, British Columbia, and the Copper River region in Alaska to this, the second metallo-genetic epoch definitely recognized on the Pacific coast.

3. The Late Mesozoic Epoch.—The third and most important epoch followed the intrusions of the great batholiths of the Pacific coast to which an early Cretaceous age is generally assigned. These intrusions of intermediate quartz-monzonitic or granodioritic character took place upon a scale difficult to grasp in its immensity. The present exposures show two main granitic masses, possibly connected beneath the Tertiary lavas. The southern batholith extends through California, the northern batholith stretches from Washington up through British Columbia to Alaska. Another smaller mass now occupies the central part of Idaho. Innumerable intrusives of less volume broke through the crust in Southern California, Southern Arizona, Western Nevada, Oregon, and elsewhere. The age of the batholith of Western Montana is somewhat in doubt, it may belong to a later epoch. But throughout this revolution and the birth of the mountain ranges on the coast, the Cretaceous was being quietly deposited at sea level all over the eastern Cordilleran region.

An epoch of intense metallization followed these intrusions, within the areas indicated. The great interior masses of the batholiths are usually free from deposits, as shown in the High Sierra, in the Clearwater region, and in British Columbia. But along their margins mineral deposits formed in abundance, as along the gold belt of California, and along the two contacts of the batholith of the Canadian and Alaskan coast regions. The latest researches by the Alaskan division of the United States Geological Survey indicate that the great placer fields of Alaska derived their gold from deposits of this epoch. Gold, primarily, and copper, secondarily, are the characteristic metals. Along the Pacific coast, where there is little limestone in the intruded sediments, lead is practically absent, but in the interior, as in Nevada and Idaho, where the intrusions came into contact with Paleozoic limestone, this metal, with zinc, begins to appear. Silver is everywhere present, but scarcely ever important, except where lead appears. Arsenic and antimony are not abundant, mercury is nowhere present in commercial quantities.

4. The Early Tertiary Epoch.—As if exhausted, the igneous forces appear to have rested until the close of the Cretaceous and then broke out in a new field, along the eastern margin of the Cordilleran region, at that time largely covered by a plastic mantle of Cretaceous shales and sandstones, several thousand feet in thickness, which rested on great accumulations of Paleozoic limestones.

The predominating magmas were again of intermediate character, and solidified as granular or porphyritic rocks, standing between the granites and the diorites; they contrast markedly with the potassic and acidic magmas of pre-Cambrian times. While it is not necessary to limit strictly this igneous activity to a certain time, there is little doubt that most of it took place in the Eocene. The eruptions mainly took the form of intrusions and largely that of laccoliths, undoubtedly because, unlike the conditions of the shattered rocks of the Pacific coast, they were covered by this heavy, tough and still yielding mass of Cretaceous sediments. We find an enormous number of these intrusions as sheets or laccoliths at various horizons between the Cambrian and the Cretaceous or as dikes or stocks that break through the underlying pre-Cambrian. They are rarely comparable in extent to the great batholiths of the coast. They occur from British Columbia, through Montana, Colorado, New Mexico, eastern Arizona, and probably attain their greatest development in eastern Mexico. For reasons already indicated many, perhaps most, of these intrusives never reached the surface. Only in a few cases, as in Montana and in Colorado, near Denver, do the strata of Laramie or Eocene age contain volcanic detritus.

The third Cordilleran epoch of metallization followed these intrusions; contact metamorphic deposits and veins were formed in abundance around their margins. The characteristic metals are silver and gold with much lead and zinc, especially where the intrusions cut the limestones. Copper and iron are also present at such limestone contacts. Arsenic and antimony are far more in evidence than during the second epoch, but mercury is still absent.

5. The Late Tertiary Epoch.—Orogenic disturbances

followed the intrusions; the whole Cordilleran region was lifted high above sea level, warped, and faulted. These disturbances may have facilitated sub-aerial eruptions; at any rate it is certain that the middle and close of the Tertiary witnessed outflows of lavas upon a magnificent scale.

These eruptions spread over a large part of the western part of the continent; less pronounced in British Columbia and Alaska, they are abundantly represented in California, Washington, Oregon, Idaho, Colorado, Utah, Nevada, New Mexico, Arizona, and attained their greatest development in Mexico. Andesites and rhyolites are the predominating rocks. In some places the flows attained such thickness that during the later part of the volcanic epoch intrusions of magmas consolidated in them with granular structure.

During these eruptions, not strictly contemporaneous throughout, a fifth metallization took place, of which the characteristic metals are gold and silver. These deposits were often of great richness which is further accentuated by secondary processes; in fact most of the "bonanzas" belong to this class. Lead and zinc are not conspicuous except where the metallization took place in limestone. Copper is not abundant. Tellurium and antimony are common. Not that they are absent in older metallizations, but they, especially tellurium, seem particularly characteristic of this epoch.

Large areas of volcanic rocks are barren. The metal deposits seem to have formed only near or at the foci of igneous activity, where connection could be established with underlying magmas. The most recent eruptions were mainly basalts, and these, except in one case, do not seem to have been affected by metallization.

6. The Post-Pliocene Epoch.—The youngest metallogenetic province is that of the Pacific coast line. It is of very late age—Post-Pliocene apparently, and is characterized by mercury accompanied by few other metals. It developed in the coast ranges of California, following basalt eruptions and contemporaneous with it was a great development of hot springs. In part the deposition goes on at the present time.

Note that the quicksilver did not develop simultaneously with the birth of the coast ranges; these are much older, and an active circulation of atmospheric water was undoubtedly established long before the quicksilver deposit was formed.

7. Cretaceous or Later Epochs of Copper Concentration in Sedimentary Rocks.—In addition to these six classes, whose connections with igneous rocks are indubitable, the disseminated copper ores of the south-west should find mention. They occur in sandstones, shales, or conglomerates ranging from the Carboniferous to the Cretaceous, and, in most cases, chalcocite is the primary ore; frequently small amounts of silver are present. New Mexico, Arizona, Utah, Colorado, and Texas offer numerous examples of this class. While their origin is not wholly clear, many observers believe that they represent concentration by groundwaters of small amounts of copper originally derived from the pre-Cambrian deposits and since distributed through late sedimentary beds.

Summing up, we have then in the Cordilleran region:—

	Principal metals.	Principal rocks associated with deposits.
1. Deposits of Pre-Cambrian period.	Gold and copper.	Granites Diorites, gabbro
2. Deposits of early Mesozoic epoch .	Copper	Basalt, diabase Gabbro
3. Deposits of late Mesozoic epoch .	Gold	Granodiorite Quartz-monzonit
4. Deposits of early Tertiary epoch..	Gold, silver. . . Copper, lead, zinc	Granodiorite Quartz-monzonite Monzonite
5. Deposits of late Tertiary epoch..	Gold, silver. . . .	Andesite Rhyolite
6. Deposits of Post-Pliocene epoch ..	Quicksilver . . .	Basalt
7. Cretaceous or later concentrations in sedimentary rocks	Copper	Sandstone, shale Conglomerate

As the surface of the earth is brought near to any deposit by the erosion of covering rocks, the chemical action of descending oxygenated groundwater, finally also the transplanting activity of running waters, are brought into play. Enrichment by simple oxidation or by the formation of secondary sulphides may then take place. Migration of metals into adjoining rocks may also follow. The heavy indestructible minerals will be sorted out and accumulate in the gravels of adjoining streams. In short, each primary deposit may be the parent of several of secondary grade, and the later are usually the richer. But the secondary deposits cannot be classified on the same basis as the primary, for groundwater and surface streams may at the same time attack deposits of widely differing age, and, under favourable conditions, such secondary migrations may be in progress at a given primary deposit for long periods of geological time.

Several observers have noted that the character of metallization appears to vary with geological time. In the above summary, this is illustrated by the almost exclusive appearance of important quicksilver deposits in recent epochs. Others have laid emphasis on the varying depth below the surface at which the deposition took place, maintaining, for instance, that, because certain sulpho-salts of quicksilver are easily soluble, they would remain in solution in the ascending waters until the surface had nearly been reached. Neither view, probably, contains the whole truth. It is evident, for example, that many deposits of gold, silver, and other metals have been formed near the surface in volcanic regions, in which quicksilver is wholly absent.

In deposits that are clearly connected with igneous rocks metallization is certainly a function of varying pressure and temperature; these factors being dependant upon depths below the surface and other conditions; metallization is also dependent on the nature of the rocks in which deposition takes place. Primarily, however, it is probably a consequence of magmatic differentiation.

It is well established that magmas of different types contain different associations of the rarer metals. For instance, tin and tungsten characterize acidic rocks, while nickel and cobalt are found chiefly in magmas rich in ferro-magnesian constituents. At the same time rocks of a given general composition may, in different

localities, vary considerably in the quantity of rarer metals contained.

Our knowledge of the content of rarer metals in igneous rocks is fragmentary, but it is at least often the case that ore deposits formed after the eruption of an igneous rock will contain the rarer metals characteristic of it. It may be true that for each differentiated rock type there are corresponding types of deposits, varying with the conditions of deposition.

As periods of long continued differentiation may materially modify the composition of a magma it is conceivable that this might find expression in a progressive change in the character of ore deposits successively formed during these periods. The quicksilver deposits of California, for instance, may be the ultimate result of such long continued differentiation.

Perhaps it may be thought that the limits of epochs of metallization have been drawn too closely in this paper. It is freely admitted that in many cases there may be room for doubt. But if this opening of the question will stimulate discussion of a vital subject it will have achieved its most desired result.

SOUTH LORRAIN SILVER AREA.

Abstract of Report by A. G. Burrows, Ontario Bureau of Mines.

This area first attracted attention in December, 1907, when a promising discovery of native silver was made on a claim now known as the Keeley mine (H. R. 19). A rush followed this discovery, and soon almost the whole area was under staking as mining claims.

The central portion of South Lorrain is about sixteen miles southeast of the town of Cobalt. The camp is most easily reached during the open season, by steamer from Haileybury, from which town it is distant about twenty-two miles. Communication is continued during the winter, over a sleigh road on lake Temiskaming. A government wharf has been constructed just north of the townsite of Sixty-six. From the latter place, a good wagon road extends westerly, by way of Loon lake, a distance of three miles, to the Keeley mine. Another road has been built by the Ontario government, just north of the wharf, and opens up another stretch of country. From these roads, old timber roads or trails may be followed to any part of the area. Lumbering has been carried on for years, so that almost all the pine has been removed. During the past season, serious forest fires destroyed much timber, which would have been suitable for mining purposes.

Topography

The surface of the country is rough and hilly, and many small lakes lie in the depressions. The shore line is bold, and the hills rise abruptly from the lake. The hills and ridges are conspicuous features, and are generally found to consist of one geological formation. In consequence, the contacts are usually in the valleys and covered. This fact is well exemplified by a glance at the map, which shows almost all the lakes to lie in contact plains.

In following the road from lake Temiskaming to the Keeley mine, there is almost a continuous ascent. The shaft at the Keeley mine has an elevation of 571 feet and the bridge south of Loon lake an elevation of 323 feet. These elevations are relative to the level of lake Temiskaming on July 15th, 1908, when the water in the lake was higher than the average. The high water elevation of lake Temiskaming is 592 feet above sea level.

