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Editor:

J. C. MURRAY, B.A., B.Sc.

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CIRCULATION.

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THE CANADIAN MINING INSTITUTE.

The large registration of members attending the Eleventh Annual Meeting of the Canadian Mining Institute, held at Montreal on March 3, 4, and 5, may be taken as evidence of the lively interest that is evoked by that fixture. Most satisfactory also was the evident attention with which the reading and discussion of papers were followed. Moreover, the three days of convention proved all too short, and many highly valuable papers had to be omitted from the programme.

On another page there appears an account of the proceedings. It is our intention here to consider briefly a few matters bearing upon the work of the Institute.

In one respect the meeting that has just been concluded was an improvement on all preceding conventions. We refer to the fact that the proceedings were much facilitated by the presentation of papers in synoptical form. This saved time and made fuller discussion possible. Undoubtedly steps can still be taken in this direction. For instance, an inflexible time limit could be fixed for the presentation of any paper. Subjects foreign to the matter in hand should be rigidly excluded. The diversity of interests represented by the membership of the Institute appears to demand some such regulation.

The custom of attaching consecutively numbered badges to all delegates has much to recommend it. An arrangement of this kind would obviate confusion and would provide an easy means of distinguishing members from non-members.

In making these and other suggestions we do not by any means intend to imply that the last meeting was not well managed. The opposite is the case. But so rapidly is the Institute expanding that it will soon become unwieldy unless all arrangements are systematized.

By far the most important result of the Institute's deliberations was the unanimous decision to urge upon the Federal and Provincial Governments the pressing need of a Royal Commission to take up the work of simplifying and co-ordinating existing mining legislation. It was pointed out that the Federal mining law is nebulous and irregular, both in respect to its text and its administration. Moreover, all the Provinces would gain prestige, commercially and politically, if the present provincial Acts were reduced to a common basis. Work of this nature requires the continuous attention of a select body of men for not months, but years. But, as one speaker pointed out, half a million dollars spent thus would be a mere bagatelle when compared with the enormous benefits that would accrue to the mining industry, and, through it, to the common-

wealth generally. We shall have occasion to take up this subject again; but we wish to impress upon our readers and particularly upon all members of the Canadian Mining Institute, the vital need there is for the creation of this Royal Commission. Canada as a mining country has reached the parting of the ways. The mining industry should rapidly assume splendid proportions. Its progress is admittedly impeded by imperfect laws. These can be changed for the better at a cost not exceeding half of one per cent. of the wealth that is annually brought to Canadians by the industry. And the improvements that a Royal Commission could make in one or two years would, without question, cause an immediate increase in our yearly mineral output. Indeed no other course could do so much to stimulate all branches of mining. We venture the statement that the Canadian Mining Institute could not do better than to devote its whole energies to promoting this movement.

During the business sessions there was much talk of committees. Our own experience has led us to believe that committees are broken reeds. Much of the work that is assigned to them devolves upon one or two devoted persons. Canadian Mining Institute Committees are usually composed of men residing in widely separated localities. If there are to be committees then, despite all fear of sectionalism, they should be made up of persons resident in one district. But we believe also that the Secretary is competent to undertake, with the advice and encouragement of the Council, nearly all of the work now delegated to committees.

Another recommendation. It is imperative that the Secretary should visit annually every branch of the Institute. And provision should be made for this even at the risk of appropriating less money for publications. Not only will this tend to keep alive the Institute as a whole, but it will give the Secretary himself an insight into the needs and grievances of each branch.

We believe that the hints given above express opinions generally held by members of the Institute. In any case they are given solely with the desire to aid and strengthen our only national body of mining men.

And now a word of appreciation. The Montreal convention was unquestionably a success. President Miller expressed himself during one of the sessions as being highly gratified at the close attention given by the large number of members in attendance. He also spoke highly of the work of the Secretary, Mr. H. Mortimer-Lamb. For obvious reasons Dr. Miller could not refer to the manner in which the Presidential chair had been filled. But it may not be out of place to state here our opinion that the Institute was most fortunate in its choice of President. Dr. Miller has performed his duties with dignity and effectiveness.

The year 1908 was signalized by the largest and most successful summer excursion ever planned by a

technical society. We hope that the year 1909 will not be less fruitful.

Meanwhile, the Canadian Mining Journal congratulates the President, the Secretary, and the Council upon the strong position into which their combined efforts have brought the society.

DISCOVERY AND ASSESSMENT.

Whatever divergence of opinion there may be as to the practical utility of inspection of mineral claims for discovery, there can be no question that a law that makes discovery of valuable mineral a prerequisite to securing mining territory encourages false swearing and a host of concomitant evils. Broadly speaking, the value of a mineral discovery is determined only by intelligent development. The actual value of a mineral deposit is determinable in no other way. Hence it may not be exceeding the bounds of moderation to characterize any attempt at an official declaration of the worth or worthlessness of a discovery as being arbitrary, useless, and, almost always, mischievous.

Experience in mining countries other than Canada has shown that rigid enforcement of discovery requirements is impossible. The most competent observers declare that legislation of this kind is either evaded or disregarded. Its literal application, were such a thing possible, would kill prospecting.

On the other hand, it is almost universally admitted that mining rights should carry with them specific obligations. These obligations may assume the form of rentals or of assessment work or both. Effective laws, effectively administered, perhaps need no more complicated basis than is thus provided. The proper expenditure of money and energy on mining prospects is to be encouraged.

Discovery is not enforceable. We know that its enforcement is largely a matter of discretion on the part of officials.

But when assessment work is neglected and its performance is falsely sworn to, the duty of an administration is clear.

Gowganda and its environs have been staked and re-staked by prospectors this winter. There are many actual cases where assessment work could not have been performed. There is no doubt that scores of men have, nevertheless, taken their affidavits as required by law, and have sworn that they had done the necessary amount of work, when they had done nothing more than place their stakes.

To this condition, we earnestly believe, the Ontario Government cannot remain indifferent. We submit, respectfully but none the less urgently, that inspection of assessment is a crying need. Not every claim need be inspected. If one or two offenders were caught and treated with exemplary severity, the atmosphere would be cleared. Meanwhile the new districts must suffer whatever stigma is attached to the unscrupulous methods of perjurers.

AGRICULTURE AND MINING.

Mr. Hiram Donkin, Deputy Minister of Mines for Nova Scotia has been advocating strongly the encouragement and rehabilitation of Nova Scotia's agricultural industries. Believing that mining and agriculture march hand in hand, especially in settled countries, Mr. Donkin is urging the coal-mine operators of his Province to do everything in their power to stimulate their employees to cultivate the land.

Already in South Africa organized attempts are being made in the direction of providing a farming population for the Rand. The South African Mining Journal referred recently to "the extraordinary interest displayed by the whole community in the work of the Witwatersrand Agricultural Society, and of the South African National Union." Our contemporary also announced its belief that there has been a complete awakening to the necessity of revolutionizing the agricultural methods of the Rand.

There are many large areas in all the mining provinces of the Dominion of Canada wherein both mining and farming can be carried on profitably together to the material benefit of both of these essential industries. We have cited Nova Scotia. But there are also almost limitless tracts throughout New Brunswick, Quebec, Northern Ontario, Alberta, Saskatchewan, and British Columbia, where growing mining camps await the development that can come only with the advent of the farmer. Cultivation of the land will lower the cost of living for all classes, and from the farm the ranks of skilled labour will be recruited with able-bodied Canadians.

ADVERTISING.

Mr. R. R. Gamey is a prominent member of the Legislative Assembly of Ontario. He is a staunch Conservative. His rise to prominence was spectacular. Formerly he was a bit of a swashbuckler. Latterly he has developed qualities that indicate larger possibilities in the political arena.

But Mr. R. R. Gamey transgresses the rules of decent business and the laws of good taste when he uses his position as a member of the Legislature to give colour to his mining advertisement. Mr. Gamey may or may not be a good adviser as to mining speculation. If he is well qualified he does not need to use his M.P.P. as a lure. If he is not a safe guide, then his

title is distinctly a source of danger. In any case he was elected not to sell mining stocks, but to serve the interests of his constituents.

If, therefore, Mr. Gamey wishes to be remembered by posterity as anything more than a huckster of dubious scrip, he will do well to respect the distinction that must exist between R. R. Gamey, the ambitious politician, and R. R. Gamey, the broker and promoter. Meanwhile, caveat emptor!

EDITORIAL NOTES.

The recently elected president of the American Institute of Mining Engineers, Mr. D. W. Brunton, is a native of Canada. Mr. Brunton is a consulting mining engineer, practising in Denver. His invention, the Brunton mechanical sampler, became the basis of a large system of public sampling works in Colorado, Utah, and Nevada.

The Financial Times (London) predicts that serious difficulties will arise when, on July 1st of this year, the Eight Hours Bill comes into force. Our contemporary's remarks are applied to the coal owners and miners of South Wales. The question of increased pay for miners working in "abnormal places" will, it is thought, become one of the most prominent causes of dispute.

The catholicity of the mining profession has been illustrated by many such cases as the election of Mr. Brunton. Dr. James Douglas, past president of the American Institute, is a Canadian. Mr. W. A. Carlyle, whose appointment to an important technical chair in London was noted lately, is a Canadian. To these names we might easily add those of a score of prominent Canadian engineers employed in foreign countries.

For some years the Ontario Government has attempted to provide practical instruction for prospectors and miners. This has been done by means of holding technical classes at various mining camps during the summer season. The Transvaal University College has followed Ontario's example. A course of lectures to miners is to be inaugurated at various local centres along the reef. Instruction will be given in subjects pertaining to mining and mining economics.

ELEVENTH ANNUAL MEETING OF THE CANADIAN MINING INSTITUTE.

Montreal, March 3, 4, and 5, 1909.

Early on Wednesday morning, March 3rd, in the rotunda of the Windsor Hotel, Montreal, mining men from east and west and north exchanged their annual greetings. A particularly large contingent from Cobalt, Sudbury and adjoining districts was much in evi-

dence. Other parts of Ontario were well represented. Quebec's delegates were not less numerous than heretofore. British Columbia, Alberta and Nova Scotia were also represented.

At 10.30 a.m. proceedings were opened officially in

the Ladies' Ordinary. President W. G. Miller read the Presidential Address, the text of which is given below:—

PRESIDENTIAL ADDRESS.

Gentlemen,—The Canadian Mining Institute, founded in 1898, has entered on its second decade. The questions may then be asked, what has the Institute accomplished, what progress has been made in the mineral industry during the last ten years, and what is the outlook for the future?

We have first to consider the work of the Institute itself. At the annual meeting in 1898 we had a membership of 63. At the present time our membership is about 850, including student members, and it is growing rapidly. We shall soon have 1,000. The Institute has covered a wide field. Its most important work, probably, has been that of the publication of papers. Our last annual volume consists of over 600 pages. Few of these papers would have been written had the Institute not existed. Mining men are proverbially reluctant to appear in print, and their valuable experience is frequently lost. Local branches have much to do with getting papers. Men will prepare papers under local encouragement when they would pay little attention to written communications from the Secretary. Moreover, the student membership has had a beneficial influence in encouraging the budding members to write for our transactions.

When arrangements are completed for the establishment of libraries in connection with the branches, the work of the Institute will be broadened still further.

During the ten years of its existence the Institute has been called upon to give advice on legislation and on other matters concerning the mineral industry. Much more has been accomplished in this connection by the Institute than could have been achieved through other channels.

Several excursions to mining centres have been held, which have done much to make Canada's mineral resources known. Among these excursions may be mentioned that to British Columbia in 1899, that to Quebec Province and to Nova Scotia, in company with the American Institute of Mining Engineers, in 1900, that to Cobalt in 1907, and lastly that of 1908, from the Atlantic to the Pacific. This excursion was a greater success than the most sanguine of our Council or members could have expected it to be. The character of the guests of the Institute from Great Britain and abroad insured success.

The work of arranging for the excursion and carrying it to a success fell chiefly on our Secretary, Mr. Mortimer-Lamb, and on our Treasurer, Mr. Stevenson Brown. While their fellow-members of Council have expressed to these two gentlemen their pleasure at the success achieved by the excursion, this annual gathering seems to me a suitable place to thank our Secretary and our Treasurer, on behalf of the membership at large, for the care which they gave to the arrangements for the excursion. The Secretary is also to be congratulated on the bulletin which he has published, recording the events of the trip.

At the last annual meeting both the Secretary and the Treasurer told me they intended to work with the object of making the past year the most successful in the history of the Institute. We have to thank them for the efforts which they have made, and for the success which they have achieved.

Mr. Stevenson Brown, having served as Treasurer of the Institute for the past ten years, is now retiring from that office. I can assure him that he has the best wishes of the members of the Institute, and we hope that his association with the Institute as its Treasurer will be a pleasant memory. When he recalls the early days of the Institute and the progress during later years, and when he watches the development in the future, it is to be hoped that Mr. Brown will find some recompense for the ten years in which he has served as an executive officer.

Our Secretary, in the Excursion Bulletin, has referred to many men in various parts of Canada to whom thanks are due for the success of the trip. On behalf of the members generally, I wish to again tender thanks to all. Time will not permit of my referring to individuals or organizations, but I wish to express thanks to another official of the Institute for the care with which the arrangements in the West were looked after. I refer to Mr. E. Jacobs, the Secretary of the Western Branch, who did much towards making the trip through British Columbia so successful.

I have briefly described the work done by the Institute, but greater than all else are the opportunities which are given the mining men of Canada, from one end of the country to the other, of getting acquainted with one another. These annual meetings would be very valuable even if no papers were read. Men get acquainted, compare notes and form friendships which they would have no other opportunity of doing. All this has a broadening effect; and I am sure that every one of us after an annual meeting goes back to his work better equipped to carry it on.

In the year 1898, when the Institute was organized, Canada's annual mineral output was valued at \$38,412,431. In 1908 the value reached \$87,323,000. This increase is highly satisfactory, and offers encouragement for the future. We may truthfully say, without being accused of boasting, that no country gives greater hope for the future in mining than our own.

For years past there has been no doubt that the territory bordering on the Atlantic, with its great coal deposits and other mineral resources, has a bright future as a mining country. Similarly, every one has agreed that the part of our country bordering on the Pacific Ocean is destined to become great as a mineral producer. Mountains with the same characteristics extend from old Mexico and the United States through British Columbia and the Yukon. It has been estimated that the metal output of Mexico and the United States in the mountainous tracts adjacent to the Pacific has amounted to over \$3,500,000 for each mile in length of these mountainous tracts. The Canadian territory to the north has then great promise. While, therefore, all will admit that the Canadian territories on the Atlantic and those on the Pacific are destined to become centres of a great mineral industry, what is to be said of that vast Canadian region which lies west of the Acadian Provinces and to the east of the Rocky Mountains?

In the past the people of Quebec and Ontario have heard little of their resources other than those of the forest and the soil. It has been difficult, as most of us know, to arouse much interest in the mineral possibilities of these two provinces.

One-half of the 3,750,000 square miles of Canada, chiefly in the provinces of Quebec and Ontario and in the territories to the north and northwest, is underlain by rocks of pre-Cambrian age. The mining experience of Canada has been drawn, naturally, largely from the

United States, where the pre-Cambrian rocks cover a small extent of territory. It is but to be expected then, especially as the great part of the pre-Cambrian region of Canada is accessible with difficulty, that it would, up to the present, have attracted little attention as a mineral field. If we consider, however, what the pre-Cambrian region has already done, it seems to me we should feel that these vast areas of the old rocks give great promise. Personally, I feel no doubt about it. These pre-Cambrian regions are destined to be the scenes of great mineral development.

A small point of these old rocks extends from the north into the States of Minnesota, Michigan, and Wisconsin. It is this pre-Cambrian area that has caused the United States to become the world's greatest producer of iron and steel, and the copper mines of Michigan have long been famous.

The pre-Cambrian country over much of its surface offers little inducement to the agriculturalist, although it possesses some fertile areas. Settlement has for this reason made little advance into the north, but along the thin line of settlement in Ontario we have, in the pre-Cambrian, the world's greatest producer of nickel, Sudbury, and the silver camp, Cobalt.

Areas underlain by rocks similar to those in the iron and copper fields of Michigan and in the iron ranges of Minnesota, and to those of Sudbury and Cobalt, are known to occur at numerous points over the 1,800,000 square miles of the Canadian pre-Cambrian regions. It does not require the vision of a prophet to foretell what will be the mineral development when our pre-Cambrian regions are adequately explored and prospected. The mining men of Canada, and their society, the Canadian Mining Institute, have a great mineral field before them—half a continent. We are scarcely at the beginning. Let us make the best use of our opportunities. Let us avail ourselves of the experience of older mining countries, have faith in Canada and in ourselves, and a firm belief in the future of our industry.

In conclusion, I wish to thank the members of Council and the membership at large for the pleasant year I have had in the Presidency of the Institute. My labors have been made light by the kind co-operation and assistance which I have received on every hand.

I now have pleasure in declaring the Eleventh Annual Meeting of the Institute open for the reading of papers, the transaction of business, and especially for social interviews and the interchange of good-fellowship.

The annual report of the Council was then read by the secretary, Mr. H. Mortimer-Lamb. The retiring treasurer, Mr. J. Stevenson Brown, presented his statement and balance sheet, and the report of election of council was announced.

After general business discussion, Mr. J. McLeish, statistician of the Department of Mines, Ottawa, read a preliminary statement of the mineral production of the Dominion for 1908. Similar statements were read for Quebec by Mr. J. Obalski, and for Ontario by Dr. W. G. Miller, representing Mr. T. W. Gibson, Deputy Minister of Mines. All three statements appear on other pages of this issue of the Canadian Mining Journal.

During the afternoon session Mr. G. R. Mickle, Assessor of Mines for Ontario, read a most important paper on "The Probable Effect of an Acreage Tax on Mining Lands in Ontario." Mr. Mickle traced the

history of mineral land taxation in Ontario, the changes in units of area, the development and effect of the acreage tax, and the present condition of the several mining divisions of the province. Copies of a blueprint map were distributed to illustrate the paper. It was demonstrated that one effect of an acreage tax of two cents per acre has been the revision to the province of many thousands of acres of mining lands in 1910.

Mr. E. L. Fraleek, of Cobalt, Ont., followed Mr. Mickle. He spoke on "The Application of an acreage tax to the Mineral Areas of Central Canada." Mr. Fraleek urged the imposition of a much larger acreage tax than has heretofore obtained. A tax of from ten to twenty-five cents per acre would, he contended, throw open the large areas now held closely by speculators and others, and would undoubtedly facilitate legitimate exploitation and development.

Mr. Fraleek adduced illustrations from the laws of Mexico and of many sections of the United States. His matter and style were convincing. After a general discussion, in which Messrs. Coste, Barlow, Hay, A. H. Smith, Brock, Langford, and others took part, the meeting declared itself in favour of acreage tax that should be heavier than that at present imposed.

To deal with questions such as these and with the larger problems of mining legislation, such as the construction of practicable Federal laws, the simplification of the various provincial laws, and the co-ordination of all of these, it was unanimously decided that a permanent committee of the Council of the Institute be instructed to approach the Federal authorities and urge the immediate appointment of a Royal Commission. As to the need of this step there appeared to be entire unanimity.

