

THE CANADIAN MINING JOURNAL

VOL. XXXII.

TORONTO, April 1, 1911

No. 7

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 - - - 17-21-23 Manning Arcade Annex, Toronto
Branch Offices - Montreal, Halifax, Victoria, and London, Eng.
London Office - - - Walter R. Skinner, 11-12 Clement's Lane,
London, E.C.

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

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

CIRCULATION.

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

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THE SPRINGHILL STRIKE.

Since the Dominion Coal Company assumed control of the Springhill (N.S.) collieries, there has been little outward change in the situation. The leaders of the strike have rejected the proposals made through the good offices of the Attorney-General, and are still insisting upon recognition of the U.M.W.A. committee.

The proposals of the company were a genuine effort to meet the claims of the strikers, so often and so insistently urged, for a tonnage rate instead of the former method of paying by the loaded box; for an equitable "docking" arrangement, and for higher wages to the lowest paid classes of labourers and boys. It is admitted by all that some method of exercising a check on the stone loaded out with the coal is absolutely necessary, and this is the object of the "docking" clause. The tonnage rates offered are the same as are now being paid to the men at work, who are making good wages, even under the hampered conditions attending operations during the strike. The rates existing when the strike was called were such as to make it impossible to operate the mine without serious monetary loss, and to attempt to continue such rates is merely to court bankruptcy.

Much the same tactics are being pursued by the U.M.W.A. organizers at Springhill as were followed in Cape Breton. A rumour is being assiduously circulated among the Springhill strikers that the Cape Breton miners will strike en masse about the opening of navigation in sympathy with the Springhill men.

There are certain ardent but irresponsible spirits among the members of the U.M.W.A. in Cape Breton who preach strike on every possible occasion, and advocate it as the remedy for all industrial ills, apparently not knowing that the idea of strikes is as obsolete as the prejudice against labour-saving machinery. An example of the methods of some of these men is evidenced by the troubles at the North Atlantic Collieries at Port Morien. Here, although the company had explained to the men that it was in difficulties owing to the winter conditions, the U.M.W.A. continued to harass the management until eventually it was announced that the Eastern Trust Company had been appointed as receivers. In these circumstances the local secretary of the U.M.W.A. wired the Minister of Labour railing against the Industrial Disputes Act in general, and stating that if a Conciliation Board were not immediately appointed, the Port Morien men would strike forthwith. At a time when it was uncertain whether or not it would be even possible to operate the mine on a reduced basis, this threat was not a very terrible one. Not content with such absolute futility, the U.M.W.A. sympathizers are stating that the mine

was mismanaged, and that the foreclosure by the Trust Company was made to prejudice public opinion!

At Port Hood, the U.M.W.A. is harassing a struggling company, and there is not a single colliery in Nova Scotia where the U.M.W.A. has gained any ascendancy that has not either been forced to the wall, or suffered serious financial embarrassment, which, in every case, has recoiled on the miners themselves.

The strike talk just referred to is entirely confined to these professional strife-breeders, and is being circulated with the idea of encouraging the strikers at Springhill to hold out. It is the general opinion that another strike in Cape Breton is the most unlikely thing to happen. As was the case in Cape Breton before the U.M.W.A. strike collapsed there, many of the Springhill strikers would gladly return to their work, but are deterred from doing so by fear of violence on the part of the pickets. The Dominion Coal Company is providing adequate police protection for the men at work, but as the local authorities either are passive or do not desire to prevent intimidation of those who wish to work, there will probably be a repetition of the farcical situation that existed in Glace Bay when the so-called U.M.W.A. special constables were appointed. In Glace Bay the people fortunately saw the humorous side of one set of policemen arresting the others, and a very grave train of possibilities was averted by the good sense of the populace. It is reported that Springhill may be proclaimed as a police district under a special commissioner in order to ensure the preservation of order.

THE COAL MINING INDUSTRIES OF NOVA SCOTIA AND OF WEST VIRGINIA.

Nova Scotian coal operators have a great deal to contend with. In particular they have to compete with the growing West Virginian coal industry, which seeks to absorb the Atlantic coast trade. Or, rather, in the event of any further reduction of coal duties, West Virginia coal will become a very disturbing factor. A glance at the present status of both countries will be timely.

Nova Scotia, throughout the past 125 years, has produced about 100,000,000 tons of coal. Nearly 50 per cent. of this total has been output since the year 1900. The annual output for the current year will approximate to 7,000,000 tons. Roughly, 94 per cent. of this quantity will be disposed of in the markets afforded by the maritime provinces, Quebec, the bunker trade, and Newfoundland. These channels are named in order of importance. The remaining few hundred thousand tons will be shipped to the United States, almost entirely by the Dominion Coal Company.

Turning now to West Virginia, a glance at a recent bulletin, issued by the West Virginia Mining Association, shows us that the total production to date has

been almost 600,000,000 tons. Since 1863 the annual coal production of West Virginia has expanded from less than half a million tons to almost 60,000,000 tons in 1910. This phenomenal growth has been most marked in the last twenty years. During the two past decades the annual production has been multiplied by six. As the coal mines of West Virginia are situated between three hundred and four hundred miles from tide-water, transportation is the chief problem to be contended with. In fact, one writer, Mr. Frank Haas, states that fully one-third of the capital invested in West Virginian coal mines is an idle asset on account of insufficient transportation facilities. Unreliable delivery, Mr. Haas claims, is the prime cause of the loss of large and important contracts. Delivery to the consumer is considerably more costly than the labour of production. Labour is cheap and plentiful. The number of coal-cutting machines in use is 1,967. The tonnage of machine-mined coal was 23,362,675 tons in 1910. The proportion of machine-mined coal is steadily increasing.

Our Nova Scotian correspondent informs us that there are approximately 500 coal-cutting machines in use in the province. The amount of coal mined by machines is about one and two-thirds million tons. Nine-tenths of the machines are in use in Cape Breton collieries, the remainder on the mainland. Native labour is not opposed to the use of machines; but it is a difficult matter to secure European miners who are acquainted with coal-cutters.

The disparity in bulk of outputs is most marked. Labour in Nova Scotia is costly and not too plentiful. Climatic conditions limit water shipments to eight or nine months of the year. The channels of trade are strictly delimited. Railway facilities are not what they might be. These considerations, whilst they do not cover the whole ground, perhaps sum up the leading features of the case.

It can be seen that, with Pennsylvania and Ohio fuels pushing hard on one side, and West Virginia on another, the Nova Scotian operator has ground to fear reciprocity. On the other hand, he has definite advantages, such as immediate access to tide-water, secure control of government railway contracts, and the possibility of safeguarding domestic markets by more considerate treatment of local consumers. But, as in West Virginia, so in Nova Scotia, organized and efficient transportation is an imperative pre-requisite. As we have said before, right economic conditions would place Nova Scotia in a position where outside competition would not imply industrial paralysis. The question is not one of how large a measure of protection is needed, but of how soon the artificial barrier can be reduced or removed. It would be as grossly unjust to disregard the interests of the operator in settling this question, as it would be to overlook the welfare of the consumer.

THE PORCUPINE BOOM.

Those who have at heart the real good of mining in general and of Porcupine in particular, strongly deprecate the stupid flotations that are now being advertised in the newspapers. When leading business men take an active part in selling to the public a risk that is based upon the opinion of an unauthenticated "engineer," it is high time to call a halt.

The specific instance that has been brought to our attention is the advertisement of Jupiter Mines, Limited. This enterprise is a \$2,000,000 affair. 1,500,000 shares are in the treasury, 600,000 shares of treasury stock are offered at 50 cents. That is, the public is being asked for \$300,000, which sum, less brokerage and expenses, is to be applied in part payment for two claims on which four veins have been uncovered. The total price to be paid for the claims is \$250,000 in cash, along with 500,000 shares. Payments are distributed over a period of nine months.

The report of Mr. James H. Miller outlines the physical basis of the project. Mr. Miller is professionally unknown in Canada. His reports, whilst cheerful, might just as appropriately contain an epitome of the Book of Job. It conveys nothing to the reader beyond the figures of certain assay reports. The "research work" to which Mr. Miller refers has not been made public. We gravely doubt if it ever will. But all the "research work" and all the assays possible on a few outcrops cannot form sufficient ground for warm technical commendation. High assay results do and always will induce men to spend money. But the careful engineer confines himself to facts and not to glowing predictions. However, in justice to Mr. Miller, we must say that he conveys a radiantly optimistic impression in language so selected that he can, if necessary, take back-water in the future.

The claims in question are well situated. How much that implies no one knows. This very fact makes totally unnecessary such decorative features as Major J. A. Murray (whose firm, the Murray-Kay Co., is widely known), Mr. James H. Miller (who is not known), and the incandescent advertisement.

Porcupine does not need the blatant advertisement. Even the scintillating Mr. F. Augustus Heinze can be dispensed with.

The real work is being done by real engineers. Porcupine has struck her gait. Let her not be ridden by the frenzied financier.

REDUCTION OF LOW-GRADE ZINC ORES.

A year and a half ago, at the solicitation of British Columbian mining men, the Dominion Government authorized the expenditure of \$50,000 in investigating the commercial practicability of treating low grade zinc and lead-zinc ores. Seven months ago, the Hon. Mr. Templeman, Minister of Mines for Canada, speaking at Nelson, B.C., outlined the steps that had been

taken and touched on the plans that were formed for the future.

These generalities from the Minister are, so far as we know, the only intimation of progress that has been made public since the movement was begun. A year and a half has passed. No doubt progress has been made. But no news has come, not even of the experiments being conducted at McGill University. Kootenay mining men are anxiously awaiting tidings. They know how much hangs on the decision. Suspense is painful and costly.

The intention of those who took the matter up in 1909 was to try to benefit the infant zinc-mining industry of the district during the life of the present generation. We hope that, in the swift passage of the years, this intention will be kept in view.

Meanwhile it is possible that more immediate relief may come from Leadville, where a method of treating ores carrying from 10 to 20 per cent. zinc is being sought. Success is not unlikely to crown the Colorado investigators.

CODIFYING THE MINING LAW.

That the work of codifying the mining laws of the Dominion is being pushed rapidly is good news. The Dominion Government, after hearing the strong representations of the Canadian Mining Institute committee, immediately caused an appropriation to be made and selected Mr. J. M. Clark, K.C., of Toronto, to supervise the drafting of the new statutes. This work will entail a colossal amount of house-cleaning and reconstruction. Mr. Clark's shoulders are broad. He has long specialized in mining law, is the author of a standard text-book on the subject, has had long experience in mining litigation, and is an active member of the Institute. At present he is in correspondence with leading authorities in the principal mining countries of the world. Newspaper despatches indicate that his appointment is acceptable in the west as well as in the east.

Important announcements will soon be made relating to the consolidated statutes. Comments and suggestions are earnestly desired. Our columns will be placed at the disposal of any responsible correspondents. There is no need of emphasizing the desirability of co-operation.

EDITORIAL NOTES.

The many friends of Mr. F. H. Mason, especially his numerous acquaintances in Nova Scotia, will be glad to learn that, after a long rest at San Diego, California, his health is rapidly improving. The article, "Volatile Constituents of Coal," that Mr. Mason contributes to our columns, is thoroughly well done.

Our Quebec correspondent gives in this issue very satisfactory details as to the changes that have recently taken place in the administration of the Amalga-

mated Asbestos Corporation. An earnest and successful attempt to reduce operating expenses to a minimum has been made, and very close attention is being paid to American and European markets. The current year should bring gratifying results.

Mr. John Handley's article in this issue, "Shaft

Surveying and New Plummets," is one of the most thoughtful and practical discussions that we have had the pleasure of publishing. The subject is one that is more often neglected than should be. The careful precautions that Mr. Handley suggests are by no means excessive.

CORRESPONDENCE.

STURGEON LAKE GOLDFIELDS.

Sturgeon Lake, Ont., March 11, 1911.

Editor, CANADIAN MINING JOURNAL:

Sir,—Now that there is so much talk about the Porcupine goldfields, I would be glad if you would allow me to put in a word for this camp.