Classification of Rocks

In this area, the formations are found to conform to the scheme proposed by Dr. W. G. Miller for the Cobalt area. The writer did not, however, see any unconformity between the quartzite-arkose series and the conglomerate-slate of the Huronian formation:—

Glacial and Recent—Boulder-clay, sand, gravel, etc. Great unconformity.

Post-Middle Huronian—Diabase. Igneous contact.

Huronian—Quartzite, arkose, conglomerate, slate, breccia. Great unconformity.

Laurentian—Syenite, granite, intrusive into the Keewatin, but not into the Huronian. Igneous contact.

Keewatin—An igneous complex, chiefly basic igneous rocks together with acid porphyries.

Glacial and Recent

Over considerable of the area, there is a covering of drift, carrying the usual glacial boulders. On the summits of the ridges, the drift is sometimes very deep. The rock exposures are usually found along the slopes of the hills, where the drift is thinner. On the shore of lake Temiskaming just south of the townsite, the fine-grained rocks well preserve the glacial striae. On the main shore, just opposite a small rocky island, the striae are very striking, and are due south (magnetic). At other points along the shore, there is a little variation to the east or west of south.

In the cutting of the government road just east of H. R. 69, the clay shows a stratified arrangement. Clay hills are seen along the shore of the lake, to the mouth of the Montreal river. Five miles up the river, the clay hills are high and much cut by deep ravines.

The total distribution of the drift is not shown on the map, but only where the working out of the contacts was seriously interfered with.

Diabase (Post Middle-Huronian).

This formation has its greatest development in the central portion of the area, extending westward from lake Temiskaming, around the north end of Loon lake, southwest to the east side of Trout lake, and north almost to the Lorrain boundary. In this area it occurs as a very prominent ridge. A smaller area is seen in the northwest portion, where it is associated with the quartzite. In appearance and texture the diabase is very similar to that described in Dr. Miller's Report on the Cobalt Area, Third Edition, and is essentially a quartz-diabase.

A marked occurrence of the diabase is a dike, about five chains in width and traceable for two miles, intruding the quartzite. This may be seen east of G. F. 26, and a short distance south of the Lorrain boundary. The dike is very fine-grained on either side, and towards the centre has the normal diabase appearance.

There are smaller patches of diabase in the basic Keewatin areas, and these are difficult to distinguish as to age. Some of them are undoubtedly of the same age as the post-Huronian diabase, but, owing to the difficulty of separation from the other rocks, are not shown on the map. A thin section of a diabase associated with the Keewatin on R. L. 468 shows rather fresh plagioclase set in the augite. The latter is greatly altered to green hornblende (uralite). Some grains of quartz are seen in the section.

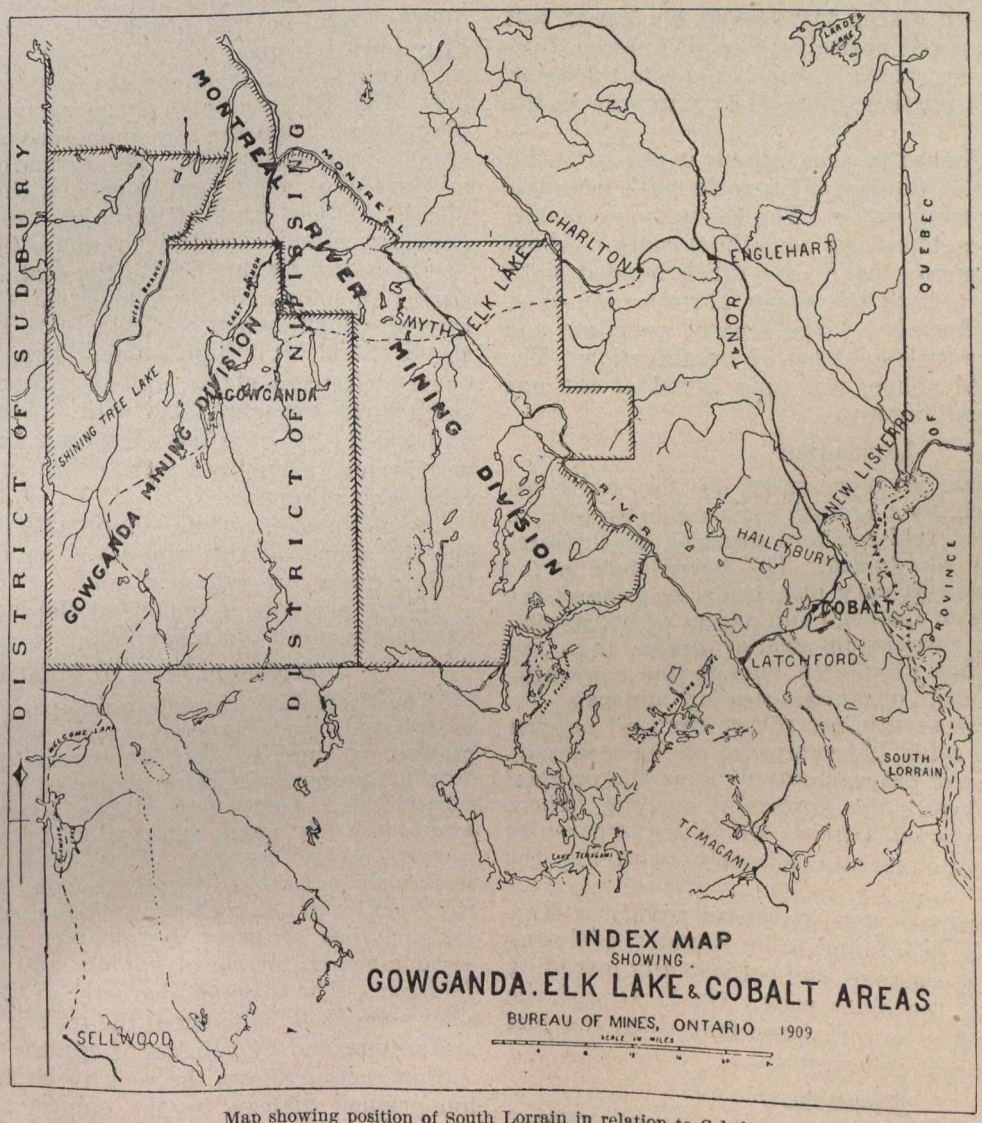
Along the north line of G. F. 12 there is a reddish granitic rock, which is apparently of the same age as the diabase, and a separation from the same magma.

river, the rock is a greywacke-conglomerate. South of Trout lake on H. R. 163, in a high rounded hill, coarse boulder conglomerate overlies well-banded slate. At the south end of the same lake and to the east, conglomerate and slate overlie the Keewatin, which shows in a bluff, and at a higher level than these in the post-Huronian diabase.

Greywacke

Just west of the No. 3 post of H. R. 34 is an outcrop of greywacke which overlies the Keewatin and is overlain to the west by conglomerate.

The greywacke, which is deceptive in appearance, was mistaken by prospectors for fine-grained diabase.



Map showing position of South Lorrain in relation to Cobalt.

Contact with the Huronian

Just north of the Keeley mine road, and west of Loon lake, on G. F. 13, the intrusive diabase (to the west) overlies the Huronian slate, at a high angle.

Huronian

The predominating rocks are conglomerates and quartzites. The southern part of the area is composed essentially of conglomerates, varying considerably in appearance. The usual variety is that containing subangular and rounded boulders of granite, syenite and greenstone of varied size, in a groundmass of greenish chloritic material. At the "notch" of the Montreal

Quartzite and Arkose

The quartzite and arkose have a great development in the north and west portions of the area. They are varied in color and texture, but are usually rather medium-grained, and the lines of stratification are not very noticeable. The prevailing colors are greenish, grayish, and reddish, and, in this area, the green variety is usually rather friable, whereas the red variety is hard and compact. These varieties seem to pass gradually one into the other on the same ridge. The chief constituents are quartz and feldspar, which are occasionally present in large angular fragments. The green color is due to the presence of sericite, an alteration product

of feldspar, and was first noticed in the sea-green quartzites along the shore of lake Temiskaming. when the rock is coarse it is difficult to distinguish in the field from granite, particularly when the red feldspar is present.

In this area the prevailing dip of the Huronian rocks is to the west, varying to the northwest. Near the No.1 post of L. O. 144, the slates dip to the west at an angle of 20 degrees. One mile west along the Keeley road from lake Temiskaming, and on H. R. 30, the slate and quartzite strike northeast and southwest and dip to the northwest. In the northwest portion of the area, near the No. 4 post of T. C. 77, the slates and quartzites dip to the southeast.

A breccia in situ is seen just east of No. 1 post, R.S. C. 68. It is composed entirely of small angular fragments of greenstone, which is seen in place to the south. This is the lowest portion of the Huronian seen in this area.

West of the Keewatin area, which is shown to the north of Trout lake, the Huronian rocks have been laid down in the following order. The Keewatin is usually overlain by a conglomerate, sometimes slaty. Above this, there is a narrow band of reddish banded slate, rather quartzose toward the upper portion, and overlying the latter there is a large area of quartzite and arkoses, with very little evidence of stratification. The breccia, mentioned above, was only noted at the one point in a very small outcrop.

Laurentian

The Laurentian is represented in the northeast portion of the area, by a reddish hornblende syenite, in which flesh-colored feldspar and greenish black hornblende are easily recognized. The hornblende is the common green variety, very pleochroic, and shows the distinctive prismatic cleavage and angles of the amphiboles. Quartz is present in smaller grains than the feldspar, and is not prominent enough for a granite. Sphene and magnetite occur as accessory minerals.

Throughout the syenite are rather rounded patches usually darker in color, but composed of the same constituents. These are basic secretions from the original magma, formed during the process of cooling. There are also some very small patches which are apparently remnants of a conglomerate formerly overlying the syenite.

Where the syenite comes in contact with the Keewatin to the south, it is found to be younger, enclosing fragments of the greenstone, and occasionally intruding for some distance, the older rock. On L. O. 153 the syenite is intruded by a very basic trap dike, ten feet wide and striking east and west.

Keewatin

The rocks of this series occur in several isolated areas. Theye are usually altered basic igneous rocks, both massive and schistose. The largest exposure extends N. N. E. from Trout lake for two miles. These are, in great part, greenish weathering rocks. The most typical portion is fine-grained, with a slaty appearance when fractured. Throughout the fine-grained rock are bands of coarser varieties, now much altered to amphibolite.

Just south of Loon lake on H. R. 57, the Keewatin is represented by very coarse massive amphibolites, which are highly mineralized with magnetite and iron pyrites.

Quite different in appearance from those above mentioned are the metamorphosed rocks three-quarters of a mile south of Loon lake, and extending form H. R. 114 to lake Temiskaming. These are seen as highly tilted bands, with a general strike a little north of east and almost vertical dip to the north. At the west end of this belt the prominent rock is light colored, weathering to an ashy gray. When freshly broken it has almost a cherty appearance and is exceedingly fine-grained. Locally it is much twisted and crumpled. Thin sections of two samples of this rock showed the original character to be entirely destroyed. The constituents are exceedingly fine-grained and secondary, consisting of quartz, feldspar, chlorite and hornblende or mica.

Folded in the bands of this schistose rock are small dikes of light colored porphyries, showing phenocrysts of reddish feldspar.

A thin section from one of these dikes, near the No.1 post of H. R. 114, shows phenocrysts of orthoclase and plagioclase, traversed by numerous small veinlets of epidote and hornblende. The groundmass is a granular mixture of feldspar and quartz, with needles of hornblende. Other dikes of porphyry are much fresher in appearance and seem to be younger in age.