Through the courtesy of the authorities of McGill University, the members of the Institute were their guests on Wednesday evening, at a lecture on "The Electric Furnace with Special Reference to the Electro-Metallurgy of Steel." The lecture was delivered by Dr. Alfred Stansfield in the Chemistry and Mining Building. After the lecture Dr. Stansfield gave practical demonstrations of the conversion of pig iron into steel in the induction furnace. The lecture was attended by a large number.

Thursday.

The Thursday morning session was one of the most instructive ever held by the Canadian Mining Institute. The first paper read was that of Mr. S. F. Emmons, of the U. S. Geological Survey. Mr. Emmons is the senior officer of the U. S. Survey. He has studied for almost 40 years the principles of ore deposition as applied to American occurrences. His address was an outline of the rise and fall and development of various theories of the formation of ore deposits. He noted the predominance in late years of the view that ore deposits are largely and generally connected with igneous or volcanic action. He showed that the work of the U. S. Survey had been of supreme value to the mining industry of that country. Since Canada is a vast and sparsely settled country, Mr. Emmons urged that the labours of our own Survey be intensive over small and important mining areas, rather than extensive over wide and doubtful territories.

Mr. Waldimar Lindgren, whose name needs no introduction to Canadian readers, spoke next. His subject was "Metallogenetic Epochs." Briefly, his theme was a comprehensive review of the successive eras in the world's geologic history which have been characterized by the deposition of distinctly different metals

and ores. In a later issue of the Canadian Mining Journal we shall deal with Mr. Lindgren's paper more fully. Meanwhile it is sufficient to state that it was one of the outstanding features of the convention. Prof. J. F. Kemp opened the discussion of both of these papers. He was followed by Mr. J. B. Tyrrell, Dr. Frank D. Adams, Prof. M. B. Baker and others.

The closing feature of the morning session was an illustrated paper read by Dr. A. C. Lane, State Geologist, Michigan, U.S., on "The Mine Waters of Michigan." The importance of a knowledge of the chemical constituents of mine waters and the bearing of that knowledge on the operations of pumping, sinking, and developing, were well brought out by Dr. Lane.

Thursday afternoon was devoted to a business session. The proposed amendments to the by-laws were rejected by large majorities. It was decided to refer amendments to a committee of the Council. The discussion rose nearly to boiling point once or twice. In general the meeting appeared to be opposed to any radical alteration of the present by-laws—at least to alterations that do not make for simplicity and efficiency.

As there was a short time to spare at the end of the business session, the President requested Mr. E. T. Corkill to read his paper on "Mine Accidents."

Thursday Evening.

The smoker has become part and parcel of the Institute's proceedings. The capacious Ladies' Ordinary was filled to the doors when, at 8.30 p.m., Chairman G. G. S. Lindsey called the meeting to order, "order" in this connection meaning simply less chaos. The evening was enlivened by a diversity of amusements. The organ notes of Mr. N. MacDonald punctuated every minute. Hereafter a MacDonald obligato will be demanded by dozens of Mr. MacDonald's admirers, new and old.

Perhaps the most instructive item on the programme was Dr. Kemp's magnificent and luminous illustrated lecture on the origin of ore deposits. By what means Dr. Kemp had secured his marvellous slides we stay not to enquire. Politeness forbids. But we feel deeply the honour at having been present at this revelation of scientific acumen and enterprise. Dr. Kemp, in that passionless, calm, dignified style that marks the true geologist, threw picture after picture on the wall to illustrate his theory of ore deposition. The volcano, a sight that congealed one's blood, was followed by the fissure; the fissure by the hot spring; the hot spring by the deposition of a huge quartz vein, and so on until the last link, the modern cyanide plant, was projected visibly upon the white canvas. So lurid was the whole presentment that strong men sobbed, and the speaker himself could scarcely suppress his emotions.

A programme of songs and anthems and specialties provided a cheerful evening for the two hundred and fifty guests present.

FRIDAY.

The Friday morning session commenced with the reading of a paper by Dr. J. F. Kemp, of Columbia University. Dr. Kemp discussed at length the question, "What is an Ore!" Mr. Waldimar Lindgren and Dr. J. W. Woodman contributed to the discussion. One definition that appeared to meet with general approval reads thus: "An ore is a mineral aggregate containing enough metal to be extracted at a profit." The discussion was animated.

Dr. Adams then made a few remarks about an occurrence of ore at the City of Cobalt Mine, Cobalt, Ont., and Mr. J. C. Murray presented a paper by Mr. F. W. Gray on "Oxygen Breathing Apparatus in Coal Mines."

The afternoon session was taken up with continued reading of papers. Mr. D. B. Dowling's "Probable Chemical Changes in the Formation of a Coal Bed" was followed by Mr. Eugene Coste's on "The Origin and History of Coal and Petroleum." Director R. W. Brock then read "The Need of Recording Occurrences of Economic Deposits," and Prof. John A. Dresser presented a synopsis of a most interesting and carefully prepared paper entitled "The Mineral Resources of the Serpentine Belt, Quebec."

The session was thus brought to a close, and there remained only the annual dinner.

Annual Dinner.

Rarely has there been such a gathering as sat down to dine in the Ladies' Ordinary of the Windsor Hotel on the evening of March 5, 1909. The Governor-General, Earl Grey, had signified his intention to be present. The Hon. Mr. Templeman, Minister of Mines for Canada; the Hon. Mr. Cochrane, Minister for Ontario; Mr. J. Obalski, representing the Quebec department, and many other distinguished guests and representatives sat at the head table, where President Miller, with Earl Grey on his right, and Mr. Templeman on his left, occupied the seat of honour.

After duly honouring the toast of "The King," President Miller proposed that of "His Excellency the Governor-General," which was received with tremendous enthusiasm. His Excellency, in responding, referred in terms of high appreciation to the work of the Institute. In tracing the progress of mining education he touched upon the labours of the late Principal Grant, of Queen's University, through whose enthusiasm the School Mining of Kingston was brought into being, the first institution of its kind in Canada. Glancing over the progress of Canada's mining industry, His Excellency predicted that within a short period our mineral output will be doubled.

Other speakers were the Hon. Mr. Templeman, the Hon. Frank Cochrane, Mr. Goodeve, M.P., Mr. G. G. S. Lindsey, Mr. Obalski, Dr. J. F. Kemp, Dr. A. C. Lane, Dr. J. W. Woodman, Mr. J. E. Hardman, Mr. E. L. Fraleck and Mr. F. W. Guernsey. The dinner was continued informally for some time after the distinguished guests had departed.

THE MINING SOCIETY OF NOVA SCOTIA.

Seventeenth Annual Meeting.

The seventeenth annual meeting of the Mining Society of Nova Scotia was held on March 3 and 4, at the rooms of the society, Hollis Street, Halifax, N.S.

On the afternoon of Wednesday, March 3rd, proceedings commenced with the reading of a paper by the Hon. Robert Drummond. "The Mine and the Farm" was the subject-title. Citing European countries as examples, Mr. Drummond argued that with the development of the mining industries all the industries would follow. A paper submitted by Dr. R. W. Ells, of the Geological Survey of Canada, on the "Oil-shales of New Brunswick," was read by Mr. Hugh Fletcher. It described the results of tests conducted in Scotland on a forty-ton experimental shipment of New Brunswick

oil-shales. The announced results were most satisfactory.

Mr. F. H. Sexton, Director of Technical Education, then spoke of the purpose and benefits of last summer's visit of the European mining engineers.

The retiring president, Mr. C. J. Coll, read a paper describing a dam built in the Macgregor shaft, Stellarton, in fighting a fire. The paper was illustrated with several large diagrams.

The Hon. Mr. Drummond, in the course of his paper mentioned above, brought out some striking facts. In the four coal mining counties of Nova Scotia the sum of \$7,890,000 is distributed annually in wages. If supplies be included in this estimate, the total becomes \$10,003,000. The number of employees is 16,750, and 57,350 souls are numbered as dependent upon these employees. Altogether there are 125,000 dependent in large degree upon coal mining. In Cape Breton County, according to Mr. Drummond's estimate, the coal mining companies distribute \$100 in wages per annum per head of population. Including supplies this figure is increased to \$128.

On Wednesday evening the seventeenth annual banquet was held at the Halifax Hotel. The gathering, while not as large as usual, was representative and enthusiastic. The toast list was short, as all toast lists should be. After the King's health had been drunk, the toast of "Canada" was responded to by Chief Justice Townsend, who, after alluding to mining as the chief industry of the country, expressed the hope that in future he would be given less to do officially with the miners of the province and that all would be peace and quietness.

To the toast of "The Provincial Government" Premier G. H. Murray responded. He spoke most warmly of the work done by the Mining Society of Nova Scotia, and by its secretary, Mr. A. A. Hayward.

The Hon. C. P. Chisholm spoke briefly to the toast of "Our Mines," as also did the Hon. W. T. Pipes. "Sister Societies" and "Our Guests" were the two concluding toasts. Throughout the dinner musical numbers and recitations varied the programme.

The menu card is one of the most effective that we have seen. A bronze-coloured print of Vaerenbergh's "The Miner" appears on the cover against a background of delicate blue. The menu is made up entirely of traditional geological dishes, some of which, we grieve to state, have room for grave complaint against the printer.

Announcement of the results of the annual elections was made on Thursday, March 4th. The following were declared elected:—

President—T. J. Brown.

Vice-President—F. H. Sexton.

Second Vice-President—G. J. Partington.

Secretary—A. A. Hayward.

Treasurer—H. M. Wylde.

Council—Hon. R. Drummond, Hon. B. F. Pearson, G. W. Stuart, C. C. Starr, J. R. Cowans, Alex. Dick, R. H. Brown, T. Cantley, A. L. MacCallum.

The session was brought to a close after the reading of a paper on tungsten occurrences in Nova Scotia, by Mr. A. L. MacCallum, and a discussion of Government aid to Nova Scotian gold mines. The discussion was led by Mr. A. A. Hayward.

Mining Methods and Equipment at the British Columbia Copper Company's Mother Lode Mine.*

By M. D. McIntosh, Superintendent at Mother Lode Mine.

The following is a brief description of the system of mining and equipment at the British Columbia Copper Company's Mother Lode Mine, Boundary District of British Columbia.

At this mine there is one distinct ore body, which already has been opened by four levels, work on a fifth having been only recently started. The ore body is a contact deposit between limestone on the foot-wall and greenstone on the hanging-wall; the dip being about 70 degrees to the east, and the strike northeast with a southerly pitch. Most of this ore has been formed by replacement and alteration in the greenstone, the limestone being as a rule but little affected.

Several dykes of porphyry, from one to twenty feet thick, intersect the ore at approximately right angles to the dip, and frequently prove troublesome in mining. East of the quarries the ore is covered with a flow of later, and barren, eruptive rock, which has limited the width of the quarries to about half that of the ore body.

The ground is very firm and stands well—a fact of the greatest importance in the operation of the mine, and without which it would be impossible to maintain in safety the large open spaces underground.

All four levels are connected by stopes and raises. On each level are parallel drifts from about 50 to 70 feet apart, connected by crosscuts and drifts run at

various angles, thus allowing ore trains to pass each other at different parts of the mine. The first drift is along the foot-wall of the ore body, the second in the centre, and the third close to the hanging-wall. By this method any number of trains may be conveniently handled on the level.

Chute raises are begun at intervals of 35 feet apart, every alternate chute being placed on the opposite side of the drift. By this arrangement the stopes on each level are easily connected, and the chutes also serve for ventilation purposes. The chutes are started in the same manner as a raise; after raising 8 or 10 feet a beginning is made to funnel them on all sides at an inclination of about 35 degrees. When several connect with one another the stope is extended, leaving pillars at convenient places. This preliminary work having been done, the stopes are carried to the next level above in a series of large spiral raises. After connecting the levels, tripods are used in the bottom of the stopes.

When any level is thoroughly connected with the next lower level by means of these spiral raises, the ground is then in such shape for caving that work can be started at the farthest point from the shaft and the

*Paper read before the Canadian Mining Institute.

pillars between the spirals blasted doyn, allowing the ore to drop to the level below. In this way the level is kept safe while the work is progressing on the other levels.

The large quarries, of which there are six, are all connected with the 60-foot level, while in one place connections are made with the 200-foot level. This has been found a great advantage, as the ore, falling so far, is thereby broken much finer, effecting a great saving in powder for bulldozing and involving much less labor for the chutemen and skipmen in handling the ore.

The ore is conveyed to pockets at the shaft in cars drawn by horses. Two types of cars are used. On the lower levels the cars are 30-ton side-dumping; on the 60-foot level trains are loaded of three and four 3-ton scoop cars. An automatic dump unloads them at the pocket. A chuteman with a helper loads the ore from the chutes. In case a chute gets blocked he does the necessary blasting to clear it. The chute openings are 3x4 feet, and are built of heavy round timbers. The bottoms and sides are 4x10-inch timbers lined with 1/4-inch steel plate. The collar braces are covered in the same manner. Two descriptions of gates are used—one a circular iron chute gate, and the other the old style chute boards.

The shaft is vertical, with four compartments, each compartment being 4 1/2 x 5 feet. Two compartments are used exclusively for ore, one for lowering and hoisting the men, and the fourth for ladder and pipe way.

Connected with the shaft are large storage pockets at each level, from which the ore is hoisted by two skips, each holding four tons, these being loaded by means of finger gates operated by compressed air.

One 20x36 Jenckes hoisting engine is used. It is easily capable of hoisting the skips 400 feet per minute, or 60 skips per hour, from the 400-foot level (the deepest now opened), or at the rate of 240 tons per hour. The cage is operated by one independent 80 h.p. single drum hoist, and is counterbalanced by sliding weights run in the ladder compartment of the shaft.

There are two compressors, one a 16x25x26 D, 2. T. Rand engine, capacity 3,400 feet of free air per minute, and one Ingersoll-Sergeant machine of 2,800 feet capacity. The Rand is driven by a 600 h.p. Canadian General Electric motor, and the Ingersoll by a 500-h.p. Westinghouse motor.

The writer has devised what has proved to be a most satisfactory system for separating the moisture from the compressed air, consisting of a 100 h.p. boiler submerged in a tank of water. The air passing through the boiler is cooled and the moisture drawn off. After once being filled, only a small quantity of water is required to keep the tank cool.

There are two crushers, one a 36x42-inch jaw opening, and the other a 16x34 Farrel-Bacon machine. These are connected with a 100 h.p. motor and a 100 h.p. steam engine, so arranged that either can be driven by steam or electricity at will, which arrangement effectually guards against failure of crushing operations. After crushing the ore, it is conveyed to the shipping bins by means of a 10-ply rubber belt, 36 inches wide and 167 1/2 foot centres. The bins have a capacity of 2,000 tons, of which about half will run into the cars.

The hoisting engines are arranged so that they may be operated either by steam or compressed air. The steam is supplied by two 60 h.p. boilers. One is kept in constant use for general heating purposes. Ordinarily compressed air is used, and this is found to be considerably less costly than steam.

During the month of December the underground force at the Mother Lode consisted of 1 foreman, 4 shift bosses, 126 miners, 4 timbermen, 4 pipemen, 16 muckers, 16 chutemen and trammers; 1 trackman, 4 nippers, 4 skipmen, 2 cage-tenders, 1 powderman and 4 blasters—a total of 187. The total force employed at the mine, exclusive of boarding-house employees, was 235. The daily average output of ore was 1,545 tons. The daily average output per man was 6 1/2 tons for all men employed.

MINE ACCOUNTING.

By John G. Grant, B.A., Chartered accountant, Toronto, Ont.

(Continued from last issue)

III.

Men working in mines are paid according to the length of time worked or according to the amount of work accomplished. The first method is used for the men who are the company's own employees; the second for the men working under contract to the company.

In large companies a timekeeper is employed to take charge of the time books and pay sheets, but in small

concerns the storekeeper or foreman may do the work. Every morning the man whose duty it is makes a round of the works and enters up in the following form the men who are at work:—

The entries are then copied into another book called the "Time Book," with the same ruling, but with the addition of two columns, one for the rate per day and the other for the amount. In the "Time Book" the

Time from		to								
Name	Occupation	Sun	Mon	Tues	Wed	Thur	Fri	Sat		

Columns continued so as to
contain two weeks

men's names are grouped on the basis of their occupation, so that all the blacksmiths, for example, will be in the same group and similarly the carpenters, engineers, etc. This will give facility in making an analysis of the cost of each department. To find the cost in wages of any new work, and for the distribution of the charges for repairs, it is necessary for the foremen of the different classes of workmen to keep "Time

Sheets," on which each man enters what he is doing and the number of hours spent in the work. Although it is customary to keep account of this in a very rough-and-ready fashion, better results will be obtained by using a printed form, which, by giving more accurate results, may be used as a good check on the Time Book. The following is a simple form of a Time Sheet:—

	from		to	
	Name of Workman	What doing	Time	Total Time
Monday				
Tuesday				

In general, the sinking of shafts, driving of levels, etc., are done by contract, a fixed price being paid per linear foot. In the case of shaft-sinking the rate per foot increases according to the depth attained. A book

ruled as follows should be kept for purposes of comparison with other work of the same character and as a check on the amount of work paid for:—

Contract Book

Date	Name of Contract	Where Done	Conditions	Measurements	Paid for	Unpaid	Rate	Amount

At the end of each month an analysis of the wages is made, showing the average tonnage of ore raised per day and the average cost per ton in wages. This

analysis may be ruled up by the timekeeper himself on blank paper, as follows:—

Analysis of Wages

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Days Worked Underground												
Aboveground												
at other work												
Worked												
Tons Raised												
Average Tonnage per Day												
Total Wages Underground												
Aboveground												
on other work												
Paid												
Tons Raised												
Average Wage Cost per Ton												

It will be noticed that columns are left for the 12 months, by which a convenient comparison is shown between the costs per ton raised for the different months. In the "total wages for other work" the contract work on shaft-sinking may be included or not,

depending on the desire of the company to charge this work to revenue or capital account.

To prepare an analysis of cost it is necessary to bring together the cost of labor, material, and fixed charges, such as mine manager's salary, etc. This

analysis may be divided into two parts, one dealing with the raising of the ore and the other with the preparing it for market (concentration). Only the first of these two will be shown here, as the method of

preparation of the second can be obtained from it by analogy. A printed form should be used similar to the form shown below:—

Cost Analysis

Raising Ore	Total Cost				Average per Ton	
	Last Month		Current Month		Last Month	Current Month
	Amount	Total	Amount	Total		
Salaries						
Laborers						
Machinery						
1. Labor						
2. Power						
Hauling						
1. Labor						
2. Materials						
3. Power						
Repairs						
1. Labor						
2. Materials						
3. Sundries						
Tools						
1. Labor						
2. Materials						
Sundry Costs						
1. Lighting						
2. Pumping						
Etc.						
Total Cost						

In the case of a silver mine the book required to record the shipment of ore is very extensive, and I will not show the ruling here. I will mention, however, what it is necessary to record, so that very little ingenuity will be required to put the columns side by side. The Sales Book must show the date of shipment, the car number, where the ore was taken from, weight at the mine, weight per railroad advice, the result of the assay, name of purchaser, sampling charge, amount per ton, total value of shipment, freight paid, and amount received.

