

THE CANADIAN MINING JOURNAL

VOL. XXXII.

TORONTO, Feb. 1, 1911

No. 3

The Canadian Mining Journal

With which is incorporated the
"CANADIAN MINING REVIEW"
Devoted to Mining, Metallurgy and Allied Industries in Canada

Published fortnightly by the
MINES PUBLISHING CO., LIMITED

Head Office Confederation Life Building, Toronto.
Branch Offices Montreal, Halifax, Victoria, and London, Eng.
London Office Walter R. Skinner, 11-12 Clement's Lane,
London, E.C.

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

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

CIRCULATION.

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

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NOTICE.

THE OFFICES OF THE "CANADIAN MINING JOURNAL" WILL BE MOVED ON FEBRUARY 15TH, FROM ROOMS 312-313 CONFEDERATION LIFE BUILDING, TORONTO, TO THE MANNING ARCADE ANNEX, ROOMS 17-19-21. AN ALTERNATIVE ADDRESS IS 26 KING STREET WEST, TORONTO, ONT.

THE PROPOSED TARIFF CHANGES.

As we are going to press, announcement is made of the proposed tariff changes. The changes are much more comprehensive than had been expected. They include, we are gratified to note, several mineral commodities.

Amongst the mine products that are affected are the following:—

FELDSPAR, crude, powdered or ground, upon which there is a United States duty of 20 per cent., and upon which there is no countervailing Canadian duty, is now to be reciprocally free.

FLUORSPAR, on which there is a United States duty of \$3 per ton crude, and 20 per cent. ground, and upon which no Canadian duty was imposed, is now to be reciprocally free.

MICA, unmanufactured and rough trimmed, and ground and bolted, is to be reciprocally free. The present Canadian preferential, intermediate, and general tariffs are respectively 15 per cent., 17½ per cent., and 17½ per cent. The United States duty is 20 per cent.

TALC, ground, bolted or precipitated, naturally or artificially, not for toilet use, is to be free. The present United States duty is one cent per pound.

From **GYPSUM** or **PLASTER ROCK**, crude, not ground, the United States duty of 30 cents per ton is to be removed. This is also the case with salt, from which duties of 7 cents per 100 lbs. and 5 cents per 100 lbs. are to be removed, respectively, by the United States and Canada.

ASBESTOS, both crude and ground, but not further manufactured, is to be free. Both countries are to wipe out a 25 per cent. duty on the ground, and Canada removes a 17½ per cent. duty on the crude.

COKE, upon which there is a United States duty of 20 per cent., with no countervailing Canadian impost, is to be free.

SODA ASH and **SALTCAKE** are placed on the free list.

The prohibitive duties on **GRINDSTONES**, unhewn

BUILDING STONES, ROOFING SLATES, etc., have been materially reduced.

On the part of the United States there has been a reduction of 5 cents in the duty on IRON ORE, making the present tariff 10 cents per ton.

As regards round and run-of-mine BITUMINOUS COAL, the Canadian duty has been brought down from 53 cents per short ton to 45 cents per short ton, as against the standing American duty of 45 cents per long ton.

* * * * *

If, as will probably be the case, these changes crystallize into actuality, then the mining industry of Canada will have received a strong stimulus. It will be noticed that amongst other minerals, gypsum, feldspar, fluorspar, and talc, both crude and ground, except in the case of gypsum, where only crude is admitted free in the United States, although both crude and ground are admitted here, are now reciprocally free. This means much to all of Eastern Canada, and will probably affect favourably Alberta and British Columbia. We regret, of course, that both ground and calcined gypsum have not been placed upon the free list. Nova Scotia and New Brunswick, with their enormous reserves of high grade gypsum, would have benefitted largely. But even the removal of the duty on crude will be of service.

As for feldspar, talc, and fluorspar, the commercial possibility of handling these minerals has been definitely enlarged. Feldspar mining is growing in importance every day. Apparently we possess the best and largest deposits on the continent, and there appears to be no reason why we should not curtail at once the shipment of crude and become shippers of ground feldspar.

The revision also provides an added outlet for our manufactured talc. The situation as regards mica and asbestos is improved. Fluorspar, mentioned above, is not yet mined in Canada, largely because of the very limited market and because of tariff inequalities. Now that these inequalities have been levelled, we shall hope to see two or more promising prospects developed.

As coke has been made reciprocally free, we shall expect a decided enlargement in the western output. Railroad tariffs are the controlling factor here. But any incidental amelioration of present conditions will be welcomed.

The whole question of mutual concessions in coal duties is too complicated to be discussed briefly here. We shall take this subject up at a later date. We may, however, remark here that this is at once the most vital and the most comprehensive topic of all.

In the main, we feel inclined to congratulate Canada's delegates upon having secured a fair quid pro quo. Canada is justly looked upon as the immediate source of raw material. Canada wishes to be looked upon more and more as the source of commercial products. The whole meaning of the tariff, or of any revision of the tariff, so far as Canada is concerned,

lies in the opportunities afforded to establish manufacturing and milling plants on this side of the International Border.

THE BELLEVUE VERDICT.

The coroner's inquest into the cause of the death of 31 men in the Bellevue colliery on December 9th, has resulted in a formal verdict attributing the fatalities to carbon monoxide poisoning. This verdict, dealing solely with proximate facts, is of little significance. The five riders attached to the verdict are much more important. They are put in the form of recommendations and read as follows:—

- "1. That more inspectors be appointed.
- "2. That a Draeger apparatus station be established in this district.
- "3. That telephones be established in underground workings under the supervision of the chief inspector wherever practical.
- "4. That a thorough investigation be made of means of preventing loss of miners by cave-in in mines.
- "5. We consider that negligence is in evidence on the part of operators and miners in the carrying out of the Coal Mines Act, and we would most strongly recommend a stricter adherence to the intent of the Act."

The first three riders are part and parcel of a necessary general movement. Inspection of coal mines in Alberta is casual, rather than systematic. Even if it were thorough, the means are lacking to make it effective. To be effective, inspection must be supplemented by rigidly enforced regulations. And, most assuredly, there must be a sufficient number of well paid officials appointed to cover the whole territory.

We are informed that, contrary to the recommendations of the manufacturer, the Draeger apparatus installed at Hosmer, B.C., which were hastily called into requisition after this Albertan disaster, were fitted only with 30-minute cylinders. The person or persons responsible for this gross error should be made to suffer. The modern respiratory apparatus is designed to supply oxygen to the user for approximately two hours. This by the way.

As pointed out in a former editorial, prevention through inspection and control of mining methods, explosives, lighting, and ventilation is the one prime necessity. Breathing-apparatus outfits are excellent accessories. But they cannot do more than supplement the work of complete inspectorial control. Mine telephones are also admirable and necessary devices. They also must be considered as units in a well organized system. No one device is a cure-all.

The last rider indicates that in the opinion of the coroner's jury there was evidence of carelessness on the part of operators and miners alike in carrying out the requirements of the Coal Mines Act, and strongly urges a stricter adherence to the intent of that Act.

In the course of the inquest evidence was adduced that proved criminal carelessness on the part of one of the miners, carelessness that implied a shocking lack of moral sense, and that, in itself, might easily have been the cause of the catastrophe. Such instances are not rare. It is hard to educate certain types of miners. While the great majority are intelligent and good citizens, the lives of hundreds may be jeopardized by the selfish recklessness of one. Hence it is imperative that steps be taken to inculcate into all a sense of personal responsibility. The individual who is willing to endanger the lives of his fellows should be treated as a criminal.

No sharp line can be drawn between management and men in the matter of responsibility. Usually both are culpable. Upon both devolves the duty of seeing to it that every possible precaution be taken to prevent the loss of life. In no less degree does the burden fall upon the Federal and Albertan Governments.

PORCUPINE PROSPECTUSES.

It appears impossible to rob the mining prospectus of its superfluous trimmings. Nor does it seem practicable to convince the promoter that a sound venture never requires bolstering with general quotations from other reports.

That recent incident, when the Hon. Frank Cochrane felt it his duty to correct a misquotation attributed to an English engineer, should go far towards clearing the atmosphere. The engineer in question had been credited in a newspaper advertisement with a sweeping eulogy of Porcupine. Of course, he had been guilty of no such silliness. But certain innocuous remarks of his had been garbled and mangled by the newspapers, and, falling under the eye of the prospectus-artist, had been promptly used. The Hon. Mr. Cochrane's correction was prompt and to the point. It is possible, even probable, that the inclusion of this quotation was done in all good faith. But it was totally unnecessary in any case, and, as the event proved, the quotation was not itself authentic.

Glancing over the prospectus that gave rise to the above-mentioned episode, we are surprised to find much evidence of carelessness and of absence of business acumen. For instance, on one page it is stated that more than fifty quartz veins have been uncovered. Later the number of veins is placed at ten. On one page, also, we are informed that stripping and trenching can be easily performed; whilst a few pages further on the opposite is affirmed. Moreover, the rash general statement is made that a certain vein will yield continuously handsome returns. This kind of vaticination has become unfashionable.

Promoters who are asking the public to take part in what may be a costly venture, can surely afford to put together a careful and accurate statement of facts. It is infra dig to permit sloppy errors and contradictions to creep into a prospectus. It is regrettably foolish to

allow one's fancy to gild the future with imaginary gold. All this is not so much a question of honesty as it is a question of horse sense.

The function of a prospectus is to present observed facts, and not to lend fictitious value to unproved mining claims.

THE MINERAL PRODUCTION OF BRITISH COLUMBIA.

Promptly with the close of the old year, the preliminary estimate of British Columbia's mineral production during 1910 has been published by the Provincial Bureau of Mines. Mr. W. Fleet Robertson, Provincial Mineralogist, is the compiler of this timely pamphlet. Once again we must felicitate the occidental Province upon its enterprise.

Taking Mr. Robertson's estimates for 1910, we note that the net increase in non-metallic products is \$2,809,116. Against this must be written off a net decrease in metalliferous products amounting to \$1,068,636. This leaves a balance of \$1,740,480 in favour of 1910 as compared with the gross output for 1909.

The appreciable falling off in copper, lead, and zinc was more than counterbalanced by an unusually substantial increase in the output of coal. The 1909 output of coal was 2,006,476 long tons. For 1910 the output was 2,800,000 long tons, an increase of 794,000 tons. This, as Mr. Robertson points out, is much larger than the two largest previous annual increases taken together.

Whilst slight enlargements of gold outputs, both placer and lode, are recorded, silver has fallen slightly. Apart from the disappointing results from the St. Eugene mine, the chief cause of the drop in lead production was the damage resulting from forest fires in the Slocan district. A larger output is predicted for the current year. The lessening of the copper output by about 6,000,000 pounds (the 1910 output being only 39,000,000 pounds), is not serious; new producing mines will bring up the 1911 totals. Zinc has been distinctly disappointing. The output for 1910 is but half of that for the previous year. Whilst there is no lack of ore, the forest fires delayed production considerably. The destruction of the Whitewater mill and the storage of a considerable quantity of concentrate by other operators contributed to cut down the returns. The outlook is not rosy, neither is it hopeless.

For 1911, prospects are in general most satisfactory. The Boundary country will, we doubt not, exceed itself. Coal production will certainly be largely expanded. The demand for coke will be distinctly better than during 1910. Gold should more than hold its own. Zinc may, or may not, gain a stronger position. One favourable symptom of 1910 was the payment of several considerable dividends by several of the larger companies.

Rand mines, during 1910, distributed a total of £9,115,500 in dividends. This enormous sum includes dividend payments from 45 companies. The largest dividend came from the Crown Mines. It amounted to £1,128,126. The rates of payment ranged all the way from 5 per cent. to 150 per cent.

Correspondence

THE EXPLOSION AT BELLEVUE COAL MINE, ALBERTA.

Editor, CANADIAN MINING JOURNAL.

Sir,—While on other pages of the CANADIAN MINING JOURNAL of January 1st you referred to the loss of life in an Albertan colliery and the duty of the Alberta Government to provide for the family of Fred Alderson, who sacrificed his life to save that of another miner, you also, in two parts of the same issue, left it to be inferred that the disaster occurred in British Columbia. Knowing that you have from time to time freely accorded the British Columbia Department of Mines credit and praise for having taken the lead in its efforts to safeguard the lives of miners employed in its coal mines, I am well aware that you would not intentionally leave room for the conclusion that there was or is any blame attachable to that department for the lamentable loss of life that took place at Bellevue last month, yet I venture to think it may be well to make it quite clear that the following item, taken from your General Mining News of the above-mentioned date, lacked the specific information that the disaster took place in Alberta, not in British Columbia. I quote the news item as you printed it:—

BRITISH COLUMBIA.

“Fernie, December 13.—Six of the Slav victims of the Bellevue disaster were buried here in one grave, and the body of Fred Alderson will be interred at Hosmer to-morrow.”

“It is a significant fact in connection with the disaster that a Government mine inspector viewed the mine for escaping gas three days before the fatality, and posted a notice to the effect that the timbering and ventilation were good, and that there was no gas.

“The Miners’ Union had asked that an inspection of the mine be made and told Inspector Sterling, it is stated, that there were volumes of gas in the mine. It is thought that there is yet one unrecovered body.”

You will probably agree that in the foregoing there is absolutely nothing to indicate that the disaster and suggested inefficient mine examination were in another Province, for British Columbia is the only Province mentioned—hence this letter.

Separately, I send you some particulars of the late Fred Alderson, who for the benefit of a strange miner—not even a working comrade in the mine in which he was employed, but an utter stranger in a mine in another province, to which he had hastened on the call of the common humanity that prompts miners to deeds of heroism—took the grave risks which cost him his life and left his wife a widow, and his children, orphans. You will note, too, that the British Columbia Government was prompt, first to send its mine-rescue apparatus to a province that had neglected to provide any, and, next, to contribute money for the relief of the distress of Alderson’s widow and orphans.

E. JACOBS.

Victoria, B.C., January 13, 1911.

ABSTRACT OF PRELIMINARY REPORT ON THE MINERAL RESOURCES OF THE CHIBOU- GAMOU REGION.

I.—Introduction.

OBJECT OF THE PRESENT INVESTIGATION:

The present investigation was designed to obtain the fullest information from a single season’s field operations regarding the natural resources, especially from the mining standpoint, of what has been called the “Chibougamou Mining Region,” with special reference to the asbestos and gold deposits already discovered there.

Ever since the first mineral discoveries in this district in 1903, the Government of the Province of Quebec had been repeatedly and strongly urged either to undertake the building of a railway to Chibougamou or to give such substantial assistance that private enterprise would be induced to undertake its construction. Before however, committing themselves to any policy or definite line of action, which in any case would involve the expenditure of a very large amount of public money, the Prime Minister and the Minister of Mines, on the recommendation of the newly appointed Superintendent of Mines, determined to obtain the judgment of those who compose the present Chibougamou Commission, not only as to the real value of the mineral discoveries already made, but also their opinion as to the future mining possibilities of this region.

With this object in view the present Commissioners examined in detail all of the prospects and mining development work which they could find or concerning which they had any information. In addition a careful and critical geological examination was made of the whole district in order to make possible the preparation of a geological map which would show the relations of the various mineral deposits studied. The Commissioners, therefore, in the present report, aim to answer the question, “Is the construction of a railway at present justified by reason of the mineral discoveries already made and partially developed?” And in the second place to furnish in detail the results of the various surveys and examinations arising out of this investigation.

PERSONNEL OF THE CHIBOUGAMOU COMMISSION:

As it was desired that the verdict of the Commissioners should be as conclusive and authoritative as possible, it was decided that Dr. Alfred E. Barlow, Special Lecturer in Economic Geology at McGill University, and late of the Geological Survey of Canada, should act as Chairman, while Professor J. C. Gwillim, Professor of Mining at Queen’s University, Kingston, and Mr. E. R. Faribault, of the Geological Survey of Canada, should

be the other Commissioners. Professor Gwillim, with Mr. A. M. Bateman, B.Sc., as assistant, devoted most of his time and attention to a critical examination and study of the numerous prospects, while Mr. Faribault's judgment was eagerly sought and appreciated in the appraisal of the gold discoveries. Dr. Barlow's work consisted primarily in the study and mapping the distribution of the several geological formations, although considerable time was devoted in company with Prof. Gwillim to the examination of the mineral deposits. In addition, Dr. Barlow, as a consequence of his direct control of the whole investigation, devoted considerable time and energy in the necessary administrative work. As it seemed desirable to cover as much of the territory as possible during the comparatively short season available for the work, the party was made unusually large.

On arriving at the scene of operations it was found expedient to sub-divide the large party into several smaller parties, each carrying on independent work, but reporting at frequent intervals to headquarters. In this way it was found possible not only to embrace the whole of the Chibougamou Mining region with a rather detailed and critical reconnaissance, but also to examine and study very closely the origin, mode of occurrence and geological relations of the various mineral deposits.

Mr. J. H. Valiquette, Q.L.S., the Assistant Superintendent of Mines of Quebec, and Mr. Arthur J. Merrill, of McGill University, did most of the topographical work, although after his arrival in the district Mr. Faribault did a very large part of this work.

Mr. Valiquette was assisted in his work by Mr. Eugene Poitevin, jr., of the Laval Polytechnic School, Montreal, while Mr. A. O. Dufresne, of the same institution, acted as assistant to Mr. Merrill. Mr. Theodore Lefebvre, of Montreal, assisted Mr. Faribault for a short time, afterwards joining Mr. Merrill's survey party.

The Commissioners wish to take advantage of this opportunity to express their keen appreciation of the zealous and intelligent work of all who aided in the scientific part of the work, often in the face of many adverse circumstances.

Our grateful acknowledgments are due to Mr. Reginald W. Brock, Director of the Geological Survey of Canada, for maps and the loan of certain surveying instruments which it was impossible to obtain by purchase during the short interval between the organization and the departure of the expedition.

ITINERARY:

The Chairman of the Commission accepted office on February 15th during a personal interview with the Premier, Sir Lomer Gouin. Owing to certain other engagements it was impossible for Prof. Gwillim to accept until March 17th, while Mr. Faribault's agreement to join the Commission was not possible for the same reason until April 28th, and it was further stipulated that he should not leave Quebec for Chibougamou until July 15th.

The chairman, in company with Mr. Valiquette, paid a short visit to Roberval on March 23rd for the purpose of inspecting the supplies which had been ordered for the expedition and which left Roberval the following day.

The expedition left the end of the portage which comes down to the Ashuapmucuan River on the north-east side almost directly opposite the Riviere aux Trembles (Poplar River), on Wednesday, June 15th, at 7.30 in the morning, and reached the headquarters camp at Pointe aux Bouleaux (White Birch Point) on

Thursday, June 30th, at 1.30. The time thus occupied in actual travelling was 13½ days. The six canoes used were made specially for the expedition by the Ontario Canoe Company, of Peterborough, Ont., and were of the larger sizes of what are known as the explorers' canoes. They were built of cedar covered over with painted canvas. Each canoe, in addition to its crew of from three to four men, carried about 700 lbs. of supplies and luggage.

The main party left the headquarters camp on Monday, September 19th, at 6.30, and travelling by way of the Chigobiche River, reached St. Felicien on Friday morning, September 23rd, at 9.30 a.m. Dr. Barlow and Messrs. Faribault, Valiquette and Bateman, by leaving the main party at the foot of the Pimonka Rapids, and travelling by way of the Riviere aux Trembles and the Village of La Dore, reached St. Felicien at 11 p.m. of Thursday, September 22nd.

Saturday and Sunday, September 24th and 25th, were occupied in settling up accounts, packing and storing outfit, when the whole party left Roberval for Quebec, reaching the latter place on the morning of the 26th.