Though started eight or nine years ago, this camp has never had a fair test. Without prejudice to Porcupine, or to any other camp, I can safely say that this district can show as good surface indications for gold as any in Ontario. The general run of the formation here is northeast and southwest, and is composed principally of diorite, diabase, and schist rocks. Some rich veins have also been found in the granite close to the contact. One sunk to a depth of 12 feet this winter, shows ore in some places going over \$500 a ton in gold, besides considerable silver. Quartz veins on the western contact run all the way from 8 to 18 feet wide, and some of them can be traced for over a mile. Most of them show good indications of gold, and where any sinking has been done the values show pretty high. One property, where a shaft has been sunk 36 feet, has a 14-foot vein at the bottom showing an average value of from \$18 to \$19. The St. Anthony mine, on the same contact, shows high values at over a hundred feet deep. Other veins all over the lake show exceptionally good values, lots of them going all the way from \$20 to \$90 per ton in gold. The north end of the lake is only three miles from the new Transcontinental Railway, and affords the best of facilities for cheap transportation. What we need here is some practical mining men to take hold of some of the properties and give a thorough test, when I have no doubt it will prove one of the most prosperous gold camps in the country. Most indications show so far as low grade ore is concerned, that the values increase going down.

Hoping you will pardon me for taking up so much of your valuable space.

Yours sincerely,
H. MURRAY TAIT.

QUALIFICATIONS OF MINING ENGINEERS.

Editor CANADIAN MINING JOURNAL:—

Sir,—A flood of prospectuses, similar to that which we had during the Cobalt boom, is again appearing in the daily newspapers. The reports contained in these prospectuses are, it is safe to say, signed in the majority of cases by men who call themselves mining engineers but who have not the slightest right to do so. During the Cobalt boom it was ridiculous to see the confidence that the public and the press apparently had in self-styled mining engineers. One of these men, who did much posing and made many reports, was a foreigner, who only a few years before had tramped the country with a pack on his back. Another was a mechanic with no technical training concerning ore deposits. The list of quacks and fakirs who reported on Cobalt deposits could be extended ad infinitum. A similar class is making reports on Porcupine, and some of our leading financial men are officers of companies which publish the reports of these men.

It is not possible nor desirable that mining engineering should be made into a close corporation, such as law, dentistry or veterinary science. But is it not possible to get the title "mining engineer" or "mining geologist" so defined by Act of Parliament or of Legislatures, that it cannot be used by fakirs in general? The use of this title by such men is with the object of deceiving the public. Could the title not be defined in some such way as the following: (1) Any person using the title of mining engineer, geologist or mining geologist must be (a) a graduate of a university or technical school; or (b) he must be one who has had at least ten years' experience in mining or geology, at least five years of which shall have been in a responsible position.

Yours, etc.,
MINER.

BOOK REVIEWS.

CANADIAN NATIONAL ECONOMY—THE CAUSE OF HIGH PRICES AND THEIR EFFECT UPON THE COUNTRY—BY JAMES J. HARPELL—182 PAGES—PAPER BOUND—PRICE 50 CENTS—PUBLISHED BY THE MACMILLAN CO. OF CANADA, LTD. 1911.

On both sides of the Atlantic the trade relations of Canada and the United States are being hotly discussed. Canadians are being edified by much Parliamentary rhodomontade and by infinite newspaper slush. Strong crusading parties—mostly of the "anti-" stripe—are touring the land. Their intrepid leader, Mr. Clifford Sifton, whose sensational defection from the Liberal

party has given him renewed prominence, is throwing all the weight of his prestige into the campaign. Many leading manufacturers are with him. With him also is that unrestful person, Prof. Stephen Leacock, maker of phrases and epigrams, and worthy wearer of the motley. For Prof. Leacock, when he remains within the bounds of good taste, most of us have large admiration. But from him, as from practically all of his fellows, it is vain to expect more than electric shocks.

On the Liberal side matters are better—but very little better. The Liberal press is no more convincing than is the Conservative. Both are carried away by

the exigencies of controversy. From neither has the public received a consecutive and dispassionate presentation of the questions involved.

It is therefore with a sense of relief that we turn to the volume under review in which the author has carefully digested his facts and has avoided emitting dangerous clap-trap. Not that we wish to concur in all Mr. Harpell's conclusions. This is not to be expected. But we thoroughly approve his constructive attempt to set forth Canada's economic conditions as they ARE, and NOT as our sanguine blindness leads us to HOPE they are.

Whilst we shall pay most attention to the chapter that treats of the mining industry, it will be well to glance over the whole volume.

The nucleus of the book was an article, entitled "Canada and Tariff Reform," that appeared over Mr. Harpell's signature in the "Contemporary Review" for January, 1910. The ideas there embodied are now set forth more comprehensively. Protracted residence in Great Britain has given the author certain advantages, and correspondence with many leading economists has provided a strong stimulus.

Chapter I. deals with the manufacturing industries. The fiscal policies of our political parties are here traced, and the influences that have led up to the overwhelming growth of our combines are analyzed and isolated. The gradual, but inevitable, effect of high protection, and of its offspring, the trust, upon labour, cost of living, and production is stated from the viewpoint of a declared free-trader. Official statistics, ranging from 1871 to 1906, are adduced to show that our manufacturing establishments have diminished in number tremendously. The effect of this centralization has been that now "hardly a staple commodity, whether imported or produced at home, . . . is not controlled by a few manufacturers and middlemen." While Mr. Harpell perhaps over-accentuates the resultant evils, yet his general argument is strongly grounded in fact. The tone of this chapter indicates the tone of the remainder of the volume.

In Chapter II. the author seeks to show that our preferential tariff is almost nugatory. The claim is advanced that with genuine free trade as between Great Britain and Canada, many of the most important commodities would drop 25 per cent. in price.

Chapter III. outlines the nature, methods, and profits of our combines, with especial reference to their relation to our banking system. Chapter IV. covers our natural resources and foreign trade, compares our adverse annual balance of trade with the favourable balances of such countries as the Argentine Republic, and alludes to the absence of artificial stimulation of industry in those countries in which tariff for revenue only obtains.

Chapter V., "The Farming Industry," will be considered the production of an alarmist. However this may be, the facts adduced are too significant to be blinked. That in ten years our exports of animals, butter, and eggs, have fallen to almost nothing, will come as a surprise to all but the best informed economists. That our boasted cheese industry is on the wane will also open many eyes. The presentation of these facts is clear and strong. The conclusions we shall leave for the reader to discover himself.

To the mining industry is devoted Chapter VI. The opening proposition is that no industry has suffered more from high prices and profited less from the considerations that produced them. The miner has suffered alike from the high cost of living and from the

undeveloped home market—a market undeveloped because of high protection. This general statement Mr. Harpell illustrates by sketching the condition of certain branches of the industry. Although, in a broad sense, the statement is true, the examples given are forced. For instance, we do not believe that the falling off in Yukon gold production is attributable to any prime cause other than the depletion of the rich alluvials. Mechanical improvements will bring up the output as time goes on. Political maladministration and other factors have had but little effect in reducing the yield of precious metals. Human stupidity and human cupidity, have probably played larger parts. So also with the iron industry. The lack of well situated, properly developed, iron ore deposits in Canada has been a greater handicap to the industry than anything else. But it is quite correct to assert that iron, coal, cement, gypsum, copper, and allied branches of mining, where low cost of production is vital, are extremely sensitive to general economic conditions. The same cannot be postulated of gold and silver. As a matter of fact, Canadian placers and mines show in outstanding instances the lowest costs in the world.

The value of Chapter VI. seems to us to lie, not in Mr. Harpell's analysis, which is strained, but in his point of view, which is original and most conducive of thought.

Chapter VII. is a concise, rather meagre, view of the fishing industry. Absence of expansion is noted.

Chapter VIII. reviews the evils resulting from political and fiscal abuses.

Chapter IX. is a forceful plea for national economy. Special stress is laid upon the necessity of recasting our banking system.

Chapter X., "Reciprocity with the United States," is a tempting chapter to dwell upon. We must refrain. Suffice it to say, that it includes a co-ordinated series of facts, well-authenticated facts, leading up to definite conclusions. It carries no tinge of party politics.

In concluding this too lengthy review, let us point out again that, however Mr. Harpell's conclusions be received, his book is a timely and valuable presentation of statistical and economic data. This kind of material is educative. It stands in sharp contrast to the fireworks of the demagogue. It appeals neither to prejudice nor to passion, but to right and calm reason. We particularly commend the book in one dose to polemic professors and pyrotechnic politicians.

CORUNDUM.

The United States produces practically no corundum at present. Canada's production, altogether from the plant of the Manufacturers' Corundum Company, Craigmont, Ont., was 2,692 tons in 1910, valued at \$172,000. This is exported principally to the United States and Europe. The demand is considerably greater than the present capacity of the plant.

Infusorial earth is being used in a number of new ways. In Europe it enters largely into the preparation of artificial fertilizers, its powers of absorption being particularly useful. It is also used in the manufacture of water glass, various special cements, glazing tiles, glazing artificial stone, and in preparing pigments, aniline colours, paper, sealing wax, fireworks, gutta-percha, Swedish matches, solid bromine, papier-mache, etc. The demand is growing steadily.

SHAFT SURVEYING AND NEW PLUMMETS.

By JOHN HANDLEY.*

The most difficult part of any mine survey is the transference of the bearing, or astronomical meridian, to the underground workings. Upon this operation depends the worth of the entire survey. Thus, anything tending towards increased accuracy will probably be well received by the surveyor.

Though almost universally applicable, my remarks have special significance in metal mine surveys. In the case of the precious metals, the values are apt to be concentrated in small veins so that an error of a few feet may become important, by reason of the large values involved, if on no other grounds. Moreover, the surveyor is often limited to one opening (which we may assume to be a vertical shaft), and unless he be provided with an auxiliary telescope he will probably adopt the two-wire method for establishing his meridian underground.

It is perhaps as well to admit at the outset that mathematical accuracy is physically impossible of attainment even under the most favourable conditions. Where a single opening has to be used the base line is commonly short. When the meridian has been carried underground through only one shaft, or opening, a check survey, made through a second opening, and using the first to close the traverse, will invariably show the original survey to be in error; though this error may be surprisingly small.

In plumbing a shaft by means of two wires carrying suspended weights the assumed conditions are as follows:—

The weights shall be heavy enough to hold the wires vertical; they should stretch the wires, and even strain them; the wires shall be equidistant their entire length, parallel to each other, and hang in the same plane.

A philosophical consideration of the conditions will show that these two wires should converge, slightly, toward the earth's centre. The practical consideration shows, however, since the mass of rock has been removed, that the wires will, in fact, diverge slightly from each other, owing purely to gravitational causes. An error is thus introduced at the outset, but it is so small that it may be ignored in practice. Nevertheless these considerations are of interest to the surveyor, who aims at the highest possible degree of accuracy.

The assumed conditions are interfered with by a diversity of causes, and probably defective weights are the most productive source of error.

Many, and wonderful, are the varieties of weights pressed into the shaft surveyor's service; of these we may consider three types:

- (a) Iron weights of any kind.
- (b) Winged weights.
- (c) The improvised weight, as exemplified by the flat-iron, or the window-weight.

Iron weights of any kind are objectionable on the ground that there is always a probability that magnetic influences, terrestrial or otherwise, may disturb the assumed conditions; causing the wires to hang out of the vertical, or in different, sometimes even in varying, planes. When magnetic influences are present the plumb-bobs may attract each other; or they may repel each other, which is, I believe, the commoner occur-

rence. It may be argued that an error of this nature will be discovered by the tape measurements; which should be in agreement with similar measurements made at the surface, near the hangers. These measurements are notoriously difficult to make with the requisite degree of accuracy since an error so small as to escape detection by the tape method might be vital when read as azimuth angle.

Plumb-bobs having wings of sheet zinc fitted into slots at their sides are favoured by some surveyors. The function of the wings is to bring the bobs quickly to a position of rest when hanging in liquids. A position of apparent rest will certainly be taken up very quickly when such weights swing in oil or other viscid liquid, on account of the large area of resistance offered by the wings. I have spoken of the position of APPARENT REST, since such position is visual rather than actual. Let the surveyor examine the wires at a point say half-way between the hanger and the plumb-bob. In the majority of cases he will find that the wire is actually vibrating considerably — in precisely the same way that a taut musical string will continue to vibrate for some minutes after it has been struck. The musical string being fast at both ends, such vibrations will be regular and rhythmic. In the case of the shaft wire one end is fast while movement at the other end is retarded, not prevented, by the weight attached. Vibration in the wire, therefore, will not be rhythmic; on the contrary, the nature and amount of the vibrations will vary at different points over the whole length of the wire. This fact may be of importance since it is customary to take off azimuths from the wires at various mine levels, so that, conceivably, the azimuths at any two given levels may not be in coincidence. Such errors may be negligibly small, in any event there is an element of uncertainty as to their possible magnitude; which may be great enough to affect the value of the whole survey. The possibility of a discrepancy in the azimuths between any two levels, is of great importance when it becomes needful to connect drifts by raising, sinking, or headings.

