

THE CANADIAN MINING JOURNAL

VOL. XXXIII.

TORONTO, Feb. 1, 1912.

No. 3

The Canadian Mining Journal

With which is incorporated the
"CANADIAN MINING REVIEW"

Devoted to Mining, Metallurgy and Allied Industries in Canada.

Published fortnightly by the

MINES PUBLISHING CO., LIMITED

Head Office - - - - - 17-21 Manning Arcade Annex, Toronto

Branch Office - - - - - Montreal, 425 Coristine Building

London Office - - - - - Walter R. Skinner, 11-12 Clement's Lane
London, E.C.

U. S. A. Office - Ward & Smith, 931 Tribune Building, New York

Editor

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

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

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

CIRCULATION.

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

CONTENTS.

	Page
Editorials	73
(a) The Bounty	73
(b) The Consulting Engineer	74
(c) Coal Mining in Alberta During 1910	75
(d) Metallurgy at the University of Toronto	76
(e) The Ottawa Meeting of the Canadian Mining Institute	76
(f) The Chibougamau Report	77
(g) The Muckraker	78
(h) Editorial Notes	78
Correspondence	78
The Bellevue Mine Disaster	79
Metallurgy in British Columbia in 1911, by E. Jacobs.	82
The New Professor of Metallurgy at the University of Toronto	91
Personal and General	91
The Petrology Department, by G. S. Scott	92
Annual Report of the Coal Mines Branch, Alberta	93
Mine Examinations, Province of Alberta	100
The Late Mr. John B. Hobson	102
Special Correspondence	104

THE BOUNTY.

The bounty on Canadian iron and steel production has come once again into the realm of practical politics. So often has the vexed question of subsidizing the iron industry been argued that there is little profit in attempting to state both sides of the case. It may not be inappropriate, however, to glance rapidly over the arguments advanced by those who seek a renewal of the bounty.

At the time of the general revision of the tariff in 1897, the total protection, bounties and duties combined, amounted to \$4.50 per ton on pig iron, and \$7 to \$8 per ton on steel billets.

The position after the cessation of bounties, in December, 1910, left preferential duties of \$1.50 per ton on pig iron and billets, and a general duty of \$2.50 on both commodities. On the general market value of pig iron and billets, roughly \$15 and \$22 respectively, the preferential tariff affords a marginal protection of 10 per cent. and 7 per cent. Thus the help directly and indirectly vouchsafed the industry is now only about one-third of what it was. It is claimed by the advocates of the bounty that the growth of pig iron outputs from less than one hundred thousand tons in 1900, to about three-quarters of a million tons in 1910, was due entirely to the stimulus of the bounty, as was the correspondingly larger growth of the steel industry.

In defining the present position of the industry, the iron manufacturers state that before 1910 the duties and bounties enabled them to retain the Canadian trade in the face of foreign competition. Now, however, an inadequate tariff is the only safeguard. The situation is rendered acute by the depressed condition of the foreign trade. Large installations are under way, but it is now practically impossible to hold the Canadian trade.

It is stated emphatically that there was a definite understanding with the late government that when the bounties were withdrawn the duties would be re-adjusted. This has not been done, and the Canadian ironmaster considers that here he has a palpable grievance.

Specific complaints are not wanting. The manufacturers of such commercial products as agricultural implements, springs, axles, tools, windmills, etc., get practically free iron and steel, and, on the other hand are granted certain exemptions on the finished products that militate ultimately against the Canadian

pig iron producer. Again, the low rates of duty on the larger sizes and sections of rolled steel shut out the Canadian mills from a large part of the field. Further, Canada is able now to supply less than one-half of the 200,000 tons of wire rods and wire products consumed within her boundaries.

The trade of Canada is growing rapidly. During the fiscal year ending March 31st, 1911, Canadian imports of certain steel and pig iron articles were valued at \$18,482,683. This is a sum almost equal to the entire production of Canadian plants. It is set forth that this implies the payment by Canadian consumers of about \$12,000,000 in wages to foreign workmen. This money, spent in employing Canadian workmen, in Canadian industries, would build up several industrial centres.

There is little virtue, apparently, in the "dumping" clause. A rigid tariff is required to prevent the wholesale demoralization of our markets when trade is depressed in the United States.

In short, the captains of the Canadian iron and steel industries believe strongly the establishment of those industries in an unassailable position is essential to the welfare of the country. They recognize that radical changes in the tariff will be the only final remedy. Meanwhile, until the Tariff Commission will have looked into the subject, the industry clamours for temporary relief in the form of renewed bounties.

With investments aggregating \$100,000,000; with 22,000 workmen dependent upon the success of these enterprises, and with an annual pay-roll of \$13,500,000, the Canadian ironmaster has some right to make known his needs.

Only by long and intimate examination of the whole matter will right adjustment be reached. Meanwhile we can see nothing to be lost and much to be gained in granting temporary aid to a threatened industry.

The iron and steel industries of Canada are what they have been made by general and special tariff provisions. Their past history must be taken into account in any present legislative enactments.

THE CONSULTING MINING ENGINEER.

Painfully frequent are the evidences of futility and misdirection in the expenditure of money and energy in every mining camp. Not only in the smaller prospects, but in larger mines, mines that are considered models of good management, one can detect signs of wasted time, energy, and funds.

Mining, careful and legitimate mining, has, at certain stages, enough inherent uncertainties. The super-added risk introduced by human folly, is ascribed most frequently to lack of luck. It is ascribable to no such thing. It is the removable cause of most of the losses that are written up against the business of mining.

The current belief that when three or four business men get together, incorporate a company, and hire a mine manager, they are capable of giving proper instructions as to how a mine should be worked, has a strong hold on the popular imagination. After the almost inevitable failure, the organizers usually claim that they have done the best they could, that they have not spared themselves. This is all well and good from the point of view of morals, from a commercial point of view it is nonsense. Failure has come because proper advice was not sought, or because the policy of the company was controlled by amateurs.

Now, instead of depending upon the wage-earner who opens up the property for them, if the small investors were to consult a *bona fide* mining engineer, or an economic geologist, weigh matters carefully with him, digest fully and discuss freely his recommendations, know why these recommendations are made, and generally develop the logic of the venture, there would be infinitely fewer heart-burnings and vain regrets.

It takes a trained expert to determine the right scale in which a mining property is to be developed. The man who has charge of actual mining operations usually has special qualifications. He may be an excellent miner, and he may or may not have that necessary sense of proportion that adjusts expenditure correctly. But he is very seldom blessed with a profound knowledge of geology. At nearly every phase of a mining venture's history geological diagnoses are required. Moreover the reports of every mine manager are the better for being checked up carefully. Exaggeration is a human and very common tendency. It will not prevail where an independent engineer is called in periodically to examine and advise. In other words, the close auditing of a mine's physical status is quite as necessary as the auditing of any commercial concern's affairs.

The average mine manager dislikes being subjected to the scrutiny of the technical man. There is no real ground for this feeling. No superintendent can honestly object to anything that renders his work more efficient. In no sense is he the inferior of the specialist. The superintendent is supposed to know his own field. His adviser specializes in one or two branches, and, unless he is charging exorbitant fees (which is remarkably seldom the case), there is no reason to object to his assistance. A close parallel is offered by the physician who calls upon the surgeon to help him. All professors have their highly specialized departments. The profession of mining is more complicated than most others.

The mining geological specialist arrogates to himself no intellectual superiority. His training fits him for a certain purpose. That purpose is to supplement the good work of the competent mine manager, and to help and guide the manager whose technical know-

ledge may be deficient, but whose services are none the less practically valuable. The probabilities are that the latter can manage the detailed operation of the mine to advantage. For this very reason he is apt to need the general help that an outside specialist can offer. It is obviously to the advantage of all that independent advice be sought and used.

COAL MINING IN ALBERTA DURING 1910.

It has taken slightly more than one year for the Albertan Department of Public Works to prepare and publish its report. Consequently we have had to wait until now to comment upon the official figures of production, etc. We have sufficient knowledge of the printer's vagaries to make due allowance for a certain amount of delay; but to permit twelve months to elapse before issuing important returns argues departmental laxness.

The total output of coal from Albertan mines during 1910 was 3,036,757 tons, made up as follows:—

Lignite	878,011 tons.
Bituminous	1,896,961 tons.
Anthracite	261,785 tons.

Coke to the amount of 121,578 tons was produced from 196,249 tons of coal—a yield of about 62 per cent. Briquette production totalled 108,996 tons.

The substantial increase in coal output, namely 862,428, is the largest on record.

By far the largest sales were made in the Province itself, 1,291,721 tons being disposed of to Albertan consumers. Exports to the United States were 215,976 tons, whilst other provinces took 124,274 tons. The amount used under colliery boilers was 53,737 tons.

Of the Anthracite production the greater part was sold in Alberta and other provinces, only a few tons of each going to the United States, Lignite was sold to the amounts of 438,781 tons in Alberta, and 317,959 tons in other provinces; 27,397 tons being shipped to the United States. The average number of men employed above ground was 1,728; below ground, 4,090. The number of mines in operation was 154. During the year 7 mines were abandoned, and 42 new mines opened. Seven of these new mines were in bituminous or semi-bituminous beds, the remainder in lignite.

The number of fatal accidents underground was large, 59 in all, for a total of 4,090 employees, or 14.4 deaths per 1,000 men employed. These fatalities were classified thus:—

Falls of coal.. . . .	4
Mine cars	8
Shaft accident.. . . .	1
Gas explosions.. . . .	1
Carbon Monoxide poisoning	31
Falls of rock.. . . .	8
Explosions	2

Asphyxiation	1
Falling from chutes	3
—	—
Total	59

Upon the Bellevue disaster, which caused the loss of 31 lives by "Carbon Monoxide poisoning," the inspector refrains from comment, but promises a full report later on. His general remarks, however, are pointed. "A number of fatal accidents," he says, "which have occurred, more especially in connection with transportation, have been entirely due to lack of discipline, and if the Coal Mines Act and the special rules in force at these mines had been strictly observed it is possible that the number of these accidents would have been diminished. In order to remove, as far as possible, the dangers to be apprehended by persons being crushed between the moving cars and the chutes, the inspectors have been . . . requiring such alterations to be made in the construction of chutes as local conditions will permit."

In addition to the underground fatalities, there were 36 serious and 51 slight accidents underground during the year.

Safety lamps are in use in all the mines of the Crow's Nest Pass District with one exception, and in all gaseous mines permitted explosives are used. Minor infractions of the Coal Mines Act have been vigorously punished.

Only four inspectors are employed by the Province. In view of the large number of accidents, and the immensity of the ground to be covered, this is a small staff. Disregarding the Bellevue catastrophe the death rate was still abnormally high, being 6.8 deaths per 1,000 men employed underground. This serious fact perhaps calls for immediate enlargement of the staff or for profound change of methods of inspection:

The Eight Hour Law is reported to be working satisfactorily, although the inspector alludes to the dangers arising from the consequent need of more rapid transportation.

Amongst the important developments of the year were the erection of one hundred coke ovens and a washer at No. 2 North Mine of the Leitch Collieries; the completion of a new tippie and plant at the collieries of the McGillivray Creek, Coal & Coke Co., Ltd.; the installation of a new tippie and electric equipment at the Bellevue colliery of the West Canadian Collieries, Ltd; and the largely increased output of the Crow's Nest Pass District.

It is regrettable that no detailed returns are presented giving the outputs of each considerable mine. We miss, also, the illustrations that usually accompany the report. In fact, it is high time that the Albertan Mines Branch issued a much fuller and comprehensive annual statement. The industry warrants it and the mining public needs it.

METALLURGY AT THE UNIVERSITY OF TORONTO.

Nothing could auger better for the future of the University of Toronto than the fact that there was no tincture of nepotism or of mere expediency in the selection of the man who has accepted the recently created professorship of metallurgy. Only after much casting of nets did the Governors come upon Mr. Guess—a Canadian, a graduate of a Canadian University, and, most important of all, a metallurgist who has made good in several of the largest smelting establishments on this hemisphere.

Professor Guess' achievements are set forth on another page. Here we may merely make the general statement that the choice was surprisingly wise, much wiser, in fact, than we ordinarily expect from academic autocrats. It will, therefore, ensure the live interest of progressive mining men, and will bring about a condition more nearly approaching equilibrium in the Faculty of Applied Science and Engineering.

To the least observant it is apparent that the University is entering upon a new phase. The first important step was taken two years ago when Mr. H. E. T. Haultain accepted the professorship of mining, an unenviable position when all the limiting and isolating conditions are considered. Common sense, had it been a factor in the debates of the Board of Governors, would have insisted at the same time upon the immediate appointment of a professor of metallurgy. This was not done. Valuable time was lost. Although, in the interval the Faculty has not lost in reputation, it has inevitably suffered by comparison with the better manned and equipped departments at Queen's and McGill. Negligence and indifference of this kind are incompatible with the dignity of our most powerful university, especially with the rapid development of the mining department before it as an object lesson.

However, an eleventh-hour conversion is better than none at all. Amends have been made, and a course in modern metallurgy is to be provided.

At this juncture it is our bounden duty to voice the convictions of the mining public in relation to the University. As we remarked in a former editorial, the mining department is being vigorously handled. But its usefulness is restricted by the traditionally conservative atmosphere and by very tenuous financial support. The new metallurgical course will suffer, to a smaller extent we hope, from the same drags. But possibly, the inclination of the authorities will be to allow the mining department to remain *in statu quo*, and to divert the larger streams of sustenance to metallurgy. No mistake could be more fatal than this. In the first place, mining and metallurgy, whilst they are both broad, and diversified subjects, are closely interdependent. One leads directly to the other, and the domains of each overlap and coincide in a thousand ways. No two studies could be more intimately assoc-

iated. The success of the University's mining department alone has paved the way for the present expansion. This must not be forgotten.

Hence, if mining and metallurgy are to be properly taught at Toronto University, neither can be subordinated to the other. Each must be considered an integral part of an organic whole—at present, a microcosmic whole. And we repeat that the established course in mining must not be starved to feed its sister. Both will require very much more of the sinews of war than they are apt to get.

The University of Toronto derives its chief financial support from the Province of Ontario. The exchequer of the Province has been enriched by large amounts of money contributed directly and indirectly by the mining industry. Through mining the Province has had its wealth augmented, its settled areas enormously increased, and its name given world-wide advertisement. Surely the Provincial Government might properly insist that a more generous policy be adopted hereafter by the University in respect of mining and metallurgical instruction. The appointment of professors will be farcical unless they are given strong support, wide discretionary powers, and the assurance of such assistant-professors as they may need.

In one sense it is fortunate that no dead-wood exists on the present staff, and that there are no unfit and tenacious survivors of the unpractical era to be sloughed off. The path for the future lies clean and wide. The only obstructions that can or will exist will be placed there by the University itself.

THE OTTAWA MEETING OF THE CANADIAN MINING INSTITUTE.

Large preparations are being made for the Annual Meeting of the Canadian Mining Institute at Ottawa on March 6th, 7th and 8th. Respectably large representations are expected from England and from the United States, and the Ontario and Quebec cohorts will be more numerous than ever. British Columbia, Alberta, and Nova Scotia are sending official representatives and private members, and not a few unclassified foreign delegates are expected.

In several respects the approaching meeting is to be highly interesting and edifying. For instance it is announced that Mr. T. A. Rickard is to read a paper on gold mining in Nova Scotia. This will be a fruitful source of comment, and should induce a large representation from that Province. It is announced, semi-officially, that the Annual Dinner will be held in one of the spacious Parliament Building rooms. This, in itself, is an inducement as it will naturally imply the presence of many distinguished Parliamentarians. Possibly, also, His Royal Highness, the Duke of Connaught, will honour the occasion with his presence. And the Duke, we are sure, will find our Dinner a mild and

agreeable diversion, contrasting strongly with the formal affairs that bring fatigue and boredom in their train.

Ottawa in many ways is an ideal city in which to gather. A large attendance, a well-managed smoker, and a dinner conducted in accordance with established tradition will impress the legislative heart, and counteract the depressing effect of long papers. We hope that every member of the Institute will arrange to attend. An instructive session is assured; a good time goes without saying.

We have vivid recollections of our last Annual Meeting in Ottawa. Who can forget the tense wait for election results? Who does not remember the smoker? Or the bold Knight-errant who pirated the Russell elevator? Or the matutinal invasion of restaurants?

Perhaps our glory has departed. Perhaps the Institute has lost its love of high adventure. Perhaps the mantle of strenuous good-fellowship has fallen on other shoulders. Perhaps not. We are not downcast. We hope and believe that in Ottawa the reputation of the Canadian Mining Institute will be gloriously upheld, and that lustrous history will be made.

It may be that no scandal will be probed, no geologist convicted by his peers of tampering with Scandinavian hearts; it may be that the Secretary will not burst incontinently into song, nor may any instructor of youth break the speed laws on the hotel "lift," nor yet may the wanton miner from the North flaunt the colours of his clan on his expansive evening chest,—yet the roots of sin are with us yet.

In all seriousness all of us must strive in every way to make the approaching Annual Meeting an unqualified success both in its serious and its non-serious aspects. The opportunity is too large to be overlooked.

[Editor's Note.—As we go to press notice is received from the Secretary that the place of meeting is to be Toronto, not Ottawa. This change of venue does not imply any change of spirit in our editorial. If our readers will be good enough to read "Toronto" for Ottawa," and take for granted the historicity of the incidents referred to, no harm will be done. Toronto is as godly a town as is Ottawa.]

THE CHIBOUGAMAU REPORT.

To read aright the report of the Chibougamau Mining Commission one must be possessed either of prescience, or of a knowledge of the circumstances that led up to the action of the Quebec Government in appointing the Commission.

The vague northern hinterland of Quebec and Ontario is a prolific source of fairytales. The prospector goes there and comes back with large stories of mineral

wealth. Only a fractional percentage of these stories will stand investigation. Thus, with these facts recognized, it was the duty of the Quebec Government duly to investigate the Chibougamau region, a region rich in rumour.

The net result of the Commission's findings is distinctly discouraging to those who had hoped for "boom" mining districts. The judicial opinion of Messrs. Faribault, Gwillim, and Barlow is diametrically opposed in tone and in substance to previously published reports. The attitude of the Commission is summed up thus in a quotation from these columns:—"Our duty, as the 'Canadian Mining Journal has very 'well represented it' was to determine the general 'geological character of the country, and to discover 'how true were current tales of spectacular wealth. 'The findings of the Commission must be accepted 'as they are offered—as an appraisal of the present 'results of prospecting in one section of Northern Quebec. It must not be misconstrued into a sweeping condemnation of a region that may yet prove entirely 'worth while.'"

Statements as to the economic value of the Asbestos Island asbestos deposits, made by Dr. A. P. Low, are directly controverted by the Commission, as also are the statements of Mr. John E. Hardman, relating to the asbestos and to the gold-bearing areas of the Chibougamau Mining Company, Limited.

In two succinct paragraphs, which summarize their conclusions regarding the asbestos and the gold, the members of the Commission state that "the ore bodies "which have gold as their chief value do not contain "this metal in a free milling state in sufficient quantity "to make stamp-milling feasible;" and, as to asbestos "the asbestos noticed in the working faces of the various open cuts, as well as in the dumps, is insignificant "in amount and altogether insufficient for their successful development as mines." Similarly does the report deal with copper, nickel, and iron.

Although the Chibougamau Region may "promise a rich reward," the prospector is recommended to turn his attention to other "large areas of equal economic "importance . . . in much more accessible portions of "Northern Quebec."

After reading the Commission's sizable report we are inclined to believe that it must have been remarkably hard work for Messrs. Faribault, Gwillim, and Barlow to fill the 216 pages. There is much matter touching on meteorology, topography, general geology, etc. The volume is carefully prepared, the editing is excellent—although we must incidentally deplore the use of such a misbegotten phrase as "data is"—and the photographic reproductions are of a high order of merit. But, except to save the Commission's face and demonstrate its literary ability, we wonder if it was all worth while!

We do not for a minute, however, wish to jeer at the work of the Commission. It was politically and otherwise necessary that the truth be determined. The Commission's pronouncement is bold, definite, and uncompromising. It is exactly what it should be—with the possible qualification that it might have been given in tabloid form instead of as soup.

THE MUCKRAKER.

Some years ago the journalistic world was electrified by the exploitation of Thomas Lawson's personality in "Everybody's Magazine." The accompaniments of this exploitation furnished the groundwork of commercial prosperity for that magazine. No thoughtful person took Mr. Lawson seriously, even at that time. His appeals, various and vociferous as they have been, have not helped to establish his prestige.

In the search for magazine material, Providence has ordained that Porcupine, the new gold mining camp of Ontario, should be the point of contact between the rake and the raked. A person whose name is Trumbull White, writes up Porcupine in the February issue of "Everybody's." Mr. White is a sensationalist. This is more than obvious to anyone who reads his article. But, (and this is the important feature) Mr. White represents a certain cult of destructors who tread where angels have a very genuine fear of treading. If, for instance, Mr. White had known his subject, he would not have dealt in so many preliminary platitudes. No one really suspects Porcupine of being a "poor man's" camp. Everyone knows that each new

mining camp is bound to breed buzzards and other birds of prey. Similarly we are all grateful to the kind Providence for having kept Porcupine out of the range of operations of Mr. Thomas W. Lawson.

The virtuous Everybody's is late in the field. Corrective influences have been long at work. There is nothing of good that can be accomplished by the type of journalism that gave Everybody's its start in life.

EDITORIAL NOTES.

In our editorial remarks on January 1st, we, inadvertently failed to acknowledge the existence of the Sudbury and Sherbrooke Branches of the Canadian Mining Institute. Our excuse is the fact that neither Branch advertises its activities. We shall be glad to hear from both.

The dividend payments of 125 per cent. made by the Bell Asbestos Mining Co. for the year 1911, throws into sad relief the condition of Amalgamated Asbestos. They also go to show that trade conditions are not so inherently bad as has been rumoured.

Mr. P. A. Robbins' report on the Hollinger, which appears on another page, is not commented upon in this issue of the Journal. It will be fully discussed in our next issue.

The offer of the city council of Port Arthur to assist the Atikokan Iron Company in erecting a large steel plant is contingent upon the renewal of the iron bounties. Levers of this kind will, no doubt, affect Ottawa considerably.

