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THE ROTHSCHILDS (?) IN SUDBURY.

Throughout the past year many rumors have been circulating concerning large mining transactions in the Sudbury nickel region. Amongst the names that have figured most prominently has been that of the Guggenheims. For some months their representatives were actively canvassing the nickel situation in Canada and were actually treating for the acquisition of properties. Apparently, however, no satisfactory terms could be arranged, and it remained (and here we must mention that the report is not yet fully confirmed) for a branch of the Rothschilds, with Dr. F. S. Pearson as their agent, to step in and acquire the large Booth-O'Brien holdings. The price to be paid is still, so far as the public is concerned, a matter of conjecture; but it almost certainly will exceed \$5,000,000. It is a fair assumption that the new owners will establish large smelting and refining plants, and that they are already assured of a market commensurate with their output. It is probable, also, that the bulk of the production will be used in industries directly or indirectly under the domination of the purchasers themselves. No doubt their own growing needs have incited them to make this huge investment. In any case, there is no reason to think that the step has not been long and carefully deliberated upon.

On the other hand, it is totally superfluous to imagine that the International Nickel Company, or any of its subsidiary organizations, will suffer from the advent of the Rothschilds. Sooner or later such an event was inevitable. International Nickel, so far as we are aware, has made no attempt to pre-empt the Sudbury nickel ore field, though quite naturally, the men at the helm have taken pains to safeguard the enormous industry of which they are the pioneers. On them has devolved the titanic task of developing a world-wide market for nickel and its alloys. Whilst they possess a practical monopoly of that market, possession has been forced upon them by circumstances. The Sudbury deposits are so extensive and so accessible as to prohibit competition from other countries. No other organization has been, therefore, in a position to supply the increasing demand for nickel, or, for that matter, systematically to foster and enlarge the market. In brief, the record of International Nickel's activities comprises the commercial history of the metal.

As with all human concerns, so with International Nickel there has been much criticism and abuse levelled at its devoted head. The fact remains, however, that the chief item harped upon is the fact that the company refines all its matte in the United States instead of in Canada. This has been so often explained that it is

almost offensive to repeat that there is a United States duty of 6 cents per pound on all refined nickel entering that highly protected country. Were this duty removed it is possible that other trade considerations might still compel the company to refine in the States. But it may be safely taken for granted that refining will always be carried on, either by International Nickel or by any other concern, exactly at those points where it can be performed with most profit.

It has taken about twenty-five years of continuous effort to build up the industry that centres at Copper Cliff. In this year of grace, the International Nickel Company is firmly entrenched. Its position could hardly be stronger. It furnishes about 70 per cent. of the world's supply of nickel, its ore reserves are sufficient for many decades to come, and it is about to double its mining and smelting equipment. In fact the whole plant may attain three times its present capacity before a new concern can possibly become a producer.

For these and other reasons we believe that it is beside the point to look upon any new organization as a rival, or even as a competitor, of the International Nickel. With larger production the price of nickel may be, we hope will be, lowered. This is a function of the market and of improved metallurgical methods. But it is obvious that the present purveyors to the market will for an indefinite period hold a practically unassailable position. It must be remembered, also, that unlike Jonah's gourd, no industry can spring up overnight. Unlimited money cannot perform miracles. Every organically sound enterprise must be built up slowly and wisely.

HYDROTHERMAL ALTERATION.

The study of hydrothermal alteration is one of the most pregnant phases of geological research. It bears directly upon the origin of quartz veins, and, hence, is of distinct professional interest.

The latest contribution to the literature of this subject comes from the pen of Dr. Elwood S. Moore. In an article published in the December (1912) number of *Economic Geology*, Dr. Moore presents the results of his investigation of the granite and quartz of the St. Anthony mine, Sturgeon Lake, Ont.

The St. Anthony lies on the contact of granite and an extensive area of Keewatin greenstones, acid eruptives, and schists. The quartz veins include certain amounts of calcite and siderite, principally when they occur in the basic schists. The granite, except near the contact where it is higher in soda, is of the ordinary type. "The absorption of the Keewatin, says Dr. Moore, "seems not only to have increased the sodium content, but also to have caused a disturbance "in the chemical equilibrium of the granite magma "which resulted in a considerable amount of differentiation." A specimen of granite taken from a spot one-quarter of a mile from the mine proved to be low

in silica and potash, and high in alumina and sodium, the result of regional metamorphism.

At the mine, and for a quarter of a mile to the westward, the granite has been shattered and the interstices filled with a network of quartz veins. These appear to be irregular segregations, disappearing gradually in the granite.

Apart from the effects of weathering, the granite surrounding the fissures shows strongly the effect of hydrothermal alteration for distances up to twelve feet from the veins. Pyrite, galena, sphalerite, and chalcopyrite occur in the veins accompanied by the gold except where the latter has been removed by secondary enrichment. In some cases the walls are impregnated with the sulphides.

Selected analyses of granite specimens demonstrated that the silica content decreased regularly as the veins were approached. The increase in alumina and soda and the variations in silica and potash contents are explicable mineralogically. Microscopic examination of their sections, together with chemical analyses, enabled Dr. Moore to reach the following conclusions: "The most important changes in chemical composition "are in the loss of silica which seems to have served, "to some extent, to build up the quartz veins; the relative increase of alumina, the loss of calcium, potash, "and sulphur, and the increase of iron and soda. The "chief mineralogical changes are in the alteration of "the feldspars to sealy mica, sericite, and paragonite; "the recrystallization of the quartz and its partial segregation into veins; the oxidation of the pyrite and "its removal, to some extent, from the rocks adjacent "to the veins; the introduction of sulphides with the "vein quartz."

The bearing of this kind of investigation upon the mine itself is of demonstrable value. It not only helps to indicate the character of the ore, but, carried further, it assists in delimiting the area wherein mining may profitably be conducted. The St. Anthony mine is one of the few really promising gold developments in Western Ontario being worked at present. Little attention has been paid to the economic geology of the region. We hope that Dr. Moore's paper is but the first of a much needed series.

"THE RICHES OF THE EARTH."

A pungent reminder of the halcyon days of Rossland and of Cobalt comes in the shape of a full page advertisement in the *Toronto Daily Star*. On Friday, February 7th, the Salvator Silver Mine was the subject of a page of ardent publicity. It comes by way of Montreal. We hardly believe that Toronto itself could originate such piffle nowadays.

A brilliant allusion to "aviation methods" is the proem of the advertisement. Then Cobalt's output is conciliatingly, if insidiously, worked in. "Just look "around Toronto to-day and see the number of men en-

“joying the highest station in Society [the capital letter “is the point!] who were, but a few years ago, men of “ordinary capacity.” Aha! dear investor, you see what is coming! Salvator will bring not only shekels, but social kudos and emended cerebation!

Beautiful word-pictures lure the reader. Metaphors are mixed in boldest fashion. “Nature is the very “Mother of industry; for instance, in order to get Gold “or Silver, it is deeply embedded in seams or veins of “quartz or calcite, surrounded by the hardest kind of “rocks, known as diabase, Keewatin, on conglomerate, “and Nature seems to notify one, by more or less visible “signs, of the presence of these metals. ‘Here I am, get- “me out if you can.’” ’Twould be a flinty soul indeed that could turn a deaf ear to the obstestations of poor “embedded” Nature. While we have never actually heard that appeal, we can readily imagine its power.

At last, Mr. R. T. Byers, for such is our hero’s name, lands gracefully from his aeroplane and condescends to explain that, having secured the Wright claims in Cobalt, he feels a vasty confidence in their future—more especially as the title has been in litigation for over five years. The Salvator property, quoth Mr. Byers, has silver now. “That’s why such a terrible “legal fight resulted for its possession. Look at the “pictures shown here. *One depicts a true fissure vein, “on a contact of diabase and Keewatin; the other shows “a small lake, a valuable indication of future wealth “stored there; for instance, all the treasure of Crown “Reserve was found under the lake.*” The italics are our own, as they very well should be. We thank Mr. Byers for his tip, and, weather permitting, we shall soon lead the rush in staking Lake Superior. No small lakes for ours!

CONGRATULATIONS.

So long have we been accustomed to receiving Government reports many months overdue, that we greet Bulletin No. 1, 1913, issued by the British Columbia Bureau of Mines, with pleased surprise. The Bulletin consists in a preliminary estimate of the mineral production of the Province for the year 1912. It has been brought out with promptitude that argues well for the spirit and efficiency of the Bureau, for the zeal of Mr. W. Fleet Robertson, the Bureau’s technical head, and, especially, for the interest that Sir Richard McBride takes in the work of his own department.

Circumstances have been so ordered as to date the issuance of this Bulletin immediately after a year in which the production of each and every important mineral shows large, or relatively considerable, increase.

The British Columbia Bureau of Mines has broken through tradition, has flouted the printer’s devil, and has set the pace for the rest of Canada.

EDITORIAL NOTES

Dividends paid by Kootenay and Boundary (B.C.) mines during January, 1913, exceeded \$350,000.

New regulations for the transportation of explosives, modelled on those of the United States, are being issued by the Canadian Railway Commission. They come into force in March, 1913.

It is reported that the Golden Cycle Mining & Milling Company’s property at Cripple Creek, Colorado, is to be sold for \$6,500,000. While the sale has been officially confirmed, the price named is based upon rumour.

The Montreal Financial Times is one of Canada’s outstanding publications. Its weekly mining letters are readable and most informing. Would that more of our periodicals devoted space to carefully edited mining news! The industry needs it.

Our thanks are due to the publishers of the American Metal Market, New York, for copies of their neat little volume, “Metal Statistics for 1913.” Complete tables of metal prices and other statistics are compiled in very convenient form. It is an invaluable work of reference.

Cobalt discoveries are occurring with gratifying frequency. Seneca-Superior, Chambers-Ferland, La Rose, and other mines have reported new veins within the last three months. The probabilities, now that a fresh impetus has been given to prospecting, are that more discoveries will follow. London is looking upon Cobalts with more than usual favour.

The Statistical Number of the Iron Trade Review is beyond question one of the best numbers that have ever appeared. An article of outstanding merit, one of a series that should ultimately be published in book form, is entitled “Pig Iron and Its Method of Manufacture,” by John Jermain Porter. We have never seen a clearer exposition of blast furnace practice.

Leadville is following the example of Cripple Creek. In the latter camp, three large drainage tunnels have been driven, the cost being defrayed by joint subscriptions of the mining companies. A fourth tunnel is projected. At Leadville there is active co-operation between operating companies to lessen the cost of pumping by utilizing cheap hydro-electric power from Shoshone.

Mine products exported from Canada during the seven months ending October, 1912, had a value of \$33,478,026, according to the October Bluebook of the Do-

minion Government. This figure exceeds by ten million dollars the corresponding figure for 1911. For the month of October alone, the value of mine products exported was \$6,344,910, as against \$3,948,291 for October, 1911.

Sir Thomas Shaughnessy, in response to a request from British Columbia, asking him to reduce the freight rates upon coal from the Nicola collieries, replied that the present rate from Merritt to Vancouver, 225 miles, was \$1.80 per ton, and that this was an irreducible minimum. As there is a serious fuel shortage, there is every probability that the British Columbia Government will institute an investigation.

According to Dr. Victor Lehner, who contributes a paper on the subject to a recent number of *Economic Geology*, the function of alkaline sulphide solutions in dissolving and transporting gold may be of much greater importance than has hitherto been suspected. From these solutions gold is not precipitated by pyrites. Exposed to the air, the gold is slowly deposited from these solutions. But, under given conditions, they are far more stable than ordinary auric chloride solutions.

Our readers should peruse with care the report of the Casey Cobalt Mining Company, published in this number. The presentation of this annual report in London is one of the really pleasant incidents in the history of Cobalt. The speeches of the two Canadian directors, Messrs. Parker and Watson, record the phenomenal success of Casey. Since Casey was a short time ago a defunct equine, the occasion is all the more pleasing. It makes for strong trans-Atlantic relations.

We take this opportunity of congratulating our contemporaries, *The Engineering and Mining Journal*, of New York, and *The Mining and Scientific Press*, of San Francisco, on the remarkable excellencies of their respective "review numbers," issued during the present month. The volume of statistical and technological information contained in these issues is little short of astonishing. In practically every instance the contributors are recognized authorities on the subjects of which they treat.

Sir James Grant, the distinguished medical adviser of Canada's former Governor-General, is reported in a New York despatch as having given an interview that is unique in many respects. Sir James refers to the "asphalt" sands of the West, to the possible "tubing" of gas or coal (the text is a trifle obscure) to Edmonton, and to the fact that Canada at large possesses at least fifty thousand tons of iron ore reserves. These and other statements of Sir James are presented to the casual reader as "news."

COBALT TOWNSITE.

The following cable gives the estimated mining results for week ended 18th January: "Value of production, £4,714; operating expenses, £1,726; weekly profit, £2,988."

NOVA SCOTIA STEEL JANUARY OUTPUT.

The output of iron and steel by the Nova Scotia Steel & Coal Company for January is less than usual owing to the furnaces being repaired. The January output is as follows: Coal mined, 69,000 tons; ore mined, 38,500 tons; pig iron, 4,800 tons; steel made, 5,800 tons.

ALADDIN COBALT CABLE NEWS.

Cables have been received from the company's manager reporting that he has secured for the company the Chambers Ferland property.

LE ROI NO. 2.

Cable: Josie mine report for December: Shipped 2,100 tons of ore and 139 tons of concentrates. The receipts from smelter are \$11,088 (£2,286), being payment for 1,207 tons ore shipped and \$2,458 (£507), being payment for 140 tons concentrates shipped; in all \$13,546 (£2,793). Estimated costs for corresponding period: Development \$8,000, ore production \$11,000, milling \$1,600. Total, \$20,600 (£4,247). No 38 drift (North Annie vein), 300 foot level—Advance 44 feet, of which 25 feet averaged 17 dwts. gold $2\frac{7}{8}$ per cent. copper, over 4 inches. No 9 hanging wall raise, 500 foot level—Advance 14 feet, of which 14 feet averaged 3 dwts. gold and $1\frac{1}{2}$ per cent. copper, over 6 inches. Annie drift, 600 foot level—Advance 41 feet, of which 5 feet averaged 4 dwts. gold and $4\frac{3}{4}$ per cent. copper, over 3 inches. East Poorman drift, 700 foot level—Advance 132 feet, of which 90 feet averaged 1 oz. 2 dwts. gold and $1\frac{1}{2}$ per cent. copper over 1 foot 10 inches."

RHODESIAN GOLD FOR 1912.

The total output of gold from Rhodesia for the month of December is cabled as 51,716 ozs., valued at £218,661, as against 53,667 ozs., valued at £225,957, in the previous month. This is a decrease on the month of 1,951 ozs. But it will be noticed that the yield of £2,707,368 for the past year constitutes a record, beating the previous best in 1911 by £59,474. There were 171 gold producers last month. The output of other minerals for last month was: Silver, 13,763 ozs.; lead, 47 tons; coal, 19,119 tons; chrome ore, 15,195 tons.

THE ALBERTA COAL INDUSTRY IN 1912.

We learn from an authoritative source that the coal production of this province for the year 1912 was approximately 4,000,000 tons, as compared with an output of 1,694,564 tons in 1911, and of 3,036,757 tons in 1910. The relatively low production in 1911 was, of course ascribable to the protracted strike of coal miners in that year; but the figures for 1912 nevertheless represent a record achievement and are a notable advance on the previous highest return. More than half of the coal at present produced is lignite, although there is a steady gain in bituminous output. Forty-four new mines were opened, mainly in the Edmonton field, during the year. The industrial outlook for 1913 is said to be very promising.

CONSPECTUS OF THE INTERNATIONAL GEOLOGICAL CONGRESS' FORTHCOMING PUBLICATION

The Coal Resources of the World—An Inquiry Made Upon the Initiative of the Executive Committee of the XII. International Geological Congress, Canada, 1913—With the Assistance of Geological Surveys and Mining Geologists of Different Countries—Edited by the Geological Survey, Canada—With Numerous Plates and Illustrations in the Text and Accompanied by an Atlas of 68 Maps in Colors—Morang & Co., Limited, Publishers, Toronto, Canada.

Until the middle of the nineteenth century the chief fuel of all nations, except possibly England and a few other of the more advanced European countries, was wood, and even in these the use of coal goes back only a comparatively short time. Since then, however, the draft upon coal has been enormous, and anxiety has been aroused regarding the future supply. The marvelous increase in coal consumption is strikingly shown in the United States. In 1850 the annual production in that country was about 7,000,000 tons. In 1907 it was 480,000,000 tons. In this time the per capita consumption had increased twenty-fold. The amount mined in the last decade of the nineteenth century exceeded the total production up to that time, and the amount mined in the first decade of the twentieth century will exceed all the coal mined up to the end of the nineteenth century.

With such amazing increase in the use of coal the question of the future supply must give concern to all thoughtful men. The supply of coal is definite. It cannot be added to. Will it hold out? The importance of coal in modern civilization cannot be over-estimated. The great coal producing nations are the greatest commercial nations, the United States, Great Britain, Germany, France, Austro-Hungary, Belgium, Russia and Japan. The hives of industry and the centres of population in these countries cluster round their coal supplies.

Coal offers to mankind solar energy in its most concentrated form. Indeed modern civilization may be said to be the daughter of coal. But the supply of coal is not inexhaustible, and every ton of it taken out of the earth leaves just that much less for the future needs of the world.

It has been said that the nations that have the coal and iron will rule the world. What is the coal supply of the world? Where have the districts that do not possess coal to look for their future supply? What nations have the supply of the future? For authoritative answers to these and similar important questions recourse must be had to the forthcoming monograph on the Coal Resources of the World. Realizing its universal and vital importance, the Executive Committee of the Twelfth International Geological Congress decided to make this subject the main topic for discussion at the Congress to be held in Canada in August, 1913.

But before these questions can be intelligently discussed, before deductions can be drawn and advice given regarding consumption, conservation, the future of industry, the commercial development of nations, it is necessary to know just what the coal supply of the world is. The Executive Committee of the Congress, therefore, undertook to prepare an authoritative and comprehensive monograph on the Coal Resources of the World that would furnish a basis for the main dis-

ussion at the Congress, in which every civilized country of the world will participate.

The preparation of the monograph has been entrusted to officers of the Geological Survey of Canada. Each country of the world was asked to contribute an article covering its coal resources, and with practically no exception each country selected its leading authorities, usually experts connected with the official Government Geological Surveys or Departments of Mines, to secure material for and write its chapter. In many cases new investigations in the field were necessary, unpublished material was drawn upon, and old work revised and brought up to date. The result is a most complete and authoritative statement of the coal resources of the globe. Not only is the quantity of coal discussed, but also the amount of each kind, its mode and conditions of occurrence including depth below ground, and this for practically each coal district in each country and each state. Even the Arctic and Antarctic regions are covered. Fifty-two countries have articles of length, fifteen are covered by short articles, nine report no resources of coal, twenty-five colonies are included in the reports of the mother lands. A chapter of about one hundred pages summarizes the individual reports and totals the resources of the world.

The work is well illustrated with figures, maps, etc., but in addition to these text illustrations there is an atlas of sixty maps in color showing the distribution of the coal areas and the geology of more important fields.

This work is of interest to the economic geologist, mining engineer, colliery owner and coal companies, but its interest is not confined to this limited field. Political economists must familiarize themselves with its contents; naval and military men will find its information valuable; large industrial concerns looking for sites for branch factories or anticipating possible future competition will find it suggestive; transportation companies have a very direct interest in it, and any one who wishes to foretell the places and countries where important future developments are likely to take place will consult the work, for the countries that have large undeveloped resources are destined in the near future to be the scenes of important industrial activity. Every reference library and every private library should possess a copy of this work.