The resistance which a viscid liquid offers to the winged weights may actually be the cause of error; certainly the increased area, which the wings give to the plummet, will be proportionately affected by air currents, or drops of falling water. To sum up the case against winged weights; it may be said that the real difficulties arise from the fact that it is almost impossible to ascertain how such weights will behave under any given conditions that may arise in actual practice. The one valuable feature about a winged weight is that it does not revolve freely, and thus danger of the wires breaking by torsion is largely eliminated.

If accurate surveys could be made in spite of the use of flat-irons, window-weights, and irregular shaped plumb-bobs of various kinds, the fact would not necessarily constitute a valid argument for their continued employment. Weights of this class are the worst of all because they do not swing in an ellipse,—they 'wobble,'—their motions are irregular and erratic. The vital importance of this point will be better appreciated if it be admitted that a weight moving freely, through a regular orbit, is the most desirable condition for correct work.

*Mining Engineer, Sudbury, Ont.

It will be noticed that plummets, otherwise suitable, but inaccurately turned, or badly balanced, are open to all the objections that may be advanced against the use of irregular-shaped weights.

In shaft surveying time is invariably an important factor, and it is imperative that the work be done with all possible despatch, subject only to the attainment of the requisite degree of accuracy. From the nature of the case the frequent re-checking, possible in ordinary surveys, is not permissible where the main entry to the mine is closed during the progress of the surveyor's work.

In the case of an opening several hundred feet in depth, hours must elapse from the hanging of the wires to the time when it may be possible to begin to take off the azimuth, assuming that the surveyor wishes to "jiggle in," or requires a quiescent wire for triangulating. One single swing of so long a pendulum may occupy minutes. There is a method in use by which the weights are fastened down; even when the correct position of rest can be chosen for the bobs the method is objectionable since it will not do away with the twanging, or vibration, of the wires; moreover, much time is needed even with this method.

For speed and accuracy both, there is nothing so good as a freely moving weight. For the employment of this method the prime requisite is a properly constructed plumb-bob, evenly balanced, and free from magnetic influences. In practice a scale is placed behind the wire, the extremity of the swing in each direction being carefully noted on the scale—it is then only a question of bisecting the longer axis of the ellipse of swing in order to find the correct position of rest for the plumb-bob. It is advisable, space and other limitations permitting, to use two transits and two scales, and by this means bisect both the longer and the shorter axes of the ellipse. Some care is necessary to place the scales at right angles to the line of sight of each transit.

Where a glass diaphragm is used, in the transit, the horizontal cross-hair may have a scale added to it, divided into an equal number of graduations on each side of the vertical cross-hair. In this way the use of scales behind the wires may be avoided, and since the scale forms part of the eye-piece it follows that it must be at right angles to the line of sight; therefore, the possibility of an error in the bisection of the ellipse of swing is reduced to a minimum.

Such micrometer scales are commonly engraved for use with a microscope, and transit makers might, with advantage, be induced to borrow this refinement.

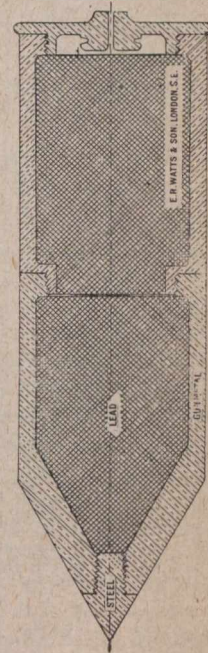
Where spider-webs, or wires, are in use in the diaphragm the scale may be engraved on an extra glass fashioned so that it may be dropped into the eyepiece. Objection may be raised to this method on the ground that such extra lens would reduce the light passed by the eyepiece. Without doubt the point is well taken since illumination underground is never too good; however, without having actually tried the micrometer eyepiece, the idea seems to me well worth consideration.

In the moving wire method it is assumed that the weight shall move through a regular ellipse without deviating or "wobbling." There must be freedom from magnetic attraction; thus all iron weights are barred. When the bobs are suspended in the shaft the wires must be continuations of the true vertical axes of the plummets. In other words, the instruments should be turned in a dead-centre lathe in order to ensure that their points, and points of suspension, are in the same vertical; the weight throughout the plumb-

bobs must be regular, and evenly distributed, otherwise these assumed conditions cannot be fulfilled.

Some months ago I found it impossible to procure plumb-bobs of sufficient weight fulfilling the above requirements, and I had such instruments specially constructed. There is nothing particularly novel about these plummets except that they are built in sections (see sectional sketch); they have proved a great convenience in my own practice, and therefore a brief description may be of use to others. They may now be obtained through scientific instrument makers.

The outer tube is of brass, and the filling is lead. A point of hardened steel is threaded into the brass tube so that in case of damage it may be replaced. The cap of the bob is bored to admit the suspending wire, the loose end of which is secured by being wound round a drum fitted inside the cap. In order to meet varying requirements the plumb-bobs are made in sections of ten pounds each. For plumbing a 50-foot winze the 10-pound bob will suffice; for a 200-foot



shaft 20 pounds are required. All the threads are made interchangeable so that plummets of any required weight may be built up by the addition of more sections. In order to protect the points and to provide a convenient means of transportation, leather cases were devised; these are of telescopic form so that they will accommodate one section alone, or a complete 20-pound bob.

The lead filling is run into the brass tubes in a molten condition, and care is necessary that the filling may set in a solid body free from bubbles, or interstices, otherwise the instrument will not be in perfect balance. After the filling is cold it is trimmed off level, and the final adjustment is again made in the dead-centre lathe.

There is a wide variation in the size and kind of wires used in shaft surveying. A steel wire is very much stronger than a copper wire of equal diameter. It is desirable to employ as small a wire as possible since fine wires are easier to line-in on, and are, therefore, more accurate; there is, further, less area for currents of air or drops of falling water to play upon. Piano wire is excellent for many purposes, but if "kinked" it breaks very readily, and, above all, it is difficult to procure.

Soft-drawn copper wire of 18 to 20 gauge may usually be obtained at any time, and even from the smaller hardware stores. I prefer this wire since it may, with care, be repeatedly employed, and a heavy weight will take out any ordinary bends.

The thinnest wire capable of sustaining the required weight, at the particular depth, should be chosen. Allowance must be made for considerable stretch when hanging the weights. If these are to be immersed in heavy oil the stretch will be very materially reduced owing to the buoyancy of the viscid liquid.

Particular attention must be given to the hangers to see that these eyelets are not rough, otherwise the wire will cut. An excellent plan is to ream out the eyelet, so as to allow of its being wound with a narrow strip of lead foil, which prevents the hard metal cutting through the copper wire.

Wires should be lowered on a frame, and the plumb-bobs attached at the bottom of the shaft, allowing the full weight to be gradually taken by the wires. The wires will be preserved, and kinking largely eliminated,

if they are wound upon two wooden drums of five or six inches in diameter.

It is good practice to use heavier weights than the apparent conditions seem to demand. The effect of air currents in a shaft is most difficult, if not impossible, to determine. For instance, the corkscrew motion assumed by air rushing up a shaft, will certainly tend to cause the wires to deviate from the true plane. An excessive weight would, of course, tend to overcome this action.

In conclusion it remains to be stated that, wherever possible, the two-wire method is to be avoided. Should a current of air, or falling water, act only upon one wire, it is readily conceivable that while the distances apart, as recorded by tape measurement, may be in coincidence, the bearing of the wires at the foot of the shaft may be different from their bearing at the surface. In a large number of mine surveys, the two-wire method is the only one open to the surveyor, and where such is the case the vital necessity for great caution is obvious.

THE VOLATILE CONSTITUENTS OF COAL

(Written for the CANADIAN MINING JOURNAL by F. H. Mason, San Diego, California.)

In his perusal of the journals of the various chemical societies, the metallurgical engineer reads many of the papers—such as “The Optically Active Salts of 4-Oximinocyclohexanecarboxylic Acid, whatever they may be—by title only; but just occasionally an eminently practical paper is found, which he feels many times repays his annual subscription. “The Volatile Constituents of Coal,” by M. J. Burgess and R. G. Wheeler, in the October issue of the “Journal of The Chemical Society,” is such a paper.

It has long been known by both analytical chemists and coal-mining engineers that the so-called “proximate coal analysis” will give concordant results only when conducted by fixed rules, generally adopted by the profession, and that so light a thing as the substitution of a porcelain for a platinum crucible is sufficient to affect the uniformity of the results. In a word, then,

careful research, considerably augmented our knowledge on the subject, and now Burgess and Wheeler publish the first installment of a research that they are still conducting. The object of this last investigation, so far as it has gone, has been to find out the amount of gas to be derived from given coals by destructive distillation at various temperatures, and also to discover the variation in the composition of the gas obtained at different temperatures.

The apparatus they employed was of the simplest nature. It consisted of a platinum tube (fig. 1), closed at one end, the open end was silver soldered into a gun-metal flange, having a sunken ring midway between its centre and circumference. The leading-tube, also of gun-metal, had a similar flange, except that the ring was raised instead of being sunk. After the coal, contained in a platinum boat, was placed in the retort, the

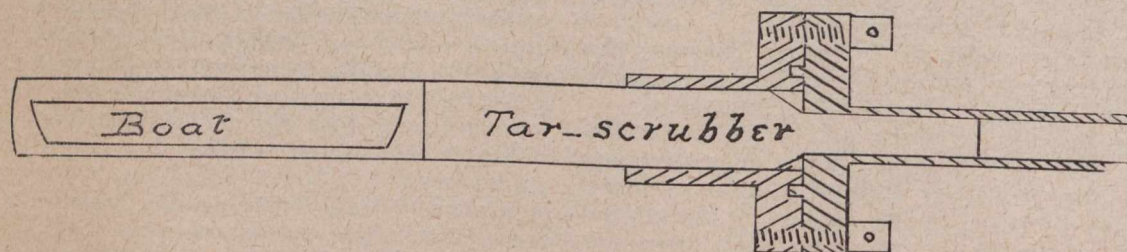


Fig 1. Platinum Retort and Connections.

a “proximate coal analysis” is of value in comparing two coals only when carried out in an exactly uniform manner, and it in no way gives a measure of the amount of gas a coal is capable of producing. The gas engineer, too, is well aware that it is in the earlier stages of the distillation of coal that a gas richest in “illuminants” comes away. But until recently, beyond such very general facts, our knowledge of the products derived from the destructive distillation of coal under varying conditions of temperature has been lamentably wanting. In 1907-8, H. C. Porter and F. K. Ovitz, of the United States Geological Survey, by a

leading-tube was bolted to it, a washer of graphite and asbestos making a vacuum-tight joint. Before making the connection, a tar-scrubber, consisting of ignited asbestos, contained in a platinum tube open at both ends, was placed in the mouth of the retort. A stout rubber pressure-tube attached to the leading-tube connected the retort with a mercury manometer, a two-litre gas-holder, or a vacuum pump; glass cocks, suitably placed, intervening, in order that the retort might be connected with any of the foregoing at will. The whole apparatus was securely fastened to a wooden support mounted on wheels, so that it could be rapidly run into the electric

furnace, that had previously been brought to the temperature of the experiment. The furnace used was a platinum-wound electric resistance furnace, which, with a current of a little more than 1 ampere at 200 volts, was capable of producing a temperature of 1,400 degrees. The temperatures were taken with a Le Chatelier pyrometer, the thermo couple running the whole length of the furnace, and the junction being in the middle of it. The evolved gases were collected over a mixture of equal parts by volume of glycerol and water, previously saturated with coal gas. This mixture was found to absorb little or no gas and to be more convenient than mercury. The analyses of the gases were made in a modification of a Bone and Wheeler apparatus. In making the analyses the following reagents were used to absorb the various gases, which were removed in the order named:

| Gas. | Reagent. |
|--------------------|---|
| Ammonia. | 10 per cent. sulphuric acid sol. |
| Benzine. | Concentrated sulphuric acid. |
| Hydrogen sulphide. | Acidified copper sulphate sol. |
| Carbon dioxide. | Potassium hydroxide sol. |
| Oxygen. | Strongly alkaline pyrogallie acid. sol. |
| Acetylene. | Ammoniacal silver chloride sol. |
| Ethylene. | Bromine and potassium bromide sol. |
| Carbon monoxide. | Ammoniacal cuprous chloride sol. |

The gases remaining after these absorptions were passed into a set of exhausted glass bulbs, heated over a water bath at 90 degrees, containing oxidized palladium precipitate. After ten minutes the bulbs were allowed to cool, and the residual gases were withdrawn by means of a mercury pump and measured. The difference in volume was taken to be hydrogen, which was expelled from the palladium and exploded in the usual way.