CORRESPONDENCE

THE EXCULPATION OF MR. WHITE

The Editor,

"Canadian Mining Journal,"
Toronto, Ont.

Sir,—My attention has been drawn to the fact that, in a letter from the pen of Mr. James White, which appears in your last issue, taking exception, not unjustly, to your permitting rash, inaccurate, or misleading statements to appear in your Journal, he incidentally refers to a geologist in Ottawa having been guilty, amongst other things, of political activity.

As it may reasonably be supposed that one while denouncing inaccuracy, etc., will make no inferences or suggestions that are not strictly correct and well-authenticated, and as almost all geologists in Ottawa are connected with the Geological Survey, a reader of his letter might, perhaps, form the conclusion that some geologist connected with the Survey had been politically active. In the case of a Government geologist this would be a serious violation of the Civil Service Act. To remove all possibility of such suspicion being

placed upon any member of the Survey, I desire to state that so far as I know or have been able to ascertain, no geologist at present in any way connected with the Geological Survey has been guilty of any political activity whatever, or for that matter of anything else suggested in the above letter. It is, therefore, evident that Mr. White was not referring to any official of the Geological Survey, and would deplore any such unwarranted inference.

Yours truly,

R. W. BROCK.

Ottawa, Jan. 23rd, 1912.

"THE INCINERATION OF MR. WHITE."

Editor Canadian Mining Journal,
Toronto, Ont.

Sir:

.. Mr. Jas. White, secretary of the Canadian Commission of Conservation, having seen fit to use me as a chopping-block in getting at you, I beg sufficient space to reply briefly to some of Mr. White's direct statements impugning my veracity and general intelligence.

Regarding Mr. White's assertion that anyone with even a superficial knowledge of mines and mining knows my statements to be absolutely false, I admit, cheerfully, that the only people who have rushed into print with assertions that my statements were false, were those who possess, like Mr. White, a superficial knowledge of mines and mining. In reply to Mr. White's direct question, I beg to observe that I do think that a single county of Michigan contains four and three-quarter billions of tons of iron ore. Having lived in that county for ten years, it necessarily becomes perfectly obvious, to any "conservationist", that I lack positive information on this point, such as Mr. White has been able to obtain at Ottawa.

Mr. White terms me erratic for advancing the novel proposition that the Guggenheims should be allowed, because they have made a losing investment in copper, to recoup themselves in Alaska by taking up large areas of coal lands, in defiance of the law. Inasmuch as I advanced no such proposition, Mr. White is demolishing a man of straw, a task in which "conservationists" excel, from much practice. The administration of the American laws in Alaska is shamefully lax and unjust, and the refusal of our government to permit either the Guggenheims or anyone else to develop coal mines in Alaska is simply disgraceful.

Regarding Mr. White's assertion that if myself, et al, will devote our attention, etc., we might achieve something material, and raise ourselves in the estimation of all right-thinking persons, permit me to observe that Mr. White scarcely comprehends my standpoint. The gentlemen in this country, and possibly in Canada as well, who call themselves conservationists, have proven themselves, in the main, so illogical, so wasteful, so extravagant in language, and so utterly unreliable in

their assertions on all vital points, that I, for one, am opposed, frankly and absolutely, to their programs, which are mainly political, and to their personalities. If by "all right-thinking people" Mr. White means the conservationists, so-called, I may state that I lack the slightest desire to stand well in their estimation, preferring to maintain my self-respect, and tell the truth, as I see it.

Mr. White, like our "conservationists", and other "reformers", on this side of the line, seems to be gifted with a very copious flow of language, but his ideas become a trifle gelatinous at times, and his view of the facts decidedly hazy. As to his scientific attainments and value as an authority, it seems to me that these are very clearly set forth in his own statement, that all that is needed to eliminate poisonous fumes from the smoke of the Washoe Smelter is to "install special appliances"—this statement coming from the chief forester of the United States, according to Mr. White, and being quoted by him as the final word in the matter. It is obvious to Mr. White, and all other true "conservationists" that the chief forester, being a simon-pure conservationist, is the final authority on all metallurgical problems. The fact that none of the metallurgists agree with the chief forester, on this metallurgical problem, seems very damaging to the men who make a livelihood in the practised metallurgy.

We have our "conservationists" on the run in this country, and propose to build a fence around them, for our own protection. They will be treated with all humanity, but, in the interests of public safety and sanity, cannot be permitted longer to run at large.

Very truly,

HORACE J. STEVENS.

Houghton, Mich., Jan. 24, 1912.

THE BELLEVUE MINE DISASTER

Written for the Canadian Mining Journal by R. W. Coulthard.*

In the Summary Report of the Mines Branch of the Department of Mines, for the year 1910, I notice a report (pages 144 to 157), on the coal mine disaster at Bellevue Mine.

This report was written by Mr. Joseph G. S. Hudson.

In the beginning of the report Mr. Hudson sets down the Letter of Instruction, which he received at the time he was asked to investigate this disaster. This letter reads as follows:—

Ottawa, December 12, 1910.

"Dear Sir:—

"You are instructed to proceed at once to Bellevue near Frank, Alberta, for the purpose of investigating the recent accident from an explosion, which occurred at the coal mine at that place.

"1. It will be your duty to obtain a full description of the disaster.

"2. You will endeavour to ascertain, if possible, the cause of the disaster.

"3. And ascertain whether the method of mining is defective, in that it prevented the escape of the miners after the explosion.

"4. To make such suggestions as will in future avoid

*Gen. Mgr., West Canadian Collieries Limited, Alberta.

at that mine or mines with similar lay-out loss of life from the probable cause mentioned under No. 3.

"You are to be present at the inquest, and take notes of all that is said in evidence.

"To report on any other essentials which may be necessary for a comprehension of the causes of the disaster, and its possible prevention in future from similar causes.

"Yours truly,

(Signed) Eugene Haanel,
Director of Mines."

"Joseph G. S. Hudson, Esq.,
Mines Branch,

Department of Mines."

In as far as these instructions were followed from the standpoint of facts, and knowledge of the condition of affairs, I am willing to leave the decision to those who are conversant with these things.

I would remark that in endeavouring to elucidate the method of exploiting the No. 1 Mine (Page 145), I am at a loss to understand certain passages of description therein, and there are besides certain omissions which show a lack of knowledge or information in connection with both the workings and the geological features of the ground.

The writer of the report, however, makes his statements boldly, and without any qualification or reservation.

In his "History of the Accident", he begins with the affair of October 31st, 1910, and states that (page 146) "considerable anxiety was felt as to the probabilities of a second explosion following the first." Just where Mr. Hudson acquired the right to make this statement I am at a loss to know, and not only consider it erroneous, but vicious. He also follows with the statement that certain mining men gathered together to hold a consultation on the matter, and to test for carbon monoxide, carbon dioxide, and carburetted hydrogen gases, in the return air of the mine. His further statement in regard to consultations between mining men is much distorted, and is a misstatement, just as much from information given as from that which is withheld.

It may possibly be that Mr. Hudson was not able to learn everything in this connection, but if so he should at least make the admission.

Mr. Hudson would make the reader believe that the mine was not entered until thorough examinations had been made from the surface openings as to gas and temperature. He also states that several tests were made on the surface to this effect, after which it was decided that an exploration party would go into the mine, and make an examination therein. This is an absolute perversion of fact. I myself in company with the General Superintendent, and the Superintendent of the mine, entered the mine about an hour after the occurrence of the blast, and made, as far as was possible, an examination of conditions.

Further it is stated that on entering the mine it was clearly demonstrated that "an explosion of considerable force had occurred." This also is not true. None of the examining party was of opinion that there were any results of severe force shown in the mine.

I might also say that contrary to a statement in the report we did not find the coal in chute No. 81 "perceptibly warm."

In regard to what Mr. Hudson considers very important evidence from a fire boss, who claims to have written down carefully his observations at the time of inspection, I might state that this matter was not brought out in the evidence at the time of the inquest, and should not, therefore, be considered in the report.

I will also say that in many particulars the observations of this fire boss are at variance with those of mine officials in a higher capacity, who were more capable of arriving at conclusions. Where this fire boss states that boards and canvas opposite the 6th cross-cut were burned he is entirely at variance with more expert observation and opinion.

In quoting a portion of the evidence of the District Inspector of Mines (page 147), Mr. Hudson states that he "found a thick coating of coal dust on the electric light globes, etc." The evidence distinctly states "dust" not "coal dust", as Mr. Hudson might wish to interpret it. As a matter of fact, and in conversation since had with Inspector of Mines, what he meant by "dust" was in reality "sludge" from the haulage roads which had caked and hardened on the lamp globes. This "sludge" is composed of coal, rock, horse manure, and all other refuse, which is to be found on travelling gangways. It is besides very wet. In fact the gangway might be termed swampy, and right at this point I wish to disabuse anyone's mind of any

trouble arising from dust in this mine, contrary to the suspicions which may be inspired by the insinuations in Mr. Hudson's report. As a matter of fact it is considered one of the dampest mines in the district.

Mr. Hudson has not, to my knowledge, ever visited the mine in question, so cannot criticize with authority.

On page 148, the statement is made that although the pillars from chute 61 to 70 had been extracted, the pit records show that up to October 29th no cave-in had taken place. "On the outside of the cave-in rooms '52 and 57 and pillars 59 and 60 are in working, getting round the cave at 75 chute to the face of the pillar 250 feet up the gangway.'" In answer to the above I might state that there have been hundreds, possibly thousands of caves in this mine in the old workings, which certainly had not been reported, nor had it ever been expected that they should be. They are taken for granted as in all other mines. As to the last sentence it is meaningless to me, and I am unable to grasp that the author wishes to convey.

Proceeding, Mr. Hudson states that the witness (meaning the Provincial Inspector of Mines), also asserted that he had a conversation with myself as to the cause of the explosion, and the remedies to be taken to put the mine into better condition; and that the mine was put into condition by "restoring the ventilation and cleaning the main gangway from broken timbers, etc." The "etc." in this statement is the most important portion of the instructions there were issued at that time, and had Mr. Hudson taken the trouble to have made enquiries, unless of course he had already done so, he would have learned that the precautions taken after this affair were numerous, costly, and of a nature such as anyone conversant with conditions would have considered efficient.

Following this Mr. Hudson makes a great point of the fact that the Secretary of the United Mine Workers of America, Bellevue division, No. 18 district, telegraphed to Mr. John T. Stirling, the Provincial Inspector of Mines, at Edmonton, that the men working in the Bellevue mine desired an inspection of the mine. Had Mr. Hudson enquired into the politics of this Union at the time, he would have discovered two facts:

1st. That they were at that time electioneering for their annual election of officers.

2nd. That also at this time their Socialistic representative in the Provincial House, was endeavouring to obtain some most remarkable revisions to the Mines' Act, in which he was aided by the Union Officials.

I might state that Bellevue mine was not the only one about which complaints were made at this time. As a matter of fact, there were few mines in the west which were exempt from criticism, and for the political reasons above mentioned. I know for a fact that a most serious complaint was made regarding the Canada West Collieries, but upon investigation it was found to be farcical in the extreme. In other words it was again the story of the boy calling "Wolf! Wolf!" to the great discomfiture of the shepherds. The very fact that the mine officials, as well as the Pit Committee, appointed by the miners themselves, had reported nothing of an unusual nature in the Bellevue mine, goes to show that they considered everything normal therein.

The criticism, therefore, of the Mine Inspectors is in my opinion unwarranted, and had a little more investigation been made on the part of the author, I think it would have been omitted. I have every reason

to believe that the Mine Inspectors in this Province perform their duties conscientiously and intelligently, and in this I think I am supported by any reasonable, unprejudiced opinion.

A further instance in connection with the gas which was reported in this mine by the Union is very important, although Mr. Hudson sees fit not to mention the matter. It is, that when the Secretary of the Local Union was asked where the gas of which he complained was located, and which was the source of the telegram to the Provincial Inspector, he replied that it was in the working faces inbye of 82 chute and not, mark you, in the old workings.

Why was not this fact brought out in the Government Report?

To the average layman the fact of there being gas in the working places might appear to be a dangerous feature. This, however, is not the case, as it is met with in most coal mines. This is the reason the regulations do not allow blasting in places where gas is found. I wish, therefore, to clear up any misunderstanding which may be taken from this statement.

The remark is also made (page 149) that "The miner working in 123 room said that he had seen gas about three feet back from the face, but brattice was 12 feet back." He also states that the room was stopped working until the gas was cleared out. In the name of all that is practical and sense-inspiring, how much closer does Mr. Hudson wish the brattice to be to the face? As a matter of fact even at this distance it is nearly always disturbed or blown down. The mention of gas in working faces by a practical man for the purpose, I presume of conveying to the reader the idea of carelessness or incapacity on the part of the management can hardly be sustained.

The imputation is childish.

The report also states that two men were sent to make a special inspection and examination of the section of the mine "where the big cave-in from the roof eventually occurred." In order to correct this misstatement, I would say that the big cave-in of the roof did not eventually occur at this point at all, nor is Mr. Hudson in a position to place the initial location of the trouble.

The report also mentions that it was not reported to the Inspector that a new regulator had been put in between 79 and 80 chutes. In as much as this regulator had been in for over 12 months previous to this. I hardly think it would be necessary to report such a matter at this time.

Further, at the end of page 149, I see that Mr. Hudson quotes from Rule 32, Chap. 25, 1906, Coal Mines Act of the Statutes of Alberta. We, however, had at that time discovered that this Act was obsolete, and were using the 1908 Act in its stead.

I notice that the report quotes from the evidence of George O'Brien, fire boss from Coleman (Mr. O'Brien, by the way, was from Coal Creek, B.C.), as to the character of the burns on certain men, who were victims of the disaster. No doubt Mr. O'Brien's evidence was quoted because of its melodramatic effect. There was other evidence produced at this inquest to show that they were not of as extensive a nature as stated by this witness. This, however, has not been mentioned.

Further, on page 151, the author of the report declares that "After consultation the Provincial Inspector of Mines—Mr. Stirling—decided that the

"mine be closed, and no one allowed to enter it until "after the Company had carried out some of the proposed alterations." This, I affirm, is at variance with Mr. Stirling's evidence, and I can state here and now that he made no such statement. It cannot be found in the evidence, and I think if Mr. Stirling is appealed to himself he will bear me out in what I say.

On page 152 of the report we have the cause of the disaster clearly outlined to us by Mr. Hudson. Of recent years there has been considerable controversy over the causes of mine explosions. These controversies have been carried on by men who have spent practically a lifetime in the study, yet in spite of the great diversity of opinions in this regard, we have but to read this report to find all other theories summarily exterminated and must perforce accept as the only cause, that of explosion of gas and coal dust ignited by the same old medium of flame. Truly the matter is settled now and for all time.

Firstly in this section re "Cause of the Disaster," we are told that "The seams of coal are all located "in mountainous districts, hence are subject to a very "heavy pressure from the strata overlying the coal "worked." I would like the author of this report to let me understand as to what he considers the thickness of strata necessary to produce a very heavy pressure, as for myself I was always of the opinion that the pressure was not heavy enough in our mines.

Also he states that because of the great thickness of our seams, and the high angle of inclination, therefore, the dangerous conditions increase as the "underground workings go deeper from the surface." This reasoning to me is somewhat vague, and I think I may here be permitted to interpolate an expression of scepticism as to the finality of the statement.

At the bottom of page 152 the remark is made "That "an explosion of gas had occurred was demonstrated "by the large amount of carbon monoxide gas and "after-damp encountered by the exploration party at "this section of the main gangway, and also that 3 of "the 4 bodies recovered between 53 and 54 were "burnt." In reply to this I will say that there was nothing in the evidence to show that there was a large amount of carbon monoxide gas and after-damp. On the other hand it was specifically remarked by experts who went into the matter thoroughly, that there was evidence of the presence of but little carbon monoxide gas and after-damp, and this was one of the reasons put forth that the cause of the disaster must have been other than what has been assumed by Mr. Hudson.

Further, on the top of page 153, he states "One important point that did not come out in the evidence "was, that a stratum of rock situated in the roof "immediately over the coal is composed of a coarse "grained sandstone, highly impregnated with iron-"stone." Heretofore it has been borne in upon me that most of the important points are those that did not come out in the evidence. Also there were some very important points brought out in evidence which have been entirely overlooked. However that may be I might say that this statement should not have been included in this report unless confirmed by evidence. I might, however, state that the assertion as it appears is entirely erratic. In regard to Mr. Hudson's theory as to the probable cause of the disaster, I have nothing to say. He is welcome to it as are others to theirs. It is, however, in my mind, the product of very hasty judgment.

He makes the statement "That the defective state of ventilation in the old workings was favourable to explosive conditions was manifest; for the ventilation was by scales of air through the board stoppings on the main gangway, and not by direct current." I might say that the evidence which was adduced at the inquest went to show that there was a perceptible current at the top of the old workings.

Further Mr. Hudson makes no mention of the fact that the air was taken in from 46 chute (the outermost portion of the old workings in question), whence it was carried to the top of the workings, inbye along the top, and up 81 chute to the surface. This may possibly put a different light on this point. Furthermore as I stated, there was no evidence of a large volume of carbon monoxide gas.

Method of Mining.

Mr. Hudson states that "The system of working the coal is to drive chutes (having 50 or 60 feet centres) on the full pitch of the seam, and to run the coal down on the chutes to the main gangway, where it is loaded on the mine cars." If by this only Bellevue mine was referred to, the author of the report is correct. If, however, he refers to all the mines in the district he is wrong. We have ourselves two other collieries in operation in this district, and neither one of them follows this system.

The impression is left that the Bellevue Mine is not provided with more than one exit. This is a misstatement.

Further the statement is made "There was not any evidence submitted at the inquest to show that any of the men who survived the shock of the explosion made the slightest attempt to escape from the mine by travelling up the exceedingly steep chutes to the surface." This statement is contrary to the evidence which I have before me. Also it is contrary to fact. I would further bring to mind that the counter gangway in our workings is travelled daily from chute 45 into the end of the workings.

General Deductions.

In regard to the establishment of rescue stations I note that the author of the report is somewhat contradictory in his method of maintaining same. In one place he states that "Dominion or Provincial Governments should be responsible for their instruction and maintenance." (I presume he means instruction of men in the use thereof). Immediately after this he asserts that "Perhaps the most satisfactory results will be obtained by the different coal companies in mining districts in the establishment of a series of strategic stations, co-operating and maintaining these stations as a first-class insurance asset." Further along in this section he says: "The respective coal companies to contribute to a general fund, assessed on the number

of tons of coal mined. From this fund the apparatus will be purchased, installed, and maintained." Note that it is the companies who bear all the expense in regard to this, but do not forget that the perpetrator of this report further states that in determining upon a suitable location for a central station, and the substations, the mines' employees must be consulted.

Emergency Access to Mine Plans.

The writer of this report should wish to convey the impression that the blue prints of the plans produced at the coroner's inquest were inaccurate. Further along he states that they should be kept up and corrected to periods of every three months. This I might mention was the practice followed at this mine. Further I will assert that it was this method of correcting to periods of every "three months," which may have given the plans the appearance of being inaccurate, in as much as the quarterly survey was just at that time being made.

He further makes the misstatement, that the plans were not available to the mine managers from surrounding collieries. This is the first time that this has been brought to my notice, and upon enquiries from the various mine managers who were on the ground at the time, I find that none of them asked for the plans upon first arriving on the ground. I was informed, however, that on the following morning two of the mine managers met in the office of the company, and upon requesting to see plans, they were immediately produced.

This mention of plans behooves me to remark upon what I consider the very unprofessional manner, in which Mr. Hudson obtained, and retained possession of the plan of the Bellevue mine, which he has evidently made use of in preparing his report.

This plan was produced by the Company at the inquest, and at the conclusion of the investigation, it was the Coroner's duty to see that the plan was returned to the Company. Without, however, obtaining my consent he approached the Foreman of the jury, who, by the way, had no jurisdiction in this matter whatever, and obtained possession of this plan. The Coroner who sat upon the investigation, informs me that he later wrote Mr. Hudson, for the return of this copy, but the latter refused this request.

There are other copies of the plan of the Bellevue mine, which he could have obtained for the asking, and his tactics in obtaining property which did not belong to him, are, I think, anything but exemplary for a professional man.

In conclusion I wish to express my admiration for the capabilities of the author of this report. The valueless generalities contained therein are in my opinion marvels in their superficiality, and I have no doubt the Department of Mines must feel proud of the achievement.

METALLURGY IN BRITISH COLUMBIA IN 1911

By E. JACOBS

In the metallurgical field there was little of unusual interest as regards actual achievement during the year. The successful use of the Dwight-Lloyd sintering process at the Consolidated Mining and Smelting Company of Canada's smeltery at Trail; the experiments with the

Elmore Vacuum Process plant—at the Britannia Mining and Smelting Company's copper concentrating mill, Britannia Beach, Howe Sound, and at the Silverton Mines, Limited's silver-lead-zinc concentrator, on Four-mile Creek, Slovan Lake district—that were in a large

measure successful; the continued investigations concerning the extraction and recovery of zinc from complex silver-lead-zinc ores, such as occur freely in Slooan district; the more effective use of precipitating and filter presses at the Hedley Gold Mining Company's 40-stamp mill, Hedley, Similkameen; the further reduction of smelting costs at the Granby Consolidated M.S. and P. Co's copper smeltery, Grand Forks, Boundary district, and the erection and equipment of several mills—one for milling gold ore and three or four to concentrate silver-lead or lead-zinc ores—these constitute the chief evidences of progress in metallurgy in the province in 1911.

It will be seen from the foregoing paragraph that metallurgy is not here being considered as "the science of smelting," as a narrow definition would regard it; rather is it being dealt with on the broader basis of its being taken as "the art or operation of separating metals from their ores or other combinations."

Now it may be convenient to supply some detail in the order above given, so this will be done. First, though, one of the difficulties that confront a layman may be pointed out. A visit was paid to one of the larger smelteries in the province; in the absence of the general manager no one about the works was authorized to give for publication particulars of the work being done or results achieved, so only a superficial idea could be obtained concerning these important subjects. Later, in response to a written application for information for annual review purposes, the following was obtained: "At the smeltery have been installed. Beside this, a great many small changes have been made in order to facilitate handling and sampling ore." The reference thus made to large reduction was contained in 33 words, some of which have been omitted here so that the identity of the works may not be disclosed. But it surely may be likened unto the great difficulty experienced by a people ages ago who were required to "make bricks without straw." However, here goes, as they say in the vernacular.