Principal Countries Contributing, With Names of Contributors.

- Antarctic—Dr. T. W. E. David, University of Sydney.
- Argentina—E. Hermite, Director, Division of Mines.
- Austria, including Galicia—Dr. W. Petrascheck, Geological Survey.
- Belgium—Armand Renier, Chief of the Geological Department of Belgium.
- Bosnia Herzegovina—Dr. F. Katzer, Director Geological Survey.
- Brazil—Canadian Commissioner.
- British North Borneo—Dr. J. W. Evans, Imperial Institute.
- Bulgaria—Professor Dr. G. Bontchew, University of Sophia.
- Canada—D. B. Dowling, Geological Survey of Canada.

Chile—Miguel R. Machada, President Geological Section of National Museum; and J. del Fuenzalida, Director of Public Works, Geology and Mines.

China—Kinosuke Inouye, Director Royal Japanese Geological Survey; and Dr. Noah Drake, Late of Imp. Tientsin University.

Corea—Kinosuke Inouye, Director Royal Japanese Geological Survey.

Denmark, including Iceland—Dr. N. Hartz, Geological Survey.

East Africa Protectorate—Dr. J. W. Evans, Imperial Institute.

East India Netherlands—Government of East India Netherlands.

Egypt—Dr. N. F. Hume, Director Geological Survey.

France—H. A. Defline, Ing. Corps des Mines.

German Empire—Royal Prussian Geological Survey.

Great Britain—Dr. Strachan, Assistant Director Geological Survey.

Greece—Department of Mines.

Guatemala—Director General of Mines.

Honduras—M. de Montis, M.E.

Hungary—Royal Hungarian Geological Survey.

India—H. H. Hayden, Director Geological Survey.

Ireland—G. H. J. Cole and E. St. J. Lyburn, Geological Survey.

Italy—G. Aichino, Chief Engineer, Corps des Mines.

Japan—Kinosuke Inouye, Director Geological Survey.

Madagascar—F. Bonnefond, Chief Service of Mines.

Malay States—Dr. J. W. Evans, Imperial Institute.

Manchuria—Kinosuke Inouye, Director Royal Japanese Geological Survey.

Mexico—J. G. Aguilera, Director Geological Institute of Mexico.

Netherlands—Van der Graacht, Director Geological Survey.

Newfoundland—J. P. Howley, Director Geological Survey.

New South Wales—E. F. Pittman, Government Geologist.

New Zealand—P. G. Morgan, Director Geological Survey.

Norway—H. Reusch, Director Geological Survey.

Nyasaland—Dr. J. W. Evans, Imperial Institute.

Panama—C. C. Arosemena, Minister of Agriculture.

Persia—Vice-Consul Rabino.

Peru—Prof. Bravo, School of Engineers, Peru.

Philippine Islands—F. Dalburg, under the direction of Warren D. Smith, Chief of Division of Mines.

Portugal—M. de Melba and M. Roldan, Department of Mines.

Queensland—B. Dunstan, Government Geologist.

Rhodesia—H. B. Maufe, Director Geological Survey, and A. R. Thompson, Manager, Wankie Colliery.

Roumania—L. Mrazec, Director Geological Institute, and I. Tanasescu, Ing. des Mines.

Russia—Dr. Th. Tschernyschew, Director Geological Survey.

Servia—J. A. Milojkovitch, Royal Servian Mines Inspector.

South African Union—Mines Department.

South Australia—L. K. Ward, Government Geologist.

Southern Nigeria—Dr. J. W. Evans, Imperial Institute.

Spain—L. de Adaro, Director Geological Institute.

Spitzbergen—B. Hogbom, Upsala University.

Sudan and Abyssinia—Stanley G. Dunn, and G. Walter Grabham, Government Geologists.

Sweden—E. Erdmann, Geological Survey.

Switzerland—Swiss Geological Commission.

Tasmania—W. H. Twelvetrees, Government Geologist.

Trinidad—A. P. Catherall, Inspector of Mines.

Turkey, including Asiatic Turkey—Leon Dominian, M.E.

United States—M. R. Campbell, United States Geological Survey.

Victoria—P. Cohen, Secretary for Mines.

Western Australia—H. P. Woodward, Government Geologist.

Partial List of Additional Reports Received and Used in Compilation.

Bolivia—British Consul.

British Honduras—British Consul.

Colombia—Pan-American Union, J. B. Barrett, and British Consul.

Ecuador—Pan-American Union, and Ecuador Legation.

Montenegro—British Consul, and Government of Montenegro.

Uruguay—British Consul.

Venezuela—Canadian Commercial Agent.

Hayti and San Domingo—British Consul.

Salvador—Minister of Public Instruction.

Siam—Royal Department of Mines.

Abyssinia—British Consul.

Arabia—(Turkish)—British Consul.

Arabia—(Muscat)—British Consul.

Armenia and Kurdistan—British Consul.

British North Borneo—T. and W. Morgans.

China—Pekin Syndicate, H. P. King, Manager; Kaiping Coal Field, U. Nathan, Manager; Pingsaing Coal Field, G. Lienung, Manager; Memo. on Chinese Mines, British Consul.

Syria and Lebanon—British Consul.

Mesopotamia—British Consul.

Northern Nigeria—Government Secretary.

Costa Rica—British Consul.

Bahamas—Surveyor General.

Barbadoes—Colonial Secretary.

Windward Islands—Attorney General.

Hawaii—Director Geological Survey.

Jamaica—Department of Public Works.

Leeward Islands—Superintendent of Agriculture.

British Guiana—Director Science Department.

Paraguay—British Consul.

Finland—Director Geological Survey.

Thibet—Geological Survey of India.

Ceylon—Min. Survey of Ceylon.

Mysore—Geological Department.

Algeria—Inspector General of Mines.

Tunisia—Inspector General of Mines.

Congo Free State—British Consul.

French Equatorial Africa—Governor-General.

Gold Coast Colony—Secretary for Mines.

Liberia—British Consul.

Morocco—British Consul.

Sierra Leone—Colonial Secretary.

Zanzibar—British Consul.

Pemba—British Consul.

Seychelles—Governor.

Mauritius—British Consul.

Partial List of Maps in the Atlas.

Austria—8 geologically coloured maps and sections of the various coal fields of Austria.

China—2 maps, in colours, showing the distribution of the coal fields.

Corea—2 maps, in colours, showing the distribution of the coal fields.

Great Britain—1 map, showing the coal areas in red.

India—1 map, showing the coal areas.

Manchuria—2 maps, in colours, showing coal areas.

Netherlands, India—2 maps, in colour, showing the coal areas.

New South Wales—2 maps, in colour, showing the coal areas.

Queensland—1 geologically coloured map, showing the coal areas.

Roumania—1 map, in colours, showing the coal areas.

Servia—1 map, in colours, showing the coal areas.

South Africa—1 map, in colours, showing the coal areas.

Spitzbergen—1 map, in colours, showing the general geology.

Sweden—1 map, in colours, showing the position of the coal districts.

Turkey—1 map, showing location of coal fields.

United States—1 map, in colours, showing the distribution of the different classes of coal.

Western Australia—1 map, showing coal areas.

Canada—1 map showing distribution of coal areas, 1 map of Maritime Provinces' coal areas, 1 map of Saskatchewan coal areas, 1 map of Alberta and British Columbia coal areas, 1 map of Crownsnest and Blairmore coal areas, 1 map of Cape Breton coal areas.

France—27 geologically coloured maps and sections of coal fields.

Japan—1 map, in colours, showing distribution of coal areas, and geologically coloured maps of coal fields.

In addition there will probably be maps illustrating the reports of Mexico, of the German Empire, of Russia, and of South America.

Partial List of Maps in the Text.

Austria—8 figures, including detailed maps and sections of individual coal fields.

Bulgaria—1 map, showing area covered by coal fields and a sectional figure.

China—16 figures showing individual coal fields in detail.

Corea—11 figures showing individual coal fields in detail.

Great Britain—10 plates showing individual coal fields.

Ireland—1 general map showing the coal areas and figures and sections of Ballycastle, Dungannon, and Tipperary coal fields.

Manchuria—15 text figures showing individual coal fields in detail.

Madagascar—1 map showing coal fields.

Netherlands—1 general map showing distribution of coal fields and 2 detailed maps.

New Zealand—2 plates showing colour and distribution of coal areas.

Philippine Islands—4 plates showing the various coal districts.

Japan—30 figures illustrating separate coal bearing areas.

Portugal—2 figures showing coal districts.

Rhodesia—1 map showing coal areas.

South Australia—1 plate showing coal areas.

Spitzbergen—2 figures showing details of coal areas.

Sweden—1 plate showing position of coal districts, 10 figures showing the individual coal fields and sections.

Switzerland—5 figures and sections showing structure of coal fields.

Tasmania—1 plate showing coal areas.

Trinidad—1 plate showing coal areas.

Turkey—1 map in detail, of Heraclea coal fields.

Canada—6 plates showing individual coal field in detail.

France—2 maps showing location of the various coal fields.

In addition there will probably be a certain number of figures accompanying reports of Mexico, Germany, Russia, and possibly two or three of the South American Republics.

CASEY COBALT MINING COMPANY'S FIFTH ANNUAL REPORT

The adjourned fifth ordinary general meeting of the Casey Cobalt Mining Company, Ltd., was held on January 17th at Salisbury House, E.C., Colonel Sir Augustus FitzGeorge, K.C.V.O., C.B. (chairman of the company), presiding.

The secretary, Mr. R. F. Eden, read the notice convening the meeting and the report of the auditors.

The chairman said in part: Ladies and Gentlemen,—You have seen the report and accounts for the last financial year, and, with your permission, we will take the same as read. This time last year your company was in a far from satisfactory position, and it gives me great pleasure to be able to tell you that not only have we turned the corner, but we are in a thoroughly sound financial condition. In the early part of last year the company was in very low finances, and it was found necessary to make an issue of £30,000 in convertible debentures. These were issued payable in instalments, the last of which came due and was paid up last month.

Owing to the very satisfactory development of the mine, the rights of conversion have been exercised to the extent of £28,800, thus leaving only the trifling balance of £1,200, which, no doubt, will also be converted very shortly. When this is done the mine will be free from any debenture indebtedness. The past year has been one of construction and getting ready for big work. The development of the mine has been very successful, and, with increased hoisting capacity, besides the erection of a mill to handle the low grade ore, we are now ready really to do work and achieve steady production. This mine, which at this time last year was in a far worse position than Townsite two years ago, is now in such a state that in this year we expect to pay a good dividend, because not only have we very good ore reserves, but we have also a great deal of ore ready broken to hoist when the new shaft comes into use, which will be about 1st March. I now beg to move: "That the report of the directors produced, together with the

statement of the company's accounts for the year ended 30th September, 1912, duly certified by the auditors, be and they are hereby approved and adopted." I call upon Mr. Rose to second that resolution.

Mr. F. W. Rose: Mr. Chairman, Ladies and Gentlemen,—I have much pleasure in seconding the adoption of the report. Anything that I could tell you would be but a very pale reflection of the very encouraging statements which I hope to hear immediately from Messrs. Parker and Watson, and therefore I shall not take up your time, but make way for them immediately.

A Fixed Weekly Output.

Mr. W. R. P. Parker, the president, said: Mr. Chairman, Ladies and Gentlemen,—This afternoon we have to make an announcement, which our worthy chairman has indicated, and that is that very shortly, within six weeks probably from to-day, we shall be able to commence a fixed weekly output from this mine, and we expect to commence the output at about 15,000 ounces a week. We have not, of course, decided to do this without being thoroughly satisfied that that is rather a modest figure to commence on, and that production upon that basis can readily be maintained. In some quarters it might be said that the profits of this company for the past year are disappointing. There is no doubt that we could easily have made the profits greater by proceeding to take out ore, as we could have taken it out from the big vein, or vein No. 6, as it is called. We decided, however, to pursue the conservative course on what we believed to be the legitimate lines of first exploring that vein, ascertaining its approximate length and approximate depth, and its silver contents, before commencing to make regular shipments, and to take out a fixed number of ounces weekly from it. We have now completed that preliminary work, and have now arrived at the stage when we feel justified in commencing shipments from that vein and other veins which we have, as has been already indicated. There is no doubt in the minds of the Canadian Board that once this fixed weekly production is commenced we shall be quite justified in entering upon a dividend-paying career, which we hope and believe should be a very long one.

A Larger Shaft.

At the present moment, and for some months past, the Casey mine might be compared to a very large bottle with a very small neck. In other words, we have had a large mine underground, and we have had a very inadequate shaft and hoisting capacity. We have had only one operating shaft in the mine, and that shaft was the original prospecting shaft, capable of hoisting only 40 tons of rock a day. Immediately on the discovery of the big vein we began to prepare plans for a much greater capacity all round, of which I will communicate more details presently. On 1st March we shall have completed the shaft. We shall have sunk some 260 feet. It will be a very large shaft, capable not only of handling the present output of the Casey mine, but it will be able to handle readily the very greatly increased output which we hope to have in the course of a year or two. To review the history of the year's operations would take some time, but I may briefly indicate what has been done in regard to development. In previous years operations on the company's properties were proceeded with systematic and with considerable energy, but the management were greatly hampered by the lack of adequate plant, and were limited in the scope of operations by the depletion of the company's

treasury. Early in the year, however, arrangements were made for increasing the power plant by the addition of two 50 h.p. boilers. Upon their installation work was pushed as energetically as possible on crosscuts east and west on the 200-foot and 210-foot levels from existing workings. These crosscuts were driven on the advice of the best engineers with whom we could consult, and were driven largely on theory. We were not driving for any known surface outcroppings, but, basing our views on the correct geological formation and on previous discoveries of small veins in the property, we decided that as long as our funds lasted we would drive crosscuts east and west from the shaft on this level in the faith that we would encounter some ore. This was rather a bold undertaking in view of the fact that the company was in low water at that time and that the debenture issue had not then been successfully brought out. However, the English Board were very strong on pursuing an aggressive policy, and we laid this plan out and intended to follow it out. In January it was considered necessary to make an appeal to the shareholders for additional finances, and your officers appreciate the very ready response which their appeal met with, as evidenced by the underwriting of some £30,000 of debentures.

Additions to Plant.

Towards the end of February the big high grade vein, known as vein No. 6, was cut, and as soon as its importance was in some measure demonstrated somewhat extensive additions to plant were decided upon and installed as quickly as possible, giving a total capacity of 280 h.p., against 80 h.p. previously, this being sufficient to run hoists, pumps and furnish enough compressed air to run from ten to twelve rock drills, and a mill with a capacity of 25 tons per day. A mill designed along similar lines to that used by the Cobalt Townsite mine, and having a capacity of 12½ tons per day, was then commenced, and while it was in course of construction the big vein was discovered. We immediately decided to double the capacity of this mill, and a mill capable of treating 25 tons of rock per day has been completed and in successful operation for some months, thereby rendering available at a profit between 6,000 and 7,000 tons of mill rock on the various dumps and broken in the mine, the estimated silver contents of which are upwards of 200,000 ounces. As the mill rock just referred to is more than sufficient to run the mill at its present capacity for more than two years, and in view of the fact that there appears to be a very great tonnage of low-grade ore already blocked out in the mine, your officers have recently decided to again double the capacity of the mill, and plans are now well on the way for adding another 10 stamps, making the mill capable of treating 50 tons a day. These improvements entailed others. The number of hands operating was very much increased. We have had to erect a new bunk house and other incidental buildings, such as a drying house, and also a new house for the manager. As soon as operations commenced on this more extended scale the inadequate nature of No. 1 shaft made itself felt, and, after careful consideration by the best experts obtainable, it was decided to sink a new and larger shaft near the south boundary of the property, providing for two skips or hoists. This shaft is being sunk near the No. 6 vein, and the present position is, as I said before, that of the total distance of 266 feet of sinking and raising necessary we have done 187 feet, and there remains 75 feet. We are sinking from the top and rising from the 210-foot level. There is the

timbering of the shaft and so on to be done, which is to be completed probably not later than 1st March.

Exploration Work.

The exploration and development work done during the year have borne out the theory held by your officers that the geological formation and mineralization of the Casey mine and in the Casey district are identical with conditions demonstrated by other producing mines in the Cobalt Camp proper. Until we had this evidence we could not state positively that there was a district immediately surrounding the Casey mine. We had correct geology, we had geology identical with that of the big producing mines of the Cobalt Camp, and we had vein outcroppings of a similar nature. In fact, we had everything but the silver, which apparently, is an essential. Mr. R. B. Watson, of the Nipissing mine, one of the great authorities in Canada on silver mining, made one or two inspections of the Casey mine and district, and he was asked if he thought the district there was going to be a silver camp. He replied, "You have the correct geology and every indication, but when you get the silver we should know if there is a camp." Now, we have the silver, and it is interesting to note that we have silver there, not only on the Casey property, but that silver has been found on three other properties surrounding the Casey property and immediately adjoining it. This is of considerable importance when you consider the very large acreage which comprises the holding of this company. As you will probably know, the average holding of the big producing companies at Cobalt Camp is 40 acres. The Casey Company has 120 acres, and all of those 120 acres are in the conglomerate formation. Wherever development work has been done on it—by sinking, cross-cutting and so on, or by diamond drilling—it has been proved to have a depth quite equal to the average depth of the formation at Cobalt Camp. It has similar surface outcroppings, and where these have been worked they have been proved to contain silver in very satisfactory quantities. Now, let me enlarge on that a bit further. On the north of the Casey property the Townsite Extension mine is in active operation and sinking a shaft. We have also done considerable diamond drilling there. The diamond drilling on the Townsite Extension disclosed a series of five veins in the very small area that was tried; all of those veins contained silver. They are now sinking on the Extension, near the Casey mine, a shaft which, at a depth of 24 feet or 25 feet, shows a 2-inch vein of calcite containing silver.

A Wonderful Discovery.

Immediately to the south of the Casey is the Kismet, on which there has been a wonderful discovery of a large vein carrying high values in silver, and on the southwest of the Casey is the Majestic, now in active operation, where a shaft is being sunk, and in the shaft by diamond drilling they have found veins containing silver. Now, let me repeat. In the Casey we have 120 acres. Of those 120 acres so far we have not prospected underground more than two or three acres, and these two or three acres have been only partially explored by development work. The whole of the 120 acres appears to be in the correct formation, and we have every chance of its containing silver; in fact, the whole area of the Casey Company's holding may prove to be silver bearing. I think there are only two of the principal properties—the Nipissing and La Rose—that have an area equal to that of the Casey, and probably only one

of those, the Nipissing, has an area of conglomerate rock greater than the Casey. If this is a district the Casey is certainly, it seems, the centre of it. The outstanding feature of the year's work is, of course, the discovery of vein No. 6, which was admitted on all hands to be one of the most important veins ever discovered in the Cobalt district. The first car of ore taken out in the course of ordinary development gave the somewhat phenomenal results of approximately \$132,000, or about £26,000. This established a new record as the richest car of ore ever shipped from the Cobalt district, and possibly the richest car of ore for its tonnage ever shipped anywhere. This vein has been developed during the six months intervening between the discovery and the end of the fiscal year by rises and drifts, and the engineers' report shows—and I may say we regard Mr. Shaw's figures as being of the most conservative nature—that there were blocked out at 30th September last 462 tons of high-grade ore in this vein which, at an average, say, of 3,000 ounces of silver a ton, will give silver contents so far blocked out of 1,214,000 ounces on this mine. In addition to the development work done on No. 6 vein, extended development work has been done on No. 1 vein at the 100-foot level. That is the vein on which the original prospecting shaft was sunk. We have taken out some ore from this vein, and we concluded that we had reached both ends of it, but in the course of development on No. 6 vein we decided to make another try to see if we could find further ore in No. 1, and after some considerable drifting we proved that there was additional ore there. The extent of the work done on the other veins will be only appreciated by an examination of the working plans, which are available, but it is believed by the Canadian directors that a very considerable tonnage of high grade ore is in sight on vein No. 1, and also on another vein, No. 3, on which we have also done considerable work, but as these are not blocked out by drifts above and below—and as they are not blocked out on four sides and are incapable of being accurately measured—we have not, of course, included anything for probable ore or for ore reserves in respect of them. In conclusion, I might say that we have every reason to look forward, I think, to the year 1913 as a year of great activity and great prosperity—in fact, as I said before, I think the mine is now about to enter into its own and take rank amongst the great silver mines of the country.