On following this belt to the east, the rocks become darker in color and more chloritic. On H. R. 186, is a typical chlorite schist, striking E. N, E., and dipping to the N. N. E. at a high angle. This rock breaks into curved cleavage plates, and is traversed by numerous small torsion cracks, filled with calcite. On H. R. 119 and 120 the schist is intruded by a large dike of white weathering porphyry with colorless phenocrysts of feldspar and quartz.

Small veins of quartz, impregnated with iron pyrites cut the schist in this vicinity. On H. R. 140 one of these carries low values in gold.

There is a belt of somewhat similar Keewatin rocks imediately south of Oxbow lake.

Keewatin West of Point Fine

The formation consists principally of rusty, metamorphosed, basic igneous rocks, which may now be classed as amphibolites. In several thin sections, the ferromagnesian mineral is shown to be green secondary hornblende. Just north of No. 1 post R. L. 469, the amphibolite is much intersected by veinlets of rusty quartz and iron pyrites. These veinlets stand out very strikingly as a ribbed structure from the dark rock. A thin section of the rock shows it to consist of small rods and patches of green hornblende, partly in parallel arrangements, grains of epidote and clear secondary feldspar. The original character of the rock is obliterated. On H. R. 74 much of the rock is very fine-grained and intersected by veinlets of epidote and iron pyrites. A thin section shows the rock to be an alteration of a fine-grained diabase, as the ophitic texture is shown clearly in the rods of altered plagioclase. The albite twinning in the feldspar is occasionally seen. The augite has been altered entirely to green hornblende. A coarser grained rock, outcropping near the No. 1 post of R. L. 465, has resulted from the alteration of a gaddro. The feldspar is now altered to saussurite minerals, and the pyroxene has changed to a very pleochroic green hornblende, now showing with ragged outline and bent forms. Only occasionally in this belt do the rocks show a schistose structure.

Discoveries

The principal discoveries have been made near the line of contact of the post-Middle-Huronian diabase and the Keewatin in the area to the north of Trout lake.

Along this contact, usually within a quarter of a mile, discoveries of native silver or smaltite have been made in both formations. The Wettlaufer veins are in the diabase, whereas the Keeley veins are in the Keewatin. Toward the north end of this belt the discoveries so far consist of smaltite and niccolite. Small showings of native silver have been found in other isolated areas of the Keewatin or diabase. The writer does not know of any discoveries of native silver in the conglomerate or quartzite, although both these rocks are seen in contact with the post middle-Huronian diabase. In this respect the conglomerate of South Lorraine resembles that around Elk lake, in which no native silver discoveries, as far as is known, have been made.

In the following is a description of a few of the promising veins on some of the properties:—

On the Wettlaufer claim, H. R. 85, there have been found three parallel veins with a strike N. E. and S. W. Of these, the two northerly veins have rich shoots showing native silver in sheet form, while the south vein carries smaltite with low silver values. The veins are narrow, but parts of them attain a width of six inches. Flake silver is shot into the diabase wall rock from one to three inches. The distance from the north to the south vein is about ninety feet. A shaft is being sunk on the north vein and the intention is to crosscut to the other veins.

At the Keeley mine, H. R. 19, considerable development has been done. At the shaft on the main vein, No. 1, the strike is S. 62 E. The silver occurs in wire form, flake-like sheets and hair-like tufts, associated with smaltite in a gangue of quartz and calcite. Quartz is very prominent in the vein, and is associated with the best values.

The following additional information is supplied by Major Boyd Magee, superintendant of the property. "The main shaft on the original discovery has been sunk to a depth of 133 feet. At the 65-feet level, 220 feet of drifting has been done on the vein, and about 60 tons of shipping ore have been taken out and bagged. The shaft is in the Keewatin formation. Dikes of old diabase have been encountered. At a depth of 130 feet, a crosscut is being driven to catch the main vein which dipped from the shaft at a depth of 78 feet. Associated with the ore is more or less cobaltite. A sulphide of copper and silver, probably stromeyrite, has been found in the No. 1 vein. No. 3 shaft sunk on a cobalt vein has run into shipping ore at a depth of 30 feet."

A sample of massive ore from a vein near the west side line of this property, analyzed by Mr. N. L. Turner, Provincial Assayer, shows it to be smaltite-chloanthite, with the following composition:—

Cobalt	10.00%
Nickel	8.16%
Arsenic	68.72%
Sulphur	.42%
Silver	8.7 oz. per ton

On H. R. 21 there are several calcite veins and one of them has shown on development native silver. This vein is near the east side line and strikes about N.N.E. A shaft has been sunk to a depth of 40 feet. The gangue is calcite, which has a very fine cryptocrystalline texture, associated in bands with quartz and decomposed material. Leaf silver, in small flakes, has been found across the vein, associated with smaltite, copper pyrites and native bismuth. Minute crystals of chloanthite are scattered through the gangue.

On H. R. 16 (Haileybury Silver Mining Company) the original discoveries were smaltite and niccolite. A sample of the massive ore has the following composition:—

Cobalt	15.92%
Nickel	11.18%
Arsenic	60.38%
Silver	trace

The vein has a strike of S. 20 E., and dips 70 to the east.

On this vein a shaft has been sunk to a depth of 100 feet, and about 15 tons of massive smaltite have been obtained. Only 17 feet of drifting have been done at this level. The chief vein filling is calcite and decomposed material.

Later a vein showing native silver was discovered on the south half of the claim. The silver is associated with smaltite. A shaft has been sunk on the vein to a depth of 75 feet. At this level drifting was carried 40 feet to the northeast and 40 feet to the southeast. The veins on this property are in the Keewatin.

On H. S. 42 (Forneri claim) there is a vein about 3 inches in width, with strike N. N. E., and occuring in the conglomerate. The vein material is smaltite and copper pyrites in calcite and quartz. A surface sample on assay showed no silver values. A shaft has been sunk to a depth of 75 feet. At 35 feet the vein dipped from the shaft. It is reported that silver values were obtained on assay at 14 feet depth.

On R. L. 471, near the east side line, there is a strong vein of massive smaltite, on which a shaft has been sunk 65 feet. The vein is in the Keewatin.

On H. R. 106, adjoining Trout lake on the northeast, a five by seven shaft has been sunk 50 feet on a calcite vein carrying smaltite.

On T. C. 73 there is a shaft down 40 feet on a calcite vein with disseminated smaltite and copper pyrites. These veins have not proved to carry appreciable silver values. The rock is the later diabase.

On H. R. 69 (Maiden claim) there has been extensive development work. Near the east side line, a tunnel has been driven from the base of a hill a distance of 206 feet on a calcite vein. At 100 feet a winze has been sunk to a depth of 60 feet. The vein in places has a width of 12 inches. Smaltite and niccolite are found in bunches in the vein. Low silver values are reported to have been obtained on assay. On vein No. 2 to the west a tunnel has been driven 176 feet. The vein filling is chiefly calcite with smaltite and niccolite in portions of the vein, 5 to 7 inches in width. The veins are in the Keewatin just north of the contact with the late diabase and strike a little east of north.

On H. R. 14, near the west side line, some native silver has been obtained in a narrow vein in the diabase.

On T. C. 71, east of Loon lake, a tunnel has been driven 100 feet on a strong calcite vein about a foot in width.

At other parts of this area there has been considerable prospecting, consisting of trenching and sinking of small pits and shafts. Calcite veins are the most common type, the calcite being usually associated with more or less quartz, and carrying smaltite and niccolite occasionally. These latter minerals have been found on a number of claims in well-defined veins.

Aplite dikes which are characteristic of many of the silver showings in the township of James and vicinity are of little importance in South Lorraine.

LEAD SMELTING AND REFINING PRACTICE AT TRAIL, B.C.

By A. J. McNab.

The Trail Smelter was built by Mr. F. August Heinze in 1896, to treat Rossland copper-gold ores only. In 1898 it was acquired by the Canadian Smelting Works. The new management at once began enlarging the capacity of the plant, and in 1899 installed the lead smelting department. This, in accordance with the standard practice of the time, consisted of hand and Bruckner furnaces for roasting, and rectangular blast furnaces for reduction. The plant consisted of three blast furnaces, ten hand roasters and six Bruckners. At this time no refinery was built, the bullion being shipped to San Francisco, where it was refined in bond. In order to save the heavy freight and refining charges, it was decided to build a refinery, and, in 1902, after careful experiment, the Betts Electrolytic Process was installed, the capacity being ten tons. This was enlarged successively in the years 1904 and 1905 to 20 and 50, and in 1906 to 75 tons—its present capacity. During this time the main changes in the smelting department were the abolition in 1906 of the hand roasters and Bruckner furnaces and the installation of the Huntingdon and Heberlein roasting furnaces and converters, the first installation being two Huntingdon and Heberlein roasters and twelve converters. In 1907—1908, four more roasters and twelve more converters were added, and two additional roasters are now being built, making eight in all, with twenty-four converters.

The ore supply is obtained from all parts of the province, Trail being the only customs smelter; in fact the only lead smelter in operation in British Columbia at the present time. The main supply comes from the St. Eugene mine, East Kootenay, owned by the Consolidated Mining & Smelting Company. This mine supplies about 75 per cent of the total lead produced. The remaining 25 per cent is almost entirely derived from other mines in East Kootenay and the Slocan districts. The lead tonnage produced from other sections being a negligible factor.

The ores are mainly sulphide, 80 per cent. being heavy galena ore or concentrates, running from 45 per cent to 75 per cent. lead. The tonnage of oxidized lead ore is small, not being over 10 per cent, while the balance of the tonnage is dry gold and silver ores with some gold concentrates from stamp mills. This preponderance of heavy sulphide ores necessitates a marked difference in policy from that followed by other lead smelters on this coneinent, as the conditions outside this province usually furnish the reverse features, viz., a comparatively small tonnage of heavy galena ore and concentrates, and a large tonnage of dry ores, iron concentrates, etc. This, as will be noticed later, compels a high percentage of lead on the charge, 35 per cent—45 per cent, as against the common practice of 10 per cent—15 per cent.

Sampling and Bedding:—The oxidized lead and dry ores are sampled in a mill equipped with Vezin samplers crushing the sample to ¼ and the reject to a 6 ring. This reject goes direct to the lead furnace charge bins. The heavy galena ores and coarse concentrates are crushed to ¼ and bedded, the sample being taken with Vezin samplers as above, 1/500th being the amount cut out. The fine concentrates are usually sampled by the fifth shovel method and bedded direct. In bedding it is aimed to secure a mixture with about 50 per cent of lead, only ore being bedded; lime rock, lead matter and a small amount of the ore (which, with the beds, constitute the roaster charge) is added later. At one time it was the practice to add the necessary amount of time rock and matte to the beds; but on account of the beds freezing in winter, which rendered a uniform mixture impossible, the extra expense of handling, together with a want of elasticity, which rendered a sudden change in the charge difficult, it was abandoned. The beds are large flat bins with a capacity of from 600 to 700 tons and are provided with tracks, etc., to enable the ore to be spread out in layers of a uniform thickness, so that in smelting the bed a fairly constant mixture shall be obtained.