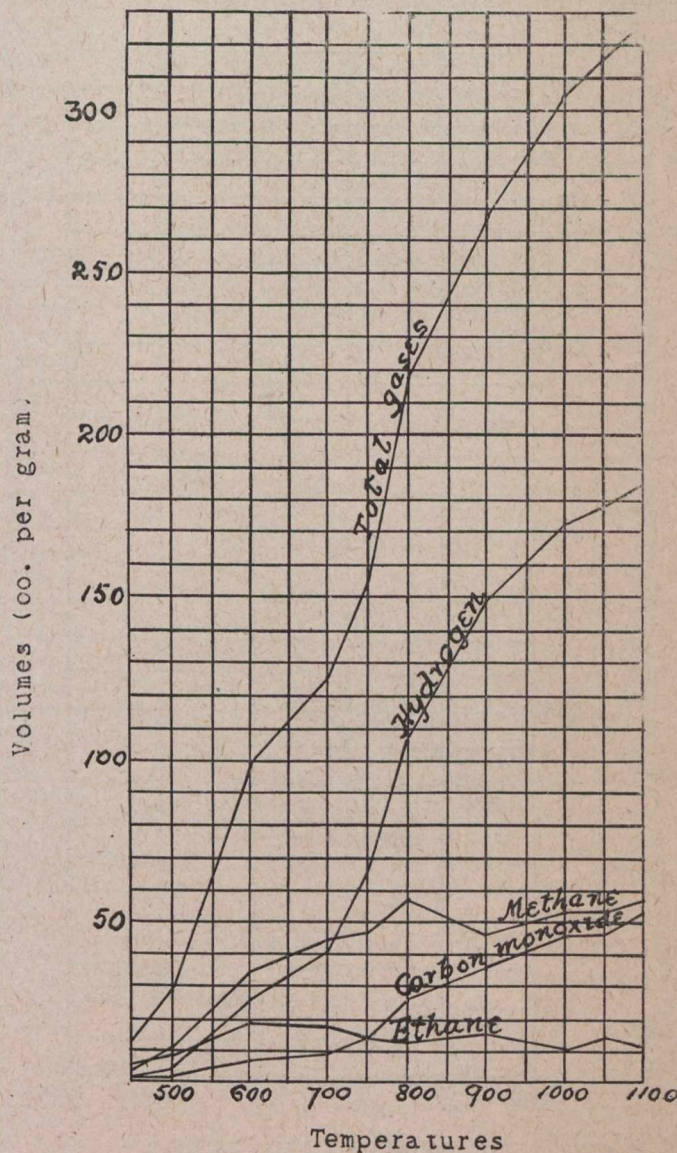
In conducting the experiments two grams of carefully sampled coal, pulverized to pass a screen with 240 meshes to the linear inch, were taken for each experiment. In all cases the temperature of the furnace was taken, but special previous experiments, in which a pyrometer was placed in both the furnace and the coal, demonstrated that the coal attained the temperature of the furnace within two minutes after being placed inside it. The coal, contained in a platinum boat, was placed in the back and the tar-scrubber in the mouth of the retort, and the leading-tube attached. The retort was then connected with the vacuum pump and evacuated, then connected with the manometer and run into the furnace, which had previously been brought to the desired temperature. As soon as the manometer indicated that the pressure within the retort had attained that of the atmosphere, and the quantity was connected with the gas-holder, and the quantity of gas that collected noted at stated intervals of time.

The experimenters examined four samples of coal—two bituminous, one semi-bituminous, and one anthracite—with this apparatus, making distillations at a number of temperatures between 450 and 1,100 degrees. For each coal they give four tables; 1, Rate of evolution of gas at different temperatures; 2, Volatile constituents evolved at different temperatures; 3, Percentage composition of gases evolved at different temperatures; 4, Total volume of gas evolved per gram of ash-free, dry coal at different temperatures, and volume of principal constituents. It will be sufficient for the purpose of this article, if we take one of the bituminous and the anthracite coal, give

an abridgment of the first table, and a modification of the curve illustrating the last table.

The bituminous coal was taken from the Altofts Silkstone seam, and had the following ultimate analysis:—

| | | |
|------------------|-------|------------------------------------|
| Carbon | 80.50 | } Per cent. of ash-free, dry coal. |
| Hydrogen | 5.45 | |
| Oxygen | 9.70 | |
| Nitrogen | 1.42 | |
| Sulphur | 2.93 | |



Curve showing total volume of Gases evolved per gram of Ash-free dry Coal at different temperatures, and volume of principal constituents.

TABLE 1.

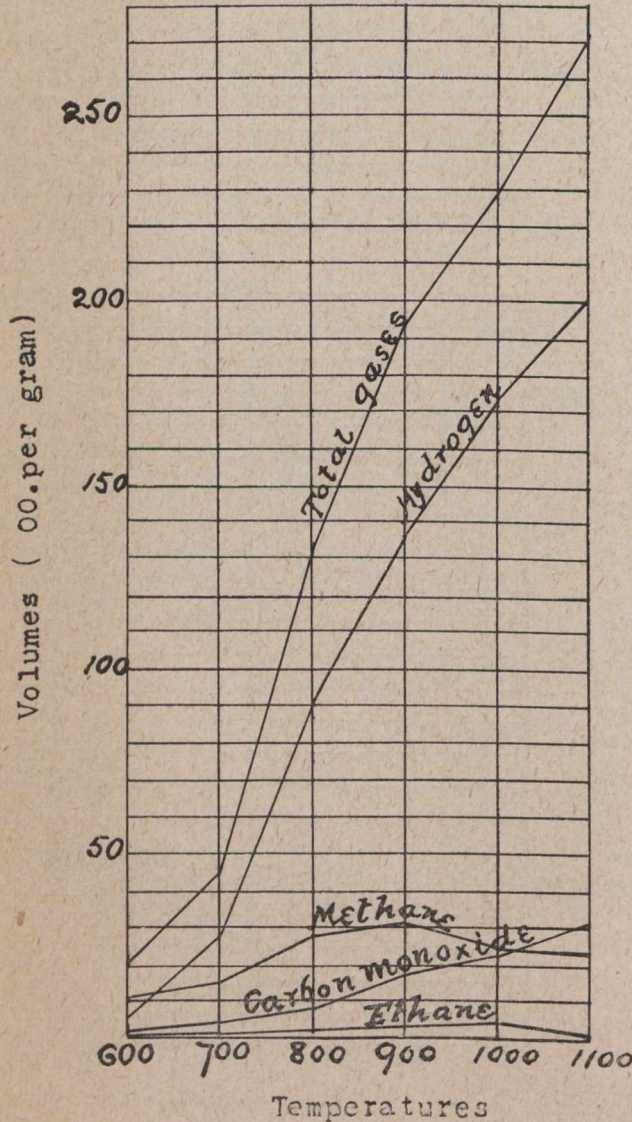
Rate of evolution of gas at different temperatures. Total gas from two grams of coal, measured at atmospheric temperature and pressure:

| | Distillation temperature. | | | | | | | |
|-------------------------|---------------------------|-----|-----|-----|-----|------|------|------|
| | 600 | 700 | 750 | 800 | 900 | 1000 | 1050 | 1100 |
| | cc. | cc. | cc. | cc. | cc. | cc. | cc. | cc. |
| 1st minute | 40 | 50 | 90 | 145 | 225 | 300 | 375 | ... |
| First 5 minutes | 95 | 125 | 185 | 300 | 445 | 505 | 515 | 565 |
| Next 5 minutes | 22 | 30 | 30 | 60 | 50 | 60 | 25 | 30 |
| Next 5 minutes | 13 | 15 | 25 | 25 | 15 | 15 | 15 | 5 |
| Next 15 minutes | 25 | 35 | 35 | 27 | 20 | 25 | 15 | 25 |
| Next 15 minutes | 15 | 10 | 15 | 13 | 15 | 15 | 15 | 15 |
| Next 30 minutes | 10 | 10 | 5 | 10 | 10 | 25 | 15 | 5 |

With distillations at 450 and 500 degrees, 25 cc. and 60 cc., respectively, were evolved, the total duration of heating being two hours.

The sample of anthracite coal was taken from Pontyberen, South Wales, and had the following ultimate analysis:

| | |
|--------------------|-------|
| Carbon | 92.66 |
| Hydrogen | 3.14 |
| Oxygen | 2.20 |
| Nitrogen | 0.99 |
| Sulphur | 1.01 |



Curve Showing total volume of Gases evolved per gram of ash-free Dry Coal at different temperatures and volume of principal constituents.

TABLE 2.

Rate of Evolution of gas at different temperatures. Total gas from two grams of coal, measured at atmospheric temperature and pressure:

| | Distillation temperature. | | | | |
|---------------------------|---------------------------|-----|-----|------|------|
| | 700 | 800 | 900 | 1000 | 1100 |
| | cc. | cc. | cc. | cc. | cc. |
| Ist minute | .. | 50 | 120 | 250 | 375 |
| First 5 minutes | 15 | 140 | 300 | 405 | 485 |
| Next 5 minutes | 40 | 50 | 43 | 40 | 15 |
| Next 5 minutes | .. | 20 | 10 | 15 | 10 |
| Next 15 minutes | 20 | 30 | 20 | 5 | 25 |
| Next 30 minutes | 5 | 10 | 5 | 5 | 15 |

With a distillation temperature of 600 degrees, 50 cc. were evolved in two hours.

The great increase in the rate of evolution of hydrogen in all the samples examined between 750 and 900 degrees is of particular interest. In discussing a cause for this, the experimenters are inclined to attribute it to a rapid break-down in the higher hydrocarbons of the paraffin series chiefly into carbon and hydrogen, while at lower temperatures they would be more likely to decompose into methane, ethane, and hydrogen. That it cannot be due to decomposition of methane itself, they claim, because, first, the quantity of that gas undergoes very little variation, and, second, it has been demonstrated that it is comparatively stable when heated in a porcelain tube at temperatures below 1,000 degrees. With regard to the latter contention, that the heated platinum of the retort may have acted as a catalytic agent to bring about the decomposition of the methane does not appear to have entered into the discussion. To the writer this appears to be a point worth investigating. This question, however, of the rapid increase of the evolution of hydrogen between the temperatures named, the experimenters are still investigating. With regard to the large amount of ethane found in the distillate made above 700 degrees, this gas, as the authors point out, must have been generated when the retort was first pushed into the furnace, and swept out with the rush of other gases, for it has been demonstrated that ethane rapidly undergoes decomposition at temperatures below 700 and is incapable of existence above 1,000 degrees.

The principal conclusions the authors draw from their investigation are: "First, with all coals, whether bituminous, semi-bituminous, or anthracite, there is a well-defined decomposition point, at temperatures lying between 700 and 800 degrees, which corresponds with a marked increase in the quantity of hydrogen evolved. With bituminous coals, the increase in the quantity of hydrogen evolved falls off at temperatures above 900 degrees, but with anthracite coals it is maintained up to 1,100 degrees. Second, evolution of hydrocarbons of the paraffin series ceases practically entirely at temperatures above 700 degrees. Third, ethane, propane, and butane, and, probably, higher members of the paraffin series, form a large percentage of the gases evolved at temperatures below 450 degrees."

One dislikes to appear to pick holes in so eminently useful a piece of research work, still it is impossible to overlook the fact that a large proportion of the gases—in some cases more than half, as can be seen from the tables—came away during the first minute of the experiment, before the coal had attained the temperature of the furnace, where the temperature of the experiment was taken. This difficulty might have been overcome by passing the products of distillation through a long porcelain tube, contained in an electric furnace, previously heated to the temperature of the experiment. It would appear, too, that a fractional distillation, in which the fractions coming away between given temperatures were removed and examined separately, might give more practical information than the massing together of the whole distillate, made during the rise to and maintenance at a given temperature, before analysis.

The ore reserves of the Great Boulder Proprietary Gold Mines, East Coolgardie, Western Australia, are estimated at 750,177 tons of ore, carrying 570,821 ozs.

OUR EUROPEAN LETTER

Good News from South Africa fails to stimulate mining investment in England — Steady engineering improvements on the Rand — The native labour question and an insurance note — Story of the finding of Bullfinch, West Australia — Its already big output — Australia celebrates sixtieth anniversary of discovery of the precious metal — Still greater gold future for the Island Continent — Increasing cost of coal getting in Europe — Diminished output of colliers — Rise of oil fuel with promises of a new oil boom.

(Exclusive correspondence of CANADIAN MINING JOURNAL.)