Ventilation of the Mine.

Mr. J. P. Watson said in part: Ladies and Gentlemen,—Two weeks ago I visited the Casey mine and made a thorough inspection of the workings. At that time it struck me that when meeting the shareholders of this company in London there might be some who were rather dissatisfied with the slow development which has taken place since the strike of the new big vein. Of course, if some of you have an inquiry to make as to that it is only right you should know all the reasons why we have been apparently slow in getting up production. At the time we struck the No. 6 vein, or the large and phenomenal vein, the mine was in such a disreputable condition that we were on the eve of being closed down by the Government because we had not sufficient ventilation for the miners. Now, after making that strike, and reporting it, as, of course, we did when it was made, had we closed the mine down it would have looked rather odd. We practically did close the mine down for a few days until we got in pipes for ventilation; we ran up a small man-way to the top and did a few things, sufficient to convince the Government

inspector that we would look after the health of our miners. But, notwithstanding everything we did, the ventilation in the Casey mine has never been satisfactory and will not be satisfactory until we get a new shaft there. That will give us the necessary ventilation and will be finished in about three or four weeks. As Mr. Parker has told you, the machinery will be installed and everything will be running by 1st March, but we think the ventilation will be carried out in a few weeks. So bad has the ventilation been that we lost two men in one of our underground workings below the big vein, and since losing those men we have had to close down that lowest drift. In the lowest drift in the big vein, in the 210-foot level, at the time we lost those men we were getting into very fine rich ore. It is now full of water and will take about a day to pump out when we have our ventilation, and then we will continue exploring the big vein at a lower depth. We might have had that shaft put there sooner, but at the time we made this big strike we did not know but that it might be a pocket, and on the strength of merely striking that body of ore we felt hardly justified in using money to put down a new shaft until we had further explored the vein. We now feel convinced that we shall need at least one shaft in the Casey mine.

Not a One-Vein Mine.

There has been rather an idea abroad that Casey is a one-vein mine. There could be no greater mistake. The fact of that No. 6 vein being so large and so rich overshadowed everything else, but the Casey is by no means a one-vein mine. We have never been satisfied, Mr. Parker and myself, with the way that the old veins, originally found in the Casey, have been developed, and some months ago we made an inspection of them and decided to further explore some abandoned veins. Mr. Parker has slightly alluded to the first two that we tackled, Nos. 1 and 3, in both of which we have very nice ore, but they do not appear in your reserves at all, because we do not know the quantity we have there, and so we say that we have nothing there. In addition to that, in sinking our new shaft we have a nice high grade vein in the shaft, not a wide vein, but a high grade one. Of course, we have had to sink the shaft vertically. The vein has a slight dip and went out of the shaft, but the vein is there, and we shall no doubt get to it again when we are ready. Now, regarding the slowness of production. We could have had a large production, and apparently been doing a great deal better than we have done, but in the end we should not have done so well for the shareholders. We did not worry about the production. What we wanted to know was what sort of property we had there, and we have demonstrated that we have a very good property. Had we used the old prospecting shaft—Mr. Parker has told you that it was only capable of hoisting 40 tons a day—we could have used it for hoisting rich ore and making a big production and paying dividends, but instead of that we simply explored the big vein and tried to develop other veins in which we have been successful. Now, when we get the new shaft we shall have, for the present at least, plenty of hoisting capacity, and we shall let her go and get the stuff out.

The Low Grade Ore.

Mr. Parker has told you what we are doing at the mill. There is a point about our low grade ore to which no attention has been paid, but we know it ourselves. Compared with the Townsite, the low grade ore in the Casey mine runs, on the average, 10 ozs richer than in the Townsite, or, say, 40 per cent. richer, and the

low grade ore in the Townsite is very good. To-day the mill on the Casey property is paying all expenses and a little better. As Mr. Parker has told you, we are doubling that. What does that mean? The low grade ore on the Casey that we have milled so far has an average of 37½ ozs to the ton. We have only up to the present time recovered 75 per cent., but it is a new mill. We have got the recovery on the Townsite up from 75 a year ago to about 84, I think, to-day, and we shall get it up on the Casey in the same way. But, taking it at 75 per cent., we recover 28 1-8 ozs, or, from the amount we are dealing with to-day, 4,400 ozs of silver a week, which is equal to £550, and that more than pays the expenses of the mine. We are doubling that, and in six months the mill will not only pay all the expenses of the mine, but £550 a week will go towards dividends, which means about 12½ per cent., and that is not the end. We hope it is only the beginning. That is apart altogether from the high grade ore, of which we have a nice lot. Looking to the year's earnings, I think we should earn on the Casey, say, from 35 per cent. to 40 per cent., or perhaps better. We shall earn that, no doubt, in the coming year.

The Question of Power.

We have a very serious problem before us all the time, and that is with regard to power. In the Cobalt district, when you want more power it is like turning a tap and getting water from the waterworks, but in the Casey we cannot do that. We have to make our power. We burn wood and generate steam from wood, and it is a very hard matter to keep our power at all sufficient for the mine. At the present time we are investigating other schemes for power, awaiting, of course, electrical power, which we shall have in the Casey district when we can prove that we shall use a sufficient quantity to induce a power company to supply the power there. In the meantime, we think we are well advised to have auxiliary power, and we are now investigating oil engines, and if they prove to be at all what they promise, it will cut down our expenses in power production, which, of course, is a large factor in the mine. We are now putting down another 150-horsepower to burn wood. We are not taking any chances of being short of power. We have not merely got a little pocket in the corner of the Casey district that has some ore. There is ore in a radius of a quarter of a mile around us, so we think that between us and the different points there is likely to be some more ore, and that belongs to the Casey.

The motion for the adoption of the report and accounts was agreed to unanimously.

NOTES FROM CURRENT TECHNICAL LITERATURE.

Gold Dredges in Alaska.

Writing in the Engineering and Mining Journal of January 15th, Mr. Lewis H. Eddy describes the several types of new dredges recently installed in Alaska. These include dredges of the screen and stacker type and of the flume type. The buckets range in capacity from 1¾ cubic feet to 3 cubic feet. The flume construction is a departure from common practice. It is built of steel and has a double bottom, the lower compartment being equipped for the introduction of steam from a 15 h.p. boiler to prevent the formation of ice on the riffles in freezing weather. Another make of dredge is provided with internal combustion engines, while the introduction of the silent-chain-drive for pumps is another distinctive feature.

MINING COAL FROM THE TOP

By Aubrey Fullerton.

A new coal find in the West gives promise of the easiest mining on the continent. It is an immense deposit of good anthracite coal, in the foothills of the Rockies, fifty miles southwest from Calgary. There a mountain range runs to its height in Mist Mount, 10,300 feet above the sea, and for fifteen miles it shows an unbroken formation in which is a continuous and regular ridge of coal. This mountain of coal runs from 200 to 1,500 feet above the surrounding levels. The seams cover an area one and one-half miles wide, and they go, it is estimated, 3,000 feet below the surface. There are billions of tons ready for mining.

The coal deposits in Western Canada, running in broken stretches along the mountain ranges, are of various grades, from lignite to anthracitic. The latter, belonging to the Kootenai series, are of infrequent occurrence, only some three or four seams, in fact, out of the many. Moreover, some of these are inaccessible. The finding of a literal mountain of high grade anthracitic coal, within easy reach of a market that badly wants its, was therefore good miners' luck.

The unusual thing about this coal find is that so large a part of it is on top. When the Rockies were piled up by convulsions from within, long ages ago, this mass of coal was lifted to from 200 to 1,500 feet and tilted into almost a perpendicular. The seams show to-day in dips of from 46 to 82 degrees from the horizontal, with thin roofs of shale, slate, and sandstone. At various points age-old streams have worn into the mountain side and made exposures where the coal shows plainly in the steep slopes and in the beds of the streams.

Tests of the coal have shown it to be of a grade corresponding almost exactly with the Pochahontas coal of Pennsylvania. A smaller deposit in Montana displays



Exposure of Solid Coal at side of stream

very similar conditions, but engineers who have examined the Alberta find declare it to be the largest known surface exposure of anthracitic coal in the world.

So easily accessible is the coal that it can be mined for less than seventy cents a ton, on engineers' estimates, and can be landed in Calgary, its nearest market, for, at most, \$2.27 a ton. For the same reason the surface mine will be practically strike-proof inasmuch as the least experienced labour will be equal to picking up coal on the level and loading it into cars. At any

point millions of tons can be brought down by blasting.

This unique bed of semi-anthracite, which was discovered only last year, is particularly well adapted to municipal development, and the City of Calgary has been negotiating for its purchase with its holders, Messrs. W. T. and H. A. Ford. An easy-grade railroad,



Coal Mountain Exposure

built right to the foot of the mountain, would put the city in close touch with a fuel supply large enough to fill its power and heating necessities for, presumably, all time; and the surplus could be distributed over the fuel-hungry prairie country to the east at from \$3.50 to \$4 a ton.

THE ELK LAKE BRANCH OF THE T. & N. O.

On February 4th Mr. J. L. Englehart, Chairman of the T. & N. O. Railway, with due ceremony drove the last spike in the Elk Lake branch of the T. & N. O. Railway. This new feeder of the Government road runs from Earlton through twenty miles of the best agricultural land in the clay belt to the Montreal river, where it crosses on a magnificent steel bridge, containing over 400 tons of steel. On arriving at Elk Lake, Mr. Englehart was presented with the freedom of the town in the shape of a silver key, 18 inches long and containing 52 ounces of native silver, from the Beaver auxiliary mine. He then completed the ceremony by driving a silver spike into the last tie to be laid on the road.

The illuminated address presented to him was engraved by Mr. J. H. Forbes, a settler, in Elk Lake.

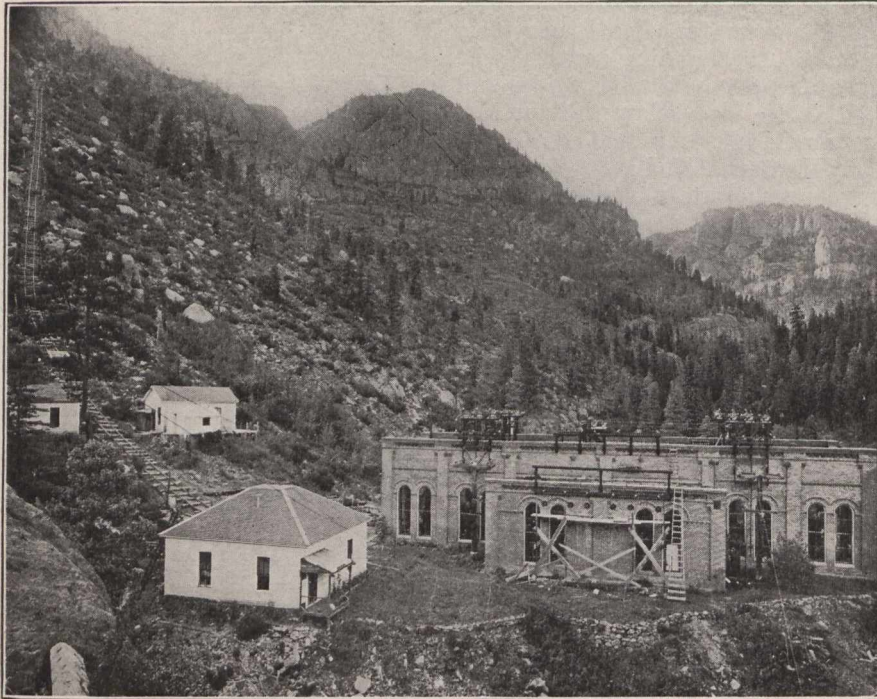
The recently-issued report on "Mine-Rescue Work in Canada," by W. J. Dick, M.Sc. (McGill), mining engineer to the Commission of Conservation, Canada, is being read with much interest in British Columbia, which is the only province in Canada requiring by law that mine-rescue apparatus, as approved by the Minister of Mines, shall be provided and maintained in an efficient and workable condition at every colliery operating in the province.

ELECTRIC POWER IN COLORADO GOLD MINES

By Frank C. Perkins.

Electric power is now extensively used in the gold mines of the Cripple Creek district in Colorado, generated to a large extent at the hydro-electric power plant at Skaguay on Bever creek, a stream rising on Pike's Peak.

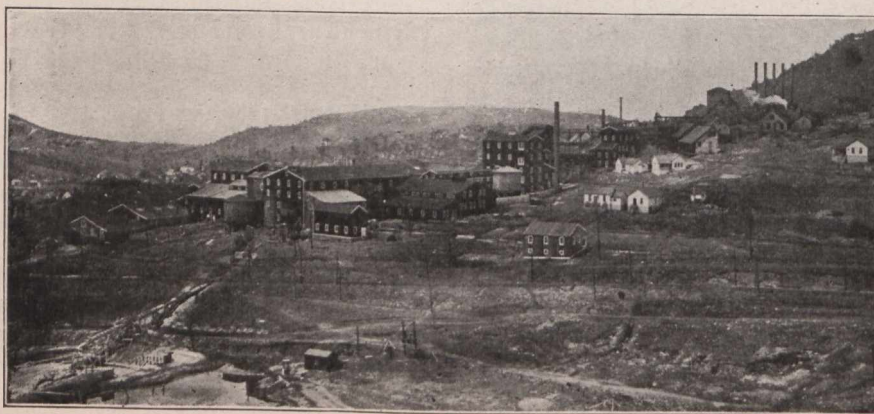
equipment of this power plant was lowered to the station on this cable ramway. All of the materials in construction and installation were brought down the mountain side on cable cars of the type shown in photograph.



Skaguay Power Station

The Skaguay power station noted in illustration, is located about five miles east of Victor, Colorado, and has a capacity of 1,400 kilowatts. The turbines operate under a head of 1,100 feet, and there are two additional sites at lower altitudes which will allow

The electric power transmission line from this power house is operated at a pressure of 20,000 volts, and the transmission system is interconnected with two up-to-date team generating plants of a capacity of about 5,000 kilowatts each, one at Canon City and the other at



Independence Ore—Reduction Mill

of further hydro-electric development for a capacity of 5,000 horse-power additional for further requirements.

One of the accompanying illustrations shows a section of an electrically operated incline railway used for bringing supplies from the top of the mountain to the power station. It is stated that the whole

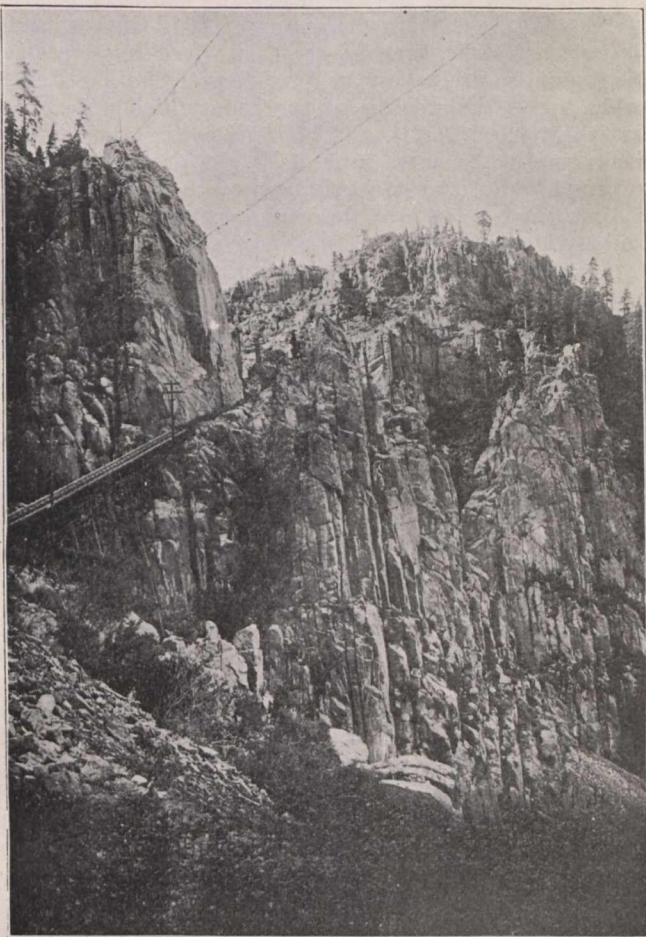
Pueblo, Colorado, so that on interchange of electric power is possible between the three electric generating stations.

The Cripple Creek gold mines at Goldfield, Victor, Independence, Anaconda and other mining towns are supplied with electric energy by three electric power

transmission lines from these hydro-electric and steam power plants.

Stepdown transformers also are used, supplying an alternating current of 2,300 volts for lighting the city of Cripple Creek.

The alternating current is reduced in pressure from 20,000 volts as it is received from the transmission line to 6,600 and 550 volts for power distribution controlling over 1,000 horse-power supplied by electric motors at the Portland mill. It is of interest to note that all the ore reduction mills in the Cripple Creek district have electrically equipped machinery, the Ajax mill having electric motors installed of 400 horse-power capacity and the Independence mill a connected load of 1 030 horse-power.



Electrically Operated Mountain Cable Tramway

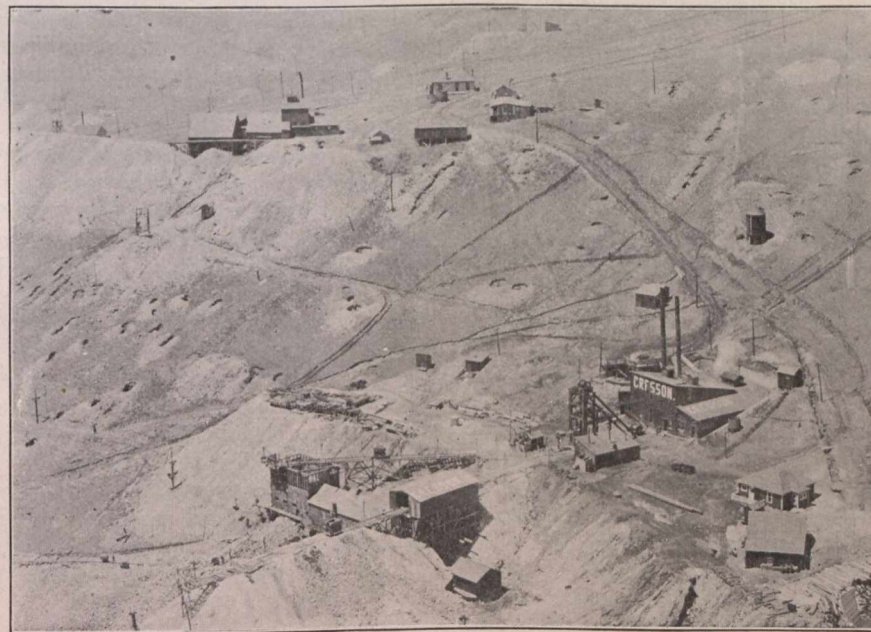


Portland, Electrically Operated Mill

The latter mill at Victor, is fully equipped electrically, the Portland mill is noted on photograph; both these mills are reduction mills, being supplied with electric power from the Skaguay hydro-lectric station.