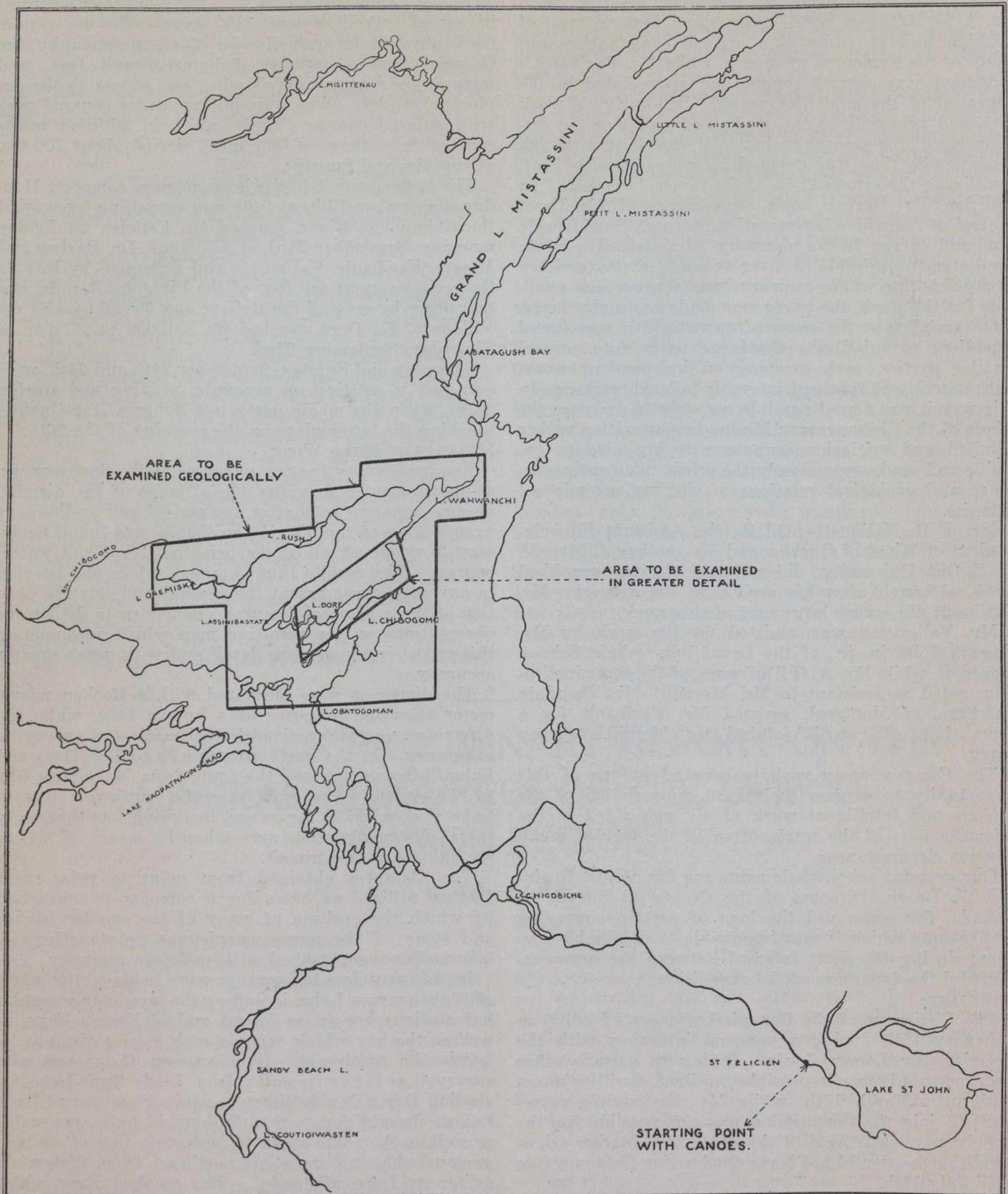
METHODS OF FIELD WORK:

The inadequacy for our purposes of the first surveys, as shown on the previous official maps of the district, became apparent soon after our arrival and preliminary examination of the district, so that it was found necessary to re-survey all of the principal lakes and water-courses. The results thus obtained, while not altering to any very great extent the general and relative position of these physical features, enabled us to depict our observations on the resulting map which accompanies this report in much more detail and with much greater accuracy.

The distances were measured with a Rochon micrometer telescope in terms of a known base, while the directions were determined by prismatic and surveying compasses. In the northern portions of Lac Dore and Lake Chibougamou and the route from Mackenzie Bay to Wakonichi Lake and from the southwest bay of Lake Wakonichi as far as and including Lac Bourbeau, the angles of direction were taken by means of a Gurley light mountain transit.

The distances obtained from point to point were further utilized as bases for a compass triangulation by which the position of many of the smaller islands and some of the more conspicuous points otherwise inaccessible were defined with sufficient accuracy.

In this way detailed surveys were made of the whole of Chibougamou Lake, including the large and irregular indentations known as Island and McKenzie Bays, as well as the bay which extends such a long distance towards the southwest. Chibougamou River was also surveyed as far as its outlet from Little Rush Lake, including Dore, David, Simon, Assinitchibastat and Rush Lakes. In addition to this, Wakonichi Lake was scaled as well as the route south to McKenzie Bay of Chibougamou Lake, and the route northeast from Wakonichi as far as Lake Mistassini. The crooked river which forms the canoe route from the northwest corner of Lake Wakonichi to the Chibougamou River and its tributary, the Chebistuenekan River, were also measured. Lake Bourbeau was also surveyed, including the route from its northeast bay to the southwest arm of Wakonichi Lake. Besides these a few of the more important tributaries of the Chibougamou River between Assinitchibastat and Rush Lakes, were ascended and surveys or sketches made of them. Besides, a survey was made of the Rapid River and the lakes which form its headwaters.



This map is from an old drawing. It is not revised to date.

THE AREA EXAMINED.

The altitudes of all the principal elevations were obtained by repeated observations with sometimes three aneroid barometers which had previously been compared with the mercurial barometer. An attempt was also made to determine by means of these same instruments the difference in elevation of all of the lakes, as well as to gauge the levels of the various streams, but with only indifferent success. These elevations have

not as yet been fully correlated with one another and Lake St. John, and cannot, therefore, be given in the present preliminary report.

All of the mineral deposits were carefully sampled by Messrs. Gwillim and Bateman and the resulting assays are included as part of Prof. Gwillim's report.

A systematic and typical series of all the rock types recognized in the district was collected, and from these

the usual transparent thin sections have been prepared for examination under the microscope. These are now being carefully studied and their detailed description will be included in the final report to be issued later.

The map accompanying this report has been compiled by Mr. J. H. Valiquette under Dr. Barlow's direction, and is on a scale of 40 chs. (1/2 mile) to an inch. It is not intended for final publication, but is included with this present report for purposes of illustration and elucidation of the various descriptions of localities.

There is also included a contoured geological map of part of Asbestos Island to show the principal excavations and pits. This is on a scale of 100 feet to the inch, with 25 foot contour intervals.

A large series of photographs (5 inches by 7 inches) was taken and the negatives developed in the field. It is intended that six albums, each including a complete set, will be prepared, three of which will be handed to the Department, while the Commissioners will each receive one.

These photographs are illustrative of the physical and geological features, as well as of the principal mining development work.

LOCATION AND AREA:

The position of the Chibougamou Mining Region covered by the work of the Commission extends from 49 degrees 30 feet to 50 degrees 15 feet north latitude and extends westward from 73 degrees 50 feet to 74 degrees 45 feet, thus embracing a rectangle measuring approximately 40 miles from east to west and 38 miles from north to south, or an area of 1,520 square miles.

The southern boundary of this rectangle is 300 miles almost directly north of Montreal, or nearly 250 miles N.N.W. of the City of Quebec. The southern end of Chibougamou Lake is about 125 miles in a straight line northwest from Roberval on Lake St. John. By the north-west route following the Ashuapmuchuan and Chigo-biche Rivers, this same locality is 200 miles from Roberval, but by using the wagon road from Roberval by way of the Village of St. Prime and St. Felicien to the Ashuapmuchuan River opposite Riviere aux Trembles (Poplar River), this distance is reduced to 185 miles. From the south end of Lake Chibougamou to our headquarters camp at Pointe aux Bouleaux, is 9.5 miles.

MEANS OF COMMUNICATION:

Being situated on the other side of the height of land dividing the waters flowing south from those flowing to the west and northwest, this region can only be reached by ascending, to its head waters, one of the larger tributaries which enter the St. Lawrence from the north. Of these the Gatineau, St. Maurice and the Ashuapmuchuan are the largest, most easily navigable and the most direct. The shortest and probably, therefore, the easiest route is that which has been usually followed by way of Roberval and Lake St. John. With the construction of the Grand Trunk Pacific Railway, a shorter and better route will no doubt be found by way of the lakes and streams near the head waters of the St. Maurice River, but pending the completion of this railway, the usual route which was followed by the Commission is much to be preferred.

The Quebec and Lake St. John Railway reaches Roberval on the west shore of Lake St. John about 9 miles from the mouth of the Ashuapmuchuan River (usually abbreviated Chamuchuan). From Roberval, canoes and provisions may be transported by wagons (14.5 miles) or by steamer by way of the lake and river to St. Felicien, a village on the southwest side of the Ashuapmuchuan River (18.5 miles).

St. Felicien is really the assembling place for the guides, most of whom come from Pointe Bleue on the Indian Reservation, and the starting point of all expeditions. From St. Felicien canoes and provisions should be transported by carts to the mouth of the Riviere aux Trembles, the old route to the head of the Bear Portage (Portage a l'Ours) having been superseded by this one, which reaches the stream some miles further up and avoids three portages.

From St. Felicien there is the choice of two routes. One road follows the west side of the Ashuapmuchuan River by way of the Village of La Dore and reaches the Riviere aux Trembles (Poplar River) about 3 miles above its confluence with Ashuapmuchuan River. The last three or four miles of this road is bad, as it passes over a flat burnt, sand country, which is now covered with a very scanty growth of small jack pine. At rather frequent intervals it also passes through black spruce swamps. It has simply been cut out of the thin forest with little or no improvements. The Riviere aux Trembles is a shallow and crooked stream with many sand bars and is scarcely navigable by loaded canoes in dry weather. The route on the east side passes over a fine new bridge (Carbonneau Bridge) nearly 2,000 feet in length and is that usually travelled to Normandin and the settlements on the Mistassini River. A branch from this road about 5 miles in length reaches the Ashuapmuchuan River, almost directly opposite the Riviere aux Trembles. This last 5 miles is very bad through a jack pine plain road running over and between sand dunes. This latter route taken by our party is about 18 miles in length. It has little if any advantages over the road on the west side and is considerably more expensive by reasons of certain exactions by certain of the local people who pretend to have improved the road.

Table of Geological Formations.

The rocks of the Chibougamou Mining Region, arranged in the order of their geological age, may be tabulated as follows in descending order:

1. Quaternary.....Sands and Gravels,
Boulder Clay.
2. Lower Huronian.....Slates, sandstones, arkoses
and glomerates.

GREAT UNCONFORMITY.

IGNEOUS.

(Intrusive and of Different Ages).

3. Laurentian.....Granites.
Granite and Diorite Gneiss,
Igneous Contact.
4. Anorthosite.....Gabbro,
Igneous Contact.
5. Keewatin.....This series includes the as-
bestos bearing serpentines
which are altered dunites
and conglomerates.
quartz porphyries and
porphyrites, amygdaloidal
basalts, diabases and gab-
bros.

General History.

This will deal with the early exploration and development of the district and will be fully treated in the final report.

PREVIOUS WORK:

A summary of this has been given by Prof. Gwillim in his report which is appended.

It will also be much more fully treated in the final report. It will then include a statement in as concise a form as possible, of all the previous reports, bearing on

the geology, topography and natural history of this region and that to the southeast by which it is reached.

Summary of Conclusions.

GENERAL GEOLOGY AND AGE, RELATIONS AND FORMATIONS.

The area under consideration is underlain by rocks of Archæan or Pre-Cambrian Age. These are included in the Keewatin, Laurentian and Lower Huronian formations. In addition a rock which seems peculiar to this Archæan area has been called and the name is here retained "gabbro-anorthosite," because, although it is of gabbroic type, there is a marked absence or paucity of ferro-magnesian minerals, which are almost invariably present and sometimes abundant in typical gabbros. In this respect the rock resembles the anorthosite formerly classified as Upper Laurentian.

The Keewatin formation is important from an economic standpoint, because it includes certain serpentinous rocks (altered dunites and peridotites) portions of which contain veins of asbestos. These are the oldest rocks of the district. They are penetrated by the batholithic mass of the gabbro-anorthosite already mentioned and which, as shown in the map, extends in a west-southwest direction from the Bay of Islands across Chibougamou, Dore, Cache, David and Simon Lakes, where it seems to end abruptly, being replaced in this direction by granite and granite schist breccia. The northern contact of this mass with the Keewatin rocks is economically important, because it is in this vicinity usually in the green schists of the Keewatin, but also sometimes in the anorthosite gabbro itself, that the gold-bearing quartz veins have been developed. Indeed it has been established almost beyond a doubt that the intrusion of the gabbro-anorthosite has been the direct cause of the formation of these quartz veins in which gold as well as copper has been found. Such quartz veins with chalcopyrite (copper pyrites) and occasionally dikes containing the same mineral are deposits which owe their presence to the differentiation of the same magma from which the anorthosite gabbro has solidified. In addition, the deposits of chalcopyrite and pyrrhotite occurring at Copper Point on Portage Island, are similar in origin, though much smaller in volume, to the nickel and copper deposits of the Sudbury district. They are thus a direct differentiate product of the anorthosite-gabbro, and occur close to the line of junction between this rock and the Keewatin green schists. The titaniferous magnetite deposits found at Sorcerer Mountain, north of Copper Point, and also on the islets near the southern or main outlet of Lake Chibougamou are also of magmatic origin and occur at or in the immediate neighbourhood of the line of junction between the anorthosite-gabbro and Keewatin green schists.

This gabbro-anorthosite is also an economically valuable rock formation, because the feldspathic dykes, which cut the serpentines on the shores of McKenzie Bay and Asbestos Island, are believed to be the surface expression or upward extension of the anorthosite-gabbro. It is the intrusion of these dykes which has contributed to the formation of the silky asbestos at Pits 3, 4 and 7, while the presence at the surface of a small dyke of similar material a short distance north-east of No. 6 Pit, may be an indication that the main body of the gabbro-anorthosite is not very deeply buried in the vicinity of Pits 1, 2 and 6.

Both the Keewatin schists and gabbro-anorthosite are intruded by certain granites and diorites, some portions of which, especially near the junctions with the older rocks, are very plainly foliated. From their general composition, appearance and geological rela-

tions, these rocks have been classified as Laurentian. Both the gabbro-anorthosite and the granite in certain areas intrude the Keewatin in the most intricate manner, forming a breccia which in certain localities underlies a comparatively large area, as on Assinitchibastat Lake in the vicinity of and opposite to the inlet (Chibougamou River).

The Lower Huronian is represented by certain conglomerates, arkoses, sandstones and slates which either in horizontal position or in low broad anticlinal and synclinal folds rest unconformably upon the upturned edges of the Keewatin and the uneven or the hummocky surfaces of all the older rocks which have already been described.

These conglomerates when resting directly upon the Keewatin often contain very few pebbles, while the greenish chloritic matrix, in which the pebbles are embedded, is by far the more abundant portion of the rock. Where, however, they rest directly upon the granites or gneisses of the Laurentian, the lower beds are an arkose conglomerate or arkose made up almost altogether of the broken up fragments of the granite. The Lower Huronian presents a transition upward from a basal conglomerate usually into arkose or arkose-quartzite; these in turn pass into comparatively dark grey or greenish grey feldspathic sandstones and these again upward into slates which sometimes show the cleavage planes as quite distinct from the bedding. Sometimes there is an alternation of coarser and finer grained sediments, so that at the tops of some of the hills as on Wako Mountain, we find in the upper beds a comparatively coarse conglomerate, while further down the hill were noticed strata of sandstone and slate.

ECONOMIC GEOLOGY:

From an economic standpoint the junction between the gabbro-anorthosite and Keewatin schist is perhaps the most important geological feature in the district, for it is at or in the immediate vicinity of this line of structural weakness that the copper bearing quartz veins, in which gold has been discovered, occur. It is in this neighbourhood also that the iron (magnetite) of Sorcerer Mountain and the sulphide deposits carrying small amounts of gold and nickel of Copper Point, occur. Both in the gabbro itself and in the Keewatin green schist, veins and patches of quartz and sometimes calcite and dolomite, often occur either with or without sulphides, but their small size and irregularity would seem to be serious obstacles to their economic development as mines.

SERPENTINE AND ASBESTOS:

The serpentines of Rapid River, McKenzie Bay, Lac Bourbeau and Assinitchibastat result from the alteration or decomposition of certain dunites and peridotites. These serpentines are very dark green in colour sometimes almost black, and have a distinctly harsh rather than an unctuous feeling characteristic of pure serpentines, except in the vicinity of certain feldspathic dykes, and other favoured localities where almost all of the iron has been leached out and removed to other places, leaving a comparatively small band (3 to 6 inches in width on either side of the dyke) of very pure pale green serpentine.

In certain places, usually in the immediate (3 to 6 inches) vicinity of the feldspathic dykes, small veins of silky asbestos have been found, many of which are of a high grade, but these do not constitute a large percentage of any considerable bulk of the rock, nor are they continuous for any great length, as they are subject to frequent dislocation and faulting and very often

thin out altogether in every direction. Most of these veins vary from the thickness of a knife blade up to a quarter of an inch and the widest is not more than three-quarters on an inch.

GEOLOGICAL PROBABILITY OF OCCURRENCE OF GOLD:

As has been already mentioned, the rocks embodying the whole area examined by the Commission are of the Archæan or Pre-Cambrian Age. This, therefore, is common with other similar areas of our hinterland, is very promising from a mining geological standpoint. The large areas of Keewatin schists present precisely similar rock types as have been found associated with the gold of the Porcupine and Larder Lake gold districts in Ontario, while the geological relations so far as known are not dissimilar. In addition the almost invariable presence of gold in the quartz and its occurrence over such a wide area, although usually in a small amount, is distinctly encouraging and should stimulate prospecting if the region was not so usually and deeply covered with peat and moss, and if it was not so remote from civilization and thus difficult of access. The sulphide deposits of Copper Point are also worthy of further development work. This occurrence seems to have puzzled the earlier mining engineers at this place and under these conditions. None of the discoveries of copper and gold is in deposits of such magnitude or promise as would enable your Commission to state without a considerable degree of hesitation that they would with further development become "mines" in the strict meaning of this term.

POSSIBILITIES OF ASBESTOS:

Although the possibilities of the Chibougamou serpentine as an asbestos producer have not been exhausted by the mining development work so far undertaken, the results so far are decidedly disappointing. The amount of asbestos noticed in the working faces of the various open cuts and workings as well as in the dumps, is inopen cuts and workings as well as in the dumps, is insignificant and altogether insufficient for their successful exploitation as mines. The previous reports on the occurrences of this mineral are, to say the least, optimistic and misleading. Not only does the serpentine of Chibougamou cover a much less area than was described and outlined in previous reports and maps, but the serpentine itself is much less pure, except in very restricted outcrops, and as a consequence is very much less in area than that of the Eastern Townships with which it has been compared. In addition, the geological relations are essentially different from Thetford and Black Lake, for whereas at these places the differentiation in the magma as shown by the various rock types extends to the most acid phases and is therefore very complete, the most acid rock type noticed at Lake Chibougamou is only at most of intermediate composition as exemplified by the feldspathic dykes already mentioned as cutting the serpentine.

POSSIBILITIES OF IRON:

The deposits of iron ore (magnetite) which are perhaps large and more typically exposed on the southern face of Sorcerer Mountain than elsewhere in the region, are not of any great importance at the present time.