Making up Charges, Mixing and Roasting:—The charge for the H. and H. roasters requires to be made up with a certain content of lead, iron, silica and lime to work well in the roasters and converters, and later in the blast furnace. In fact, the roasting department is the most important part of a lead smelting works; and the experience here has been, that with a good roast, there is little or no furnace trouble, whereas with a bad roast furnace complications are considerable. We find that for our usual conditions the most economical roast will analyze about as follows:—
Lead 40—44 per cent; tin 10—13 per cent; silica 8—11 per cent; lime 7—10 per cent; zinc under 10 per cent.

This material when properly mixed, roasted and converted will give a fairly hard, dense product of a yellow or grayish-yellow colour, showing considerable litharge, will make but little fines and wil lbe fairly easily broken. It will run fast in the blast furnace with a cool top, clean slags and bright tuyéres. We have found some difficulty in getting a good roast with over 45 per cent lead in the roaster charge, the sulphur being usually high; but we have not had occasion to try it since installing the mixer, and that might make some difference. The difficulty seemed to be that in places the charge would not be sufficiently stiff, the galena fusing before roasting much, and in the fused condition, it is almost impossible to roast it. With a properly mixed charge this might not occur and several per cent. more lead might be carried. We have never had occassion to run our lead lower than 38 per cent. over any lengthy period. This gives a good product if the other constituents are properly proportioned; in fact, a 38 per cent. is, we think, preferable to 42 per cent. as it runs a little faster and gives less trouble. If our ores were suitable, we would run about 38 per cent—40 per cent lead, as on the whole it would be little more satisfactory, being, for example more easily broken. But this difficulty is not so great that it would pay us to dilute our charge with ores carrying a low treatment rate. The iron ought at the least to be as high as the silica, and it is better to have it one or two per cent. higher. We have been compelled at times to run our roast with from 2 per cent to 3 per cent and even 4 per cent higher silica than iron and we have always had trouble. It did not seem to interfere with the sulphur elimination at all, as that would be as good if not better than ever; but do as we would, the tonnage would fall

off badly, the slags would get higher in lead and there was a great tendency for the heat to get up in the furnace. We varied the rest of the blast furnace charge in every way we could think of, carried our lime in the slags high and carried it low, tried the coke higher and lower, varied the amount of slag, changed the feeding and the blast but with no very decided improvement. But on changing the analyses of the roast, all our troubles would disappear in a short time. The only explanation that we can see is that the high silica roast was too fusible, fusing too high in the furnace, which would cause the bad reduction, hot top, and slow running. We have no data on the relative fusing temperatures of the two roasts, and consequently have no facts to base our assumption on, but it seems to be the only one to fit the results and one would imagine the higher silica roast would have a considerably lower melting point. This would be a rather interesting but a difficult point to determine on a small scale, as it would be hard to get the roast sufficiently uniform so that a small piece would accurately represent it. However, if a series of determinations on each kind were made, the average would probably be very near correct.

We run the lime between 7 per cent. and obtained 10 per cent. This, with our conditions, represents about the limits. We have never too good results with the lime below 7 per cent; as a rule we run it about 8 per cent to 9 per cent. However, if we had suitable ores to enable us to keep our iron up, that is to keep about the same total percentage of iron and lime, and keep the lead down to 42 per cent, it might work well. We have never had ores to enable us to try this, as we are somewhat short of iron and are compelled to use lime to keep our lead down. Another reason is that the product is difficult to break when the lime gets too low. We have never run the lime higher than 10 per cent; in fact, we always keep it as low as possible, because it is not economical, as we have to add most of our CaO as $CaCO_3$, which has to be charged with the cost of roasting.

The roaster charge is accurately figured and carefully weighed, being made up with bedded ores, lime rock, stamp mill concentrates and matte, from the furnace, that is too high in lead and too low in copper to be concentrated. This charge is put through a cylindrical mixer, one mixer handling the material for four furnaces. This discharges the material into an elevator, discharging into chutes which convey the material to the furnace feed hopper.

(To be continued.)

EXCHANGES.

Mines and Minerals, July, 1909.—Birds in their little nests do quarrel sometimes. The Engineering and Mining Journal now believes that there is some connection between earthquakes and coal-mine explosions. Because Mines and Minerals did not believe, the E. and M. J. called it names. Mines and Minerals replies by classing E. and M. J., in point of modernity, with the horse cars that still survive in New York.

Both of our hot-headed contemporaries are old enough to know better. Apart from the waste of valuable space, this interchange of brickbats is exceedingly bad taste. Apologies are due from both belligerents.

The Engineering and Mining Journal, July 3, 1909.—"Speculation in Copper" is the title of the leading editorial in this issue.

The London Metal Exchange, which in effect is international, serves as a balance wheel, and the prices for copper at New York and London can never be for long out of joint.

Last year outside interests, having no direct concern with the metal industry, participated in copper speculation. The active movement of the copper market has attracted several classes of speculators. Thus a gambling spirit has been injected into the business in a staple commodity. This is deleterious. Speculation has kept up the price of copper at its present level. Production is not decreasing. Only an increased consumption can sustain the market.

The Mining Journal, June 26, 1909.—The report of a Royal Commission on the centralization of Departments of State in India took up the mining legislation that obtains there. The Mining Journal comments upon the report, and upon some of the statements submitted by witnesses. It appears that the Director of the Geological Survey of India defined the functions of his department as purely advisory. Under six heads he defines the duties that it performs: (a) The preparation of a general geological map of India; (b) the collection and dissemination of information about the mineral resources of the country; (c) the preparation of statistics of mineral production; (d) the control of a geological museum; (e) the teaching of geology in the Presidency College, Calcutta, and (f) the training of a limited number of prospectors and post-graduate students. The Director objects to taking under his wing the granting of mining concessions. He expresses frank distrust of his subordinates. The mining Journal indicates its astonishment at this surprising confession.

The South African Mining Journal, June 5, 1909.—Some pertinent remarks on present-day problems are made in this issue.

Absorption and amalgamation of properties on the Rand have brought about new problems. Small mines, equipped for small tonnages, require remodelling when they become component parts of large concerns. The East Rand Proprietary Mines Company is a case in point. Here several small mines were amalgamated under one management. Consequently its working costs are higher than for single large mines of similar total tonnage capacity.

One of the chief problems in operating a group of small properties is the arrangement of the shafts. These are often not capable of dealing with the increased tonnage which is usually the object of the consolidation of properties. Another problem is the sorting of ore from wide stopes that make a large amount of waste. Theoretically, 50 per cent. is the limit of hand-sorting. In practice about 15 per cent. is the average amount of surface sorting done, and 33 per cent. is the maximum. Thirty per cent. appears to be the highest amount that can be economically sorted. The results of the stope drill contest will modify this question.

The Mining World, July 3, 1909.—This Special Mexican Edition of our Chicago contemporary is filled with facts, figures, and descriptions of Mexican mining. In several of the editorials there is important information. Concerning the smelter situation in Mexico, it is noted that owing to the extended use of cyanide, a scarcity of siliceous ores for smelting is becoming pronounced. At Guanajuato the cyanidation of concentrates is being

tried out. The proposed nationalization of the smelters is not taken seriously by the Mining World.

There is no zinc smelter in the republic. The spelter used is imported, and pays a large duty, except when in the form of perforated sheets for use in cyanidation. There is no export duty on zinc ore, and when it contains less than 250 grams of silver per ton the export tax on silver is not assessed. Promising zinc ore deposits have been opened up in Jalisco, Sinaloa, and Sonora, tributary to Pacific ports, and available for the European market. Most of this is sulphide ore.

Thirty-seven Mexican mining companies to date have paid to shareholders $58,307,432 in dividends, a return equivalent to 66 per cent. on their outstanding capitalization of $89,100,662. By far the larger dividends are being distributed by corporations that are still doing business under the old Mexican custom of capitalizing at so many shares, not dollars, their par value depending upon the demand for the stock in the open market.

On the precious metals there is in Mexico a federal tax of 2 per cent. on the output. There is no federal export tax or direct tax on the base metals, but there are numerous fees and stamps, which are in effect a tax on the base metals exported. The states taxes vary, and include direct taxes on the gross output, percentage taxes on the salary and wage roll, and tonnage taxes on ore mined and ore treated. The stamp tax is ever present.

We could multiply interesting notes from this Mexican edition indefinitely. It is a creditable issue.

We notice with pain that in one editorial the word "data" is used as a singular noun.

PERSONAL AND GENERAL.

Mr. L. B. Orchard has been appointed chemist to the Atikokan Iron Company, Port Arthur, Ont.

Messrs. R. E. Harris and Thomas Cantley, of the Nova Scotia Steel Company, sailed on June 25 for England.

Mr. Samuel Cohen, general manager of the Crown Reserve, Cobalt, recently underwent on operation in Montreal. He has recovered completely.

Dr. C. W. Dickson has resigned the position of assistant professor of chemistry at the School of Mining, Kingston, and is making arrangements to settle in British Columbia.

Mr. Martin Cohn, managing director of the German Development Company, has returned to Toronto from a visit to Quebec. Late in June Mr. Cohn made a record-breaking return trip to Europe.

Mr. P. N. Nissen, of Los Angeles, is to spend this summer in Ontario. Mr. Nissen is the inventor of the Nissen stamp mill. At the enormous mill of the Boston Consolidated 312 of these stamps are installed. Two trial stamps are to be placed in the mill of the Northern Customs Concentration Company, Cobalt.

Mr. William Maxwell has resigned his position as manager of the Dominion Coal Company's No. 12 mine, which he has held since the early stages of its development, and has taken a position in the Pincher Creek District, Alberta, where a new coal property is being opened up under the direction of Mr. Charles Fergie.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, July 5.—June Tonnages.—The month of June was the briskest that has been seen around the collieries of Cape Breton for a long time past. The men have worked steadily, shipping has been regular, and outputs have in consequence been unusually large.

The mines of the Nova Scotia Steel Co. produced in the neighborhood of 78,000 tons which is some 7,000 tons more than the best preceding output, and is 21,000 tons greater than the output of June last year.

At Glace Bay likewise outputs were good. The mines of the Dominion Coal Company raised 355,000 tons, which is the largest June output ever obtained by that company, and the highest output on record, with the single exception of last July, when 368,000 tons were obtained. The outputs for the half year ending June 30th totalled 1,629,000 tons, showing a reduction of 300,000 tons in comparison with the corresponding period of 1908.

Some notable figures were made by the individual collieries. Dominion No. 1 had an output of 58,000 tons, which is the highest monthly production since the 1903 fire, and approaches the record of this mine before the fire. On one occasion during the month the daily output reached 2,600 tons, which is really an astonishing output from this old colliery.

Dominion No. 2 has 70,400 tons to its credit for the month, which establishes a new record for this mine. On several occasions during June the daily output was over 3,100 tons.

The Hub Colliery (Dominion No. 7) also made a very fine showing, raising 20,600 tons, this being the largest tonnage for a month that the Hub ever put out, in all its numerous vicissitudes.

Throughout the month the outputs showed a remarkable uniformity, practically unmarked by the fluctuations that occur after paydays. This was to some extent accounted for by the dates on which wages were paid, and also by the evident desire of the workmen to provide for possible trouble ahead.

The Nova Scotia Steel Company have now got their rescue station into operation, and gangs of men have been practising in the smoke-chamber. Mr. Robert Robson, a gentleman whose mining experience in Cape Breton reaches back to the days of the General Mining Association, is in charge of the station, and he spent several days at the rescue station at Glace Bay, in order to obtain hints from the experience which the Dominion Coal Company have had in this work. The equipment of the Nova Scotia Comprises twelve of the latest model Draeger apparatus, and a corresponding number of the "Tankersley" electric hand-lamps. We think the N. S. S. Company are to be heartily commended for this addition to their equipment, and it is to be hoped that the example set by the two largest coal companies in the Dominion will be followed by others.