Among the important machinery operated electrically in the Colorado gold mines are the air compressors used for supplying air under pressure to the pneumatic drills and other mining machinery.

Some of these air compressors are electrically driven



The Cresson Mine

There are two sub-stations of the Cripple Creek district, in to the mines and for electric railway service.

by motors direct connected to the machines, as in the case of the compressor in service ath Rexall mine.

In other instances air compressors are belt driven by electric motors in the same room or adjoining room, as noted in the photograph of an installation in the shaft house of the Cresson mine, which is one of the large electric power users in the Cripple Creek district. This is a bird's-eye view of this important Colorado gold mine and its equipment.

For the reduction of ore in the crusher and rolls at three different mills of 350, 300 and 400 tons the load factor was respectively 61 per cent., 58 per cent. and 63 per cent. and the electric current consumption was 26, 18 and 24 kilowatt hours per ton respectively. For operating the electric compressors which have come into very general use, the electric motors range from 50 to 200 horse-power each.

The consumption of current per drill shift, by electrically operated compressors is said to be very uniform. At seven mines the current consumption was as follows:—

| Mine. | Aver. drill shifts per month. | Kw. hrs. per D.S. | Load factor. | H.P. motor. |
|-------|-------------------------------|-------------------|--------------|-------------|
| 1 | 213.7 | 67.2 | 20.5 | 125 |
| 2 | 498 | 80.2 | 31 | 175 |
| 3 | 358 | 90 | 34 | 175 |
| 4 | 199 | 59 | 29 | 75 |
| 5 | 105 | 70 | 13 | 100 |
| 6 | 736 | 61 | 42 | 200 |
| 7 | 219 | 63 | 26 | 100 |

There are not as many electric hoisting plants in this mining section as in some other places, but motor driven pumps are largely used. At the Gold Cycle mine the electric pumps work against the unusually high head of 1,650 feet. Two electric pumps of 300 gallons capacity each are used of the horizontal triplex double acting type connected by herringbone gear to 175 horse-power three-phase 30-cycle volt motors.

The electric motors are of the 2-steep type, so that the following combinations of capacities can be had and running two motors full speed 600 gallons per minute are pumped. When driving the motor full speed and one at half speed 450 gallons per minute are pumped; with the motor full speed 300 gallons are declined.

It is of interest to note that the power company rents out on a flat rate basis a number of 5, 15 and 30 horse-power units, also a few 50 horse-power, and it has been found that a safe figure to use in computing the energy needed for raising a ton load 1,000 feet is one and one-half kilowatt hours, the average being considerably less according to conditions.

SILICATE BRICK.

The Silicate Engineering Company, of Montreal, has entered the brick-making field, having taken over the Canadian patents issued to L. F. Kiviatkovski, the originator of the so-called "Division Method" of making silicate bricks. Active steps have been taken for the introduction of their process throughout Canada with, apparently, pronounced success. The company is under the active management of Mr. R. Brutinel, of Montreal, president, the vice-president being Mr. W. F. Tye, C.E., of Toronto.

The Canada Brick Company, of Montreal, has adopted their methods and is now producing forty thousand per day at the St. Lambert plant. It has placed an order for further plant to bring the capacity up to eighty thousand per day. In Ontario contracts have been closed for the erection of a forty thousand plant at Guelph, while negotiations are pending for a similar

sized plant at St. Thomas, and for plants of eighty thousand in Toronto and Ottawa.

The brick produced under these patents, while made from sand and lime, is very materially different in practically all details from the ordinary sand-lime product, the greatest difference being in the bonding material. The bond of the ordinary sand-lime brick is effected solely by the hardening of the lime which appears to coat the particles of sand, whereas in the new method brick a natural cement is made in the process of manufacture by the intimate grinding of the total quantity of lime, and a certain determined proportion of the sand with a sufficiency of water or steam to afford the water of crystallization, the resultant product being practically a hydrated calcic silicate, and artificial product closely approximating the mineral Wollastonite. In the ordinary method of producing sand-lime brick the sand, dry or damp, is mixed in a dry or wet pan with from 8 to 15 per cent. of either quick or hydrated lime and run direct to the press, from which the freshly moulded bricks pass to the hardening cylinder, where they are kept under steam pressure, 120 to 140 lbs., for about ten hours. As may be seen on examination the finished article is rough, the texture being that of the sand used and, if the sand be coarse, the brick is very porous, though if heavy pressure were exerted in the press, its crushing strength might be high. This high crushing strength, if it exist, would, however, be due to the arch formed by the angular particles of sand rather than to the homogeneity of the brick. Under the new, or "Division Method," the sand is thoroughly dried and a certain determined proportion with all the lime (quick-lime), 4 to 6 per cent., is ground to air-float size in a pebble mill, the ground material then being intimately mixed with the unground sand and the necessary water for hydration. The mixture is then conveyed to a steel tank, or "silo," wherein hydration is completed and the necessary chemical re-action takes place to form the hydrated calcic silicate. The mixture goes to the silo quite cool, but during the ten-hours it remains there, it generates considerable heat, while the re-action is going on, and when fed to the press is warm and very slightly moist. The press and hardening cylinder are the same as in ordinary sand-lime brick practice, either vertical or rotary presses being used, though the latter type are preferred.

On comparing the two processes it will be seen that under the ordinary method the product is practically a "mortar" brick, while under the new a "cement" brick is produced. In appearance the two bricks differ materially, the new one having a smooth glossy surface with sharp well-defined edges and corners, while the old method product shows a rough dull surface and round or ragged corners. Internally the new brick shows a great improvement over the old, being very dense and non-absorbent, the absorption test running about 9 per cent., as against an average of 12 per cent. in ordinary clay brick, and higher in the ordinary sand-lime article. This low absorption value is obtained by the use of the fine grained cement with which the brick is made, the ground material being so fine that, under the press, it flows liquid-like throughout the mass, filling all the interstices, and at the same time affords the smooth finished exterior.

Recent tests of brick made by the Canada Brick Company, in Montreal, afforded the following results:—

Test by Canadian Inspection and Testing Laboratories, Ltd., Montreal—

Transverse test between 6-inch supports. . . . 2,470 lbs.
Crushing strength per square inch. 4,738 lbs.

A more recent series of tests made at the Testing Laboratory of McGill University showed the crushing strength of average samplers to be 6,800, 6,450 and 6,580 lbs. per square inch, respectively.

For comparison with an ordinary clay brick, tests were carried out at the Mechanical Engineering Department of Columbia University, New York, on silicate bricks made by the "Division Method" in Washington, and the well-known "Rose" brand clay brick of New York. These tests showed:

| | Rose | Silicate |
|--|-------|----------|
| Crushing strength per sq. in., lbs..... | 4,056 | 4,808 |
| Transverse strength per sq. in., lbs.... | 496 | 527 |
| Absorption test, 2 days' soaking..... | 12.7% | 9.9% |

The above are averages obtained from a number of tests made by Prof. Ira H. Woolson, of Columbia University.

COAL MINING IN BRITISH COLUMBIA IN 1912

By E. Jacobs, Victoria, B.C.

But for a strike of the miners at the mines of the Canadian Collieries (Dunsmuir) Limited, which adversely affected production of coal at that company's Extension and Cumberland collieries, both situated on Vancouver Island, the output of coal in 1912 would have been the largest in any year in the history of coal mining in British Columbia. As it was, an estimated production of, approximately, 3,026,000 long tons, as compared with 3,139,000 tons in 1910, which

latter was the highest yearly output on record in the province.

The quantity of coke produced was also comparatively large, though here again production fell short of the highest yearly output, last year's figures having been, as estimated, 264,000 tons, while those for 1905 were 271,800 tons.

Particulars of the output of the various collieries follow:

| | Tons Gross. | Tons made into coke. | Tons net. | Tons of coke. |
|------------------------------------|----------------|-------------------------|--------------|------------------|
| Vancouver Island— | | | | |
| Western Fuel Co. | 594,000 | ..... | 594,000 | ..... |
| Canadian Collieries | 661,804 | ..... | 661,804 | ..... |
| Pacific Coast Coal Mining Co. | 167,500 | ..... | 167,500 | ..... |
| Vancouver-Nanaimo Co. | 90,000 | ..... | 90,000 | ..... |
| Total Vancouver Island | 1,513,304 | ..... | 1,513,304 | ..... |
| Nicola and Similkameen— | | | | |
| Nicola Valley C. & C. Co. | 152,000 | ..... | 152,000 | ..... |
| Inland C. and C. Co. | 31,273 | ..... | 31,273 | ..... |
| Diamond Vale Collieries | 3,260 | ..... | 3,260 | ..... |
| Columbia Coal & Coke Co. | 2,000 | ..... | 2,000 | ..... |
| Princeton Coal & Land Co. | 25,000 | ..... | 25,000 | ..... |
| United Empire Co. | 400 | ..... | 400 | ..... |
| Total Nicola and Similkameen | 213,933 | ..... | 213,933 | ..... |
| Crow's Nest— | | | | |
| Crow's Nest Pass Coal Co. | 962,879 | 326,721 | 636,158 | 219,784 |
| Hosmer Mines, Ltd. | 213,070 | 68,651 | 144,419 | 44,352 |
| Corbin C. & Co. Co. | 123,214 | ..... | 123,214 | ..... |
| Total Crow's Nest | 1,299,163 | 395,372 | 903,791 | 264,136 |
| Summary— | | | | |
| Vancouver Island | 1,513,304 | ..... | 1,513,304 | ..... |
| Nicola and Similkameen | 213,933 | ..... | 213,933 | ..... |
| Crow's Nest | 1,299,163 | 395,372 | 903,791 | 264,136 |
| | 3,026,400 | 395,372 | 2,631,028 | 264,136 |

(Note.—The Canadian Collieries (Dunsmuir) Limited has coke ovens at Union Bay, Vancouver Island, but owing to lack of sufficient demand from Coast district smelters, no coke was made at those ovens during the last two years. Meanwhile the small coke requirements of those reduction works were supplied from stock.)

VANCOUVER ISLAND COLLIERIES.

The record of coal mining on Vancouver Island covers a period commencing in 1835. East Kootenay mines first shipped coal in 1898, and Nicola Valley in 1907. Of the aggregate of 37,300,000 long tons (includ-

ing that made into coke), produced during the whole period of 77 years, 3,029,000 tons was the total output in 50 years, to 1885 inclusive; 20,703,000 tons in 20 years, to 1905, inclusive, and 13,600,000 tons in seven years, to 1912, inclusive. These figures are of interest as indicating the increase in recent years—from a little more than an average yearly production of 1,000,000 tons a year over the 20-year period mentioned, to nearly 2,000,000 tons a year for the seven years, 1906-12. The largest output of any single year was that of 1910—3,139,235 tons, of which 339,189 tons was made into

coke, leaving a net production of 2,800,046 tons. In 1911 the mines in the Crow's Nest district were closed during the greater part of the year, while last year production on Vancouver Island was also interfered with by labour troubles, as already stated.

PRODUCTION OF COAL IN ALL YEARS.

The operating collieries on Vancouver Island are those of the Western Fuel Company, Canadian Collieries (Dunsmuir) Limited, Pacific Coast Coal Mines, Ltd., and Vancouver-Nanaimo Coal Mining Company, Ltd., respectively.

Western Fuel Company.—This company is working three producing mines, and opening a fourth. Its head office is in San Francisco, California. Mr. Thos. R. Stockett is general manager, and Mr. Thos. McGuckie superintendent. No. 1 shaft and Protection shaft are worked conjointly, these mines (as officially reported) being connected in several places, and ventilated by the same fans under the same ventilation system. Many of the men working in No. 1 mine are lowered to their work and hoisted again at the Protection shaft, which is on Protection Island, while No. 1 shaft is on Vancouver Island. The underground workings of No. 1 mine are extensive; from the face of the inside workings in the Diagonal slope to the face of No. 1 North level the distance is from five to six miles. There are two seams of coal being worked here, known as the Upper and Lower seams; the Lower seam is from 30 to 60 ft. below the Upper seam, and is separated therefrom by a hard conglomerate rock. The coal in the Lower seam varies from 30 to 40 inches in thickness; it is hard coal, of good quality, and well stands handling. All workings on this seam are on the long-wall system, the floor and roof being well adapted for this method. Compressed air-driven coal-mining machines are used with much success, as regards both cost and production, a greater percentage of lump coal being produced. Nearly three-fourths of the coal mined by this company in recent years has been taken from these combined mines.

No. 4 shaft, Northfield (Brechin) mine has workings in the Lower seam, in coal also of good quality. Hoisting is done through a shaft 60 ft. in depth, and from the bottom of this a slope extends about a mile, passing under Exit passage, and Newcastle Island to where the coal is mined. Mining here is also on the long-wall system.

The new mine being opened is known as the Reserve shaft. Two shafts are being sunk on the Indian reserve, at the mouth of Nanaimo river, at a distance of rather more than three miles from No. 1 shaft, which is in the near vicinity of the town of Nanaimo. Dimensions of shafts are similar, being 10 ft. by 25 ft. 9 in. inside timbers. They will be divided into three compartments each, and it is calculated that they will have to be sunk to a depth of 980 ft. One shaft by the end of 1912 had been sunk to about 920 ft. depth, and the other to approximately 500 feet. Both are to be equipped for hoisting; the air shaft will be used for lowering and raising men and materials, and the other exclusively for hoisting coal. Hoisting engines for permanent use have been installed at both shafts, and these are being used in the work of sinking. The engines have been supplied by Andrew Barclay & Sons, Kilmarnock, Scotland; the main engine is 30 by 60 in., Corliss valve, and with two 14-ft. drums, and the other 26 by 54 in., Corliss valve, with 12-ft. drums. Both are equipped with special devices to prevent overwinding.

While sinking the shafts a new method of lighting is being tried. Heretofore both shafts have been lighted by clusters of six incandescent lights, one at each end

of the respective shafts, and when blasting was being done those were hoisted out of the way. Owing to the work being done close to the sea, and the consequent presence of salt water, difficulty has been experienced in keeping intact the wires and insulation of the electric cables, so as the experiment of placing a searchlight above the mouth of each shaft and turning the light down on the shaft sinkers is being tried. So far as known, at any rate, in British Columbia, this is the first time an electric searchlight has been used for such a purpose.

Transportation facilities are being provided by the construction of a standard gauge railway to the company's shipping docks and loading bunkers near No. 1 shaft, Nanaimo. Included in the railway work is the building of a bridge across Nanaimo river—in itself an important work.

Canadian Collieries (Dunsmuir) Limited.—This company operates what were formerly known as the Dunsmuir mines (or those of the Wellington Colliery Company). Its Extension colliery includes Nos. 1, 2 and 3 mines—all worked from what is known as No. 1 tunnel—and No. 4 mine, worked by a shaft. Its Cumberland colliery includes Nos. 4 and 7 slopes and 5 and 6 shafts. A new mine—No. 9—is being opened about a mile north of No. 7.

There was not any important addition to plant nor extensive new development work done at the above-mentioned producing mines during 1912. Both shafts—main and air—at No. 8 are now down about 500 ft. It is expected two seams of coal will be reached by these shafts. Construction work on a railway from Trent to No. 8 has been in progress.

In connection with the development of hydro-electric power on Puntledge river, for use in substitution of steam at the several mines at Cumberland colliery, construction of transmission lines, erection of substations, installation of switchboards, etc., has been in hand, and the first unit of the generating plant has been received from the General Electric Company. An increase in the output capacity of the mines is planned, when the additional power shall be available.

It is proposed to put in at Union Bay, the company's shipping port for coal from the Cumberland colliery, a coal-briquetting plant, and in this connection much data is being obtained. The coke ovens are at Union Bay, as, too, are the main workshops for Cumberland and connecting railway.

Mr. W. J. Coulson is general manager of the Canadian Collieries (Dunsmuir) Limited; Mr. J. Ralph Lockard, superintendent at Cumberland; Mr. J. A. Tompkins, at Union Bay; and Mr. J. H. Cunningham, at Extension.

Pacific Coast Coal Mines, Ltd.—This company owns the Fiddick colliery, formerly owned by the South Wellington Mines, Ltd., and the Suquash colliery, the latter being a new property opened within the last two or three years. Mr. Geo. Wilkinson is manager.

The Fiddick mine has been worked from two slopes. Shipping facilities consist of a railway from South Wellington to tidewater at Boat Harbour, on the east coast of Vancouver Island, where there are loading bunkers, etc. Two shafts are being sunk at a point one mile nearer the shipping place than South Wellington. These will be between 500 and 600 ft. deep by the time the coal is reached. For use at the latter, the Canadian Ingersoll-Rand Co. has supplied the high-pressure side of a compound steam compound air compressor having a displacement of 2,050 cubic feet of free air per minute at its normal speed of 120 r.p.m.

At Squash a 6 by 10 ft. shaft is down 170 ft., with levels turned off on each side. Levels and slopes therefrom are in good coal, 4 to 5 ft. in thickness, with small bands of rock running through it, the seam being well adapted for long-wall mining, worked by machines.

Vancouver-Nanaimo Coal Mining Co., Ltd.—This company operates the New East Wellington colliery, near Nanaimo. The mine is opened by a slope and counter-slope from the surface to the dip at a distance of about 1,200 ft., pitching about 27 degrees. The main haulage-level branches off from the bottom of the slope at an angle of 75 degrees to the left. There are two counter-levels running parallel with the main-level. Most of the work is to the dip of the slope, or straight along from the bottom. The mine is worked on the pillar-and-stall method, with a little long-wall being done as well. It is officially described as being a fine mine, the coal in the Wellington seam being from 5 to 12 ft. thick, and of the very best quality.

NICOLA VALLEY AND SIMILKAMEEN.

Nicola Valley Coal and Coke Co., Ltd.—This company owns the Middlesboro colliery, in Nicola valley, Yale district, with five mines—Nos. 1 to 5.

Development work in 1912 consisted chiefly of the further opening of No. 4 mine, from which the larger part of the year's output of coal was obtained. In prospecting a fault, a new seam was discovered, and a rock-tunnel driven to further prove the coal, which was found to be about six feet thick and of good quality. The seam having been proved of large extent, a second tunnel was driven, to be used as the main roadway into the new area, the other tunnel to be the counter-level. Much drilling was done, under a contract let the previous year to the Sullivan Machinery Company, and this definitely showed the continuance over a large area of the seams of coal that are being worked.

Much machinery and handling plant having been put in during 1911, there was not any need for additions thereto last year. While this company finds the demand for its screened coal steadily increasing, it is confronted by a serious problem in the matter of the disposal of its slack, for with present high railway freight charges its utilization at a profit is not practicable. The purchase and installation of a briquetting plant is, therefore, under consideration; meanwhile, investigation and experiment have shown that a coal-briquette of excellent quality can be made, and that a ready sale for such a fuel can be obtained. As a second railway is being built, there is, too, a prospect of some relief in the direction of somewhat reduced transportation charges. Mr. Charles Graham is mine superintendent at the Middlesboro colliery.

Inland Coal and Coke Co., Ltd.—This company is developing a new property, situated on a hill above the Middlesboro colliery. Three slopes have been driven and a small shaft sunk. In both size and quality the coal is good, but operations are not yet on a scale admitting of a large output being made. Mr. Andrew Bryden is mine manager.

Diamond Vale Collieries, Ltd.—The Diamond Vale colliery lies immediately south of Middlesboro colliery, the Coldwater river being the boundary between the two properties. Production was unimportant in 1911, while in 1912 the mine was closed for the greater part of the year, following an explosion in which several lives were lost, and in consequence of which the mine manager's certificate of competency was cancelled.