The chief occurrences of pyrite are on Portage Island near the northern end of Paint Mountain. The mineral here occurs as abundant disseminations in chlorite schist and decomposed diabase. No large body of pure pyrite capable of economic development as a source for sulphur was, however, noticed. Similar outcrops on one of the western summits of Sorcerer Mountain may be a continuation of this belt, but here likewise no massive deposit was found. Similar occurrences, some richer and some leaner, are by no means uncommonly met

with in the Keewatin formation of Northern Ontario and Quebec; in fact, their frequency seems to be a characteristic of this formation. It is possible that a large and pure body of pyrite might be discovered, but the expense of prospecting and the remoteness of the district will be ample deterrents.

NO PROBABILITY OF SILVER OR COBALT AT CHIBOUGAMOU:

The conglomerates of McKenzie Narrows, McKenzie and Rapid Bay on Lake Chibougamou, as well as those on Wakonichi Lake, are of Lower Huronian and thus presumably of the same geological formation as those of Cobalt, in which many of the silver veins of Cobalt have been found.

The newer diabase, however, which is the real "silver bringer" and to whose intrusion the silver bearing veins owe their presence, was not found, although careful search was made for it.

It is not likely, therefore, that any similar deposits will be found in the Chibougamou Region, and the reputed "finds" of silver, smaltite and cobalt bloom must be treated as false. It is possible, although unnoticed by any member of your Commission, that cobalt bloom may occur in small amount, but an examination of the localities where it was reported as occurring, failed to show any sign of this mineral, while the rocks themselves at one of these places was not at all favourable to its presence.

OCCURRENCE OF LEAD AND ZINC AT MISTASSINI MAY BE IMPORTANT:

Galena and zinc blende are present, both in small amount, in the flat lying limestones occurring at the Narrows about two miles north of the Hudson's Bay Company post at Mistassini. Although the deposits there examined are not economically valuable, the presence of these minerals, even in small quantities and in such geological association, is of somewhat more than scientific interest, as it is under precisely similar conditions that the great deposits of the Mississippi Valley occur.

(To be continued.)

The Investigation and Development of Gold Areas,

(Written for the CANADIAN MINING JOURNAL by
R. B. Lamb.)*

The examination and development of gold-bearing deposits present some features so very different from other metalliferous ore bodies that discussion and consideration of their many problems is always in order.

Too much reliance is invariably placed upon immature observation and assay values of grab samples of gold-bearing rock.

Nothing should be so vigorously condemned as the faith placed in samples selected by untrained samplers. Such information is uniformly misleading and is the source of false reasoning and of money losses. It is not the intention here to discuss methods of sampling, examining, and valuation of gold deposits, but rather to point out some of the pitfalls into which the younger engineer may trip.

It should be noticed that:

1. Gold occurs free, in association with other metals and minerals, and as alloys.

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2. It is found almost invariably in shoots "pitching" in the ore body.

3. Gold is usually irregularly distributed in the pay shoot.

4. Values exist frequently beyond the limits of the pay shoot.

5. There is a very small weight of metal per ton of gangue material.

6. Free gold in an ore shoot is usually found in crevices, cracks, vugs—in crushed and fractured parts of the vein matter—in association with other minerals softer than the gangue—in aggregations, bunches, flakes, etc., irregularly distributed in the rock matter of the vein or deposit. It is sometimes discovered in the wall rock in releases, gouges, etc.

Frequently parts of the vein within the ore shoot are wholly barren. In replacement deposits, as altered limestones, great irregularity of gold deposition occurs and barren material in the limits of the ore shoot are of common occurrence.

"Horses" of barren material often cut into the vein or ore body; in many instances within the pay shoot itself.

7. Gold values, in many types of ore deposits, present a banded structure, the gold being found in parallel or irregular lines with barren or low grade material between the higher grade bands.

8. Some types present definite but narrow streaks of pay-ore with irregular direction within a low grade or barren gangue material.

The above factors are the principal reasons why sampling and investigation of gold-bearing deposits differ substantially from those of most other metals. It will readily be seen that should conditions such as the above obtain, inexperienced sampling must of necessity be absolutely worthless. An assay from any portion of a gold vein is only representative of the sample taken. The sample and not the assay is the determining factor.

It may be said that a free gold condition with sulphides, for proper appraisalment requires samples cut under an engineer's direction, which means due regard in cutting for all the eight factors stated above and such minor considerations as will present themselves to the valuer making the appraisalment.

The closer the sampling and checking such as additional time and expense will permit, the more reliable will be the conclusion. The fire assay results should be invariably checked by the pan. It may be almost needless to observe that exact valuation of gold deposits depends largely on frequency of sampling and the methods employed. Generally a difference up to fifty cents per ton is a close check on ore under six dollars per ton between different engineers on average conditions; and up to one dollar per ton on ore of ten dollars per ton up to twenty dollars per ton. Under one dollar per ton

with ten dollar or twenty dollar ore is usually regarded as a trace in mine sampling.

The accuracy of sampling in mine work in ores from ten dollars to twenty dollars per ton as a general rule need not be calculated closer than the above-named margin between different engineers. The whole of the sampling should be properly mapped and calculated on the widths taken. The usual methods of calculation are followed.

A departure at this point is usually made by experienced gold engineers. Notwithstanding the care taken in sampling, free gold makes for irregular results and the engineer is frequently called upon to give the milling average of the deposit under observation. A deduction after calculation is made for this and the result obtained should show what the ore can be depended on to mill; that is, to return to the mine owner in bullion. This deduction varies from two and a half per cent. to about twenty per cent., and is determined by the experience of the engineer making the observations. It is possible to eliminate entirely this deduction in developed properties by going to greater expense in sampling.

In sampling and observing prospects local conditions will largely influence the observer, but no final conclusion should be reached on purely surface showings. Sampling should be done on the surface outcrops and stripped showings, but it should be supplemented by samples from pits, trenches, etc., put down under the direction of the examining engineer during the time of his investigations. It is usual to accept the indicated observations of prospects that look favourable only on condition that development work be allowed before substantial payments are made.

The whole of the pioneer work in gold areas should be directed to "following the ore"—stick to the values and develop for further examination and observation. Permanent development work and the laying out of a mine cannot be properly begun until there is something exposed to do it upon. The prospect under working exploration will show conditions that will indicate to the engineer in charge how to lay out future development and what kind of managerial policy to recommend. It is impossible to make a two-day infant walk—a prospect is not a mine—don't kill a possible mine by conducting and managing an encouraging prospect like a proposition of blocked out reserves. A windlass is needed before a Nordberg, and picks and powder are required before a stamp battery. It is important to have a shaft on the ore shoot before a completely stocked warehouse is placed on the claim.

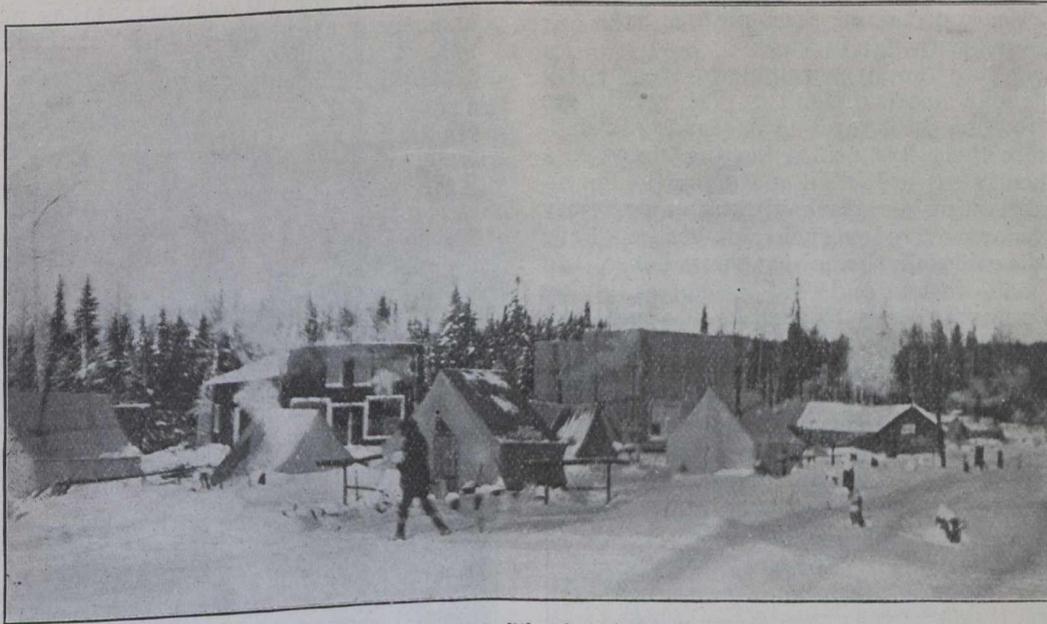
Spend your money on men and dynamite and assay, map and tabulate your results. Then it is known what your proposition is and what it stands for. More money can then be intelligently spent or the shaft can be nailed down.

PORCUPINE GOLDFIELD IN WINTER

(Reginald E. Hore, Houghton, Mich.)

The potentialities of Porcupine being now well recognized, and a good temporary road available, strenuous efforts are being made in preparation for the exploration and development of the gold deposits. Testing work in Tisdale Township during the past year has proven two large ore bodies, for the mining and milling of which there is machinery now on the road. Surface prospect-

ing has disclosed some very promising deposits, which are now being explored, and a very large number of less promising or less favourably situated deposits which are being investigated in varied degree according to the supply of faith and funds. Notable efforts are being made by merchants who wish to participate in the business arising from the mining activity. Others have been



The tented City west of the Shuniah, Porcupine

attracted by the opportunity for speculation in claims and town lots; but there has been no remarkable boom.

On the sleigh road from the railroad to the camp over 200 teams are engaged in hauling in supplies. The lack of good summer roads, followed by two or three weeks of isolation during the freeze up, left the camp in the fall with a meagre supply of foodstuffs. During the last week of November a winter road became available, and the immediate needs were soon served. Then followed hundreds of sleigh loads of building materials, part of it for the mines; but much also for the housing of mercantile enterprises on the numerous townsites. Then in January began more frequent shipments of mining machinery. Building materials, food and machinery will be hauled in in large quantities during the next few weeks, and then in March and early April the camp will be stocked with food sufficient to last until the arrival of the railroad in midsummer.

Kelso Mines.

As a result of the activity on the trail, a temporary town has sprung into existence at mileage 222, and has been officially designated Kelso Mines. The T. & N. O. Ry. has provided good yard facilities for handling the incoming freight, and has erected a suitable station house in place of the old day coaches which served in the summer. Besides numerous buildings for the accommodation of men and horses there is, facing the railway, a long line of shops. Once the branch line into Porcu-

usually well filled with cars, but there are at present sufficient teams to handle 200 tons per day, and the road should be good until the end of March at least. The freight charges vary according to the demands, but 60c. per cwt. is quite frequently quoted. The larger consignments are being handled on contract.

To take care of the large quantity of supplies and machinery ordered for the Dome Mines, the management has a private siding with office and warehouse. Other large interests also have special facilities, and there is, consequently, little confusion in the yard.

The Sleigh Road.

There is a remarkable contrast between the summer and winter roads to Porcupine, the former exceedingly bad and the latter unusually good. It is doubtful whether there could be found in Ontario a 30-mile road better suited for the hauling of freight than is the sleigh road to the gold mines. It is more nearly level than most roads of equal length, is remarkably well protected by thick forest, and on account of the low temperature presents an unusually hard and firm surface. Heavy loads are, consequently, readily handled, and the average drawn by single teams must be nearly three tons. An ordinary load of rough lumber contains 2,500 to 3,000 feet.

From Kelso the stages follow the wagon road to Frederick House Lake, then go along the shore to the mouth of the Frederick House River. The river is then



Noonday scene at Price's Stopping Place.



The Shuniah Hotel, Porcupine.

pine is constructed there will be little reason for the existence of Kelso, and most of the buildings have evidently been erected with this in view.

It seems likely that the large volume of freight will be handled without great difficulty. The yards are followed for a few hundred yards to Richardson's stopping place. Here there is a bridge leading across to a winter road recently cut to Hill's Landing on the Porcupine River, and making a remarkably pretty driveway through close snow-covered spruce and cedar. Four miles from Richardson's is Price's halfway house, and here a stop is made to rest and feed the horses, giving the passengers an opportunity to partake of a meal and warm their toes and noses. The journey is then resumed, and the Porcupine River is crossed at Hill's. Then the narrow, high-crowned, deep-ditched summer road is followed to Golden City and Porcupine Lake. South Porcupine is reached by crossing on the lake, and

the lake; but for various reasons has not been used so extensively as the route described above.

Most of the sleigh roads end in Tisdale Township, and supplies for outlying properties are taken in on toboggans. Off the trails, travelling without snowshoes is practically impossible. To draw the toboggans, dogs are much used, though the prospector is frequently himself the beast of burden. The sleigh dogs are of very numerous types, and mostly mongrels; but there are few of the hybrids such as are used in the far north. An occasional Labrador wolf dog may be seen, but it is the exception rather than the rule.

Mail and Telephone Service.

Porcupine has at last been given a daily mail service, and the summer's second-class mail was taken in in time for Christmas. It is hoped that adequate post office facilities will soon be established, though there is no remarkable haste to this end manifest. A telephone



On the Winter Road.



Grading on Porcupine Branch of T. and N. O. Railway.



Machinery on road to Timmins Mine.



A scene at Kelso Mines, at right is road to Porcupine.

thence there are good roads to several of the leading properties. One leads west to the Hollinger, Rea and Vipond, and a second southwest to the Dome and Foster.

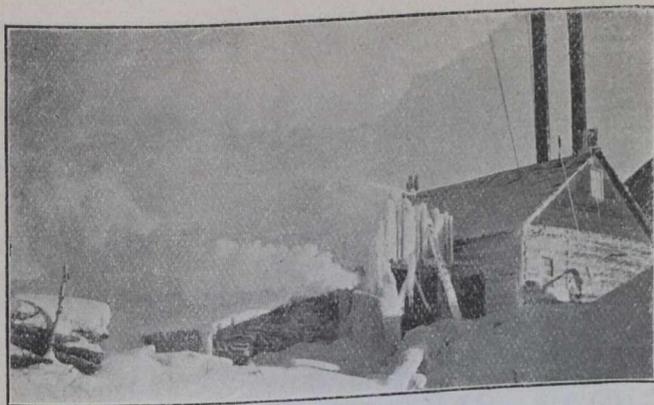
The stage trip is under ordinary conditions quite a pleasant one, and rarely a severe one if made in daylight. Since many of the travellers reach Kelso in the evening, it is the custom to send stages over the road during the night. Travelling in the dark gives the advantage of a road free from teams; but, especially along Frederick House Lake, has led to undesirable experiences on cold and stormy nights. It is unfortunate that the lake shore has been used rather than do a little additional cutting through the wind-defying forest, and it is remarkable that no marks have been set to guide the teamsters.

While most of the freight travels over the same road as the stages, there is a second road from Kelso to Hill's. This runs past the Kelso nickel mine and avoids

company has connected the mines and town with the outside world, and proposes to establish telegraphic connections at an early date.

Townsite.

Of townsites at Porcupine, there are seven or eight, and much speculation and confusion has naturally resulted. Some of these are evidently better than others, but none are remarkably favourable. The lake shore does not present a good natural townsite of any great extent, since for the most part the land is low and the water shallow. Drainage and water supply will be serious problems for a town of any size on any of the present lake shore sites. Under the circumstances, the location of the railroad will probably determine that of the town. Well informed persons have remarked on the superior conditions at Mattagami River, a few miles west of the Hollinger Mine, and though perhaps too far distant from the present centre of mining activity



Hollinger Stamp Mill, Porcupine.

to be as yet seriously considered, the natural advantages on the river will doubtless be generally recognized later. Certainly the railroad should be extended thus far.

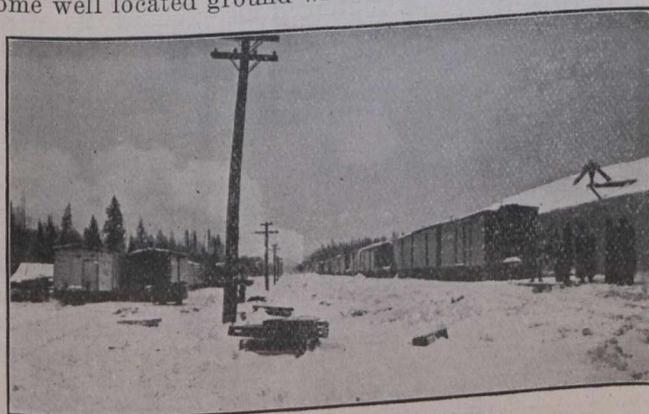
On the various townsites, numerous buildings are being erected. Among these are two hotels, and as the Shuniah is being enlarged, there should soon be good accommodations for visitors. Very conspicuous are the numerous banking offices, making plain the desire of these institutions to get a foothold in Ontario's gold camp.

The Government Railway.

After private interests had, after much delay, begun the construction of a railroad into the camp, the Ontario Government announced that the Province would build the road. From a point two miles above Kelso the work is now being carried on. Several miles of the line has been cleared of forest, and some grading, which is very light, has been done. The exact location has not yet been made public; but the line will evidently cross the Kelso wagon road twice before Frederick House Lake is reached, and probably pass near Price's stopping place. It is expected to touch at the north end of Porcupine Lake, and then run down the west shore to South Porcupine, and thence to the Dome Mine. Probably later an extension will be made westward to Pearl Lake and the Mattagami River. The appropriation of \$450,000 for the building of the road allows about \$15,000 per mile. It is expected that there will be steel to Porcupine Lake by July.

Development.

Owing to the deep covering of snow, surface prospecting in winter is in most cases unsatisfactory. Few new finds are made, and of the nature of these little is determined before the snow melts. Some surface work is being done, however, including the stripping of finds made during the past summer, and the trenching of some well located ground which was too wet to work in



Freight on Siding at Kelso Mines.

the fall. It was found that in some such places water filled the trenches almost as quickly as the clay was removed, and hence it is an advantage to have the ground frozen. The removal of a few feet of snow is a small item when the trenches are of any considerable depth.

On a number of properties which have good surface showings, preparations for development work are now in progress, camps are being built, and supplies and machinery assembled. On two properties, Dome and Hollinger, development work has already been carried on to such an extent and with such satisfactory results, that preparations for mining and milling ore on a large scale are under way. The quartz mass at the Dome Mine has been blocked out by drifts and cross-cuts run at regular intervals on the 60-foot level, while the surface has been carefully sampled. The several drill holes proved the deposit to a depth of 400 feet, showing the ore body to be very large and giving a more definite idea of its shape. No tests have yet been made at greater depth, and exploration work is now postponed, while the permanent hoisting shaft is being sunk. The exploration shafts will probably be used in blasting down the ore by underhand stoping, while all hoisting will be done at the new shaft. That the cost of mining will be low is evident. The cost of milling has yet to be determined, as some of the conditions are not remark-



On the Kelso Road.

ably favourable. To reduce the ore, a 40 or 50-stamp mill, and a complete recrushing and cyanide plant will be erected in the spring. It is planned to handle about 250 tons per day.

On the Timmins-McMartin-Dunlap properties, the chief development is on the claims held by Hollinger Gold mine. On one large vein two shafts, 250 paces apart, have been connected at the 100-foot level by a tortuous drift following the vein for most of the distance. From the first level a winze has been sunk in the vein, and is said to be in good ore. The 2-stamp test mill handles about 4 or 5 tons per day, with a maximum capacity of 10 tons when the steam pressure is good and favourable ore is being fed. The quartz crushes readily; but the schistose carbonate wall rock is more troublesome. One of the owners is quoted as stating that the 300 tons of ore first treated in the mill averaged \$50.00 to \$250.00 per ton. Only a small fraction of the ore mined in development work has been milled. A 30-stamp mill, to crush Hollinger ore and take custom work, has been ordered by the Timmins syndicate, and will be erected in the spring. It is apparently not the intention to put in a cyanide plant immediately, as there is considerable quartz that is reasonably free from sulphides. It will evidently be possible to keep the stamps busy crushing for some time before feeding much of the pyritic country rock.