An interesting note is contained in one of the papers recently read before the American Institution of Mining Engineers, describing the operations of the Stag Canyon Fuel Company, whose mines are situated near Dawson City, New Mexico, from which it appears that the rescue station of this company is designed after that of the Dominion Coal Company at Glace Bay, with some few modifications. Dr. James Douglas is the president of this company, and judging from the description of the Stag Canyon Company's mine, he is to be congratulated on the provision that has been made for the safety of the workmen, and their personal comfort in such matters as housing and recreation.

The U. M. W. A. in Glace Bay now has its own newspaper organ, a weekly newspaper known as the "Stanard." This paper in its first issue, with that characteristic modesty which distinguishes the U. M. W. A., stated that its mission in Glace Bay was to "raise the status of the local press." Some of the items we have noticed in the "Standard" do not, however, bear the impress of the fair-mindedness that we should expect from the editorial chair of a newspaper with such a sense of its high mission to the public. For example, in the last issue we read that the Dominion Coal Company are wantonly destroying two coal seams in their Glace Bay coal field by working the Phalen Seam. Above the Phalen Seam, at a distance of 115 feet, is to be found the Back Pit Seam, 2 feet 7 inches in thickness. Above the Back Pit at a further distance of 73 feet, is the Boutilier Seam, said to be 3 feet 9 inches thick. Separated from the Boutilier by 243 feet of strata is the Harbour Seam, 5 feet 6 inches thick. The "Standard" says that when pillars are drawn in the Phalen the roof falls up to the Back Pit, destroying the same. This is interesting information indeed. A "fall" 115 feet high would be an unhealthy place to work around. The "Standard' goes on to blame the deputy inspectors for dereliction of their duty in allowing this to go on, and the Government for alienating the "people's property" to a corporation that is so wicked as to destroy its own lease value. A little knowledge is a dangerous thing, and is apt to lead the eager newspaper scribe into mistatements of a particularly glaring kind.

The Royal Commission on Coal Supplies which sat some years ago in England and went thoroughly into every phase of coal mining, particularly investigated the effect on coal seams produced by the order in which they were worked, and their conclusions may be taken as the last word on this question, for the witnesses that gave evidence before the Commission were men whose knowledge of coal mining was beyond cavil. The witnesses were unanimous in one statement, namely, that the best seam was always worked first. They all agreed also that the order of working must be decided by the peculiarities of the district, but in general the best way was to take the lower seam first. The effect of working an upper seam was to "wind" or render lifeless the seam immediately below. In such a case it was necessary to decide which seam it would be more profitable to allow to suffer injury. In the Glace Bay coalfield the Back Pit Seam is not a seam that can be commercially worked in the present state of the coal trade, as it is thin, uncertain, and dirty. It was stated in the evidence before the Commission that if the distance between seams was over 100 feet there was no danger of the falls communicating from seam to seam, and that if a sufficient time is allowed to elapse after the exhaustion of the lower seam the upper seam can be mined without any appreciable loss, except a somewhat smaller proportion of round coal. In the case of the two inferior seams lying between the Harbour and Phalen Seams in the Glace Bay coalfield the Dominion Coal Company are following the most approved method of extracting coal seams where the strata contains several coal seams of varying value overlying one another. This method has been approved and passed upon by three at least of the most eminent mining engineers alive, under which circumstances the editorial criticisms of the "Standard" are not likely to carry much weight. We would not have noticed the paragraph but for the fact that many of the readers of the "Standard" may gather an erroneous idea, which should be corrected. It may not be out of place to enquire whether these same readers would prefer to draw pillars in the Phalen Seam, which is 8 feet 6 inches high, or in the Back Pit in 2 feet 7 inches of head room.

U.M.W.A.-itis.—After Mr. Tom Lewis's departure to his own country there was a hush in the U. M. W. A. campaign, but we are now given to understand that it was a "sultry hush," and but the prelude to Armageddon. For a year past the motto of the U. M. W. A. leaders in Cape Breton seems to have been that of the Spaniard, "manana," "to-morrow, to-morrow." Since January there has been a rustling in the tops of the mulberry trees, and now we understand the day of reckoning is at hand. But we have heard this so often. The downfall of the coal barons was fixed for May 1st, a date beloved of the red flag, but something went wrong with the programme. Nothing has even yet been heard of what took place at the convention of May st. The public were then informed that President Lewis himself would visit Nova Scotia and teach the coal companies the egregious error of their ways. Mr. Lewis came, said a few honeyed words, and went. Now the U. M. W. A. clans have foregathered at Sydney, and are in session at the time of writing. They magnanimously invited the coal operators of Nova Scotia to meet them at Sydney and talk the matter over, saying that they, the U. M. W. A., wished to arrive at a satisfactory understanding. Unfortunately, the views of the coal operators and of the U. M. W. A. as to what constitutes a satisfactory understanding do not coincide, and never will. The ideal of the U. M. W. A. as preached to the listening faithful is said to be the simultaneous presence of the legs of a coal operator opposite and contiguous to the legs of a U. M. W. A. delegate, under the same table. However, that may be, the meeting of July 2nd, for which the invitations were issued, did not measure up to this ideal; the letter of the U. M. W. A. was most cordially ignored, and the coal owners were rude enough not even to notice the r.s.v.p.

The district president of the U. M. W. A. has now issued a statement to the press, in which he states that if the Dominion Coal Company do not agree to meet the Executive of the U. M. W. A. by 2 p.m. (Atlantic standard time), June 5th, A.D. 1909, the U. M. W. A. will call a strike on the following morning for higher wages, shorter hours, better conditions generally, and recognition. The Dominion Coal Company will not meet the U. M. W. A., will not recognize them, will not give shorter hours, higher wages, or alter any of the conditions of the present agreement with its workmen, arranged by a Board of Conciliation with the Provincial Workmen's Association, and effective until the end of 1909. So it is up to the U. M. W. A.

There is a law on the statute books of this Dominion known as the Industrial Disputes Act of 1907, and better known as the Lemieux Act, which states that no person shall strike for any change in wages or hours without giving 30 days' notice of his intention to do so, and reference to a Board of Investigation and Conciliation. This law is a sort of ratchet arrangement, and works one way only. At least that is how it looks to the casual observer. We do not remember to have seen its provisions and penalties carried out, although they have been violated times innumerable. It looks as if an opportunity would arrive for testing the impartiality of this law. What is sauce for the goose is sauce for the gander, and what applies to the Dominion Coal Company should also apply to the U. M. W. A. We shall see.

The U. M. W. A. at Springhill have served demands upon the Cumberland Coal Company of such a nature that we think the bare recitation of them will suffice.

First and foremost, the U. M. W. A. ask for "complete recognition, and collection of all dues and assessments through the colliery office." Riding rakes are to be put on half an hour earlier in the afternoon than has hitherto been the custom, and the "Managing Committee of the U. M. W. A. are to be allowed to ride out on the first rake." The list of rates demanded is much too long to quote even in part, but some idea of what it means may be conveyed by the following: Skilled shiftmen are to be paid $3.05 per day, unskilled shiftmen in charge of gangs $2.13, and all other unskilled labor $1.83 per day. All overtime and Sundays to be paid at double-time rate. Any man called out in the night time or working out of his regular shift is to be paid double time. All miners out of places are to be paid wages equal to those which they would earn in places, and if for any reason the regulation wage is not made by a miner he is to be made up to that figure. All coal dropped on the roads or cleaned up in the general opera-

tions is to be credited to the checkweighman's tally, and go to help to pay his wages.

The above are but a few of the requests made to the Cumberland Coal Co. The actual document is a lengthy one, and with a modesty in keeping with their demands the U. M. W. A. have appended to the schedule of demands an agreement all ready drawn for signature, the place of signature of the officers of the Cumberland Coal Company being placed below those of the U. M. W. A.

This is typical of the generally inverted notions of the U. M. W. A., and we think the leaders of this movement must be afflicted with a severe form of either megalomania or megalocephaly. They talk and act like characters in a Gilbert and Sullivan opera, and they have gasconaded and caracoled before a long-suffering public until their antics and vaporings have ceased even to be amusing, and people are getting most decidedly bored by these disturbers of the public weal.

In pleasant contrast to the rhodomontade of the U. M. W. A. is the attitude of the P. W. A. This organization has preserved a very discreet attitude during the agitation, so discreet, in fact, that its enemies and sometimes too-eager friends have mistaken it for pusillanimity. Mr. John Moffatt, the secretary of this union, now states that all the members of the P. W. A. will continue to work in the event of a strike. Resolutions to this effect were passed at a joint meeting from 13 lodges of the P. W. A., including men from the shipping piers, and the officers of the P. W. A. claim they were never more thoroughly organized. They say the agitation has weeded out the disaffected members and left behind men who can be trusted to stick together.

The Dominion Coal Company appears to have been selected by the U. M. W. A. as their main objective, and it is claimed the whole of the funds of the organization and all its power will be concentrated upon this one corporation. The other operators presumably have no objection to having the Dominion Coal Company set in the forefront of battle, but the fight is theirs also. The Dominion Coal Company will not be found unready, and they will afford all necessary protection to the men who continue at work. If the preparations that they have made savor too much of industrial warfare as it is in the United States, the public know who are to blame. The Dominion Coal Company have been incorporated sixteen years, and until the U. M. W. A. introduced itself they never had a colliery fence, or a police force, or a strike. All grievances have been discussed between the men and the officials of the company in a fair and friendly way, and the general manager of the company was always accessible as a court of appeal from the decisions of his subordinates through the medium of a committee. Are we to believe that the whole of this province groaned in darkness until are U. M. W. A. came to set them free?

If the U. M. W. A. strike, they will do so in face of the award of the Board of Conciliation which they themselves asked for, in face of the fact that the P. W. A. or the majority of the workmen will remain at work, with no grievances to adjust, except the withholding of recognition; and (if the International Board of the U. M. W. A. do as it is claimed they will do) will strike with the aid of money contributed by men whose prosperity depends to a large extent on the wresting of the Canadian market from our own miners, living under a foreign flag, and the agitation will be carried on by alien and professional "walking delegates" and men who have their own little axes to grind. The little group of men who for purely personal aggrandisement have played with fire may see a conflagration they cannot control, and those ease-loving gentlemen who have carelessly and grandiloquently sowed the wind may reap the whirlwnid.

ONTARIO.

Cobalt, July 3.—A writ has been taken out against the directors of the Crown Reserve Mining Co. as trustees for a block of stock amounting to 231,143 shares, which was turned over to the directors by the syndicate for the purpose of raising money to carry on the development work at the mine. The action is for the return of the stock to the original syndicate. Accrued dividends are also claimed. The plaintiffs are John Black, Percy Ross, R. W. Garth, A. G. Fowler Ross, W. A. MacKay, and Dr. Herbert Ross. In order to avoid the expenses of a suit, the syndicate is, however, willing to have the block of stock equally divided between its members and the shareholders of the Crown Reserve. This compromise the directors have refused to consider.