Princeton Coal and Land Co., Ltd.—This mine, situated at Princeton, Similkameen, is at a disadvantage by reason of having a long railway haul from mine to market, and correspondingly high freight rates. However, railway construction in progress in the district promises by competition to afford some relief in this direction. No particulars were received concerning quite recent progress, but the last-published official account was as follows: "The development work in this mine has been steadily carried on without interruption during the year. A new tippie was erected with a capacity of 700 tons a day; this tippie is modern, with shaking screens and picking tables, the coal being separated into the various sizes the market calls for. A box car loader of the Victor type has also been installed, reducing to a minimum the breakage in loading. The development work in the mine is well in advance of the demands, and the entire output is produced by "Little Hardy" post machines. With a sufficient demand for the coal, the output can at any time be brought up to the capacity of the tippie. The seam from which the coal is mined is 9 ft. thick and it is worked on the pillar-and-stall system. The ventilation is good; the roadways are large and well kept; and the general mine conditions compare favourably with the best coal mining practice in the province." Mr. Ernest Waterman is resident manager of the company, and Mr. Jas. Holden, mine manager.

EAST KOOTENAY COLLIERIES.

The collieries of the Crow's Nest district, Southeast Kootenay, are those of the Crow's Nest Pass Coal Company, Ltd.; Hosmer Mines, Ltd., and Corbin Coal and Coke Company, respectively.

Mr. D. B. Dowling, of the Geological Survey of Canada, in a published paper on the "Undeveloped Coal Resources of Canada," says of the field occupied by the companies just mentioned: "Crow's Nest Field Area, 230 square miles. Coal seams of workable thickness aggregate 177 ft. of coal, or a total coal content for the area of 39,000 million tons. On account of the thickness of some of the seams, occasioning great waste in mining, an estimate was based on 100 ft. of coal, or a total of 22,600 million tons."

In addition, Mr. Dowling mentions the "Fording River Field—a northward continuation of the Crow's Nest beds to the head of Elk river. Area 140 square miles, with 100 ft. of coal—14,000 million tons.

Crow's Nest Pass Coal Co., Ltd.—This company, of which Mr. W. R. Wilson is general manager, owns three collieries as follows: Coal Creek colliery, situated about five miles east from the town of Fernie. In 1911 four mines on each side of Coal creek were operated. In 1912, in addition to working most of those mines, the company opened No. 1 East and developed this new mine to a producing capacity of 1,000 tons of coal a day. A new seam of coal, above No. 1 seam at Coal creek, was also opened and preparations for permanent development of this were being made at the close of the year. Production of Coal Creek mines in 1912 totalled approximately 757,000 short tons, of which about 250,000 tons was made into 168,000 tons of coke. Mr. John Shanks is manager of this colliery.

Michel colliery is situated on both sides of Michel creek, on the Crow's Nest branch of the Canadian Pacific Railway, and is distant 23 miles northeast from Fernie. Of half a dozen mines, four are on the south and two on the north side of the creek. Only No. 3 seam was worked in 1912, and the production was 284,000 short tons of coal of which 116,500 tons was

made into 78,541 tons of coke. Mr. B. Caulfield is manager of Michel colliery.

Carbonade colliery is on Morrissey creek, 14 miles from Fernie, in an opposite direction to Michel. There has not been any production of coal here in recent years, the work done having been exploratory only, to obtain more information relative to the coal seams occurring here.

Hosmer Mines, Limited.—All the coal seams at Hosmer, which is on the C.P.R. Crow's Nest line, between Fernie and Michel, about 8 miles from the former town, are reached by two cross-cut adits, which, entering in the Fernie shales, underneath the coal measures, cross-cut the ten principal coal seams of the Crow's Nest field. This is known as A level. During the last two or three years B level has been opened; this has been driven along the outcrop of the seams, about 500 ft. higher than the main tunnel, and is reached by an incline on the mountainside, which connects with the A level incline down to the tippie.

Only ordinary development work was done in 1912, and the colliery equipment being adequate to all requirements, no additions were made to plant or machinery in that year. Production figures appear in the foregoing table. Mr. David G. Wilson was manager, but has quite lately been transferred to Bankhead, Alberta, and has been succeeded by Mr. W. Shaw, of Canmore.

Corbin Coal and Coke Co.—This company's colliery, situated on the East fork of the South branch of Michel creek, is connected at McGillivray by the British Columbia Eastern Railway with the C.P.R. Crow's Nest system. McGillivray is about 13 miles west of Crow's Nest, a railway station at the summit of the pass through the Rocky mountains.

The main tunnel of the Corbin No. 1 mine has been driven about 2,000 ft. in coal, which varies in thickness from 10 to 250 ft., constituting a deposit of most unusual size. Some 800 or 900 ft. higher, on the other side of the mountain, there also occurs a large deposit of coal, proved to be 300 ft. across, and this has been cleared and stripped of surface debris over a considerable area, for the purpose of working it like an open quarry. To provide transportation facilities, eight miles of railway has been graded, and steel (standard-gauge) laid for seven miles. Winter having come on, construction work has been suspended, but next season, when the deep snow shall have melted, the remaining one mile of steel will be laid and shipment of coal from this mine, known as the Corbin No. 3, will be commenced. Production figures are as shown above. Shortage of railway cars materially retarded shipment of coal, otherwise output would have been larger. Mr. W. Gus Smith is resident engineer, and Mr. R. T. Stewart, mine manager.

CONCLUDING NOTES.

In various parts of the province development of new coal properties has been in progress. In Skeena district, both in the Bulkley River country, and in the Groundhog field farther north, coal measures have been opened. In Similkameen district, the Columbia Coal and Coke Company has done much development work at its coalmont property, but has not yet commenced to ship coal in considerable quantity. In Southeast Kootenay, too, preliminary work has been done on several new properties. Again, other fields have had some attention, but being without transportation facilities, this has not been considerable.

Mine-Rescue Matters.—To give particulars of the progress made in connection with the establishment of mine-rescue stations, provision of apparatus, and training of men in the use of mine-rescue appliances, would take more space than is here available. As all operating collieries are required by law to provide mine-rescue apparatus, and as the Provincial Government has established mine-rescue training stations in different parts of the province, all that may now be stated is that ample provision is made for mine-rescue.

MINE RESCUE WORK IN CANADA.

The Committee on Minerals of the Canadian Commission of Conservation has issued an interesting compilation on Mine Rescue Work in Canada, written by W. J. Dick, Mining Engineer of the Commission. The object of the publication, as set out in the preface, is "to encourage mine rescue work in Canada by setting forth what is being done in this country and elsewhere, by the establishment of mine-rescue equipment stations, to lessen the number of fatalities due to mine fires and explosions."

Mr. Dick's report recapitulates the history of mine-rescue apparatus, reviews the outstanding features of the existing standard types, and details the laws now in existence in European countries compelling the provision of mine-rescue apparatus at coal and metal mines.

The existing stations in Canada are described in detail, and numerous illustrations accompany the description. Appendices to the report include a reprint of W. E. Garforth's paper on "Suggested Rules for Recovering Coal Mines after Explosions and Fires." Mr. Garforth's paper is a classic, and it was a good idea to reprint it, as the paper is now becoming scarce in its original form. The recommendations of the National Mine-Rescue Conference held in Pittsburg last September are also included, which give in small compass some exceedingly good advice.

The report is printed on good paper, and the illustrations are excellent.

In view of the controversy now being carried on in Great Britain on the relative safety and merits of "injector" and "non-injector" apparatus, it is interesting to note that out of an approximate total of 175 breathing apparatus in Canada, 150 are of the "injector" type, and only 25 apparatus are "non-injector" type.

British Columbia is the only province in Canada that compels the provision of mine-rescue apparatus by law, and bearing this fact in mind, it is distinctly encouraging to note the advances made by Canadian coal operators on their own initiative in mine-rescue work.

The Commission is to be congratulated upon this report, which will go far to remove from many minds the lurking suspicion which still exists that the provision of mine-rescue apparatus is a "fad" advocated by enthusiastic, but unpractical persons. Mine-rescue work is to-day a highly scientific and specialized matter, and will not permit the theorist and the dabbler. The modern mine-rescue party carries with it a portable field telephone, electric lamps, safety-lamps, gas-analysis apparatus, thermometers, pocket compass and mine maps, in addition to breathing apparatus and "pulmotors." This is not the equipment suggested by a theorist, but the actual list advised by Miners' Circular No. 4, issued by the United States Bureau of Mines.

If a criticism may be permitted, it is that the report deals too exclusively with the use of breathing apparatus in the salvage of human life. It is true that the

attention of inventors and governments has been largely focussed on this feature in the usefulness of artificial breathing devices, but probably their greatest service up to the present has been connected with underground mine-fires. In many respects it is unfortunate that the word "rescue" should ever have been used, as, while such terms as "rescue-stations," "rescue-apparatus," etc., are not exactly misnomers, they have in the past been used in a misleading manner. Breathing apparatus should be looked upon as a useful auxiliary to the usual equipment of an underground fire brigade. The combination of the use of breathing apparatus with the pumping of inert gases into fire-areas, is opening up a new era in dealing with mine fires and explosive atmospheres, that may have far-reaching consequences.

All the stations mentioned in the report are equipped

with some type of oxygen resuscitating device, principally "Pulmotors." This little device, which is so simple in operation, but is actually the result of years of research, has given results that are almost unbelievable in reviving persons apparently dead. There are many places where the necessity for such a device is felt much more often than at the ordinary coal mine. Many men have died in chemical works, electrical plants, steel works, and gas works, who could have been revived by timely use of this invention. The Commission of Conservation could not go far wrong in recommending the provision of a "pulmotor" for every city hospital, every large fire brigade, and in connection with all works where men run the risk of suffocation by gases or death from electrical shock.

F. W. GRAY.

THE COPPERMINE COUNTRY*

By J. B. Tyrrell, M.A., F.G.S., F.R.S.C.*

The Coppermine country is situated about the centre of the northern coast of North America, just south of the Arctic Ocean, the shores of which are low, shallow and covered with ice for most of the summer.

Whaling ships now regularly navigate the Arctic Ocean from Behring Strait as far eastward as the mouth of the Mackenzie River, but from this point eastward navigation becomes more difficult and more impeded with ice, so that it has rarely been possible for such vessels to reach the mouth of the Coppermine River.

The country here considered is of unknown area, but speaking generally, it lies near the mouth of the Coppermine River and would appear to extend one hundred miles or more westward from it along the Arctic coast and about two hundred miles eastward from it. Taking its centre as a point on the Coppermine River, about thirty miles above its mouth, this centre lies nine hundred miles northwest of Fort Churchill, on Hudson Bay, five hundred and fifty miles west-northwest from the head of Chesterfield Inlet on Hudson Bay, three hundred miles north of Fort Rae on the north arm of Great Slave Lake, and fifty miles east of Great Bear Lake.

At the present time the easiest method of reaching it is to descend the Mackenzie and Athabasca Rivers from Athabasca Landing to the mouth of Great Bear Lake River, to ascend this river to Great Bear Lake, cross Great Bear Lake, and thence to strike across the country eastward from Great Bear Lake to the Coppermine; but the main difficulty in this route is caused by the fact that Great Bear Lake, which is very large, having an area of 11,800 square miles, is only open throughout its whole extent for about two months of each year, from the first of August to the first of October.

A canoe route leads north from Great Slave Lake (area 10,700 square miles) to the east end of Great Bear Lake, and thence to the Coppermine River. It is available for a little longer time than the other, in fact from the time when Great Slave Lake opens on the first of July until it freezes again on the first of November.

For more than two hundred years native copper has been known to exist on the banks of the Coppermine

River, and over large areas in its vicinity. Writing about 1714, M. Jeremie, who had been in charge of York Factory or Fort Bourbon, then the most northerly trading post on the west side of Hudson Bay, between 1708 and 1714, while it was in the hands of the French, says of the Dogribbed Indians: "They have in their country a mine of red copper so abundant and so pure that without putting it through the forge, just as they obtain it at the mine, they pound it between two stones and make anything that they wish with it. I have often seen it, since our Indians constantly bring it from there when they go in war parties."

Thus the French traders, who travelled so far through the northern country and have told us so much about it, were the first to give us information about this region which still seems so remote and difficult of access.

After York Factory and the other trading posts on Hudson Bay were handed back by the French to the English and to the Hudson's Bay Company, those in control of this latter company immediately began to look for the great mine of copper from which the Esquimaux and Indians derived their supply of the metal, and as early as July, 1717, they sent out Richard Norton, a boy about seventeen years of age, who had shown a great aptitude for learning the Chippewyan Indian language, with two of these Indians. No account of Norton's journey has ever been published, but from the remarks of Captain Middleton and Arthur Dobbs, it would appear that he spent about a year travelling with the Indians, and there is a possibility that he went as far north as the Coppermine River itself. At all events, judging from the reports brought back by him and from the reports of the Northern Indians, Captain Christopher Middleton, F.R.S., writing in 1743, makes the following remarks:—

"All the Indians I have ever conversed with, who were at the Coppermine, agree in this: That they were two summers going thither, pointing towards the north-west and sun setting, when at Churchill; and that where this mine is, the sun, at a certain season of the year, keeps running round the horizon several times together, without setting. Now we know from the principles of cosmography, that this cannot be true of any place,

*Extracts from paper read before the Canadian Institute.

whose latitude is less than 67 or 68 degrees, even allowing for the effects of refraction: and if the credibility of the testimony of these simple Indians be called in question, I can mention that of Mr. Norton, who was Governor at Churchill above twenty years, and had travelled almost a year north-westward by land with this country Indians. This gentleman has often affirmed the same thing of the sun; and that in his whole journey he met with no Salt river, nor tree, nor shrub, but only moss; and that he and his retinue were reduced to

Company, states in the Parliamentary Report of 1749, that he "himself carried Mr. Norton, who was afterwards Governor, and two Northern Indians, to Churchill, where he put them in a canoe; and the purpose of their voyage was to make discoveries, and encourage the Indians to come out to trade, and bring copper ore."

In the same Parliamentary Report, Alexander Brown, a surgeon who had been for six years in the Company's service, testified that the Indians "brought down the



The Coppermine Country

such extremity as to eat moss several days; having nothing else that could serve them for substance but their leather breeches, which they eat up also."

In 1719 the directors of the Hudson's Bay Company ordered Mr. Norton, upon application of his mother on his behalf, a gratuity of £15 on account of having "endured great hardships in travelling with the Indians," doubtless on this journey to or towards the Coppermine country. With reference to this journey a Captain Caruthers, who was in the employ of the Hudson Bay

ore at the request of Governor Norton," and also "that he had heard the late Mr. Norton say that he had been at this mine, and that a considerable quantity of copper might be brought down."

During the same time Captain Knight, who had been in charge of a number of the Company's posts on Hudson Bay, and who was himself the founder of Churchill, had also seen some of this copper ore and had become greatly interested in it, though there is also reason to suppose that he considered that it was associated with

gold, or that gold occurred in the country. Arthur Dobbs says of him, that he had a great share in the Company's stock and that he pressed the Company to go upon the discovery and trade and had strong chests made to hold the gold he was to bring home.

After the unsuccessful and tragic voyage of Knight and Barlow no serious attempt was made to find the Coppermine country for some time, but the following references to it in Arthur Dobb's "Account of the Countries adjoining to Hudson's Bay," 1744, pp. 47, 48, 59 and 80, will show that it was not forgotten.

"Mr. Frost, who has been many years employed by the Company in the Bay, both at Churchill and Moose River Factory, who was their interpreter with the natives, and travelled a considerable way into the country, both north-westward of Churchill—

"He says when he was at Churchill, he travelled a considerable way in the country north-westward of the River of Seals; that near the rivers and sea-coast there was small shrubby woods, but for many miles, at least 60 farther into the country, they had nothing but a barren white moss upon which the reindeer feed, and also the moose, buffalos, and other deer; and the natives told him, further westward beyond that barren country, there were large woods. He was acquainted, when there about fifteen years ago, with an Indian chief, who traded at Churchill, who had been often at a fine copper mine, which they struck off from the rocks with sharp stones; he said it was upon islands at the mouth of a river, and lay to the northward of that country where they had no night in summer.

"The Company avoid all they can making discoveries to northward of Churchill—

"But tho' they are fully informed of a fine copper mine on a navigable arm of the sea north-westward of Whale Cove, and the Indians have offered to carry their sloops to it, yet their fear of discovering the passage puts bounds to their avarice, and prevents their going to the mine, which by all accounts is very rich; yet those who have been at Whale Cove own, that from thence northwards is all broken land, and that after passing some islands, they from the hills see the sea open, leading to the westward;—

"Churchill river, in latitude 59 degrees, a noble river, navigable for 150 leagues, and after passing the falls, navigable again to far distant countries, abounding in mines of copper—

"Scroggs, in his journey northward in 1722 had two Northern Indians with him, who had wintered at Churchill, and told him of a rich copper mine somewhere in that country, upon the shore, near the surface of the earth, and they could direct the sloop so near it, as to lay her side to it, and be soon loaden with it; they had brought some pieces of copper from it to Churchill, that made it evident there was a mine thereabouts."

About the same time an acrid discussion was carried on between Arthur Dobbs, and Captain Christopher Middleton, captain of the "Furnace," as to the honesty of the latter in endeavouring to find a northwest passage in 1741-2, and while the main points in the discussion are of little interest, the disputants published four books which contain some useful information about Hudson's Bay and the adjoining country.

With regard to Richard Norton's journey, Arthur Dobbs makes the following statement:—

"For there are several persons, now living, who know the exact time of Norton's setting out upon his travels, and the time of his return, who all agree, that Norton was a poor boy, taken apprentice by the Hudson's Bay Company, and sent over to one of their factories in Hudson's Bay. After he had served three years of his

time, he became a tolerable linguist for the languages of those nations that traded with the Hudson's Bay Company's Factors. When Norton was about seventeen years of age, a factory was first begun to be settled near Churchill river, in order to enlarge the Company's trade; and Norton was pitched upon, though a youth, to go in quest of a nation of Northern Indians (he speaking their language), to acquaint them there was a factory settled at Churchill, for promoting a commerce between that nation and the company. Norton set out in his canoe, with a Northern Indian, the middle of July, 1717, and went no farther to the northward than the latitude of 60 degrees. He there left his canoe, and travelled inland in quest of this northern nation, took a great sweep to the southward of the west, and found them returning to their winter quarters. He engaged some of those people to travel with him to Churchill, where they all arrived about Christmas the same year, after having endured a great many hardships. How does this relation, which is well known to be matter of fact, tally with Captain Middleton's story of the Indian and Norton travelling by land to 68 degrees, their seeing the sun running round the horizon for several days together, especially Norton, who must have inverted the order of Nature, by seeing the sun above the horizon for several days together in winter time, when in 68 degrees."

In the same book Dobbs quotes Edward Thompson and John Wigate, the surgeon and clerk of the "Furnace," as follows:—

"Whereas it hath been reported by Capt. Middleton, that Mr. Norton, late Governor of Churchill, travelled from Whale Cove, in the latitude of 62 degrees off to 65 degrees odd inland, without interruption of any lakes, rivers or streights, and could perceive no such thing as any inlet or opening to the South Sea, etc.

"To confute this, it has been several times reported by the said Norton, that so far as he travelled he saw nothing but broken lands and islands from 60 degrees to the extent of his journey; and that the native Indians he had then with him gave him a very good account of a copper mine upon the side or bank of a large river or streight; and that a person might easily go with a ship or sloop, and lie close to the side thereof, and fill their vessel with the aforesaid metal at pleasure.