This property has been incorporated as the Hollinger Gold Mine, and shares representing a minority interest were recently placed on the market. The control lies still with the quintette who developed the La Rose Mine.

Aside from the Hollinger claims, the Timmins syndicate has done some development work on promising veins on the Miller-Middleton claims. If these veins prove as satisfactory as the surface showings indicate, there should soon be another producing mine in the camp.

At the Vipond property of the Porcupine Gold Mines Company, there have been two stamps put into com-

mission recently, and there are, consequently, now three Porcupine properties which are producing gold while exploring the ore bodies.

At a number of other properties, including the Rea (Consolidated Goldfields), Foster, and Armstrong-McGibbon (Tisdale Mines), exploration shafts are being sunk in ore, and much information as to the nature of the deposits should be gained in the next few months.

Spring should show the camp to be well stocked with supplies, power from Mattagami River available, and steel being laid. Important developments during the year are therefore to be expected.

WORK OF THE GEOLOGICAL SURVEY IN 1910

(Written for the CANADIAN MINING JOURNAL.)

The geological and topographical field work undertaken by the Geological Survey during the past season has, as usual, been economic in its bearing, most of it directly so; but a little has been on the broader problems of Canadian geology whose solution is required for the interpretation of the facts gleaned in the detailed examination of the mining districts. Most of the fields selected are those in which work has been specially asked for by the mining profession, Boards of Trade, etc. Not all such requests received could be met, on account of the lack of specially qualified men to take charge of the operations. So far as possible, however, this was done. The guiding principle in the selection was to choose those districts in which the work would be likely to prove of most immediate or of greatest value. The parties were distributed as follows:

Mr. D. D. Cairnes was engaged in investigating the ore deposits of the Atlin District. This district has for a decade been known as a placer field. During the past season some promising developments in lode mining have taken place.

Mr. R. G. McConnell spent the season studying the geology and ore deposits of the Stewart district at the head of Portland Canal. This district attracted a great deal of attention during the summer. While promising deposits have been found, exaggerated reports sent out threatened a wild boom, which, fortunately, the Survey was able to assist in preventing by the publication of official despatches from its representative in this field.

Mr. G. Malloch made a topographical survey of this district.

Mr. W. W. Leach continued his topographical and geological mapping of the Hazelton district. The approach of the Grand Trunk Pacific Railway brings this section into prominence. Promising discoveries of silver-lead, copper and coal have been made.

Mr. R. H. Chapman, assisted by Messrs. Chipman, McLean, MacKay, McElhanney and Wookey continued the topographical mapping of Vancouver Island. Mr. McLean continued the triangulation of the island as control of the topographic maps. Mr. Chapman divided his forces into three parties and completed the mapping of three more sheets.

Mr. C. H. Clapp made a detailed examination of the area of the Victoria and Saanich sheets, which were topographically mapped the previous season by Mr. Chapman. Vancouver Island is now attracting many settlers and the topographical and geological mapping of the island is of great and immediate value.

Mr. C. H. Camsell completed his topographical and geological survey of the Tulameen district and made a

reconnaissance from the international boundary line to the Nicola Valley. This section is noted for the variety of its minerals, and prospect of railway transportation is bringing it into notice.

Mr. L. Reinecke completed his topographical mapping of the Beavercreek mining district, West Fork of the Kettle River, and began a study of its geology and ore deposits.

Mr. W. H. Boyd made a topographical survey of the Deadwood Mining Camp and continued his survey of the Slovan district.

Mr. O. E. LeRoy made a study of the geology and ore deposits of Deadwood, completed his investigation of the ore deposits of the Slovan silver-lead district, and made a preliminary examination of Franklin camp, North Fork of the Kettle River.

Mr. S. J. Schofield continued his topographical and geological survey of East Kootenay.

For the correlation of the formations met with in the mining camps and for the deciphering of their complicated geological structure several detailed geological sections across the Cordillera in Canada are required. Such a section has been constructed by Mr. R. A. Daly along the international boundary line. A similar section is now needed along the main line of the Canadian Pacific Railway. Work upon this was commenced this season. Mr. J. A. Allan was at work in the vicinity of Ice River. Mr. H. S. Shimer studied in detail the Devon Carboniferous rocks near Field. The Cambrian rocks near Field have been made the subject of careful study for several seasons by Dr. C. H. Walcott, Secretary of the Smithsonian Institution, Washington. Incidentally it may be mentioned that Dr. Walcott found here one of the most remarkable deposits of fossils ever discovered.

Mr. D. B. Dowling continued his explorations of the coal-bearing rocks on the east slope of the Rockies. This year he was delimiting the coal formations in the neighbourhood of the Yellowhead Pass. Being right on the Grand Trunk Pacific Railway these fields are of special importance.

With the settlement of the country the demand for clays suitable for all kinds of clay products becomes urgent. If found, important industries are developed. Unless found, a serious burden is imposed upon the communities. Mr. Heinrich Ries, the most prominent clay expert in America, and Mr. Joseph Keele, spent the season investigating the clay resources of the Western Provinces.

Mr. W. McInnes mapped and more accurately defined the geological boundaries in the district north of Cum-

berland House and the Pass, work which is at present desirable in anticipation of the early construction of the Hudson Bay Railway.

Mr. J. D. Trueman spent the season in the Gunfint Lake district, Western Ontario. This area has never been mapped geologically. On account of its proximity to known iron districts its examination was called for.

Mr. W. H. Collins completed his geological map of the Gowganda district, and commenced the mapping of the unsurveyed but promising district west of the Temiskaming sheet and north of the Sudbury sheet.

Mr. W. A. Johnston continued his topographical and geological surveys in the Lake Simcoe district.

Mr. C. R. Stauffer began a re-survey of the geology of Southwestern Ontario, in which important non-metallic mineral deposits occur. No detailed study of its geology has been made since the early days of the survey, the reports and maps of which are long since out of print.

res. wells, borings, etc., have brought to light much additional information, so that a revision of the geology of this district will be welcomed.

Mr. Morley E. Wilson was engaged in mapping and examining the district east of Abitibi Lake. This district is similar to Northern Ontario, and it is hoped that similar mineral discoveries may be made in it.

Mr. J. A. Dresser continued his investigations in the Eastern Townships of Quebec, noted for their great and varied mineral wealth.

Mr. J. W. Goldthwait studied the raised marine beaches south of the St. Lawrence River. This work has a bearing on the clays, sands and soils of the region. The elevation of the land relative to the gulf has been comparatively recent; it is important to ascertain if it has been uniform or greater at one point than another and also, if possible, whether the uplift is still in progress.

Dr. G. A. Young made a geological and topographical survey of the Tobique district, New Brunswick. For some years this field has been brought to the attention of the Survey, there being a strong feeling in New Brunswick that it may prove to be possessed of mineral wealth.

Mr. M. Y. Williams made a detailed study of the district about Arisaig, N.S. This presents probably the best section of Silurian rocks in Eastern America, and their detailed study here may provide a key to their investigation elsewhere.

Mr. E. R. Faribault continued his mapping of Nova Scotia and his investigation of the gold tungsten-bearing rocks. Leaving his party at work in the field, Mr. Faribault spent the two summer months in the Chibougamou district, Quebec, as one of the Commissioners appointed by the Quebec Government to report on the geology and mineral resources of the Chibougamou Lake district, his services having been loaned by the Survey to the Quebec Government for this purpose.

Mr. W. J. Wilson spent a few weeks in the Maritime Provinces collecting fossils to aid in fixing geological horizons, and Mr. P. E. Raymond collected in the neighbourhood of Ottawa, with a similar object.

The Director visited Porcupine, Ontario; accompanied His Excellency Earl Grey on his Hudson Bay expedition; represented Canada at a meeting of the American Mining Congress at Los Angeles, Cal., where he was called upon on several occasions to address audiences on the mining possibilities in Canada; he also made an examination of Turtle Mountain, at Frank, Alta.

No detailed work was done by the Survey in Porcupine, as this district was receiving attention at the

hands of the Provincial Bureau of Mines. By mutual arrangement, duplication of work is avoided.

At the instance of the Geological Survey, the Government of Canada and the Canadian Mining Institute, invited the International Geological Congress to hold its next meeting in Canada. This invitation has been accepted and in 1913 about one thousand of the leading geologists, representing every civilized country, will visit Canada and study the geology and mineral resources of this country.

Topographical Division.

During the past year considerable progress has been made in the organization of the topographical division. To this the generous assistance of the United States Geological Survey, afforded through Mr. R. H. Chapman, contributed in no small degree. A corps of carefully selected topographers is being trained, and our standard topographical maps, now being made, will compare favourably with those produced anywhere. Perhaps no part of the work of the Geological Survey is of more immediate economic value; for not only are these accurate topographical maps necessary as base maps for the detailed geology of mining camps to make it sufficiently exact for economic purposes, but these topographic maps are in themselves very valuable to the mining companies, as they may be used for many of the engineering problems which are constantly arising, thereby saving large sums to the operators. This saving represents just so much more capital that is available for developing and other directly productive uses.

A significant tribute to the character of the work now being done is afforded by a British army officer who, after visiting one of our parties in the field last summer, decided to send his son to Canada to receive his training in a Canadian university and on a geological survey topographical party.

In addition to geological work, the Geological Survey is called upon by the Department of Mines Act to engage upon work in natural history, anthropology, etc.

Natural History.

Mr. John Macoun spent the field season in Nova Scotia collecting information and illustrative material on the botany of the Province. He also supervised the work of Mr. C. H. Young, who was collecting marine fauna on the Nova Scotia coast.

Mr. James Macoun went to the north-west coast of Hudson Bay to collect the flora and fauna of that district.

Anthropology.

While the Survey has done some important work in anthropology in the past, it has been spasmodic and entirely secondary. With the rapid settlement of the country, the time has come when work along this line must be vigorously prosecuted, for settlement destroys the materials, and unless they are collected and preserved now, they will be lost forever, and the succeeding generations of Canadians will search in vain for authentic information concerning the native races of their country.

Since this work is called for in the organic law of the Department and the time was opportune, a Division of Anthropology was established this year, and Dr. Edward Sapir was appointed to take charge of it.

Mr. Sapir spent the field season in the West, more particularly in the neighbourhood of Alberni, Vancouver Island, studying the Indians of this section.

Mr. V. Stefansson, who is in the Arctic under the auspices of the American Museum of Natural His-

tory, continued his study of the life and habits of the Esquimo east of the Mackenzie River. He had a trying winter, on account of the failure of the hunt, but managed to pull through. The present winter he expected to spend near Coronation Gulf.

Publications.

The results of the investigations of the Survey are given to the public in the form of maps and reports. Since, however, a great many different classes and individuals find the work of the Survey of interest and value for very different purposes, it is impossible in a general report to present the matter in other ways and in the detail that might be desirable for any single class or individual. A great deal of information is acquired that may be of value to certain individuals but not to the general public, hence must be omitted in a report. Much of such information is given to individuals in the field, and this is perhaps the most practical work the Survey does. A great deal is supplied by correspondence. This branch of the Survey's work is growing rapidly. To avoid delay, information that is of immediate interest to the public is furnished through Press Bulletins, which are sent to the press throughout Canada and also to those individuals who have expressed a wish to have their names placed on the "Notice list" of the Survey. Timely information concerning the Porcupine gold district, the Stewart district, Portland Canal, the Atlin district, Hazelton district, etc., was made public in this manner.

Educational Work.

By a little extra effort and at a comparatively small expenditure, the Survey is able to assist materially the educational institutions of the country. Reports and maps that may be of use in the higher grade schools and colleges are supplied free of cost. To institutions of at least High School grade, attractive cabinets of typical Canadian rocks, minerals, and ores are also furnished free. Positions as student assistants on field parties are reserved for college graduates or students who have at least finished their second year, and who are specializing in geology, mining or topography. The experience gained in the field supplements the college work and is of great direct educational value.

Victoria Memorial Museum.

For many years both the museum halls and storage accommodation in the old building have been taxed to their utmost capacity and as a natural result little has been possible in the way of making new acquisitions. During the past year, however, some important collections were obtained and preparations made for moving

the collections to the new Victoria Memorial Museum. Although the building was not completed but still in the contractor's hands, moving was begun in November and at the close of the year the greater part of the offices and collections had been placed in the new building, where the valuable material will no longer be in danger of destruction from fire. On account of lack of accommodation in the old building, not only was the museum stifled, but the general work of the Survey was seriously handicapped. These disabilities are removed in the new quarters. The museums can now expand and the work of the Survey be accelerated. The museums will include mineralogy and geology, biology, and anthropology. In the old museum mineralogy and geology were dominant, the other divisions being only sparingly represented. It is the intention to increase the economic material in the mineralogy and geology division so that Canadian ores and their products, their mode of occurrence, etc., may be thoroughly represented, and to greatly strengthen the biological and anthropological divisions. A large amount of material suitable for public display is already on hand, which for lack of room could not be placed in the old exhibition halls. For the present it is the intention to restrict the museum to Canadian material (except in educational collections where necessary objects may be lacking in Canada) in order to make it first of all the great Canadian museum, whose collections in Canadian material will surpass all others. When this has been accomplished in all divisions, it may be advisable to enlarge its scope, and make it a world museum. It is proposed to take some space for scientific collections. As a National Museum it will be the repository of all Canadian objects of scientific value. Most of such material is of no interest to the general public and should, therefore, not take up valuable space and costly cases in the exhibition halls, but they should be arranged and catalogued and be accessible to Canadian students and scientists from abroad who may wish to study Canadian material. It will be some time before the exhibition halls can be made ready for the public. The old furnishings are unsuitable, and new modern cases will be provided. The specimens for public display will each have to be selected, labelled, and placed in position. This involves an immense amount of labour that has to be done personally by the officials in charge and cannot be relegated to temporary helpers. On account of lack of space in the old building, little could be done in this direction. Now that the material is in the new building this work will be pushed.

REPORT OF THE COUNCIL OF THE CANADIAN MINING INSTITUTE FOR THE YEAR 1910.

In reviewing the activities of the Institute for the year ending December 31st, 1910, the Council takes the opportunity of congratulating the members on the present satisfactory condition of the affairs of the Society; on the expansion of its scope of influence and usefulness; the well maintained increase in its membership, and the manifest improvement in the value of its publications. The interest displayed in the meetings is strongly evinced by the statement that the registration at the annual general meeting in Toronto in March showed an attendance of over two hundred and

thirty members and guests; or a representation of about thirty per cent. of the total membership. Considering the vast area over which the membership is scattered, so considerable an attendance is remarkable, and in the highest degree gratifying. The meeting of the western branch in Vancouver in February last was also well attended, and the papers read stimulated discussions of an exceptionally valuable character. A largely attended meeting of the Cobalt Branch was held in July, at which Prof. Robt. H. Richards, the distinguished authority on ore-dressing, delivered a lecture on this

subject, having special reference to the conditions obtaining in the Cobalt district.

The special contributors to the Transactions this year, and to whom thanks are due, include Prof. Richards, for his comprehensive paper on "The Development of the Hindered Settling Apparatus"; Dr. F. L. Ransome, Mr. B. B. Lawrence, Dr. James Douglas, and Dr. Heinrich Ries. It should also be noted that Dr. J. D. Irving delivered an exhaustive address on the subject of "Relieved Placement Deposits," at the annual meeting, but by reason of other pressing duties has not found leisure in the interim to transcribe his notes for publication. It is hoped, however, that this contribution in printed form will be available to members in the near future.

In view of the considerably augmented cost of publishing the Transactions, partly ascribable to the increased bulk of the annual volume of Transactions, to the publication of a quarterly bulletin, and also to the general advance in prices charged for printing, the Council, recognizing that retrenchment in some direction was necessary, decided to discontinue the practice of binding the annual volume of Transactions in half-leather. In future, therefore, the volumes will be issued in paper covers. Provision is made, however, that members desiring it shall receive the volume in half-leather binding upon payment of one dollar per annum in addition to the regular membership subscription.

Unquestionably the most important work undertaken by the Institute during the year has been the endeavour to induce the Dominion Government to act on the recommendation of the Select Standing Committee of the House of Commons on Mines and Mining. These recommendations were (1) that there be assigned to the Mining Department the administration of mines, including the issue of title thereto, and of all mining laws; and (2) that an Act be passed consolidating all the laws relating to mines under Federal control.

Immediately after the annual meeting the Council appointed a committee under the chairmanship of Mr. G. G. S. Lindsey, to represent the Institute, and to take such steps as might be expedient to properly impress on the Government the need for early and prompt action along the lines indicated. The committee, therefore, proceeded to Ottawa, on Monday, March 21st, and waited on the Premier, to whom the issues were fully submitted, special stress being laid on the importance of providing that provision of issue of title to mining lands controlled by the Federal Government, be fixed by Statute enactment, instead of by regulations subject to arbitrary and frequent change by orders-in-council. The committee also pointed out that the present opportunity was favourable to the framing of a mining law for the Dominion that would be so just and right in principle as to recommend itself for universal adoption in Canada, and expressed the hope that the introduction of such a bill would be the first step towards the accomplishment of this uniformity, which was very much desired by those interested in the development of our mining resources. The Premier's reception of the committee's views was entirely courteous and friendly, and before the close of the conference he gave a definite assurance that a transference of the administration of mining lands from the Department of the Interior to the Department of Mines would be made, and added the suggestion that the Canadian Mining Institute undertake the drafting of a mining law which could be introduced to and considered by Parliament at the next session. The committee consulted with the Hon. Wm. Templeman, Minister of Mines, and with members of

the Parliamentary Committee on Mines on this point. No definite action was taken by the Government until Wednesday, December 14th, when the committee, having drafted certain recommendations, embodying what in their judgment should be adopted as the basis of a mining law, again went before the Parliamentary Committee to urge immediate action. These recommendations, which had previously been endorsed by the Council of the Institute, are as follows:

(1) That the title to be required should be leased for ninety years for all purposes.

(2) That the rental should be based upon the acreage and paid in advance at the rate of one dollar per acre per annum. Work done on any claim to the extent of the rental, but only where work alone amounts to at least \$200 in any one year, is to be received in lieu of rental for that year.

(3) That, in addition, royalties at the rates at present provided, be paid (it to be made clear what the general clause in regard to royalties in the existing statute means).

In the case of coal, the present royalty, five cents per ton (2,000 pounds) should prevail up to the year 1930 (this date is given because the existing 21 years' leases based on the five cent royalty expire at that time), and after 1930, and up to the end of the present century the royalty should be ten cents per ton.

NOTE.—Existing lessees should be permitted to exchange for leases under the new statute.

(4) The prospector shall not be obliged to make discovery of mineral in place to the satisfaction of anyone, but having made what by him is believed to be a discovery of mineral in place, he is to be permitted to stake out a claim and then record it in the Government recording office at a nominal fee, on doing which a lease it to be issued to him, which lease is to be perfectly free from any condition dependent on the opinion or reports of officials.

(5) A license fee shall be required of persons applying for the lease of mining lands from the Crown, and a prospector must either obtain a license to prospect before going into the field, or qualify in this respect before recording a claim.

The argument in favour of the adoption of the leasehold system of mining land tenure was strongly presented to the Parliamentary Committee by Mr. Lindsey, and this as well as the other recommendations put forward were approved. The Minister of Mines having pointed out that under existing conditions the question arose whether the Minister of the Interior or of Mines should be responsible for the preparation of the Bill, the point at issue was referred to the Premier, who decided that the responsibility rested with the Minister of Mines. In consequence, Mr. Templeman immediately instructed Mr. J. M. Clark, K.C., of Toronto, to draft a Bill on the lines suggested by Mr. Lindsey's committee.