In the monthly report to the head office, information must be shown as to the salaries and wages paid, the purchases of stores, stock of stores on hand and stores used, the sales during the month, the ore raised and treated, and the amount of cash on hand. If the company has an audit at the mine, only summaries need be sent, and no vouchers need accompany these. If no audit takes place at the mine, it is necessary to send full details of all classes of transactions, with vouchers for all payments. The first method is the natural way, and lessens the work both of the head office and of the mine office. By this method the analysis shown above is sent as the wages report, the smelters send two reports of the sales, one of which is sent to the head office, the analysis of costs is sent, and a summary of

the "Stores Ledger." Thus, you see, very little extra work is needed to place the head office in full possession of all the facts necessary for the preparation of their Balance Sheet.

In the next issue we will follow these reports to the head office and prepare books to record the facts shown therein.

(To be continued.)

RESCUE WORK IN COAL MINES.

Speaking before the Midland Institute of Mining, Civil and Mechanical Engineers, Doncaster, England, Sergeant A. Winborn, who has charge of the joint rescue station at Tankersley, stated that the rescue work done after the Hamstead disaster was probably the most severe test to which any rescue apparatus had ever been subjected. Scores of miners, totally unprotected by breathing apparatus, begged the opportunity of descending the mine. The method of effecting a rescue by means of sheer muscular force and daring, without the aid of scientific apparatus, appealed to the average miner most. Miners viewed the advent of "new-fangled" apparatus with distrust. Consequently they must be brought by experience to a realization of its practical value.

PRELIMINARY REPORT OF THE MINERAL PRODUCTION OF CANADA IN 1908.

Prepared by John McLeish, B.A., in charge of the Division of Mineral Resources and Statistics.

ANNUAL Mineral Production in Canada since 1886.

1886	\$ 10,321,255	1898	\$ 38,412,431
1887	10,321,331	1899	49,224,005
1888	12,518,894	1900	64,420,983
1889	14,013,113	1901	65,804,611
1890	16,763,353	1902	63,211,634
1891	18,976,616	1903	61,740,513
1892	16,623,415	1904	60,073,897
1893	20,035,082	1905	69,525,170
1894	19,931,158	1906	79,057,308
1895	20,505,917	1907	86,842,765
1896	22,474,256	1908	87,323,849
1897	28,485,023		

A preliminary review of the mineral production in Canada in 1908 shows a total mineral output valued at slightly over 87 million dollars as compared with a little less than 87 million dollars in 1907.

The industry has therefore in the aggregate more than held its own despite the large decrease in the prices of the metals. That this falling off in the prices of the metals has been an important and serious question for the metal mining industries, will be better realized when it is stated that had the metals, copper, silver, lead and nickel maintained as high average prices in 1908 as in 1907, their total production in Canada in 1908 would have been worth over 8,000,000 dollars more to the producers than was actually the case.

A comparison of average monthly prices of metals in 1907 and 1908 showing the decreases in 1908 both in price and percentage is given hereunder:—

COMPARISONS OF PRICES OF METALS, 1907 and 1908.

	1907.	1908.	Decrease in 1908.	Percentage of Decrease.
	Cts.	Cts.	Cts.	%
Copper	20.004	13.208	6.796	33.97
Lead	5.325	4.200	1.125	21.12
Nickel	45	43	2	4.44
Silver	65.827	52.464	12.463	19.07
Spelter	5.962	4.725	1.237	20.73
Tin	38.166	29.465	8.701	22.79

PRELIMINARY REPORT ON THE MINERAL PRODUCTION OF CANADA IN 1908.

(Subject to revision.)

Product.	Quantity (a)	Value (b)
METALLIC.		
		\$
Copper (c)	Lbs. 64,361,636	8,500,885
Gold	" 9,559,274	9,559,274
Pig iron from Canadian ore (d)	Tons 99,420	1,664,302
Lead (e)	Lbs 45,725,886	1,920,487
Nickel (f)	" 19,113,111	8,231,538
Cobalt	" 1,853,296	112,253
Silver (g)	Ozs 22,070,212	11,667,197
Total value, metallic		41,655,936
NON-METALLIC.		
		\$
Arsenic	Tons 699	38,054
Asbestos	" 65,534	2,547,507
Asbestos and asbestic sand	" 25,239	25,829
Calcium carbide	" 6,864	417,150
Chromite	" 7,225	82,008
Coal	" 10,904,466	25,067,236
Corundum	" 1,039	100,389
Feldspar	" 7,877	21,099
Graphite	" 251	5,565
Grindstones	" 3,843	45,128
Gypsum	" 340,964	575,701
Limestone for flux in iron furnace	" 418,661	289,706
Magnesite	" 120	840
Mica	"	191,602
Mineral pigments—		
Barites	" 4,091	18,265
Ochres	" 4,746	30,440
Mineral waters	"	109,391
Natural gas (h)	"	1,012,060
Petroleum (i)	Bris. 527,987	747,102
Phosphate (apatite)	Tons. 1,596	14,794
Pyrites	" 47,336	224,824
Quartz	" 27,134	32,277
Salt	" 79,975	373,798
Talc	" 1,076	3,048
Tripolite	" 30	195
Total value, non-metallic		32,479,006

(a.) Quantity of product sold or shipped.
 (b.) The metals, copper, lead, nickel and silver are for statistical and comparative purposes valued at the final average value of the refined metal in New York. Pig iron is valued at the furnace and non-metallic products at the mine or point of shipment.
 (c.) Copper contents of ore, matte, &c., at 12.208 cents per pound.
 (d.) The total production of pig iron in Canada in 1908 was 630,835 short tons valued at \$8,111,194, of which it is estimated about 99,420 tons valued at \$1,664,302 should be attributed to Canadian ore and 531,415 tons valued at \$6,446,892 to the ore imported.
 (e.) Lead contents of ore, matte, &c., at 4.200 cents per lb.
 (f.) Nickel contents of matte shipped at 43 cents per lb.
 (g.) Silver contents of ore, &c., at 52.864 cents per lb.
 (h.) Gross return from sale of gas.
 (i.) Deduced from the amount paid in bounties and valued at \$1 1/2 per barrel.

PRELIMINARY REPORT ON THE MINERAL PRODUCTION OF CANADA IN 1908—Concluded.

(Subject to revision.)

Product.	Quantity (a)	Value (b)
STRUCTURAL MATERIAL AND CLAY PRODUCTS.		
		\$
Cement—natural	Bbbs. 1,044	815
Portland	" 2,665,289	3,709,063
Flagstones	No. 4,000	3,600
Sand and gravel (exports)	Tons. 298,954	161,387
Sewer pipe	" 514,042	514,042
Clay products, stone, lime, &c., Estimated	"	8,500,000
Total structural material and clay products		12,888,907
All other non-metallic		32,479,006
Total value non-metallic		45,367,913
Total value metallic		45,655,936
Estimated value of mineral products not reported		300,000
Total value, 1908		87,323,849

The outstanding feature of the mining industry during the year has undoubtedly been the silver production, a total increase of over 72 per cent being shown in the number of ounces produced. The metals copper and gold also show important increases in quantity produced, whilst iron, lead and nickel were produced in slightly smaller quantity than in 1907.

In the non-metallic class, decreases in gypsum and petroleum are more than counterbalanced by increases in coal, asbestos, natural gas, salt, etc. The Portland cement industry shows a small increase in sales and a large increase in quantity of cement made with large stocks on hand at the close of the year.

The two following tables will illustrate these special features of increases and decreases, the first showing the total increases or decreases in value of some of the more important products, and the second the percentage increase or decrease in quantity as well as value:—

Product.	Increase.	Decrease.
Copper		
Gold, Yukon		\$2,806,494
Gold all other	\$ 450,000	
Pig iron, from Canadian ore	726,494	
Lead	318,006	
Nickel	621,999	
Silver	1,303,869	
Asbestos	3,318,538	
Chromite	62,739	
Coal	9,107	
Gypsum	1,189,393	71,213
Natural gas	197,028	
Petroleum	309,886	
Portland cement	68,266	
Pyrites	12,333	
Salt	36,483	

Product.	QUANTITY.		VALUE.	
	Increase.	Decrease.	Increase.	Decrease.
	%	%	%	%
Metallic—				
Copper.....	13.86			24.82
Gold.....	14.03		14.03	16.04
Pig iron, (from Canadian ore only).....		7.60		11.11
Pig iron, (from home and imported ore).....		3.24		24.45
Lead.....		4.22		13.67
Nickel.....		9.66		89.75
Silver.....	72.69			
Non-metallic.				
Asbestos and asbestic.....	0.38		2.73	
Coal.....	5.21		5.27	
Feldspar.....		37.40		29.27
Gypsum.....		29.83		11.01
Natural gas.....			24.00	
Petroleum.....		33.07		29.32
Salt.....	10.01		10.66	
Portland cement.....	9.41			1.81

Gold.—For the first time in nine years the gold output shows an increase over the previous year. The Yukon output in 1908 is estimated at about \$3,600,000 as compared with \$3,150,000 in 1907. While a considerably increased production is also shown in the Province of British Columbia, derived chiefly from the Trail Creek ores, the placer workings having shown a smaller output.

In Nova Scotia the output in 1907 was \$282,686. Complete returns are not yet available for 1908, but the output was probably not over \$225,000.

Of the total gold output in 1908, over 44 per cent. was obtained from placer and hydraulic workings and 56 per cent. from sulphuret and quartz ores.

Silver.—The estimated silver production of Canada in 1907 was 22,070,212 ounces, shipped as fine bars, silver bullion, and obtained in matte, ore, etc., as compared with 12,779,799 ounces produced in 1907, an increase of over 72 per cent. Owing, however, to the much lower price received in 1908, the total value shows an increase of only 40 per cent. Over 87 per cent. of the output was obtained from Ontario, and the increase is all to be credited to this province, since there was a slight falling off in the silver output of British Columbia.

The price of refined silver varied between a maximum of 57 cents on the 8th January and a minimum of 47 5-8 cents on the 2nd of December, the average monthly price being 52.864 cents per ounce, as compared with 65.327 cents in 1907.

The output from the Cobalt district in the Province of Ontario again shows a very large increase over the previous year, nearly twice as much silver having been produced. Returns from 29 shipping mines show the ore and concentrates shipped as approximately 25,497 tons, containing 19,296,430 ounces of silver, as compared with 14,644 tons containing 9,982,363 ounces in 1907. Valued at the average price of refined silver for the year, the production in 1908 would be worth \$10,200,865, and it represents an average return of 756 ounces of silver or \$400 per ton of ore shipped, as compared with an average return of 681 ounces silver or \$445 per ton of ore shipped in 1907.

If the output of this district continues to increase at the present rate, Canada will in the immediate future become one of the chief silver producing countries of the world. The total silver production of the world in 1907 was approximately 193 million ounces, the chief contributing countries being, Mexico 65 million ounces, United States 59 million ounces, Australia 17 million ounces, Canada nearly 13 million ounces, Germany 12 million ounces. With an output of 22 million ounces in 1908 Canada probably moves up to third place, but

still does not produce more than from 10 to 12 per cent. of the world's output.

Copper.—Statistics of copper production in 1908 show a total output of 64,361,636 lbs., an increase of over 14 per cent. over the production of 1907. There was an increase of over 900,000 lbs. in the copper from the Sudbury mines, while preliminary statistics of production in British Columbia appear to show a very important increase in production in that province of over 7,000,000 lbs.

The New York price of electrolytic copper varied but slightly during the year, the lowest being 12 cents in February and the highest 14 1/4 cents in December, the average for the year being 13.208.

The total exports of copper in ore, matte and blister being, according to Customs Department returns, 25,568 tons.

Lead.—All of the lead production shown in the general table, viz., 45,725,886 pounds valued at \$1,920,487, was obtained in the Province of British Columbia. The production in 1907 was 47,738,703 pounds, valued at \$2,542,086, a decrease in quantity being therefore shown of about 4 per cent.

The total amount paid as bounty on lead production was, during the twelve months, \$139,064.57.

The exports of lead in ore, etc., during the year were 2,256 tons, and of pig lead 6,971 tons, or a total of 9,227 tons.

The price of lead in New York during the year varied between 3.60 and 4.60 cents, averaging about 4.2 cents per pound.

Nickel.—With the exception of the nickel contained in the ores shipped from the Cobalt district, the production of nickel in Canada is derived entirely from the well-known nickel-copper deposits of the Sudbury district. Previous to 1906 the output had been increasing steadily for a number of years. During the past three years however, the production has not varied very greatly. About 815 tons less matte was shipped in 1908 than in 1907. The nickel contents were also somewhat lower in 1908, averaging about 45.1 per cent. as compared with 48.1 per cent. in 1907. On the other hand the copper contents were higher in 1908.

Two companies are carrying on active operations, the Mond Nickel Co., at Victoria Mines, and the Canadian Copper Co., at Copper Cliff. The ore is first roasted and then smelted to a Bessemer matte containing from 77 to 80 per cent. of the combined metals, copper and nickel, which is shipped to the United States and Great Britain for refining.

The price of refined nickel in New York was quoted during the first nine months at from 45 to 50 cents per pound, and during the balance of the year from 40 to 45 cents according to size and terms of order.

The above figures do not include the nickel contents of the silver-cobalt ores from the Cobalt district, of which it is difficult to obtain satisfactory returns. The shippers of silver-cobalt ores receive little or no return for the nickel contents, although this metal forms an important constituent of the ore.

Iron Ore.—The total shipments of iron ore from mines in Canada in 1908 were 203,490 short tons, valued at the mine at \$486,857, as compared with 312,496 tons valued at \$666,941 in 1907. The greater part of this production was from the Helen mine, Michipicoten, delivered to Midland and Hamilton. During 1908 very little Canadian ore was exported.

Pig Iron.—The total production of pig iron in Canada in 1908 from both Canadian and imported ores,

The following were the aggregate results of the operations on the nickel-copper deposits in Ontario in 1906, 1907 and 1908:—

	1906.	1907.	1908.
	Tons of 2,000 lbs.	Tons of 2,000 lbs.	Tons of 2,000 lbs.
Ore mined.....	343,814	351,916	409,551
Ore smelted.....	340,059	359,076	360,180
Bessemer matte produced.....	20,364	22,041	21,197
" " shipped.....	20,310	22,025	21,210
Copper contents of matte shipped.....	5,265	6,996	7,503
Nickel " ".....	10,745	10,595	9,572
Spot value of matte shipped.....	\$4,628,011	\$3,289,382	\$2,930,989
Wages paid.....	1,117,420	1,278,694	1,286,265
Men employed.....	1,417	1,660	1,690

According to Customs returns exports of nickel in matte, etc., were for twelve months ending December 31, as follows:—

	1906	1907	1908.
	Pounds.	Pounds.	Pounds.
To Great Britain.....	2,716,892	2,518,338	2,554,486
To United States.....	17,936,953	16,857,997	16,865,407
	20,653,845	19,376,335	19,419,893

according to direct returns from nine plants comprising 16 furnaces, was 630,835 short tons, valued at \$8,111,194, as compared with 651,962 tons, valued at \$9,125,226 in 1907. These figures do not include the output from the two electric furnace plants, making ferro-products, which are situated at Welland, Ontario, and Buckingham, Quebec. Of the total output of pig iron during 1908, 6,709 tons, valued at \$171,383, were made with charcoal as fuel, and 624,126 tons, valued at \$7,939,811, with coke.

The amount of Canadian ore, including mill cinder, etc., used was 219,266 tons, while the quantity of imported ore was 1,051,445 tons. The total amount of charcoal used was 1,121,990 bushels, valued at \$85,738. The quantity of limestone flux charged was 483,065 tons.

The plant of the Atikokan Iron Co., Ltd., was out of commission throughout the year, while a number of others were operated for a part of the year only. The blast furnace at Londonderry was in blast for little over a month, and the furnace of the Deseronto Iron Co., Ltd., for about two months.

Iron and Steel Bounties.—Following is a statement of bounties paid on iron and steel during the calendar year, as kindly furnished by the Trade and Commerce Department:—

	1907.		1908.	
	Quantity on which Bounty was paid.	Bounty.	Quantity on which Bounty was paid.	Bounty.
	Tons.	\$ c.	Tons.	\$ c.
Pig iron made from Canadian ore.....	95,914.97	201,421.47	101,647	213,458.34
Pig iron, made from imported ore.....	537,903.45	591,683.80	517,427	569,166.93
Total, pig iron.....	633,718.42	793,005.27	619,074	782,625.27
Steel ingots.....	666,589.87	1,099,873.37	556,289	917,876.63
Steel wire rods.....	68,738.22	412,417.26	49,630	297,778.68
Total bounty paid on iron and steel.....		2,305,296.90		1,998,283.58

Steel.—The returns for the year from eight companies making steel showed a total output of ingots and castings of 588,763 short tons, valued at \$9,233,602, as compared with 706,982 tons, valued at \$15,612,590, from seven companies in 1907.

Asbestos.—Returns of shipments of asbestos from the Eastern Townships, Province of Quebec, were received from twelve operating companies who employed 2,643 men in mine and mills and paid in wages \$1,002,768. Several other companies were engaged in development work and preparing to make shipments during the coming year.

The total shipments divided into crude and mill stock were in 1907 and 1908 as follows:—

	1907.		1908.	
	Tons.	Value.	Tons.	Value.
Crude.....		\$		\$
Mill stock.....	4,327	830,633	3,346	692,232
Total asbestos.....	57,803	1,654,135	62,188	2,805,275
Asbestic and asbestic sand.....	62,130	2,484,768	65,533	2,547,507
Total products.....	28,296	20,275	25,239	25,829
	90,426	2,505,043	90,772	2,573,336

Exports of asbestos, according to Customs returns, were:

	Tons.	Value.
Twelve months ending December, 1906.....	59,464	1,689,257
" " " " 1907.....	66,763	1,669,299
" " " " 1908.....	61,210	1,842,763

Coal and Coke.—Each of the coal mining provinces, except British Columbia, contributed an increased out-

put to the coal production in Canada in 1908. The total sales and shipments of coal, including colliery consumption and coal used in making coke, were 10,904,466 short tons, an increase of about 5 per cent. as compared with 1907. Of the total, Nova Scotia contributed over 59 per cent., Saskatchewan and Alberta over 19 per cent., and British Columbia 21 per cent.

The production by provinces was approximately as follows, the figures, of course, being still subject to correction:—

Province.	1907.		1908.	
	Tons of 2,000 lb.	Value.	Tons of 2,000 lb.	Value.
Nova Scotia.....	6,354,133	12,764,999	6,539,866	13,138,124
New Brunswick.....	34,584	77,814	60,000	135,000
Saskatchewan.....	151,232	252,437	130,000	214,500
Alberta.....	1,591,579	3,836,286	1,845,000	4,899,611
British Columbia.....	2,364,898	7,390,306	2,329,600	7,280,000
Yukon.....	15,000	60,000	*	*
Total.....	10,511,426	24,381,842	10,904,466	25,567,235

*No production reported.

The total production of oven coke in 1908 was approximately 865,257 short tons, valued at \$3,668,974, being an increase of about 3 per cent. over the quantity produced in 1907. The coke was made in the provinces of Nova Scotia, Alberta and British Columbia, and entirely from Canadian coal. At the end of the year there were in Nova Scotia about 659 ovens in operation and 173 idle, and in Alberta and British Columbia on the same date 916 in operation and 528 idle, not including the ovens at Hosmer and Comox in British Columbia, from which no returns have yet been received.