Dwight-Lloyd Roasters at Trail.—Early in the year two units of the Dwight-Lloyd sintering process machines were put in at the Consolidated M. and S. Co's works at Trail, and these were placed in operation in May. Since then they have been used for roasting gold-copper concentrate from the Le Roi No. 2 Company's Josie mine, Rossland, and mixed silver-lead ores having some zinc in them. All the information obtained concerning the roasting operations at Trail is that the roast of the gold-copper concentrate was perfect, the result being a sintered product favourable for smelting in the blast furnace, but similar success had not resulted in the case of the lead-zinc ores, which sometimes required to be roasted a second time. The average metal contents of the concentrate, as shown by shipper's assay, were: Gold 1.425 oz., silver 0.747 oz., and copper 25.8 lb. per ton. No information was obtained as to the physical condition, that is the degree of fineness to which the charge was reduced before being sintered, nor was a complete analysis asked for, but it is known that the concentrate is from second class ore remaining from sorting an auriferous chalcopryrite with pyrite and pyrrhotite, in a siliceous gangue.

There are a number of Dwight-Lloyd plants in operation in various parts of the world—United States, Mexico, Australia, and Europe, but prior to the installation at Trail there was not one in Canada. It is claimed that this machine is particularly adapted to

handling concentrates, flue dust, and all classes of fine ores, converting these into a coarse cake which, owing to its strength and porosity is highly suitable for reduction in the blast furnace. It will economically sinter and desulphurize mixtures having from 8 to 18 per cent. sulphur, and of sizes from one-quarter inch down to 200 mesh or finer, making from them a coarse porous product which will contain between 2.5 and 5 per cent. sulphur. The statement has been made in connection with several of the plants installed that there has been a noticeable increase in the capacity of blast furnaces running on a charge containing sinter produced by the process—in one case as much as 20 per cent. This is due to the great porosity of the sinter and the fact that it is practically fused to a slag. Further advances urged are that cost of installation is much lower than that of any other roasting appliance, and that cost of operation is less than that of the old hand-rabbed reverberatory roasters.

Elmore Vacuum Process.—Similarly, no detail was obtainable relative to the results of experiments with the Elmore Vacuum Process plant in British Columbia. Several years ago a small Elmore plant was put in at the Giant Mine, Golden mining division in northeast Kootenay, but the results obtained did not lead to the adoption there of the process for commercial purposes for the reason, as officially reported by the district Gold Commissioner, that while the process proved a success as far as the separation of the lead and barytes was concerned, the cost of oil and acid made the treatment too expensive for use on such low-grade ore as that of the Giant mine. This cost was higher from the fact that the mine is situated at an elevation of about 3,500 ft., and seven miles in from a landing place on the upper Columbia River. The character of the ore treated here is indicated in the following reference to it by the Provincial Mineralogist, Mr. Wm. Fleet Robertson: "There appears to be a line of contact of limestone on the south with a black-coloured slate on the north. Along this line of contact the lime seems to be more or less completely altered into barytes for a width of from 20 to 30 ft., when the barytes gives place gradually to a silicification of the limestone. This zone of barytes is in parts heavily impregnated with galena to the extent of from 5 to 10 per cent., together with some zinc, arsenic, and antimony sulphides. The galena is fine-grained, and occurs in numerous small seamlets running through the barytes gangue, and carries silver value in about the proportion of one ounce to the per cent. of lead. As far as could be determined by inspection, the mineralization diminished with the barytes, both being strongest next to the slate."

In connection with the work done on Britannia ore by the Elmore plant, it will probably be of interest to note, first, the general character of the ore occurring on this property and, next, the nature of concentration methods in the past. The ores of the Bluff and Jane mines, of the Britannia group, are thus described in a report prepared for the Dominion Department of Mines by Mr. Robert R. Hedley: "The Bluff ore is an association of pyrite and chalcopryrite, with some little sphalerite and galena in a quartz gangue, often of a cherty nature and exceedingly hard. The Jane ore is distinctly the result of secondary enrichment, and consists of pyrite and chalcopryrite, in schist. Ore from the Bluff will probably average 1.75 per cent. copper, varying between 1 and 4 per cent. throughout its entire extent. The richer ore is found in fairly large masses, and does

poorer ore is, however, finely disseminated. In the Jane note no fine crushing to release the mineral. The ore occurs in four well-mineralized beds or bands, aggregating in width some 250 ft., that may be mined to yield about 3 per cent. copper. To handle these ores to best advantage some concentration is necessary."

Summarizing the information given the writer of these notes when, some time ago, he visited the Britannia concentrating works, the following briefly presents the position: "In concentrating Britannia ores the result aimed at was the removal of the excess of silica, in order to make a desirable product for smelting, with a minimum of copper loss, rather than to concentrate to a high-grade copper product. The extremely hard matrix of much of the ore limits the application of concentration. Experience proved that the copper losses in the slimes, resulting from fine crushing, were too great, and that a large part of the ores contained mineral that could easily be separated from its gangue without fine crushing. The practice for some time was treatment which gave a concentrate about neutral as to its iron and silica contents, and from the picking belt a shipping ore containing a large excess of silica. A modification adopted was to take from the picking belt both the high-grade neutral shipping ore (for shipment to the smeltery in its crude state) and the waste, and to leave the remainder to be crushed for concentration by jigs and on tables.

During the last two years Mr. Robert H. Leach, who recently resigned as general manager of the Britannia Company, has carefully watched the results of the concentration operations at the Britannia mill. The latest comment on this subject is contained in the following: "The graded crushing and concentrating mill has been worked out to a very satisfactory point, results showing extraction to have been about 80 per cent., which, it will be recognized, is very high for a chalcopyrite ore. This high extraction has been made possible by the fact that ore newly-discovered in the mines contains a large percentage of coarse blocky sulphide that is recovered by means of hand-picking and coarse jigging. On the fine concentration and very careful experimenting with a full-sized working unit of the Elmore Vacuum Oil Process plant has shown that high recoveries can be made from the fines and slimes, so that this process supplementing hand-picking and jigging will contribute appreciably to make the total extraction high, while the product will be nearly neutral so far as smelting is concerned. The gist of this comment appears to be that the Elmore Vacuum process has been successful in treating fines and slimes from Britannia ores, and this in "a full-sized working unit" of the plant.

Preliminary results in treatment of ore from the Silvertown Mines Company's Hewitt mine, while distinctly encouraging, were not decidedly successful. However, local conditions should be taken into account, for it is probable that the unit of the Elmore plant put in there has been operated under difficulties separate from it and against its having opportunity to demonstrate its suitability or otherwise to recover the silve-bearing zinc it is sought to save there. The Wakefield mill is an old one, and it has been out of repair to an extent that has interfered with continuous operation. It has been overhauled lately, so it was too soon, when the mill was visited early in November, for those directly concerned to state what results might be

expected under ordinarily favourable conditions in connection with the running of the mill plant.

Progress in Zinc Investigation.

Two years ago the Dominion Government was urged to make investigations in connection with the smelting of zinc ores, with a view to finding a solution of the problem of how to turn to profitable account the great quantities of zinc and lead-zinc ores known to occur in the province, especially in mines in Kootenay district. Several months later the sum of \$50,000 was voted for the purpose of conducting investigations and making experiments, these being under the direction of the Mines Branch of the Canadian Department of Mines. Mr. F. W. Harbord, of London, England, was authorized by the department to investigate and report on the zinc-smelting plants and processes of Europe, and Mr. W. R. Ingalls, the prominent authority on zinc in America, was engaged to act in an advisory capacity to the department. Afterward, bulk samples of zinc ore from Kootenay mines were forwarded to McGill University, Montreal, Quebec, so that reduction tests might be made with a view to determining what treatment process will best suit the ores, respectively. Before quoting Mr. Ingalls' progress report, earlier endeavours to overcome the obstacles to economic utilization of the zinc ores of the Kootenay will be briefly stated.

After the zinc question had been for some time engaging the attention of leading mining men and others interested in mining ores containing lead and zinc, the Associated Silver-Lead Mines of British Columbia, an organization of silver-lead mine owners and managers, instructed its special committee to memorialize the Dominion Government to engage a high authority on zinc and its treatment to investigate and report on the zinc ores of the Kootenay. In connection with this movement, Mr. A. C. Carde, then resident manager of the Payne mine, Slocan, prepared and published a long statement outlining the benefits to be derived from fully investigating the zinc resources of British Columbia as to their extent, value, character, etc., and giving much information relative to the occurrence of zinc in numerous silver-lead mines in Slocan district and elsewhere in British Columbia.

A direct and important result of this agitation was the appointment of a commission "to investigate the zinc resources of British Columbia and the conditions affecting their exploitation." The investigation was conducted by Mr. W. R. Ingalls, who had as his assistants Mr. Philip Argall, of Denver, Colorado, and Mr. A. C. Garde, of Slocan, B.C. The report of this commission—a volume containing about 400 pages—was published by the Dominion Government in 1906.

Progress Report of W. R. Ingalls.—Under date August 23, 1911, Mr. Ingalls made to the Director of Mines, Ottawa, Ontario, a progress report of the zinc investigation authorized in 1910, as follows:

"The general plan of the investigation was fully outlined in my report to you of January 28, 1911. Since that time work has been prosecuted, especially in the field of electric smelting, this being done in the metallurgical laboratory at McGill University, Montreal, under the immediate direction of Dr. Alfred Stansfield. A large number of experiments have been made with several forms of furnaces, certain of which have been of rather elaborate construction, and with a variety of raw material.

"Our early experiments were directed chiefly toward a discovery of the metallurgical conditions that have heretofore prevented a satisfactory condensation of zinc as molten spelter. While I cannot say that these experiments have afforded us a complete explanation of those conditions, they have taught us a good deal, but in spite of the knowledge acquired, we have been so far unable to master the difficulties.

"We have indeed produced some small quantities of spelter and in certain experiments have condensed a fairly large proportion as molten metal, but we have not yet been able to do that at will.

"Our experiments have thrown light upon the principals of furnace design and have led us to condemn several types that we have tried. Our work has indicated that in order to achieve any material improvement over the ordinary practice of zinc smelting, it is necessary to abandon certain features of the latter and contemplate continuous charging of the ore and reduction material and discharging of the residuum without interfering with the process of distillation. These conditions introduce a multitude of perplexing difficulties that can be worked out only by tedious experimentation.

"At the request of the secretary of the Canadian Mining Institute, and with your permission, I presented at the meeting of the Institute in Quebec, in March, 1911, a paper on 'The Problem of Mixed sulphide Ores,' that concisely summarizes the state of the art in the treatment of such ores and the natural obstacles that block procedure in certain directions.

"A careful scrutiny of the work on the treatment of such ores that is being done by other metallurgists and investigators has been maintained, and I have examined numerous proposals that have been presented with more or less detail, both through your office and to me directly but I have not discovered anything save one that in my opinion holds out any promise of successful application to the conditions existing in British Columbia. I am conducting correspondence respecting this, but as to inaugurating experiments upon it, I am disposed to hold them in abeyance pending further progress in our electric work.

"I regard the electric work as being of particular interest as an exploration in a virgin field of unknown possibilities. Doubtless with the same idea a great deal of work in this field is being done by numerous investigators in both Europe and America. I have been informed within a few weeks that there are now two electro-thermic zinc smelteries in operation in Scandinavia, namely, one at Trollhattan, Sweden, using about 7,000 h. p., and one in Sarpsbor, Sweden, using about 4,000 h.p. Operations at those works were inaugurated five or six years ago, but according to my information the results were for several years commercially unsatisfactory, and it is only recently that it has been claimed to have become possible to make spelter from ore on an industrial scale. The companies operating these works maintain absolute secrecy respecting them, and I have not been able to learn any details as to their operations.

"Apart from the work in Scandinavia, as to the commercial success of which no information is available, the electric smelting of zinc ore is, in spite of all claims to the contrary, not only still in the experimental stage, but is in the infancy of the experimental stage. Even if the metallurgical difficulties can be overcome, which is possible, I am of the opinion that no one, except per-

haps the Scandinavians, is yet in a position to make any reliable estimate of commercial advantage or commercial results in any way. It is, however, well worth while to determine the possibilities and publish the results for the general benefit, unveiling so far as possible the secrecy that is likely to be maintained as to investigations in this field by private interests, having always in mind, of course, the hope that our work may develop a process that will be commercially applicable to the treatment of the zinc ores of Canada."

The French Process.—Mr. A. Gordon French, a metallurgical chemist who had previously been making experiments in connection with the reduction of lead-zinc ores, has patented a process which was the outcome of his investigations and experiments. A well known metallurgist thus describes and comments on this process:

"Mr. French's process aims at the extraction and recovery of the zinc contained in ores such as the silver-lead-zinc ores of the Slocan district of British Columbia, leaving as a residue the silver-lead, iron, and gangue matter, which would be afterward smelted in the same manner as a lead ore free from zinc.

"The advantages claimed for such treatment would be:

"1.—The recovery of the zinc in a metallic and marketable form.

"2.—By the removal of the zinc from the original ore—

"(a) The residue would become a lead ore free from zinc and as such would obtain a lower smelting rate and avoid any 'zinc penalty' that would have been attached to the original ore;

"(b) The residue, carrying all the lead and silver of the original ore would be less in weight than such original ore, by the weight of zinc extracted. Consequently, it would contain a higher percentage of lead and silver and there would be a proportionately lessened tonnage to smelt.

"3.—The silver actually occurring in the blende would remain in the residue and so be recovered by smelting, whereas it would be lost if the zinc-blende were to be separated from the lead ore by any mechanical process.

Ores Experimented Upon.—The ores experimented upon have been chiefly zinc concentrates containing galena, zinc-blende, iron pyrites, and iron carbonate together with the gangue matter (quartz and shade), and apparently a percentage of manganese in some form.

Treatment.—The ore is crushed to pass through a 10-mesh screen. It is then roasted in an ordinary calcining furnace until the ore is nearly 'dead', which reduces the original sulphides, theoretically, to oxides, although in practice there are probably sulphates and some sulphides left, depending in quantity upon the completeness of the roast.

"While the roasted ore is still in the calciner, at the hot end, a small percentage of nitre-cake* in powdered form, is thrown in with the ore and thoroughly rabbled into it, making an intimate mixture. This mixture is stirred (rabbled) under heat for a short time. The

*Nitre cake is a bisulphate of soda with some free sulphuric acid in it and is a waste product of sulphuric acid works.

all converted into sulphates. When this action is complete the effect of this is that the oxides in the ore are almost completely dissolved. The charge is removed from the furnace and allowed to cool.

"This roasted and treated ore, after having sufficiently cooled, is transferred to a wooden leaching tank, and water, in which a small quantity of nitre-cake has been placed, is added, and this dissolves out the sulphates of zinc and manganese, together with the sulphate of soda formed by splitting up of the nitre-cake.

"The sulphate of lead is not soluble and the silver can be rendered insoluble. These remain in the tank, as does all gangue.

"Mr. French claims that the sulphates of iron are not leached out until all the zinc is in solution, and if the leaching is stopped before the zinc is all out the iron will be left undissolved. The solutions in the works did not carry much iron, which seems to confirm his statement.

"The filtrate from the leaching tank, containing the sulphates of zinc, manganese and soda are run into a wooden box in which are hung alternate sheets of zinc and lead, immersed in the filtrate or electrolyte. The zinc plates are connected to the positive pole and the lead sheets to the negative pole of a direct-current dynamo of low voltage.

"The action of the electric current is to plate the zinc sheet with metallic zinc which accumulates in a dense hard mass over the entire side of the plate. When this deposit of zinc has attained the desired thickness it is lifted out and a new zinc sheet put in its place. The electrically deposited zinc is afterwards easily stripped from the zinc sheet, the latter to be used again and the former now ready for market after having been melted and run into bars.

"On the negative pole manganese is precipitated as a black oxide of manganese in a powder which is brushed off occasionally and collects in the bottom of the box. This black oxide of manganese has a commercial value.

"The filtrate from the leaching tank flows into the electrolytic precipitating box and out again, being pumped back to the leaching tank, this flow keeping the solution at a normal strength.

"The plant that Mr. French has at Nelson is only an experimental one and is very crude, sufficient only to demonstrate the principle and is capable of treating only a batch of from 500 to 1,000 lb. of ore at a time. The whole plant is home-made. It consists of a small calcining furnace, with a hearth about 20 ft. long by about 5 ft. wide, built of concrete with a brick arch, heated by cordwood used in an ordinary firebox, working doors on one side only.

"The calcining hearth is inclined at an angle of about 10 deg. for the upper part of its length but is level for the lower 5 ft. The ore is fed in at the upper end through the side door by shovel and is rabbled by hand.

"There is one leaching tank, also two wooden tanks for the storage of solutions."

Stamp Milling and Cyaniding.

In this branch of saving of lode-gold the Hedley Gold Mining Co. is by far in the lead in British Columbia; in fact it has been practically alone. However, the Motherlode Sheep Creek Mining Co. is preparing

to also operate a milling and gold-saving plant on distinctly modern lines, though for the present on a smaller scale.

Hedley Gold Mining Co.—The ore from this company's Nickel Plate group of mines is an auriferous arseno-pyrite, with gold virtually its only valuable product. The percentage of extraction made during 1911 from approximately 57,000 tons of ore of an average value of \$12.10 per ton was 92 per cent., or \$11.13 per ton. This is an estimate made before the close of the year, so the official figures, when made public later, may vary somewhat from this, but taking this amount as a basis of comparison, it is four cents per ton higher than the average recovery in 1910 from 46,826 tons, and is believed to represent a closer saving of value. Incidentally, it may be mentioned here that the company paid in 1911 four dividends, totalling \$300,000 or 25 per cent. on its issued capital of \$1,200,000.

In the company's mill are four 10-stamp batteries; stamps are 1,050 lb. each, and they drop $7\frac{1}{4}$ in. at 99 per min. Screens, formerly 20-mesh, are now 14-mesh. There is not any saving of gold on amalgamating tables. The pulp is classified by Bunker Hill screens; the coarse product is concentrated on corrugated belt Frue vanners and the vanner tailing pulverized in a Gates tube-mill having Montana-Tonopah lining. The tube-mill product together with the fine (less than 60-mesh) from the Bunker Hill screens, after regrinding, passes to classifiers and hydraulic sizers, the coarse going thence to smooth-belt vanners and the fine to Deister tables. The tailing from the vanners goes to sand vats and that from the tables to slime vats, sand and slime being thus kept separate. No sand is coarser than 60-mesh when it reaches the leaching vats; leaching takes 20 days in upper and lower vats. Slime is collected in 200-ton settlers, and pumped thence into agitating tanks of similar size and having mechanical agitators. The gold solution is decanted from the agitating tanks and the slime residue passed to two Oliver filter presses. The gold solution from both agitating tanks and filter presses is treated by two Merrill presses, standard 36-in. frame with 20 and 10 leaves, respectively. Consumption of cyanide is about 1 lb., and cost per ton of sand 18 cents. Zinc dust is $\frac{5}{8}$ lb., and cost 5 cents. Approximately 300 tons of concentrate has been produced monthly—probably more now that tonnage capacity of mill is larger; it runs high in gold and is sent to the smeltery at Tacoma, Washington, for extraction of value.

It is permissible to add that during the year development work in the lower levels of the mines placed in sight fully \$1,000,000 worth more ore, so that the outlook for 1912 is bright and the prospects for continuance of dividend-paying most favorable. Mr. Gomer P. Jones is general superintendent.

Motherlode Sheep Creek Co.—The Motherlode Sheep Creek Mining Company, a State of Maine corporation, of which Mr. John McMartin, of Cornwall, Ontario, is the principal owner, and Mr. Wm. Watson, of New York, vice-president and general manager, has put in a 10-stamp mill in connection with which the best talent available has been employed in designing and equipping, so as to ensure thoroughly modern and effective milling and gold-saving treatment of ore from the Motherlode mine, which was first proved to have an ample supply, opened to a depth of 500 ft., and with a sufficient quantity blocked out to keep the mill run-

ning continuously for three years. It was expected this mill would be completed and in operation by the end of the year, but it is not known to the writer if this expectation was realized.

The plant is housed in a frame building covered with corrugated iron, dimensions 187 ft. long and 87 ft. wide. The ten stamps are each 1,250 lb. Size of screens to be used will be determined after ore-crushing has been commenced. The pulp will pass to Merrill patent sizing cones; thence the oversize will be pulverized in a tube mill and be put through a 200-mesh screen joining the undersize from the sizing cones. The entire product will be passed over silver-plated, amalgamating plates, tailing going to a Dorr thickener; overflow pumped back to return battery water tank and the underflow to Pachuca tanks where it will be agitated in cyanide solution by compressed air. Product from the Pachuca tanks will go to another Dorr thickener; overflow, containing the bulk of the gold in solution, will be put through a Merrill clarifying press, which will remove last traces of sand preparatory to precipitation; underflow to mechanical agitator tank from which Merrill slime presses will be fed. Sludge will be washed in the presses and the gold-bearing cyanide solution then flow to the gold tanks, at the bottom of the mill, also containing cyanide solution from the clarifying press. The solution, with zinc dust, will be pumped thence to the top of the mill where the gold will be collected in a Merrill precipitation press designed to hold a month's output. The scheme for refining, which may be modified later, is as under: First, drying precipitate in steam drier, grinding, fluxing with soda, borax, etc., and litharge briquetting, cupelling, in a large test down to lead bullion and continuing cupellation down to high-grade bullion. Amalgam from plates will be retorted and melted in a Case melting furnace.

Power for operating the mill machinery will be derived from Pelton water-wheels, water being delivered at mill at average effective pressure of 600 ft. head. Water will come from two creeks, by continuous red fir stave pipes 2,100 and 4,500 ft., respectively, and then by 7,000 ft. of steel pipe 16 to 14 in. Compressor at mill to have a capacity of 1,440 ft. of free air per minute, and be fitted with a specially designed variable capacity valve gear to ensure highest efficiency from water available.