The Council consider that the committee is to be heartily congratulated on its success in advancing the business with which it was entrusted to the present stage, and confidently anticipate that as a direct result of the committee's exertion, a mining law which will be highly acceptable to the mining community, will, in the near future, be placed on the statutes of the Dominion.

It is also satisfactory to record that two resolutions adopted by the western branch, one advocating the removal of Customs duty from rescue apparatus for use in coal mines, and the other the establishment of telegraphic communication with the Portland Canal district, have been acted on by the Federal Government.

Two important international meetings took place dur-

ing the year in Europe, namely, that of the International Geological Congress in Sweden, and the International Mining Congress at Dusseldorf, Germany. The Institute was represented at the former by the President, Dr. Frank D. Adams, of Montreal, who was appointed one of the vice-presidents at the Congress, and contributed several valuable papers, dealing with Canadian geological conditions, to the proceedings. The President, on behalf of the Institute, also invited the Congress to hold their next meeting in Canada, and this invitation, which was made conjointly by the Dominion Government and the Canadian Mining Institute, having been accepted, the meeting will be held in Canada during the summer of 1913. The Council takes this opportunity of bespeaking the interest and co-operation of the membership in the organization arrangements which have been already initiated.

The meeting of the Congress in Canada, which will be attended by probably a thousand of the most eminent geologists from all parts of the world, will be an event of first-rate importance. Highly beneficial results of both a scientific and practical character may be confidently looked for, and the Council is most desirous that the Institute should not fail to do full justice to the occasion.

The meeting of the International Mining Congress was held at Dusseldorf, Germany, during the last week in June. The Institute was officially represented by the Secretary, who presented a paper on "The Mineral Resources and Industries of Canada," which has been widely circulated. The Secretary also delivered an address, illustrated by lantern slides, on the same subject in England, and several interviews with him were published in the London papers. As a result of a suggestion made to the chief clerk in the office of the High Commissioner for Canada, persons applying to that official for specific information respecting mines and mining in this country, have been advised to communicate with the Institute, and during the past few months numerous enquiries have been received and replies duly sent.

The effect of the by-law adopted at the last annual meeting, providing for the admission of members of the Institution of Mining and Metallurgy to the Institute at a reduced annual subscription, has been to further strengthen the relationship between the two organizations; and at a banquet tendered by the Council of the Institution to members of Council and officials of the Institute in London, in July last, reported in Quarterly Bulletin, C.M.I., No. 12, page, 3, appreciative reference is made by the President of the Institution to this action on the part of the Institute. The desire of the Institution to promote close and friendly relations, is also evinced by the extension of the post-graduate courses under the auspices of the Institution, to Canada, and on the recommendation of a committee of the Council, Mr. R. B. MacKay, a graduate of the School of Mining, Kingston, was awarded one of the Institution's Scholarships last spring, and has since left to follow the prescribed course in South Africa. A proposal to hold a joint meeting of the Institution and the Institute in Canada during the winter of 1911-12 is meanwhile under discussion, and it is hoped that arrangements to that end will shortly be completed.

Meetings.

The twelfth general annual meeting of the Institute was held at the King Edward Hotel, Toronto, on March 2nd, 3rd, and 4th, 1910. As already mentioned, the attendance was the largest yet recorded since the inception of the Institute. Other meetings held during the

year were at Vancouver, B.C., on February 25th; at Grand Forks, B.C., on May 26th; at Sherbrooke, Que., on May 27th; at Cobalt, Ont., on July 6th; at Montreal on November 4th, and at Toronto on December 2nd. Five regular and two special meetings of Council have been held during the year.

Publications.

The papers presented at the annual meeting, together with those read at the branch meetings, and also others transmitted direct to the Secretary, in all, 41 papers, two of which were contributed by non-members upon the invitation of the Council, two contributed by corresponding members, thirty-three by members, and four by student members, together with the discussions thereon, are published in Vol. XIII. of the Journal of the Institute, which has been distributed to members in good standing. Four Bulletins, representing 796 pages of printed matter, have also been published and distributed during the year.

Branches.

The meetings at Vancouver and Grand Forks, B.C., held under the auspices of the western branch, were well attended, and interest in this branch is well maintained. At the meeting of the Cobalt branch in July, an attendance of upwards of one hundred members and guests is reported. The feature of the Toronto branch meetings is a fortnightly luncheon, after which matters of general interest as affecting either the mining industry or the Institute are frequently discussed. The Toronto branch has also on several occasions entertained distinguished engineers from abroad at their periodical gatherings. The reorganization of the Sherbrooke branch, established in 1900, is a further matter for congratulation, and has resulted in a considerable increase of membership from the Eastern Townships of the Province of Quebec.

Library.

A special effort has been made to increase the efficiency of the library, and a considerable appropriation was devoted this year to the purchase of new books, book-cases, and to binding. Sets of reports, society transactions, or reference works, from which early numbers were found to be missing, have been completed as far as possible, and in all some 300 volumes have been added to the shelves. An abridged catalogue of the books in the library has been printed in No. 12 of the Bulletin, and members have been advised on what terms they may borrow books, and informed that the Secretary will undertake to make searches, prepare bibliographies, and abstract information on special subjects upon request. Advantage has already been taken of these provisions. Use, to a considerable extent, has also been made of the library and reading room by visitors from abroad.

Secretary's Office.

The following returns are taken from the Secretary's records for the year ending December 31st, 1910:

Letters received	2,039
Letters sent, notices, etc.	5,477
Circulars issued	7,600
Publications issued	6,525

Students' Competition and Awards.

Eight papers were submitted this year by student members in competition for the Institute's annual awards. After receiving the report of the judges, namely, Dr. A. E. Barlow, Mr. J. C. Murray, and the Secretary, the Council awarded the President's Gold Medal to Mr. G. L. Burland, of McGill University, Montreal, for his paper entitled "Longwall Mining and Emery Pit, Dominion No. 10, Reserve, C.B.," while a cash prize

of \$50 was equally divided between Mr. A. M. Bate-
man, of the School of Mining, Kingston, Mr. J. J.
McEachern, of the School of Mining, Kingston, and
Mr. A. G. Haultain, of McGill University, Montreal.
The prize winning papers (with the exception of that by
Mr. Burland, which is withheld for the present), as
well as a paper contributed by Mr. G. A. Gillies, of
McGill University, have been published in Vol. XIII.
of the Transactions.

Commans-Frecheville-Marriott Prize.

The prize of two hundred and fifty dollars offered by
Messrs. R. E. Commans, William Frecheville, and H.
F. Marriott, of London, England, for the best paper
dealing with mining or metallurgical progress in Can-
ada between October, 1908, and October, 1909, con-
tributed to the Transactions of the Institute prior to
January 1st, 1910, was divided equally between Mr. H.
H. Yuill for his paper on "The Hosmer Mines, B.C.,"
and Mr. Frank B. Lathe, for his paper on "The Granby
Smelter."

Membership.

The membership now numbers, inclusive of all classes,
nine hundred and seventy-four members.

The accessions during the year were as follows:

Honorary members	1
Corresponding members	2
Ex-officio members	5
Life members	3

Members	71
Associates	22
Students	5
	109

Deaths.

The Council records with profound regret the deaths
during the year of the following members:

Members—Grundy, Frank, Sherbrooks, Que.; Hardy,
G. D., Cobalt, Ont.; Reed, Dr. James, Reedsdale, Que.;
Wiley, H. A., Toronto, Ont.

The resignations of the following members and asso-
ciates have been accepted:

Members—Anderson, W., Rossland, B.C.; Farquhar,
J. B., Vancouver, B.C.; Gamey, R. R., Toronto, Ont.;
Hardinge, H. W., New York City, U.S.A.; Harris, J. M.,
Sandon, B.C.; Kaye, Alex., Vancouver, B.C.; Miller,
Spencer, New York City, U.S.A.; Mills, S. D., Toronto,
Ont.; Parkhurst, F. S., Niagara Falls, N.Y.; Powell, J.
W., Coleman, Alta.; Sands, J. M., Rossland, B.C.; Sharp,
B. N., Orient, Wash., U.S.A.; Sproule, G., Montreal,
Que.; Stoek, H. H., Scranton, Pa., U.S.A.

Associates—Bowers, A. E., Northport, Wash., U.S.A.;
MacKenzie, A. B., Rossland, B.C.; Morrison, G. F., To-
ronto, Ont.; Pringle, Clive, Ottawa, Ont.; Rugh, W. S.,
Rossland, B.C.

Students—Carr-Harris, A., Mexico.

The Destruction of a Valuable Water-Power on the Frederick House River, near Porcupine.

(Written for the CANADIAN MINING JOURNAL by C. W.
KNIGHT.*)

Father Paradis is reported to have made the state-
ment that the clay belt of northern Ontario should be
drained, not dammed, and that the present drainage
system might be likened to a man suffering from pneu-
monia. As to the verity of these assertions the reader
must form his own conclusion; but, be that as it may,
it is certain that the reverend gentleman must have had
some such belief when in the fall of 1909 he lowered
the water of Frederick House River by cutting away
its embankment beside a falls, thereby destroying a
valuable water-power. It is further certain that the
prospecting and mining fraternity of that region does
not believe, as a general rule, in draining the country,
just as it is also certain, on the other hand, that it be-
lieves in heartily damning a certain gentleman who
shall be nameless. For the lowering of Frederick House
River caused a fall of four or five feet in Frederick
House Lake, and, since the latter is shallow and flat,
navigation by canoe or small gasoline boats became
impossible. It would take the softening touch of Bret
Harte's pen to put into decent and respectable print
the language which floated away from many a belated
canoe struggling across the sand-barred lake. But, like
other situations, there are two sides to the question, and
it may be that future generations of prosaic farmers,
long after Porcupine is a dead one, may bless the worthy
friar for draining areas of what might otherwise have
remained, in part, swamp land.

Thirteen years ago, Professor W. A. Parks, of Tor-
onto University, examined the river for the Bureau
of Mines, and his description of the part under con-



Fig. 2. Fault in clay on Banks of Frederick House River.

sideration is as follows: "The water of Frederick House
Lake passes out at the north end by a river of the same
name. It is two or three chains wide at the head, with
an easy current. About a mile and a half down, it
bifurcates around an island forty chains in length and

* Assistant Geologist, Bureau of Mines, Ontario.

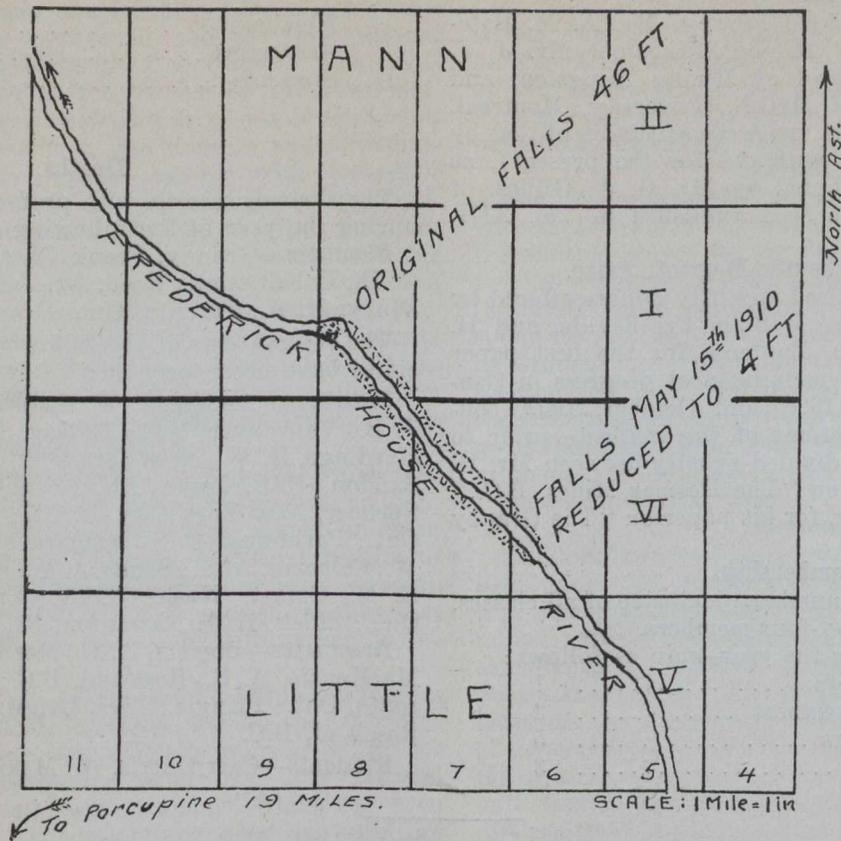


Fig. 1. Plan showing original position of Falls on Frederick House River.

continues a little west of north to the first falls, about seven miles down. A barrier of rock crosses here, N. 10 degrees E., causing a succession of cascades with a total descent of 46 feet. An island divides the river, and, in all, it may be said that there are three tiers of three cascades each, with a total width of five chains. A rather steep portage of three chains on the east enables us to pass the obstruction."

During the summer of 1910 Porcupine was the lode-stone that attracted prospectors, and there were few who went out of their way for the purpose of visiting the scene of Father Paradis' operations on the Frederick House River. Early in May of last year the writer accompanied Dr. Willet G. Miller on his trip into Porcupine, but, before reaching the gold camp, a few days

were spent in examining the effects which the lowering of the water had on the banks and bed of the river.

Originally the Frederick House River, at a point eight or nine miles below the lake of the same name, poured its waters over a rocky cliff fifty-six feet high. On the eastern bank, just above the falls, Father Paradis dug a trench in the soft clay and sand. It so happens that the rocky floor on which this clay rests dips steeply, almost vertically, in an easterly direction, and consequently the clay had here a thickness of about fifty feet. Part of the water thus diverted into a new channel began to deepen it, and before long the whole river was rapidly carving a gorge in the soft clay, abandoning its original bed on the solid rock. Father Paradis, in discussing the matter afterwards, said he introduced the



Fig. 3. Three successive faults in clay on banks of Frederick House River.



Fig. 4. Showing the results of lowering the water on Frederick House River.

principle and the river drew the conclusion. The trench which he dug was a comparatively shallow one. By May of the following spring the falls had cut their way up the river a distance of about one and a half miles, leaving in their wake a path of devastation.

As the old channel was deepened the clay banks gradually caved in, caused by a series of faults illustrated in two of the accompanying photographs. The faulted blocks of clay were sometimes hundreds of square feet in area, and, as the upper parts of the banks were covered with a dense foliage of birch, poplar, spruce and other trees, these were carried down with the soil on which they grew, and either cast into the torrent below or strewn up and down the new banks in the wildest confusion. Many of them were snapped in two like twigs and now lie crossed in all directions. In places whole masses of earth the width of a street have been



Fig 5. Showing the results of lowering the water on Frederick House River

dropped down bodily without disturbing the trees or vegetation growing on them, so that, if a man had been standing on one of these masses, he would probably have received no injury other than a severe jolt. But, for the most part, the moss, trees, and surface soil have been disturbed and deeply buried under the heavy clay deposits. Originally the banks had a height of about thirty feet, and the channel a width of 200 feet. But, as a result of the landslides, the distance between the top of the banks has been increased in places to 800 feet, while the width of the water is only about 100 feet, the river having become a swift, impassable torrent.

The sections revealed in the new gorge show the clay to be partly stratified and to be in part without stratification, the latter facies containing a few pebbles or boulders. It was pointed out by Dr. Miller that the river in cutting its way back formed two or more horseshoe falls, suggestive of Niagara on a small scale. Each horseshoe was then slowly deepened, until finally the intervening walls became thin, collapsed, and were washed away, thus forming a single horseshoe, which again divided into others. So the process was continued.

It is interesting to speculate on what will be the course of events in future years as the river continues to cut back and deepen its old channel. Provided it meets with no obstruction in the form of solid rock, it is probable that Frederick House Lake may eventually disappear, seeing that it has a shallow, flat bottom. In that case the river would find a channel somewhere in

the bed of the lake. However, there is at least one outcrop of rock half way between the present falls and the lake. If this barrier is large enough, it may arrest the progress of erosion, and a new falls would then be formed at this point, gradually increasing in height as the channel below was deepened in the soft clay.

Mineral Output of Russia.

The following report on the mineral output of Russia is made by John H. Snodgrass, United States consul general at Moscow:

Statistics recently issued by the government show that the gold production of Russia in 1909 amounted to 1,284,912 ounces, an increase of 171,696 ounces over 1908; platinum, 134,784 ounces, an increase of 6,000 ounces; copper, 40,572,000 pounds, an increase of 3,636,000 pounds.

During the first seven months of 1910 the output of copper was 29,664,000 pounds, compared with 21,744,000 pounds for the corresponding period of 1909, an increase of 7,920,000 pounds. The imports of copper into the empire consist principally of electrolytic copper, which is now produced at only two Russian works, but the production of which is making gradual progress. In 1901 Russia imported 29,520,000 pounds of copper; in 1907, 9,792,000 pounds, and in 1909, only 7,668,000 pounds.

The production of iron also shows notable progress, chiefly in the south of Russia, and the Ural district, and in 1909 the output, as well as the home consumption, reached the highest level known, being above that of the banner year 1904. In 1904 Russia produced 2,461,145 tons of iron; in 1908, 2,369,806 tons; and in 1909, 2,606,129 tons. During the first four months of 1910 the output was 922,838 tons, as compared with 825,322 tons in the corresponding period of 1909.

There were 3,117,742 tons of pig iron produced in the empire in 1909, against 3,193,548 tons in 1904, when the production reached the highest level in the history of the country.

The preliminary data for the first half of 1910 show a considerable increase as compared with the same period of 1909 and 1904, as follows:

Pig iron, 1904, 1,454,839 tons; 1909, 1,412,903 tons; 1910, 1,487,097 tons.

Half products, 1904, 1,503,225 tons; 1909, 1,488,709 tons; 1910, 1,687,097 tons.

Manufactured iron, 1904, 1,259,677 tons; 1909, 1,279,035 tons; 1910, 1,443,548 tons.

The production of coal in European Russia in 1909 aggregated 24,080,645 tons, compared with 24,677,419 tons in 1908, a decrease of 596,774 tons. The output in European Russia for the first quarter of 1910 was 6,225,806 tons, against 6,338,709 tons for the same period of 1909, a decrease of 112,903 tons. The falling off in the production is due to the decreasing consumption of this mineral by the Russian railways, which are now using naphtha for fuel on account of the prevailing low prices of this product.

The production of naphtha in the Baku district amounted to 7,908,064 tons in 1909, compared with 7,532,258 tons in 1908, an increase of 375,806 tons.

In the bituminous mines of Pennsylvania the death rate per thousand men employed was 2.72 during the year 1909. In the anthracite mines the death rate was 3.32 per thousand men employed.

Explosion at Bellevue, Alberta.

By E. JACOBS, Victoria, B.C.

On the night of December 9th an explosion took place in the Bellevue mine of the West Canadian Collieries, Ltd., situated along the Canadian Pacific Railway Company's Crow's Nest line, two miles east of Frank, southwest Alberta. Immediately after receipt of information concerning the disaster, steps were taken to send from Hosmer, British Columbia, distant 45 miles by rail from Bellevue, the Draeger oxygen breathing apparatus and auxiliary appliances from the British Columbia Government mine-rescue station, established there last autumn, and, as well, that of the Hosmer Mines, Ltd., which apparatus, used by men from Hosmer who had taken a special course of training in mine-rescue work, proved of much service in saving the lives of some of the men in the mine at the time the explosion took place, and kept the number of fatalities down to 31.