Petroleum and Natural Gas.—The production of crude petroleum is as usual practically all derived from the Ontario peninsula. Direct returns from the producers have not been obtained, but the production has been estimated on the basis of the bounty of 1½ cents per gallon paid by the Dominion Government. The total bounty paid in 1908 was \$277,193.21, representing a production of 527,987 barrels, compared with a bounty of \$414,157.89 paid in 1907, representing a production of 788,872 barrels. A decreased production of 33 per cent. is, therefore, shown.

Natural gas was produced in the counties of Welland, Halidimand, Norfolk, Kent, Essex and Bruce, in Ontario, and at Medicine Hat, Alberta; the sales from the Ontario fields constituting over 95 per cent. of the total.

The total receipts from gas sold in 1908 show an increase of about 24 per cent. over the receipts of 1907, and are now larger than at any time since the gas was first used.

Portland Cement.—Complete statistics of cement production in 1908 have been received from twenty-three operating plants.

The total quantity of cement made was 3,495,961 barrels, as compared with a total of 2,491,513 barrels made in 1907, showing an increase of 1,004,448 barrels, or over 40 per cent.

The total sales were 2,665,289 barrels, as compared with 2,436,093 barrels in 1907, an increase of 229,196 barrels, or over 7 per cent. The total daily capacity of the 23 plants was about 27,500 barrels, as compared

with an operating capacity of 14,300 barrels in 1907. The operating plants were distributed as follows: One each in Nova Scotia, British Columbia and Manitoba, the latter manufacturing a natural Portland, two in Alberta, three in Quebec Province and 15 in Ontario.

Of the 23 operating plants, 12 use marl and clay, ten use limestone and clay, and one blast furnace slag.

The average price per barrel at the works in 1908 was \$1.39, as compared with \$1.55 in 1907.

The imports of Portland cement into Canada during

the 12 months ending November, 1908, were 1,600,934 cwt., valued at \$530,209.

This is equivalent to 457,408 barrels of 350 pounds at an average price per barrel of \$1.16. The imports in 1907 were equivalent to 672,630 barrels, valued at \$837,520, or an average price per barrel of \$1.24½. The duty is 12½ cents per 100 pounds.

There is very little cement exported from Canada; the consumption is, therefore, practically represented by the Canadian sales together with the imports.

MINERAL OUTPUT OF QUEBEC FOR 1908.

(Subject to slight correction.)

Minerals (tons of 2,000 lbs.)	Quantities shipped or used.	Gross Value.
Bog iron ore.....	11,628	\$30,957 00
Calcined ochre.....	1,346	15,440 00
Raw ochre.....	1,500	4,500 00
Chrome iron.....	7,564	83,740 00
Copper ore.....	26,598	159,588 00
Asbestos.....	65,156	2,551,596 00
Asbestic.....	24,011	34,666 00
Mica, trimmed.....	106	95,311 00
Phosphate of lime.....	175	1,610 00
Prepared graphite....lbs.	2,640	165 00
Magnesite.....	65	520 00
Slates.....squares	4,336	20,056 00
Flag stones.....sq.yds.	4,000	3,600 00
Cement.....bbls.	801,695	1,127,335 00
Granite.....cu.yds.	30,000	250,000 00
Lime.....bush.	556,000	960,000 00
Bricks.....	94,000,000	5,250,000 0
Tiles and pottery.....	270,000 00
Limestone.....cu.yds.	97,710	223,580 00
		\$5,493,664 00

6,324 men employed in the mining industry of the Province of Quebec, receiving \$2,094,357 in wages.

EXPORTS of the Products of the Mine, Year 1908.

(Compiled from Trade and Navigation Monthly Statements.)

Products.	Quantity.	Value.
		\$
Arsenic..... Lbs.	1,913,732	43,493
Asbestos..... Tons.	61,210	1,842,763
Barytes..... Cwt.	3,509	13,690
Chromite..... Tons.	4,571	56,864
Coal..... "	1,729,833	4661,377
Feldspar..... "	9,524	34,045
Gold.....		7,740,918
Gypsum..... Tons.	280,091	324,574
Copper, fine in ore, &c..... Lbs.	51,136,371	5,934,559
Lead, in ore, &c..... "	4,511,931	153,394
" pig, &c..... "	13,942,663	469,060
Nickel, in ore, &c..... "	19,419,893	1,866,624
Silver, in ore, &c..... Ozs.	20,884,451	12,403,482
Platinum, in ore concentrates, &c..... "	43	937
Mica..... Lbs.	580,195	198,839
Mineral Pigments..... "	249,635	4,850
Mineral Water..... Galls.	8,953	3,659
Oil, refined..... "	25	296
Ores—		
Antimony..... Tons.	149	5,647
Iron..... "	4,334	72,260
Other ores..... "	13,910	509,779
Phosphate..... "	1	30
Plumbago..... Cwt.	7,706	10,159
Pyrites..... Tons.	17,283	96,600
Salt..... Lbs.	527,229	3,840
Sand and gravel..... Tons.	298,954	161,387
Slate..... "	10,709	2,538
Stone, ornamental..... "	1,314	28,777
" building..... "	4,009	14,034
" for manufacture of grindstones..... "	661	5,991
Other products of the mine.....		176,007
Manufactures—		
Bricks..... M.	2,334	9,047
Aluminum, in bars, &c..... Cwt.	194,546	399,785
" manufactured.....		1,727
Cement.....		34,591
Clay, manufactures of.....		92
Coke..... Tons.	58,708	248,759
Grindstones, manufactured.....		13,730
Gypsum, ground.....		9,765
Iron and steel—		
Stoves..... No.	651	8,258
Castings, N. E. S..... Tons.	290	28,062
Pig iron..... Tons.	290	10,614
Machinery (linotype machines).....		126,590
" N. E. S.....		285,257
Sewing machines..... No.	9,697	109,002
Typewriters..... "	3,720	169,939
Scrap iron and steel..... Cwt.	92,566	73,807
Hardware (tools, &c.).....		57,631
" N. E. S.....		59,304
Steel and manufactures of.....		1,169,673
Lime.....		43,316
Metals, N. O. P.....		65,360
Plumbago, manufactures of.....		876
Stone, ornamental.....		13,748
" building.....		1,446

The production of chrome has been as follows:—

	Gross tons.	Value.
Second-class, in lumps.....	3,754	\$38,740
Concentrated.....	3,000	45,000
	6,754	\$83,740

The production of asbestos was as follows (2,000 lb. tons):—

First-class crude.....	900	\$261,216
Second-class crude.....	2,771	438,305
Fibre.....	13,911	716,811
Paper stock.....	47,574	1,135,264
	65,156	\$2,551,596
Asbestic.....	24,011	34,666

Pig Iron.—There was 5,989 gross tons of charcoal pig iron valued at \$171,286 manufactured during the year.

The above figures show the value of the product at mine or at nearest shipping point.

PROPOSED B. C. MINING LEGISLATION.

On February 18th the Hon. Richard McBride, before the B. C. Legislature, introduced a bill to amend the Coal Mines Regulation Act. The bill has to do with coal miners' certificates of competency. It provides that these certificates shall be granted by a board of three. Each board shall consist of one member appointed by the Lieutenant-Governor in Council; one member, with two alternates, appointed by the manager or managers of the colliery; and one coal miner,

with two alternates, actually working in the colliery and possessed of certificates of competency as such. The last member of the board shall be elected by the coal miners working in the colliery. The board will hold office for one year. Boards are to be appointed for each colliery which the Lieutenant-Governor in Council may designate.

Two other bills were introduced by Mr. McBride, one to amend the Companies Act, to the effect that free miners' licenses may be issued to companies; and another to amend the Placer Mining Act, to give the Gold Commissioner power to extend the limits of a claim of bench or dry diggings beyond the limits of the bench or dry diggings, but not to extend 250 square feet.

MINERAL PRODUCTION OF ONTARIO IN 1908.

Product.	Quantity.	Value.
Metallic—		
Gold ounces	3,465	\$60,337 00
Silver " 19,424,781		9,125,903 00
Cobalt tons	1,224	110,166 00
Nickel " 10,175		1,866,059 00
Copper " 7,561		1,071,140 00
Iron ore " 199,395		537,379 00
Pig iron " 271,656		4,390,839 00
		<hr/>
		\$17,161,823 00
Less value Ontario iron (170,215 tons) ore smelted into pig iron...		456,176 00
		<hr/>
Net metallic production		\$16,705,647 00
Non-metallic—		
Arsenic, refined . . . tons	702	\$40,373 00
Arsenic, crude " 2,970		
Brick, tile and other clay products		2,600,000 00
Calcium carbide . . . tons	2,364	147,150 00
Cement, Portland . . bbls.	2,022,877	2,417,769 00
Corundum tons	141	14,977 00
Feldspar " 7,875		20,300 00
Graphite, refined . . " 10		1,600 00
Gypsum " 10,389		20,778 00
Iron pyrites " 20,970		69,980 00
Lime bush.	1,850,000	357,050 00
Mica tons	368	73,586 00
Natural gas "		969,160 00
Peat fuel tons	200	900 00
Phosphate of lime . . " 881		7,048 00
Petroleum . . . Imp. gals.	18,479,547	703,773 00
Pottery		50,310 00
Quartz tons	44,741	52,830 00
Salt " 79,112		488,330 00
Stone		475,000 00
Talc tons	1,016	3,048 00
		<hr/>
		\$8,513,962 00
Add metallic		16,705,647 00
		<hr/>
Total production		\$25,219,609 00

The figures given are subject to revision. Values are computed at the selling prices at the mines or works, and in the form in which the substances are produced.

As compared with 1907, there has been a considerable increase in the output of metalliferous mines and

works, and a shrinkage in the non-metallic production, the aggregate for 1908 being about \$200,000 in excess of that for the preceding year.

The falling off in the non-metallic list is mainly in crude petroleum and building materials. The new oil field in Kent County showed a greater proportionate diminution in yield than the older fields in Lambton County. The output of natural gas was materially greater than in 1907.

The silver mines of Cobalt yielded 9,000,000 ounces more than in 1907, but owing to the fall in the price of silver the value was not correspondingly greater. Shipments from the silver mines amounted to 24,485 tons. A little less than a third of the total tonnage was treated in Canadian reduction works, most of the remainder going to the United States, and a small amount to Europe. The ore treated at home was largely high-grade, the lower qualities being sent mainly to smelters in the United States, where they have been found suitable for mixture with other ores.

The nickel and copper output for 1908 was about the same as in 1907, but the valuation is lower.

PRELIMINARY NOTE.

In a forthcoming issue of the Canadian Mining Journal, Mr. J. W. Evans' work in electrometallurgy will be described. This brief note is published now as a foreward.

In April, 1904, Mr. J. W. Evans undertook to apply electric smelting to the titaniferous and sulphurous iron ores of Hastings County. In August of that year he obtained the first steel directly from iron ores in Canada, and shewed a sample to Dr. W. G. Miller in Toronto, who advised continuing the experiments on a larger scale.

Accordingly, during the next winter Mr. Evans built a 2,000 kw. alternating current generator and exciter, the power supplied to run them being furnished by a 5 h.p. gasoline engine.

From September, 1905, to January, 1906, several pounds of high-grade titanium steel was smelted directly from the titaniferous iron ores, and about the same quantity of mild steel from the sulphurous iron ores of Hastings County. These experiments were described in a paper read before the Quebec meeting of the Canadian Institute in 1906.

Mr. Evans has a larger furnace now under construction, capable of smelting 25 lbs. of steel at a charge, and he expects to have it running before the middle of April.

Mr. Evans has also obtained a high grade of steel from iron sands in this furnace. No briquetting is required, as the sand is fed to the furnace in the fine state, and there is no blast to interfere with the feed. There are large deposits of ferrous sands in Ontario and Quebec, the cost of concentrating which is far below the cost of mining and grinding ore.

Titanium steel is being used more extensively every day, and it is only a question of time till the titaniferous ores of Ontario and Quebec will be used for steel-making.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

By F. W. Gray.

(Continued from issue of Jan. 1, 1909.)

THE EMERY SEAM AND LOWER SEAMS OF THE GLACE BAY BASIN.

Chapter V.

The Emery Seam is found below the Phalen at depths varying from 160 to 180 feet. It averages from 4 feet 6 inches to 5 feet in thickness, but it has been found as thin as 1 foot 6 inches, and it is stated, although the fact cannot be given as a certainty, that the seam thickened out to 11 feet near Schooner Pond. Generally speaking, it is more irregular both in thickness and in depth than is usual in the seams of this Basin. The coal is harder than that of the thicker seams which overlie it, and will stand handling better. The analysis shows a high percentage of fixed carbon and although the ash contents are higher than the Phalen coal, it makes an excellent house or steam coal. The heating value approaches 14,000 B.T.U.'s. Twenty-five years ago the coal bore an excellent reputation as a steam coal, for which purpose, judging from the analysis, it seems to be specially adapted.

The measures immediately above the Emery are extremely rich in fossil remains. Some of the best fossils that have been found in the Sydney Coal Field have been taken from the roof of this seam, and whenever a shaft has been sunk to it the presence of characteristic fossils has told the seekers that Emery Seam was not far below.

The seam was first worked at the Acadia Colliery, Schooner Pond, about midway between Big Glace Bay and Cow Bay. The principal in this Company was Mr. Ross, who opened up a level from the shore in 1863. For some time the seam was known as the Ross Seam, but it afterwards came to be referred to as the Emery Seam, and it is stated to have been so named after Dr. Emery, of Boston, a director of the old Glace Bay Mining Company. As before stated, the seam was thicker at Schooner Pond than it has been found to be elsewhere. The property was afterwards acquired by the Glasgow & Cape Breton Coal & Railway Company, who built a narrow gauge railway from Schooner Pond to Sydney Harbour. Later the mine was taken over by the Sydney & Louisburg Coal & Railway Company, and passed from them into the hands of the present owners. Very little coal has been taken out of the seam at this point. From 1866 to 1872 the mine did not work; from 1872 to 1879 it was worked intermittently, and was closed in the last-named year, and has not since been re-opened.

The seam was also opened at Reserve Mines in 1873 by the Cape Breton Coal & Railway Company, who drove slopes from the outcrop. Between 1873 and 1875 the mine produced about 56,000 tons before it was closed down. When the property came into the hands of the Sydney & Louisburg Coal & Railway Company they drove a steeply dipping cross-measure drift out of the Main Slope in the Phalen Seam, cutting the Emery Seam at the extreme dip of their areas and worked the coal to the rise. In 1885 they sank a stapple pit from the Phalen to the Emery workings for purposes of ventilation. Working was once again

discontinued, and again recommenced in 1891. When the Dominion Coal Company took over the property in 1893 their policy was to work the thicker and more profitable seams, and along with several others the Emery Mine was closed.

In 1899 the Dominion Coal Co. sank slopes from the outcrop of the Emery Seam near the bankhead of the present No. 3 Colliery. The slopes were driven down for 1,600 feet, and were abandoned in 1901. They are now full of water. These workings were known as No. 4, a name which still survives in the nomenclature of the post office, to the bewilderment of passengers on the tram line, who are generally directed to alight at "No. 4" if they wish to go to "No. 3."

In 1905 the Company once more decided to operate the Emery Seam, and they pumped out the old workings at Reserve. The coal was first taken out by way of the old stone drift and disused main slope of the Phalen Seam on to the old bankhead, which was afterwards burnt down. The stapple pit before referred to was used to lower men in order to avoid the necessity of their travelling the steep drift. In 1906 a shaft 169 feet deep was sunk to the Emery Seam close by the old bankhead; a connection was made with the workings below the drift by headings driven from both ends, which met successfully. Coal was first hoisted from the new shaft in July, 1907. The output from this seam was 47,518 tons in 1906, 100,617 tons in 1907 and 163,000 tons in 1908. At the present time the mine (known as Dominion No. 10) produces 800 tons per day. In the beginning of the 1909 season it is anticipated that No. 10 will have an aggregate in the various levels of 5,000 feet of longwall face, and will reach the maximum output that it is expected to produce, namely, about 1,000 tons per day.

The surface equipment of the colliery is small, as it is served by the same power plant as No. 5, the coal being dealt with on a common bankhead which was previously referred to in the description of No. 5 Colliery (Reserve).

The coal hoist is a double, slide-valve, horizontal engine, cylinders 20 inches by 42 inches, made by the Jenckes Company. The hoisting rope is 1¼ inches in diameter passing over 12 ft. pulleys. The headframe is similar to that described at Dominion No. 7. The cages are 15 ft. 10 in. long by 7 ft. 9 in. high, and take two cars at a trip. The cars are pushed in and out of the cage in the same manner that was described in the reference to International Colliery. The shaft is rectangular, timbered with buntons 8 inches square, spaced every 4 feet and lagged behind with 3-inch scantlings.

The underground haulage is endless rope, operated by clutch gearing from the same engine that drives the French Slope rope in the Phalen Seam. The rope used is 1 inch in diameter and 6,000 feet in length. The mine cars are of special design for the low seam. They are 6 feet 4 inches in length, 2 feet 8 inches from the rail to the top of the box and 3 feet 6 inches wide. They weigh, empty, about 580 lbs.

The coal is undercut by rotary-disc coal-cutters

worked by compressed air. The mine is equipped with nine of these machines of the "Diamond" type, one of the special features of which is that it dispenses with rails and jigs itself along the pavement on a steel sled. Two of the machines cut 4 feet 6 inches under; the others have a larger wheel, and make a 5 feet 6 inches undercut. The coal is blasted down, the explosive used being "Rippite." Puncher machines are used in the development work.

At the present time the gate roads are spaced 40 feet apart, but the management are endeavoring to get them 80 feet apart, and more if possible. The horses are now taken up the gates to the face, but as the workings advance it will not be possible to continue this. The pitch of the seam is not at present steep enough to admit of gravity planes being successfully worked, but it will be necessary as the workings advance to devise some method of mechanical haulage in the main gates. At the present time the Company are considering the purchase of longwall face-conveyor belts, which will take the coal along the face and deliver it at the head of the main gates, thus avoiding the necessity of taking the mine cars into the face and saving a certain amount of breakage. Machinery of this type is being successfully worked at the present time in Europe.

The workings are ventilated by a Stines fan 8 feet in diameter. A small air-shaft 30 feet deep was sunk from the surface in 1908 on to the main slope of the Phalen Seam, and the air for the Emery workings goes down the stapple pit before mentioned. The pit bottom and the main approaches of the mine are lit by electric incandescent lamps, and safety lamps only are used in the workings.

The development of No. 10 to its present condition has been a slow and difficult process, owing to the method of extraction adopted. The native miners, and their fathers before them, have all been accustomed to working in high and dry seams, and to the "pillar and room" system of extraction, with its accompanying classification of labor, and they prefer to work in these seams so long as it is possible. The Coal Company have been compelled to import miners used to the longwall method from European mining countries, where this mode of extraction is general. A large proportion of the miners in the Emery are from Belgium, and there are quite a few workmen from Middle Europe. Conversation therefore in the workings is occasionally a little mixed.