London, Feb. 18th, 1911.

Mining share investment and speculation in the United Kingdom shows no particular movements of interest and quietness rules in market conditions. Even the fact that the report just issued by the British South African Company (generally known as the Chartered Company) shows a profit for the first time in the company's remarkable history, has failed to move things. This report is a remarkable document for the above-mentioned reason, and it is to be noted that the profits of \$115,000 there mentioned have taken twenty-one years to mature. Of course, these profits are far too small to allow of any dividend upon the ordinary shares of the Chartered Company, as they exceed six million in number, of the face value of five dollars each. It is these shares which reached, in the glorious days of Rhodes, Beit and Company and the others, to \$40 a share. In recent years their ways have laid in humbler places, their present figure even being no better than \$8.50.

Rand descriptions continue quiet, although the news from the Transvaal is generally wholly good. All kinds of interesting developments are taking place. A few of these may be noted here. Petrol locomotives for underground work are being tried at several mines and it is conceived that these may, in view of the shortage of native labour, supply a convenient motive power for small loads. A special petrol engine has been designed for the underground workings at the Crown mines. These trials will be watched closely by mining engineers throughout the world, as in many mining countries petrol can be obtained at a lower rate than on the Rand, and the desire to save labour costs is always with us.

Another point of interest is in connection with shaft sinking through the Rand water-bearing strata. It will be no news to readers of the CANADIAN MINING JOURNAL that the overlying dolomites of the Rand carry very heavy bodies of water. While passing through the water-bearing strata on the Western Rand estates arrangements were made to tub the shaft with a patent underhung tubbing, by which means the shaft as it proceeds can be hermetically lined and kept perfectly dry. This avoids the heavy cost for pumping and permits heavily charged water zones to be passed through. Temporary difficulty was met by an inflow of water, but this has been overcome and shaft sinking is being proceeded with. When the water-bearing formation has been passed through, more solid ground will perhaps be passed through, more solid ground will permit of ordinary sinking being resumed without the necessity of tubbing. On the Far-Eastern section of the Rand, in the Geduld and Springs, a similar inflow of water was encountered.

Two interesting sets of pumps have just been completed for the New Kleinfontein. These are of the three-throw type, each of which will deliver 15,000

gallons of water per hour against a head of 2,000 feet. They are belt-driven from an electric motor and have a set of double reduction, double helical tooth gearing, while the crankshaft, which runs at 41 revolutions a minute, is supported on four bearings. Both suction and delivery branches are so arranged that the pipes may be led off on either side of the machine as may be most convenient.

With regard to the Rand labour question, although there is an increase in the number of labourers offering, the requirements of the mines increase in a still greater ratio. Including the Premier Diamond mine and the collieries, the complement at the end of last year was 276,844 native labourers. This was an advance of over 50,000 labourers on the year, and yet the ratio of employees to complement had fallen to 71 per cent. Developing mines are employing twice as many natives as a year ago and absorbing half the increase in labour. Mortality is very heavy amongst the natives in the mines, especially from pneumonia.

Whilst on the question of Rand mine employees it might be noted here that the assurance companies which issue policies protecting the mining companies from compensation loss through accidents to workmen are finding their business very extensive on account of the tendency of the Transvaal courts always to give the claimant the benefit of any doubt. At present the insurance is being underwritten for a premium of 2 per cent.; it will probably be increased to 3 per cent., and the risk in connection with building has so increased that the building premium will be raised from three-eighths of one per cent. to one and a half per cent. A very large proportion of the compensation risks of the Rand mines is covered by a mutual insurance company in which the employing companies are interested, and which does not seek to make profits. It seems that if it did so seek it would be grievously disappointed.

The attempts that have been threatened from time to time to introduce legislation restricting or abolishing Sunday labour on the Transvaal mines have been thrust in the background for the time being by the fact that the new draft mining regulations contain no vital alteration with regard to Sunday work. It seems clear that the finances of the Union Government of South Africa are in so indifferent a condition that the authorities could not see their way to bring about what would be a serious reduction in the revenue derived from the mining industry.

Although West Australia shares do not show much life on this side, despite the fact that an important market here is devoted to them, and although we have seen nothing of the threatened Bullfinch boom here, all the news from Australia is full of the fame of Westralia's newest goldfield. D. L. Doolette, the Bullfinch finder, a member of the famous Westralia mining family, is on a visit to this country, and has been telling the story of the discovery. Doolette and a colleague, Shallcross, following a prospector whom they had sent on ahead, secured a substantial claim in the Southern Cross district of West Australia. Fine pannings resulted, but the indications were such that the two men did not think the show big enough for them both, and they decided that one should sell out to the other for \$5,000. Doolette was the lucky buyer, and almost immediately afterwards indications improved and the value of the mine could hardly be estimated. Doolette in his interviews modestly passes over the fact that he

promptly gave his colleague a sixteenth interest in the mine instead of the \$5,000 which had been arranged. Some of the ore run into carried gold up to 25 ounces to the ton, and when it got into Kalgoorlie for treatment the boom set in and men from all over Australia hurried to Southern Cross. The twenty miles of road from Southern Cross to Bullfinch was crowded. Pegging took place for sixty miles of country from Golden Valley, thirty miles north of Southern Cross, to Parker's Range as far south. In a very few weeks there was not an acre of timber, salt brush, or granite country that had not been taken up. Of course, the outlying properties had no intrinsic value and were probably only secured in order to be sold to the later option seekers who afterwards thronged the district. Between June 22nd and December 17th, the Bullfinch property produced gold to the value of over \$215,000.

Australia's gold industry celebrated its diamond jubilee in the second week of February this year. In that period over \$2,600,000,000 worth of gold has been won, and these recent developments in Western Australia point to even more remarkable finds in the future. Despite the fact that wool growing has brought more wealth to Australia than all the minerals put together, the gold industry has always exercised the greatest fascination over the public mind. The name of the actual first finder of gold in Australia will never be known. The Dauphin Chart, dated 1530-1536, which is preserved in the British Museum, contains a land to the south of Java, which is thought to represent Australia, and its northwest coast is called "Costa d'Ouro," or "the Gold Coast." Coming down to known fact, however, it is recorded that a New South Wales surveyor named McBrien, found gold near Bathurst in 1823, but no steps were taken to work it. In 1839 Count Strzelecki, the Polish explorer, reported a discovery of gold to the Governor, but at his request kept the matter secret. It was feared in official circles that economic conditions in the young colony might be disturbed by a gold rush.

That this fear was well founded was shown by subsequent events. The facts prove that Australia is one of the greatest gold-bearing countries of the world. An additional fact, often lost sight of, is that she is also a country a large portion of which has never been geologically explored. The cursory examinations of the Northern Territory made so far by geologists and prospectors indicate that the mineral future of that enormous province of half a million square miles is on the knees of the gods. Practically every precious and semi-precious metal is known to exist in the Territory, and it would be no surprise to those who know the country if it should eventually become one of the world's richest mineral areas. A proposal has received the consideration of the Commonwealth Government—which recently took over the administration of the Northern Territory—for a commission of scientific experts from the universities of Australia to make a tour of exploration through the Territory, which would greatly increase the general knowledge as to its mining possibilities.

Coming back to British and European matters, some interesting facts have been arrived at with regard to the cost of winning coal in the chief European producing centres. The average cost per ton runs highest in Belgium and France, where it is 16.14 francs and 15.95 francs respectively. England comes as one of the cheapest countries, at about two-thirds of these costs. During the past twenty years the price of mining coal has substantially increased all over Europe. In Wales, Belgium and Westphalia, between 1886 and 1907 it

more than doubled. The increase has been least in France. One of the reasons given for this augmentation in cost is the diminishing daily output of the coal getter. The range of time covered is not so great, but it appears that whereas in 1899 the English coal miner, who, by-the-by, headed then and still heads the list for output per man, turned out 311 tons of coal. This figure had shrunk to 279 tons in 1908. Belgium is at the bottom of the list with a fall in output per man from 173 tons to 160 tons.

It is urged that in the United Kingdom recent legislation in restricting operations to an eight-hour day in our mines has also had an adverse effect both on the quantity of coal produced and in the cost of production. It has led to a speeding up in many collieries and to the discharging of many of the older miners who were unable to put in the amount of work in the reduced hours, and to an increase in mining risk for the miners.

Apart from the result in curtailment of coal consumption by the rise of oil fuel, there is a midway method in operation whereby oil is mixed with coal on railways and other works. A large colliery owner in this country has just declared that he has tried the admixture of oil in coal on his own line and in his own works and finds a large economy as a result.

The direct competition of oil with coal in Europe is emphasized in a report issued by the Petrowsche Commission in favour of replacing coal by fuel oil on the Russian State railway system. This has caused something like consternation in the Donetz coal district, for almost 30 per cent. of their entire output is now taken by the State railway authorities. It is not thought possible that the change from coal to oil can be anything but a gradual one, for any other policy would press with great severity on the workers. Prices of coal have fallen as a result of this report, and producers assert that they are now below profitable levels. It is quite certain that Russian coal producers are finding the oil competition difficult to meet, and many manufacturers, attracted by the exceedingly low rates at which heavy oils are being offered, have adopted this system of firing, and have contracted for supplies to cover their 1911-12 requirements. Instances of contracts covering 1913 are mentioned.

It is very clear that a new oil boom might break out at any time upon the least provocation. The number of new oil ventures waiting to make their appeal for capital to the public is considerable and every oil centre of the world is drawn upon. The Maikop field will, of course, be responsible for many, while renewed attention is being paid by the promoters to Galicia. Cuba, even, is coming into favour. Even that far-away corner of the British Empire—New Zealand—produces testimony to the value of oil fuel. Upon the State railways there the fuel used is crude petroleum containing about 40 per cent. of kerosene and benzoine. The price to the railways was eight cents per gallon. In one of the tests the fuel kept its end up by maintaining special steam on a locomotive pulling at least 200 tons for 20 miles, generally uphill, at a satisfactory rate and without the least hitch.

On account of unwarranted reduction of working costs in 1909, many Rand mines have been forced to bring up their expenditure largely during 1910. Average costs for 1909 were 17s.3d. per ton; whilst those for 1910 were 17s.8d. Individual mines, of course, greatly exceeded these figures. The average profits per ton for 1909 were 11s.7d., and for 1910 only 10s.8.

Valedictory Banquet to W. H. Aldridge.

The valedictory banquet given at Trail, British Columbia, on February 20th, to Mr. Walter H. Aldridge, who on January 1st retired from the position of managing director of the Consolidated Mining & Smelting Company of Canada, Limited, was an unique event, for on no other occasion has there been such general and widespread expression of appreciation of the value of the services of any one man in promoting the best interests and extending the operations of the mining and metallurgical industries of the southern interior of British Columbia.

In the JOURNAL of February 1st were given brief particulars of Mr. Aldridge's retirement, and the chief reason for it, namely—to quote Mr. Aldridge's own words: "in order to enable me to become associated with William B. Thompson, of New York, who is a director of several of the largest copper-producing companies of the United States, and who, with Gunn, Thompson & Company, has control of a number of the leading copper mines of Arizona and Nevada." At the same time there was given, too, a short account of Mr. Aldridge's career as a mining engineer and metallurgist from the time he left the Brooklyn Polytechnic in 1883.

The banquet at Trail was largely attended by a most representative assembly, comprising men chiefly from various parts of the Kootenay and Boundary districts, in which Mr. Aldridge's activities had been numerous and important during the comparatively long period of twelve or thirteen years throughout which he was intimately associated with the development and expansion of mining and smelting operations of a part of the province, the ore production of which has reached an annual tonnage in excess of 2,000,000 tons, and the coal output of which last year was about 1,500,000 short tons. Beside this influential gathering present to do honour to Mr. Aldridge, there were many others who, by letter or telegram, intimated their regret at his departure from the province to other scenes of activity, and joined in the unanimous expression of goodwill and best wishes for the continued success of the guest of the evening. Among the large number from whom felicitous communications were received were the Hon. Richard McBride, Premier of British Columbia (who is also Minister of Mines for the province); Hon. Wm. Templeman, Dominion Minister of Mines; Mr. R. W. Brock, Director of the Geological Survey; all the members of the Provincial Legislature (then in session) representing the mining districts of the southern interior; the president of the Consolidated Mining and Smelting Company of Canada, Toronto; many and mining engineers and metallurgists; two judges of the Supreme Court of British Columbia; prominent Canadian Pacific Railway officials, and others too numerous to mention. Communications appropriate to the occasion were also received from the Canadian Mining Institute, Montreal; the Western Branch of the C.M.I., British Columbia, and the Toronto Branch of the Institute.