A specially noteworthy incident in connection with the mine-rescue work was the self-sacrifice of Fred Alderson, as indicated in the following account: "One of the special party rushed from Hosmer, with the British Columbia Government oxygen helmets for use in the mine. Alderson led the rescue party direct to the danger zone, and himself succeeded in getting five men out of danger before he was overcome. He was skilled in the use of the helmet, and while the party was making its way back to fresh air, saw an unknown Italian fall to the ground. Hastily picking him up, Alderson pressed his helmet on the man (whose life was thereby saved) and, thinking he could stand the poisonous fumes until he could reach the purer air, started to run. He had not gone a dozen yards, however, before he was overcome, and although some of the party saw him fall they could do nothing to help him, as they were in bad shape themselves, and, in addition, were dragging other unconscious men to a place of safety. As soon as they reached an air station they sat down the men they had brought out and rushed back to save Alderson, but he was dead before he was brought into the pure air."

Fred Alderson was born in Durham County, England, in 1875. He worked in the Kimblesworth colliery for eight years, and prior to leaving there was deputy overman. At the Hetton colliery, where he worked three years, he was back shift overman. For two years he was engaged in shaft-sinking in the Transvaal, South African Republic, and next spent a similar period at Nanbada, Central India. Returning to England, he was company's inspector at the Kimblesworth colliery for two years, after which he went to Texas, U.S.A., where he was a year. About the middle of 1909 he removed to Hosmer, where he was actively engaged in coal mining until his recent untimely death. He held coal mine manager's certificates for Great Britain, British Columbia, and Alberta. In England he took the St. John's ambulance training course, and was instrumental in getting a class started in Hosmer. Last year, in compliance with the law of the Province, the Hosmer Mines, Ltd., put in Draeger mine-rescue apparatus, and at the time it was installed the mine officials were trained in its use. Alderson was one of these, and received instruction in the use of the oxygen breathing helmet and accessory appliances from the Draeger representative who supervised the establishment of the company's mine-rescue facilities at the Hosmer colliery.

Alderson left a widow and four young children. The miners at Hosmer promptly initiated a movement for

the benefit of the bereft family, and public subscription lists were opened in several towns in eastern British Columbia and at others in Alberta. The Government of British Columbia has shown its appreciation of Alderson's heroic conduct by subscribing the sum of \$500 to the fund being accumulated for the benefit of the widow and orphans.

A coroner's jury is investigating the cause of the disaster. The first witness called was James Burke,



Fred Alderson, the Hero of the Bellevue Disaster

secretary of the Bellevue local union of the United Mine Workers of America, who testified to having, on December 3, telegraphed the chief inspector of mines for Alberta asking for an inspection of the mine, the presence of gas in the mine having been reported by miners.

The Alberta Government report for 1908 contains the following reference to the Bellevue mine: "At the Bellevue mine, a new tibble has been erected, equipped with cross-over dump, and picking tables, capable of

handling one thousand tons per day. An electric light plant for lighting the tippie, mine buildings and main gangway of mine has been installed. Wolf safety lamps have been introduced, which add greatly to the safety of these mines, and all blasting is done by qualified shot-lighters."

The Government official report for 1909 was as follows: "A steel tippie fitted with Greene dump with a capacity of 1,500 tons per day, is being erected by the Bartlett Snow Company, and one high-pressure compressed air plant, one 8-ton and two 5-ton compressed air locomotives have been installed. The present mine track is being relaid with 40-lb. steel. One 78-inch Sirocco fan, capable of giving 100,000 cubic feet of air per minute with a 2-inch water gauge, and one 150-k.w. electric generator for lighting purposes, driving fan, tippie, etc., have been put in. The power house is being built of masonry. A considerable amount of diamond-drilling is being done on the property to ascertain the quality and position of the coal seams at a depth of 400 to 500 feet."

The official report for 1910 has not yet been published.

Retirement of Managing Director of Consolidated M. and S. Co.

About the end of December public announcement was made of the intention of Mr. W. H. Aldridge, of Trail, B.C., to retire from the active management of the Consolidated Mining & Smelting Company of Canada, Limited, of which he has been managing director since the organization of the company. In this connection, Mr. Aldridge has been quoted by the Daily News, Nelson, as having said: "While it is true that I am giving up the active control of the Consolidated Company's operations, yet I expect to remain as a director and in an advisory capacity, and intend to keep in as close touch with the various questions involved in the company's general policy as in the past. My decision to give up the general management was made in order to enable me to become associated with William B. Thompson, of New York, who is a director of several of the largest copper-producing companies in the United States, and who, with Gunn, Thompson & Company, has control of a number of the leading copper mines of Arizona and Nevada. Mr. R. H. Stewart, who has for several years so ably managed the Consolidated Company's mines, has been appointed general manager, and Mr. S. G. Blaylock, formerly metallurgist at the Trail smeltery and lately superintendent of the St. Eugene and Sullivan mines, becomes assistant general manager."

Mr. Aldridge left the Brooklyn Polytechnic in 1883; he graduated as a mining engineer at Columbia University, New York, in 1887. He was assayer, chemist, and metallurgist with the Colorado Smelting Co. (now the American Smelting & Refining Company), 1887-1892. Then he was general superintendent, assistant manager, and manager of the western interests of the United Smelting & Refining Works (now American Smelting & Refining Company) at Helena and Great Falls, Montana, 1892-1897. Next he was employed as mining and metallurgical engineer by the Canadian Pacific Railway Company, and was first engaged in reporting on Rossland, Boundary, and other Canadian mining camps. In 1898, the Heinze smeltery at Trail was purchased by

the Canadian Pacific Railway Company, and thereafter for six or seven years it was known as the Canadian Smelting Works, until in 1905 it became the property of the Canadian Consolidated Mines, Limited, a company organized to acquire the various mining and metallurgical properties now held by the Consolidated Mining & Smelting Company of Canada, Limited, the changed title of the Canadian Consolidated Mines, Limited, as from January 1, 1906. Prior to the organization of the merger company, Mr. Aldridge's official title was that of Chief of the Mining and Metallurgical Department of the Canadian Pacific Railway Company. During the thirteen or fourteen years Mr. Aldridge has been associated with the Canadian Pacific Railway Company he has had the oversight of all the company's mining interests, including the collieries the company established and still operates at Bankhead, Alberta, and Hosmer, B.C., and the large though undeveloped coal mining interests the company holds in the upper Elk River district. The steady expansion of the operations of the Consolidated M. & S. Co. during the last five years has been under the active direction of Mr. Aldridge, who has been a member of the American Institute of Mining Engineers from 1889 to date, and as well for a number of years a member of the Canadian Mining Institute.

Mr. Robert Holden Stewart, who has succeeded Mr. Aldridge as general manager of the Consolidated Company, graduated as a mining engineer at McGill University, Montreal, Quebec, in 1896, obtaining first rank honours in natural science and the Governor-General's medal for highest general standing in final examination for his B.Sc. degree. He went to Rossland several years ago from the Bankhead mines, Alberta, and succeeded Mr. James Cronin as manager of the Consolidated Company's mines when that gentleman retired. He has since devoted himself assiduously to the further development and improvement of the mines, and is well-known in the Kootenay and Boundary mining districts as a fully competent manager and a tireless worker, very zealous in the promotion of the company's interests. He is a member of both the Canadian Mining Institute and the American Institute of Mining Engineers, and has been on the Council of the former.

Mr. Selwyn Gwilym Blaylock, the new assistant general manager, is also a McGill University B.Sc.; he graduated as a mining engineer in 1899. He has been in charge of the St. Eugene mine and concentrating mill for several years, and, like Mr. Stewart, has shown much zeal in the performance of his responsible duties. He is a member of the Canadian Mining Institute and is at present on the Council of the Institute.

Smelting in the Interior of British Columbia.

By E. JACOBS, Victoria, B.C.

The following notes will serve to give a brief description of the smelters now being operated in the Kootenay and Boundary districts of British Columbia:

Consolidated Mining & Smelting Co. of Canada, Ltd.

The works of the Consolidated Mining & Smelting Company of Canada, Ltd., include copper and lead blast furnaces. Distinctive features here, in comparison with other reduction works in British Columbia are the use of the Huntington-Heberlein roasters and converters, and the Betts electrolytic process for refining lead.

An idea of the extent of the company's operations during 1910 may be obtained from the following figures; Tons smelted, 445,210. Metal contents, gold,

138,901 oz.; silver, 2,017,007 oz.; lead, 33,871,837 lb.; copper, 5,282,139 lbs. Total value, \$5,543,574. The figures for the company's fiscal year ended June 30, 1910, were generally higher, especially in lead produced (42,368,816 lbs.), while total value was nearly \$400,000 greater. Some 550 men are employed at the works, which are situated at Trail, on the Columbia River, and within a few miles of Rossland, with which mining camp there is railway connection.

Lead Smelting.

Of the three sampling mills, two are arranged to deal with lead and dry ores. The equipment of one of these consists of Blake and Farrel crushers, rolls, and Vezin and Brunton samplers. The capacity of this mill is 30 tons per hour. Oxidized lead and dry ores are first crushed to a 6-inch ring, the final sample being $\frac{1}{4}$ -inch, and the reject going direct to the furnace charge bins. Galena ores and coarse concentrates are crushed to $\frac{1}{4}$ -inch and bedded. In each case the samplers cut 1-500th part and deliver it to the quartering floor. Fine concentrates are usually sampled by the fifth-shovel method and are placed on the lead beds.

The lead ore supply is mainly heavy sulphide, with comparatively little dry ore, the lead furnaces carrying a charge of from 35 to 45 per cent. lead, as compared with the customary 10 to 15 per cent. More than 30 per cent. of the ore received runs from 20 to 75 per cent. lead, the remainder consisting of dry gold and silver ores, a small quantity of oxidized lead ore, and some pyritic mill concentrates. The sulphide, with lime rock, lead matte, etc., is treated in the Huntington-Heberlein roasters and converters. The resultant lead sinter is smelted in the blast furnace with dry ores, etc. The lead beds are made up with heavy ores and concentrates only; they contain about 600 tons each, with 38 to 40 per cent. lead.

There are seven Huntington-Heberlein circular roasting furnaces, 26 feet in diameter, with hearths revolving once in three minutes. Stationary cast-iron rabblers work the ore through in about two hours. The making up of the roasting charge is important. An approximate analysis of the charge as now run is as follows: Lead, 40 to 44 per cent.; iron, 10 to 13 per cent.; silica, 8 to 11 per cent.; lime, 7 to 10 per cent.; zinc, kept under 10 per cent. if possible. Pyritic concentrates and matte form part of the charge. The converters number 24; they are 8 feet $8\frac{1}{2}$ inches in diameter, and are made in four sections bolted together. The time of converting varies widely with the charge, but averages three 10-ton charges in 24 hours, with a 10 to 12 oz. blast, which is decreased to 2 oz. at the close.

Properly made up, carefully fired, roasted, and converted, the product will be fairly hard, yellowish or grayish yellow, showing some litharge, and be easily broken up with little fines. In the furnace it will run with cool top and bright tuyeres.

The two lead blast furnaces are, respectively, 45 by 160 inches and 45 by 140 inches at the tuyeres. One of these has smelted as much as 260 tons in a day, but the average is about 170 tons or ore, beside by-products, matte, slag, etc., these constituting 20 to 30 per cent. of the charge. The furnaces are standard type, with brick crucibles water-jacketed to the top of the bosh, above which is a firebrick shaft. The height of the charge is 17 feet 6 inches above the tuyeres, and the blast used is 32 to 34 oz. The lead bullion flows from the side of the furnace into a kettle of 50 tons capacity, from which it is pumped by a $1\frac{1}{2}$ -inch centrifugal pump into vertical anode moulds. Frame cars of special make, each holding ten anodes, are taken in railway cars to the

refinery. The matte and slag are tapped into a large receiver at the end of the furnace; the slag overflows into a granulating launder, while the matte is tapped from the receiver into pots.

The charge usually has about 85 per cent. of Huntington-Heberlein roast, varying considerably with the ores, and some oxidized and siliceous dry ore and lime rock. The coke is about $12\frac{1}{2}$ per cent. of the charge, not taking into account slag and easily smelted by-products. An addition of 100 to 300 lbs. of slag from the high-grade copper furnace is made to each charge to keep it open, make the furnace action uniform, and reduce the percentage of zinc. The lead in the charge averages about 40 per cent., but it has been successfully run as high as 55 per cent. Sulphur is kept below four per cent., the lower the better, as the matte fall is less. The speed of running decreases markedly with a small increase of sulphur. From 30 to 40 per cent. of the sulphur is eliminated in the blast furnace.

The slag is kept at about 31 to 33 per cent. silica, 18 to 20 per cent. lime, 24 to 30 per cent. iron and manganese, 7 to 12 per cent. zinc oxide, and 8 to 16 per cent. alumina. It contains about 0.4 ounces silver and a little more than 1 per cent. lead. With high zinc the lime is reduced to keep the slag fluid. It is not profitable to run siliceous ores to bring the slag much above 33 per cent. silica, as the furnace runs too slowly. Alumina gives no serious trouble. Iron and manganese may vary between the percentages above given without making much difference in the furnace running. Scrap iron is added occasionally, although unnecessary when the charge is good.

At present only one furnace is being operated, and this produces about 75 tons of bullion per day. A single day's production has been as much as 130 tons. An average analysis of the bullion is: Copper, 0.22; manganese, nil; zinc, 0.098; antimony, 0.32; arsenic, 0.28; nickel, cobalt and cadmium, nil; bismuth, 0.0133, and lead, 98.5 per cent.; silver, 100 ounces and gold, 0.5 ounces per ton. A furnace is operated continuously for about seven months; then if accretions have accumulated sufficiently to make it profitable to blow it out and clean up, the other furnace is blown in.

Lead Refining.

In the refinery there are 240 tanks, 3 x 8 x $3\frac{1}{2}$ feet, and pumps keep the electrolyte circulating in these. Each tank has a capacity of 20 anodes, which weigh 370 pounds each; they are cast with shoulder lugs, which rest on copper current bars on the sides of the tanks. The anodes are spaced $4\frac{1}{2}$ inches apart with the bodies down in the tanks. Cathodes, consisting of sheets of pure lead about 1-16 of an inch in thickness, hung on $\frac{1}{2}$ by $\frac{3}{4}$ -inch copper bars, are placed between and outside the anodes, 21 in each tank. The electrolyte used is lead fluosilicate with free fluosilicic acid, averaging 12 per cent. acid and 5 to 6 per cent. lead. Between half a pound and one pound of glue per ton of lead is daily added to the electrolyte to prevent the lead deposit becoming soft and non-coherent and the tanks from rapidly short-circuiting. The tanks are operated with a current density of 16 amperes per square foot of cathode area; a reduction to 12 amperes is proposed, it having been found that this gives better results. The voltage averages 0.32 volt per tank, the contacts causing a loss of not more than 0.02 volt per tank. A tank is worked out in about 8 days, and 15 per cent. of the anodes, as scrap, goes back to the melting pot after being washed. The cathodes are removed from the tanks, washed, melted, and cast into pigs of lead—of 190 pounds each for the Chinese trade, and half that

weight for other markets. An average analysis of 2,000 tons of lead ready for shipment was: Arsenic and bismuth, nil; zinc, 0.0005; silver, 0.0013; copper, 0.00075; lead, 99.9938; iron, 0.00075; tin, 0.0001; antimony, 0.0028.

Most of the slime adheres to the anode scrap, though some settles in the electrolytic tanks, which are cleaned out monthly. From the tank room it is taken in copper cars to the slime plant, where it is agitated in tanks with hot water. Afterwards the water is drawn off and evaporated in steam coil tanks to recover the electrolyte. The slime is filtered and dried, and next melted in a water-jacketed reverberatory furnace lined with magnesite brick. The impurities are oxidized off, and dore metal running 960 to 975 parts gold and silver is obtained. The fumes pass through a series of inverted U cooling flues, in which most of the volatilized metals is recovered, the condensed fume going to the blast furnaces. The dore metal is parted in sulphuric acid. The silver sulphate is run into steam-heated tanks, where the silver is precipitated as a slime by bars of metallic copper. The silver and gold are collected, melted, and cast into bars. The gold is 995 fine and the silver 999, the latter in bars of about 80 pounds each. Fine gold and some silver are sold to the branch of the Royal Mint at Ottawa, Ontario, and the United States Assay Office, Seattle, Wash. Silver finds its chief market in the Orient; refined lead is sold in Eastern Canada, the Orient, and other places.

By-products are copper sulphate and antimony. The copper sulphate solution, obtained in the course of treating the slimes, is taken to the bluestone plant where copper sulphate is crystallized from it, making a commercial pro-

duct used by farmers to pickle their seed wheat and so kill the smut in it. When commercial conditions make it profitable to also save the antimony, this is recovered by a special electrolytic process discovered by Mr. A. J. McNab, superintendent of the company's smelting works.

COPPER SMELTING.—There are five copper blast furnaces, as follows: Two of 42 by 300 inches at the tuyeres; one of 42 by 263 inches, and two of 42 by 240 inches. The height of the charge is 9 feet above the tuyeres, and the furnaces are operated with air pressure of 36 ounces. Two forehearthers are used for each furnace, but only from 0.25 to 0.50 per cent. of the total matte is caught in the second settler. Most copper ores are smelted raw to a low-grade first matte. The slag from the low-grade furnaces runs about: Silica, 43 to 46 per cent.; iron, 14 to 15 per cent.; lime, 20 to 22 per cent.; copper, 0.1 per cent., and a very little gold and silver. The first matte, containing about 15 per cent. copper, 27 per cent. sulphur, and 56 per cent. iron, is granulated, roasted in O'Hara furnaces to about 10 to 12 per cent. sulphur, blown in Huntington-Heberlein converters to a product which runs 3 to 4 per cent. sulphur, and then smelted in a high-grade furnace, with suitable ores, to a matte running about 40 per cent. copper, which last product is shipped to Tacoma, Wash., for Bessemerizing. The slag from the high-grade furnace analyzes about: Silica, 40 to 42 per cent.; iron, 26 to 28 per cent.; lime, 16 to 18 per cent.; alumina, 10 to 12 per cent., and copper, 0.35 per cent.; with gold 0.02 ounce. Some of this slag is used in the lead furnaces and part of its gold content recovered there.

(To be Continued)

SPECIAL CORRESPONDENCE

ONTARIO.

Cobalt.—At the annual meeting the condition of the Savage of the McKinley-Darragh group will be the chief subject of comment. From a mere prospect in one year the Savage has developed into a mine producing between 60,000 and 70,000 ounces per month with 300-foot ore body on two veins and five other veins that will certainly make some ore.

The damage at the plant of the Cobalt Hydraulic at Ragged Chutes has been repaired and mines are now getting a fair air service. It will, however, make a sensible difference in the production particularly at the Nipissing and La Rose where steam plant is now inadequate to the needs of the company.

Fifteen Cobalt companies shipped bullion in 1910, aggregating 934,666 ounces, and valued at \$493,950. Already this month eight mines have shipped 133,135 ounces, worth \$65,407.

The amount of concentration in the mills of Cobalt has more than doubled in 1910 and the tonnage was greater by almost 4,000 tons. The bulk of the tonnage from the Cobalt camp went to the States, but more than half the values in the ore stayed this side of the line.

In declaring a dividend of 10 per cent. payable on March 15 the Kerr Lake has joined the other three Cobalt companies that have paid over a hundred per cent. The T. & H. B., the Crown Reserve, the Buffalo, the Kerr Lake and the Nipissing, with an aggregate capitalization of \$12,007,718, have paid \$14,272,113.

During December the Nipissing mined 371,559 ounces of the net value of \$201,022. Ore shipped after mining expenses had been deducted amounted to \$437,615. A good high grade lens of ore has been cut at 122 shaft; 40 feet of 64 has been opened up at the intermediate level and shows very rich; an inclined

raise on the west side of the Fourth of July shaft has cut into great ore and the winze in the west drift is proving good below the 170 foot level.