Other Gold Stamp Mills.—Of eight or ten stamp mills in Nelson mining division, varying from 80 stamps in the mill of the Ymir Gold Mines, Ltd., down to 4 stamps in a Sheep Creek camp mill, only three were operated over the greater part of the year, namely those of the Granite-Poorman mines near Nelson city, and the Queen and Nugget mines, respectively, at Sheep Creek. The Granite-Poorman mill has 20 stamps crushing quartz ore occurring in country rock described as mica-syenite. An application for information concerning the year's progress was not replied to, but a local newspaper during the year printed much stuff about metals of the platinum group having been found on the Granite-Poorman property and what was going to be done at the mill to recover these metals, but, so far as known to the writer, nothing has yet been done on a commercial basis. The Queen, also with a 20-stamp mill, is understood to have continued milling quartz containing auriferous pyrite; no information has been supplied relative to recent results, but earlier opera-

tions, with ore averaging about \$13 in gold per ton, gave a recovery of 55 per cent. on the plates, with the remainder of the recovered value contained in an iron concentrate which was sent to the smeltery for reduction. The 4-stamp mill at the Nugget did good work, making a total recovery of 2,611 oz. of gold and 776 oz. of silver from 3,500 tons of ore; in future this small plant will be used only to treat ore accumulating from the development faces until such time as the permanent milling plant shall be put in. Though comparatively unimportant in itself, this small mill did much to attract notice to Sheep Creek camp, and in large measure led to the bonding and later development of the Motherlode mine and installation there of a mill equipped with the latest effective gold-saving appliances.

It may be of interest to note that, as recorded in a report issued by the Canada Department of Mines, some extremely interesting work was done several years ago near Nelson by Mr. Douglas Lay (who is now superintendent of the Van-Roi silver-lead-zinc mine and concentrating mill), in the treatment of a very low-grade auriferous pyritic ore. A small installation of a Chilean mill, Hendryx agitator, etc., was made; experiments carried on for a period extending over some months demonstrated that, with modifications of what was known at the Hendryx process, an extraction of 85 per cent. of the gold content could be obtained at a cost of \$1.40 per ton for mining and milling; but for commercial purposes a plant of much greater capacity would be required. The experimental plant, however, was a model of economical arrangement.

The owners of the Kootenay Belle gold mine, at Sheep Creek, during 1911, acquired by purchase the 14-stamp mill previously leased, together with water records; the Athabasca mill was worked intermittently; it was reported that the Jewel 15-stamp mill, erected in recent years but as yet but little used, was operated during a part of 1911, but no information was made public. Practically all other mills in the province equipped for treating gold ores were, so far as known, inoperative.

Lower Copper—Smelting Costs.

In his last annual report, for the fiscal year ended June 30, 1911, Mr. Jay P. Graves, Vice-President of the Granby Consolidated Mining, Smelting and Power Co., Ltd., made the following reference to cost of mining and smelting: "Notwithstanding the lower tonnage shipped and the disadvantages under which it was mined by starting and closing the operation of the mines at various periods, the cost of mining was only one cent per ton greater than the year previous, while the cost of smelting was reduced three cents per ton. I consider this excellent work in view of the conditions that prevailed at both mines and smeltery. I believe it is safe to say that the condition of our mines and smeltery is now such that when we are able to operate at full capacity much better results will be achieved and lower costs than we have ever before had will be secured." The tonnage for the two years referred to by Mr. Graves was 950,563 tons for the later year, and 1,175,548 tons for the earlier; the lower costs were on a tonnage reduced in quantity by 19 per cent. Conditions during the greater part of the calendar year, 1911, however, were entirely unfavourable to low costs, for a strike of coal-mine employees in south-eastern British Columbia and Alberta, whence is obtained the usual supply of coke for use in the blast

furnaces, lasted over two-thirds of the year, and the much greater cost of obtaining coke from Pennsylvania, though incurred for a short period by the Granby Co., was prohibitory to smelting the characteristic low-grade ores of this company's mines at a profit, so operations were suspended until after the settlement of the strike and the making available again near the end of the year, of the ordinary sources of coke supply. The disastrous effects of the labour troubles above referred to upon copper production by the Granby Company during the year under review, will be evident from the following figures: Copper produced by company during calendar year 1910, approximately 20,000,000 lbs.; during 1911, 11,000,000 lbs.

British Columbia Copper Co.—This company worked its mines and smelting works throughout the year, notwithstanding the serious disadvantage attending the production of copper at the comparatively high cost of Pennsylvania coke. The tonnage of ore smelted at its works at Greenwood, Boundary district, was about 580,000 tons, and the metals recovered therefrom were: Gold, 29,600 oz.; silver, 127,000 oz., and copper, 9,650,000 lbs. These approximate figures compare favourably with those for 1910, when the tonnage smelted was about 456,000 tons, and the metals recovered were: Gold, 25,640 oz.; silver, 85,000 oz., and copper, 7,351,000 lbs. The increase in tonnage was, therefore, a fraction higher than 27 per cent., and in copper produced, 31 per cent. The great bulk of the ore smelted in 1911 was from mines in the Boundary district, operated by the company—only 15,420 tons came from its mines in the adjoining State of Washington. As costs for 1911 will have been abnormal, it would not be fair to use them for comparative purposes even were they available (which they will not be for a few weeks), but those of several previous years may be given. The cost of producing, refining and marketing per pound of fine copper, after crediting expenditure with the value of gold and silver recovered, has been as follows: For fiscal year ended November 30, 1908, 9.996 cents; 1909, 9.829 cents; 1910, 9.048 cents. If conditions be normal throughout 1912, a further decrease is probable, since management is fully competent and plant thoroughly efficient. As the Granby Company's operations are under similar advantageous conditions, a like further improvement may also be looked for with confidence.

Other Copper Smelting Companies.—As few particulars were obtained of the year's operations at other copper smelteries in British Columbia, it is not practicable at present to give much detail. During eleven months to December 1, the Consolidated Mining and Smelting Company of Canada, Ltd., with smelting works and electrolytic lead refinery at Trail, smelted 308,146 tons, chiefly of crude ore, though a proportion was concentrates. Including receipts during December, estimated at 22,000 tons, the year's total tonnage may be placed at approximately 330,000 tons, and the value of the several metals recovered therefrom as follows: Gold, \$2,745,000; silver, \$715,000; lead, \$770,000; copper, \$520,000; total, \$4,750,000. Quantities of metals have not yet been obtained, but for suggestive purposes the several totals of the last fiscal year (to June 30, 1911), follow: Tons smelted, 388,785. Contents: Gold, 119,067 oz.; silver, 1,458,758 oz.; lead, 24,026,015 lbs.; copper, 4,421,988 lbs.; gross value, \$4,437,901. The production of the calendar year shows

an increase in gross value of about \$312,000. This result is the more noteworthy since the tonnage smelted in the fiscal year was nearly 60,000 tons greater than that during the calendar year.

The Tye Copper Co.'s smeltery, at Ladysmith, Vancouver Island, owing to insufficiency and irregularity in receipt of supplies of ore, is not operated continuously, but only intermittently. During 1911 the furnace was in blast probably six out of twelve months; there was smelted 35,300 tons of ore, from which was produced 6,755 tons of matte, value of which (less refining charges), was \$761,850. It is likely, though, that in 1912 an aggressive policy will be adopted to overcome present transportation difficulties (largely excessive freight charges for transportation of ore), and a sufficient supply of ore to keep the furnaces running at near capacity be secured. Three directors of the company, who recently went from London to British Columbia to investigate local conditions, are understood to intend recommending their colleagues in England to accept their view of the local situation and take steps for an early enlargement of the scope of operations.

Smelting With Oil Fuel.

The following information relative to a demonstration of the use of oil as fuel for smelting copper ore, being part of a report made last summer by Mr. Thos. Kiddie, metallurgist, of Vancouver, B.C., who had made several earlier trial runs at the same works—the old smeltery at Van Anda, Texada Island—is of interest:

“The ore mixture smelted consisted of Boundary district ore, iron ore as a flux; and copper slag from a previous operation. The furnace was started at 11 o'clock a.m., using two burners until it became sufficiently heated, when two more were started. Everything went along satisfactorily and slag began to flow at 12 o'clock, noon. The slag was hot and increased in quantity until it ran a pot of slag in one minute of time up to 2.30 o'clock p.m., during which time it smelted without trouble or interruption.

“Allowing one hour for the heating up of the furnace—a very conservative allowance—we used 157 gallons of oil in 2.33 hours, and 60 gallons for heating up the furnace, or 217 gallons in all. This gives an average of 14.6 gallons of oil per ton of material smelted, equal to 43.8 cents per ton of ore. The rate of smelting was 110 tons per 24 hours, an increase of more than 100 per cent. over the results obtained during the best previous demonstration.

“I have no hesitation in saying that these conditions can, and will, be much improved upon after certain changes shall have been carried out, so that full advantage may be taken of better and more complete combustion of the oil, when the cost of oil consumed per ton of material smelted should approximate 30 to 35 cents per ton of ore. The saving of labour costs at the furnace I estimate at 9 cents per ton of ore.”

New Slag Disposal System.

The excessive cost of continuing the hot-slag haulage system in use at the Granby Company's smeltery at Grand Forks, Boundary district, has caused the management to make provision for disposal of the slag at less cost. For several years the blast furnace slag was granulated by water and conveyed in flumes to the dump; eventually this method of getting rid of the slag was found difficult, a sufficient grade not being

obtainable, as the dump was filled. Then haulage by several 14-ton steam locomotives in 44 cu. ft. slag cars was substituted for granulation, and the level of the dump raised considerably during following years. Latterly it has been necessary to haul the slag about three-quarters of a mile before it could be dumped, and this involved large expense in maintenance of locomotives, slag cars, and railway, so a new system has been devised and the slag from two furnaces will be disposed of by it, pending practical experience of its advantages over the hot slag haulage method.

Central storage bins have been built below the level of the present dump, and to these the granulated slag will be sluiced in flumes. After having been dewatered, the slag will be taken by conveyor belts up an incline trestle and distributed from moveable hoppers. When, later, the top of the incline shall be reached, much of the space along the trestle between the storage hoppers and the highest part of the trestle having meanwhile been used for dumping purposes, a level trestle built to a height of 100 feet, and at right angles to the incline, will serve as a stage from which to dump the slag, and when the dump shall be filled to that height, the platform, or floor, will be moved along as the filled dump shall be extended. For some time a second line of conveying belt will be pushed out, telescope-like, and this device will provide for extension of the dump at the high elevation for some distance. Further development of the system will be arranged when necessity shall arise. Meanwhile the system now about to be used is expected to provide means of disposal of from six to ten millions of tons of slag. Later, when it shall have been in practical operation for a while, an opinion as to its effectiveness can better be given, but if, as is expected it will do, it shall prove successful, the slag from all the blast furnaces, eight in number, will be disposed of by this means.

Concentrating Mills for Silver-Lead Ores.

Several more mills have been erected and equipped for concentrating silver-lead ores, and in two or three instances arrangements have been made for producing a silver-zinc as well as a silver-lead concentrate. Of these mills, that of the Van-Roi Mining Co., on Four-mile Creek, near Silvertown, Slovan Lake, was in operation during about nine months of the year. The quantity of ore treated and production of metals during six months to October 1, was as follows: Ore treated, 22,427 tons. Metal contents of 1,214 tons silver-lead concentrate: Silver, 100,887 oz.; lead, 1,585,960 lbs.; zinc, 220,960 lbs. Of 1,598 tons of silver-zinc concentrate: Silver, 47,507 oz.; lead, 54,340 lbs.; zinc, 1,457,320 lbs. Production for the remaining three months of the year was proportionate—say about half as much as that given above, since the quantity and grade of ore treated monthly remained about the same. A mill for the Standard mine, also in Four-mile camp, was completed in November, and concentration of second-grade ore commenced, first-class being sorted out and shipped to the smeltery in its crude state. The Portland Canal Mining Co. completed its mill in Portland Canal district, and after operating it for a time, enlarged its capacity to 75 tons per day. The output consisted of two products—an iron concentrate, having its chief value in gold, and a silver-lead concentrate. A mill to treat 50 to 60 tons of ore per diem, will concentrate ore at the Monarch mine, near Field, on the Canadian Pacific main-line railway. The ore is

principally lead, but there are shoots of it containing much zinc also. Some 20,000 to 25,000 tons is blocked out, and development of more ore is in progress. Changes and improvements were made at several other concentrating mills, but there is little, if anything, out of the ordinary to note in connection with their operation.

Work of Geological Survey in Western Canada in 1911.

A number of Canada Geological Survey field parties gave attention to Western Canada, doing chiefly geological and topographical work, during the field-work season of 1911. Most of these pursued their investigations in British Columbia; the others were engaged in Alberta, with the exception of one party that worked in Yukon Territory.

Field Work in Alberta.

Dr. Heinrich Ries, Professor of Economic Geology at Cornell University, Ithaca, New York, and Mr. Joseph Keele, of the Survey permanent staff, continued their investigations, commenced in 1910, of clay deposits in the prairie provinces and British Columbia. As noted in the last "Summary Report" of the Survey, "with settlement of the country the demand for clays suitable for all kinds of clay products becomes urgent. If found, important industries are developed; without them, a serious burden is imposed on the communities concerned." The information relative to the clay resources of the western provinces, thus obtained by the Survey, will be both dependable and valuable.

Mr. D. B. Dowling continued the work he commenced in 1909 and also carried on in 1910, exploring the coal-bearing rocks on the eastern slope of the Rocky Mountains, north of the Canadian Pacific main line of railway. In 1911 he finished mapping the coal area immediately adjoining the Grand Trunk Pacific Railway in the Rockies, the coal fields along which are of special importance. This supplemented his work in 1910, when he delimited the coal formations in the neighbourhood of Jasper Park, Yellowhead Pass. He also visited numerous localities in Alberta and Saskatchewan, where new coal mines are being opened.

Mr. W. W. Leach made a study of the geology and measured a number of sections, preparatory to the publication of a map of the Blairmore-Frank coal field, through which the Crow's Nest Railway passes. This field was examined by Mr. Leach in 1902, and the Survey published his report and map of it. Now it has developed into such an important coal-producing area that the Survey is bringing up to date the available information relative to it. Mr. W. H. Boyd, chief topographer, had a large party working in the vicinity of Coleman, Blairmore, Frank, Bellevue and Hillcrest, obtaining data requisite for publication of a topographical sheet on a scale of one mile to one inch. He also completed a detailed map of Turtle Mountain and the Frank landslide. It was the intention of the director of the Survey to visit Frank at the time the commission appointed by the Dominion Government to examine the condition of Turtle Mountain and to report the result of their investigations as bearing upon the probability or otherwise of another slide occurring and the possible danger to life and property, but serious illness prevented Mr. Brock from meeting the commission at Frank in October, as had been arranged he should do. The report of the commission, which consisted of Mr. G. S. Rice, of the United States Geological Survey; Dr. R. A. Daly, formerly geologist

of the International Boundary Commission, and Dr. Willet G. Miller, geologist for the Province of Ontario, has not yet been made public.

Survey Operations in British Columbia.

British Columbia was privileged in having the benefit of the valuable services of by far the greater number of Survey parties engaged in the West, as is shown by the following notes:

Mr. John A. Allan continued his study of a section along the Canadian Pacific Railway, across the Rocky Mountains. He also made a reconnaissance in the Beaverfoot range and investigated the known mineral deposits there. An interesting report on his 1910 work in the Ice River district is contained in the "Summary Report" for that year.

Dr. C. D. Walcott, of Washington, D.C., Secretary of the Smithsonian Institution, who during three years, 1907-10, had been studying the Cambrian series about Field and east along the C. P. R., spent the 1911 season in investigating the Cambrian fauna of the Rocky Mountains, in the vicinity of Field. In the course of this work Dr. Walcott has secured many most beautiful fossil specimens, concerning which he has placed on record valuable information.

Mr. S. C. McLean did the triangulation for a topographical map of the Windermere district, East Kootenay, following similar good work done in the interior of Vancouver Island, in 1909 and 1910.

Mr. Stuart J. Schofield continued his investigations in East Kootenay, and spent last season in studying the geology and ore deposits in the country southwest of Cranbrook; he also examined a group of deposits around Kimberley, in another part of Fort Steele mining division. With the provision of railway transportation facilities northerly from Cranbrook, up the valley of Kootenay River, and thence beyond Windermere, down the Columbia Valley, the work of Messrs. Schofield and McLean is timely and will be of much service to prospectors and other mining men, giving attention to that part of East Kootenay.

Mr. O. E. LeRoy, who commenced late in the season of 1908 to give attention to the Sloean district, and continued his investigations during two seasons that followed, last year examined the geology of 100 square miles in the vicinity of Nelson; beside this, he supervised the work of Mr. C. W. Drysdale, who mapped an area of 16 square miles, embracing Franklin camp, north fork of Kettle River, Boundary district. Mr. A. C. T. Sheppard completed the work on the topography of Sloean district, with which he had previously assisted Mr. Boyd in 1910.

Dr. R. A. Daly made a reconnaissance of the area covered by the Shuswap sheet, with a view to a report being issued on this area, the map of which has already been published by the Survey.

Mr. L. Reinecke studied the geology and ore deposits of the Beavertell district and adjacent country, west fork of Kettle River, Boundary district, the topography of which he had been engaged on during the 1909 and 1910 seasons.

Mr. Charles Camsell examined the gravels of Tulameen River, for the purpose of obtaining further information regarding the occurrence of diamonds at

Olivine Mountain, Tulameen district. He also made a study of Steamboat Mountain, Siwash Creek, and Fraser Canyon, beside making a reconnaissance into the country west of Lillooet.

Mr. Charles H. Clapp followed up his 1910 geological work in the vicinity of Victoria, Vancouver Island, by making a detailed survey of the Nanaimo district, in which is situated the producing mines of the Nanaimo coal field. A visit was also made by him to the Cumberland-Comox and Suquash coal fields.

Messrs. R. H. Chapman and K. G. Chipman were again engaged in mapping portions of Vancouver Island. Last season's work embraced Nanaimo, Alberni, and Cowichan Lake. The work for the northern part was done by Mr. Chapman, while Mr. Chipman undertook it in the southern part.

Mr. G. S. Malloch made a traverse from Hazelton to the Groundhog Mountain coal basin, and examined in a preliminary way the south end of this basin. He also investigated the geology of the Kispox Basin, and visited a number of the more recently discovered metalliferous deposits near Hazelton.

Mr. R. G. McConnell, who spent the season of 1910 in studying the geology and ore deposits of the Portland Canal district and made a long report thereon, which report was printed in the "Summary Report" for that year, completed his work in that region, and then made a study of the geology and mineral deposits on Observatory Inlet and Salmon River.

In Yukon Territory.

Mr. D. D. Cairnes, who in 1910 spent the season in Atlin district, B.C., last year resumed work in Yukon Territory, in which he had previously been engaged during three seasons—1907-9. His 1911 work included studying the geology of an area 60 miles long and 5 miles wide, along the Yukon-Alaska boundary, between the Yukon and Porcupine Rivers. Beside this, he made a preliminary examination of the quartz veins in the Klondike district.

From the Director's View-Point.

It will be at once admitted that the Geological Survey of Canada continues to do a great deal of most valuable work in western Canada. In this connection it is of interest to have the view of the Director of the Survey, who, in the last published "Summary Report" observed, under the head of "Field Work": "The geological and topographical field work undertaken by the Geological Survey during the past season has, as usual, been economic in its bearing, most of it directly so; but a little has been on the broader problems of Canadian geology the solution of which is required for the interpretation of the facts gleaned in the detailed examination of the mining districts. Most of the fields selected are those in which work has been specially asked for by the mining profession, boards of trade, etc. Not all such requests received could be met, on account of the lack of specially qualified men to take charge of the operations. So far as was possible, however, this was done. The guiding principle in the selection were to choose those districts in which the work would be likely of most immediate or of greatest value."

THE NEW PROFESSOR OF METALLURGY AT THE UNIVERSITY OF TORONTO.

The appointment of Mr. George A. Guess to the position of Professor of Metallurgy in the University of Toronto, is an event of prime importance. It is only the beginning of a sane recognition on the part of the University Board of Governors of the imperative need of finishing the lop-sided structure that now exists.

Mr. George A. Guess is a mitigated Canadian. On Ontarian by birth, his academic training was received at Queen's University, from which institution he graduated, in the year 1894, with the degree of Master of Arts, a degree that then implied in certain courses strong specialization in the sciences.

The first venture of the young graduate was in south-eastern British Columbia. In those days the college product had a hard row to hoe. The paternal instinct had not then been developed in the professional bosom. The graduate had to look out for himself. His ambi-



tion usually was to run an assay office. He was regarded with a hostile eye by manager and miner. In short, his path was strewn with no roses.

After experiencing the usual vicissitudes, Mr. Guess, wholly on his own merits, formed connections with Canadian and American smelting interests that gave him a fair start in his profession. It was at about this time that the orbits of Mr. Guess and of Mr. H. E. T. Haultain, at present his fellow-professor, crossed—without damage to either. Together they evolved and perfected the Guess-Haultain laboratory electrolytic apparatus for the estimation of copper, lead, etc.

Of Mr. Guess's whole professional career it is impossible to give a detailed account. An attempt to penetrate his armour of reticence or modesty—or alloy of both elements—turns the point of the keenest enquiry. Suffice it to say, that he has specialized for a number of years in the metallurgy of copper ores in the United States, Mexico, and South America. The Greene Cananea Copper Company, operating in Mexico, is one of the largest and most noted of its kind. Mr. Guess was in charge of smelting and concentrating investigations there for two years. Leaving there to become assistant superintendent of the Tennessee Copper Company, within a year he was promoted to the position of Metallurgical superintendent. At the Tennessee plant, pyritic smelting is practised on a large scale. The ore capacity is about 40,000 tons per month. Smelting costs are as low, if not lower, than those of any other American concern, and it may be mentioned that Mr. Guess himself was a factor in reducing expenses to their present level.

The next move made by Mr. Guess was to Peru. Here, in the rarified atmosphere of the Andes, he performed the onerous duties of metallurgical superintendent for the Cerro de Pasco Mining Company. The scale upon which operations are conducted at this plant is indicated by the monthly output of 4,000,000 lbs. of fine copper, rich in silver. The plant is situated at an altitude of 14,000 feet above sea-level.