The Lower Seams.—The thickness and characteristics of the Emery Seam adapt it for extraction by the longwall method, which is a comparative novelty in Cape Breton. This mode of extraction has been tried on a limited scale at the Gardiner, the Gowrie, the Victoria Mines and, of course, in the Emery itself. What is true of the Emery seam is also true of all the lower seams in the Glace Bay Basin. In the longwall extraction of coal the seam is taken out in one operation by successive slices along an extended portion of the seam. The haulage-roads, air-roads and general means of communication through the waste or goaf, that is, through the territory where the coal has been extracted is maintained by building pack-walls to support the roof. These packs are constructed in the same manner as the dry stone walling which one sometimes sees on the surface. The thick seams of the Glace Bay Basin, which up to the present time have been worked to the practical exclusion of the thinner seams, have all been extracted on the "short-wall," or what is better known

as the "pillar and room" system. In this mode of extraction a square of coal is extracted, and a square is left to support the roof. The plan of the workings of such a mine resembles therefore a checker-board, the alternate squares representing solid coal and goaf.

A seam such as the Phalen or the Hub, which consists of from 7 feet to 9 feet of clear coal without any dirt bands, cannot be worked by the long-wall system, as the seam contains no waste material that can be utilized to pack the roads and the goaf. In the thinner seams the roof has to be taken down in the roads to make height for the men and the horses; a process that has to be repeated from time to time as the superincumbent strata presses down to fill up the vacant space left by the extraction of the coal seam. This roof stone and the stone that is taken down in the faces will provide sufficient material for packing the goaf and maintaining the gate roads. As previously mentioned, it is probable that the Emery and all the seams below it will be mined altogether on the longwall system of coal extraction.

Below the Emery Seam are to be found the Lorway Seam, Clarke Seam, Martin Seam, and the Mullins Seam. None of these have been worked to any great extent, and the most valuable portion of all of them is included within the areas of the Dominion Coal Company. In looking over a map of the leases of coal areas in the Glace Bay Basin, one cannot help but be struck by the wisdom with which the areas of the Dominion Coal Co. are chosen, as they include the most valuable portions of all the coal seams; and it is no exaggeration to state that the seams not included within the leases of the Dominion Coal Company are seams which cannot be worked with profit in the present state of the coal trade, or in competition with the Coal Company.

Referring to the section of the coal measures which is given in the description of No. 2 Colliery, it was pointed out that from the Hub to the Lorway Seam, the measures hold nearly 40 feet of coal in a total depth of a little over 1,300 feet. The lowest of the workable seams is the Mullins Seam, and, judging from the data of the Geological Survey, it will be found about 1,400 feet below the Gardiner Seam, or at a total depth from the surface at No. 2 of from 2,700 to 3,000 feet; so that in the land area of the Glace Bay Basin the Coal Company have all the seams within workable limits of depth. However, until the thicker and more profitable seams which the Company own in the land and submarine areas of the Glace Bay Basin, and in their magnificent property in the Lingan-Victoria areas (which will be later referred to in detail) approach exhaustion, it is not probable that anything below the Lorway Seam will be worked. As the collieries on the Phalen Seam, such as Reserve, Caledonia, and in fact all the older collieries, become depleted, the present plant will doubtless be used for mining the Emery and the Gardiner (or Lorway), and the life of these collieries may be considered for the purposes of the present generation as indefinitely prolonged.

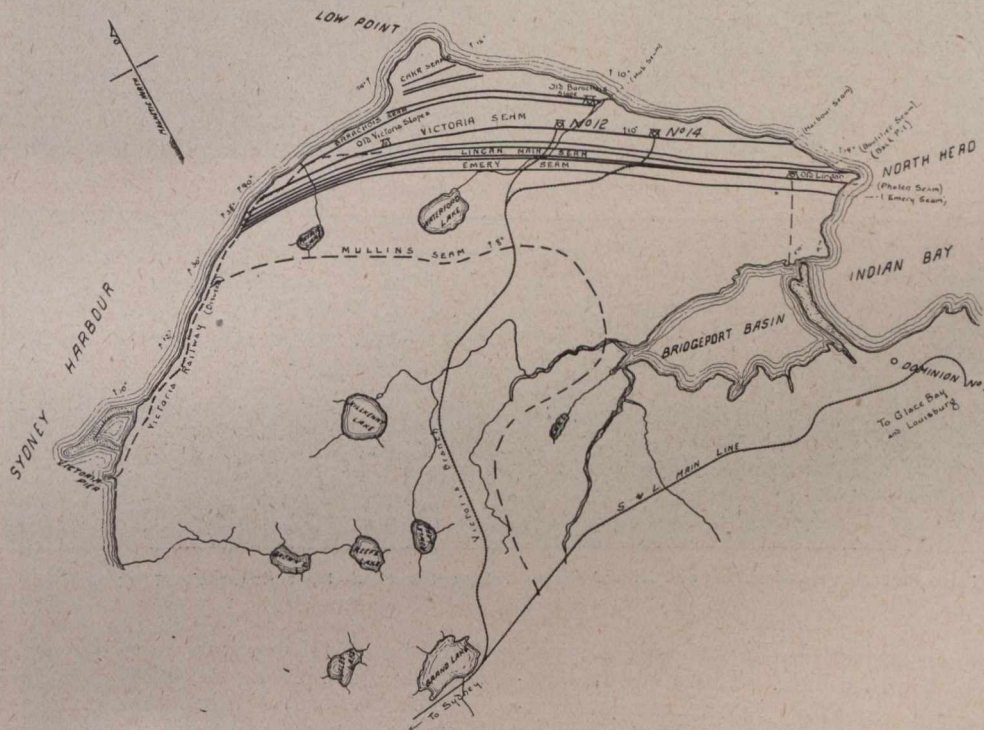
We may expect in Cape Breton as time goes on the same appreciation in the value of coal fields as has taken place in older countries. In England, for example, the thicker seams, such as the Barnsley Bed in South Yorkshire, and the Thick Coal in South Staffordshire, are rapidly being worked out, and seams are now being mined which were at one time entirely neglected. By the use of coal-cutting machines, electric power transmission, longwall face-conveyors and the general improvements in mining practice afforded by modern

equipment, it has been found possible to successfully and profitably mine coal-seams that do not exceed 16 inches in thickness. When it is considered, therefore, that there are in the Glace Bay Basin not less than six seams of coal practically untouched, which are each over three feet in thickness, and that in addition to this the Coal Company's submarine leases in the Glace Bay Basin, the Lingan-Victoria tract and near Point Aconi, in the Sydney Mines Basin, are as yet almost virgin, it will be seen that there is not yet any need for anxiety as to the coal resources.

The amount of information that is available with reference to the lower seams is extremely meagre, and very little more is known about them at the present time than is contained in the transactions of the Mining Societies and the writings of Mr. Richard Brown, which are dated in the 'seventies. This fact is in itself a commentary on the previous remarks, for with such large resources actually proved and within sight it has not been thought necessary to do much prospecting.

seven workable seams of coal situated inside the productive coal measures. The edge of the Millstone Grit lies one and a quarter miles inland along this line, and proceeding further, the Mullins Seam is met with at a distance of two and a quarter miles from Low Point.

Following the seams along the coast from the Bridgeport Anticline, they are found to dip at an average angle of 10 degrees until the Barachois Pond is passed. On the eastern side of Low Point the dip is 15 degrees, and increases through a distance of three-quarters of a mile to 24 degrees on the western side. The rapid increase in the dip continues until at the point where the Victoria Seam passes under Sydney Harbour, two and a quarter miles distant from Low Point, the seams are inclined at a maximum angle of 40 degrees. At the shore-crop of the Mullins the dip has decreased to 30 degrees, and at South Bar, one and a half miles further up the Harbour, the inclination is once more 10 degrees.



Chapter VI.

LINGAN-VICTORIA AREAS.

This portion of the Sydney coal field has been less worked than any of the other basins, and its seams are to-day practically intact. The whole of the coal seams in the territory shown on the accompanying sketch map are under lease to the Dominion Coal Company, as the direct successors of the General Mining Association, and they constitute a magnificent asset.

The western boundary of the field is a disturbance of unknown extent under the waters of Sydney Harbor. The eastern limit is the Bridgeport Anticline. From the point at which the crops of the coal-seams disappear under the waters of Indian Bay, or, as it is some times called, Lingan Bay, to where they are visible on the shores of the lower reaches of Sydney Harbor, measures seven miles. About midway in the sweep of the seams is the flat promontory of Low Point. A line drawn inland from this point will cross the outcrops of

The disturbance previously referred to, which undoubtedly exists under the Harbor between the coal seams of Lingan-Victoria and those of the Sydney Mines Basin, is in all probability the continuation of the synclinal fold underlying the northwest arm of Sydney Harbour. The indications afforded by the configuration of the shores of the Harbour from South Bar to Low Point and the rapid increase in the dip of the seams on the Victoria shore compared with the regular dip of the seams at Sydney Mines and the undersea workings of the Nova Scotia Steel & Coal Company on the other side, suggest that the disturbance lies very close to the eastern shore of the harbour, and may be accompanied by faulting.

The relation of the seams in the two foregoing basins has for a good many years been an interesting subject for speculation, and one which presents a good many difficulties. The relation of the Lingan-Victoria seams to those of the Glace Bay Basin does not, however,

present such difficulties, as will be seen from a study of the following sections:—

Lingan-Victoria.			Glace Bay.	
Seam.	Measures.	Total Depth.	Seam.	Measures
Carr Seam ...	3' 0"			
	170' 0"			
McNeil	3' 5"	176'		
	341' 0"			
Barachois	6' 0"	523'	Hub	9' 6"
	55' 0"			
Dunphy	3' 0"	581'		404' 6"
	306' 0"			
Victoria	7' 0"	894'	Harbour ...	5' 6"
	257' 0"			253' 0"
Fairy H.	3' 5"	1,154'	Boutilier ..	3' 9"
	66' 0"			73' 0"
Northern H. .	5' 0"	1,225'	Back Pit...	2' 7"
	113' 0"			115' 0"
Lingan	8' 0"	1,346'	Phalen	8' 6"
	134' 0"			160' 0"
Emery	2' 8"	1,483'	Emery	4' 6"
	(?) 1,000' 0"			
Mullins	6' 0"			

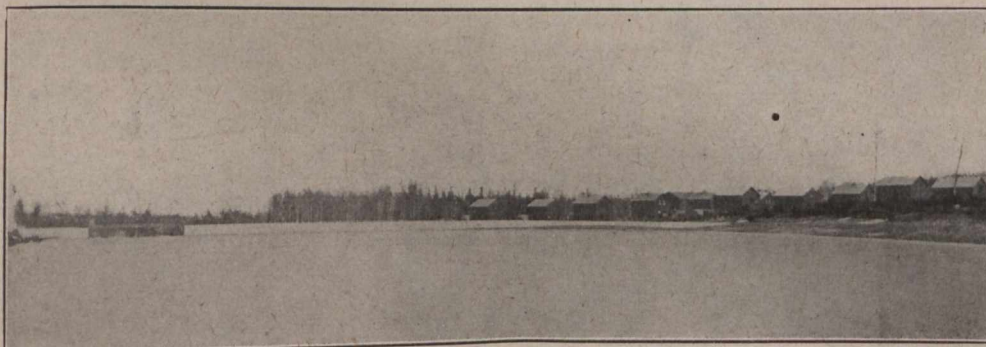
It is usual to give two sections of the Lingan-Victoria seams for the reason that there is a large differ-

of the country between the outcrop of the 2 feet 8 inches seam, or Emery, and the outcrop of the lowest seam of all, namely, the Mullins. If the above correlation of the seams as yet unproved lying between the outcrops of the two seams last mentioned.

The only two seams that have been worked to any extent are the Lingan Main and the Victoria Seams, and the total yield of the whole coalfield as far back as records extend has not exceeded 2,000,000 tons.

The Lingan Main Seam was opened by the General Mining Association in 1855, and a short railway was constructed about a mile in length to a small harbor in Indian Bay. The mine appears to have closed down about 1885.

The Victoria Seam was first operated by the Victoria Company, who opened a mine in 1865 to work submarine coal areas under Sydney Harbour. The slopes were driven on the property of the G.M.A., who owned the land area. At that time the "Victoria" seam was known as the "Ross." From 1878 to 1883 the mine was idle, and was taken over about 1884 by the Lingan and Low Point Coal Company, from whom it passed into the hands of the Dominion Coal Company. They continued to work the seam vigorously until 1897, when the workings were abandoned in accordance with the policy of concentration which was being followed at that time. As successors of the former owners, the



Large Reservoir, showing Dam and Miners' Houses under construction—Reservoir capacity, 7,200,000 gallons.

ence between the measures on the Lingan side compared with those on the Victoria side. There is not, however, any very marked variation in the seams themselves, although in one case, that of the Lingan seam, a small parting thickens out until it separates one seam into two, but there is a general thickening of the measures between the coal seams as they approach the Victoria side. Mr Richard Brown, in commenting on this, writes: "The thickness of the intervening strata in the Low Point is nearly four times greater than in the Lingan section—a phenomenon by no means unusual in almost every coal field where the persistency in the coal seams exceeds that in the sedimentary strata with which they are associated."

The section just given is a representative one, and gives a fair idea of the number of workable seams which are present in this tract. The equivalents of the four best known seams in the Glace Bay Basin, namely, the Hub, Harbour, Phalen and Emery seams, are all present. Altogether there are eight seams at least which are workable, but taking the conservative figure of 20 feet of workable coal in the best seams only, it is estimated that these areas should yield approximately 400,000,000 tons. It should be taken into consideration that as yet practically nothing is known

Dominion Coal Company own the railway right-of-way and the old Victoria shipping pier shown in the sketch.

The General Mining Association also proved the Barachois Seam by driving slopes from the surface near the Barachois Pond, but no coal appears to have been shipped from this point.

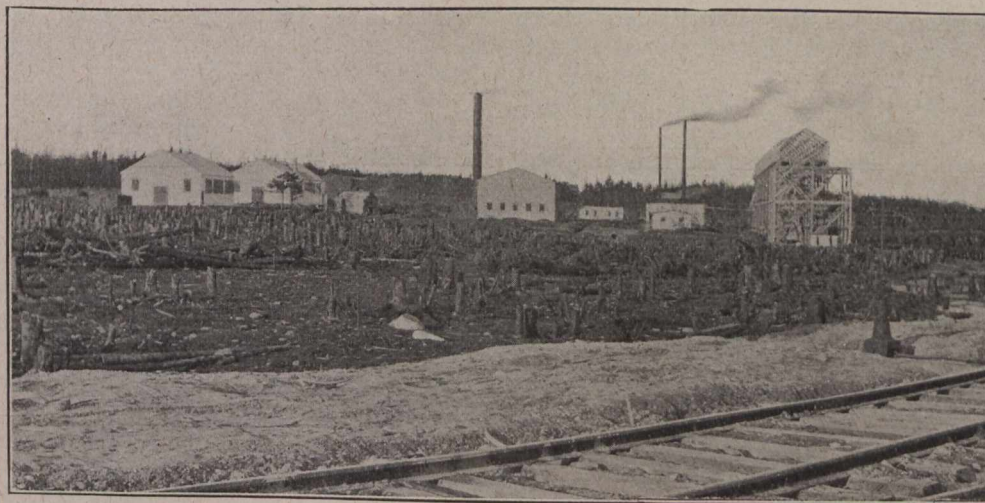
The settled portion of this coalfield consists of a narrow strip of cultivated land skirting the coastline, between the sea and a wooded hinterland. The farmers and fishermen who constitute the population are mostly the direct descendants of the original settlers, and some of them can relate interesting reminiscences of those more primitive days. Irish names predominate, and are well represented in the nomenclature of the seams, as instance such names as Dunphy, Keefe, Carr, McNeil and McGilvray, not to mention the "Phalen" on the other shore. It is supposed that the word "Lingan" is a corruption of the French words "l'Indien," and this assumption is corroborated by the fact that the neighboring arm of the sea is called Indian Bay. The word "Barchois" is a very common one in Cape Breton. It is no doubt of French origin, and is usually given to a small salt-water lagoon almost, but not entirely, separated from the sea by a low sandbar. It has been suggested that the original spelling of the

word was "barre-a-choir," from "barre," a sandbar, and "choir," to fall away, or an opening in the bar. The word is sometimes spelt "Barasois," but doubtless this is a corruption.

In the summer of 1907 the Coal Company decided to open new collieries, and did a large amount of preliminary prospecting work. They finally determined

eral development of Dominion No. 12 as it is was at the end of 1908. The work of construction is now going on and the description is necessarily incomplete, as all the details have not yet been finally worked out.

The site of the colliery is well chosen, and has been cleared out of an almost completely wooded country. It lies near the stream known as Irish Brook, which



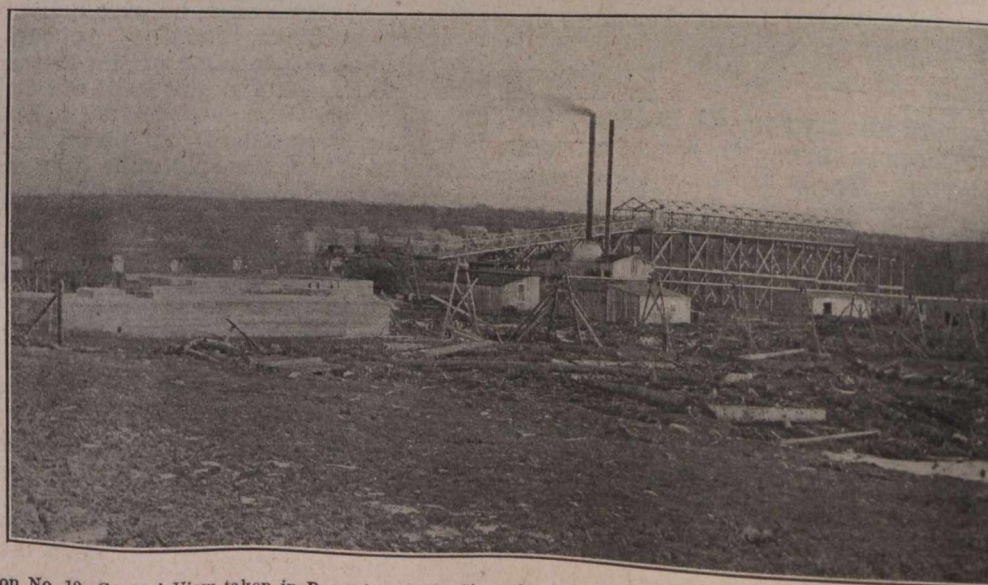
Dominion No. 12—General View of Colliery in December, 1908.

upon opening a slope mine on the Victoria Seam not far from Barachois Pond, and another opening on the same seam about a mile to the eastward. These two collieries are named respectively Dominion No. 12 and No. 14. Another colliery, to be called No. 15, is projected on the Lingan Main Seam, but the site is not as yet definitely decided upon.

Victoria Seam, Dominion No. 12.—This seam is supposed to be the equivalent of the Harbour Seam of the

forms the Barachois Pond at its mouth. Near the colliery this stream runs through a ravine, and by a slight expenditure on an earthen dam an adequate water supply has been obtained, which will supply the demands of this group of collieries for some time to come.

At the end of 1908 the slopes were driven in from the surface for a distance of 1,600 feet, and it is anticipated that by the summer of 1909 sufficient territory



Dominion No. 12—General View taken in December, 1908, Shows bankhead framework, foundations in the forefront and miners' houses in the background.

Glace Bay Basin and of the Main Seam of the Sydney Mines Basin. When it was mined by the old Victoria Company the coal had an excellent reputation, which the present product seems likely to uphold. The coal is low in ash, very free burning and does not clinker.

Following is a description of the plant and gen-

will have been opened out to give a daily output of 500 tons. The equipment of the colliery is designed to deal with from 1,000 to 1,200 tons per day, a capacity which will in all probability be reached by the shipping season of 1910.