"Likewise the two Northern Indians that we took in at Churchill, the one named Nabiana, the other Iazana (though upon the ship's books they are called Clayhulla and Cloydiddy), gave me a particular and more affirmative account than Mr. Norton's. They marked out upon my table the tract of land or confines of their country, as far as they knew together with the course of some remarkable fresh water rivers in their country; but in particular they gave a very good and clear account of a copper mine, which they generally used to go to once in two years; and at this copper mine there is a large river or streight, salt water and strong tides, plenty of a large kind of black fish, which by their description I imagine to be whales; and that they were five days in crossing that salt water in their canoes; and that this river or streight was so deep; that they could find no bottom with a deer skin cut into very fine thongs, and at least was an hundred fathoms long; that the course of this river run towards the sun at noonday, and this river appeared to me to be about the latitude of 63 degrees, or thereabouts; for they seemed, in our voyage, to have more knowledge of the land near that latitude than in any other part of our discovery; and when we sailed to the northeastward

of that latitude, they told us we were going from the copper mine, and the river they spoke of."

In 1768 Richard Norton was dead, but his half-breed son, Moses Norton, had been appointed Governor of Fort Churchill in his place, and during that year some Indians brought in beautiful specimens of copper from that fabled copper country. Norton was so interested in these new specimens from a country of which he had already doubtless heard much from his father and others, that he took passage on the annual ship to England and laid before the Governors of the Company a project for what he believed to be the complete exploration of the country and a definite settlement of the question of whether there was available copper within reach of the shores of Hudson Bay or not. It is interesting to note that the same ship which took Governor Norton to England had brought out William Wales and Joseph Dymond to observe the transit of Venus at Churchill.

In the following year Mr. Norton returned from England with authority to send out one of his clerks named Samuel Hearne to explore the Coppermine country. The following is an extract from the instructions of the Company as given by Hearne himself:—

"Mr. Norton has proposed an inland journey, far to the north of Churchill, to promote an extension of our trade, as well as for the discovery of a northwest passage, copper mines, etc.; and as an undertaking of this nature requires the attention of a person capable of taking an observation for determining the longitude and latitude, and also distances, and the course of rivers and their depths, we have fixed upon you (especially as it is represented to us to be your own inclination) to conduct this journey, with proper assistants.

"We therefore hope you will second our expectations in readily performing this service, and upon your return we shall willingly make you any acknowledgement suitable to your trouble therein."

Hearne was then a young man 24 years of age, and as soon as possible after Norton's arrival home he made preparations for the journey inland. On the 6th of November he left Churchill, or rather Fort Prince of Wales, at the mouth of Churchill river, in company with a few Chippewyan Indians and started northwestward on foot for the copper mine, but he only got a short distance when the Indians left him and he was obliged to return.

After a couple of months at home he again started out in the middle of winter and wandered over the barren grounds until the following autumn, when, being again abandoned by his Indians, he was obliged to return to his old home on Hudson Bay; but on the way home he had met an Indian chief named Matonabee, who offered to take him to the Coppermine river, and who afterwards showed that he was able to substantiate his offer by accomplishment; so, on the 7th of December, 1770, after having been home for only twelve days, he again started out on foot for the Coppermine river, and this time, thanks to the leadership of the great Indian whom he accompanied, he was able to reach the country that he was in search of.

Hearne knew nothing of mines or minerals, but, like many a man similarly equipped since his day, he was sent to report on a great mining property. Naturally, his report on the mine of copper is of little value, but in his book he has given an exceedingly interesting account of life among the Indians on the barren grounds in his time. What he has to say, however, is interesting, as it is the first account of the occurrence of the copper by an eye witness. His remarks are as follows:—

"We arrived at one of the copper mines, which lies, from the river's mouth about south southeast, distant about twenty-nine or thirty miles.

"This mine, if it deserves that appellation, is no more than an entire jumble of rocks and gravel, which has been rent many ways by an earthquake. Through these ruins there runs a small river; but no part of it, at the time I was there, was more than knee-deep.

"The Indians who were the occasion of my undertaking this journey represented this mine to be so rich and valuable, that if a factory were built at the river, a ship might be ballasted with the oar, instead of stone; and that with the same ease and dispatch as is done with stones at Churchill river. By their account the hills were entirely composed of that metal, all in handy lumps, like a heap of pebbles. But their account differed so much from the truth, that I and almost all my companions expended near four hours in search of some of this metal, with such poor success, that among us all, only one piece of any size could be found. This, however, was remarkably good, and weighed above four pounds. I believe the copper has formerly been in much greater plenty; for in many places, both on the surface and in the cavities and crevices of the rocks, the stones are much tinged with verdigrise.

"It may not be unworthy the notice of the curious, or undeserving a place in my journal, to remark, that the Indians imagine that every bit of copper they find resembles some object in nature; but by what I saw of the large piece, and some smaller ones which were found by my companions, it requires a great share of invention to make this out. I found that different people had different ideas on the subject, for the large piece of copper above mentioned had not been found long before it had twenty different names. One saying that it resembled this animal, and another that it represented a particular part of another; at last it was generally allowed to resemble an Alpine hare couchant; for my part, I must confess that I could not see it had the least resemblance to anything to which they compared it. It would be endless to enumerate the different parts of a deer, and other animals, which the Indians say the best pieces of copper resemble: It may therefore be sufficient to say, that the larger pieces, with the fewest branches and the least dross, are the best for their use; as by the help of fire, and two stones, they can beat it out to any shape they wish.

"Before Churchill river was settled by the Hudson's Bay Company, which was not more than fifty years previous to this journey being undertaken, the Northern Indians had no other metal but copper among them, except a small quantity of ironwork, which a party of them who visited York Fort about the year one thousand seven hundred and thirteen, or one thousand seven hundred and fourteen, purchased; and a few pieces of old iron found at Churchill river, which had undoubtedly been left there by Captain Monk. This being the case, the numbers of them from all quarters used every summer to resort to these hills in search of copper, of which they made hatchets, ice-chisels, bayonets, knives, awls, arrow-heads, etc. The many paths that had been beaten by the Indians on these occasions, and which are yet, in many places, very perfect, especially on the dry ridges and hills, is surprising; in the valleys and marshy grounds, however, they are mostly grown over with herbage, so as not to be discerned.

"The Copper Indians set a great value on their native metal even to this day; and prefer it to iron, for almost every use except that of a hatchet, a knife, and an awl; for these three necessary implements, copper

makes but a very poor substitute. When they exchange copper for iron-work with our trading Northern Indians, which is but seldom, the standard is an ice-chissel of copper for an ice-chissel of iron, or an ice-chissel and a few arrow-heads of copper for a half-

worn hatchet; but when they barter furs with our Indians the established rule is to give ten times the price for everything they purchase that is given for them at the Company's factory."

(To be Continued.)

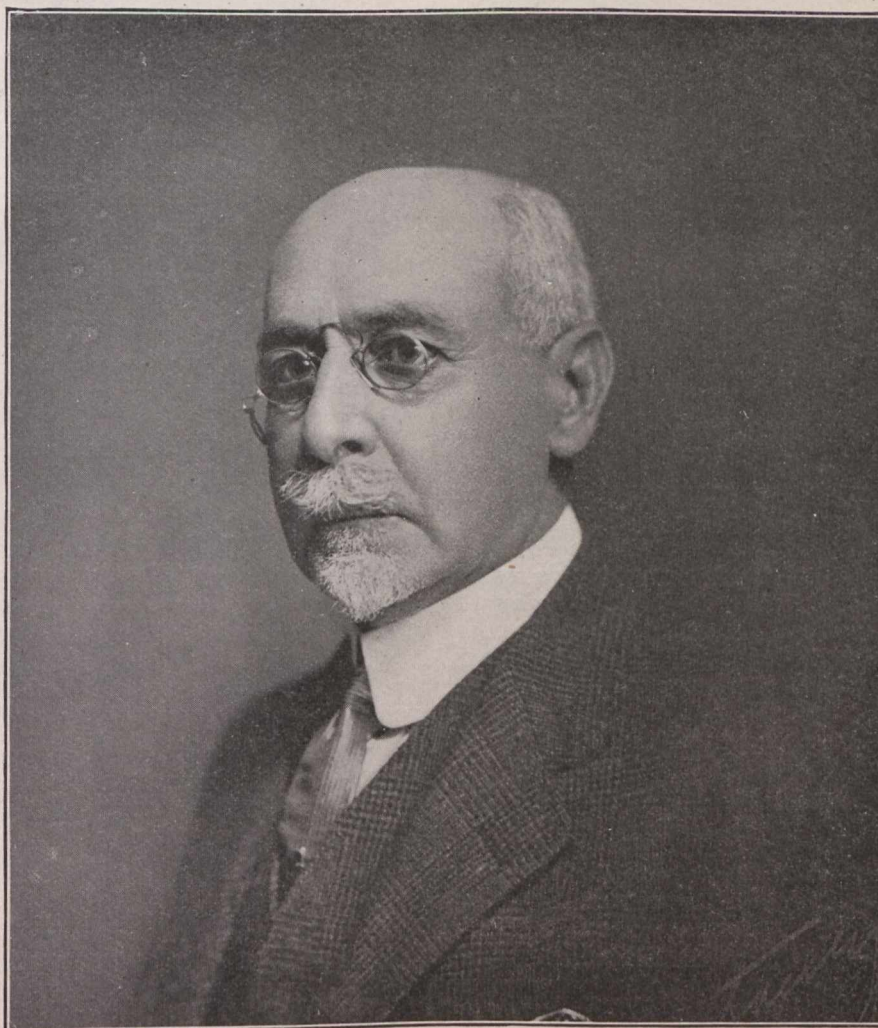
THE CHAIRMAN OF THE T. & N. O. COMMISSION

(Written by J. C. Murray.)

Every successful organization, whether commercial, educational, religious, or political, must have at its head an individual round whom the reins of influence are centred, and from whom radiate the enthusiasm and inspiration without which a corporate body is a hollow mockery.

would still be "backwoods" had not a generous Providence ordained that Nature should have a profitable convulsion near Milepost 103.

In the year 1905, Mr. J. L. Englehart accepted an appointment to the T. & N. O. Railway Commission. Shortly after, he succeeded the late Mr. Cecil B. Smith



MR. J. L. ENGLEHART

Less than ten years ago Northern Ontario was hardly a name. Immigration flowed past Ontario's door to the welcoming West, and Ontario herself supplied settlers, teachers, professional men, and money for the far-removed Western Provinces. In self-defence the Ontario Government determined to throw a colonizing line of railway through north from North Bay. Then followed the unexpected discovery of Cobalt, which changed alike the character and scope of the new railway. This is all a matter of history. It is needless to reiterate details. Suffice it to say that the country

as Chairman. Throughout the following period, a period remarkable for troubles and vicissitudes, Mr. Englehart gave personal attention to multitudinous details. Never carried away by popular clamour, or by the specious arguments of politicians, he guided the new enterprise in accordance with what he believed to be the wisest and safest policy. And events have amply justified that policy.

For instance, a less self-reliant Chairman might easily have been carried away by the urgent cry for rail connections with Larder Lake, or Gowganda, (and here I

do not refer to the rejuvenated Gowganda of to-day, but to the effervescent camp before the bubbles had subsided.)

In short, bringing a Government railway, built through a new country, into a state of efficiency, is a Herculean task. That task Mr. Englehart has performed, as witness the following figures.

The total number of passengers carried in the year 1905 was 86,648. The revenue from this traffic was \$108,681.76. Compare now the past year of grace. In 1912, 497,452 passengers patronized the line (with infinitely greater comfort), bringing to the exchequer of the Commission no less than \$599,681.73.

Even more impressive is the growth of freight traffic. The T. & N. O. in 1905 carried only 99,192 tons of freight, earning thereby \$121,530.46. But by 1912 this traffic had waxed wonderfully. The railway in that year handled 562,734 tons of freight, receiving therefrom \$929,464.66.

Throughout the history of the Temiscaming & Northern Ontario Railway not one fatality has been recorded among the 3,672,407 passengers carried. The total mileage of the railway is now 421.8 miles. When Mr. Englehart first became Chairman, it was but 113. These facts are sufficiently eloquent. Set encomiums are superfluous.

BOOK REVIEWS

Mining Engineers' Examination and Report Book—Parts I. and II.—By Chares Janin—Part I., 94 pages—Soft Cover—Part II., 57 pages, contained in pocket of cover of Part I.—Price for both, \$2.50—Part II. alone, 50 cents—Published by the Mining and Scientific Press, San Francisco, 1913—For Sale by the Canadian Mining Journal.

This latest field-book in much more than a mere skeleton form. Part I. is a suggestive and helpful compilation of exactly such data as the engineer needs when he has not access to a library. It contains working facts and specification forms for the erection of stamp mills, aerial trams, and so on. The reference tables have been admirably selected. Specimen forms of deeds, working bonds, escrow agreement, are included. Well chosen advice directs the engineer in his examination of prospects and of mines.

Part II. is even more timely than Part I. It is a neat little pocket-book, so arranged as to provide space for the engineer to jot down in order all the essential facts concerning any property examined.

Sheets of co-ordinate paper for sketch maps form a good feature. Ample provision is made for tabulating and recording cost item.

While the complete work need only be purchased once, Part II. may be had separately. It is cheap and most portable. Both Part I. and Part II. are improvements upon anything heretofore published.

Concentrating Ores by Flotation—Being a description and history of a recent metallurgical development, together with a summary of patents and litigation—By Theodore J. Hoover—221 pages—Illustrated—Board covers—Price \$3—Published by the Mining Magazine, Salisbury House, London, E.C., 1912—For sale by the Canadian Mining Journal.

Much misapprehension exists as to the scope and application of the various flotation processes of ore concentration. Agitation of crushed ores in water has

long been used in different forms as a means of separating metals and metallic minerals from gangue. Magnetic separation is of comparatively recent origin. More recent are the beginnings of the flotation methods. And the history of separation by flotation has been a record of complicated litigation and of brilliant achievements. So remarkable, indeed, have been the progressive steps that Mr. Hoover is within the mark in comparing their effect upon ore dressing with that of cyanidation upon the metallurgy of gold and silver.

The author first sketches the gradual development of the process. It is pleasant to note amongst the names of those who have contributed to the upbuilding of flotation methods, that of Mr. H. E. T. Haultain, now professor of mining at the University of Toronto. Special mention is made, also, of a Miss Carrie J. Everson, an American school teacher, who independently discovered and enumerated the fundamentals upon which subsequent work was based.

Mr. Hoover divides the history of the process into three stages. The first period, 1860 to 1902, was marked by the trial of a dozen or more methods. Of these methods there were two classes, namely, those depending on the selective action of oily substances to entrap sulphide particles, and those depending upon the analogous selective action of gas. Both ideas had very pronounced commercial limitations.

In the second stage, 1902 to 1907, the two previous ideas were embodied in one—the actions of acid and oil were combined.

The third stage, 1907 up to the present, saw the effect of commercial experience. Suitable mechanical appliances were invented, and the practical application of the process became an assured success.

A lengthy list of patents granted completes the history of the evolution of flotation.

Chapter III. is an interesting account of the litigation that followed in the train of these inventions.

Chapter IV. deals with the theories involved. "An entirely unnecessary veil of mystery has been suffered 'to obscure the theoretical side of flotation processes'" is Mr. Hoover's opening remark. He proceeds to show the essential simplicity of concentration by flotation, and then explains clearly the underlying principles.

The next chapter treats of small laboratory tests. Then each well-known patented processes, such as the Potter-Delprat, De Bavay, Elmore, Minerals Separation, etc., etc. In the second last chapter are expounded the economics of the process, and the last chapter is composed of an exhaustive bibliography.

Mr. Hoover clears away the mists that have obscured the process and have helped to restrict its exploitation. "The imagination of professional engineers is so well 'trained in these days that they should have no difficulty in grasping the significance of most of the observed facts, and there is, therefore, no reason why 'anybody engaged in metallurgical pursuits should not become as familiar with these methods of ore treatment as with any other.'"

"To inspire confidence and allay the well established fear of the mysterious," Mr. Hoover cites the amalgamation treatment of gold ores, which was once classed as an occult art.

The volume under review is notable for clarity and simplicity of diction. It opens up a hitherto fenced field wherein the engineer may now disport himself.

PERSONAL AND GENERAL

Mr. J. W. Collis, of Lecky and Collis, has returned from a visit to England.

Dr. J. F. Kemp delivered a series of lectures on ore deposition before the science undergraduates at McGill University this week (Jan. 27 to 28th). During his stay in Montreal he was the guest of Dr. Frank D. Adams.

Dr. James F. Kemp was entertained at a luncheon by the Canadian Mining Institute on the occasion of his visit to Montreal during the last week in January.

Mr. Phelps Johnson, of the Dominion Bridge Company, Montreal, has been elected president of the Canadian Society of Civil Engineers for the ensuing year.

Mr. J. M. Gordon, of Montreal, left recently on a visit to Germany to study certain advances in coal mining methods with a view to ascertaining their applicability to Canadian practice.

Mr. Neil MacDonald has left for the new gold district of Big Rice Lake, in Manitoba, for the purpose of developing claims in which he has interests.

Mr. Wm. Allison, of Hazelton, Skeena river, gold commissioner for the Omineca mining division of British Columbia, lately spent a winter vacation at Victoria.

Mr. W. J. Barker, who for years had charge of the Arlington gold mine, in Erie camp, Nelson mining division of British Columbia, under the direction of Mr. Leslie Hill, consulting engineer for the Hastings (B.C.) Development Syndicate, on May 1, 1912, took over the property as lessee. Since that date to the end of 1912 he shipped 300 and 400 tons of ore of good grade.

Mr. Charles Biesel, formerly superintendent of the Snowshoe, Phoenix Amalgamated, and No. 7 mines of the Consolidated Mining and Smelting Co., in the Boundary district of British Columbia, now has his headquarters at El Paso, Texas. In his last annual report the general manager of the Consolidated M. and S. Co. included the statement that Mr. Biesel had resigned to become general manager in charge of properties of the Mines Company of America.

The intended visit of Mr. Herman C. Bellinger to England has been postponed. In the course of his address to the shareholders at the general meeting of the Great Cobar, Limited, held in London, England, on December 30, the chairman said: "The directors had hoped that the general manager (Mr. Bellinger) would be able to be present at this meeting, but, owing to the delay in the erection of the concentration plant, it was impossible for him to leave Cobar, and, therefore, he has had to delay his journey." It is of interest to note that the company is having put in a Minerals Separation flotation plant at Cobar, which is in New South Wales, Australia. An idea of the proportions of the metals contained in the ores this company mines and reduces can be gathered from the fact that an annual production is expected of, approximately 10,000 tons of copper, with between 40,000 and 50,000 ozs. of gold and from 200,000 to 250,000 ozs. of silver.

Further confirmation of the fact that the report of several months ago that Mr. James Breen, who, like Mr. Bellinger, was, in the nineties, actively engaged in smelting ores from Rossland camp, B.C., had died in Montana, was incorrect, was given lately when Mr. Breen paid a visit to his old stamping ground in British Columbia.

Mr. Lorne A. Campbell, general manager of the West Kootenay Power and Light Co., and representative of Rossland electoral district in the Legislative Assembly of British Columbia, has been appointed chairman of the mining committee of that provincial legislature.

Mr. George E. Farish, of New York, son of Mr. John B. Farish, is now general manager for the Motherlode Sheep Creek Mining Co. (owned by Mr. John McMartin and associates) operating a gold mine and modern 10-stamp mill, with cyanide plant, at Sheep creek, Nelson mining division, British Columbia. The company milled about 13,500 tons of ore last year and recovered between 7,000 and 8,000 ozs. of gold, with which was about 3,000 ozs. of silver. It is stated that notwithstanding the difficulties of the earlier months of operation with a new plant, a substantial profit has been made, while reduced expenses and higher net returns in the early future are looked for.