In the course of his professional work, Mr. Guess has visited all the more important copper smelters and refineries in the United States. His opportunities have been exceptionally favourable to the rounding out of his knowledge and judgment. He is typically the product of large commercial responsibilities successfully assumed. And, praise be, he is a Canadian.

The **Canadian Mining Journal** greets Professor Guess with both hands. The warm sympathy of the mining fraternity of Toronto was sufficiently shown at the last local meeting of the Canadian Mining Institute. The willing co-operation of the whole body of Ontario mining men may be counted upon by the University, provided the University does its fair share in treating rightly its departments of mining and metallurgy.

PERSONAL AND GENERAL

Mr. Stanley Leckie returns from Europe this week.

Mr. Martin Nordegg is expected in Toronto on January 31st, after a long absence in Germany.

Mr. J. M. Eakins, formerly manager of the Foley-O'Brien, has returned to Toronto, after a professional visit to Cuba.

Mr. Chas. J. Coll. for a number of years general manager of the Acadia Coal Company, Limited, Stellarton, Nova Scotia, has severed his connection with that company. Under Mr. Coll's management the Acadia Coal Company's outputs have been steadily maintained and enlarged, until during the last year all previous re-

cords have been exceeded. The sinking of the famous Allan shafts, the construction of steel bankheads, and the installation of electrical equipment at the Allan and Albion collieries, were some of the many features of his work.

Mr. Coll has been constantly active in all matters pertaining to the improvement of methods, the fighting of mine fires, and in mining matters generally. For two years he was president of the Mining Society of Nova Scotia, and has been a member of the Council of the Canadian Mining Institute for some years. It is with sincere regret that the mining fraternity of Nova Scotia learns of his departure from the Province.

Mr. P. A. Robbins was in Toronto during the last week of January.

The officers elected by the Cobalt Branch of the Canadian Mining Institute for the coming year were, Mr. Norman Fisher, Chairman; Mr. A. A. Cole, Secretary; and Messrs. Reinhardt, Neilly, and McVichie, Committee.

Mr. Herbert Carmichael, provincial assayer, recently visited the Marble Bay and other mines in the vicinity of Van Anda, Texada Island, British Columbia.

Mr. Clive White, mining engineer, in the employ of the Arizona Copper Company, at Morenci, Arizona, has been visiting his father, Mr. Oscar White, manager of the Slocan Star mine, near Sandon, Slocan district, B.C.

Mr. J. W. Bryant, for years with the Tye Copper Company, has been at some of the Conrad mining properties in the Windy Arm district, Southern Yukon, during several weeks since, meeting the directors of the company named, when they were on the Pacific Coast late last year.

Mr. Thomas McGuickie has succeeded Mr. Thomas Graham as superintendent of Western Fuel Company's coal mines in Nanaimo district, Vancouver Island, B.C. Mr. Graham now has his headquarters, as chief inspector of mines for British Columbia, in Victoria, his office being in the Department of Mines there.

Mr. J. W. Powell, formerly mine manager for the International Coal and Coke Company, at Coleman, Alberta, and afterward for a short time at the Bellevue Mine of the West Canadian Collieries, Ltd., near Frank, Alberta, is now with the Columbia Coal and Coke Company at Coalmont, Tulameen, B. C.

Mr. J. E. McAllister, of New York, consulting engineer for the British Columbia Copper Company, Ltd., was in the Boundary district, B.C., recently.

Mr. Donald G. Forbes, at one time manager of the Silver Cup and other mines situated in the Lardeau district of British Columbia, has been examining the Hidden Creek copper mine, Observatory Inlet, B.C.

Mr. James Rutherford, of Victoria, B.C., who during the last two or three years has been obtaining, for Scottish capitalists, information relative to the mineral resources of the Peace River country and other interior districts of British Columbia, has gone to Scotland to personally report to his principals the results of his extended enquiries.

Mr. W. J. Elmendorf, general manager for the Portland Canal Mining Company, has returned to British Columbia, after having met Sir Donald Mann in Southern California, and discussed with him a proposed amalgamation of certain interests in mining properties situated in the Portland Canal mining division. Mr. Elmendorf, after a conference with the directors of his company, went up to Portland Canal.

THE PETROLOGY DEPARTMENT

By G. S. SCOTT

[This department has been arranged with a view to assisting those of our readers who are far removed from ordinary scientific facilities. The following article explains itself. Any further suggestions will be welcomed.]

Every mining engineer whose interest in ore deposits extends to the microscopic study of rocks is aware of the great delay in having thin sections prepared by the section makers in the States or in Germany. As a result microscopic examinations are often set aside as impracticable, even by those who most appreciate their value. And even if the sections could be had at once, it often happens that the engineer has neither the time nor the convenience required for their study. And moreover, not all have had the somewhat tedious training and experience which is necessary to make this study effective.

In view of these facts, arrangements have been made to have thin sections cut from rock or ore specimens sent to the **Canadian Mining Journal** for that purpose and the result of their study published in the following number. The examinations will be made by the writer, who first studied the examination of rocks with the microscope at the School of Mines in Freiberg, and for

two years was Assistant in Mineralogy at the Toronto University. He has had considerable experience with the Porcupine and Swastika rocks.

In choosing samples of rock they should be selected away from fractures and rusty joints, and should be solid and free from cracks. Information regarding the occurrence of the samples greatly facilitates microscopic study and is always to be sent. For instance the locality, the depth from the surface, the distance from vein or dike or other mass of rock should never be omitted.

These facts are useful in making a microscopic examination and often save the observer who has only the hand specimen and section to judge from much trouble by indicating at the start the class of rock he has to deal with. This is specially the case with fine grained rocks.

No charge will be made for the study of the sections, but to cover the cost of their preparation which is done in the City on a day's notice 35c each will be required. This with the specimens and notes should be addressed to the Petrological Department, Canadian Mining Journal, Toronto.

No one will dispute the value of geology in mining. The day is past when a mine was considered a haphazard accumulation of ore whose development could be safely left to the miner. But it is not far past as regards the greater part of the mining profession; and many mining engineers are still intolerant of the introduction of matters concerning the rocks, and the genesis of the ores, into the practical questions of mining. Yet no proposition could be more self-evident than that all interferences regarding such important points as the extension and shape of the ore-body beyond where known, alternations in the character and richness of the origin and history of the deposit concerned, and that the origin and history of a deposit concerned, and that properly planned and it should be equally apparent geological. But this blindness is more conspicuous among the operators. How common it is to see a company that has acquired a prospect or a mine, acting as though the only thing to do were to send out the necessary number of labourers to load the ore on the cars! It might be expected that ordinary prudence would manifest to them the advisability, not to say necessity, of first determining what they had in their mine and how it was distributed, so that development could be properly planned. It should be equally apparent that a problem of such essentials to success should be entrusted to a man with the training and experience requisite to decipher the only evidence bearing on the question,—namely, that presented by the ores and the associated rocks. The engineer familiar merely with extraction, treatment, and incidental matters is here out of his place. From lack of acquaintance with, and

appreciation of the subject, he must necessarily limit himself to statements of little significance, which are usually expressed in the time-honoured and hackneyed terms of the prospectus.

No branch of geology is of more importance in the investigation of ore deposits than that concerned with rocks. And in the study of rocks (petrography) no method of observation can be compared for utility with the method of examining rocks with the microscope (petrology). No person engaged in working out the geology of a mine can afford to ignore its unique and lavish assistance. So far as rocks are concerned, this is specially true of Canada where crystalline schists are predominant. These rocks (gneisses, schists, phyllites, many greenstones, etc.) were a sealed book, until towards the end of last century the geologists interested in these puzzling rocks discovered in the microscope an unexpected but most capable ally. Considering what an enigma the crystalline schists were at that time, the subsequent progress of knowledge is nothing short of marvellous. The microscope is doing for the schistose rocks, with which many ores are generally related, what palaeontology has already done for the more superficial strata of the earth's crust.

The essential part played by geology and petrology in mining has been treated above only in a very general way. It is a subject as fascinating as it is helpful and it is hoped to continue it in future articles. Some of these will deal in detail with particular cases, preference being given to those that best exemplify the practical value of the microscope.

G.S.S.

ANNUAL REPORT OF THE COAL MINES BRANCH, ALBERTA

During the year several changes were made in the staff of inspectors. In March Mr. Robert Livingstone resigned his position as Provincial Inspector of Mines to accept a position with the Alberta Railway & Immigration Co., at Lethbridge, as superintendent of their mines, Mr. John T. Stirling being appointed provincial inspector and Mr. Elijah Heathcote, who held the position of mine superintendent with the Crows Nest Pass Coal Co., at their Coal Creek mines, was appointed district inspector of mines with headquarters at Calgary.

In June Mr. A. R. Wilson resigned his position as district inspector of mines at Lethbridge, and Mr. John W. Powell, who held the position of mine superintendent with the McGillivray Creek Coal & Coke Co. at Coleman, was appointed as his successor.

In September, owing to the increase in the number of mines operating in the province, it was decided to appoint another district inspector, and consequently a rearrangement of districts was made necessary. Mr. Elijah Heathcote was appointed district inspector for the district west of Macleod, with headquarters at Macleod. Mr. John W. Powell was transferred from Lethbridge to Calgary District, which is the district east and west of Calgary, south to Okotoks, and north to Wetaskiwin, and Mr. Andrew N. Scott was appointed district inspector

with headquarters at Lethbridge. The Lethbridge district includes the district from Kipp east to Medicine Hat and from the south boundary of the province north to Reid Hill.

From the following comparison of outputs for the last few years, it will be seen that a steady development has been taking place in the coal mining industry in the province. The year 1910 shows an increase in output of 862,428 tons over the year 1909.

Year.	Output in tons for N.W.T. (Alberta and Saskatchewan.)	Output in tons Alberta.
1901	346,649	.....
1902	510,674	.....
1903	622,939	.....
1904	782,931	.....
1905 .....	.....	811,228
1906 .....	.....	1,335,000
1907 .....	.....	1,834,745
1908 .....	.....	1,845,000
1909 .....	.....	2,174,329
1910 .....	.....	3,036,757

The above figures show that there has been an increase of 39.66 per cent. over the 1909 output.

CLASSIFICATION OF OUTPUT OF COAL IN ALBERTA DURING THE YEAR 1910.

	Tons.		Tons.
Lignite coal	878,011	Coal used in coke production	196,249
Bituminous coal	1,896,961	Coke produced	121,578
Anthracite coal	261,785	Briquettes produced	108,996

The following summary shows the total sales of coke, briquettes and coal of the Province:

	Bitu'nous.	An'cite.	Lignite.	Briquettes.	Coke.
Sold for consumption in Alberta	1,291,721	40,091	438,781	89,383	136
Sold for consumption in other provinces	124,274	43,110	317,959	19,387	70,297
Sold for export to the United States	215,976	758	27,397	44	51,144
Total sales	1,631,971	83,959	784,137	108,814	121,577

The following table shows the classification of persons employed above and below ground in the bituminous, anthracite and lignite fields:

AVERAGE NUMBER EMPLOYED.

Character of Labour.	Bituminous.		Anthracite.		Lignite.		Total	
	Above.	Below.	Above.	Below.	Above.	Below.	Above.	Below.
Supervision and clerical assistance	70	64	11	11	68	94	149	169
Miners and helpers . . . . .	..	1341	..	177	..	1264	..	2782
Mechanics or skilled labour	233	47	35	..	160	14	428	61
Other employees	602	624	146	150	403	304	1151	1078
Total	905	2076	192	338	631	1676	1728	4090

SUMMARY OF STATISTICS.

Number of mines at present in operation	154
Number of new mines opened in 1910	42
Number of mines abandoned in 1910	7
Number of tons of coal mined	3,036,757
Number of tons of coke produced	196,249
Number of tons of briquettes produced	108,996
Average number of persons employed inside mines	4,090
Average number of persons employed outside mines	1,728
Number of persons employed inside the mines during December, 1910	4,714
Number of persons employed outside the mines during December, 1910	1,808
Number of separate accidents causing loss of life	29
Number of deaths caused by accidents inside the mines	59
Number of deaths caused by accidents outside the mines	2
Number of non-fatal accidents inside the mines	87
Number of non-fatal accidents outside the mines	11
Number of mine manager's certificates issued	9
Number of pit boss certificates issued	12
Number of fire boss certificates issued	38

MINES ABANDONED DURING 1910.

Mine No. 103.—Operated by Simon Downie & Son, Carstairs, section 19, township 29, range 5w5.

Mine No. 109.—Operated by Harper Coal Co., Edmonton, River Lot 22.

Mine No. 125.—Operated by Ketchum Coal Co., Edmonton, northwest quarter of section 7, township 53, range 23w4.

Mine No. 176.—Operated by Ashworth Townsley, Magrath, section 2, township 7, range 2w4.

Mine No. 190.—Operated by R. B. Durrant, Livingstone, northwest quarter of section 36, township 8, range 2w5.

Mine No. 206.—Operated by Burdett City Coal Co., Burdett, section 23, township 10, range 12w4.

Mine No. 230.—Operated by R. W. K. Cousins, Cochrane, southeast quarter of section 6, township 26, range 4w5.

EXTRACTS FROM INSPECTOR'S REPORT.

John Stocks, Esq., Deputy Minister of Public Works, Edmonton, Alta.

Sir,—As Provincial Inspector of Mines, I have the honour to submit herewith my annual report for the year ending December 31, 1910.

Considerable development has taken place in the coal mining industry in the province, in both the lignite and bituminous fields, but more especially in the bituminous field. A number of new mines have been opened up, and while a large percentage of them are not yet large producers it is expected that during the year 1911 there will be a still greater activity shown in the coal mining industry.

In the Lethbridge District the Alberta Railway & Irrigation Co., Ltd., has commenced development of their No. 6 mine on a large scale. The Diamond Coal Co. is also pushing ahead with development work and have made additions to its plant. The Lethbridge Collieries, Ltd., has sunk two shafts and is equipping for an output of about 2,000 tons per day. Shafts are also being sunk by the Chinook Coal Co. in this district.

In the Taber District considerable development has taken place, although the majority of the mines are being operated on a small scale. Coal cutting machinery is being largely adopted in this field, thus allowing a larger output to be produced with the same number of persons.

In the Crows Nest Pass District a large development has also taken place, and although there have been no new mines opened up the output from this district has increased considerably. The Leitch Collieries, Ltd., is carrying on a large development in its No. 2 North

Mine and is erecting one hundred coke ovens and a washer. At Blairmore a new mine opened up by the West Canadian Collieries, Ltd., is also being rapidly developed. The McGillivray Creek Coal & Coke Co., Ltd., has completed the installation of a new tippie and plant. The West Canadian Collieries, Ltd., has completed the installation of a new tippie and electric machinery at its Bellevue mine. The Davenport Coal Co. has also been installing a tippie and plant at its mine opened up last year at Burmis.

In the Pincher Creek District the Western Coal & Coke Co., Ltd., is employing sixty men and is developing its mine so as to be able to handle a large output when they get railway facilities.

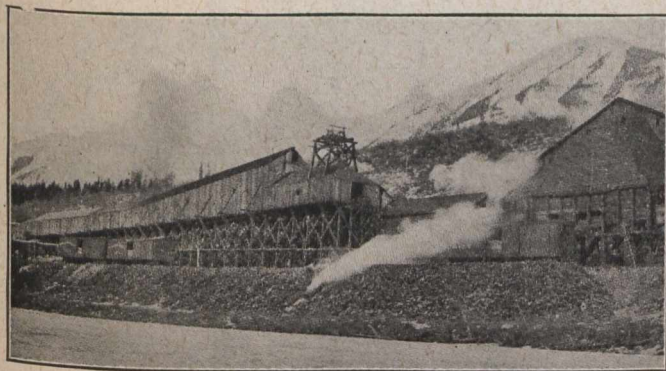
Considerable activity has taken place in the district west of Edmonton, five companies have been mining on their respective properties during 1910, and it is expected that as soon as railway connections are made with these different properties a large quantity of coal will be produced. The following is a summary of development work which has taken place at the different mines in the various districts during the past year:

[Editor's Note:—Only a few of the more important mines are noted here.]

CALGARY DISTRICT.

Bankhead Mines, Ltd., Bankhead.

Two 7 in. x 14 in. compressed air locomotives, one surface condenser with 2,000 sq. ft. of cooling surface and one L. P. air compressor have been installed. A tunnel is being driven across the measures. This tunnel has been driven a distance of 3,000 feet. Another rock tun-



Surface Plant, No. 2 Mine, H. W. McNeill Co., Ltd., Canmore, Alta.

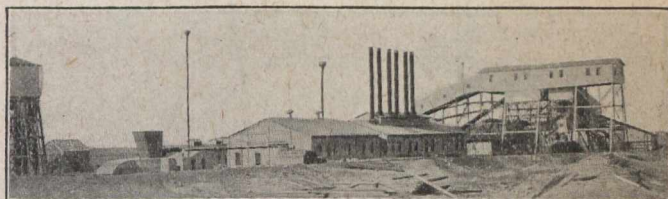
nel is being driven, which will be used as a haulage road from Nos. 4, 5 and 6 seams. The use of explosives is still being discontinued as far as possible, and where it is necessary to use an explosive only Monobel powder is being used. The use of this powder has added greatly to the safety of the mine and has also increased the percentage of lump coal produced.

The H. W. McNeill Co., Ltd., Canmore.

One 6 in. x 10 in. Porter compressed air locomotive has been installed at this mine. A slope is being sunk from the surface to the Sedlock seam for a return airway for No. 1 mine. The airways in both Nos. 1 and 2 mines have been enlarged and re-timbered. A tunnel is being driven in No. 1 mine from No. 1 seam to intercept No. 3 seam.

CARBON AND THREE HILLS DISTRICT.

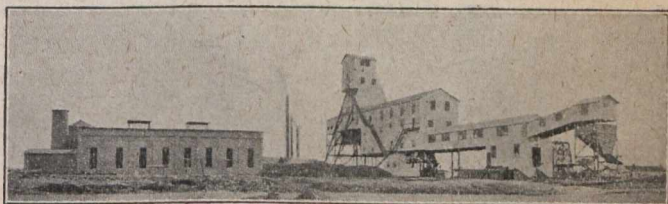
There are ten mines operating in the Carbon and Three Hills District, all of which are being worked on a small scale owing to the lack of transportation facilities; the amount of coal produced being regulated entirely by the local demand. This coal is of an excellent quality for domestic use. The seams are easily accessible, lying practically horizontal and overlaid by shale and sandstone which forms a fairly good roof. With the coming of this railway, which it is expected will be built through this part of the country during the present year, a largely increased output is to be expected. Preparations are being made in this district for the installation of machin-



Surface Plant of Canada West Coal Co., Ltd., Taber, Alta.

ery at various mines so that they will be in a position to produce a fairly large output when the railway is completed.

Only one or two mines are being operated in the High River District and on a very small scale. The coal is of a semi-bituminous nature and of good quality, and varies from five feet to eight feet in thickness, but owing to the lack of transportation facilities very little is being done in this district. Machinery has been installed by the Black Diamond Collieries near Okotoks, and preparations are being made to sink a deeper shaft and do a large amount of development work underground.



Surface Plant, Nos. 5 and 6 Mines, Lethbridge, Alta.

A number of small mines have also been opened up along the Wetaskiwin and Lacombe branches, but as the output of these mines is entirely regulated by local demand, they only work for about six months in the year. In the Fieldholme District a mine has been opened up on sections 6 and 7, township 23, range 14, west of the 4th meridian. The coal seam is 5 ft. 6 in. thick and makes a very good domestic coal. Considerable prospecting has also been done along the north side of the Red Deer River and quite a number of parties have located coal lands in this district.

EDMONTON DISTRICT.

In the Edmonton District a number of mines have been opened up and some of them are becoming fairly large producers. At Clover Bar a number of these mines have now got transportation facilities on the railway and are largely increasing their output.

Edmonton Standard Coal Co., Ltd., Edmonton.

A considerable amount of development has taken place

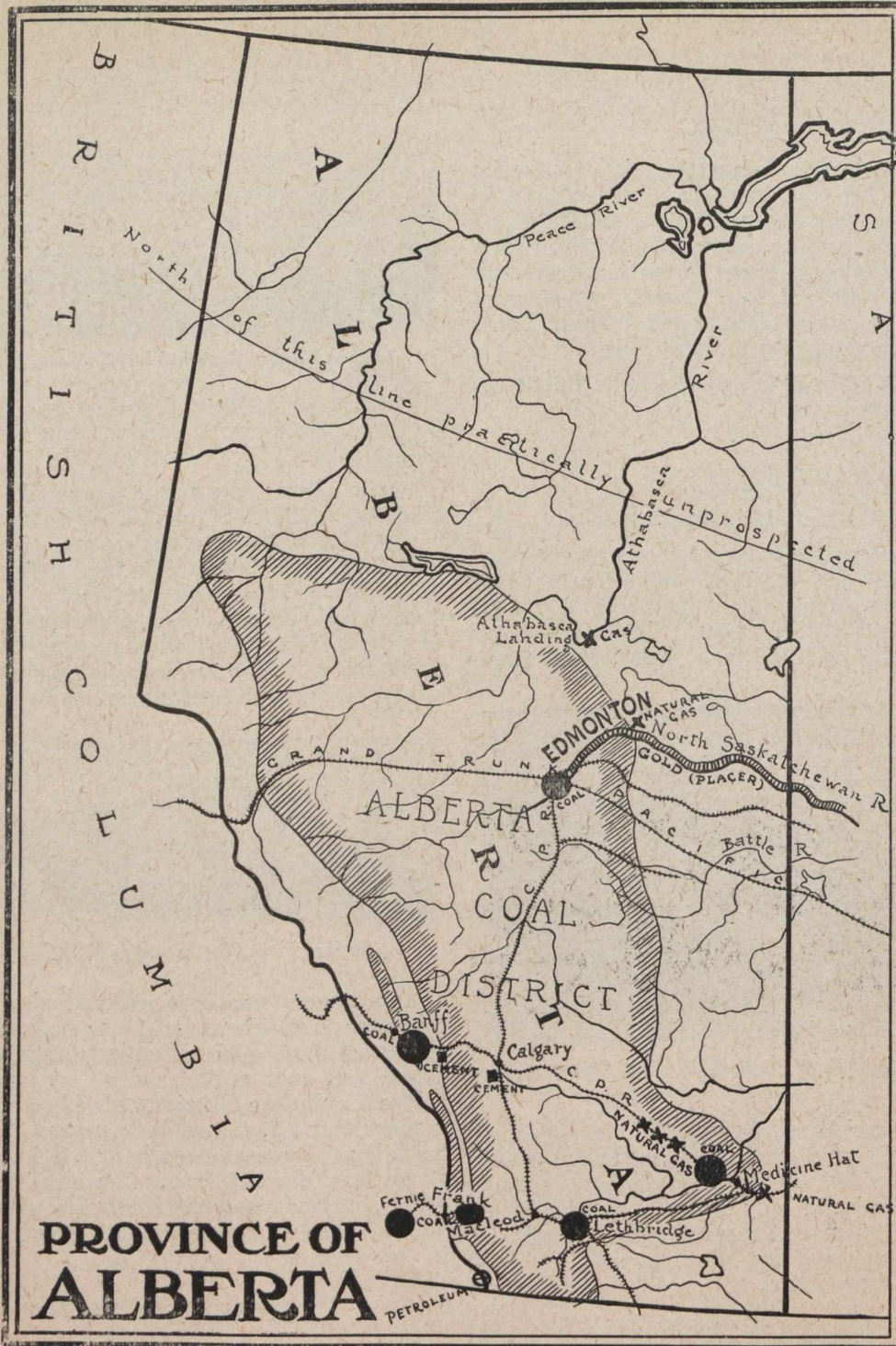
at this mine and a Sheldon fan capable of producing 40,000 cubic feet of air per minute has been installed.