The seam as proved at No. 12 and No. 14 is 6 feet 7 inches in thickness, and is pitching at an average rate

of 22 per cent. The pitch was very much steeper at the edge of the crop, but flattens out as it goes farther to the deep both at No. 12 and No. 14 slopes. The workings are laid out to take advantage of the pitch of the seam, and the coal will be worked uphill from the levels by rise "balances" or gravity plane-haulages. The pillar and stall method of extraction will be used; rooms, 20 ft. wide; pillars, 20 ft. by 70 ft., and levels every 450 feet. Mechanical haulage will be used along the levels worked by a small winch at the end of each level. Trip haulage will for the present be used on the main roads. The workings are, however, being laid out with a view to the possible introduction of endless haulage at a later date. The style of pit tub adopted is not so large as is usual in the Glace Bay Mines, owing to the heavier pitch in the Lingan areas. The tub is 5 feet 8 inches long by 3 feet 2 inches wide by 2 feet inside depth, over-all length 6 feet 10 inches, capacity 2,240 lbs., rail gauge 2 feet 6 inches. At the present time the seam is being worked by hand-picks. Mining machines will be put in later, and the type chosen will,

of course, depend largely upon the power system which is adopted.

The form of power that is to be used in the group of collieries now being described is not yet definitely decided upon, but it is very probable that they will be operated by electricity. A proposal is being considered to install exhaust steam turbines at Dominion No. 2 Colliery, and to generate electric power there for transmission to the Lingan collieries, but this proposal is not at the present time sufficiently matured to enable a definite statement to be made.

At the present time there are two 250 h.p. Babcock & Wilcox boilers in a temporary house. The permanent boiler-house is not yet erected, and it is not yet definitely decided how many boilers are to be laid down. When the house is built it will be of brick and steel construction, similar in design to the one at No. 6 Colliery.

A temporary air compressor is being run to work the underground pumps. The permanent compressors are not yet purchased.

(To be continued.)

EXCHANGES.

The Mining World, February 20, 1909.—Arthur Lakes, in an article entitled, "The Many Varied Occurrences of Ore in Veins," writes of the widely diverse manners in which ores of the precious metals occur. "Any cavity, opening, or weak zone in the crust of the earth, formed by whatever agency that is susceptible of being filled or saturated by waters carrying vein and metallic solutions, is capable under proper conditions of depositing ores and becoming an ore body. Obviously the nature and appearance of these openings must be very varied." Mr. Lakes then goes on to discuss the so-called true fissure vein.

The Engineering and Mining Journal, February 27, 1909.—Nevada gold camps have provided world's records in high-grading. Mr. Mark R. Lamb, in this number of the E. & M. J., narrates a few picturesque incidents of ore-stealing in the Goldfield camp. One of these narrates how a miner, seated on the curb in front of a bank, requested the assistance of a passerby. The miner explained that ore, not whiskey, was his load. From the crown of his Stetson to the top of his boots he was laden with specimen ore.

Apparently there was no difficulty in disposing of stolen ore and bullion. The owners of one mill advertised openly to buy bullion. They were known to have bought from their own employees bullion that was stolen from their own mill.

The Iron and Coal Trades Review, February 19, 1909.—After summing up briefly the Privy Council decision in the appeal of the Dominion Coal Company, the Review concludes its editorial thus: "Their Lordships dismissed the appeal, with costs. . . . The effect of this is that the Steel Company obtain full damages, as they will be assessed by the Canadian court to whom the question of amount is remitted; they do not obtain fulfilment of the contract. . . . The case affords another instance where the conditions of a contract of

great importance are left to a few loose words of quite extraordinary elasticity. That may be an advantage sometimes; but for a steel company of this importance to contract for 'all the coal it may require for use in its own works,' without anything to show that it was for steelmaking, is surely exceptionally open wording."

The Engineering and Mining Journal, February 20, 1909.—A synopsis of an address delivered by Dr. James Douglas, at Bisca, Arizona, appears in this issue. The address is a resume of the history of the Copper Queen Mine. Dr. Douglas went out to Arizona in 1880, to look at what has since proved to be the Verde mine. Being disappointed in this prospect, he visited, with his friend Riley, the only mine then opened in the district, the Copper Queen. This was early in 1881. The mine throughout August and until January, 1882, yielded ore carrying 20 to 25 per cent. copper. In spite of mining men's prejudice against copper ores that occurred in limestone, Dr. Douglas was strongly in favour of purchasing the mine; \$10,000 was the price then asked. In the following year Dr. Douglas advised Phelps, Dodge & Co., to purchase the property for \$25,000, the price then asked.

Dr. Douglas refers to the transaction thus: "I gave them the opinion that if they were poor men and it would likely impoverish them to buy it, they had better leave it alone; but if they were in a position to throw their money away, to take it." When the new owners had got as far as the 400 ft. level the ore had cut out entirely. This was in 1884. Only three months supply of ore was left. Money also was scarce. Dr. Douglas and his friends determined to follow a little streak of ore on the Atlantic claim. The expenditure of a few thousand dollars brought them into "another glorious body of ore." The Queen, at the same time, encountered the same body. The Copper Queen Consolidated Mining Company was formed in August, 1885. Its good and evil times are vividly described.

INDUSTRIAL PAGE.

The Nova Scotia Steel & Coal Co., of Sydney Mines, N.S., have recently ordered from the Robb Engineering Company, of Amherst, N.S., a 54-inch double inlet Sirocco mine ventilating fan, also a 125 h.p. Robb-Armstrong automatic engine for driving the fan.

On December 14th, 1908, a large gathering witnessed the first run of the new 1,000 kw. Belliss-Morcom engine which was installed at the Johannesburg municipal power station. The new engine is similar to two other large units in the power station. They were all built by Belliss & Morcom.

We have received from the Allis-Chalmers-Bullock Company, Montreal, a remarkably effective calendar. A striking picture of beavers at work has under it the legend, "The First Engineers." As the Allis-Chalmers-Bullock people are manufacturers of hydro-electric power machinery, this legend is most appropriate. The calendar runs from March, 1909, to March, 1910.

Westinghouse Traction Brake Company, Pittsburgh. Instruction Pamphlet No. T. 5042, December, 1908.

The electric pump governor is a device for controlling automatically the operation of motor-driven air compressors between predetermined minimum and maximum air pressures. The pamphlet, whose title is given above, describes types J and J-4. Type J is a governor for use with direct-current or single-phase alternating-current motor-driven air compressors. Type J-4 is used in industrial service, with two-phase (3 or 4 wire) or three-phase circuits, 100 volts to 550 volts, controlling compressor motors up to and including 15 h.p.

In the United States Circuit Court for the Northern District of Illinois the judge filed a decree in the case of the General Electric Company against the Morgan-Gardner Electric Company on Bassett patent 56792, granted March 20, 1894. This decree is the outcome of a suit brought by the General Electric Company to restrain the Morgan-Gardner Electric Company from the further infringement of the Bassett patent in the manufacture and sale of certain electric motors for use on electric mining locomotives. The court holds that the patent is valid and the defendant has infringed. The Bassett patent relates to a form of railway motor in which the field frame is diagonally split so as to allow ready access to the armature or interior parts of the motor, without removing the motor from the locomotive or car to which it is attached, and in which the parts are thoroughly protected from injury. The form of motor held to infringe in this case is the one which the Morgan-Gardner Electric Company has been selling for a number of years as its standard motor.

The Hennig Concentrator. The Ore Dressing Machinery Co., 114-118 Liberty Street, New York.

The Hennig Ore Concentrator embodies some new ideas in riffled tables. These ideas include the "Hennig" sinuously curved riffle, the substitution of an even reciprocal drive in place of jerking or bumping, and the introduction of a new motion to one portion of the

table, which, it is claimed, gives a greatly increased efficiency.

The base of the Hennig, consisting of two heavy 8-inch channels 14 ft. 6 in. long, rests upon three heavy cross-timbers, or may be directly set upon a concrete foundation. Three short 8-inch channels are riveted to the bottom of the long channels. These space the long channels accurately, and stiffen them materially. On top of the channels the eccentric drive and the two cradle supports are firmly bolted. The drive consists of a one-piece heavy casting containing three bearings. A double eccentric provides a simple and positive adjustment for the length of stroke from 0 to 15-16-inch in increments of 0.001 inch.

The table is 16 feet long by 7 feet wide. The deck is made of strips of clear white pine laid in white lead and placed diagonally. The most satisfactory covering has been found to be heavy canvas coated with asphaltum. Both covering and riffles are put on the table before shipment.

CORRESPONDENCE.

March 8, 1909.

Editor Canadian Mining Journal:

Sir,—The article on "Our Visible Supply of Brick," by Professor Baker, in a recent issue, brings the practical side of the matter before us in an excellent way; but his Pleistocene geology is so different from our modern views on the subject that it is worth while to show what changes have been made in our knowledge of the Ontario pleistocene since the *Geology of Canada* appeared in 1863.

The old terms of Erie and Saugeen clays are no longer useful, since we know that the so-called Erie clay was laid down partly as boulder clay and partly in several glacial lakes. The term really includes clays of different origins, which should have different names, corresponding to the bodies of water in which they were formed.

The Saugeen clay is not of separate origin from much of the Erie clay. It is often only the shallow water deposit near the edge of a glacial lake, and connects up with blue Erie clay laid down in the deeper waters of the same lake. In other cases it is simply weathered Erie clay, from which the lime has been leached.

The statement that an ice dam was formed across Eastern Ontario through Perth, Ottawa, etc., about the middle of the glacial period, separating fresh water on the west from salt water on the east, is entirely incorrect. The ice dam which held in the fresh waters of Lakes Algonquin and Iroquois in Western Ontario occupied the whole St. Lawrence valley, leaving no place for salt water.

The enlarged Gulf of St. Lawrence did not cover Eastern Ontario till this ice dam was completely removed from the southern part of the province, so that the Leda clay is thousands of years later in origin than the so-called Erie clay, and was formed when the climate of Ottawa was the same as at present.

May the remark be made, in conclusion, that this criticism of the geology of the paper implies no reflection on its value from the economic side.

Yours truly, A. P. COLEMAN.

Department of Geology, University of Toronto.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay.

Eight Hour Commission of Enquiry.—During the past fortnight the Eight Hour Commission has continued its labors, interviewing and examining representatives of employers and workmen in the coal and iron industries around Sydney and Glace Bay. It is expected that a preliminary report will be given by the Commission at no distant date, to be followed by a more detailed publication.

The United States Antagonist of the P. W. A.—The executive of the U. M. W. of America has kindly sent down two of its agents to Cape Breton to assist in the squelching of the Provincial Workmen's Association of Nova Scotia. In the inception of this movement the agents of the American order posed as missionaries who having heard the Macedonian cry of oppression that rose from Nova Scotia were constrained to come to the aid of their distressful brethren. They have now thrown off this mask of pretence, and are publicly stating that it is their earnest hope that the P. W. A. is—as one of their speakers in Sydney put it—"a thing of the past." This same speaker expressed a pious wish, which we are sure must be re-echoed in every true Canadian bosom, that before very long the U. M. W. of America would "reign from Sydney to Vancouver."

The P. W. A. is, however, not willing to be classed with the ditherium or the dodo. Some happenings in Glace Bay recently proved this very effectively. The two representatives of the U. M. W. of America just referred to announced a public meeting in the King's Theatre at Glace Bay, to which they invited members of the P. W. A. to listen to the gospel of freedom as it is in Pennsylvania interpreted by a gentleman from Kansas, U.S.A. The P.W.A. for once descended from its perch of reposeful dignity and decided to make a "demonstration." When the U. M. W. A. detachment arrived they found the theatre filled to the doors with about 1,000 members of that effete body—the P. W. A. As many of the enemy as found it feasible squeezed themselves into the theatre, and then the fun commenced. Both sides entered a contest as to which could howl the loudest, and it may be said that the Cape Breton miner has a gift in this direction. A scene of confusion ensued, and for the space of two hours the crowd vied with the Ephesians of old, finally breaking up in disorder. The honors were decidedly with the vociferous powers of the P. W. A. men. The lungs of the non-native elements which constitutes the large majority of the U. M. W. A. supporters cannot cope with the brazen throats of men whose ancestors said good-morning to each other across a Highland glen. So they gave it up. The scene was not edifying, but it served to show how incensed the native unionists are becoming against the interlopers who have come unasked and certainly unwelcomed from the United States, with the avowed intention of causing trouble where peace did reign.

There was a large crowd in the streets of Glace Bay on this occasion, and so tense was the situation that very little would have caused an ugly row. It speaks well for the self-control of these men that no breach of the public peace took place, and it further serves to show how inborn is the sense of order in the Canadian citizen. It was a well-dressed crowd also. Speaking as one who has lived among and seen mining populations in several European countries, we are bound to admit that the native miner of Nova Scotia need fear no comparison, in dress, physique, speech or brains with his foreign brethren. We apologize for the term "native" but use it to distinguish between the Canadian born population and the new-comers. Where the European miner goes abroad in hob-nailed boots, with a scarf around his neck and a cap on his head, the Nova Scotian miner

is shod with trim boots, protected by "rubbers" or overshoes. He wears a starched shirt, a "Derby" hat, and would not dream of appearing in the streets without a collar. He speaks the King's English more or less correctly, not in the uncouth gibberish that passes current for English in some place we wot of.

To any person who knows the conditions that attend the miner's life in the United States and in Europe it is quite incomprehensible that Nova Scotian men should wish to put themselves under the thumb of an alien organization, who wish to make catspaws of them and nothing more. Seeing that conditions in Nova Scotia to-day are far ahead of conditions in the land which owns these self-styled saviours of the people, we fail to see how conditions will be improved here. Rather, would we think they will be dragged down to the level of less favored lands than our own.

Take for example, the recommendations made by the group of European mining experts which were lately called in by the U. S. Government to report on the prevention of mine explosions. These recommendations might have been adopted in toto from the accepted practice of Nova Scotian mines. Look at the record of life lost by explosions in Cape Breton during the past half-century. The two greatest disasters were the Caledonia explosion in 1899 and the Port Hood explosion in 1908, which together caused the death of twenty-one men. During the fifty years in question, Cape Breton produced between sixty and seventy million tons of coal, so that the percentage of lives lost by mine explosions cannot be called large.

It is not altogether a matter of safer mining conditions either. It is simply because mining in Cape Breton is conducted on proper lines, with due regard to the safety of the workers. And until they can do things better in Kansas or Pennsylvania we consider it is cheerful gall for any person to come from there and pretend to teach us anything that pertains to either the practice or the economics of mining.

We have once before referred to the utterances of a representative of the U. M. W. A. who in the rink at Glace Bay told an audience of miners that he knew they worked in ill-ventilated mines and were only half-fed: "it was plainly marked in their pallid faces." This gentleman came from British Columbia where the fatal accident rate among miners is twice as high as it is in Nova Scotia. What are people called who do not tell the truth?

North Atlantic Collieries, Limited.—The new shaft which has been sunk on the area leased by this company, reached the Blockhouse seam on the 27th of February. The seam in the new winning is 9 feet 6 inches in thickness. This seam is correlated by the Geological Survey as being equivalent to the Harbour on the Glace Bay side of the Morien anticline, but its thickness and general characteristics so resemble the Hub Seam that many people prefer to think it is the same seam. A peculiar feature of this seam was referred to in the Transactions of the North of England Mining Institute as long ago as 1871 by John Rutherford, namely the irregular shaped masses of shale which are met with in the body of the seam. Mr. Rutherford says: "This peculiarity consists of masses of shale which intercept the workings in a very singular manner. They are occasionally several yards thick, sometimes they are wedge-shaped, running to a point at the bottom of the seam, and are often of the most fantastic forms. From the fact of there being a bed of shale over-lying the coal, and also that in only one instance are they connected with the floor of the seam, it appears reasonable to infer that they have been thrust into fissures in the coal; but how these have been caused without disturbing the general shape of the beds is not so evident."

QUEBEC.

East Broughton.—The Quebec Asbestos Company's property has been purchased by New York capitalists. Mr. Ling is president of the company which will be known as the Ling Asbestos Company. The Frontenac Asbestos Company have completed their mill and are now installing machinery. The Shawinigan Power line has been extended from Thetford Mines to East Broughton and will supply most of the power used at the mines.

Black Lake.—Mr. R. T. Hopper, of the Standard Asbestos Co., lately purchased from King Bros. Limited, lot 28, range 6, Ireland. The Q. C. Ry. Station and a considerable portion of the town are located on this property. The Imperial Asbestos Co. has taken up part of block "A" in Coleraine and propose building a mill in the early future. The property was bought from Mr. J. N. Greenshields, Montreal, who is the vice-president of the new company.

Danville.—The Asbestos and Asbestic Co., Limited, last year produced the largest tonnage in their history, approximating twenty thousand tons. A new mill is under construction which will increase the milling capacity by a half.

Thetford Mines.—Mining business has been very quiet here since the new year, and it is not probable that there will be much activity before the first of May. The building of new plants and enlargement of the old ones indicate a busy season. In 1894, at the close of a depression similar to the present, there was little latent confidence, while to-day there is a genuine boom in mining sales and exploitation. Messrs. W. Raleigh Kerr, J. A. Jacobs, and Mortimer Davis have purchased lot 28, range 6, Thetford, and are commencing at once to build a four "cyclone" mill. The company is called the Thetford Asbestos & Exploration Co. The Robertson Asbestos Co. are progressing favorably with the erection of their mill and hope to have it in operation in May.

ONTARIO.

Cobalt.—One of the latest districts to attract the attention of the prospectors is the Township of Morel. Many hundreds of claims have already been staked and several good silver finds are reported. The new district is situated about thirty-seven miles to the northwest of Elk Lake, and in summer is accessible by canoe, on the east branch of the Montreal River.

The timber question in Gowganda has given rise to a great deal of dissatisfaction. Cutting timber is strictly prohibited by the Government, and offenders are being severely dealt with. The saw mill which was started some time ago has been forced to close down. The difficulties arise out of the fact that the discoveries are located in the Forest Reserve.

One of the most important finds of the year at Gowganda has recently been located on the Mann claim. The rich vein of the Boyd-Gordon has been traced to the former property and stripped for considerable distance. Excellent showings of native silver are reported to have been found.

A syndicate, composed of Detroit men, has purchased sixteen claims in Gowganda for \$50,000. A gang of twelve men has been sent up to do the assessment work.

The Bannell Sawyer, one of the big operators of the Larder Lake Camp, has acquired the Milne property, known as T.R. 108, adjoining the Mann and Armstrong property in Gowganda.

On the claim owned by Col. Hay at the south end of Silver Lake, Montreal River District, a force of twenty men are engaged doing development work. On the 50-foot level of the old shaft, a drift is being driven on a 5-inch vein of calcite, carrying quantities of smaltite and niccolite.

The Toledo Mines Co. operating in the northwest corner of Tudhope Township, has purchased a plant consisting of a boiler, a six-drill Sullivan compressor, hoists, drills, etc., and at the mine everything is being put in readiness for the installation of the machinery, as soon as it arrives. A contract has been let for sinking a shaft 60 feet deep and as soon as the plant is in place this working will be taken over by the company. So far only temporary camps have been erected on the property.