The sale of the 830 acres of the mining lands of the Gillies Limit was a fizzle, and the returns were very disappointing, considering the extremely high prices that have been offered at various times. The lack of success is not to be wondered at when the procedure adopted by the government is considered. For two years or more the limit has been prospected under the supervision of government engineers, and during that time no reports have been issued to the public. The short time that elapsed between the publication of the notices and the close of the sale, which was not sufficient to permit of proper prospecting, also had a tendency to make people suspicious. Another important factor has been the failure, so far, of the Provincial Mine. This property is located in the centre of the district that was to be sold. Only 283 acres were disposed of, and the price amounted to $75,643. The following is a list of the successful tenders, giving the price and the amount of land: H. P. Glidden, for John McMartin, Cobalt, 26.7 acres, for $10,250; F. M. Connell, Haileybury, 11.7 acres, for $2,500; Geo. Pratt, Buffalo, N.Y., 18.3 acres, for $11,000; J. H. Waldman, Toronto, two 20-acre lots, for $2,025 each; S. D. Maddin, Toronto, 20 acres, for $2,750, and 15.4 acres for $2,500; Robt. McKay, Toronto, 19.5 acres, for $10,500; Boyd Magee, Haileybury, 16 acres, for $8,558; A. T. Budd, Toronto, 19.86 acres for $2,500, 19.7 acres for $2,500, and 20 acres for $2,500; C. A. Phillips, Parry Sound, 19.8 acres, for $5,500, and J. G. Ross, Montreal, 20.07 acres, for $5,100.

Plans and specifications for a new concentrator for the Nova Scotia Mine have been completed, and the cost is estimated at $100,000. Development at the mine is being pushed in a vigorous manner for the purpose of enlarging the ore reserves sufficiently to warrant its construction. At the present time No. 3 shaft is being remodelled. When finished, it will have two compartments, and will be used for hoisting only. A new hoist with a capacity of 1,000 feet is being installed at this working. The total amount of workings up to date in the mine is 7,000 feet. The lowest level is 240 feet from the surface, and at this depth on No. 2 vein a winze is being sunk. Drifting will commence on the vein as soon as it has reached a depth of 65 feet. When No. 3 shaft is completed the No. 1 vein will be developed. The veins of this mine are low-grade, but wide, and the ore is especially adapted for concentrating. On the lowest level the vein has a width of about 8 feet.

Mr. H. Southworth, formerly engineer for the O'Brien, has been appointed manager of the City of Cobalt, in place of Mr. B. Leason, who resigned a short time ago.

The Coniagas have started work clearing the ground preparatory to the erection of the addition to their mill.

The preliminary surveys for the continuation of the T. & W. O. Railway from Charlton to Gowganda have been completed to a point within five miles of the latter place. The Government engineers are at present making exhaustive inquiries to ascertain the amount of revenue that the road would be likely to produce. No reports have so far been given out, and it is not likely that any decision will be arrived at before the end of August. The estimated cost of the road, which would be about 48 miles long, is about $2,000,000. The location surveys have already been completed as far as Elk Lake.

In the north cross-cut from the No. 2 shaft of the O'Brien, at the 150-foot level, the No. 3 vein of the La Rose was encountered.

At the point where the vein was cut it shows about seven inches of high-grade ore.

In a raise started from the drift at the 150-foot level of the Badger good values were struck. The vein, which previously had been lean, widened out into five inches of high-grade ore.

At the Kerr Lake Mine a new vein of high-grade silver ore has been discovered. It is claimed to be better than the famous Crown Reserve vein.

The O'Brien Mine will shortly commence to double their output of high-grade ore from the mine. The smelter at Deloro, which is also controlled by Mr. M. J. O'Brien, will also have its capacity doubled this summer.

One of the shafthouses of the Cobalt Lake Mine was destroyed by fire on June 21st.

At the Peterson Lake lease of the Kerry Mine a new vein was discovered recently. The find was made at the 125-foot level, about 80 feet from the shaft. Previous development had failed to show the presence of silver in this vein.

While cross-cutting at the 360-foot level of the Big Pete Mine in order to tap a vein located some time ago by the diamond drill, a new vein carrying high silver values was struck at a point about 40 feet distant from where they expect to encounter the other mine. The vein was found in the Huronian slates, underlying the diabase. The finding of these slates, in which the best values of the mine occur, has had an important bearing on the development of the surrounding properties. It is understood that later developments have shown the presence of Keewatin underlying the Huronian slates.

The plant of the Beaver, which was destroyed by fire some time ago, is being rebuilt. Operations will be undertaken on a much larger scale when the mine is in a position to furnish its own power.

The directors of the Silver Cross Mine have decided to increase the capital from $500,000 to $1,000,000, and the by-law has been passed allowing them to sell the issue at 10 cents per share. There was a good deal of opposition to the increased capital, and a very stormy meeting resulted.

It is understood that a new 6-inch vein carrying good values has been discovered on the 75-foot level of the Otisse. The wall rock is also said to be well mineralized.

The remainder of the 830 acres of the Gillies Limit mining lands which were unsold under the recent tenders will be again offered for public sale on July 13th.

The Union Pacific, which is operating a lease on Peterson Lake, will shortly install a small steam plant, consisting of a 6x8 hoist and a 25-horsepower boiler. Drills will not be used until the power companies have air ready for distribution. The shaft will be sunk to gretaer depth before cross-cutting of the vein is started.

At the Temiskaimng a winze has been sunk 50 feet below the 250-foot level on No. 4 vein, and from the bottom a drift was driven to the vein. When the drift was in about 15 feet the vein widened to about 7 inches of high-grade ore. A cross-cut is also being driven from the bottom of the winze to tap No. 7 vein.

It is understood that the Trethewey will shortly commence sinking a shaft in the northeast corner of the property. The Temiskaming & Hudson Bay have been operating a drill in this section from the 150-foot level of their shaft for the Trethewey, and it is with these workings that the shaft will connect.

Mr. A. P. Seymour has resigned his position as manager of the Floyd Mine.

Formal application has been filed in the office of the Provincial Secretary at Toronto for permission to increase the capital of the Temiskaming & Hudson Bay Company to $3,500,000.

The diamond drilling at the City of Cobalt Mine has been stopped, and it is understood that satisfactory results were obtained. Drilling was started from the bottom of the shaft, and when a depth of about 550 feet from the surface was reached, the Keewatin, in which the hole was started, was found to give place to the diabase. The discovery of this rock underlying the Keewatin is of great importance.

Diamond drill cores have lately been the means of giving a great deal of information regarding the different formations. A short time ago the diamond drill that was working on the Foster located the Huronian slates underlying the Keewatin. As the drilling progressed, however, the Keewatin was found to come in again below the slates.

A new find has been made on the Rawhide property located near Miller Lake. The vein consists of aplite, carrying good silver values.

The Gifford Extension has made arrangements to buy air from the Ophir, and the pipe line is now being laid.

The buildings of the Badger Mine were almost totally destroyed by fire. They caught from the bush fires in the vicinity, which also menaced the buildings of several of the surrounding mines.

BRITISH COLUMBIA.

Rossland.—The management of the Le Roi Mining Company have intimated that the company has been successful in the raising of money with which to carry out the plan of development work that it is deemed advisable to do in the Le Roi mine. One of the chief features of the work, that will very likely be started early in July, will be a thorough exploration of what is considered the richest and most likely part of the Le Roi ground, from the present bottom of the mine, the 1,650-foot level, to the 2,560-foot level. The preliminary part of this work will (if plans already discussed are used) be done with diamond drill, holes being put into the ore-bearing ground from the 1,650-foot level downward, at intervals of about 100 feet in depth and about 200 feet apart on the vein. Comparatively rich ore has been found on the 1,650-foot level of the Le Roi; it occurs, however, in lenticular deposits in ground that is badly broken up, so that a broad plan of exploration seems to be the most advisable and what would prove the most economical in the long run, as sinking, drifting, etc., is expensive in the hard diorite of this locality.

During the week ending June 19th the output of the Centre Star group climbed to the 4,350-ton mark, which is 500 or 600 tons over what that property has been averaging during the last few months. During the same week other properties of the Consolidated Company shipped ore to the company's smelter at Trail as follows: St. Eugene, 601 tons; Snowshoe, 3,880; while the last shipment from the Richmond-Eureka amounted to 202 tons.

The Le Roi 2, Ltd., maintains a steady weekly production of approximately 420 tons, and mills about 250 tons of second-class ore. Le Roi 2 ore is the best that is shipped from this camp in the way of copper ore, but there is a very narrow margin of profit in milling operations here. The Blue Bird sent out ten tons of hand-picked ore during the past week. This ore comes from the galena-bearing reef in the South Belt, and gives returns of nearly $80 per ton when carefully selected.

The metallic production of the Trail smelter during May was $300,000 of gold, silver, $250,000; copper, $65,000; lead, $175,000; a total of $790,000. The production of this plant for the present year will be a couple of million dollars more than during 1908.

Boundary.—Mr. P. F. Roosa, erstwhile receiver for the Dominion Copper Co., has been appointed manager of the New Dominion Copper Co., now that the new concern has taken over the recently acquired interests of the defunct corporation. It is thought the mines will be opened up again early in August. The

New Dominion Copper Co. starts off in pretty good form, and it is to be hoped that this venture will prove a profitable one to the men who have their capital in the enterprise.

A small force of men have been put to work clearing up about the Sunset mine, getting things ready for the resumption of work. There is some talk of work being taken up again at the Providence mine, Greenwood. Over 700 tons of high-grade ore was shipped from this property in 1907, while only 50 tons was taken out last year, the energy of the directors being mainly centered on the placing of the company's bond issue.

As the coal miners in the Alberta fields have rejected the agreement of the Arbitration Committee, there is still no hope of coke from Coleman, whence the B. C. Copper Co. derives its supply. It is stated that this company during the last month that it worked was able to lay its copper product down in New York City for a fraction of less than eight cents per pound. It is hardly to be expected, however, that this figure could be maintained month in and month out, particularly when all fixed charges have been included. The B. C. Copper and Granby Companies, however, are in a position to make copper nearly as cheaply as any copper mining company on the continent, with a few exceptions, where quarrying is extensively carried on. The ore bodies are quite large in the Boundary, so that thousands of tons of the low-grade ore can be broken at a time, and, once broken, it is handled as much as possible by gravity, automatic loading, electric underground railways, gigantic crushers, etc, while at the smelters the ore, coke, etc., are all handled by automatic or nearly automatic machinery.

The tramway on the Phoenix-Amalgamated has nearly been completed to the railway siding. As soon as things have been arranged at this mine the Consolidated Company intends to ship ore from it to the Trail smelter.

Nelson.—The Eva mine, at Camborne, has been bonded by Eastern capitalists. The mine is very well equipped with machinery for present needs, there being a modern air compressing and power plant on the ground, as well as a 10-stamp mill and concentrator. In the Eva mine there is a large tonnage of gold ore that runs on an average low-grade, although there are veins in the large lodes that carry good quantities of the precious metal. Work on the "glory hole" plan has been carried on at some of the big surface lodes with good results. The mill was put in four or five years ago, and was worked steadily up to twelve or fourteen months ago, when it was decided by the management to sell the property. During the time that the mill was operated about $250,000 in gold was taken from the ore treated.