Pacific Pass Coal Fields, Ltd., Edmonton.

This company controls coal claims of about 50,000 acres extending in a northwesterly direction from the forks of Big Pembina and Little Pembina Rivers, about

to handle a large output when the Grand Trunk Pacific branch line has been built in to the property from Mile 16.

A mine is being opened up by the Wabamun Coal Co. at Lake Wabamun and a shaft being sunk and it is expected mining operations will be commenced in the early part of this year.



28 miles. Several seams are outcropping all along the property, the two largest being about 17 feet thick and separated by 140 feet. The strata where No. 1 mine is being developed are pitching about 25 degrees in a southerly direction. The coal is bituminous and of good quality for steam purposes. Preparations are being made

At the crossing of the Pembina River the Coal can be seen outcropping on the river bank. Besides these outcroppings on the river a large amount of drilling has been done on the property of the Pembina Coal Co., Ltd. Shafts have also been sunk on this property and the quantity and quality of the coal proved. It is a lig-

nite coal and very suitable for domestic use. The next point where coal is found is at Wolfe Creek, but as it does not appear to be of workable thickness very little has been done at this point. Following the MacLeod River westward large beds of sandstone of the lower Larmie series are passed to Mile 142.

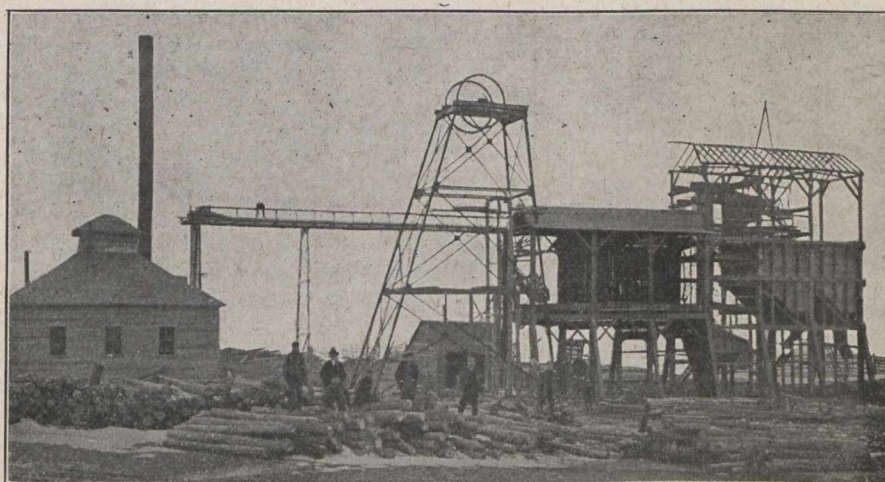
Further west at the headwaters of the Embaras River, a large amount of development work was done during the summer of 1910 by the Yellowhead Pass Coal & Coke Co., Ltd., and several seams of a semi-bituminous coal, varying in thickness from two feet to twenty feet have been proved. These seams dip at an angle of about fifty degrees. Four slopes have been driven across the measures in the bottom bench of the twenty-foot seam at an angle of about twenty-five degrees. These seams are separated by carbonaceous shales and sandstone which form a very good roof. This company has installed the following machinery on its property during the year: Two 80 h.p. boilers, one 60 h.p. hoist, one 20 h.p. engine for ma-

with a capacity of 150 gallons per minute has been installed, also one pump with a capacity of 200 gallons per minute, and one Sirrocco fan capable of producing 50,000 cubic feet of air per minute.

This company has also built a steel tippie with a capacity of 2,000 tons per day and installed 60 steel Watt mine cars with a capacity of four tons each. One machine shop 100 feet by 30 feet, built of stone and fully equipped. One power-house 80 ft. x 56 ft. built of stone and equipped with two 150 h.p. Waterous boilers and one 150 k.w. direct current generator direct-connected to engine. An outside electric haulage road 42-inch gauge, one and a half miles long connecting the mine and tippie and operated by two 100 h.p. electric motors of the Goodman type.

Blairmore Mine.

The following plant has been installed during the year 1910: One 150 h.p. boiler of 125 pounds steam pres-



Breckenridge and Lund Co.'s Plant at Lundbreck, Alta.

chine shop purposes, four Fairbanks Morse pumps of a capacity of 250 gallons per minute. Wolfe lamps have also been installed and a lamp-house built.

During the summer of 1910 the property owned by the Brazeau Collieries, Ltd., has been prospected and five seams of coal have been proved. Tunnels have been driven to the different seams on the south side of the river. It is expected that much further development will take place on this property during the year 1911.

CROWS NEST PASS DISTRICT.

International Coal & Coke Co., Ltd., Coleman.

The main entries in this mine have been enlarged and retimbered. Five compound air locomotives have been installed, also 100 two-ton mine cars, two 72 in. x 18 ft. return tubular boilers, ash pump and electric motor. The locomotive sheds have also been extended and the engine, boiler and fan have been removed from No. 98 chute No. 2 seam to Yorke Creek.

McGillivray Creek Coal & Coke Co., Ltd., Coleman.

This property is situated at Carbondale west of the Town of Coleman, the seams of coal being a continuation of the Coleman seams. No. 2 seam is being worked. This seam is 12 feet thick. A slope is driven down on the pitch of the seam and from the bottom of the slope, north and south entries are driven, the main north entry being 1,793 feet and the main south entry 348 feet. One pump

sure, one three-phase 75 k.w. generator, one transmission line, one Murphy fan four-foot in diameter electrically driven, one wash-house capable of accommodating 150 men and fitted with steel lockers and five shower baths, one concrete lamp-house and 150 Wolf lamps (these lamps are installed throughout the mine), one stable to accommodate 20 horses, one new tippie which includes creeper chain to haul cars, and Phillip's automatic cross-over dump with bar screens and picking tables, new railway sidings to accommodate 35 cars, one railroad Fairbank's steel scale of 100 tons, one assay office, a mine office and store, electric light system outside and incandescent lamps along main entry in mine.

Bellevue Mine.

The installation for the Bellevue mine includes one wash-house capable of accommodating 300 men and fitted with steel lockers, and shower baths, one machine shop fitted with two lathes, one shaper, one radial drill press, one ordinary drill press, one pipe and bolt cutter, hack saw, grindstone and emery wheel, one steel tippie with a capacity of 2,000 tons in eight hours with an automatic dump, picking belt and box car loader, a new power-house fitted with four 150 h.p. Waterous boilers, feed pumps, one Rand four-stage air compressor, with a capacity of 746 cubic feet, pressure of air 1,200 pounds with compound steam cylinders, one Ridgway 150 k.w.

generator, one Sirrocco fan of 100,000 cubic feet capacity driven by direct current motor, one 50 k.w. alternator and three wire transmission line, one 6 ft. Murphy fan driven by electric motor, two compound air locomotives (cylinders 5½ in. x 11 in. x 10 in., weight 17,000 pounds), one compound air locomotive (cylinders 7 in. x 14 in. x 14 in., weight 19,000 pounds), to haul coal underground. The main entry has been laid with heavy steel. Concrete lamp-house, mine office, powder magazine, oil-house and new yard is laid out which adjoins the main line of the C. P. Ry. to facilitate the loading and handling of cars to and from the new steel tippie. Safety lamps of the Wolf type are installed throughout the mine.

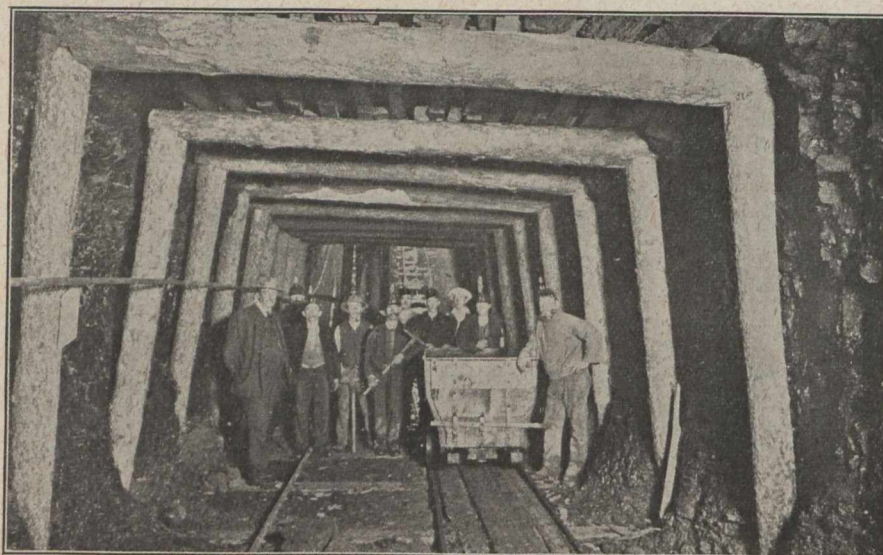
Lille Mine.

One electric light system around the coke oven plant. Safety lamps are installed in No. 1 mine, but open lights are still being used in Bear Valley North Mine.

volts driven by a non-condensing 15 in. x 14 in. engine; one alternating generator 75 k.w., 3 phase, 60 cycles, 2,300 voltage, which is installed to duplicate the first 2,300 volt machine; four Babcock and Wilcox water tube boilers, 250 h.p., each, 160 pounds steam pressure, steam header 12 in. diameter; 175 h.p., alternating motor has also been installed to drive the tippie machinery, also a motor to drive the saw mill. One 150 h.p. motor has been coupled to the ventilating fan at the old mine and is proving satisfactory. Hithertofore the fan was steam driven but good results were not obtained. A new electric hoist is being installed at the entrance of the old mine to supercede the steam driven hoist now in use. This hoist is for the purpose of hauling coal up the slope, the slope having been driven to attain a greater depth of working.

Maple Leaf Coal Co., Bellevue.

A new slope has been driven 400 feet down to attain a greater depth of working, and to prove the coal at a



Underground Workings of the Alberta Coal Mining Co., Cardiff, Alta.

Hillcrest Collieries, Ltd., Hillcrest.

This company is driving an incline across the pitch of the coal measures, on an inclination of nine degrees. The coal was prospected ahead of this incline with a slope driven to a depth of 300 feet on the true pitch of the measures. Outside the mine the company has built a new locomotive house for the railroad locomotive.

Canadian Coal Consolidated, Ltd., Frank.

This company is working the same seam of coal at the shaft and the old mine. In the shaft mine the breast system of mining coal was adopted; this system of mining consists in taking out the coal with 25 or 30 feet breast on a pitch of 86 degrees. This system, however, has been discontinued and the angle system adopted, the angles being driven on an inclination of 35 degrees across the pitch. The smelter entry is being opened up and will soon be on an operating basis.

A new power-house has been built at the shaft mine and equipped with one 500 k.w. alternating generator 3 phase, 60 cycles, 2,300 voltage. This generator is driven by a compound non-condensing engine 24 in. x 36 in. x 24 in., a simplex engine 8 in. x 8 in., dynamo 25 k.w. 125 volts, direct current; also to duplicate above; one alternator 100 k.w., 3 phase, 50 cycles, 500

lower level. This company has installed one 150 h.p. boiler, one 75 h.p. hoist for hoisting coal up the slope, one 150 ton track scales, one Sirrocco fan driven by electrical power with a capacity of 50,000 cubic feet of air per minute, one Robb high speed electric engine 125 h.p. with generator. A stable to accommodate 12 horses, with granary, has been built, also a boiler-house, power-house and lamp-house.

Leitch Collieries, Ltd., Passburg.

This company is working No. 1 mine south of the Canadian Pacific Railway of the Crows Nest Pass branch, but owing to the irregularities of the coal, development of the mine has been delayed. One mile east of the No. 1 mine south, the No. 2 mine north has been opened up. The main entry has been driven 2,200 feet in the No. 2 seam. At two points on the main entry rock cross cuts have been driven, one to the east and one to the west of the entry, for the purpose of proving Nos. 1, 3 and 4 seams, the coal in each seam proving of excellent quality with a good roof and pavement. Nos. 3 and 4 seams are being developed, and will soon be large producers.

A rock tunnel has been driven to the surface and connects with the main entry in No. 2 seam and is being

used as an air shaft. A fan is installed on the surface in connection with the rock tunnel to ventilate the mine. This fan is capable of producing upwards of 100,000 cubic feet of air per minute and is so arranged that it can be used either as a forcing or exhausting fan.

The entrance to the mine being some distance away from the tippie, an outside single rope system of haulage has been installed to run the loaded cars to the top of the tippie and bring back the empty cars. This haulage is capable of handling 3,000 tons of coal in ten hours. A new tippie has been erected together with coal pockets, shaking screens and picking table, capable of handling 2,000 tons of coal per day. A spur track from the Canadian Pacific Railway Crow's Nest branch, together with yards for holding one hundred cars has been laid.

A power-house providing room for four 150 h.p. boilers, engine room, machine shop and locomotive stalls, has been built. Also a coal washing plant of the Luhrig type constructed of wood with ten jigs for washing small coal for supplying the coke ovens. One hundred rectangular coke ovens are being built, sixty of which are completed.

Davenport Coal Co., Ltd., Burmis.

This company is operating the mine which was formerly operated by the East Crow's Nest Coal Co., Ltd.; east of the old mine a new gravel tunnel has been driven which opens up No. 5 seam. To the west of this tunnel a rock cross cut has been driven which proves Nos. 1, 2 and 3 seams. Nos. 2 and 5 seams are being worked, most of the coal being produced from No. 2 seam. From the west side of Burmis station on the Canadian Pacific Railway, Crow's Nest line, a spur track has been put in for the storage of cars, the cars being loaded under the tippie on this spur track.

One temporary tippie built of wood has been erected and plans are being prepared for a new steel tippie. From the top of the tippie a mine car track has been put down and graded to connect with the mine. An extensive plant is in course of construction, consisting of boilers, haulage engine and Sirrocco fan, to deal with an increased output, also a new wash-house. A blacksmith shop, store house, mine office and lamp-house have been erected. The development is being pushed ahead and it is intended to produce an output of 1,000 tons per day.

Galbraith Coal Co., Lundbreck.

A new slope has been driven on No. 2 seam to a depth of 250 feet, at which depth the slope was discontinued for the time being, and a main level driven 250 feet. The new slope was driven to attain a greater depth of working. A boiler house has been erected and a new boiler and hoisting engine installed.

Western Coal & Coke Co., Ltd., Pincher Creek.

The property of the Western Coal & Coke Co., Ltd., is situated 12 miles west of Pincher Creek and the mine is opened up by a tunnel driven 1,300 feet. At a point 850 feet from the entrance, a slope 7 ft. x 8 ft. is driven 400 feet. The main entry is now driven a distance of 2,968 feet, together with a counter entry. The main slope is driven a distance of 1,028 feet and has been widened and re-timbered 6 ft. x 10 ft. in the clear.

Across the valley of Beaver Creek a second opening was made in the same seam of coal. An entry has been driven a distance of 851 feet, and a raise 225 feet driven from it to the outcrop. A tunnel 8 ft. x 8 ft. is being driven through drift along the strike at a proper working elevation to meet the seam on end, the tunnel being driven a distance of 118 feet.

One 100 h. p. horizontal tubular boiler has been installed and four cottages built.

PINCHER CREEK DISTRICT.

There are a few small mines operating in the Pincher Creek District and one on the south fork. In the Pincher Creek District, A. D. McKinnon has opened up a small mine by driving a tunnel at water level from Mill Creek. On the south fork of the Old Man River the Fernie Syndicate owns coal lands and has driven small tunnels and done surface stripping, proving six seams of coal, four of which vary in thickness from 7 feet to 13 feet, and two vary in thickness from 8 inches to 3 feet. The seams are regular throughout and two of them are of excellent coking quality.

LETHBRIDGE DISTRICT.

Alberta Railway & Irrigation Co., Lethbridge.

The new plant which was in course of erection last year has now been practically completed. Steel head gear has been erected at the No. 5 shaft, the whole being encased in steel plates and fitted with an air lock. No wood whatever has been used in the construction, and this part of the plant is as nearly fireproof as possible. An Ottumwa box car loader has been completed and is now in operation. All steam pipes have been covered with asbestos. A three-stage turbine pump with a capacity of 275 gallons per minute against a head of 350 feet has been added to the plant at the river. This pump is electrically driven. Foundations have been laid for another battery of Babcock & Wilcox boilers, and steel plate storage bins with a capacity of 300 tons have been built. A conveyor 200 feet long has been installed to carry the slack from the shaking screens to the storage bins.

An engine of 50 h.p. has been installed so that it is now possible to do the shunting of the railway cars without the aid of the locomotive. Shoes 8 ft. long have been placed on either side of the cages to replace the small shoes. These shoes are giving much better satisfaction and have prevented to a great extent the cutting up of the guides. A large up-to-date wash-house has been erected with lockers and shower baths. An emergency hospital is also provided. Blacksmith, carpenter and machine shops are in course of construction and will be equipped with up-to-date machinery. Systems of fire protection have been installed both below and above ground. Above ground five hydrants and twelve lengths of hose pipe are provided and can be connected with the boiler feed pumps. A 2½ inch pipe has been brought from the water tank on the surface, and seven hydrants and five lengths of hose pipe installed underground. Preparations are being made for installing an endless rope haulage underground. The development work of the No. 6 mine has been pushed rapidly ahead until the output has now reached about 800 tons per day. This development work has been considerably delayed as numerous faults have been encountered.

(To be continued.)

MINING EXAMINATIONS, PROVINCE OF ALBERTA

Examinations held by the Albertan Department of Public Works

Examinations for fire boss certificates was held at Banff and Frank on May 18th, at which twenty-nine candidates presented themselves for examination, seventeen of whom passed, and the regular examinations for mine managers, pit bosses and fire bosses were held at Banff, Frank and Edmonton on October 12th, 13th and 14th. At the latter examinations one hundred and eleven candidates presented themselves for examination, forty-five of whom passed, as follows: Managers, thirty-five sat for examination, eleven passed. Pit bosses, twenty-nine sat for examination, thirteen passed. Fire bosses, forty-seven sat for examination, twenty-one passed.

The number of candidates who presented themselves for examination during the year 1910 shows a considerable increase over the previous year, and with the steadily increasing number of mine officials qualifying each year there should soon be no difficulty in securing a sufficient number of certificated persons to fill all official positions at the mines.

During the year sixty-two provisional pit boss certificates and fourteen provisional fire boss certificates were granted to different persons until they had an opportunity of obtaining certificates by examination:

The following are the questions set at the examinations held at Banff, Frank and Edmonton on October 12th, 13th and 14th, 1910:

Mine Manager's Examination.

Paper No. 1. Time allowed, two hours. The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

COAL MINES ACT.

1. What are the provisions of The Coal Mines Act relating to the employment of boys in or about a mine? (12)
2. State fully what returns and notices are required by The Coal Mines Act to be sent to the Minister of Public Works and to the Inspector of Mines, and what books are required to be kept at the mine. (12)
3. What provisions are made in The Coal Mines Act for the establishment and modification of "Special Rules"? (12)
4. State fully the provisions of The Coal Mines Act dealing with the reporting of accidents in or about a mine, and state what information is required when reporting an accident. (11)
5. What are the requirements of The Coal Mines Act as to plans of workings? (8)
6. What are the provisions of The Coal Mines Act regarding the use and handling of explosives in a mine? (17)
7. Give the provisions of the "Act to Amend The Coal Mines Act for the Purpose of Limiting Hours of Work below Ground." (12)
8. What are the provisions of The Coal Mines Act regarding winding engines, machinery and steam boiler fittings? (8)
9. What is the interpretation of "mine" as given by The Coal Mines Act? (8)

Mine Manager's Examination.

Paper No. 2. Time allowed, two and a half hours. The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

GASES AND SHOT-FIRING.

1. Discuss briefly the known mine gases under the following heads: Origin, Composition, Probable Locality, Mode of Detection, Effects. (17)
2. Mention the several explosives used in mines in Alberta. Describe their properties and peculiar characteristics. Show their adaptation for certain results in blasting operations, and explain the dangers attending the use of each. (8)
3. State fully what should be the qualifications of a perfect safety lamp. In what ways may a safety lamp cause an explosion? (12)
4. Explain the law of the "diffusion of gases" and its effect on their behaviour in mines. (10)
5. What is the influence of coal dust on the safety of a mine? In what mines, and what parts of them is it most dangerous? And in what different ways can the dangers be dealt with? Mention any other practical advantages that can be obtained by removing the dust? (10)
6. Which do you consider the best type of safety lamp to be used by a miner? Give a description and sketch it, with your reasons for preferring it. (12)
7. Does the presence of carbon-dioxide affect the inflammability of fire damp? If so, how? State fully. (7)
8. What are the chief causes of mis-shots in electric blasting? Describe the "high tension" and "low tension" systems of electrical shot-firing respectively. (12)
9. If in a fiery mine the quantity of air passing through the return is 115,000 cubic feet per minute, and contains 4 per cent. of fire damp when the barometer registers 30, what quantity of fire damp is given off in the mine? What is the least decrease of the quantity of air that will render the air in the return explosive? What increase of gas will render the return air explosive? (12)

Mine Manager's Examination.