Mr. Alexander Faulds, of Vancouver, B.C., a well-known coal mine manager, has been the subject of much adverse newspaper criticism. The grossly extravagant statements made in advertisements of companies having shares to sell, in several British Columbia newspapers during the last two years, deserved the prosecution of the "trustees" whose names appeared therein. Profuse extracts from what were alleged to be Mr. Faulds' reports were included in the advertisements, so as Mr. Faulds, so far as known, took no effective steps to stop this use of his name, it is not surprising that he is now being hauled over the coals.

Mr. J. A. Fraser, gold commissioner for Atlin mining division, British Columbia, has been spending a holiday at Victoria. Information published in the Journal of January 15, ulto., gave a review of the 1912 mining operations in that division.

Mr. F. August Heinze, of Butte, Montana, has again been in Victoria B.C., interviewing the Provincial Government. It is generally understood that Mr. Heinze is desirous of making some arrangement with the Government relative to a large area of lands in the province he holds, this being part of a land grant made years ago in aid of a railway building scheme Mr. Heinze promoted. For years it was a subject of much merriment to many of Mr. Heinze's friends that when he sought concessions in Victoria he found the Government and Legislature "quite easy." But it is somebody else's turn to laugh now, for the big area of land is subject to payment of provincial taxes.

Mr. E. Hibbert, whose intended early removal from the British Columbia Copper Co.'s Mother Lode mine, in Boundary district, B.C., to Sudbury, has already been announced, was, with others, given a "valedictory" at the Greenwood Club on January 28. The Greenwood "Ledge" says: "In a short time Messrs. W. C. H. Wilson, E. Hibbert, C. Charlton, and J. Applequist will leave for Sudbury, Ontario, where they have accepted positions with the Dominion Nickel Co., of which Mr. J. E. McAllister is manager." Mr. Frederic Keffer was in the chair at the farewell gathering, and among those who spoke was Mr. Oscar Lachmund, the recently-appointed general manager of the British Columbia Copper Co.

Mr. A. G. Larson, of Vancouver, B.C., left that province late in January on a visit to Los Angeles, California.

Mr. Thomas Kiddie, of Vancouver, B.C., was in San Francisco, California, last month.

Mr. Frank E. Pearce, formerly of Baker City, Oregon, has for several months been manager of the Inland Mining Co., Ltd., of Walla Walla, Washington, owning and operating the Inland Empire mine and stamp-mill, situated near Paulson, in the western part of Trail Creek mining division, British Columbia.

Mr. J. H. Tonkin, who some years ago was manager for the Crow's Nest Pass Coal Co., at Fernie, B.C., is stated to be the new manager of a company recently organized to take over a coal-mining enterprise already established on Vancouver Island, B.C.

Mr. Fred M. Wells has been supervising development of the mine on Princess Royal island of the Surf Inlet Gold Mines, Ltd., of Vancouver, B.C.

TECHNICAL LITERATURE

Ore Treatment at Republic, Wash.—An interesting paper on this subject was read by Mr. Francis A. Thomson, before the Spokane Section of the American Institute of Mining Engineers recently, and is printed in January issue of the Institute Bulletin. Mining in the Republic district has witnessed many vicissitudes, and it is somewhat surprising to learn that the production of the camp to date represents so considerable a value as 3,898,492. Between the years 1903 and 1909 activity practically ceased, but during the past three years, as a result largely of improved methods of treating ores, the industry has been re-vitalized. This treatment consists essentially of cyaniding by standard methods of fine grinding and filtration, a typical plant comprising a 5 by 22 foot tube mill, short Pachuca tanks, Oliver filter, and zinc shaving precipitation boxes. The prevailing ore of the camp is a fine grained, close textured, chalcedonic quartz, the values being entirely in gold and silver. The author states that unquestionably the ore can be satisfactorily treated on the ground for \$2 or less per ton if cheap electric power is available; and that all ore over \$5 in value can be handled at a profit. He is of the opinion that a very large tonnage of ore of this grade is available.

Dealing with Gob Fires in Natal Collieries.—The two methods of dealing with gob fires in Natal are described in a recently issued government report as follows: (1) By surrounding the affected area with substantial brick or stone stoppings so as to exclude access of fresh air, and afterwards leaving intact a double line of coal pillars to prevent any disturbance of the stoppings when pillar extraction has again commenced on the outside of the barrier. (2) Extracting the coal as rapidly as possible from the pillars in the area in front of the outbreak and letting down the roof with the idea of excluding air from the fire by the fallen goaf. This method involves some risk. Firstly, because the goaf does not fall evenly or close up completely on the extraction of the pillars, thus not with certainty excluding air from the fire; and secondly, if a section in which this method is employed is abandoned, the fire which has never been extinguished, will probably work its way to the front.

The Effect of Titanium on Cast Iron.—In a paper contributed to the transactions of the American Institute of Mining Engineers, Mr. B. Stoughton, after discussing the occurrence, physical and chemical properties, and production of titanium, describes tests and adduces evidence to indicate that the strength iron may be increased from 30 to 50 per cent. by the cautious addition of titanium. The desired results, however, can only be obtained by using suitable proportions of titanium, to incorporate it thoroughly with the molten metal, and to cast at the right temperature.

The Disposal of Tailings.—Mr. W. H. Storms recently read a paper before the California Miners' Association on the subject of the disposal of tailings, recommending the adoption of the method practiced on the Rand and elsewhere of storing in stopes. He describes the practice in this respect in Silesia, in West Australia and on the Rand. It goes without saying, he remarks, that all of the tailings resulting from milling a given block of ore cannot be replaced in the mine in the stope from which the ore originally came, since a cubic foot of solid quartz weighs 165 pounds, and a cubic foot of sand about 106 to 110 pounds. Nearly every mine, however, has open workings into which the remaining one-third of the tailings could be stored.

Mica and the Electrical Industry.—In an article in *Cassier's Magazine* on the Occurrence, Production and Uses of Mica, Mr. J. F. Springer remarks that sheet mica is chiefly consumed in the electrical industry. Here it is employed for insulation purposes. In the commutators of direct current motors and in dynamos where strips of copper and mica are arranged to alternate, it is important that both the copper and the mica shall wear at about the same rate. For this particular service the mica produced in the United States is less suitable than that originating elsewhere. Canadian mica or phlogopite, has about the same degree of hardness as copper, and hence is eminently suitable for electrical purposes.

Graphite as a Lubricant.—Lubrication is one of the most important uses of graphite, the addition of which to oil results in a lower frictional resistance than would be obtained by the use of oil alone. The quantity of oil required for a given service is also reduced and a lighter grade of oil or one of inferior quality may be employed without decreasing the quality of the lubrication. A small quantity of graphite only is required, and the benefits derived from its use persist long after the application has ceased. Both the amorphous and the crystalline varieties of natural graphite are extensively employed for lubrication. The artificial graphite manufactured at Niagara Falls is also largely utilized in this way, and the Acheson Company has secured a product termed "deflocculated graphite" which, it is claimed, shows little or no tendency to sink when mixed with oil or water, and when suspended in water will pass through the finest filter paper made. The suspension is obtained by adding small quantities of gallo-tannic acid and other substances to the medium carrying the graphite. Some attempt has been made to utilize a mixture of graphite and water for lubrication purposes. Such a mixture, although perhaps less likely to produce rust than water alone, is not a rust preventative and is not safe for steel bearings as is a mixture of oil and graphite.

A Mine Telephone System.—Referring to the reported adoption by the municipal authorities of Berlin of the device known as the pocket telephone, which is being used largely as an adjunct to the police system, the Australian Mining Standard suggests that this instrument might advantageously be introduced in mines, where it would serve obviously many useful purposes. In Berlin, every street contains, at short distances from one another, contact devices attached to walls, to trees and to lamp posts. In the busy portion of the city there are as many as two or three of these contact to every block. The pocket telephone is so small that it may be carried comfortably in the pocket, and its weight is only 7 ounces.

The Rainy Hollow Copper Mining District.—Under the title, "A New Copper District," Mr. J. W. Bryant describes in the Mining Magazine for December, a new mineral region about to be made accessible by railway building, from Haines, on Lynn Canal, into the interior

of Yukon and Alaska. The proposed railway will tap, among others, the Rainy Hollow mineral district, in British Columbia, and the Kluane and White River copper districts. The first has already attracted the attention of capital. Bornite carrying silver and gold occurs in the form of flat deposits conformable to the surrounding strata in a gangue of limestone and garnetite. There are also outcrops of galena and blende. Pyrrhotite containing small quantities of chalcopyrite occurs alongside of silicious dikes, traceable for long distances. Galena and zinc blende occur in another series of veins known as the "Custer F." At the north-eastern end of the mineral belt are large deposits of magnetite containing chalcopyrite, in limestone near its contact with granite. Two trial shipments of ore have been made to smelters, the returns from those showing copper values of 25.36 per cent. and 32.17 per cent., and silver values of 55.67 oz. and 42.73 oz. per ton. Mr. Bryant is of the opinion that the outlook in this district is encouraging.

SPECIAL CORRESPONDENCE

ONTARIO

COBALT, SOUTH LORRAIN, ELK LAKE, AND GOWGANDA.

THE ELK LAKE RAILWAY.

With the arrival of the first train into Elk Lake that silver camp has all the transportation advantages of the steel rail and lack of results can no longer be attributed to expensive freight charges and lack of facilities. The opening up of the Donaldson claim by the Beaver Consolidated Mining Company of Cobalt has given new life and hope to the camp. The Donaldson was one of the group of claims to the north-west of Elk Lake including the Regal, the Big Six, the Mother Lode. It was not as far as surface indications went much their superior and the vein was narrow until the hundred foot level was reached. At this point a massive smaltite vein three to four inches wide containing high grade silver vales was cut and followed down on a slight incline for 42 feet, when work was abandoned until machinery could be installed. At this juncture the Beaver bought control and at once saw that the old shaft could not be used for extensive operations. A new shaft was commenced some 400 feet away, but progress was slow, the laying of the foundations for the new plant occupying much of the time of the little force. However, the shaft is down to the point where cross-cutting will commence, all the foundations are in and one car of machinery has been delivered over the new road. The other car is at Earlton and work should be started on a larger scale in a few weeks. The Donaldson vein resembles very strongly the high grade veins of the conglomerate formation in Cobalt, but it is the only lead to date in the Elk Lake camp that has their characteristics. It must be remembered that save for two or three meritorious exceptions the money that has been expended in Elk Lake prospects has not been spent wisely, and this may have something to do with comparative lack of results.

Other properties working in the camp are the Sterling. This is the old Haentschell claims on Boland Lake ten miles from Elk Lake. There was a good surface discovery, but underground operations have not developed any great strength in the vein.

The Fleur de Lys is a Montreal company of which Mr. J. H. Macduff is president. This is the old Silver Bell property. There was a narrow vein containing leaf silver on the surface, but it is not strong in the shaft, though the wall rock is occasionally enriched with leaf silver.

The Moosehorn has recently struck a strong vein of niccolite and Cobalt at the 150-foot level. The Moosehorn has some promising veins and has developed the property along sane lines; but so far silver values have been light.

The Beacon Consolidated, a Boston company, and the Mackenzie syndicate have two prospects working to the south-west of Elk Lake with varying success. The Regal is crosscutting from the 200-foot level in the hope of picking up the Donaldson vein.

These are all the companies at present operating, but with costs materially lowered by the advent of the railway, quite a number of others are sure to try their luck again in the spring. If optimism and persistence can carry a camp to success there is no doubt of the future of Elk Lake.

The last spike had not been driven in the Elk Lake road many hours before the agitation commenced to continue the road through to Gowganda. That camp has been the producer of the Montreal River section and certainly needs the steel rails much more sorely than Elk Lake. The two or three producers of the camp are getting near the end of their fuel resources. The Miller Lake O'Brien is now cutting and hauling for a mile and a half and upwards from their camp at a cost of \$3.50 to \$3.75 a cord, and it will soon be not a question of getting it at any reasonable or unreasonable price but of getting it at all. The companies that have been operating for any length of time and upon any scale have long ago exhausted their fuel resources and have had to resort to staking adjoining forties. This has now been exhausted and claims that have been staked and patented have been reached. The only solution of the situation is coal, and to haul coal at a reasonable price there must be a railway. This is one of the arguments the advocates of the Gowganda railway are putting forward. Three properties in Gowganda are doing well. The Mann on the west ridge is

now making rapid gains. Below the first level the vein has been stoped for a distance of forty feet, and it was remarkably rich. Going down to the second level the values are also holding well. The Miller Lake O'Brien is now sinking from the 300 to the 350-foot level and here again there appears to be no danger of the values failing. The Miller Lake O'Brien has now concluded negotiations for the purchase of the Millerett and in the spring when they need it they will have the advantage of the Millerett mill. But if the fuel question is not solved soon there will be a critical situation. The Powerful Mining Company near Calcite Lake struck a thirty-foot shoot of high grade ore and it is the best prospect in the camp apart from the two main producers. The Mann purchased the old Boyd Gordon for \$8,000, and they have already taken more than that amount of ore out of the latter's territory where their ore body extended over the line.

CITY OF COBALT AT PEACE.

The annual meeting of the City of Cobalt ended in the pacification of the opposition and a unanimous return of the old officers to power. The meeting was preceded by the long delayed announcement in regard to the royalty reduction, it now being stated that it will be on a 5 per cent. net basis. The only alteration in the directorate is in the replacing of H. H. Lang by J. H. Black. The financial statement showed that the company had reduced their indebtedness by one thousand dollars, or from \$13,000 to \$12,000. The proposal to increase the capitalization of the company was dropped, but by laws authorizing the sale of the property, (presumably to an English company), and the erection of a mill were passed.

Mr. James McVichie, the mine manager, in his statement gave the total production for the year at 287.72 tons, containing 234,802 ounces. The total tonnage of ore in sight is placed at 36,554, and it is estimated to contain 1,269,662 ounces worth at current prices \$761,707. At the beginning of the year the ore reserves only amounted to 7,266 tons, a remarkable increase.

McKINLEY-DARRAGH.

A very interesting development at the McKinley-Darragh is the discovery of what has the appearance of a definite ore body along the Cobalt Lake fault. In the Keewatin side of the fault there is found stringers of argentite, much leaf silver, and argentiferous galena in addition to silver sulphides not visible before concentrating. Rock that showed no silver at all assayed 34 ounces to the ton. This find is but confirmatory of the results now being obtained by the Cobalt Lake, but the importance of the new development lies in the fact that the fault runs right through the Princess on the north through the McKinley-Darragh down the lake, through the Right of Way and the La Rose, and opens up possibilities of low grade ore bodies of considerable extent.

During the month of January the McKinley-Darragh produced but 180,000 ounces. This was due very largely to the fact that much high grade ore is being piled up at the Savage instead of minning it through the rock house and adding to the already enormous dump of jig tailings already capable of keeping the Savage extension of the McKinley mill in ore for three years. Work on the extension is proceeding rather slowly owing to the large amount of rock excavation necessary, but ore should be passing over the aerial tramway from the Savage in April at latest. The extension will raise the

capacity of the mill to 240 tons per day, the largest in Cobalt, excluding the Northern Customs plant.

QUICK WORK.

The record time after the reduction of the royalty has been made known to the Cobalt Aladdin, the English Syndicate, operating the old Silver Queen under lease the control of the Chambers Ferland was sold. Within two weeks after negotiations were opened 1,200,000 shares were turned over to the English Syndicate upon payment of about \$480,000 in cash. Most of the stock was purchased privately from David Fasken, Arthur Ferland, W. C. Chambers, R. A. Galbraith, and W. B. Russell. Already it is announced that a good strike has been made at the 200-foot level and no doubt further good news will be liberated for shareholders. The City of Cobalt is also obtaining better results since the reduction of the royalty was definitely stated.

PORCUPINE, SWASTIKA AND KIRKLAND LAKE

BOOM DISTRICTS.

Interests in time two new districts, Hurricanaw and Kirkland, continues to increase. Though Kirkland Lake is but five or six miles from Swastika, the ore deposits there appear to be quite different in character from the older gold camp, and the phenomenally rich ore at the Foster Tough claims has excited more interest in prospectors than anything since Porcupine was staked solid. Good reports are also beginning to filter through of the gold region of Hurricanaw in Quebec. The excitement here is about 130 miles east of Cochrane, and thirty or forty miles south of the Transcontinental railway. The camp can be reached in summer with the greatest of ease by the Hurricanaw River and a string of lakes. At present some very pretty gold ore is being shown from various claims.

DOMELAKE FIND.

At the 180-foot level of the Dome Lake mine the vein has now been definitely located. It is thirty inches wide of ore that will average \$32 to the ton. The mill building has been completed and so have the foundations, but the machinery has not yet arrived though it has been shipped for some time. The controlling interests in the company have reduced the capitalization by two million dollars, the capital of the company now being \$500,000 instead of \$2,500,000.

HOLLINGER FEELS THE STRIKE.

According to the statement of Mr. P. A. Robbins mailed with the fourth dividend of the Hollinger mine, the output of the Hollinger was lowered 20 per cent. by the strike which was declared on November 15. According to the figures published at the outbreak of the strike ore to the value of 26.21 cents per ton was being mined. For the week ending November 23rd the per ton value fell to \$18, while the total production for the seven days amounted to only \$18,000. The lowest week was that ending Dec. 21, when the production was but \$10,816. On Jan. 21 the period which the report closes at, the production had gone back to \$41,000, or within ten thousand dollars of the normal weekly output of the mine.

WORK AT THE SCHUMACHER.

Mr. Joe Houston who is now in charge of the Schumacher, at Schumacher, is going to diamond drill some parts of the property before he commences underground operations in earnest. Mr. Houston has been put in charge with the instruction to do everything

that he thinks best to make a mine of this interesting prospect at the earliest possible date.

BRITISH COLUMBIA

The amounts and sources of the gold bullion received at the Dominion of Canada Assay Office, Vancouver, during the calendar year 1912 were as follows: From British Columbia, 50,198 troy ounces, net value, \$831,803; Yukon Territory, 2,212 ounces, value, \$36,481; Alaska, 6,659 ounces, value, \$105,793; total, 59,069 ounces, net value, \$974,077. For the calendar year 1911, the figures were: From British Columbia, 32,176 troy ounces, net value, \$525,747; Yukon Territory, 2,074 ounces, value \$34,994; Alaska, 5,535 ounces, value \$86,675; total, 39,785 ounces, net value, \$647,416.