The following address was presented at the banquet: "Mr. Aldridge: This gathering and these few expressions evidence in a simple way the great goodwill which the people of the Kootenays, the men of the Consolidated Mining and Smelting Company of Canada, your associates, and your friends, entertain for you. In retiring from the active direction of the mining and smelting interests which have been in your charge for

the past twelve years, the sentiment is general that not only the mining districts but the whole province of British Columbia is losing a capable, conscientious, and faithful advocate of the country's welfare.

"The desire to show recognition of the signal services you have performed in the development of the vast and varied resources of the province, does not constitute the only motive for admiration and respect. Consistency of character, and a uniform regard for the welfare of employees, coupled ever with evidences of fairness, courtesy, and high-minded principles, have commanded a confidence and esteem which promoted the pleasantest relations and insures for you always the kindest recollections. In the success of all engagements and the achievement of every ambition you have the earnest and cordial following of a host of well-wishers who appreciate you as an executive, admire you as a citizen, and honour you as a man."

Before reading the foregoing address, the chairman said, in giving the toast of "Our Guest": "Gentlemen: In proposing the toast to the guest of the evening, I do so with mixed feelings, pleasure and regret; pleasure, because there is no man deserves the honour more than the guest of this evening; regret, that we in British Columbia are losing a man of Mr. Aldridge's standing in the mining and smelting world. This province can ill afford to lose such a gentleman as the guest of this evening. We admire him not only as a successful mining and smelting man, but as well as a good, broad-minded citizen and a thorough gentleman, a man whose word is as good as his bond. But we are not selfish in our regret, so we are met here this evening to bid him God-speed in his new field of labour, and wish him every success in all his undertakings. When Mr. Aldridge came to the Kootenay, some thirteen years ago, mining and smelting were at a low ebb, owing to the high rates for freight and treatment of ore. The Le Roi mine was forced to build its smelter at Northport, Wash., and we, in Trail at any rate, felt that our sun was darkened. But Mr. Aldridge came along then and took hold of the smelter at Trail, and through his energy and business ability, freight and treatment charges were reduced by about one-half. A few years later he formed what is known as the Consolidated Mining and Smelting Company of Canada, Limited. It was through his ability and the high respect in which he was held in the financial world, that he was enabled to form this company. To-day the company not only has mines at Rossland, but in nearly every camp in the Kootenay and Boundary country. We have here in Trail one of the largest smelters in Canada, and the only refinery of its kind in the Dominion. This, gentlemen, is part of the work of the guest of this evening, but this is not all. During all these years he has had no serious trouble with any of his employees. Why? Because he was always ready to meet them in a fair and generous spirit, and treat them as men. But while he is going away from us, we are glad he has not altogether severed his connection with the Consolidated Mining and Smelting Company, and I am quite satisfied that those upon whom his mantle has fallen will in the future carry out his policy."

After the toast had been enthusiastically honoured, Mr. Selwyn G. Blaylock, assistant manager of the Consolidated Company, on behalf of the company's many employees, presented Mr. Aldridge with a magnificent service of silver plate. They had desired, Mr. Blaylock said, to give Mr. Aldridge something that would express their esteem for him and, also, that could not be duplicated elsewhere. This had been accomplished through this service, which was manufactured from sil-

ver mined in the Kootenay and refined at Trail.

Mr. Aldridge, in his response, first suitably acknowledged the honour done him and the great kindness his many friends had shown him. Following this he said there was one thing he felt he could fairly take credit for, namely, in having got together in the company's employ the finest and ablest lot of young men he knew of working anywhere. Referring next to the men employed at the company's mines and smelting works, he observed that the Lemieux Act was designed to give employer and employed a rest, but he could say with pride that not a property of the Consolidated Company had stopped work for even a day by reason of labour troubles. He had always found the labour leaders in this territory able and reasonable men. Regarding the outlook for mining, he remarked that in many parts of the country promising indications of the occurrence of copper ore had been discovered, and he looked for a great future for the copper mining industry of the province. He spoke of the days when the War Eagle mine, at Rossland, had been supposed to be worked out, but since it had passed into the possession of the Consolidated Company it had become the greatest producer the company had ever owned. At one time, though, there was only three months' ore in sight, but mines sometimes were able to come back as this one had done. After speaking of the new duties he had undertaken, and the great productiveness of some of the mines with which he will hereafter be connected, Mr. Aldridge said that before leaving British Columbia he would like to make a few suggestions. Certain of the western States were founded through the mining industry. Then had come the agriculturist to supply the wants of the miner, and then the manufacturer. These States are now in a position where, if the mining industry ceases to exist, they will still be prosperous. For similar reasons mining in British Columbia should be given every encouragement, for it opened up the province. The St. Eugene mine, at Moyie, for years had not paid a cent to its shareholders, and the Centre Star War Eagle mine at Rossland, which is the Consolidated Company's best property, is paying to the Government a comparatively large proportion of its profits, and yet is not paying dividends to its shareholders. He advocated a reduction of the mineral tax from two per cent. to one-half per cent. A second suggestion was that measures should be taken to prevent large numbers of mineral claims being held by men who do not work them, but who are only required to pay \$13 a year taxes on each. Every man holding a claim should be compelled to develop it. A third suggestion was that the law of eminent domain should be adopted in principle, so as to debar, for instance, some of the occurrences in certain states, where a man owning a few acres of land and employing, perhaps, one Chinaman, was able to cause the closing down of a mine employing thousands of men.

The Nelson "Daily News" has published a lengthy report of the evening's proceedings, and from that has been taken the information given above. Space limitations prevent further quotation except to make brief reference to an address from the company's Italian employees, read by one of their number, and a speech by one of the Rossland miners. The former expressed—as the reader said, quite inadequately, being in English—the sentiments of those who presented it, which were expressive of esteem for Mr. Aldridge and great regret at his departure. The latter was as follows:

Mr. Rupert Bulmer said no higher tribute could be paid to Mr. Aldridge than the loyalty of the men who had worked for him. He would be assured of success

in his new sphere, for he would command equal loyalty from his men there. He had assembled a splendid staff of young men, and the administration of the affairs of the Consolidated Company's properties had fallen upon the shoulders of a young man (Mr. R. H. Stewart), in whom Rossland had complete faith. As long as the employers met their men in the open spirit which Mr. Aldridge had uniformly employed with his men, they would find union men ready to meet them half way. On behalf of the Miners' Union of Rossland he wished Mr. Aldridge God-speed.

Discussion

Discussion of Paper by John Stansfield on "Microscopic Examination of Some Typical Specimens of Porcupine Rocks and Vein Matter." *C. M. J.*, Feb. 15, 1911, p. 109.

The descriptions of the rocks and ores from the Vipond mine, show these specimens to have characters in common with those from other parts of Tisdale Township. It is noteworthy that while the wall rocks of different deposits are of many different rock types, they have all been so altered by secondary processes to carbonates, that it is almost certain that they have been acted upon by solutions which emanated from the fissures later filled with gold-quartz. As Mr. Stansfield points out, the quartz veins are in most cases younger than the carbonates. The carbonates are, however, not all in the form of veins; but form replacement deposits in altered rocks, and the quartz veins are clearly younger than the carbonates which enclose them. The relation of the quartz to the carbonates is well illustrated on a large scale by the Foster lode, of which photographs have been shown in this journal. A similar relation for minute quartz veins is found on microscopic examination.

It is well to point out, however, that as Mr. Stansfield notes in some of his specimens, there are some carbonates in the quartz which are younger than the carbonates in the wall rock and younger than most of the quartz. The younger carbonate, moreover, is not the same as the older. In some specimens from the Dome mine it is apparently calcite, while the carbonate in the wall rock is ferrodolomite.

The character of the quartz at the Vipond is evidently like that of other deposits, largely made up of coarse grains full of inclusions and showing strain effects and in less degree of fine grains which have been produced partially by crushing, aided by solution and recrystallization. These finer grains are then younger than the coarse, as are also the small particles which were not so evidently formed from neighbouring quartz grains, and which may have been deposited from solutions coming from some distance.

The character of the veins and the abundance of carbonates strongly suggests that the solutions which altered the country rocks and deposited the gold-quartz were hot and contained constituents common in molten rock magmas. It is reasonable to suppose, therefore, that the solutions rose from an igneous magma which was intruded into Keewatin and Huronian rocks. The rock mass has not yet been located. It may underlie the deposits at considerable depth and nowhere reach the surface, or it may outcrop at some distance from the deposits.

REGINALD E. HORE,

Houghton, Feb. 25, 1911.

CANADIAN TELLURIUM-CONTAINING ORES.

D. D. Cairnes, Ph.D., Ottawa, Ont.*

(Annual Meeting Canadian Mining Institute, Quebec,
1911.)

INTRODUCTION.

During the past few summers the writer, while employed in northern British Columbia and southern Yukon, has had occasion to examine a number of quartz veins that contain rich ores in which various tellurides occur; and since tellurium-containing minerals seem to be particularly attractive to the prospector and are of somewhat rare occurrence, it is thought that, possibly, a brief description of these veins together with a compilation of some of the main, available facts concerning other known Canadian ore-deposits in which telluride minerals occur, may be of interest to members of the Canadian Mining Institute. Tellurium occurs as native and in composition with sulphur, selenium, bismuth, gold, lead, mercury, nickel, and silver, yet the tellurides are the only mineral-compounds of gold that are known.

MINERALS.

The following tellurium minerals have been found and identified in Canada:—

Sylvanite, (Au Ag) Te.

Hessite, Ag₂ Te.

Petzite, (Ag, Au)₂ Te.

Calaverite, Au Te₂.

Nagyagite, a sulpho-telluride of lead and gold, containing about 7 p.c. of antimony.

Altaite, Pb Te.

Tetradymite, approximately Bi₂ (Te, S)₃.

Tellurite, (Telluric ochre), Te O₂.

In addition, a mineral thought by Dr. Hoffman¹ to be native tellurium, was found at Long Lake, Greenwood mining division, British Columbia.

OXIDATION.

All these tellurides oxidize readily and give rise mainly to telluric oxide, tellurites or tellurates with bismuth, iron, and probably mercury, and native gold, silver, also rarely, bismuth; the telluric oxide, also known as tellurite and telluric ochre, in its pure state is a soft (H.2) white to yellowish mineral, but generally occurs mixed with other oxides, frequently those of iron, when a yellowish to reddish powder or coating results.

MINERAL ASSOCIATIONS.

With the exception of tetradymite, these minerals occur in Canada only in veins which may have been produced either by fissure filling or by metasomatic replacement or may owe their existence in a large degree to both agencies. The veins are found in a great variety of formations, including various schistose rocks, granite, granodiorite, diorite, andesite, volcanic breccias, quartzite, slate, shale, and arkose; but with but one known possible exception they are all either in, or in the vicinity of, igneous rocks. In all cases, so far discovered, the veins consist predominantly of quartz, but calcite, and, rarely, ankerite and sericite occur as gangue minerals. Several varieties of tellurides are in many cases intimately associated in the same deposit and wherever one or more of these occur, native gold, silver and in places bismuth and copper are char-

acteristic accompanying minerals, in addition to which, pyrite, chalcopyrite, and galena are present in many of the veins, and pyrrhotite, chalcocite, siderite, and zinc blende are found in some of them.

Sylvanite, hessite, petzite, calaverite, nagyagite, and altaite are, in all the deposits so far discovered, minerals of primary deposition, so that their presence indicates a zone of unoxidized or at least incompletely oxidized material. The native gold, so commonly found associated with the tellurides, has in many cases been derived from these minerals by oxidation, when it is generally spongy and frequently has a brownish colour; where this origin for the gold can be proved, the zone in which it and the telluride occur together lies above that of the primary sulphides and consequently (as the zone below ground-water level is reached, i.e., below the oxidized zone and the zone of secondary enrichment), the gold may be expected to cease to be free and to occur instead, combined with tellurium.

Tetradymite is known to have been discovered at but two points in Canada, viz.: at the Nickel Plate mine, Osoyoos mining division, and on the Roderick Dhu claim, Greenwood mining division, both in British Columbia. At the Roderick Dhu claim tetradymite occurs in a quartz vein like the other tellurides; but at the Nickel Plate mine it is found in contact-metamorphic rocks, and is probably also a primary constituent of the ore, although Mr. Camsell,² who has described the occurrence, considers that possibly this mineral may be the result of secondary surface alteration.

USES AND VALUE.