There is no doubt but that the Slocan lead-zinc district is a factor, and a not unimportant one, in the tariff war being waged at Washington, D.C. This has been more particularly evinced by the presence in this district during the past week of J. A. Ede, of the Illinois Zinc Company, who is studying the local situation. The general manager of this concern, Mr. T. F. Noon, is in the capital city fighting on the side of those who are against too much protection for the zinc industry. There are big bodies of zinc ore (the Mammoth group on Arrow Lake, for instance) that the American zinc companies would buy and work if the tariff wall was taken down. This state of affairs may be to the best interests of Canadian capitalists, however, who are bound to work these big zinc mines when the Canadian market grows to a point that will warrant such action, which it is drawing nearer to from year to year.

An $8,000 gold brick was realized at the clean-up made at the Nugget mill last week. This was the result of a twenty-day run.

The fifth annual report of the International Coal & Coke Co. shows that the net profits on the operations of the company for the past fiscal year were $284,210. This company recently sold 200,000 shares of its treasury stock to Victoria men, the proceeds of which will go toward paying off the bonded indebtedness. The International Company is about as well equipped for the mining of coal and the manufacture of coke economically as any company in the Crow's Nest-Alberta field, and with continued good management will prove a moneymaker for those who have invested their capital in the enterprise.

The Highland mine at Ainsworth is under bond, and it is understood will be worked early this summer.

The president of the B. C. Mining & Development syndicate, Dr. G. A. Ullerick, of Chicago, is in the district looking over the property of the company, comprising six gold-copper claims on the St. Mary River. A meeting of the Board of Directors was held while Dr. Ullerick was here, the engineer's report on the claims was read, and plans for working the claims at an early date were discussed.

The Head-Martin coal lands, which adjoin the property of the International Coal & Coke Co., will soon be under active development, a company known as the Head Syndicate having been formed with a substantial capital, part of which is now available for the proposed work. Leslie Hill, of Nelson, has been appointed consulting engineer and manager.

Vancouver.—Recently the interests of the Stave Lake Power Co. were taken over by the Western Canada Power Co., a new five-million-dollar corporation, the management of which expect within eighteen months to be able to deliver all or any part of 30,000 electrical horsepower to the cities of Vancouver and New Westminster, that power to be derived from the force of Stave River. A crew of sixty men is now employed in the construction of dam and plant, but this force is to be immediately augmented in order that the work will be finished at the time that has been set for its completion.

Continued activity is the watchword of the Portland Canal Mining Co., of which Mr. C. H. Dickie, of Victoria, is president. The extension of two of the tunnels on the property is being prosecuted with all possible speed, and a new tunnel has been started toward the ore-bearing ground. The towers are nearly finished that will carry the aerial tramway, and the concentrator site has been cleased and the foundation built in. The work will be hurried as much as is possible, in order that shipments can be started early this fall.

GENERAL MINING NEWS.

NOVA SCOTIA.

Sydney.—The Dominion Coal Company has made a formal demand upon the Dominion Iron & Steel Company for a readjustment of the price of coal.

The coal contract between the Dominion Coal Company and the Dominion Iron & Steel Company, which was made on October 20th, 1903, provides that coal should be supplied till June 30th, 1909, at the price of $1.24 per ton.

The contract then provides than on and after June 30th, 1909, either party may require a readjustment, and if no agreement can be arrived at between them, the prize shall be settled by arbitration.

The new priie is to be determined by taking the average cost of mining and delivering the coal for the five years ending June 30th, 1904, and also for the five years ending June 30th, 1909, and as the average cost for the first period is to the average cost for the second period, so will $1.24 per ton be to the new price for the period from June 30th, 1909, to June 30th, 1914.

It is understood that no arbitrators have yet been appointed, and that the arbitration proceedings will not be proceeded with until the return of President Plummer from England.

QUEBEC.

It is understood that the capital of the new asbestos merger, the Black Lake Consolidated Asbestos Company, will be $1,000,000 6 per cent. bonds, $1,000,000 7 per cent. non-cumulative preferred stock, and $3,000,000 common stock. The company will take over the Union Asbestos mines, Southwark mines, the controlling interest in the Imperial Asbestos Company, and the Black Lake Chrome & Asbestos Company—in all an acreage of 5,385.

ONTARIO.

Elk Lake.—A 40-inch vein was cut at the Otisse mine on July 1st.

Cobalt.—The fire that visited Cobalt on July 2nd did not do as much damage as currently reported. One thing is to be placed to its credit—it gave the town an opportunity of building regularly; $350,000 will more than cover the entire loss.

Dryden.—The Northern Pyrites Co., operating on the shores of Vermilion Lake, near Lake Superior Junction, is about to commence shipping ore.

Fort William.—Several former Cobalt men, including N. G. Trethewey, have passed through Fort William on their way to the Sturgeon Lake gold fields. The Grand Trunk Pacific has now a direct train service from Fort William to Sturgeon Lake. On the lake, steamer connection may be had to any point on the shore.

Port Arthur.—The Atikokan blast furnace will very soon be blown in. A successful campaign will do much for the town. Mr. J. Dix Fraser, general manager, is a most competent man.

BRITISH COLUMBIA.

Vancouver, June 28.—Greenwood Miners' Union, No. 22, Western Federation of Miners, has declared a strike against the mines and smelter of the British Columbia Copper Co. for the recognition of Greenwood Miners' Union. This is the substance of the circular issued by the Greenwood union. The manager of the British Columbia Copper Co. states that he has received no notification of the strike. The company is not operating at present through lack of coke.

Rossland.—The results obtained recently from the workings of the Blue Bird and the Hattie Brown mines in the South Belt are most favourable. The lessees of the Blue Bird took a carload of ore out of the new ledge that netted them $2,400.

Fernie.—The Crow's Nest Pass Coal Company has just completed the construction work on a new steel tipple at its mines at Michel, B.C., with a capacity of 1,000 tons of coal per hour. This is probably the largest single tipple on the continent.

Rossland.—J. L. Warner, F. M. Black and Dr. F. E. Morrison made the third payment, of $13,500, on the Kootenay Belle mine at Sheep Creek, owned by Thomas Bennett and H. M. Billings. During the past week the mill returns have averaged $160 per day.

During the past week an important strike was made on the Golden Belle at Sheep Creek. Two ledges had previously been laid bare and had shown excellent shipping and milling values. A third ledge was, however, discovered, showing about 11 inches of $100 ore and about 12 inches of $40 milling ore.

A rich discovery was also reported on the Gold Note, near Eagle Creek, and some magnificent samples of free milling quartz were brought in to the city. The specimens shown were joined together by threads and small veins of pure gold.

It was announced that the reorganized Dominion Copper Company at Greenwood intend to open up their properties in August.

Rossland shareholders in the Le Roi mine have received a circular in which it is stated that the necessary arrangements have been made whereby an extensive scheme of development may be carried on, and that work in connection therewith will commence without delay.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Ninety-three per cent. of the Scotch coal masters have agreed to stand together for the reduction of the men's wages, and in opposition to a recognized minimum wage of 6s. per day.

The Prince and Princess of Wales on June 11th visited the Phoenix mine, six miles from Liskeard. Here the Prince christened a new shaft, and the Princess started a new pumping engine named after herself. After putting on mining attire, their Royal Highnesses went underground, where they inspected the tin lode and watched the miners at work.

MEXICO.

One of the most remarkable oil wells ever known probably is that at Dos Bocas, in the northern part of the State of Vera Cruz. The well has been remarkable, not only on account of the fierce conflagration which consumed several million barrels of oil, but also on account of the tremendous force of the flow and the enormous output. Since the extinguishing of the fire the paramount problem has been to control the flow and save the oil. Immense earthen reservoirs and dykes have been built, but the oil has overflowed these and spread over the lagoons for a distance of several miles. In addition to this discouraging predicament, men and animals have succumbed to the effects of the noxious gases which are constantly being thrown off by the well in great quantities. The company owning the well have worked incessantly and persistently, and now have it under control.

One of the effects of the development in the oil districts of Mexico has been that petroleum has come into use as a substitute for coal as fuel. Formerly the Mexican railways consumed from 120,000 to 140,000 tons of patent fuel drawn from Cardiff and district, but during the latter half of 1908 they converted 50 per cent. of their engines to oil-burners, and so satisfactory and economical has the result been that it is only a matter of the erection of the necessary storage tanks for the use of coal as fuel to be given up altogether. Many industrial enterprises which were formerly coal consumers have changed, and still others are now changing, their boilers in order to use oil. This has affected the importation of coal and patent fuel from the United Kingdom and elsewhere to the extent of causing a decrease in imports of about 40 per cent. during 1908.

UNITED STATES.

At the experimental plant of the Fink smelter at Salt Lake City a 90 per cent. copper product was made. Later, in the same furnace, blister copper was made.

The retention of unmanufactured asbestos upon the free list is an acknowledgment by Washington legislators that Canada

has other special resources required by American industrial centres. It would be more to the purpose now if the manufacturers of asbestos were also relieved of the 25 per cent. ad valorem imposition, since the action of the Senate is an admission that the Canadian product is an essential.

The 25 per cent. penalty is having the effect of inducing those in the pro-British Continental trade to locate factories in Canada, and the concession made in the tariff bill will enable these to "catch 'em going and coming," as it were. The trend of affairs in the asbestos industry is toward milling stock. If the States will take "the cotton" in increasing quantities, and the first and second crude remain at present prices, the Quebec mines will assume greater importance.

CHINA.

The draft agreement with regard to the Anhui mining concession granted to Sir John Lister Kaye on behalf of the London and China Syndicate, Ltd., has been completed, but has not yet been approved by the Chinese Central Government. It necessitates the issuing of 160,000 £1 deferred shares of the An Yu (Yangtsze) Concession Company, Ltd., at par, for Chinese subscription. These shares are now being offered to the leading merchants in the Anhui Province. The main idea of the agreement is Anglo-Chinese co-operation in the development of the Tung Kwan Shan mines, with British control of the finance. Hopes of an early settlement are entertained.

AUSTRALIA.

The first shipment of refined copper from New South Wales was made in May by the Electrolytic Company from Port Kemble. It consisted of 280 tons of copper wire bars.

At the Great Boulder Perseverance mine, Kalgoorlie, West Australia, telluride gold ores were discovered last October at a depth of 1,750 feet. The ore at that level assayed 100 dwts. per ton. A winze sunk to a further depth of 116 feet showed up ore carrying 42 dwts. per ton. This winze is to be sunk to the 1,900-foot level. At this depth there is 6 feet of ore in the drift assaying 8 dwts. per ton.

The Great Fingall Consolidated, Western Australia, has done away with its old filter system for treating slimes, and has installed a vacuum process. The new plant treats 10,000 tons per month, with 2 shillings profit per ton.

The shrinkage of 4,600 in the number of native mine labourers during May is explained as being always a concomitant of cold weather. Recruiting in Central Africa is progressing rapidly.

SOUTH AFRICA.

The Transvaal Government has agreed to issue 3,00 passes to enable the mining industry to enlist natives from the Central African Protectorate for work on the mines.

The developments on Waterbury tin prospects are most encouraging. In the Lydenburg district the sandstone reefs are opening up well on many properties.

Eight monitors will be working by September in the Swaziland tin fields. The deposits worked give a return of 15 per cent. metallic tin.

SOUTH AFRICA.

The East Rand Gold and Coal Estate have located the reef in their fresh borings on the farm Vischknil, adjoining one of the East Rand Mining Estates.

The commission appointed to inquire into the various electrical power schemes in their relation to Rand mining is now sitting. One witness stated that the utilization of electric power on the City Deep would result in a saving of £124,000 per annum. No new power scheme will be authorized until the commission has reported.