It is expected that in future there will be much more gold bullion received at the above mentioned Dominion Assay Office, for the reason that the Federal Government quite recently authorized the abolition of a charge heretofore made of one-eighth of one per cent. on the gross value of deposits, which charge was in excess of the cost of having gold melted at the Mint at Ottawa or the United States Mint at San Francisco, California. Mr. G. Middleton, manager of the Dominion Assay Office at Vancouver, in his official report for 1911 to the Director of Mines, Ottawa, made full representations concerning the unfavourable effects of this charge. He wrote, in part: "The United States Government has recognized the above mentioned principle" (namely, that where the gold is sold there also is purchased a large part of the supplies for the mining districts from which that gold comes), "and has established assay offices and mints in the gold-producing states, so that the gold can be marketed in the region where it is obtained, and unless the same course is followed in Canada the greater part of the output of our gold mines will continue to be marketed in a foreign country. The State of Washington is not a gold-producing state, but when gold was discovered in Yukon Territory the United States Government, recognizing what it meant in trade, established an assay office at Seattle, for the purchase of gold. That city, consequently, secured the trade that accompanied the marketing of the gold; it being a recognized fact that it was the trade accompanying the marketing of the output of the Yukon gold mines that built up Seattle. The charges imposed at our Vancouver office are now the same as those in force at the Seattle Assay Office, but the charges at the Ottawa and San Francisco Mints are one-eighth of one per cent. on the gross value of the bullion deposited less at these latter offices than at this office. The result is that the Yukon gold is marketed at the two latter mentioned institutions, the transportation charges on gold bullion from Dawson to Ottawa or San Francisco by registered mail being the same as to Vancouver." In submitting to the Dominion Minister of Mines the memorandum of the manager of the Vancouver Assay Office, the Director of Mines (Dr. Eugene Haanel) wrote: "This memorandum deals also with the utility of the Assay Office, and the desirability of shipping the gold purchased at the same to the Mint at Ottawa instead of selling it, as has been our practice, to the United States Assay Office at Seattle or the Mint at San Francisco. In view of the facts presented by the manager, and those ascertained by myself and reported in my 'Summer Report' for 1910, page 20, I strongly recommend that, as regards charges, the Assay Office at Vancouver be placed in the same position for the purchase of gold as the United States Mint and the Mint at Ottawa, by

abolishing the one-eighth of one per cent. on the gross value of the deposit. This charge was adopted to defray, in part, the expenses and maintenance of the Assay Office. I further recommend that gold hereafter purchased at our Assay Office, Vancouver, B.C., be sent to our own Mint at Ottawa, and that advantage be taken of the present system of shipping the gold from Vancouver to Ottawa by registered mail."

Having after an unreasonably long delay obtained a concession that should have been made several years ago, it will now be well for the Vancouver Board of Trade and others interested in the commercial interests of that city to press for the abolition of the discrimination against Cariboo district, to which the Post Office Department has persistently denied a similar privilege of sending gold by registered mail. It is an astonishing fact that the Department permits gold to be sent by registered mail from Dawson, Yukon, but has all along refused a like advantage to Cariboo. There should be a determined effort made to ascertain whether or not there is sufficient reason for the continued withholding of this privilege from a part of British Columbia situated much nearer to Vancouver than Yukon Territory, and whether it be the stubbornness of officials or the financial interests of the Express Company, the "nigger" should be smoked out of "the woodpile," and the Cariboo miners be placed on an equal footing with those of Yukon Territory.

Misleading Press Notices.

Provincial newspapers have lately published a press despatch from Nelson under the caption "Nelson Leads Mineral Exports to United States." While it is characteristic of a correspondent or of correspondents sending information out from Nelson to make it appear that Nelson district is especially important as regards its mining, it is well that the public be told the simple truth. Now it happens that a United States consular agent has his office in Nelson and, it would seem, to suit its own convenience the United States Department with which he is connected styles the district under his official jurisdiction the "Nelson United States Consular District." This simple accident gives the Nelson correspondent or correspondents an excuse for greatly exaggerating the value of the exports of what is officially known in British Columbia as the Nelson district. An examination of the figures relating to mineral exports and an enquiry as to the sources of production will at once show the hollowness of the claim that "Nelson Leads," etc. These figures include the following: For blister copper, \$7,048,966; copper matte, \$2,636,794; gold concentrates, \$620,038; silver bullion, \$427,987; zinc concentrates and zinc ore, \$237,434; gold bullion, \$134,738; coal, \$3,746; and comparatively small sums for non-mineral exports. Now this gives a total of nearly \$11,110,000 out of the \$11,186,776 claimed for Nelson district. The total annual value of the mineral production of Nelson mining division during ten years, 1902-1911 (1912 official figures are not yet available) varied from a minimum of \$462,836 in 1908 to a maximum of \$876,002 in 1910. Even allowing a value of \$1,000,000 for 1912, there remains about \$10,000,000 of the value of minerals that is not fairly to the credit of Nelson district, as that district is commonly known to the public at large. Silver and zinc from Ainsworth and Slocan divisions; all the gold, silver, and copper from Rossland mines; all the gold, silver, and copper from the big mines of Boundary district—much of which was probably at no time any where near even the farthest boundary of Nelson mining division; all these, which together reach a total value about ten

times that of Nelson mining division, have been included, so as to bolster up the fiction that "Nelson leads in mineral exports to the United States." Small wonder that the other mining divisions and districts affected assert that Nelson is "hoggish."

NOVA SCOTIA

Dominion Coal Outputs.—The Glace Bay mines of the Dominion Coal Company began the new year with a gain for the month of January of 100,000 tons over the previous January. The output was approximately 380,000 tons. The weather was unusually favourable for outdoor work, and banking operations were not hindered by snowstorms. Shipping was continued throughout the whole month both at Sydney and Louisburg. The month had by far the largest shipments ever made in January. No. 16 Colliery exceeded 1,000 tons per day on several occasions, and No. 21 Colliery is now averaging nearly 600 tons daily. No. 10 Colliery obtained 1,000 tons in one day, for the first time in the life of the mine.

Active preparations are being made to re-open the Emery seam at No. 3 Colliery, and pumping has continued throughout the month from the workings of No. 17 Colliery (Old Victoria mine).

The Springhill mines produced about 30,000 tons, which is less than January of last year, but is a very good output, in view of the hindrances caused by the fire which occurred in No. 2 slope on Christmas Eve. The fire area has been opened up and no signs of heat were found. Both slopes are now producing their normal output, and no loss will have been occasioned by the fire beyond the reduction in output in the first half of January.

UNITED STATES' CONSUL'S REPORT

United States Consul, G. C. Cole, stationed at Dawson City, has reported as follows:

Statistics for 1911, the last year for which official data are available, show the Yukon gold production that year to have been \$4,024,246, or \$57,365 less than in the previous year. Of the 1911 production, Mr. Cole says, \$3,173,360 was exported to the United States, leaving a balance of \$850,886, which was shipped to the Canadian Mint at Ottawa, with the exception of about \$25,000, which was utilized in the manufacture of domestic jewellery.

Mr. Cole does not think 1912 reports, yet to be issued, will show any great reduction from the 1911 field, but that the present average production will continue for some years to come unless the present mining companies increase their capacity or other companies install mining plants.

"The individual mining process — the rocker and sluice box," Mr. Cole asserts, "has been almost entirely superseded in this district by the dredge and hydraulic process. While the Yukon Gold Company is the principal producer, yet the Canadian Klondike Mining Company has produced a fair share of the gold. This company in 1912 added two more dredges to the two it already had in use. They were built by the Marion Steam Shovel Company, of Marion, Ohio. This company now has three of the largest dredges in the world, with a daily capacity of 10,000 cubic yards each.

United States Imports Diminishing.

"The Granville Power Company is preparing to install a large hydraulic plant for working the benches and higher ground which cannot be worked by the dredge.

"The prospect for quartz is quite promising in many parts of the Territory. In some of the ledges the ore is very rich and a number of stamp mills are now in operation for the purpose of making a thorough test both as to quality and quantity.

"The copper mines around White Horse, in the south end of the Territory, are now being worked extensively, and large quantities of ore are shipped daily to the smelter at Tacoma, Wash.

"Coal is mined in considerable quantities along the Yukon river for domestic use and for the river steamers.

"The imports into this Territory from the United States are diminishing rapidly, owing to the high customs duties and the fact that Canada is now prepared to supply the wants of the Territory in almost everything except machinery.

"There were no exports to Porto Rico, Hawaii, or the Philippines during the calendar year 1911."

Auto Line to Dawson.

Mr. Cole says that an automobile line from White Horse to Dawson, to be operated by a new stage company, is quite probable.

"The White Pass and Yukon route," he explains, "has used a stage line for many years during the closed season of navigation, which lasts for about eight months in the year, to convey mails, passengers, express, and freight between these two points. Wagons are used for a few weeks after navigation closes and also before it opens, but for the rest of the time, about six months, sleds are used. The distance overland is 330 miles. During the past summer the road was greatly improved at a great expense to the Government, by cutting down grades and making it wider, so any gauged vehicle could be used on it, and the sleds now used are of the same gauge as automobiles. The grades are now even, and none of them is so steep but that automobiles can climb them with heavy loads.

"During the past summer automobiles were used on the road from White Horse to Carmacks, half the distance to Dawson, making the trip in ten hours. Because of the recent improvements the north end of the road is more suitable for automobiles than the south end.

"The White Pass Company receives \$80,000 a year for conveying mails over its lines to Dawson. Its passenger rates by stage from White Horse to Dawson (one way) vary from \$75 to \$125, which includes twenty-five pounds of baggage. Its express rates are 25 cents a pound, and freight rates 20 cents a pound. The time occupied in making the trip is five to ten days for passenger stages, but a longer time for freight stages.

"The new company proposes to run automobiles all the year over this route and to make the trip from White Horse to Dawson in one day during the summer and in two days during the winter. It will also have a line of steamers on the river during the summer.

"It has been thoroughly demonstrated here that automobiles can be used in a temperature as low as 70 degrees below zero, and Dawson has now four automobiles which are being used at all seasons of the year. This section of the Yukon will be greatly benefited by this new enterprise, as quick transportation at all seasons of the year will be afforded, and hundreds of business people will thereby be induced to come here for

investments, as well as hundreds of others for pleasure."

COMPANY NOTES

DOMINION STEEL EQUIPMENT.

The first of the Dominion Steel Company's new 500 ton mixers was brought into operation on the 19th of January. It is being used as a preliminary working furnace with a charge of 300 tons of pig iron.

The work done has so far been excellent. The second furnace is being lined and if the experience of the first week is any criterion these mixers, or rather large preliminary furnaces will materially help the production of steel as to quantity and give a more uniform product, all tending to economy in costs and to a larger percentage of yield in the finishing mills.

WETTLAUFER-LORRAIN REPORT.

The Wettlaufer-Lorrain Silver Mines, Limited, report for the year ended December 31, shows:

| | |
|----------------------------|-----------|
| Profits | \$320,248 |
| Dividends | 238,318 |
| Surplus | 36,930 |
| Previous surplus | 222,810 |
| Total surplus | 259,741 |

The general balance sheet as of December 31 last shows total assets and liabilities of \$1,703,152.

WETTLAUFER'S NEW BOARD.

The new directors of the Wettlaufer Mining Company are D. M. Steindler, P. G. Scheffer and W. H. Clapsham, succeeding David H. Fasken, J. D. McGee, and Ferd. Hellman. The last named was the company's mining engineer.

CITY OF COBALT DEFICIT.

The City of Cobalt Mining Company has issued a statement for 15 months ended December 31, 1912. Revenue, including rentals and bank interest, amounted to \$155,265.81; while expenditure was \$153,991.67. The debit brought forward from September 30, 1911, was \$13,927.67, so that the company shows at December 31, 1912, a debit balance of \$12,653.53.

TEMISKAMING BOARD.

At the annual meeting of the Temiskaming Mine Company, directors were re-elected as follows: President, Burr E. Cartwright; R. A. Cartwright, E. C. Whitbeck, Wallace Thaver, J. L. Wheeler and Alex. Fasken.

McKINLEY-DARRAGH-SAVAGE.

Application will be made to the Ontario Legislature by the McKinley-Darragh-Savage Mines of Cobalt, Limited, for an act to authorize the directors to declare and pay dividends to the shareholders out of the company's funds and also to repay on account of capital such amounts as they may determine, notwithstanding that the value of the net assets may be less than the par value of the issued capital stock.

COBALT LAKE ENGLISH COMPANY

Under the title of the Cobalt Lake Silver Mining Company, Ltd., a company was registered in London on

the 21st of January with a capital of £300,000 in £1 shares to carry on the business of silver and general miners, prospectors, explorers, metallurgists, etc., and to acquire and deal with any mines, mining rights and metalliferous lands in Canada or elsewhere.

MILLERETT TRANSFERRED.

The Millerett mine, in Gowganda, which was closed some time ago, has been purchased outright by the Miller Lake O'Brien Mine, which adjoins it. The consideration is not announced. The Millerett property will be now merged with and operated as a part of the Miller Lake O'Brien, which is owned by M. J. O'Brien, who also owns the O'Brien mine in Cobalt.

STATISTICS AND RETURNS

COBALT ORE SHIPMENTS.

The principal event of the week ended February 1st has been the record bullion shipment sent out in one day by the Nipissing and the Buffalo mines. Both these mines are now equipped with refineries for melting down their concentrates to bullion.

The shipments for the week ending January 31 were:

| | High. | Low. | Tons. |
|----------------------------|-------|------|-------|
| Hudson Bay | 2 | .. | 62.05 |
| McKinley-Darragh | 1 | .. | 42.75 |
| La Rose | 1 | .. | 32.00 |
| Chambers-Ferland | .. | 1 | 31.20 |
| Cobalt Townsite | 1 | .. | 41.00 |

Total 209.00

Bullion Shipments.

| | Ounces. | Value. |
|---------------------|------------|--------------|
| Nipissing | 157,882.00 | \$98,084.32 |
| Buffalo | 58,488.00 | \$36,600.00 |
| Total | 216,370.00 | \$134,684.32 |

BRITISH COLUMBIA ORE SHIPMENTS.

Week Ending January 25.

Nine hundred and ninety-nine tons of ore, probably the heaviest shipment in the history of the property, was sent from the Queen Victoria mine, near Nelson, last week by the British Columbia Copper Company to its smelter at Greenwood. The Molly Gibson, near Nelson, where the tramway was recently damaged by a snowslide, returned to the shipping list with 34 tons of ore sent to Trail smelter.

Ore production in the Kootenay and Boundary districts for the week ending January 25th was 47,602 tons and for the year to date 170,073 tons. Smelter receipts for the week were 40,912 tons and for the year to date 143,813 tons.

Ore production and smelter receipts in detail were:

Rossland.

| | | |
|---------------------------------|-------|--------|
| Inland Empire, milled | 90 | 360 |
| Centre Star | 2,540 | 11,135 |
| Le Roi | 1,149 | 4,582 |
| Le Roi No. 2 | 116 | 1,436 |
| Le Roi No. 2, milled | 350 | 1,400 |
| Le Roi-Elsmore | 3 | 3 |
| Other mines | .. | 46 |
| Total | 4,248 | 18,962 |

| East Kootenay. | | |
|------------------------|------------|--------------|
| Sullivan | 458 | 2,935 |
| Other mines | ... | 91 |
| Total | 458 | 3,026 |

| Nelson. | | |
|---------------------------------|--------------|--------------|
| Queen Victoria | 999 | 2,057 |
| Yankee Girl | 193 | 445 |
| Granite-Poorman, milled . . . | 250 | 1,000 |
| Mother Lode, Milled | 500 | 1,500 |
| Queen, milled | 400 | 1,600 |
| Second Relief, milled | 200 | 800 |
| Hudson Bay | 225 | 681 |
| Molly Gibson | 34 | 48 |
| Queen | 36 | 73 |
| Other mines | ... | 144 |
| Total | 2,837 | 8,348 |

| Lardeau. | | |
|-----------------------|-----|----|
| Other mines | ... | 65 |

| Slocan and Ainsworth. | | |
|-------------------------------|--------------|---------------|
| Standard | 384 | 1,066 |
| Bluebell | 191 | 695 |
| Standard, milled | 500 | 2,000 |
| Bluebell, milled | 1,200 | 4,800 |
| Van Roi | 32 | 95 |
| Utica | 20 | 62 |
| Van Roi, milled | 1,100 | 4,400 |
| Kilo, milled | 100 | 400 |
| Rambler-Cariboo, milled . . . | 300 | 1,200 |
| Other mines | ... | 488 |
| Total | 3,827 | 15,206 |

| Boundary. | | |
|--------------------------------|---------------|----------------|
| Granby | 22,947 | 66,283 |
| Mother Lode | 5,474 | 26,837 |
| Rawhide | 4,738 | 20,156 |
| Napoleon | 965 | 2,826 |
| Jewel, milled | 200 | 800 |
| Unnamed | 56 | 369 |
| Nickle Plate, milled | 1,500 | 6,000 |
| Knob Hill | 53 | 301 |
| Ben Hur | 85 | 234 |
| Snowstorm | 116 | 398 |
| United Copper | 98 | 227 |
| Other mines | ... | 35 |
| Total | 36,232 | 124,466 |

Consolidated Company's Receipts.

| Trail, B.C. | | |
|--------------------------|-------|--------|
| Centre Star | 2,540 | 11,135 |
| Le Roi | 1,149 | 4,582 |
| Le Roi No. 2 | 116 | 1,436 |
| Le Roi-Elsmore | 3 | 3 |
| Sullivan | 458 | 2,935 |
| Yankee Girl | 193 | 445 |
| Hudson Bay | 225 | 681 |
| Molly Gibson | 34 | 48 |
| Queen | 36 | 73 |
| Standard | 384 | 1,066 |
| Bluebell | 191 | 695 |
| Van Roi | 32 | 95 |
| Utica | 20 | 62 |
| Knob Hill | 53 | 301 |
| Ben Hur | 85 | 234 |
| Snowstorm | 116 | 398 |

| | | |
|-------------------------|--------------|---------------|
| United Copper | 98 | 227 |
| Other mines | ... | 869 |
| Total | 5,733 | 25,285 |

Granby Smelter Receipts.

| Grand Forks, B.C. | | |
|-------------------|--------|--------|
| Granby | 22,947 | 66,283 |

British Columbia Copper Company's Receipts.

| Greenwood, B.C. | | |
|--------------------------|---------------|---------------|
| Mother Lode | 5,474 | 26,837 |
| Rawhide | 4,738 | 20,156 |
| Napoleon | 965 | 2,826 |
| Queen Victoria | 999 | 2,057 |
| Unnamed | 56 | 369 |
| Total | 12,232 | 52,245 |

TORONTO MARKETS.

Feb. 11.—(Quotations from Canada Metal Co., Toronto).

- Spelter, 6.25 cents per pound.
- Lead, 4.85 cents per pound.
- Antimony, 52 cents per pound.
- Tin, 11 cents per pound.
- Copper, casting, 17¼ cents per pound.
- Electrolytic, 17¼ cents per pound.
- Ingot brass, 11 to 15 cents per pound.

GENERAL MARKETS.

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

Coke.

- Feb. 7—Connellsville Coke (f.o.b. ovens).
- Furnace coke, prompt, \$2.75 to \$3.00 per ton.
- Foundry coke, prompt, \$3.74 to \$4.00 per ton.

Feb. 7—Tin, Straits, 49.50 cents.

- Copper, Prime Lake, 15.87½ cents.
- Electrolytic copper, 15.75 cents.
- Copper wire, 17.50 cents.
- Lead, 4.35 cents.
- Spelter, 6.55 cents.
- Sheet zinc (f.o.b. smelter), 8.75 cents.
- Antimony, Cookson's, 9.35 cents.
- Aluminium, 26 to 26.25 cents.
- Nickel, 40 to 45 cents.
- Platinum, ordinary, \$46 per ounce.
- Platinum, hard, \$51 per ounce.
- Bismuth, \$2.00 to \$2.25 per lb.
- Quicksilver, \$40 per 75-lb. flask.

SILVER PRICES.

| | New York cents. | London pence. |
|-------------------|-----------------|---------------|
| Jan. 22 | 62¾ | 28⅞ |
| " 23 | 62⅝ | 28⅞ |
| " 24 | 62½ | 28¾ |
| " 25 | 62¼ | 28⅝ |
| " 27 | 62½ | 28⅝ |
| " 28 | 61½ | 28⅝ |
| " 29 | 61½ | 28⅝ |
| " 30 | 62 | 28½ |
| " 31 | 61⅞ | 28½ |
| Feb. 1 | 61⅞ | 28½ |
| " 3 | 62 | 28⅞ |
| " 4 | 62⅝ | 28⅞ |
| " 5 | 62⅝ | 28⅞ |
| " 6 | 62½ | 28¾ |
| " 7 | 62⅝ | 28⅞ |