Mr. A. P. Seymour has resigned his position as manager of the Cobalt Lake. He will be succeeded by Mr. M. B. R. Gordon, who has been manager for the Little Nipissing for some time. Mr. Gordon will act as the consulting engineer for the Little Nipissing for the next few months at any rate, but will live at the Cobalt Lake.

A number of Cobalt men are interested in the Beauce placer fields along the Famine River. Mr. J. Rose an old Australian miner, states that after persistent prospecting the ground offers good possibilities for a dredge. An old report stated that the average from 28 shafts was 15 dwt.

At the annual meeting of the Cross Lake Mining Company it was decided to allow the Cobalt Coalition to work through the property of the company provided that the former company should get a 25 per cent. royalty on any of the ore extracted. The main shaft of the Cross Lake has been sunk to the 225-foot level. At the 210-foot level a drift has been pushed towards the diabase contact 75 feet under the lake.

At the quarterly meeting of the directors the Coniagas declared the 3 per cent. regular and the 6 per cent. bonus, making in all \$360,000. The property has now paid altogether 44 per cent., or \$1,760,000.

The Crown Reserve has now definitely started to develop its claims in Poreupine. A gang of men have commenced development on the McEnaney property near the Hollinger.

The Union Abitibi, on Opasatika Lake, near the Larder Lake goldfield, announces that it has all its four-stamp mill on the ground and will erect it this summer. It has numerous quartz

leads in which some specks of free gold have been found.

The Thelma Gold Mining Company, of Montreal, has bought six more claims in Bryce Township to add to its property. A test consignment of ore has been sent from the 25-foot shaft to McGill University for sampling. The company announces its intention of putting in a plant soon.

With an ore body 180 feet long on the 175-foot level the Cobalt Provincial is now paying chief attention to the discovery of fresh ore and the completion of its ore sorting plant at the mine. The new camps are almost completed.

Elk Lake and Gowganda.—There has been a little revival in mining activity at Elk Lake. Some of the prospectors who went to Porcupine and did not make a stake have returned to the Montreal River section again. The Beacon Consolidated announces that it will surely develop the Cleaves claim. The Tee Arr has ordered a good new plant from England and the Syracuse states that it will open up its property again in the spring. Meanwhile transportation hangs up activity.

It is reported from Elk Lake that the Miller Lake O'Brien will ship this year in the neighbourhood of a quarter of a million from its property.

That the Gowganda camp is still in point of shipments the second best in northern Ontario is shown by the following table of shipments: Millerett 345, Reeves Dobie 62, Boyd Gordon 30, Lucky Godfrey 20, Miller Lake O'Brien 59, Burke Remy 2, and Welsh 1.25. Total 1,419.25.

Porcupine.—In all probability the railroad at Porcupine will go down the east or undeveloped side of Porcupine Lake, thereby leaving one or two townsites out in the cold. There is an excellent grade. The station will certainly be at the Government townsite at Golden City.

Fifty men are working at the Foley O'Brien and the four-drill compressor plant has been running since the early part of the month. The vein is from 18 to 20 feet wide and there is a good deal of galena associated with the gold in the lead. Three drills are working night and day.

It is stated that blanketing is as prevalent in the Cripple Creek section of the camp as it has always been wherever Cobalt prospectors have travelled. Whitesides Township has been staked solid while not more than 25 properties were recorded.

T. E. Godson, K.C., of Bracebridge, has been appointed police magistrate at Porcupine at a salary of a thousand dollars a year.

The Dome Mining Company is rushing in 4,000 tons of supplies for the next year, and including all its heavy machinery.

At the property a force of carpenters is erecting camps. Quite a number of Porcupine companies have been incorporated within the past month. One of these is the Preston East Dome mines, with a capital of \$3,000,000.

The other is the Montreal Tisdale Gold mines, with a capital of \$2,000,000, and headquarters at Sault Ste. Marie.

After working steadily for a year the Scottish Ontario has now cut its vein at the 100-foot level. The vein appears to be wide, and though only specks of free gold were discovered at first, values are now improving.

Jack Munro reports that he has now under option some good claims in Deloro and Shaw. The ex-pugilist expects to sell them at a good price to United States capitalists.

Mr. P. A. Robbins, of the McKinley-Darragh, has left the employ of that company and will go to Porcupine in the first two or three days of this month.

South Lorrain.—It is extremely improbable, in spite of the extravagant management of the Keeley, that more than \$400,000 has been spent on the mine to date. It is understood that the worth of the Keeley lies in its big surface cobalt veins, which on neighbouring properties have shown silver at depth. There is good ore in a new shaft near the Beaver Lake line and it is reported that the vein has been cut at the 240-foot level with good results.

The Wettlaufer has declared a 2½ per cent. regular and 2½ per cent extra, payable in February and March respectively. The latest reports of the mine state that there is now an excellent ore body 200 feet long at the 300-foot level, and that some of the bunches are very spectacular. The head office will be moved from Toronto to New York, which probably means that the Lewisohns have now control.

The South Lorrain shipments to date are: Wettlaufer 421.50, Keeley 44.34, and Bellellen 7.50, making a total of 473.34.

The Wettlaufer shipments for 1910 were 150 tons of seconds and 160 tons of high grade. The seconds ran between 500 and 600 ounces and the high grade between 3,000 and 4,000. There are two more cars of high grade waiting to be shipped when it is possible to take them out conveniently.

ALBERTA.

Blairmore, January 14.—The severe storm that swept through the Pass from the 8th to the 12th of this month blocked the railways to such an extent that all freight traffic was abandoned. This necessitated the closing of the coal mines during that period.

The consumption of a deal is rumored involving the purchase of a considerable area of coal land in the South Fork district. The details of the transaction have not been made public, but it is understood that the purchaser is a well-known capitalist in the United States. The value of this acquisition is not readily apparent, as it is evident that the mines already opened are fully capable of supplying not only the present demand, but also the demand for years to come.

The coroner's inquest into the causes of the disaster at the Bellevue mine on December 9, of last year, has been completed. The thoroughness of the investigation may be judged from the fact that it extended over a period of ten days. It will be noted that the verdict of the jury attaches blame to no one. The verdict reads:

That thirty men came to their deaths by carbon monoxide poisoning, and one by a combination of carbon monoxide poisoning and fractured skull. The said carbon monoxide and fractured skull being caused by a percussion of air caused by a cave of rock over chutes No. 76 and No. 78.

The jury respectfully submit the following riders to their verdict:

1. That more mine inspectors be appointed.
2. That a Draeger apparatus station be provided in this district.
3. That telephones be installed under the supervision of the chief inspector of mines, where practicable, in the underground workings of coal mines.
4. That a thorough investigation be made of means of preventing the loss of life by caves in coal mines.
5. We consider that negligence is in evidence on the part of both operators and miners in the carrying out of the provisions of the Coal Mines Act, and we would most strongly recommend a stricter adherence to the intent of this Act.

BRITISH COLUMBIA.

[Owing to illness, our correspondent in British Columbia has been unable to prepare for this issue of the Journal his usual summary of mining news of that province. He has sent, however, the following notes on Rossland mines in 1910, which were written before he was taken ill.]

Rossland Mines in 1910.

So far as can be ascertained from the available information relative to mining operations in Rossland camp, the total production was larger in 1910 than in 1909. The preliminary figures indicate an increase of about 16,000 tons in the total tonnage of ore mined, and the recovery of metals shows a general gain as compared with that of the immediately preceding year. While this increase is not large—in value of metals produced it is estimated at nearly \$100,000—it denotes progress, and is, therefore, gratifying. The output of the Centre Star group of mines constitutes more than two-thirds of the total tonnage of ore mined, and nearly a similar proportion of the metals pro-

duced. The mines of the Le Roi No. 2, Ltd., come next, and then the Le Roi mine, the remainder of the total production being contributed by half a dozen small shippers, in quantities varying up to about 50 tons.

Centre Star Group.—The last annual report of the managing director of the Consolidated Mining and Smelting Company of Canada, Ltd., which owns this group of mines, among others, gave information relative to them for the fiscal year ended June 30, 1910. The ore reserves of the group, at the end of the fiscal year, were estimated at 245,640 tons. The following are among the developments during the latter half of the calendar year 1910.

Beside the new ore in the Centre Star, mentioned in the annual report, further development has proved the existence of ore not previously definitely ascertained as being in the mine. Ore was found on the 2nd, 3rd, 4th and 5th levels, and exploration is being continued with the expectation of finding these ore shoots on lower levels. A new drift (537) has developed the downward continuation of some of the ore shoots found on the 4th level; these are yielding a fair tonnage, with value above the average, and they give promise of a considerable increase in quantity. The ore taken from the Centre Star is generally of a good shipping grade, with value chiefly in gold, the silver running about one ounce to the ton, and copper 0.6 per cent. Diamond drilling is being continued in the lower levels of this mine. The 16th is the lowest level; it is at a depth of 2,300 feet on the incline, or approximately 2,000 feet in vertical depth. This is only about 1,600 feet above sea level, and is nearly down to the level of the company's smelter at Trail.

Conditions at the War Eagle during the latter half of the year continued much as stated in the annual report. One important change, though, was the development on the 12th level, which proved the existence of a strong vein, but the ore taken out was of rather low grade. Diamond drilling in the vein from this level was resorted to, with the result that high grade ore was found to occur 75 feet deeper. Assays of samples taken across 5 feet of this ore returned a gold value up to 3.25 oz. per ton and 0.4 per cent. copper. It was decided to sink in the vein from the 12th level preparatory to stoping the high grade ore found here. This important development resulted from following some small streaks of ore mentioned by the managing director in his report. Stope 1086 continued to produce a large tonnage of high grade ore during the latter part of the year, and stope 1168, opened since the annual report was made, has also been giving a considerable tonnage of ore of excellent quality.

In the Idaho, stope 470 has been holding out well, and stope 539 has been maintaining its producing capacity. Ore from this mine is of generally good grade, above the average of the Centre Star ore, the bulk of which does not run quite so high in gold as that from the Idaho.

Conditions in the Iron Mask remained much as during the fiscal year. Stoping has been in progress in the orebody opened by the cross-cut from the Centre Star 4th level, and ore has also been mined below the Iron Mask old 5th level, which is only 40 feet above the Centre Star 4th level cross-cut, which has made these ore bodies accessible.

The total footage of work done in 1910 in further development of the Centre Star group of mines was 12,566, chiefly drifting and cross-cutting. Diamond drilling totalled 27,698 feet. About 400 men are employed in these mines. The tonnage of ore for the year, allowing an average output for December, was rather more than 191,000 tons.

The following figures may prove of interest: Aggregate tonnage of ore mined since production was commenced in 1894, 1,477,324 tons. Metal contents of value: Gold, 721,636 oz.; silver, 850,750 oz.; copper, 28,239,017 lbs.; gross value, \$19,508,633. These statistics are to July 1, 1910; if the production made during the latter half of 1910 be added, an approximate tonnage of 1,570,000 tons, and a value of nearly \$20,500,000 will

be obtained. There have been fully 26 miles of underground development or narrow work done in the mines of the group.

Le Roi.—While the production, tonnage and development work figures of this mine for 1910 are higher than for 1909, they compare unfavourably with those of earlier years when the mine was being worked on a larger scale. Exploration work last year was chiefly with diamond drills, with which 11,421 feet of drilling was done; cross-cutting, drifting, etc., totalled 1,745 lin. ft. The output of ore was about 14,275 tons, and the valuable metal contents as follows: Gold, 9,567 oz.; silver, 8,070 oz.; copper, 294,194 lbs. The only work being done late in the year was that of stoping out some ore known to have been left in the ground above the 200-foot level.

The Le Roi Mining Company is now in voluntary liquidation, the shareholders having authorized the winding up of the company after much exploration with diamond drills had failed to find any large shoots of ore of a sufficiently high grade to give reasonable promise of profitable results should the operation of the mine be continued. What will be the future of the mine is not known. Mr. A. J. McMillan, late managing director, is liquidator, and he will doubtless dispose of the company's property, which includes the smelting works at Northport as well as the mine at Rossland, in such manner as will best conserve the interests of the shareholders.

Le Roi No. 2.—The gross tonnage of ore produced from the mines of the Le Roi No. 2, Ltd., in 1910, was about 47,000 tons, approximately one-third of which was milled at the mine (producing 1,370 tons of concentrate) and the remainder was shipped crude to the smeltery at Trail. The development work done underground totalled 4,400 lineal feet, beside which there was 11,500 feet of diamond drilling done.

The cross-cut from the Josie shaft, at the 1,300-foot level, commenced last year, was driven south until it reached the vein at about 1,000 feet from the shaft. The ore body opened proved to be large, but the value contained in the ore was less than had been hoped for, though the fair percentage of copper in it was regarded as a promising indication. Most of the year's work on this level having been dead work, there has not yet been time to develop the ore body extensively. Satisfactory results are expected from the further development of this ore, there being every reason to look for the ore in this deep part of the mine yet proving as profitable to the Le Roi No. 2 Company as that at depth in neighbouring mines has proved to other companies operating them.

In other parts of the mines, at various depths down to the 900-foot level, much work has also been done during the year, and in several instances important shoots of ore have been discovered. Ore was opened in the Hamilton vein, in the west end, between the 700 and 500-foot levels. In the May Day vein, discovered six years ago, ore has been found above the 100-foot level and work done in it. In the Annie vein ore was found above the 500-foot level, besides which stope 523 was opened and worked. A rich veins was quite lately found on the 500-foot level, but there has not yet been sufficient time to do much development in it. Driving towards an entirely new vein, known as the Shackleton vein, on which no work had previously been done anywhere on the property, has been in progress during the latter part of the year. On the northern part of the group, 100 feet of sinking was done, by contract, in the Surprise vein, and after ore of good grade had been found, work was stopped temporarily, but will be resumed in the near future.

Besides the foregoing work, some diamond drilling was done in No. 1 mine. There was little change made in the surface works, these being adequate to present requirements of the mines. An exception is that a self-acting tramway is being put in between the ore-sorting bins and the shipping bins, this to be worked by a small induction motor.

The company, which ordinarily employs about 110 men, with Mr. Ernest Levy in charge in the province, during the year paid

three dividends each of two shillings respectively on March 8, July 8, and November 8. Its capital is £600,000 in 120,000 shares of £5 par. The total of dividends paid to date is approximately \$1,062,000.

Velvet.—Shipments of ore from this mine during two months of 1909 and four months of 1910 totalled 647 tons, containing 576 oz. gold, 647 oz. silver, and 45,290 lbs. copper. One lot of 17 tons averaged 3.13 oz. gold, and 5.3 oz. silver per ton, and 9.76 per cent. copper. Much of the ore shipped averaged about \$24 per ton, gross value. Years ago this mine was opened by six levels to a depth of 500 feet. An adit drains the mine to the 4th level. The larger part of the ore above No. 5 level has been extracted. The vein in the upper levels has varied in width from 3 to 8 feet; diamond drilling has shown the occurrence below the 6th level of 11 to 13 feet of solid ore, samples of which have assayed \$18 to \$20 per ton. It is stated that as the country is less disturbed below the 6th level, the ore body is stronger and better defined than above it, and the ore of good average grade. The mine equipment including power plant, stamp mill, concentrating tables, etc., cost about \$70,000. Ex-

cepting that done under lease in 1909 and 1910 no work of consequence has been done on this property since 1903.

Other Properties.—Very little information was received relative to other mines in Rossland camp, the following brief notes include all that can be given at this time. The Cliff is being developed by the Granby Company, under option of purchase. Two tunnels are being driven. Air for driving two machine drills is obtained from the Centre Star. Between 15 and 20 men are employed.

The Nickle Plate has been worked on a small scale during recent months by some leasers, who have shipped about 850 tons of ore. Part of this was gathered up on the surface and other ore has been taken from a drift on the 200-foot level of the mine.

The I.X.L. has also been worked in a small way and a few hundred tons of ore extracted.

In the south belt, galena ore of good quality has been reported as occurring in the Blue Bird and Mayflower mines, both of which have made small shipments to the smeltery.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The Welsh anthracite coal trade during 1910 was a disappointing one. The year opened with every prospect of being a profitable one, but the mild Continental winter, the Paris floods, the uncertainties prevailing over the Eight Hour Act, and the absence of American and Canadian orders, which at one time formed an important factor in the market, all contributed to the period being one of the most disastrous in its history. The ruling price of Big Vein at the close of the year was 13s. 9d. per ton f.o.b., as against about 18s. for the same class of coal at the opening of the year, and alongside of the gradual fall in price has been constant loss of time at the mines, which has been greater than for several years past. In part, this was due to the sidings at Swansea being so completely blocked up with coal that the railway companies were unable to clear any more from the collieries, with the result that the latter were recently on stop for days together. Lately two anthracite collieries were put up for auction, but in view of possible labour troubles and the poor demand at the moment for the coal, no bid was made. The immediate outlook is somewhat gloomy for the trade in view of the opening up by British capital of the Russian anthracite fields, which will compete in places where Welsh anthracite has been used for years.

SOUTH AFRICA.

Johannesburg.—One of the most serious of the native faction fights which have taken place on the Rand during the Christmas holidays was waged at the Cason mine. One native was cut off from his comrades and was literally beaten to a pulp. Seventy were wounded. Fighting was renewed underground this morning. One man has been killed and many have been injured, several fatally—Reuter.

INDIA.

The gold production of the mines of the Kolar Goldfield (Mysore) and two outside mines (the Hutti Nizam's and the North Anantapur) for December was 48,419 ozs., an increase of 1,147 ozs. compared with the return of the previous month.

RUSSIA.

Warsaw, January 20.—Four hundred miners were entombed alive to-day and forty instantly killed by an explosion in the Casimir coal mine at Sosnowice on the Russo-Prussian frontier. Fire broke out following the explosion, cutting off the escape by the main shaft, but 360 cut their way through a wall separating them from a cross tunnel and came out alive. Rescue parties that were able to enter the mine after the fire had raged for several hours found forty men dead, their bodies badly mutilated.

Negligence of the mine owners to apply proper safety devices was responsible for the disaster and the arrest of three of the owners was ordered by Government officials, who arrived on the scene and directed the work of rescue.

Rioting broke out among the rescued miners and the relatives of the men who were killed, and soldiers were called to prevent an attack on the mine owners when they were taken into custody.

AUSTRALIA.

The Broken Hill South Silver Mining Company received the following cablegram on January 4 from Adelaide: "Four years and half wages agreement concluded. Supply of Water Bill has passed."

The North Broken Hill Mining Company also received a cable, dated 4th instant, from its head office at Melbourne: "Labour troubles settled. Men are to receive 1s. per day extra; all other conditions remain as before."

UNITED STATES.

Butte, Mont., January 21.—The Tuolumne Company is now shipping on an average of about 350 tons of ore a day, which is running from 10 to 12 per cent. copper. At the same time development work is going on and large bodies of ore are being blocked out and the sinking of the shaft from the 1,400-foot level is proceeding and good progress is being made. The management has received bids or offers from at least two smelters for the treatment of its ore, but as yet no decision has been arrived at.

Washington, D.C.—According to Director of the Mint George E. Roberts, in the annual statement of the Bureau of the Mint on the gold and silver production of the world, although the production of gold in South Africa probably will increase, the increase will be slow, while the production in other parts of the world is standing still or declining.

The natural expansion in industry, commerce and wealth can be depended upon to offset the probable slight increase in gold production. The increase for 1910, according to the bureau's figures was only \$451,100. Africa leads the world in production of gold during 1910, with \$170,000,000 worth of its credit. This was an increase over last year of about \$4,000,000. The United States came second during 1910 with \$96,055,200 produced in gold, compared with \$99,673,400 last year. Australasia came third with \$65,002,000 in gold, compared with \$71,007,900 last year. The total gold production of the world in 1910, the bureau says, was \$454,874,000, compared with \$454,422,900 in 1905.