Further substantial tin discoveries have been made in the Waterberg district.

The June gold output, allowances being made for the transferred reserves appearing in the December figure, actually constitute a record.

COMPANY NOTES.

BUFFALO MINES SURPLUS.

The Buffalo Mines, Limited, reports for the year ending April 30, 1909:—

Total income	$479,483
Expenses	275,193
Surplus	$204,290

The general balance sheet shows a profit and loss credit of $183,834, out of which was declared a dividend of 3 per cent., payable May 5 last.

The statement of operations for the first complete year of the new La Rose Company's existence, from June 1st, 1908, to May 31st, 1909, has just been issued.

The statement shows that the net operating profit is equivalent to 19½ per cent. on the outstanding capital prior to the distribution of the Lawson stock. The amount of ore taken out has been practically replaced by the addition of ore reserves in the main and other veins of the La Rose proper. With the transfer of the Lawson mine the whole of the company's capital of $7,500,000 is now practically all issued, with the exception of a few shares not yet taken up by University holders.

The following are the official figures for the fiscal period:—

Shipments.	Tons.	Oz. silver.	Net value at mine.
June-December, 1908	325,777	1,498,592	$671,286
January, 1909	58,145	291,349	132,598
February, 1909	50,280	220,938	99,237
March, 1909	49,281	131,345	55,188
April, 1909	64,984	309,944	137,128
May, 1909	56,956	496,004	226,043
Total shipments	6,054.23	2,948,172	$1,321,480
On hand May 31, 1909	109,198	89,657	42,892
Total production	6,163.43	3,037,829	$1,364,372
Sundry income (interest and ground rentals)			1,518
			$1,575,497
Marketing expenses			$203,231.19
Concentrating			6,375.20
Operating expenses at mine			272,318.67
			481.925
Net operation profit for one year			$1,093,572
Construction accounts			23,574

The Temiskaming & Hudson Bay Company, of Cobalt, has declared a dividend of $3 a share, or 300 per cent., on the capital issued.

Up to date the company has distributed 13,600 per cent. in dividends, the payment being as follows:—

Date.	P.C.	Amount.
November, 1906	200	$15,552
October, 1906	2,500	94,025
November, 1906	6,500	504,465
July, 1907	300	23,283
February, 1908	200	15,522
March, 1908	200	15,522
June, 1908	400	31,044
July, 1908	600	46,566
August, 1908	1,200	93,132
September, 1908	300	23,283
November, 1908	300	23,283
December, 1908	300	23,283
February, 1909	300	23,283
June, 1909	300	23,283
Total	13,600	$955,526

The annual report of the Buffalo Mines, Limited, shows a production of approximately 1,000,000 ounces of silver marketed during the past year, a very creditable showing, particularly in view of the fact that for the first half of the year the policy of the management was one of simply maintaining the former dividend of 12 per cent. per annum.

During the last half of the year the policy was changed to one of heavier production following the increase in the dividend rate. The production of the last year added to that of the two preceding years will total about 3,000,000 ounces of silver shipped to date. The management have decided upon a production of 2,000,000 ounces during the next year, which will mean doubling the rate of production of the three past years.

The Buffalo mine was among the first to begin the installation of a concentrating mill to treat the low-grade ores. As experiments had to be made, time was required in the installation first and in experimenting afterwards, but their untiring efforts were rewarded at last. The mill is treating at present upwards of 100 tons per day. The annual report shows that the mill has been saving 86.4 per cent. of the values. The mill rock averaged 43 ounces silver, the concentrates 1,500 ounces silver, and the high-grade ore 3,000 ounces silver. Nothing but high-grade ore and concentrates is being shipped, and a large saving is being effected over the old method of shipping all grades.

During the present month a crushing plant will be installed at a depth of 75 feet in No. 6 shaft for the purpose of adding to the capacity of the plant. By this means the crushing facilities will be doubled and the mill rock will be all the more easily handled after being hoisted. A complete cyanide plant has been installed, and will be started this month.

A new feature about the Buffalo Company, and one most commendable, is a decision to issue a monthly report to the stockholders. This will be sent out about the middle of each month covering the operations of the past month, and will embrace among other details the cost of operating, number of men employed, work accomplished in each department, number of tons of ore hoisted, amount of high-grade shipped, concentrates shipped, and the value of the shipments. The mill report will include the number of days the mill ran, quantity of ore milled, total ounces of silver recovered, and the mine report will show the number of tons of ore broken and the quantity of high-grade and mill ore blocked out.

STATISTICS AND RETURNS.

The Dominion Coal Company's output for June, 1909, shows a gain of 10,000 tons over same month last year, and a gain of 26,359 tons over May, 1909. The following comparative table shows the last six months' production:—

	1909.	1908.
January	195,971	312,358
February	206,970	283,358
March	251,585	344,129
April	241,934	303,249
May	316,888	335,829
June	353,247	343,313
Total for six months	1,616,705	1,922,236

The output of the Dominion Iron and Steel plant for June was largest yet reached, and new high records were made at blast furnaces, open hearth, blooming, and rod mills. The principal items of production are:—

Pig iron	24,260 tons
Steel ingots	28,142 tons
Rails	18,419 tons
Wire rods	7,402 tons

Shipments for month aggregated 27,000 tons.

Shipments from the collieries of the Cumberland Railway & Coal Company, Springhill, N.S., for June were 25,801 tons.

COBALT ORE SHIPMENTS.

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

	July 3. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	613,777
Chambers-Ferland	60,000	719,440
City of Cobalt	.....	874,522
Cobalt Central	35,901	398,924
Coniagas	.....	807,005
Crown Reserve	51,380	2,950,664
Drummond	480,000	920,000
Kerr Lake	124,103	1,115,261
King Edward	.....	141,180
La Rose	.....	6,519,933
McKinley-Darragh	.....	935,786
Nipissing	540,896	7,037,001
Nova Scotia	.....	480,810
Nancy Helen	.....	83,400
Peterson Lake	.....	200,540
O'Brien	127,697	1,226,654
Right of Way	138,527	1,909,361
Silver Queen	.....	255,335
Temiskaming	120,000	1,344,860
Trethewey	130,000	1,167,838
T. & H. B.	.....	918,260
Muggley Consolidated	.....	72,900

Ore shipments to July 3, 1909, from Jan. 1, are 30,693,451 lbs., or 15,346 tons. Total shipments for week ending July 3 are 2,032,653 lbs., or 1,016 tons.

COBALT ORE SHIPMENTS.

Heavy shipments by the Nipissing last week put that mine ahead of the La Rose for the first time this year as the leading shipper of the Cobalt camp, and also helped to swell the total of the camp's shipments to 1,429,708 pounds of ore for the week, 714 tons, a record.

Shipments for the year to date total 28,433,203 pounds of ore, or 14,216 tons, nearly double the output in the same time last year, when shipments aggregated 17,358,338 pounds, or 8,676 tons.

	Week ending June 26.	Year. to date.
Buffalo	46,153	613,557
Crown Reserve	134,725	2,809,266
Coniagas	.....	842,630
Cobalt Central	.....	465,165
Chambers-Ferland	.....	659,440
City of Cobalt	.....	865,522
Drummond	240,000	440,000
Kerr Lake	61,600	987,028
King Edward	.....	97,050
La Rose	139,367	6,196,304
McKinley	51,364	935,686
Nipissing	453,135	6,406,075
Nancy Helen	.....	83,400
O'Brien	188,891	1,099,051
Peterson Lake	.....	200,540
Right of Way	61,363	716,120
Silver Queen	.....	255,275
Temiskaming	.....	1,224,960
Trethewey	.....	1,032,838
T. & H. B.	63,000	918,080
Muggley Consolidated	.....	72,900

B. C. ORE SHIPMENTS.

The shipments for the week ended June 26 were several thousand tons above the average for the year. The following are the ore shipments for the week and year to date:—

Boundary Shipments.

Total	22,284	531,858

Rossland Shipments.

Total	5,012	116,013

Slocan Kootenay Shipments.

Total	3,838	90,338

Total shipments for the past week were 31,134 tons and for the year to date 738,209 tons.

Granby Smelter Receipts.

Grand Forks, B.C.

Total	19,760	464,608

Consolidated Co.'s Receipts.

Trail, B.C.

Total	8,259	178,037

The total smelter receipts for the past week were 28,019 tons and for the year to date 794,428 tons.

Gold output of the Transvaal mines last month, as estimated by Kaffir houses in London, was 610,000 ounces fine. This estimate indicates a falling off in output from that of May of 14,500 ounces—owing, likely enough, to one day less of operations. Comparison of values is as follows:—

June, 1909	$12,962,000	June, 1908	$12,212,000
May, 1909	13,263,000	June, 1907	10,780,000
April, 1909	12,894,000	June, 1906	10,709,000
March, 1909	12,903,000	June, 1905	8,757,000
February, 1909	12,004,000	June, 1904	6,546,000

The total output of gold from Rhodesia for the month of May is cabled at 53,467 ozs. valued at £225,032, as against 52,906 ozs. valued at £222,700, in the previous month. This is an increase on the month of £2,332. There were 230 gold producers last month. The output of other minerals for last month was: Silver, 22,116 ozs.; lead, 81 tons; coal, 14,420 tons; copper, 11 tons; chrome ore, 623 tons; asbestos, 33 tons.

TORONTO MARKETS.

Metals, July 8.—Quotations from Canada Metal Co., Toronto. These prices are slightly higher than wholesale prices obtainable on large orders.

Spelter, 5½ to 5¾ cents per lb.
Lead, 3½ cents per lb.
Antimony, 8½ cents per lb.
Tin, 31 cents per lb.

Copper—

Casting, 13¾ cents per lb.
Electrolytic, 13¾ cents per lb.

Ingot Brass—10 to 14 cents per lb.

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

Summerlee, No. 1, $22.25 (f.o.b. Toronto).
Summerlee, No. 2, $21.75 (f.o.b. Toronto).
Midland, No. 1, $17.75 to $18.00 (f.o.b. Toronto).
Pig iron prices are stiffening.

Coal—

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

MARKET REPORTS.

Coke.

July 8.—Connellsville coke, f.o.b. ovens—
Furnace coke, prompt, $1.50 to $1.60 per ton.
Foundry coke, prompt, $1.80 to $1.90 per ton.

Metals.

July 8.—Tin, straits, 29.125 cents.
Copper, prime lake, 13.40 to 13.50 cents.
Electrolytic copper, 13 to 13.10 cents.
Copper wire, 15 cents.
Lead, 4.35 cents.
Spelter, 5.45 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.375 cents.
Aluminium, 21 to 24 cents.
Nickel, 40 to 47 cents.
Platinum, $22.50 to $23.50 per oz.
Bismuth, $1.75 per lb.
Quicksilver, $44.50 to $45 per 75 lb. flask.

SILVER PRICES.

		New York. Cents.	London. Pence.
June	19	52⅜	24⅛
"	21	52¼	24 1-16
"	22	52⅝	24 3-16
"	23	52½	24⅛
"	24	52½	24⅛
"	25	52¼	24 1-16
"	26	52⅛	24
"	28	52⅜	24 1-16
"	29	52	23 15-16
"	30	52⅛	24
July	1	51⅞	23⅞
"	2	51⅞	23⅞
"	3	51¾	23 3-16
"	5	..	23 11-16
"	6	51⅜	23⅝