Paper No. 3. Time allowed, three and one-half hours. The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

VENTILATION.

Coefficient of friction .00000002.

1. What are the advantages of splitting the air, and by what causes is the number of splits limited? (9)
2. How is ventilation produced? Describe briefly the different modes, natural and artificial. State which is best, and why you consider it to be so. (8)
3. There are three airways in a mine, viz.: (a) 3,000 ft. x 6 ft. x 5 ft.; (b) 4,000 ft. x 6 ft. x 6 ft.; (c) 2,000

ft. x 5 ft. x 5 ft. The total quantity of air passing in the three airways is 50,000 cubic feet per minute. What is the quantity passing along each airway? (15)

4. Ventilate the given plan, having due regard to the requirements of haulage. Criticize the plan, and point out anything you consider to be defective. (20)

5. A certain quantity of gas occupies 25,073 cubic feet with the barometer reading 30.7 inches. How will this volume be effected if the barometer falls to 28.9 inches? (6)

6. How many cubic feet of air per minute would be circulated through a mine whose airway is 1,875 feet long, to insure a circulation of 70,000 when the airway has been extended to a length of 4,800 feet? (7)

7. If a ventilating fan is running at 40 revolutions per minute with 1.5 inches of W.G. and it be altered so that W.G. reads 2.6 inches, what will be the fan speed? (8)

8. Define the terms "Coefficient of friction," "Ventilating pressure," "Water Gauge," and "Resistance of Air." (10)

9. What precautions should be taken in the matter of safety lamps? Trace lamp from the cleaning and trimming in the lamp-house to the use of it at the face, and show how it should be treated in a dangerous mine. (7)

10. What will be the height of the motive column in a case where the depth of the downcast is 300 feet, and the temperature of the downcast is 32 degrees F. and the temperature of the upcast 48 degrees F.? (10)

Mine Manager's Examination.

Paper No. 4. Time allowed, three and one-half hours. The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

PRACTICAL WORK.

1. Are mine fires more likely to occur in one mine than in another, and if so, why? In the event of a mine fire, what precautions would you take to protect the workmen engaged in extinguishing the same? (10)

2. Give a short description of two methods of working a coal seam six feet thick, with tender roof and pavement, and pitching at an inclination of 35. Explain fully the circumstances under which each system is most suitable. (15)

3. Describe the method of driving and timbering rapidly a large haulage road, with tender roof and pavement, showing how the alignment and gradient are kept. (9)

4. State your views as to the causes of explosions in mines, and what precautions you would adopt to prevent them. (10)

5. For what purpose is electricity used in the operation of coal mining? Name the four electrical units in common use and define each. Name the dangers in the use of electricity under ground that might be avoided by ordinary care. (10)

6. Describe with sketch how, and with what material you would build a dam in solid strata, to withstand a head of 580 feet of water. Give dimensions. (8)

7. Describe, with sketches, how you would lay out a shaft bottom, to handle an output of 800 tons per day of 8 hours. (10)

8. Two shafts are to be sunk to a depth of 500 feet, the one a downcast, and the other an upcast. The daily output of coal is 800 tons, and the water 300 gallons per

minute from the bottom. Sketch and describe the forms and dimensions you would recommend for each shaft, giving details of lining, midwall, slides, etc. (11)

9. What are the causes of sudden outbursts of gas in coal mines, and what in your opinion should be done to prevent them? Explain fully. (9)

10. What are the advantages and disadvantages in the use of the different kinds of coal cutting machines, keeping in view health, safety and economy? Answer fully. (8)

Mine Manager's Examination.

Paper No. 5. Time allowed, three and one-half hours. The value attached to each question is given in parenthesis. Candidates must obtain 60 per cent. of the allotted marks to pass.

MACHINERY.

1. What is the effect of incrustation forming in a boiler, and how would you prevent it? Are there any dangers likely to arise from it? If so, state them. Mention some causes of priming in connection with steam boilers, and the methods you would adopt to prevent or diminish it. (8)

2. What is meant by "initial," "mean," "terminal" and "back pressure of steam?" (5)

3. What would be the size of a cylinder of a single engine geared in the ratio of 1 to 6 to a drum 5 feet in diameter in order to hoist a weight of 4,000 pounds from a shaft 85 feet deep in 45 seconds? (To allow for friction add one-fourth of the load to be hoisted: assume a mean effective steam pressure in the cylinder of 50 pounds per square inch.) (10)

4. Describe the working action of a forcing pump. (6)

5. Recognizing the losses arising in the use of compressed air, state generally what arrangements you would adopt with a view to obtaining the best results. (10)

6. How would you proceed to determine the horse-power of an engine from a diagram or diagrams taken by an indicator? Do you require one or more diagrams? ()

7. In deep winding shafts what are the best modes of counteracting the weight of the winding rope, and what methods have been adopted for reducing the excessive strain on the rope at the point of starting? (8)

8. Give a short account of two principal methods of mechanical haulage adopted underground, including the advantages and disadvantages peculiar to each. (12)

9. What requirements for the preservation of winding ropes are necessary in the interests of safety? What kind and size of winding rope would you use to hoist a load of 5,000 pounds? (8)

10. What is meant by "electro-motive force," "ampere," "volt"? What is a horse-power generally taken at in dealing with electrical energy? (8)

11. What pressure per square inch will an air compressing engine produce under the following circumstances, viz.: Two steam cylinders each 30 inches in diameter, 7-foot stroke, steam pressure 45 pounds per square inch, one air cylinder 36 inches in diameter, and one 20 inches in diameter? (10)

12. Compare the use of compressed air and electricity in coal mining, giving the advantages and disadvantages of each. (10)

(To be continued.)

THE LATE MR. JOHN B. HOBSON.

BY E. JACOBS, VICTORIA, B.C.

On the morning of Tuesday, January 9, John B. Hobson, long, well, and favourably known in British Columbia, and in earlier years in California, died at his residence, "Gisburn," Rockland avenue, Victoria, B. C. On the following Saturday morning his body was sent by the S.S. "Iroquois," to Seattle, Washington, whence it was taken by rail to San Francisco, California, for burial in the vicinity of that city. Upon Mr. Robert Hobson, eldest son of the deceased mining engineer, devolved the sad duty of making the journey to California, where, with his uncle, Mr. H. B. Hobson, he paid his last respects to the remains of his father.

The late Mr. Hobson was born in Ireland. As his age is stated to have been 67 years, the year of his birth must have been 1844. Not much information is at present available concerning his younger days, save what is contained in the first part of the following notice of him, which was printed in the "British Columbia Mining Record" of February, 1903, probably prepared by the then editor (Mr. H. Mortimer-Lamb), and this at a time when the subject of it was taking an active and prominent part in the organization of the Provincial Mining Association, which was established in that month. The "Mining Record" said:

His Career in California.

"Mr. John B. Hobson is a native of Ireland, where his father was for many years engaged as manager of coal mines. In 1848, Mr. Hobson, with his parents, arrived in New York, and resided there until 1857, in which latter year the family removed to California, where Mr. Robson studied metallurgy and mining engineering and became closely identified with many of the large quartz and deep gravel mining enterprises in the central part of that State.

"In the fall of 1891 Mr. Hobson, associated with the Hon. Jacob H. Neff (the present Lieut.-Governor of California); Mr. D. W. Lubeck, of the Placer County Bank, and other gentlemen, met at Auburn and formulated plans for the organization of the California Miners' Association, which has done so much to place the mining industry there on a prosperous footing.

"Prior to the organization of the California Miners' Association, Mr. Hobson published in San Francisco the "Mining and Industrial Advocate," for the purpose of calling public attention to the necessity for uniting in an effort to secure at the hands of the National and State administrations the legislation necessary to improve the conditions of the mining industry and to remove the many disadvantages under which the miners were labouring. Immediately upon the organization of the California Association, that body selected Mr. Hobson as one of the legislative committee, where he had associated with him the Hon. Niles Searles, ex-Chief Justice of the Supreme Court of California; the Hon. J. K. Luttrell, and others. They were sent to Washington, D. C., to draft a bill and urge its adoption by Congress. They did this so effectively that Congressman Caminette introduced the desired measure, which was finally passed and resulted in the complete rehabilitation of an industry which has since produced from \$10,000,000 to \$15,000,000 annually.

Turns Attention to Cariboo, B.C.

"In 1892 Mr. Hobson was invited by Sir Wm. Van Horne and the directorate of the Canadian Pacific Railway Company to visit British Columbia and explore the vast areas of auriferous deep gravels in the northern districts of the province and determine their value. As a result of his investigations, the Consolidated Cariboo Hydraulic Mining Co. and the Horsefly Hydraulic Mining Co. were formed, to take up the large properties here, the equipment and opening of which for production on a very extensive scale has been in progress for the last ten years.

"Prior to Mr. Hobson's departure for British Columbia, he had been associated for many years with the Geological Department of the California State Mining Bureau, and the results of his field work may be seen in the annual reports of that institution.

"Shortly after Mr. Hobson commenced mining operations in British Columbia, he encountered many of the difficult and objectionable features of the Mineral Placer Mining, and Water Clauses Acts, and for the last seven years he has been urging on Parliament the necessity for adopting such remedial legislation as would result in throwing the country open for exploration by individual miners, prospectors, and investors in such a manner as would encourage the settlement of the province and the development of its mineral resources."

Promotes Provincial Mining Association.

Before making other quotations relating to the late Mr. Hobson, it may be mentioned, in passing, that he was strongly supported for election as the first president of the Provincial Mining Association of British Columbia. There were more than 200 delegates present, and among these were many who urged Mr. Hobson's election. One said: "Mr. Hobson was one of those gentlemen who met originally to organize the California Miners' Association; he has ever since been an active member of it, and he has given our association the benefit of his experience and connection with that association. He has been the leading spirit in getting up this organization. I need not say that he does not at all covet any such position as this, and he has repeatedly stated so to many of us." Another added: "Had it not been for the energy of Mr. Hobson in organizing this association and calling together this convention, there would not have been, this year at least, any such gathering as we have had in Victoria the past week. He has done it absolutely without any object except that of bettering the conditions of the mining industry in this country, and in giving him this position it is no more than he is justly entitled to." However, it was eventually decided that it would be in the best interests of the new association to have as its president one who was not so strong an advocate of the claims of any particular branch of the mining industry as Mr. Hobson, from his extensive connection with placer mining, necessarily was, so a president not actively engaged in mining was chosen instead.

It may be no other suitable opportunity will present itself to recall what Mr. Hobson's views were in connection with the Provincial Mining Association he so materially assisted in organizing. Early in the pro-

ceedings of the convention he said, on February 16, 1903:

"I congratulate you, gentlemen, upon the favourable auspices under which you meet here to-day. Your prompt response to the call for a Miners' Convention proves conclusively that you are here to make a united and determined effort to better the conditions surrounding the mining industry, and to encourage the development of the vast mineral resources of the province.

"You are here to-day for the purpose of organizing a Provincial Mining Association, the object of which will be to encourage and foster the development of the mining industry, which must be considered the paramount industry of the province.

"The association, as I understand it, will not be a technical one, concerning itself with the science and practice of mining; nor a commercial and financial one, concerning itself with mining properties and investments; nor should it have anything to do with labour problems, nor interfere in any way with labour unions. Most of the mining organizations of the world have been formed for these and similar purposes (with the exception of the California Miners' Association, which has attained such wonderful success).

"This association from its beginning should make united efforts to secure legislation in behalf of the whole mining industry, and otherwise promote and protect the legal rights and privileges of miners, prospectors, mine owners, and mining investors. In all other matters of general importance, it should represent the whole mining interests, and express its policy, and this will be the second association organized in the world in the general interest of the mining industry. It should represent the concentrated influence of the population of the province directly and indirectly interested in the industry of mining. Its influence will be strongly felt in the halls of Parliament and the Provincial Legislature.

"Through being composed of men representative of the best ability and character in the British Columbia mining field, by adopting conservative measures and conciliatory methods, and working with energy to secure its ends, it will attract and maintain the confidence and respect of the people. It will do much to improve the present depressed condition of the industry and restore confidence to the legitimate mining investor, who is required to assist in placing the mineral industry of the province on the basis for large and profitable production.

"I feel confident, gentlemen, that the association you will organize to-day will maintain its vitality so long as there is mining done in British Columbia. The success of the association will depend on the basis upon which it will be organized, so I urge upon you to see to it that you organize upon a carefully laid foundation. If this be done, the association cannot fail to be a grand success, and general prosperity will surely result."

This is not the time nor place in which to attempt to explain why Mr. Hobson's worthy aspirations in this direction were later woefully disappointed; only the simple fact may here be stated, that the Provincial Mining Association, while it first bade fair to be of material service to the mining industry as a whole, in

the course of two or three years failed utterly, to the great regret of Mr. Hobson, who was not only grievously disappointed, but was also at pecuniary loss, for he personally paid, to the extent of nearly \$1,000, liabilities it had incurred while in existence.

Other Phases of Activity.

Turning now to other phases of Mr. Hobson's activities, the following information has been gleaned from various sources:

Among the many useful achievements that marked his connection with mining in California, was that of having invented a deflecting nozzle, for use in hydraulic mining. This is stated to have been known as "Hobson's Improvement," and to have been of great service to hydraulic miners.

In regard to his contributions to literature on placer mining subjects—it is much to be regretted that of late years he wrote little if anything to place on record his extensive knowledge of, and experience in connection with hydraulic and other placer mining methods and results. In the "Year Book of British Columbia, 1907," reference is made to a paper on "The Auriferous Gravels of British Columbia," which is shown to have appeared in the Journal of the G. M. A. of Quebec, Vol. II., p. 177, 1894-5. It is worthy of note here that when, in 1907-8, Mr. John Hays Hammond (who is stated to have obtained some of his early mining experiences under Mr. Hobson), was president of the American Institute of Mining Engineers, of which institution Mr. Hobson became a member in 1892, he urged his old friend to contribute a paper on hydraulic mining, but without success.

Mr. Hobson's membership in the present Canadian Mining Institute dated from the incorporation of the institute; his name appears in the charter of the institute, adopted by the Parliament of Canada in 1898, as one of the founders. For four years—1898-1899 and 1901-1902—he was a councillor of the institute, and for two years—1903-1904—one of its vice-presidents.

Hydraulic Mining on Large Scale.

The late Mr. Alexander Begg, who established the British Columbia Mining Record" in 1895, publishing it in Victoria, in his June, 1896, issue, printed the following: "During the summer of 1891, Mr. J. B. Hobson, a practical engineer of great experience, with two men, went over the ground on the Horsefly River, where at the present time active hydraulic operations are being carried on. In the fall of the same year practical steps were taken for the organization of a company which in 1893 was fully incorporated. Mr. Hobson then made a minute observation of the ground 10 miles wide by 20 long, drawing maps in which every stream, lakelet, prominent hill, and gulch of any consequence were shown. On this report the parties interested took up about 1,500 acres about 53 miles north of the 108 Mile House on the Cariboo road, and about six miles south of Quesnelle Lake. There are 11 mining leases in all, and the exact acreage covered by these comprises 1,475 acres of land covering the auriferous gravel deposits of an ancient river, a portion of which is similar in character to the famous ancient river deposits in California known as the Blue Lode.

(To be continued.)

SPECIAL CORRESPONDENCE

Porcupine, Swastika, and South Lorrain.

The Hollinger Extension branch of the Porcupine railroad has been completed into the Timmins Townsite, and for the present at any rate the railway construction in the gold camp is completed. The T. & N. O. took over the right of way of the Porcupine branch on December 6th of 1910, and the main line was completed in a little over six months; through various misadventures and difficulties the Hollinger Extension, between six and seven miles long, has taken as long to build. After the fire the location of the line was changed so that it would not pass over too valuable mineral ground and another cause of delay was the falling in of 400 feet of grade on Pearl Lake. The ballasting should soon be completed and trains should be running to the Timmins in February. Freight has been hauled to the Schumacher or Aura Lake siding since the first of the year. The fire at Golden City and the failure of E. D. Warren & Co. has accentuated the dullness of what was previously a very languid interest in highly speculative Porcupine stocks, and until the Dome and Hollinger are producing steadily there is not likely to be any general revival of interest. The Dome is still running four diamond drills and has now available one 12-drill compressor. Another machine of the same capacity has been ordered and a contract has been signed with the Porcupine Power Company for a thousand horse-power from Sandy Falls. Work on the Dome mill has been considerably hindered by the very severe weather that has prevailed. At the Hollinger good progress is being made with the mill. Development on the main vein at the 200-foot level continues to be quite satisfactory. Since it was picked up it averages five feet of quartz in the drift and cursory assaying shows from \$30 to \$40 per ton. Where the new ore shoot was first cut it was extraordinarily rich.

Development on the Vipond also continues very satisfactorily. Both of the main veins have now been cut at the 200-foot level and both show ore of very much the same values and body as at the 100-foot level. The No. 3 vein has been more recently crosscut and shows apparently the same grade of ore as at the 100-foot level where a large body ran over \$11 to the ton. The mine now presents eight faces of pay ore, from which the mill can draw when it is completed, and since the new compressor is now running the underground development is now proceeding at a much more rapid pace.

At the Rea, Mr. Oscar Bergstrom has installed an assaying plant and both the 200 and 300-foot levels have been carefully sampled and the assays are now being run. In the meanwhile the main shaft is being sunk to the 400-foot level.

Core at 92 and 132 ft. at the Martin Porcupine property adjoining the big Dome on the south show very fine free gold in the quartz. From the 85-foot core to the 100-foot core there are fifteen feet of quartz and schist very highly mineralized. The core showing gold is included in this section, the other native gold core at 132 feet is in a quartz stringer. Small stringers of quartz on the surface show rich gold.

Frank C. Armstrong, of New York, and D. Lorne McGibbon, of Montreal, who are operating on a large scale in the Northern Ontario field now have recently bought control of the Swastika mine at Swastika. It is reported that the new holders bought their stock at 45 cents, and this and the favourable developments below the 200-foot level at the mine caused a considerable advance in the stock. At a distance of 50 feet from the shaft the Hughes vein has been cut and has been opened up for a distance of two feet six inches. The camp buildings have been finished and work is in full swing.

Mr. Ernest Williams, who has for the past year been manager of the Bewick Moreing holdings on the field, has left for England, and during the remainder of the winter months the staff will be reduced. In the spring there will be renewed activity in assessment work, it is expected.

The Foley-O'Brian property has closed down for the time being, and the manager, Mr. Rickard, has left the camp for Mexico. The Foley-O'Brian was one of the first to commence underground development in the Porcupine camp.

The Dome Lake Mining Company has recently purchased a small second-hand plant and will instal it on their properties on Edwards Lake in the near future. Two shafts are being put down 800 feet apart and a diamond drill is working to cut the ore body.

A diamond drill is now working on the Cartwright claims in Mountjoy Township. Previously a contract had been sunk to the 50-foot level and some crosscutting done.

The longest spell of very severe cold that the North has known since mining operations commenced caused a very considerable amount of hardship, but fortunately, as far as can be ascertained to date, no fatalities have occurred among prospectors. Very few men who went abroad in the very cold spell escaped without freezing their nose, ears or fingers, but as far as has been reported no serious injuries were inflicted. Surface work was, of course, very seriously hampered by the intense cold, but at no time was it altogether discontinued.

Cobalt, Elk Lake, Gowganda and South Lorrain.

If the smelter returns coincide with the mine assays the Temiskaming Mining Company last week shipped the richest car of ore that has ever left the camp. It weighed 31.3 tons, and was worth at the current price of silver \$110,397. The ore, which was handpicked, came from the 500-foot level, where the Temiskaming is now stoping some very spectacular ore.

With the McKinley-Darragh dividend cheques for January 2nd, went a financial statement which showed on December 23:

Cash on hand	\$375,441.81
Ore at smelter and transit	130,000.00
Ore at mine and ready to ship	100,000.00
	\$605,441.81

At the La Rose proper sinking is continuing in the winze below the third level with a view to exploring the country below the big fault which cut off the values at the 200-foot level. Extensive exploration and crosscutting will soon commence at the 460-foot level of the mine.

The Temiskaming and Hudsons Bay Mining Company has just declared another 300 per cent. dividend, payable on January 24th. Last year this company paid 1,800 per cent., and altogether has now paid back to the limited number of shareholders interested 19,300 per cent., or \$1,497,873.

Since the announcement of the building of the Elk Lake road there has been a revival of activity in the Elk Lake section. The Eddy Burland Development Company, which now has control of the Hitchcock property, has resumed operations, and an order has been placed for a seven-drill compressor and two 60 horse-power boilers. It is the intention to sink right away to the 300-foot level and endeavour to discover what is there.

The Paragon Cobalt Silver Mining Company, with headquarters at Collingwood, is pushing forward development work on its claims in Willett Township. The shaft is now down 30 feet and will be continued to 100 feet before a station is cut.

The Homestake mines, nine miles north of Gowganda, are reported to have ordered a three-drill compressor and full equipment in order to open up its properties. Three shafts have been commenced already, but have not been sunk below 50 feet.

In South Lorrain the Bison Consolidated, operating the Ross claim, is sinking a shaft to the 100-foot level preparatory to crosscutting for its vein, which at the surface, was of a very strong smaltite character. The shaft is now down 40 feet.

The Kerr Lake Mining Company has declared its usual quarterly dividend of 5 per cent., payable on March 5th. This dividend calls for \$250,000. The company will in March have paid 229 per cent. or altogether \$3,870,000.

The Canadian Gowganda, near Gowganda, has shipped seven and a half tons of ore to the Cobalt sampling works. The property will now be shut down till the returns from the shipment have been received and further capital has been raised.