The Bradshaw properties in the northwest corner of Tudhope Township will be operated by a company known as the United States Silver Mining Co. with a capital of \$1,000,000. A contract has been let to sink two shafts, each 100 feet in depth from the bottom of which drifting will be carried on. Permanent camps are being constructed and it is expected that machinery will shortly be installed.

The Big 6 Mining Co. recently sold four of their claims in the Miller Lake District to a syndicate. On their property adjoining the Motherlode Mine, considerable development work is being done. A shaft is down to a depth of 75 feet on a well-mineralized vein of calcite and a contract has been let to sink 25 feet more, at which depth drifting on the vein will commence.

There is great activity in the townships of Corkill, Brewster and Charters, Montreal River District. The recent discoveries at Calcite Lake have attracted the attention of a large number of prospectors. Several good discoveries are reported.

The system of leasing in this camp is rapidly gaining prominence, and the recent developments at Peterson Lake show that this method gives good results. The Little Nip., the Kerry Mining Co., and the Lucky Seven, are among the most important leasers, and the work done by the Lucky Seven, with the diamond drill has given such good results, that a small plant will probably be installed, and active development work carried on. The Kerry Mining Co., are still sinking on the 2½-foot niccolite vein discovered some time ago at a depth of about 95 feet. Sinking will be continued to the 150-foot level when drifting will commence. The vein has widened to 4 inches and carries good values.

The Bridge Syndicate, operating on Peterson Lake, have purchased a plant consisting of the following: One 100-h.p. boiler, the first half of an eight-drill compressor, a hoist, and three drills. The machinery has been shipped and will be installed early in March.

The Silver Mountain property has been leased to Mr. J. A. Jacobs.

Sinking is being carried on in the shaft of the Columbia Cobalt, which is under lease. The vein left the shaft at a depth of 30 feet, but the work will be carried on to the 75-foot level, where a cross cut will be run to tap the vein. If the values show up as well at the 75-foot level as at the 30-foot, a plant will be installed.

The North Cobalt Mine is under lease. A shaft will be sunk to a depth of 75 feet and then a cross-cut run, to cut the vein.

On the properties of the Holden Silver Mining Co., operating in Tudhope Township, the shaft is down over 90 feet and the company is carrying on the development work in a progressive manner.

The Empire Mining Co., which owns a number of claims in both Coleman and Lorraine, is doing active development work on their property in the latter township. A force of men are engaged in sinking the shaft which at the present time is down over 50 feet. The company expects to carry the shaft to a depth of 125 feet before any drifting is done. Several stringers of calcite are showing in the shaft. Good camps have been

erected and the equipment consists of one 35-h.p. boiler, a hoist and drill. It is probable that in the near future a compressor will be installed.

The new plant being installed by the Otisse Mine, Silver Lake, is expected to be in operation early in March. It consists of two 80 h.p. boilers, a nine-drill compressor, six drills, hoists and pumps. The total cost, including buildings, will be in the neighborhood of \$20,000. Two shafts are being sunk at a distance of 600 feet apart, and these will be connected by a cross cut, which is expected to cut a number of veins discovered on the surface. Cross cutting from the shafts will be commenced at a depth of 100 feet.

A force of thirty men are doing development work on the Hayden property. The shaft is now down over 70 feet and the vein varies in width up to 24 inches and carries silver values.

The W. J. Clerihue Syndicate, which owns eleven claims in South Lorraine, has recently ordered a plant which it is expected will be in operation about the first of April. It consists of a hoist and boiler sufficient to run two or three drills. A force of ten men are employed.

At the Davis fraction at Giroux Lake the shaft is down to a depth of 85 feet and is now being timbered. Three calcite veins are found in the shaft, two being one inch in width and the other 6 inches.

A curious accident occurred recently in the Columbus Mine, when drilling on the 250-foot No. 3 level. The men were drilling to cut No. 1 vein, when a subterranean body of water was encountered, which rushed with great force into the workings. The mine was promptly abandoned, and in an incredibly short time the water had drowned out the pump and risen to second level, where it was held in check by two station pumps. The next day the force of water grew less and it was soon under control. A few days after the men started to work again, but when the first round was taken out the water came in again with greater force than before, and everything had to be taken out of the mine. For the present all work has been stopped.

A strike of great importance was made recently at the Big Pete Mine of the Cobalt Central. A new silver vein was cut by the diamond drill 170 feet from the present workings of the third level of the mine, and at a depth of 410 feet from the surface. This is, with one exception, the greatest depth at which values have been found in this camp.

Fifty men are at present employed at the Chambers Ferland, and the work is being carried on in a very progressive manner.

The Red Jacket Mining Co. in Coleman, whose holdings were formerly known as the Morrison property, are installing a plant consisting of a 100 h.p. boiler, an 8x10 hoist, a 6-drill compressor and three drills.

A cross cut is being run from the 175-foot level of the Rochester and the management expect to cut the vein shortly. The vein left the shaft at the 85-foot level, but no cross-cutting was done until the 175-foot level was reached.

Excellent progress is being made on the property of the Alexandria Mining Co. which adjoins the Bailey on the west. The main shaft is being sunk and is now down to a depth of 175 feet. Sinking will be continued to the 250-foot level, and from that depth diamond drill holes will be bored to test the surrounding country.

The new strike on the Silver Leaf is supposed to be a continuation of the main vein, which was worked last fall. The vein was cut off by a fault, and to the present the continuation had not been discovered.

A contract has been let to sink a shaft on the Farah property, adjoining the Nova Scotia.

The plant of the Colonial mine is being moved to the property of the Temagami Cobalt Silver Mining Co., under the

supervision of Mr. Somers, mechanical engineer for this company.

It is said that Cobalt is to have a custom sampler, the plans of which are now being prepared. The work of installation will commence in the near future. The sampler will fill a long-felt want, as a lack of proper sampling facilities has proved to be a serious handicap in handling the class of ores which are encountered in this camp.

The new shaft of the Ontario Development & Mining Co., in the first concession of Coleman, is down fifty feet.

It is expected that the new plant being installed by the Kerr Lake Majestic will be in operation shortly.

A small surface plant is to be installed by the Quaker City Mining Co., close by the Temiskaming. A force of 20 men are at work on the property.

The Hydraulic Co. have purchased more drills, and are carrying on their operations in a progressive manner. They expect to be able to supply air and electricity by next July.

On February 25th the Kerr Lake discovered a new vein 10 inches wide, carrying 6,000 oz. of silver. The negotiations between the Kerr Lake and the Hargraves for the use of one of the shafts of the former company to develop the Hargraves property, are still pending.

A rich vein of ore one inch wide was discovered in No. 2 cross-cut of the Crown Reserve, which runs almost parallel to the cross-cut. Returns of ore shipped in the month of January show a value of \$175,000. One hundred and thirty men are working at the mine.

A new strike, 3 feet wide, and carrying good values, was made on March 2nd at the Chambers-Ferland. The car of high-grade ore now at the Denver smelter shows exceptionally high values.

G. C. Brewer, of Cobalt, has secured the contract for transporting the Bartlett mining machinery to Gowganda. There will be 25 teams at work on the job. The contract price is \$12,000.

The Town of Cobalt has decided to appeal against the decision of the High Court in regard to the litigation of the Coniagas mine.

BRITISH COLUMBIA.

Rossland.—Mining is a little quiet in this district at the present time, as the full working force has not yet been put back into the Le Roi since the recent shut-down. During the week ending February 20th the Le Roi shipped 1,295 tons of ore, the Centre Star group 3,580, and the Le Roi 2, Ltd., 455 tons. Work at the smaller mines and leases is not as active as it may be a little later on in the season, as at the present time there is a lot of water to contend with in many of these smaller properties, and adequate pumping facilities are not always on the ground.

A few weeks ago the Mugwump Mining Co. breathed its last, the affairs of the company having been wound up by A. B. Mackenzie, liquidator. One stockholder who owned 100 shares that he bought thirteen years ago, expecting to make a handsome profit on his investment, received 15 cents for his holdings. The Mugwump claim, which it is expected will some day prove to be a valuable property, was bought in by the Consolidated Co. for \$2,000; of this sum \$520.63 was eaten up with the legal expenses, leaving \$493.83 to divide among the stockholders.

Nelson.—The Star Mining & Milling Co., of Sandon, in its action against the Byron N. White Co., has again been awarded the decision, in this case by the Supreme Court of Canada. This case, which lately involved a question of apex rights, of much importance to Sloean miners, was begun in 1901 for trespass by

the taking of ore, for an injunction and damages. While no definite action has yet been taken by the White Company in the matter, it is probable that the case will be taken before the Privy Council, as both sides are most positive that they are in the right, and feel as though the case should be fought to a finish.

One of the successful Cobalt mining men, Mr. Jas. McMartin, president of the La Rose Consolidated Mining Co., has been interested by J. L. Warner in the Mother Lode group on Sheep Creek, the Kootenay Belle also being included in the deal. Extensive development work will be done on the property acquired and the mines placed on a heavy producing basis. The Kootenay Belle adjoins the Queen mine, which to date has paid nearly half a million dollars to its operators.

A bond has been taken on the Yukon claim in the Ymir district by H. L. Rodgers, of Spokane, who some time ago acquired the American Girl and Canadian Girl claims. The price at which the Yukon has been acquired is said to be \$35,000, 10 per cent. of which was paid upon the signing of the papers.

The Central Mining Co., and the Seranton Coal Mining Co., operating near Lethbridge, have been consolidated, and will work on a larger scale in the future. The property is at present producing about 500 tons of coal per day, but this output is to be increased to 800 to 1,000 tons per day in the immediate future.

The ore body recently opened up on the Independence group, Sheep Creek, has widened to about 20 inches, and is looking much better as the work proceeds. This ore ought to run about \$185 per ton, judging from what has been shipped heretofore.

An 8-foot ledge was cut on the Queen during the past week that will give an average of \$43 per ton. This property continues to mill its weekly quota of 420 tons of second-class ore, and makes shipments of the higher class of ore at regular intervals.

The Le Roi 2, Ltd., Rossland, has declared a dividend of two shillings per share. It is understood that this is to be taken in the nature of a quarterly dividend, and that others will be forthcoming at the proper time. The Le Roi 2 certainly makes a good showing for a property working on such a small scale in low-grade ore, comparatively speaking, of course.

At the Second Relief, Erie, the company milled 145 tons of ore during the past week. Shipments are being made to Northport smelter, and the mine is looking fairly well.

The big stamp mill at the Blue Bell continues to work steadily and treat its 900 tons of lead-zinc ore per week. The company has crushed 5,900 tons of ore so far this year, and has sent out nearly 600 tons of crude ore besides.

The Molly Hughes, Yankee Girl, Silver Hustler, Silver Glance and other light shippers of the district have already appeared on the shipping list.

At the Aurora, on Moyie Lake, the operators are meeting with much success. The ore is coming in at several levels, and there is a quantity of good shipping ore on hand that will be sent out at an early date.

Milling at the Whitewater is going on steadily at the rate of about 700 tons per week. The company has treated nearly 5,000 tons of ore so far this year.

Phoenix.—During the week ending Feb. 27th, the shipments from Boundary amounted to 31,544 tons, the Granby shipping 21,397, Mother Lode 7,800, Oro Denoro 155, and Snowshoe 2,170 tons.

The formation of the Osoyoos Mining Co., to take over and work 1,920 acres of coal lands in the Similkameen valley, is announced. Those interested recently bored a test hole over 800 ft., cutting over 50 feet of coal. The coal found in this locality is a good quality of bituminous fuel.

The Sacramento claim, near Hedley, is about to be worked again. Development will be pushed for some time.

The report of the British Columbia Copper Co. for the fiscal year ending Nov. 30, 1908, shows that the company mined, refined and sold its copper during the last seven months of operation at a cost of 9.996 cents. The cost per ton of ore handled was \$2.6322. The total earnings of the company during the fiscal year were \$1,086,635; ores sold, etc., \$13,324, making a total of \$1,099,959. From this was written \$899,475 for expenses, maintenance, etc., and \$106,793 for decrease in the market value of metal unsettled for Nov. 30, 1907, and expenditure during the suspension of operations from Dec. 1, '07, to April 30, '08, leaving a net profit for the year of \$93,691. The surplus shown at this time is \$269,732. The showing is good, and it is gratifying to see that by the co-operation of the different departments of the company the price of producing its copper was kept down to the low figure of 9.996 cents, which augurs well for the future.

Vancouver.—The Government has introduced a bill making several minor amendments to the Mineral Act. Section 8 is being changed, elucidating the point of mining without a miner's license. The question of the share of a partner or co-owner who has allowed his free miner's license to lapse will also be simplified. Section 36, regarding the securing of a certificate of improvement prior to the issuing of a Crown grant, will be amended to provide that prior to obtaining a Crown grant a certificate of improvement will be obtained from the Gold Commissioner, and prior to that a certificate of work from the mining recorder. The life of a certificate of work in future will be but three months, if this bill is passed, when the provision will come into force April 1, 1910. A further minor change will be the charging of a fee of \$10, instead of \$5, for the issuing of a Crown grant to surface rights of mineral claims.

The property of the Mountain Boy group on American Creek at the head of Portland Canal has been bonded by T. Hopkins, of Seattle, who has a number of American capitalists behind him. The group of four claims has been taken over at a figure in the neighborhood of \$125,000. Mr. Hopkins has also secured control of the charter of the Portland Canal Mining Co., which embodies valuable railway privileges, and it is the intention to build a railway under this charter from the town of Stewart to the mines on American Creek.

GENERAL MINING NEWS.

ONTARIO.

Kingston.—The annual meeting of the Eastern Ontario section of the C. M. I. was held in the School of Mining, Kingston, Thursday, Feb. 25th, the president, Prof. J. C. Gwillim, in the chair.

The election of officers for the ensuing year resulted as follows: President, Prof. J. C. Gwillim; Vice-President, Prof. M.

B. Baker; Secretary-Treasurer, John Donnelly, M.E.; Assistant Secretary-Treasurer, E. H. Birkett.

The following papers were read and discussed: "The Wilbur Iron Ore Deposit," by S. King; "Diamond Drill Methods as Practised in the Michigan Iron Ore Range," by J. K. Osborne; "Summer Experiences of an Undergraduate," by F. Ransome. Two other papers, entitled "The Diabase and

Aplite of the Cobalt Silver District," by N. L. Bowen, and "The Chromiferous Peridotites of Lake Abitibi District," by H. T. White, were to be read, but owing to the lateness of the hour it was decided to leave this over till next meeting.

A vote of thanks, on motion of Dr. Goodwin, seconded by Mr. Donnelly, was tendered to the students presenting the papers, and the meeting adjourned.

The Queen's branch of the C. M. I. is to be congratulated on its increased membership, having increased in the last year from 47 to 87. It is expected that a large number of the local branch will attend the annual meeting of the Institute, which is to be held in Montreal.

Cobalt.—One hundred and eight veins have been found on Nipissing. Three hundred and ten men are employed, and there are 20,000 feet of underground development work.

A three-inch vein in wall rock has been found at the 100-foot level in the Silver Leaf.

While cross-cutting at the 250-foot No. 3 level at the Columbus mine the men drilled into No. 1 vein and struck a submarine lake. Within a few hours the water reached No. 2 level at 150 feet. The company put four pumps at work, but they could not cope with the water, and the mine is for the present idle.

A miner named Boyes, an employee of the Nipissing mine, was sentenced in Cobalt Police Court to eighteen months in the Central Prison for high-grading.

Two hundred and fifty men and 18 drills are working at La Rose, and 250 men and 17 drills at Nipissing.

The Fourth of July shaft at the Nipissing is now down 165 feet. During February \$75,000 worth of ore was taken from shaft-sinking alone. In one day 564 sacks of ore were brought up.

The timbering of the Badger main shaft is almost completed. Rich ore is being taken out at the 100-foot level, calcite and native silver. The main shaft is now down 225 feet. Seventy-five men are at present employed.

Three new veins have been discovered at the 100 and 150 foot levels of Kerr Lake mine, with a total width of 35 inches.

The action of William Armstrong, in which he claimed one-sixth interest in the Lawson mine, has been dismissed.

Thirteen veins have been found on the territory of the Cobalt Station Grounds Mining Co. Four veins are to be cross-cut on the McKinley-Darragh side. Towards the north, near the Right of Way several veins are expected to be cross-cut.

Gowganda.—Trouble is feared over the location of the Gowganda townsite. At first the Government located the townsite in a place at Gowganda Lake where prospectors claim three feet of water will be found in the slough in the spring. The new townsite, as proposed, will be on better grounds, but many who claim to be in possession of the facts say the Government is trying some scheme which makes those interested feel that they will have to abandon their rights to make room for the new townsite.

It is most regrettable that with so much money waiting to be spent in Gowganda, as well as the enormous sums already spent, the matter of a townsite could not have been permanently settled some time ago.

Elk Lake.—A new ore-chute has been opened up at the Mother Lode mine, showing a vein of high-grade ore about 12 inches wide.

Three drills are being operated at the Otisse-Currie, and the shaft is down to the 60-foot level, from which level drifting has been commenced. The following buildings have been erected: Powerhouse, 30x40 ft.; office, cookhouse, sleeping camp, pump-house and stable. Forty men are at present employed.

Fort William.—A strike of gold ore has been made near Sturgeon Lake on the Grand Trunk Pacific. A stampede is expected as soon as the weather moderates.

ALBERTA.

Edmonton.—M. J. O'Brien, of Renfrew, Ont., has formed the Yellowhead Pass Coal & Coke Co., Ltd., which will commence this summer the development of a hard bituminous coal field west of Edmonton. The coal property embraces an area of 5,120 acres. It is situated 24 miles southwest of the G. T. P. where it crosses the Macleod River. The coal has the same appearance as the bituminous coal of the Crow's Nest Pass. The preliminary work of uncovering the coal seams will be begun in August, but actual mining will probably not take place before the summer of 1910.

Pincher.—There are five veins averaging eight feet in width on the property of the Pincher Creek Coal Co. The holdings consist of 1,200 acres. The miners are down 150 feet, three shifts sinking an incline shaft. Between 300 and 400 tons of coal will be shipped daily before the end of next summer.

Lethbridge.—The South Alberta Irrigation Co. struck a flow of seven million cubic feet of natural gas per day at Bow Island at a depth of less than two thousand feet.

BRITISH COLUMBIA.

Fernie.—The Crow's Nest Pass Coal Co. intend doing a large amount of building in the near future. It is intended to build 1,000 more coke ovens, and other improvements are to be made.

At Michel the Crow's Nest Pass Coal Co. are daily producing 1,800 tons of coal and 750 tons of coke.

Hosmer.—The new collieries of the C. P. R. began the shipment of coal and coke on December 19th, 1908. Two hundred and forty beehive coke ovens, with a daily capacity of 300 tons, are in use.

Rossland.—The Republic mine, sold some time ago for taxes, is to be reopened. The new Republic Company will take over the property and franchises of the Republic Light and Water Company. The facilities will be improved and the surplus power used in driving the machinery, which is now en route from the East.

Active mining will start in the winze as soon as the hoisting plant is installed. To exhaust the ore now in sight will take at least two years of steady operation. One car of ore has already been sent to the smelter.

Preparations are being made to increase the output of the Granby smelter. The furnaces are being enlarged from 18 to 22 feet in length, and the capacity of the converter plant for producing blister copper has been increased to 36,000,000 pounds per annum.