Tellurium as yet, has practically no technical use and consequently there is very little if any demand for the metal itself except for experimental purposes. A number of uses to which this metal may be put have recently been proposed, however, and concerning it, Edison³ says: "I have worked it to a considerable extent and I pronounce it a marvellous substance; I could use it in large quantities if it were cheaply produced."

Potassium tellurate is employed to a limited extent, however, in therapeutics, being used for night sweat or phthisis.

TREATMENT AND ASSAY.

To enter into a detailed discussion concerning the assaying and treatment of tellurium-containing ores, would be beyond the scope of this short paper; but a few lines on this topic may not be entirely amiss, since a study of the literature dealing with these ores cannot fail to impress one with the fact that tellurium has a much more general distribution and is more commonly associated with gold than has been commonly supposed.

TREATMENT—Ores in which tellurium occurs associated to any considerable extent with the precious metals have been a source of perplexity to many millmen and metallurgists, particularly in American practice; in many of these cases, possibly in the majority of them, the tellurium has not been detected or if it has been discovered, its presence has been ignored with disastrous consequences. In milling processes, it is found that ores in which compounds of tellurium are

*By permission of the Director, Geological Survey, Department of Mines, Canada.

prominent, are not susceptible to amalgamation or to the ordinary methods of hydraulic concentration. Concerning smelting operations Kustel⁴ states that "not all tellurium combinations with gold, lose gold to a notable extent while roasting; but some do, and that up to a considerable amount, 20 per cent., perhaps even more." He also adds: "The loss is no mechanical one, occasioned by draft of the furnace, but principally by volatilization." The result of the various investigations from those of Plattner to the present, seems to be that in all ordinary oxidizing roasting of gold ores containing no tellurium that there is no loss of gold other than a mechanical one; but where ores are involved in which there is any appreciable amount of tellurium, there appears to be always a loss of gold by volatilization, in any operation involving the roasting of the ores or any of their products from which neither the gold nor the tellurium has been separated. Mr. F. C. Smith has made a careful investigation of such ores and in an excellent article⁵ concerning them writes:

"Careful experiment with such ores, especially where conducted at a reduction works handling large quantities of them, should not only finally avoid embarrassment from the presence of the tellurium, but even turn it to a profit." This indicates that the only objectionable influence tellurium in ores possesses is likely to be overcome; when this is established the discovery of this metal in an ore-deposit will be cause for unalloyed gratitude on the part of the owner, as tellurium is almost invariably an indication of the occurrence of gold.

ASSAY—On the subject of the assaying of ores containing tellurium, Mr. Chas. A. Fulton, has published a very carefully prepared article⁶ and according to him scorification of any kind is a very bad, and the crucible assay is the best, method. The fire should be moderately hot, a large excess of litharge should be used, and a button of 20 to 28 grains should be obtained, which can be cupelled directly.

IDENTIFICATION.

The presence of tellurium is frequently overlooked partly because, in many cases, it occurs in very small amounts, and also because its determination is a somewhat difficult and laborious process in comparison with that of gold and silver. A small fraction of an ounce of gold to the ton of ore may be easily and accurately determined by dry assay; but a similar amount of tellurium, or other metal to be found by wet methods, calls for a refined analysis. A refractory character in ores, or even the recognition in the gold carried by them of the brown spongy appearance characteristic of gold derived from the alteration of tellurides, is sufficient to arouse suspicion as to the presence of tellurium. A further significant fact concerning ores containing this metal is that even when very rich, they often fail to show colours in panning.

LOCALITIES.

Ores containing tellurides have been found in the following Canadian localities, which are named in order commencing at the northwest and proceeding towards the southeast. On the accompanying map of Canada the positions of these localities are indicated by encircled numbers which correspond with those in the list given below.

Yukon Territory.

1. Wheaton River district, Conrad mining division, on—
 - (a) The Gold Reef claim on Gold Hill.
 - (b) The Buffalo Hump group on Mt. Stevens.

British Columbia.

2. The Engineer Mines and vicinity, on the east side of Taku Arm, above Golden Gate, Atlin mining division.
3. Valdez Island, Nanaimo mining division.
4. The Nickel Plate mine, Osoyoos mining division.
5. Near Osoyoos Lake, Osoyoos mining division at the following points:—
 - (a) Northern end of Osoyoos Lake (reported occurrence).
 - (b) On Kruger Mt., on western side of Osoyoos Lake.
6. Olds Mt., Arrow Lake mining division, (reported occurrence).
7. Burton camp, Arrow Lake mining division (reported occurrence).
8. Long Lake camp, Greenwood mining division, on the following properties:—
 - (a) Jewel mine.
 - (b) Lakeview claims on the north side of Long Lake.
 - (c) North Star claim, on the south side of Long Lake.
 - (d) Enterprise claim, on the south side of Long Lake.
 - (e) Roderick Dhu claim.
9. Olive Mable claim, Gainor Creek, Trout Lake mining division.
10. Six miles north of Liddle Creek, Kaslo River, West Kootenay district (reported occurrence).
11. Pay Roll mine, ten miles southwest of Cranbrook, Fort Steele mining division.

Ontario.

12. Gold Creek, Pine Portage Bay, Lake of the Woods district.
13. The Huronian mine, near Jackfish Lake, Moss Township.
14. The Sudbury mining division, two miles south of the southeast corner of Musgrove Township (reported occurrence).

Quebec.⁷

15. The Opasatica district, Pontiac County. Tellurium is reported to occur also in Newfoundland.

DESCRIPTIONS OF OCCURRENCES.⁸

In the following paragraphs, brief synopses are given of the available information concerning the tellurium-containing ores of the above mentioned localities, together with references to published descriptions of these deposits. An attempt has been made to make the list of occurrences and references as complete as possible, and it is hoped that members of the Canadian Mining Institute will kindly supply any omissions that occur.

1a. GOLD REEF CLAIM.⁹

The Gold Reef claim was staked in 1906, and was the first location made on Gold Hill in the Wheaton River district, Yukon Territory, situated midway between the Watson and Wheaton Rivers and twenty miles in a westerly direction from Robinson on the White Pass and Yukon Railway.

The ore on the Gold Reef property occurs in a vein in greenstone schists in the vicinity of intrusive granodiorites, and is traceable for upwards of 1,000 feet, throughout which distance the vein has an average thickness of possibly four to five feet. The strike of the vein, in a general way, coincides with that of the formation in which it occurs, so that the greater part of the quartz has been deposited along the foliation planes of the rock and lies conformable to the enclosing laminae; in places, however, the deposit cuts across

the planes of schistosity for considerable distances.

The vein-filling consists predominantly of quartz, which presents a dense, massive appearance, and with the exception of occasional particles of pyrite, contains, in most places, practically no metalliferous minerals. A few widely separated pockets of rich ore, however, have been found, ranging in weight from five or ten pounds each to one of about six hundred; this ore contains free-gold, sylvanite, hessite, petzite, and telluric ochre, the values usually representing hundreds of dollars to the ton; but so far the mineral has not been found in nearly sufficient quantity to pay for the development work undertaken on the vein.

1b. BUFFALO HUMP GROUP.¹⁰

The Buffalo Hump Group consists of three claims located in 1906, and situated on Mt. Stevens in the Big Bend of the Wheaton River, Conrad mining division, Yukon Territory. On the Golden Slipper claim several tons of quartz were discovered. This was at first thought to form part of a vein in situ, but which subsequent development showed to be transported; the material, however, occurs near the summit of the mountain, and appears to have been derived from the hill on which it is found.

The quartz, in addition to a small amount of disseminated galena, contains some native gold and sylvanite.

On the Surprise claim a quartz vein also occurs, which is as much as seven feet in thickness at one point, and contains promising amounts of gold and silver, but in it no tellurides have been detected.

2. ENGINEER MINES¹¹ AND VICINITY.

The Engineer mines are situated on the east side of Taku Arm, ten miles above Golden Gate, Atlin mining division, British Columbia. This property was first located in 1899, and although rich gold-bearing quartz was found at various times in the early workings, the operations during the season of 1910 have resulted in the discovery of the rich ore in considerably greater amount than in previous years. The recent workings consist mainly of a few open-cuts, several hundred feet of trenching, and about fifty feet of tunnelling. A Joshua Hendry 2-stamp mill has been installed and was in operation during part of the season of 1910.

The ore occurs in veins in Upper Jurassic or Lower Cretaceous shales, slates, and related elastic rocks in the vicinity of granitic and andesitic intrusives. The veins consist mainly of quartz associated with some calcite and varying amounts of intercalated and brecciated wall-rock, and contain as ore-mineral free-gold, a brass-yellow telluride, apparently calaverite, native bismuth, and pyrite.

Two deposits of quartz and brecciated and intercalated slate and other wall-rock; these all carry gold to the extent of 270 and 200 feet, respectively, and exposed lengths of but little in excess of these figures; but on account of the thick covering of superficial materials, neither their entire widths nor their lengths could be ascertained. Traversing these two central masses, from various directions, two sets, of three and six veins respectively, have been discovered, which range in thickness from 2 to 40 feet. In addition, ten other veins from 1 to 50 feet thick were noted which have not been traced into any central mass.

The larger veins and deposits are generally to some extent brecciated and contain considerable intercalated slate and other wall-rock; these all carry gold to some extent at least, as small particles were frequently found in them. The amount per ton of the gold, however, has not been definitely determined; but is known

to be low in most cases, and the few assays that have been made have generally given results ranging from traces to about ten dollars per ton.

In four or five of the smaller, more thoroughly prospected veins, pockets or shoots of very rich ore have been found. These veins are composed almost entirely of quartz with some calcite, are from 6 inches to 4 feet in thickness, and can be traced on the surface from 100 to 1,000 feet; but even these have been but slightly explored. The pockets appear to occur prevailingly at points where the veins are intersected by cross-fissures; they vary considerably in size, some containing but a few pounds while others contain several hundred pounds, and the greater part of the ore has a value of from \$1 to \$5 per pound. It was ascertained during the summer of 1910, that much of the quartz in the veins between the high grade pockets, will pay to mill. The only body of rich ore of sufficient size to be termed a shoot, so far explored, is in vein No. 1; this has an average thickness of from 1 to 2 feet, is at least 20 to 30 feet in length, measured along the strike of the vein, and has been followed downwards for thirty feet without any apparent depreciation in values. This shoot might perhaps be better described as a portion of the vein in which pockets are more than usually present, but practically all the material so far obtained from it has been pay-ore.

The first 800 pounds of selected ore from this property that was milled during the summer of 1910, yielded 20 pounds 3 ozs. (Troy) of gold, the next 1,000 pounds, gave 21 pounds 8 ozs. (Avoirdupois), and it is claimed that the tailings in each case contain approximately 30 per cent. to 40 per cent. of the original gold-contents; but the truth of this claim was not investigated. The ore taken from the various workings during the summer previous to September 1st, was valued at about \$25,000, and from the part milled \$8,000 worth of gold bullion was obtained.

Tellurides are reported to have been found on other claims near Engineer mines; but no specimens could be found by the writer when these properties were visited.

3. VALDEZ ISLAND.

Mr. H. Carmichael, Provincial Assayer, Victoria, V.C., writes¹²: "From Valdez Island, B.C., we have news of a recent strike of copper ore carrying associated gold tellurides running half an ounce of gold per ton."

4. NICKEL PLATE MINE.

"Tetradymite is found sparingly in the upper part of the Nickel Plate mine¹³" which is situated in Hedley mining district, Osoyoos mining division, British Columbia. This mineral there "occurs in massive altered limestone which consists of garnet and epidote with much arsenopyrite, and is often found in association with free gold." Specimens of the ores from the Nickel Plate mine show crystals of tetradymite enclosing small particles of native gold.¹³ This telluride "has apparently no connection with fissures," and, as mentioned above, is most probably a primary mineral here as it is in the various veins in other places, but Mr. Camsell¹³ also considers the possibility of the occurrence being the result of secondary surface alteration.

5a. OSOYOOS LAKE.¹⁴

Narrow quartz veins containing tellurides of gold and silver were reported to Dr. R. A. Daly¹⁴ to occur in the diorite found at the northwestern corner of Osoyoos Lake, Osoyoos mining division, British Columbia.

5b. KRUGER MT.

Messrs. H. A. and G. A. Guess¹⁵ observed hessite occurring with petzite, native gold, etc., in a vein composed of quartz and coarsely crystalline siderite, and the Calumet claim, Kruger Mountain, on the western shore of Osoyoos Lake, in Osoyoos mining division, British Columbia.

6. OLDS MOUNTAIN.

Tellurides have been reported to occur on Olds Mountain which formed the divide between the headwaters of Kettle River and Eight Mile Creek, which drains into Fire Valley. The deposits in this locality were examined in 1901, by the Provincial Mineralogist of British Columbia¹⁶, who, however, was unable to find any of these minerals.