In the United States, California resumed first place among the States, which she lost to Colorado in 1897, with \$21,146,150 to her credit, compared with \$20,703,600 last year. Colorado, in second place, had \$20,408,041, compared with \$21,846,600 last year. Nevada came third, with \$17,941,643, compared with \$16,286,200 last year; and Alaska was fourth, with \$16,987,990, compared with \$20,339,600 last year. Kansas, which last year produced no gold, had to her credit in 1910 \$11,163 worth of precious metal.

Joplin, Mo., January 16.—Zinc ores sold as high as \$44 for a few lots, \$43.50 for a few more, while the major portion of the tonnage brought a \$43 base. Small lots sold down as low as \$40. The highest price reported paid for any ore was \$47.

Calamine ores sold at \$20 to \$24 for large lots, while small jags sold for less prices. The highest price reported for any lot was \$29.

This week marked the first time in the history of the district when heavy tonnages of ore sold on a contract price. Something like 1,200 tons of ore in the Joplin district was contracted for this week on a regular scale of prices based on the spelter market at St. Louis. This movement involves a number of the smelters and a number of the producers, and has attracted the attention of the entire field.

Production is gradually improving again and within another fortnight will be back to its old gait, unless interfered with by bad weather conditions. The surplus ores in the district have been reduced greatly during the shut-down.

A strong demand marked the lead ore market of the past week and ores sold at \$57 to \$58 per ton of 80 per cent. zinc. Nearly all the large lots received \$58, while smaller lots shaded down to \$57.

The curtailment in output and increase in demand by the starting of two new smelters has caused the market to respond quickly and the producers are feeling much better over the situation.

Spelter has been steady for the past ten days at \$5.40 to \$5.45, St. Louis, while the London market has advanced to £24 2s. 6d. Lead has been steady at \$4.37½, St. Louis.

Goldfield, Nev., January 19.—The resignation of J. R. Finlay as manager of the Goldfield Consolidated Mining Company was

announced yesterday, and will, it is stated, take effect next Saturday. Mr. Finlay is returning to New York City, where he will resume practice of his profession as mining engineer. He has been in charge of the Goldfield Consolidated's property for a year, and during that time has brought the affairs of the company to a highly satisfactory stage, achieving remarkable success in production, profits, development and improvement of underground and surface equipment.

No successor to Mr. Finlay has been chosen or at least announced. For the present, operations will continue under the existing organization, with Superintendent J. W. Hutchinson in charge of the mill and Assistant Manager J. F. Thorne in charge of the mines.

Tonopah, Nev., January 12.—The year 1910 closed and 1911 began under the most encouraging conditions as far as the mining industry in Tonopah is concerned. While the latter part of the last month of the year recorded smaller shipments on the part of most mines, it was not due to any fault of the property, but, rather, to the time lost because of the holidays. There is more high grade and milling ore available in the mines now than at the same time last year, if we may judge from general and official report, and it seems certain that if ordinary working conditions prevail during the year, Tonopah mines will score the biggest production in their history.

Coalinga, Cal., Jan. 12.—A 400-barrel gusher has been developed at well No. 1 of the Creme Petroleum Company, which was brought in several weeks ago. Since completion of the well late in November it has been on the pump and making a good production until early last week, when the hole sanded up. In the course of work preparatory to putting the well on the pump again the sand suddenly loosened and the oil commenced flowing in heavy volume.

MEXICO.

Parral, Mexico, January 21.—The future for the Parral district looms up brighter than ever since the Alvarado started to grind, and the Veta Colorado made good its word to buy ore. Fifteen hundred tons in one lump were purchased of P. B. Butler, representing the owners of the Santa Gertrudis property, by the Veta Colorado Company at first, and several more purchases are pending.

COMPANY NOTES

COMPANY NOTES.

Directors of the Wettlaufer mine have put the stock on a dividend basis, declaring a regular quarterly dividend of 2½ per cent. and extra of 2½, payable March 11, to holders of record February 25.

HOLLINGER GOLD MINES, LIMITED.

24 King Street West,
Toronto, Canada, 9th January, 1911.

To the Shareholders,

Hollinger Gold Mines, Limited:

The following general statement of affairs is issued for the information of the shareholders of the company.

The company is incorporated under the Ontario Companies Act with full powers for the mining and treatment of ore and with share capital of \$3,000,000, divided into 600,000 shares of five dollars (\$5.00) each, of which 100,000 remain in the treasury and 500,000 have been issued as fully paid and non-assessable for transfer of properties, the carrying on of mining operations until the erection of the stamp mill and making provision for milling the ore, etc.

The directors and officers of the company are: N. A. Timmins, of Montreal, President; John McMartin, of Cornwall, Vice-President; L. H. Timmins, of Montreal; Duncan McMartin, of Montreal, and D. A. Dunlap, of Toronto, Secretary-

Treasurer. The Toronto General Trusts Corporation has been appointed Transfer Agent and Registrar of stock.

The mining property of the company consists of four mining claims of 40 acres each (160 acres in all), being parts of Lots Nos. 10 and 11 in the Second Concession of the Township of Tisdale, all of them being patented by the Crown in the name of the company as owner. As these claims adjoin each other they form a block of land that can be mined from one centrally located power plant. The present power plant and workings are so situated, being at about the centre of the block of claims.

The buildings consist of a power house and various commodious buildings for the accommodation of the men, office, smithy, storehouse, stables, etc. The power plant which is in good order and working steadily comprises two 60 h.p. boilers, 6-drill compressor, 3 hoists and all working connections.

The mining done up to the present includes 365 feet of sinking and 1,040 feet of drifting at the 100-foot level. The sinking comprises the main three-compartment shaft reaching to the 100-foot level known as No. 1 shaft, No. 3 shaft about 700 feet southerly reaching to the 100-foot level and connected at that level with No. 1, one intermediate shaft of about 65 feet in depth, and the winze about 100 feet northerly from the main shaft and reaching from the first level down 100 feet to the second level where the work of sinking at present ends (being

200 feet from the surface). All the ore raised from these workings is dumped and piled for conveyance to the stamp-mill.

The ore body consists of gold bearing quartz veins described on the Official Geological Maps and which are of varying and somewhat irregular widths. These veins out-crop in places but generally have been defined on the surface by trenching, the surface covering of soil and debris being in some cases several feet deep. Comparatively little, however, has been done in the way of uncovering known veins, or in prospecting for others, much of the territory being untouched. There appear at present to be three systems of veins running northeasterly and southwesterly across the property, and on what appears to be the main system the present workings are located. The width of the vein upon which the sinking and drifting has been done averages about from six to eight feet, and the length so far uncovered upon the surface is about 1,700 feet. The values throughout, according to the tests from sampling, assaying, and milling, have been fairly uniform without any apparent diminution at the depth reached (200 feet) where the vein still continues. Veins have been uncovered upon each of the four claims showing ore similar in character to that already mined and tested.

Consistent assay tests have been made from the commencement by means of a well-equipped assay plant and assayer on the property. In addition to this there have been the returns from the small two-stamp Tremaine mill, installed in the early part of the summer, the ore treated by it having been taken in the course of mining indiscriminately from the sinking and drifting.

The returns from the sampling and assaying have averaged \$49.80 in gold per ton, while from the stamp-mill the values have averaged over \$50.00 in gold per ton recovered from a saving of about 85 per cent. effected without concentration or effort to treat the sulphides, thus proving the free-milling character of the ore.

Under agreement with the company, mining operations are being vigorously carried on by the former owners and will be so continued free of expense to the company until the completion of the stamp-mill now being erected by the Procupine Gold Milling Company, Limited, in a convenient location on a site, a part of which has been leased from this company. Contracts

have been let for the erection and equipment of this mill and it is fully expected that operations will begin by July next with electric power supplied by the power plant now being installed at Sandy Falls on the Mattagami River. Ore from this company's properties has the first claim to treatment up to the full initial capacity of the mill, viz.: thirty stamps. Thus the company, by the time the stamp-mill commences operations, will own, entirely free of cost to it, a fully equipped and efficient mining plant, a large quantity of ore mined and ready for treatment, a further large quantity of ore blocked out, with provision made for milling the ore, as a result of which financial returns should be quickly obtainable.

The Tremaine stamp-mill was installed to ascertain the gold content of the ore and its free milling character. The gold so recovered by this process, which is the property of the company, has not yet been refined and its value therefore cannot be stated, but a full report will be given later.

Mr. P. A. Robbins as General Manager will take charge on February 1st next, and will be assisted by Mr. A. A. Pare under whose superintendency the mining and milling operations have hitherto been conducted with great satisfaction.

N. A. TIMMINS, President.

LA ROSE.

The dividend cheques of La Rose Consolidated mines were mailed on January 21st. A brief statement accompanying the cheques shows that there is \$708,470.99 in cash on hand and ore in transit and at smelters, and \$303,343.40 in ore sacked at the mine ready for shipment. Since October 1 the available cash assets have been increased over 65 per cent.

January 20, 1911.

Cash in bank, ore in transit and at smelters.....	\$708,470.99
Ore sacked at mine ready for shipment.....	303,343.40
	\$1,011,814.39

The fact that the cash position has been trebled since April 20, 1910, and that the ore reserves are very much greater, reflects the new order of events at La Rose mining areas and emphasizes the executive capacity of President McGibbon and his co-directors.

STATISTICS AND RETURNS

COBALT BULLION SHIPMENTS.

January 14.

A shipment of bullion consisting of 17 bars and 1 keg silver left Cobalt on Wednesday afternoon through the Dominion Express Company. The 17 bars were billed through to St. John for conveyance by the C.P.R. steamer Empress of Britain to London (Eng.) The keg of silver was consigned to the American Smelting & Refining Company, Perth Amboy, New Jersey.

The details of the shipment are as under:

Temiskaming Mine—12 bars; weight, 13,840 ounces; value, \$6,220.

Trethewey Mine—2 bars; weight, 1,952 ounces; value, \$865.

Silver Cliff Mine—1 bar; weight, 832 ounces; value, \$371.

Waldman Mine—1 bar; weight, 328 ounces; value, \$140.

Campbell & Deyell's Sampling Works—1 bar; weight, 160 ounces; value, \$66.

Kerr Lake Mine—1 keg silver; weight, 4,384; value, \$1,258.

The bullion shipments for this year now read as under:

	Ounces	Value.
O'Brien	18,921	\$10,217
Nova Scotia	80,177	40,000
Temiskaming	26,381	12,490
Trethewey	1,952	865

Silver Cliff	832	371
Waldman	328	140
Kerr Lake	4,384	1,258
Campbell & Deyell's Sampling Works	160	66
	135,135	\$65,407

COBALT ORE SHIPMENTS.

Shipments from Cobalt camp for the week ended January 14th were 822,598 pounds, or 411 tons divided among eleven mines. Shipments since the year opened are 2,210,858 pounds, or 1,105 tons. The details are:

	Jan. 14.	Since Jan. 1
Beaver		6,300
Buffalo	57,590	120,690
Cobalt Lake		131,400
Cobalt Townsite		63,700
Coniagas	61,820	288,620
Crown Reserve	40,200	104,200
La Rose	60,000	122,300
Kerr Lake	120,398	180,728

McKinley-Darragh	125,610	269,070
Nipissing	152,400	433,600
O'Brien	79,200	79,200
Right of Way	60,860	60,860
Silver Cliff		47,920
Temiskaming	64,520	145,820
Trethewey	97,250	97,250

Hewitt	23	47
Queen, milled	420	840
Granite-Poorman, milled	250	500
Nugget, milled	110	220
Wilcox, milled	75	150
Emerald	100	100
Standard	63	63
Society Girl	34	34
Maestro	70	70
Eastmont	29	29
Summit	35	35
Hope	56	56
Second Relief	37	37
Idaho	13	13
Other mines		142

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending January 21, and those from January 1, 1911, to date:

	Jan. 21. Ore in lbs.	Since Jan. 1. Ore in lbs.
Beaver		63,500
Buffalo	63,980	184,670
Cobalt Lake		131,400
Cobalt Townsite		65,700
Coniagas		288,620
Crown Reserve		104,200
Chambers-Ferland	64,900	64,900
La Rose	153,310	275,610
Kerr Lake	120,165	300,893
McKinley-Darragh-Savage	110,430	379,500
Nipissing	124,280	557,880
O'Brien		79,200
Right of Way		60,860
Silver Cliff		47,920
Temiskaming		145,820
Trethewey		97,250
Townsite		184,040

The shipments for the week were 821,105 pounds, or 410 tons. The shipments from January 1 to January 21 were 3,031,963 pounds, or 1,515 tons.

Total 4,552 9,216
The total shipments for the week, including the estimated milling, were for the week, 43,058 tons, and for the year to date, 90,695 tons.

British Columbia Copper Co.'s Receipts.

Greenwood, B.C.

Mother Lode	8,226	15,524
Rawhide	8,105	7,161
Jack Pot	385	829
Other mines		240
Total	11,716	23,754

Granby Smelter Receipts.

Grand Forks, B.C.

Granby	19,894	44,553
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Consolidated Co.'s Receipts.

Trail, B. C.

Centre Star	3,495	7,186
Snowshoe	2,164	3,715
Sullivan	319	1,099
Le Roi No. 2, part concentrates	453	1,004
Le Roi	334	442
Number Seven	98	151
Richmond-Eureka	59	117
St. Eugene	130	180
Rambler-Cariboo	84	114
Hewitt	23	47
Standard	63	63
Emerald	100	100
Society Girl	34	34
Maestro	70	70
Eastmont	29	29
I. X. L.	7	7
Summit	35	35
Hope	56	56
Nickle Plate	45	45
Second Relief	37	37
Idaho	13	13
Other mines		164

Total..... 7,648 14,708

The total receipts at the smelters, including concentrates, were for the week, 39,258 tons, and for the year to date, 83,015 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the returns of the ore production and movement for the past week ending January 14th, and for the year to date:

Boundary Shipments.

Granby	19,894	44,553
Mother Lode	8,226	15,524
Snowshoe	2,164	3,715
Rawhide	3,105	7,161
Jack Pot	385	829
Number Seven	98	151
Other mines		240
Total	33,872	72,173

Rossland Shipments.

Centre Star	3,495	7,186
Le Roi No. 2	453	1,004
Le Roi No. 2, milled	300	600
Le Roi	334	442
I. X. L.	7	7
Nickle Plate	45	45
Other mines		22
Total	4,634	9,306

Slocan-Kootenay Shipments.

Sullivan	319	1,099
St. Eugene, milled	2,775	5,550
Richmond Eureka	59	117
Rambler-Cariboo	84	114

TORONTO MARKETS.

Jan. 24.—(Quotations from Canada Metal Co., Toronto.)

- Spelter, 5.60 cents per lb.
- Lead, 3.65 cents per lb.
- Antimony, 8 to 8½ cents per lb.
- Tin, 45 cents per lb.
- Copper, casting, 13.25 cents per lb.
- Electrolytic, 13.25 cents per lb.
- Ingot brass, 8 to 12½ cents per lb.

Jan. 24.—Pig Iron.—(Quotations from Drummond, McCall Co., Toronto).

- Summerlee No. 1, \$23.00 (f.o.b. Toronto).
- Summerlee No. 2, \$22.50 (f.o.b. Toronto).
- Midland No. 1, \$20.00 (f.o.b. Toronto).
- Midland No. 2, \$19.50 (f.o.b. Toronto).
- Hamilton No. 1, \$18.75 (f.o.b. Hamilton).
- Hamilton No. 2, \$18.25 (f.o.b. Hamilton).
- Clarence, \$20.00 (f.o.b. Toronto).
- Cleveland, \$20.00 (f.o.b. Toronto).

GENERAL MARKETS.

- Coal, anthracite, \$5.50 to \$6.75.
- Coal, bituminous, \$3.50 to \$4.50 for 1¼-inch lump.

Coke.

Jan. 20.—Connellsville Coke (f.o.b. ovens).
 Furnace coke, prompt, \$1.40 to \$1.50 per ton.
 Foundry coke, prompt, \$2.00 to \$2.15 per ton.

Jan. 20.—Tin (Straits), 41.55 cents.

- Copper, Prime Lake, 12.70 cents.
- Electrolytic copper, 12.50 cents.
- Copper wire, 14.00 cents.
- Lead, 4.50 cents.
- Spelter, 5.65 cents.
- Sheet zinc (f.o.b. smelter), 7.50 cents.
- Antimony, Cookson's, 8.25 cents.
- Aluminium, 21.75 to 22.00 cents.
- Nickel, 40.00 to 45.00 cents.
- Platinum, ordinary, \$38.50 per ounce.
- Platinum, hard, \$41.00 per ounce.
- Bismuth, \$2.00 to \$2.10 per lb.
- Quicksilver, \$42.00 per 75-lb. flask.

SILVER PRICES.

	New York cents.	London pence.
January 10	54¾	25¼
" 11	54¾	24½
" 12	54½	25⅜
" 13	54½	25⅜
" 14	54½	25
" 16	53¾	24½
" 17	53⅞	24⅞
" 18	53⅞	24¾
" 19	53⅞	24½
" 20	53¼	24⅝

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

Miscellaneous—January 24, 1911.

Amalgamated Asbestos	..	14
Black Lake Asbestos	15	16
Dominion Coal	..	..
Dominion Steel	..	..
Dominion Steel Corp.	56¼	56½
Granby	31	33

Consolidated Mining	45	55
Nova Scotia Steel	88	88½
Crow's Nest Pass	..	77

Cobalt Stocks—January 24, 1911.

Amalgamated	.00½	.03
Bailey	.06	.06¼
Beaver Consolidated	.32⅝	.32¾
Buffalo	2.28	2.30
Chambers-Ferland	.12	.12½
City of Cobalt	.16¾	.18
Cobalt Central	.08½	.10
Cobalt Lake	.12⅝	.13
Coniagas	6.52	6.60
Crown Reserve	2.55	2.57
Foster	.05	.07
Gifford	.02	.04
Great Northern	.11⅞	.12
Green Meehan	.01⅞	.02
Hargraves	.22¾	.23½
Hudson Bay	90.00	120.00
John Black	.01	.03
Kerr Lake	7.60	7.70
La Rose	4.72	4.77
Little Nipissing	.12¼	.12½
McKinley	1.50	1.51
Nancy Helen	.01	.04
Nipissing	10.60	10.85
Nova Scotia	.17½	.18¼
Ophir	.02½	.15
Otisse	.01¼	.01¾
Peterson Lake	.14½	.14⅝
Right of Way	.12¾	.13
Rochester	.03¾	.04
Silver Leaf	.04	.04½
Silver Bar	..	..
Silver Queen	.04	.05
Temiskaming	.76⅞	.77⅞
Trethewey	1.13	1.14
Watts	.01	.04
Wetlaufer	1.10	1.12
Hollinger	4.21	4.25

New York Curb—January 24, 1911.

Boston Copper	..	..
Brit. Col. Copper	6½	6¾
Butte Coalition	18¾	19½
Canadian Mines	..	..
Chino Copper	2½	2⅝
Davis-Daly Copper	1½	1⅝
Ely Consolidated	.37	.39
Gila Copper	..	..
Giroux Mining	6½	6⅝
Goldfield Consolidated	6¾	6⅞
Greene-Canadian	6½	6⅝
Harcuvar Copper	..	..
Inspiration Copper	8⅞	8½
Miami Copper	18⅞	19⅞
New Baltic Copper	5	8
Nevada Con. Copper	18¾	18⅞
Ohio Copper	1¾	1⅞
Rawhide Coalition	.03	.03½
Ray Central	1¾	1⅞
Ray Consolidated	17½	17⅞
Union Mines	¼	⅝
Yukon Gold	3¾	3⅞