Moyie.—Three feet of crude ore has been struck in No. 1 raise off the main tunnel in the Aurora mine. An 18-inch vein has also been found in the main tunnel, which has now been driven a distance of 450 feet.

Nelson.—The Blue Bell is shipping at the rate of nearly 700 tons a month, and receiving substantial bounty benefit.

The Canadian Zinc Co. are reorganizing on a larger capital basis to give the company a larger scope for operations and the purchase of ores.

The 8-inch paystreak of the Independence mine at Sheep Creek in the west drift of the new lower level has widened to twenty inches.

An 8-foot streak was found on the Queen mine, showing an average assay of \$43 gold per ton.

Three of the five lower levels of the Silver King have been unwatered. Four machine drills are now in operation, and 26 men are employed.

The Consolidated Mining & Smelting Co., of Trail, have taken a two and a half year bond on the Queen Victoria mine. The mine is equipped with the most modern machinery, and shipments of ore to the Trail smelter will begin immediately.

Ymir.—H. L. Rodgers, of Spokane, who recently took bonds on the Canadian Girl and American Girl mines, has secured possession of the Yukon property. The Yukon adjoins the American Girl, and the intention is to combine the two properties. The price paid was \$35,000.

Vancouver.—The Nuba and Early Bird Mining Companies will jointly install a 20-stamp mill on their claims at Gold Harbor on the west coast of Moresby Island, Queen Charlotte Islands. The order for the plant has been placed in Germany.

The Nuba Company owns fifty-four claims near Gold Harbor. Twenty men have been engaged at development work since last autumn.

At Rose Spit, Queen Charlotte Island, preparations are under way for prospecting and working the black sand in that vicinity.

Victoria.—The Government has introduced a bill for the amendment of the Mineral Act. Section 8 is amended by making clearer the penalty for mining without a miner's license.

Another change is simplification of the proof required to vest in man the share of a partner or co-owner who has allowed his free miner's license to lapse.

Section 36, regarding the obtaining of a certificate of improvements prior to the issuance of a Crown grant, is amended to provide that prior to obtaining a Crown grant a certificate of improvement or improvements has to be obtained from the Gold Commissioner, and prior to that again a certificate of work from the Mining Recorder. In future the life of the certificate of work will be but three months. This provision is not to come into force until April 1st, 1910.

Another minor change is the charging of a fee of \$10, instead of \$5, for the issuance of a Crown grant of the surface rights of a mineral claim.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The coal owners have applied to the Coal Conciliation Board for the federated mining districts in England and North Wales for a 5 per cent. reduction in the existing rate of wages. The Board could come to no agreement on the subject, so the matter was referred to Lord James of Hereford, the independent chairman, for his casting vote.

The Board of Trade returns for the month ending January 31st, 1909, are: Tin—Imports 3,564 tons, value £465,702; exports, 993 tons, value £129,975. Copper—Imports, metal, 8,180 tons (£502,894); ores, 7,727 tons (£75,150); exports, 2,870 tons (£196,673). Lead—Imports, 18,613 tons (£246,694); exports, 2,765 tons (£45,084).

GERMANY.

An amalgamation of German zinc works, with the co-operation of a large number of Belgian, French, Dutch and Austrian zinc firms, has been completed in Berlin, under the title of the Zinc Smelters' Association, Limited, with a capital of 2,047,000 marks. The basis for an international agreement with other European spelter firms has already been arranged.

RUSSIA.

The latest figures available concerning asbestos production show that there were 25 mines in operation, employing 1,900 men, and the output amounted to 15,970,285 lbs. The mines are in the Ural Mountains, in the Province of Perm, also in the Altai Mountains of Siberia.

INDIA.

With a view to encouraging the study of mining, the Government of Bengal, East Bengal and Assam intend to give scholarships to students, who will study the subject in the Shibpur Engineering College.

AUSTRALASIA.

The tin mines of Tasmania employed during the last quarter of 1908 a total of 1,747 men, 1,461 of whom were Europeans and the balance Chinese.

The gold productions of the various states for January are as follows: Queensland, 24,500 oz., or \$506,415; Victoria, 40,848 oz., or \$844,328; Western Australia, 132,267 oz., or \$2,713,959; New South Wales, 19,885 oz., or \$411,023.

The mineral production of New South Wales for the year 1908 is valued at £8,609,607, including £954,854 for gold, £2,947,824 for lead and silver, £502,812 for copper, £205,447 for tin, £3,353,093 for coal. The coal production was 9,147,028 tons.

SOUTH AFRICA.

The Natal Government has appointed a commission to revise the mining laws of the colony; to advise as to the best means of encouraging and assisting the development of the mineral resources of the colony, especially in regard to gold and base metals, and to advise as to the necessity for reorganizing the Mines Department.

The output of Cassiterite in the Transvaal for 1908 was 1,427 tons, of a total value of £97,188. Practically the whole of this has been mined from the Waterbury district.

The scheme for supplying the Rand mines with electric power provides for many of the mines using this power by the beginning of next year. In order to do this it will be necessary to convert their present steam plants to electric working installations.

WEST AFRICA.

The West African Chamber of Mines states that the gold yield of the colony for January was 22,817 oz., valued at £91,112, a decrease of 1,807 oz., or £7,150 compared with the preceding month.

UNITED STATES.

Goldfield, Nevada, has been selected as the place for the next annual convention of the American Mining Congress.

According to the Bureau of Statistics, in the Department of Commerce and Labor, the value of copper and manufactures of copper exported during December was \$6,958,710, which compares with \$11,337,544 in corresponding month of year previous. The total copper exported during 1908 amounted to \$90,555,503, as compared to \$100,800,355 in 1907.

The Calumet and Hecla's regrinding plant is showing excellent results in the saving of copper heretofore lost in the tailings. With the plant in full operation a saving of 3,000,000 lbs. of copper annually will be made at a cost of about 12 cents per lb.

It is expected that the placer gold output of Oregon for 1908-9 will be the greatest in years. Every mine is in full operation, and the rains have been heavy and unbroken.

MEXICO.

Owing to the unsatisfactory conditions in the metal markets, which have resulted in the shutting down or the short time

working of many Mexican mines, the smelters of the American Smelting and Refining Company are working on half time. The scarcity of silicious ores in Mexico is being felt by metal reduction works.

There has been an increased demand for zinc ores since the recent decision of the U. S. Court of Appeals making carbonate ores and calomine free of duty in their importation into the United States.

Oil will soon replace coal as fuel in all the mine power-houses of the Cananea Copper Co., the misunderstanding with the Federal Government as to the scope of the concession having been adjusted about a month ago.

COMPANY NOTES.

At the annual meeting of the Dominion Coal Company, called for March 4th, an adjournment will be made to a later date for the transaction of the business of the meeting. The directors of the Dominion Coal Company, Limited, have made an offer to the Dominion Iron and Steel Company, Limited, covering the settlement of pending litigation. It is deemed advisable to await the reply of the Dominion Iron and Steel Company, Limited, before proceeding with the business of the annual meeting of the Dominion Coal Company, Limited, in order that a complete and more definite statement than is now available may be presented to the shareholders.

"SCOTIA" PFD. DIVIDEND.

Nova Scotia Steel directors have declared the quarterly dividend of 2 per cent. on the preferred stock, payable April 15.

INTERCOLONIAL COAL ANNUAL.

The annual meeting of the shareholders of the Intercolonial Coal Mining Company, Limited, took place in Montreal, March 3rd. The output of coal and coke for the year amounted to 310,198 tons.

The following were elected directors: Messrs. James P. Cleghorn, W. M. Ramsay, R. MacD. Paterson, K. W. Blackwell, E. Goff Penny, D. Forbes Angus and Duncan Robertson.

At a subsequent meeting of the Board the old officers were re-elected.

Mr. Duncan Robertson is an addition to the Board since last year.

ANOTHER DIVIDEND.

The Temiskaming & Hudson Bay Co. has declared another \$3 dividend, or at the rate of 300 per cent., making total dividends since its inception 12,400 per cent.

POSITION OF LA ROSE.

From June 1st to December 31st, 1908, La Rose produced 1,764,146 ounces silver, and made net profits of \$650,566. It has paid two dividends, one of 3 per cent., on October 20th, 1908, and one of 3 per cent., with a bonus of 1 per cent., on January 20th, 1909.

It will be seen that in seven months' operations La Rose has very nearly earned its entire dividend requirements for one year on a 12 per cent. basis.

Its present known ore reserves—by far the largest in Cobalt—are sufficient for dividend requirements on this basis for five years to come.

Cobalt has produced since its discovery 48,678 tons of ore. The La Rose mine has shipped 9,483 tons of ore, or nearly 20 per cent. of the total production of the camp.

January net earnings of the La Rose Company amounted to \$90,000. Net earnings for the eight months ended January 31 amounted to \$739,584, out of which two regular and one extra dividend was declared, calling for the total payment of \$420,000, leaving surplus earnings of \$319,584.

COBALT LAKE MEETING.

The annual meeting of the Cobalt Lake Mining Co. was held at Ottawa, February 27th.

The consulting engineer, Mr. E. L. Fralick, said no very hopeful outlook as to prospects could be held out; but there was a possibility of soon striking the McKinley-Darragh vein, toward which they have been working for some time.

The financial statement for the year showed the working expenses to have been \$142,554.56, while the proceeds were \$83,547.14, which included interest, transfer fees, ore sales and ore on hand, leaving a balance at debit of profit and loss of \$59,007.42. Adding the balance from 1907, \$132,776.20, to this, the balance at debit of the profit and loss account December 31st, 1908, amounts to \$191,783.62.

The consulting engineer, Mr. E. L. Fralick, reported that 3,272 feet of work had been done during the year, comprising 3,138 feet of drifting and cross-cutting and 134 feet of sinking. In addition, 18,000 cubic feet of stoping had been done. According to Mr. Fralick, the past year has seen the end of the dead work, and every one of the machines is driving in conglomerate or Huronian slate.

The report of Mr. D. B. Rochester, managing director, contains some interesting information. The mine has been operated without interruption, except for a few days, with an average of 60 men. Most of the underground work done has not met with much success, so far as discovering silver is concerned. This is probably owing to the formation existing on the east side of the lake from the centre to the south end, where most of the work has been done. It is hoped that the McKinley-Darragh and Right of Way veins will be encountered shortly. Owing to the property being under water this is probably the most expensive property to work in the camp.

Mr. D. B. Rochester, the managing director, was formerly paid \$4,000 per year, but owing to the amount of criticism he resigned and a new arrangement was made whereby Mr. Rochester was to be paid \$200 per month. Mr. Rochester was to give all the time necessary to Cobalt Lake Mining Co., but was to have permission to engage in other business in his spare time.

The old Board of Directors was re-elected as follows. President, Sir Henry M. Pellatt; Vice-President, Geo. F. Henderson, K.C.; Directors, M. Marchand, John H. Avory, Major J. A. Murray, Thos. Birkett, Gordon C. Edwards, Dr. C. Cousens and D. B. Rochester.

Letters patent have been granted to the Crown Exploration and Development Company, Limited, Montreal, with capital stock of one million dollars. The provisional directors are mostly leading figures in the Crown Reserve Mining Company, namely, Robert Reford, John Carson, W. I. Gear, Peers Davidson and James Cooper.

RIGHT OF WAY ANNUAL MEETING.

At the annual meeting of the Right of Way Mining Co., Limited, it was decided to pay a quarterly dividend of 6 per cent., together with a bonus of 9 per cent., payable on April 1. Books close on March 22 and reopen April 1.

NANCY HELEN ANNUAL MEETING.

The directors and stockholders of the Nancy Helen met at the mine office. W. R. Smyth, M.P., was elected President;

Shirley Ogilvie, of the Ogilvie Milling Co., was elected Vice-President; J. A. Hutton, merchant, Thornton, Ont., a director, and William Black, Secretary-Treasurer. The directors were empowered to lease or deal with the 40-acre lot in Bucke Township belonging to the company in any way advantageous to the company.

TEMISKAMING DIVIDEND.

The directors of the Temiskaming Mining Company have declared the regular quarterly dividend, which will be paid on April 1. It finally disposes of the rumors to the effect that this company would pass its dividend this quarter.

A quarterly dividend of two shillings per share has been declared by the Le Roi No. 2 Mining Company, payable on March 11th.

STATISTICS AND RETURNS.

NOVA SCOTIA STEEL OUTPUT.

The coal output of the Nova Scotia Steel Company amounted to 55,667 tons for February. The company has about fifty thousand tons on the bank, which will be increased.

The pig iron output was 5,000 tons, and the product of the steel plant slightly above that figure. All departments are in satisfactory operation.

CUMBERLAND COLLIERIES.

The shipments from the collieries of the Cumberland Railway and Coal Company for the month of February were 27,191 tons.

STEEL COMPANY OUTPUT.

Dominion Iron & Steel Company's output for February is as follows: Pig iron, 20,200 tons; steel, 22,500 tons. Total shipments, about 20,000 tons.

DOMINION COAL OUTPUT.

The output of the Dominion Coal Company's collieries last month was 207,328 tons. The shipments were 119,646 tons.

The output in January was 195,971 tons. In February of last year the output was 282,508 tons, and for February, 1907, the figures were 226,490 tons.

Considering that February was a short month, the output shows a satisfactory improvement over January.

The February output in detail was as follows:—

No. 1, Dominion	40,298
No. 2, Phalen	40,127
No. 3	12,924
No. 4, Caledonia	29,210
No. 5, Reserve	40,527
No. 6, Donkin	1,250
No. 7, Hub	9,065
No. 8, Bridgeport	13,428
No. 9, Bridgeport	20,359
Total	207,328

CROW'S NEST PASS OUTPUT.

The output of the Crow's Nest Pass Company's collieries for the week ending February 26th was 15,785 tons, a daily average of 2,631 tons.

The output of the Crow's Nest Pass Company's collieries for the week ending March 5th was 14,940 tons, a daily average of 2,490 tons.

COBALT ORE SHIPMENTS.

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

	Week end. Feb. 20.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo	44,730	133,010
Crown Reserve	103,590	698,800
City of Cobalt	60,000	330,930
La Rose	258,730	2,008,290
Nipissing	256,481	1,564,603
Right of Way	182,580	372,595
Temiskaming	60,000	370,000
T. & H. B.	60,000	384,060

Ore shipments to Feb. 20, 1909, are 7,791,057 lbs., or 3,895 tons. Total shipments for week ending Feb. 20 were 1,086,250 lbs., or 542 tons.

	Week end. Feb. 27.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo		133,010
Coniagas		271,905
Crown Reserve		905,700
Cobalt Central	296,900	121,755
Chambers-Ferland	40,375	142,000
City of Cobalt		390,930
Kerr Lake	60,000	205,097
King Edward		53,920
La Rose		2,267,340
McKinley-Darragh	259,050	308,080
Nipissing		1,777,278
Nova Scotia	212,675	401,390
Nancy Helen		40,000
Peterson Lake		81,560
O'Brien		127,880
Right of Way		495,085
Silver Queen	122,490	65,000
Temiskaming		370,000
Trethewey		342,930
T. & H. B.	65,000	384,060
Muggley Cons.		72,900

Ore shipments to Feb. 27, 1909, are 8,847,547 lbs., or 4,423 tons. The total shipments for week ending Feb. 27 were 1,056,490 lbs., or 528 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the shipments for the week ending Feb. 19th, and year to date in tons:—

Boundary Shipments.		
Granby	18,672	133,356
Snowshoe	4,188	21,421
Mother Lode	8,684	64,608
Oro Denoro	248	1,898
Sally	20	41
Total	31,812	221,324

Rossland Shipments.		
Le Roi No. 2, milled	260	1,560
Centre Star	3,994	15,716
Le Roi No. 2	547	4,141
Le Roi	1,057	5,370
Other mines		92
Total	5,858	26,879

Slocan-Kootenay Shipments.		
Total	3,589	23,066

The total shipments for the past week were 41,225 tons, and for the year to date 271,235 tons.

Granby Smelter Receipts.

Grand Forks, B.C.		
Granby	18,672	133,356
Others mines		85,580
Total	18,672	219,036

B. C. Copper Co.'s Receipts.

Greenwood, B.C.		
Mother Lode	8,684	57,301
Oro Denoro	248	1,898
Snowshoe	1,950	5,800
Total	10,882	64,429

Consolidated Co.'s Receipts.

Trail, B.C.		
Total	7,759	40,106

Le Roi Smelter Receipts.

Northport, Wash.		
Le Roi	1,057	5,370
Other mines	329	2,109
Total	1,386	7,479

The total smelter receipts from the various mines for the past week were 38,699 tons, and for the year to date 133,950 tons.

The following were the ore shipments for the week ending Feb. 26th and year to date in tons:—

Boundary Shipments.		
Granby	21,397	154,793
Mother Lode	7,800	72,408
Oro Denoro	155	2,053
Snowshoe	5,275	28,696
Other mines		41
Total	31,522	252,886

Rossland Shipments.		
Centre Star	2,752	18,468
Le Roi No. 2	485	4,606
Le Roi No. 2, milled	260	1,820
Total	3,497	31,916

Slocan-Kootenay Shipments.		
Total	4,503	27,575

The total shipments for the week were 39,522 tons, and for the year to date 312,377 tons.

Granby Smelter Receipts.

Grand Forks, B.C.		
Granby	19,029	152,485
Other mines		85,580
Total	19,029	138,065

B. C. Copper Co.'s Receipts.

Greenwood, B.C.		
Mother Lode	7,800	65,101
Oro Denoro	155	1,483
Snowshoe	2,170	7,970
Total	10,125	74,554

Consolidated Co.'s Receipts.

Trail, B.C.		
Total	7,786	46,998

The total smelter receipts for the past week are 36,940 tons, and for the year to date 239,720 tons.

RAND GOLD OUTPUT.

The Rand gold output in February, as estimated in London, was 640,000 ounces. Comparison of value of the month's output is:—

February, 1909	\$13,600,000
January, 1909	13,064,000
December, 1908	14,031,000
November, 1908	13,048,000
October, 1908	13,120,000
February, 1908	11,524,000
February, 1907	10,482,000
February, 1906	8,658,000
February, 1905	7,726,000
February, 1904	6,148,000

MARKET REPORTS.

Silver Prices.

	New York.	London.
	Cents.	Pence.
February 22	50¾	23 5-16
" 23	50¾	23 5-16
" 24	50¾	23 7-16
" 25	50¾	23 5-16
" 26	50¾	23 5-16
" 27	50¾	23 5-16
March 1	50¾	23¾
" 2	50¾	23 5-16
" 3	50¾	23¼
" 4	50¾	23 1-16
" 5	50¾	23¼

March 5.—Connellsville coke, f.o.b., ovens:—
Furnace coke, prompt, \$1.50 to \$1.60.
Foundry coke, prompt, \$2.00 to \$2.25.

Metals.

March 5.—Tin, Straits, 28.65 cents.
Copper, prime Lake, 12.90 to 13 cents.
Lake, arsenical brands, 12.70 to 12.80 cents.
Electrolytic copper, 12.65 to 12.75 cents.
Copper wire, 14.25 cents.
Lead, 4 cents.
Spelter, 4.80 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8 cents.
Aluminium, 22 to 24 cents.
Nickel, 40 to 47 cents.
Platinum, \$22.50 to \$23.50 per ounce.
Bismuth, \$1.75 per lb.
Quicksilver, \$44.50 per 75 lb. flask.