During December the Nipissing mined ore of an estimated net value of \$225,156 and shipped ore of an estimated net value of \$303,600. Of the ore shipped no less than \$267,600 was in the form of bullion from the high grade mill. Excellent progress is being made with the low grade mill. Development at the lower levels of the Meyer, Fourth of July and No. 100 is pro-

ceeding very satisfactorily and the drifts to the east are still in good ore.

The production of the Trethewey mine for the year just completed totalled 716,464 ounces valued at \$373,486 slightly below the production of the previous year chiefly because so much development work had to be accomplished earlier in the year. The production came from 572 tons of ore including 443 tons of concentrates containing 478,205 ounces and mine ore containing 231,620 ounces bullion 6,639 ounces. To date the Trethewey has produced 5,000,000 ounces.

From the north cross cut of the Coniagas at the 75 foot level the Coniagas has just cut five veins the largest of which is from three to four inches wide of high grade silver. As they are all within fifty feet and there is a considerable amount of milling ore in the wall rock the discovery is of importance.

At the annual meeting of the Green Meehan mining company it was decided to accept the offer of the Santa Maria mining company of Buffalo for \$150,000 for the property. The Santa Maria mining company is now working the property under lease and some ore has recently been shipped.

It is stated that in driving a tunnel at the Thompson Gamey property near Spawning Lake in the Gowganda district a calcite vein 18 inches wide has been cut carrying some silver.

GENERAL MINING NEWS

YUKON TERRITORY

Dawson.—The stampede to stake on the new place. strike on the South fork of Sixty Mile River is the greatest since the first Klondyke strike. Two hundred men have been racing for six days with teams, many going night and day and stopping only long enough to cook, get a little rest and then push on.

Ernest Miller, Frank Wagner and Louis Cruickshank, who happened to be at Ogilvie, 50 miles above Dawson, and were the first to arrive have just got back. They staked below John Matson, discoverer, and John Pike, who got the original claims. Clarence Skelly, a Dawson machinist, was also among the first. Two Slavonian wood choppers, and a big party of miners from Stewart City, were also in the lead.

Mr. Miller declares that it was the hottest race he ever saw; he met 75 outfits rushing from Dawson, among them many Moosehide Indians, hired with their teams by mushers. All trained dogs in the country and all real prospectors are going. Miller and others are preparing to go back at once with outfits for sinking several holes. He says he would not take \$50,000 for his claim, basing his valuation on Matson's prospects.

ONTARIO.

Ottawa.—Representations have been made to the Government for the appointment of a special commission into the lead zinc industry, and to assist it by a proper tariff or bonus on both. The lead bounty expires in June, and it is desired that in place of waiting for the tariff commission, special enquiry be made meanwhile.

Cobalt.—The mill report of the Buffalo mine for December reports that the mill during the month treated 4,088 tons of ore. The average assay of the ore before being milled was 40.27 ounces of silver a ton and the amount of silver recovered was 144,440 ounces, or 87.70 per cent. of the silver disclosed by the assay. The expense of running the mill was \$7,636.73, and the value of the silver recorded computed on an average price of 54½¢ an ounce was \$78,900.22. The silver paid for during December which had been shipped previously amounted to 124,798 ounces.

Cobalt.—Figures just compiled show that the bullion shipped from the Cobalt camp during 1911 amounted to 3,772,920 ounces, worth \$2,012,428. Of this the Nipissing contributed no less than 2,352,758 ounces, valued at \$1,268,495. Last year, the first year the Cobalt camp produced bullion, only 945,702 ounces, worth \$501,815, were shipped from the camp. The Nipissing and Buffalo ore is sent to New York; all the other shippers send to Mocatta & Goldsmid, and other London bullion brokers. The shippers of bullion from the Cobalt camp during the past year were:

	Ounces.	Value.
Buffalo	97,413	\$52,008
Crown Reserve	375,214	192,125
Kerr Lake	14,687	7,793
Nipissing	2,352,758	1,268,495
*Nova Scotia	530,350	277,769
O'Brien	275,506	146,527
Temiskaming	84,409	46,286
Cobalt Townsite	3,537	1,919
Cobalt Lake	5,503	2,290
Colonial	3,691	1,950
Cobalt Central	800	368
Drummond	3,050	1,638
Green-Meehan	391	208
Hargraves	5,403	2,708
Hudson Bay	8,519	4,124
Nancy Helen	227	125
Silver Cliff	2,363	1,209
Silver Bar	332	176
Trethewey	6,638	3,569
*Wildman	241	120
Wyandoh	668	350
Miscellaneous	1,220	650
Totals	3,772,920	\$2,012,428

*Customs ore.

Port Arthur.—The City Council and the Atikokan Iron Co. the other day reached an agreement whereby the company will locate here a \$5,000,000 steel plant, to employ 2,000 men, contingent upon the Government renewing the iron bounties. It is estimated that there is already proved in the district between Sudbury and Manitoba enough iron ore to last Canada 100

years, but which it is not profitable to develop without Government assistance.

Cobalt.—During the month of December the Nipissing mined ore of an estimated net value of \$225,156 and shipped ore of an estimated net value of \$303,600. The ore mined is about on an average of the usual monthly production of the mine.

COMPANY NOTES

Mr. P. A. Robbins, general manager of the Hollinger Mine, Porcupine, has made public the long-expected report.

Mr. Robbins estimates that there is no less than \$10,230,000 worth of ore in sight at a moderate depth. He estimates the profits for the next four or five years at \$7,500,000, and that a profit of \$2,500,000 will be added on every 100 feet the mine goes down.

As regards depth, he points out that similar formations to the Hollinger elsewhere have shown workings 1,000 to 2,000 feet below the surface.

The report contains results of sampling on various veins, both upon the surface and underground. The estimates of tonnages and gold contents are based upon allowances for the persistence of values beyond the present workings.

Approximately 3,000 samples were taken, involving the chipping of 8,400 feet of sample trenches. A minimum stoping width of 3 feet has been allowed, and a minimum of \$4 per ton has been included as payable.

No. 1 Vein.

Surface exposure 950 ft., average width 9½ ft., average assay value \$32.96 per ton in gold, 100 ft. level, 1,000 ft. of drifting in payable ore, average width 8 ft.; average gold value, \$31.54 per ton; 200 ft. level, 350 ft. of drifting, average width 9¾ ft.; average gold values, \$49.30 per ton.

Vein No. 2.

Exposed upon surface 300 ft.; average width, 7 ft.; average gold value, \$7 per ton.

Cross cut at three points upon 100 ft. level, proving additional length of 450 feet. Cross cut at one point upon 200 foot level; 25 feet of drifting upon 100 foot level. Cross cuts show the following values at the points cut: \$7.20 over width of 13 ft.; \$16 over width of 8 ft.; drift upon 100 ft. level averages approximately \$20 over width of drift for the distance of 25 ft. driven.

Vein No. 3.

Exposed 350 ft., upon surface shows average gold value of \$9.30 per ton over average width of 5½ feet.

35 ft. of drifting upon 100 ft. level shows \$4.50 per ton over an average width of 5.2 feet.

Vein No. 4.

Exposed 375 feet upon surface, showing average gold contents of \$11.60 per ton, over an average width of 8 feet.

Cross-cut at 100 ft. level shows width of 22 feet, and average gold value of \$16 per ton over full width.

50 feet of drifting at 100 ft. level shows \$32.40 per ton across width of drift.

Vein No. 8.

Shows an average width of 7 ft., carrying \$13.92 over an exposed length of 86 feet upon surface.

Cross-cut upon 100 ft. level shows width of 25 feet, and gold value of \$7 per ton.

Besides the above veins there are 31 veins upon which no development work has been done. These have been exposed at intervals upon the surface and thoroughly sampled.

Estimated Tonnage and Values.

Vein 1—Deepest workings, 200 ft.; depth of vein allowed, 300 ft.; estimated tonnage, 210,000; gross gold contents, \$7,560,000. Vein 2—Deepest workings, 200 ft.; depth of vein, 200 ft.; estimated tonnage, 110,000; gross gold contents, \$1,200,000. Vein 3—Deepest workings, 100 ft.; depth of vein allowed, 100; estimated tonnage, 20,000; gross gold contents \$150,000. Vein 4—Deepest workings, 100 ft.; depth of vein allowed, 200 ft.; estimated tonnage, 35,000; gross gold contents, \$450,000. Vein 8—Deepest workings 100 ft.; depth of vein allowed 200 ft., estimated tonnage, 10,000; gross gold contents, \$140,000; miscellaneous veins, surface, 100 ft.; estimated tonnage, 77,000; gross gold contents, \$730,000. Totals: Estimated tonnage, 462,000; gross gold contents, \$10,230,000.

In the aggregate, the ore bodies so far discovered will yield, for each 100 feet of depth, approximately 225,000 tons, containing a gross gold value of \$4,000,000, from which a net profit of \$2,500,000 may be expected for each 100 feet of depth.

Estimated Profits.

Profits during the next four or five years should amount to \$7,500,000, and should continue after that period. Every 100 feet of additional depth upon the No. 1 vein below 300 feet will add \$2,100,000 to the profits, and the continuance of other veins below the arbitrary depths allowed will also add considerably to profits.

Comprehensive tests made upon the ore have shown that by means of the cyanide process practically a complete extraction of values may be obtained.

Experience in similar rock formation in other parts of the world has shown that veins continue to depths of 1,000 to 2,000 feet, so that there can be no doubt as to the conservatism of the estimated depths of the Hollinger veins.

A four compartment shaft is being sunk, and is expected to break through to the 200 foot level this week. Sinking will be continued to 400 feet. A winze is about to be started from the 200 foot level, which will be driven to 400 foot level on main vein at once.

Total underground work to date: Shafts 366 feet; winzes 127 feet; raises, 82 feet, drifting, 100 ft.; level 1,289 feet; 200 ft. level 370 feet; cross-cutting, 100 ft. level 1,233 feet; 200 ft. level, 50 feet. Total, 3,717 feet.

The Mill

After giving technical details of the new mill, Mr. Robbins says that it will cost \$275,000, and expects to have it in operation in April.

Its crushing capacity will be about 300 tons per day, with provision in its construction for such increase as may become necessary, while the cyanide plant is being constructed for a capacity of 500 tons per day.

Financially, the company is in a sound condition. There are 50,000 shares of stock in the treasury, which have an intrinsic value far exceeding all requirements.

The Liabilities.

The only current liabilities are "accounts payable," amounting to \$150,403. Most of this is due to the original syndicate, the members of which have made the necessary financial arrangements to provide the further sum of \$275,000 required to carry the work in hand to completion.

Hence by the time milling operations are commenced, the company will be in possession of plant and development work costing approximately \$700,000, and ore reserves amounting to approximately \$10,000,000 gross, both of which items will be clear assets over and above any indebtedness, the treasury reserves being more than ample to offset all loans or other liabilities contracted for the purpose of completing the plant and bringing the mine to a producing state.

Mr. Robbins concludes his report by stating that the future of the company is positively assured.

BELL ASBESTOS.

The annual meeting of the stockholders of the Bell Asbestos Mines was held at Ambler, Pa., U.S.A., resulting in the return of the present officials, to serve for the year 1912. Previous to the meeting the Board of Directors declared a dividend from the result of the mines for the year 1911 of 100 per cent., and also an extra dividend of 25 per cent. The asbestos bearing rock mined by the Bell Asbestos Mines has always been very rich, some reclamations in 1911 having run as high as 14 tons of asbestos fibre to each 100 tons of rock passing through the mill. Mr. George R. Smith, whose supervision as mines manager has been so successful in the past, still continues to care for the material interests of the company.

CROWN RESERVE.

The annual statement of the Crown Reserve Mining Company shows net profits of \$1,279,739, for year ended December 31, 1911. This is equal to 72.30 per cent. on the capital stock. The company now has a cash surplus of \$764,851 and ore on the dump of 500,000, which is not treated as an asset. We cannot do better than give a summary of Messrs. Carson and Cohen's reports which follow:

Colonel Carson's report contained the following gems of interest:

- Total production to end of 1911, \$6,581,847.77.
- Total dividends paid, \$3,714,509.40.
- Production, 1911, \$1,833,516.80.
- Net profit, 1911, \$279,739.79.
- Dividends 1911, \$1,061,288.40.
- Surplus, December 31st, 1911, \$764,851.76.
- Added to surplus in 1911, \$104,865.25.
- Written off in 1911, \$160,977.63.
- Value of ore on dump, \$500,000.
- This is not entered as an asset.

Mr. Cohen, general manager, says in part: "We are getting richer ore at lower levels than we ever did before. Two-thirds of the property not yet touched. There is no reason why this should not be a producer.

"Development of low grade ore is very important, as results show 25 per cent. increase over last year's estimate. Milling ore alone paying all working costs, leaving high grade as profit. After producing over 3,430,000 ounces of silver for the year, the mine has more ore in sight than a year ago."

STATISTICS AND RETURNS

B. C. ORE SHIPMENTS.

The famous Whitewater properties near Kaslo, which are being operated by John L. Retallack & Co., were on the shipping list last week for the first time this year, sending 43 tons to the smelter. A new shipper was the Nickle Plate mine at Hedley, B.C., which sent a consignment of 41 tons of concentrates to the Trail smelter. The Nickle Plate is one of the most profitable mines in British Columbia, last year paying dividends of 25 per cent.

Both the big copper producers in the Boundary country are again operating at full strength, the British Columbia Copper Company and the Granby Company being responsible for 30,526 of last week's total shipments of 35,885 tons. The total shipments for the year to date from the Kootenay and Boundary districts are 106,512 tons and the ore smelted for the year is 99,408 tons, and for the week 33,552 tons. The Knob Hill at Republic, Wash., last week shipped 56 tons. The figures in detail for the week ended January 20th, and year are:

Boundary Shipments.

Granby	20,565	59,421
Mother Lode	7,150	20,395
Emma	1,130	1,822
Unnamed	242	762
Rawhide	1,120	2,772
Jack Pot	319	1,008
Other mines . . . . .	.....	165
Total	30,526	86,345

Rossland Shipments.

Centre Star	1,946	7,409
Le Roi No. 2	199	1,200
Le Roi No. 2, milled	300	900
Le Roi	362	1,654
Other mines . . . . .	.....	33
Total	2,807	11,196

Slocan-Kootenay Shipments.

Sullivan	84	696
Emerald	27	218
Arlington (Erie)	42	174
Van Roi	93	298
St. Eugene, milled	420	1,260
Queen, milled	420	1,260
Granite-Poorman, milled	250	750
Van Roi, milled	800	2,400
Standard, milled	300	900
Richmond-Eureka	32	96
Whitewater	43	43
Other mines . . . . .	.....	635
Total	2,511	8,730

Granby Smelter Receipts.

Grand Forks, B.C.

Granby	20,565	59,421
------------------	--------	--------

B. C. Copper Co.'s Receipts.

Greenwood, B.C.

Mother Lode	7,150	20,395
Emma	1,130	1,822
Unnamed	242	762
Rawhide	1,120	2,772
Jack Pot	319	1,008
Other mines . . . . .	.....	165
Total	9,961	26,924

Consolidated Co.'s Receipts.

Trail, B.C.

Sullivan	84	696
Emerald	27	218
Arlington (Erie)	42	174
Le Roi	362	1,654
Richmond-Eureka	32	96
Nickle Plate	41	41

Whitewater	43	43
Centre Star	1,946	7,409
Le Roi No. 2	199	1,200
Van Roi	93	298
St. Eugene	69	201
Knob Hill	56	234
Nugget	22	22
Other mines .....	....	777
Total	3,026	13,063

SHARE MARKET.

(Courtesy of A. E. Bryant & Co.)

NEW YORK CURB.

	Bid.	Ask.
Braden	5 $\frac{5}{8}$	5 $\frac{3}{4}$
B. C. Copper	4 $\frac{1}{8}$	4 $\frac{5}{8}$
Butte Coal	22 $\frac{1}{2}$	22 $\frac{3}{4}$
Giroux	4 $\frac{1}{8}$	4 $\frac{5}{8}$
Greene-Canadian	8 $\frac{7}{8}$	9
Inspiration	10 $\frac{1}{2}$	10 $\frac{5}{8}$
Yukon Gold	3 $\frac{3}{4}$	3 $\frac{1}{2}$
Goldfields Cons.	4 $\frac{1}{8}$	4 $\frac{1}{2}$
Nevada Cons.	$\frac{1}{8}$	$\frac{1}{8}$
Miami	24 $\frac{1}{2}$	24 $\frac{1}{2}$
Granby .....	.37	..
Ray Cons.	17 $\frac{7}{8}$	18
Chino	20 $\frac{1}{8}$	20 $\frac{1}{4}$
United Copper	3 $\frac{3}{4}$	3 $\frac{1}{2}$

COBALT STOCKS.

	Low.	High.
Bailey .....	.01 $\frac{1}{8}$	.02
Beaver Consolidated .....	.41	.42
Buffalo	1.50	..
Chambers-Ferland .....	.10	.10 $\frac{1}{2}$
City of Cobalt .....	.07 $\frac{1}{2}$	..
Cobalt Lake .....	.27 $\frac{3}{4}$	.28
Coniagas	6.85	6.95
Crown Reserve	3.00	3.06
Great Northern .....	.10 $\frac{1}{2}$	Bid ..
Gould .....	..	.03
Gifford .....	.01	.01 $\frac{1}{2}$
Green-Meehan .....	.01 $\frac{1}{8}$	.01 $\frac{1}{4}$
Hargraves .....	.04	.04 $\frac{7}{8}$
Kerr Lake	2.80	..
La Rose	3.70	3.75
McKinley-Darragh	1.65	1.66
Nipissing	6.85	6.95
Nova Scotia .....	.05	Bid ..
Ophir .....	.05 $\frac{1}{2}$	.06
Otisse .....	.01	..
Peterson Lake .....	.06 $\frac{1}{2}$	.06 $\frac{3}{4}$
Rochester .....	.02	Bid ..
Right of Way .....	.06	.06 $\frac{1}{4}$
Silver Leaf .....	.03	.03 $\frac{1}{4}$
Silver Queen .....	..	Asked .03
Temiskaming .....	.33	.35
Trethewey .....	.75	.75
Wettlaufer .....	.80	Bid

PORCUPINE STOCKS.

	Low.	High.
Apex .....	.07	.08 $\frac{1}{2}$
Dobie .....	..	Asked .75
Crown Charter .....	.10	.14
Dome Extension .....	.30 $\frac{1}{2}$	.34
Eldorado .....	.09	.09 $\frac{1}{2}$
Foley O'Brien .....	.24	.25
Hollinger	13.25	13.85

Jupiter .....	.49 $\frac{1}{2}$	.50
Moneta .....	.15	.19
N. Ont. Exp.	2.95	Bid ..
Pearl Lake .....	.19	.20
Porcupine Central	3.50	3.62 $\frac{1}{2}$
Porcupine Imperial .....	.06	.06 $\frac{1}{2}$
Porcupine Northern .....	.94	.95
Porcupine Tisdale .....	.03 $\frac{1}{2}$	.04
Porcupine Southern .....	.93	.94
Preston East Dome .....	.06 $\frac{1}{4}$	.06 $\frac{1}{2}$
Rea	1.36	1.40
Standard .....	.18	.18 $\frac{1}{2}$
Swastika .....	.24	.24 $\frac{1}{2}$
Vipond .....	.45	.46
United .....	.02 $\frac{1}{2}$	.03
West Dome .....	..	.45
American Gold Fields	1.00	1.01

Sundry.

Island Smelters .....	..	.05
Canadian Marconi	4.00	Bid ..

SILVER PRICES.

		New York.	London.
		Cents.	Pence.
January 6	6	55	25 $\frac{3}{8}$
" 8	8	55	25 $\frac{3}{8}$
" 9	9	55	25 $\frac{3}{8}$
" 10	10	54 $\frac{7}{8}$	25 $\frac{5}{8}$
" 11	11	54 $\frac{1}{4}$	25 $\frac{7}{8}$
" 12	12	55 $\frac{3}{8}$	25 $\frac{1}{2}$
" 13	13	55 $\frac{3}{8}$	25 $\frac{1}{2}$
" 15	15	55 $\frac{1}{2}$	25 $\frac{3}{8}$
" 16	16	56	25 $\frac{3}{8}$
" 17	17	55 $\frac{3}{4}$	25 $\frac{1}{4}$
" 18	18	56 $\frac{3}{8}$	26
" 19	19	56 $\frac{7}{8}$	26 $\frac{3}{8}$
" 20	20	57 $\frac{1}{4}$	26 $\frac{3}{8}$
" 22	22	57 $\frac{3}{8}$	26 $\frac{3}{8}$
" 23	23	57 $\frac{1}{4}$	26 $\frac{5}{8}$
" 24	24	57 $\frac{3}{8}$	26 $\frac{3}{8}$

TORONTO MARKETS.

Jan. 26—(Quotations from Canada Metal Co., Toronto):—

- Spelter, 6.50 cents per lb.
- Lead, 4.25 cents per lb.
- Antimony, 7 to 9 cents per lb.
- Tin, 45 cents per lb.
- Copper, casting, 14.50 cents per lb.
- Electrolytic, 14.50 cents per lb.
- Ingot brass, 7 to 12 cents per lb.

Jan. 26—Pig Iron (Quotations from Drummond, McCall & Co., Toronto):—

- Summerlee No. 1, \$23.00, f.o.b. Toronto.
- Summerlee No. 2, \$22.50, f.o.b. Toronto.
- Midland No. 1, \$19.00, f.o.b. Toronto.
- Midland, No. 2, \$18.50, f.o.b. Toronto.

GENERAL MARKETS.

- Jan. 24—Tin, straits, 43.00 cents.
- Copper, Prime Lake, 14.40 cents.
- Electrolytic copper, 14.30 cents.
- Copper wire, 15.25 cents.
- Lead, 4.45 to 4.50 cents.
- Spelter, 6.55 cents.
- Sheet zinc (f.o.b. smelter), 8.00 cents.
- Antimony, Cookson's, 7.37 $\frac{1}{2}$ cents.
- Aluminium, 18.50 to 19.00 cents.
- Nickel, 40.00 to 45.00 cents.
- Platinum, ordinary, \$46.00 per ounce.
- Platinum, hard, \$48.50 per ounce.
- Bismuth, \$1.80 to \$2.00 per lb.
- Quicksilver, \$43.00 per 75-lb. flask.