7. BURTON CAMP.

Mr. R. W. Brock¹⁷ reports that some tellurides are stated to occur in Burton Camp, which is situated at the east side of the lower end of the narrows between Upper and Lower Kootenay Lakes, Arrow Lake mining division, B.C.

8a. JEWEL MINE.¹⁸

The Jewel mine is situated in Long Lake camp, Greenwood mining division, Boundary Creek district, B.C. The ore on this property is described by Mr. R. W. Brock¹⁸ as occurring in veins of from two to twelve feet wide, mainly at the contact between grey biotite-hornblende granodiorite and a green schist, but occasionally in one or other of these formations. In the production of these veins both replacement and fissure-filling processes have been active. The ore is galena, pyrite, and chalcopryrite, in a quartz gangue, the upper portions containing free gold and "rich tellurides" are found.

8b. LAKEVIEW CLAIM.

Messrs. H. A. and G. A. Guess, identified altaite "associated with hessite, fine to coarse native gold, thin plates of native copper and, apparently, native tellurium, in segregated quartz veins carrying chalcopryrite, pyrrhotite, and chalcocite, at the Lakeview claim on the north side of Long Lake, a small sheet of water some thirteen miles north-northeast of the mouth of Boundary Creek,"¹⁹ Greenwood mining division, Boundary Creek district, B.C.

8c. NORTH STAR CLAIM.

Messrs. H. A. and G. A. Guess observed hessite "associated with native gold, chalcopryrite, pyrite, and galena in a quartz vein, at the North Star claim"²⁰ on the south side of Long Lake, Greenwood mining district, B.C.

8d. ENTERPRISE CLAIM.

Messrs. H. A. and G. A. Guess identified petzite "in association with free gold, galena, and pyrite, in a quartz vein at the Enterprise claim, on the south side of Long Lake"²¹ Greenwood mining division, B.C.

8e. RODERICK DHU CLAIM.²²

In 1895, Mr. Harry Guess, of Midway, identified several tellurides, including tetradymite and altaite, in a 12-inch vein cutting a large granite-boss flanked by siliceous and micaceous schists on the Roderick Dhu claim, Long Lake camp, Greenwood mining division, British Columbia. Mr. Fowler also noted tellurides on this property.

9. OLIVE MABEL CLAIM.

The Olive Mabel claim is situated on Gainor Creek, Trout Lake mining division, British Columbia, about

15 miles directly east of the head of the northeast arm of Upper Arrow Lake, and according to Prof. Kemp's²³ descriptions, a body of quartz about two feet thick, which narrows to small dimensions at each end, has been opened on this property. The vein "contains much siderite, some of which is decomposed, revealing considerable coarse free gold. Principally in the quartz, but to some extent in the siderite also, two tellurides are found. One is certainly nagyagite, as it affords a mere trace of silver, if any, but much lead and gold. The vein lies in an extensive belt of argillites," which it cuts across, and no igneous rocks appear.

10. LIDDLE CREEK.

Mr. R. A. A. Johnston, of the Geological Survey, Department of Mines, Canada, identified as massive altaite, a mineral occurring in a gangue of white sub-translucent quartz, in a specimen said by Mr. Ruecan²⁴ to have been found by him at a point six miles north of Liddle Creek, Kaslo River, West Kootenay district, British Columbia.

11. PAY ROLL MINE.

The Pay Roll mine is situated to the north of the Moyie River, about a third of a mile north of the point where the trail up the river crosses Nigger Creek. Here, according to Mr. McEvoy, a dike of dark-green intrusive rock, resembling a diorite, extends northward, dissecting the flat-lying massive beds of gray quartzite. A small vein cuts across this dike and "showed," in a specimen examined by Dr. Hoffman,²⁵ "rust-stained quartz carrying a little telluride of lead (altaite) and some particles of free gold."²⁶

12. GOLD CREEK.

Hessite is reported to occur²⁷ in lead-gray, plate-like masses with quartz and a little pyrite and chalcopryrite on Gold Creek, Pine Portage Bay, Lake of the Woods region, Ontario.

13. HURONIAN MINE.²⁸

The Huronian mine, also at one time known as the Shebandowan gold mine, is situated in location H.1, in the Township of Moss, Ont., and is about 70 miles in a direction a little north of west from Port Arthur. The rock formation here according to Bureau of Mines' reports, consists mainly of interbedded taicoid, chloritic, dioritic, and a little dolomitic schist, siliceous magnetite, and massive diorite. A small intrusive area of granite sends an arm southwestward to within a short distance of the mine and is well exposed on Jackfish Lake. The ore occurs in a vein which is six to eight feet in thickness, of which two to five feet are mainly quartz, the rest being incorporated schist. The quartz carries pyrite, chalcopryrite, galena, zinc blende, sylvanite, and a little free-gold. Mr. F. C. Smith²⁹ says: "The ore carried an inconsiderable amount of galena with iron and copper pyrites, argentite, hessite, sylvanite (or petzite), and probably altaite, the telluride of lead. Near the surface the ore showed considerable native gold, but this disappeared with greater depth. In some cases the tellurides occurred in irregular, bluish-grey masses enclosed in pure quartz; at other times they occurred as very dark brown scales filling small seams in the quartz. Samples of quartz from this mine, which showed no trace of metallic contents, but seemed to be saturated with the tellurides and resembled an ordinary piece of smoky quartz, have given upon assay as high as 902 ounces of silver and 34 ounces of gold per ton."

A ten-stamp mill was erected to treat the ore in 1883, and was run to some extent during 1884 and

1885, when work was suspended and has not since been resumed.

14. SUDBURY MINING DIVISION.

Mr. J. C. Nelson, of Haileybury, Ont., showed a sample of ore to Mr. R. A. A. Johnston, Mineralogist, Geological Survey, Department of Mines, Canada, which he claimed was obtained from a point in the Sudbury mining division, Ontario, two miles south of the southeast corner of Musgrove Township. Of this specimen Mr. Johnston writes: "A quartzose rock carrying small quantities of tellurium minerals containing lead, silver, and possibly gold."³⁰

PORCUPINE AREA.

Tellurides probably occur in the Porcupine area, Ontario, as some apparently unpromising veins have yielded good assay returns ascribable, it is thought, to the presence of tellurides; further, in refining gold bullion at McGill University from the Hollinger mine, lot 11, con. 2, Township of Tisdale, phenomena suggesting tellurium are believed to have been observed.

15. OPASATICA DISTRICT.

In the Opasatica district in the northern part of Pontiac County, Quebec, near the Ontario boundary line, on a claim owned by the Pontiac-Abitibi Mining Company, sylvanite occurs with native gold in quartz-ankerite veins cutting the Keewatin porphyrite and the Huronian breccia and associated dikes. The largest vein reported from here is about 2½ feet in thickness. The quartz is commonly banded with ankerite and carries sericite, pyrites, and chalcopyrite. The gold occurs both free and in combination with silver as sylvanite which is later than the quartz and ankerite.

From published accounts of the geology of the Porcupine country, Mr. Harvie³¹ considers this district in geological characteristics must closely resemble the Apasatica and anticipates the discovery of tellurides there.

NEWFOUNDLAND.

Mr. Howley³² mentions the occurrence of tellurium in Newfoundland.

(1) Hoffman, G. C.,—Annual Rep. Geol. Survey of Can., Vol. VIII., p. 10R.—12R., 1895-96.

(2) Camsell, C.,—"The geology and ore-deposits of the Hedley Mining district, B.C.;" Memoir, No. 2, Geol. Surv., Dept. of Mines, Can., 1910, p. 138.

(3) Edison, T. A.,—Trans. Amer. Inst. Min. Eng., Vol. XVIII., p. 442.

(4) Roasting of Gold and Silver ores," p. 57.

(5) "The occurrence and behaviour of tellurium in gold-ores, more particularly with reference to the Potsdam ores, in the Black Hills, South Dakota;" Trans. Amer. Inst. Min. Eng., 1896, Vol. XXVI., pp. 485-516.

(6) "The assay of telluride ores;" Jour. of Amer. Chem. Soc., 1898, p. 586-597.

(7) Tellurides also probably occur in the Porcupine area.

(8) For an excellent general article on telluride gold ores the reader is referred to:—

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(9) Cairnes, D. D.,—Sum. Rep. Geo. Surv. of Can., 1906, p. 27.

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(12) Carmichael, H.,—Journal Can. Min. Inst., 1909, p. 452.

(13) Camsell, C.,—"The geology and ore deposits of Hedley mining district, British Columbia"; Memoir No. 2, Geol. Surv., Dept. of Mines, Can., 1910, p. 138.

(14) Daly, R. A.,—"Geology of the western part of the international boundary (49th parallel)"; Annual Rep. Geol. Surv. of Can., 1902-03, Vol. XV., p. 143A.

(15) Hoffman, G. C.,—Ann. Rep. Geol. Surv. of Can., 1895-96, Vol. VIII., p. 12R.

(16) Report of the Minister of Mines of British Columbia, 1901, p. 1130.

(17) Brock, R. W.,—Ann. Rep. Geol. Surv. of Can., 1898, Vol. XI., p. 69A.

(18) Brock, R. W.,—"Preliminary report on the Boundary Creek district, British Columbia;" Ann. Rep. Geol. Surv. of Can., 1902-03, Vol. XV., p. 127A.

(19) Hoffman, G. C.,—Ann. Rep. Geol. Surv. of Can., 1895-96, Vol. VIII., p. 10R-11R.

(20) Hoffman, G. C.,—Ann. Rep. Geol. Surv. of Can., 1895-96, Vol. VIII., p. 12R.

(21) Hoffman, G. C.,—Ann. Rep. Geol. Surv. of Can., 1895-96, Vol. VIII., p. 12R.

(22) Kemp, J. F.,—"Geological occurrence and associates of the telluride gold ores;" Mineral Industry, 1898, Vol. VI., p. 317.

(23) Kemp, J. F.,—"Geological occurrence and associates of the telluride gold ores;" Mineral Industry, 1898, Vol. VI., p. 317.

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Smelting in the Interior of British Columbia.

By E. Jacobs, Victoria, B.C.
(Continued from Feb. 1, 1911.)

General Information.

Other information must be very briefly summarized. The bulk of the copper ores received is sampled in the largest mill, which includes in its equipment Nos. 8 and 4 McCully crushers, Vezin samplers, smaller crushers, rolls, etc. The proportion of the ore delivered to the quartering floor is one two-thousandth part of the quantity sampled. It is quartered by hand or in Jones riffles; part goes to the assay office, part to the owner, and part is kept as a check until the ore is paid for. The blower plant comprises 7 rotary blowers, operated by individual motors; three are Connersville type and four the later Root blowers. The largest of these delivers 33,000 cubic feet of free air per min. at a pressure of 36 ounces and requires 350 horse-power to drive it. The total power for the blower plant is 1,200 horse-power. Electric power is transmitted from Bonnington Falls, distant 33 miles, at 20,000 volts; at the smeltery it is stepped down to 550 volts. The total power consumption is about 3,000 horse-power.

Extensive brick and metal flues connect with two brick stacks, from the copper and lead furnaces, respectively. The copper furnace stack is 185 feet high and 144 square feet internal area. The flue dust, amounting to two per cent., is briquetted and resmelted. The assay office has modern equipment, including electric motor for driving the crushers, electric heater, four coal-fired muffle furnaces, and a complete equipment for wet and electrolytic work.

The ore supply comes chiefly from East Kootenay, Slocan, Nelson, Rossland, and Boundary districts, and some from the neighbouring State of Washington. Coke, of which about 225 tons is used daily, comes from Hosmer, Crow's Nest Pass, 249 miles distant. Limestone, chiefly for flux, is obtained from the company's quarry at Fife, 68 miles away; requirements are about 200 tons a day and cost is \$1 a ton in the charge bins. The works are advantageously situated, with railway connections to all important mining camps in the Kootenay and Boundary districts.

Granby Consolidated Mining, Smelting and Refining Company, Limited.

The Granby Company's smeltery, situated at Grand Forks, Boundary district, is stated to be the largest copper reduction works in the British Empire, and among the largest in the world, second only to the great Washoe works at Anaconda, Montana, U.S.A.

There are at Grand Forks eight rectangular water-jacketed blast furnaces, contained in a building having steel frame and corrugated iron sides and roof, dimensions 71 feet wide by 289 feet long, with a lean-to 9 feet 6 inches wide by 12 feet high. The feed floor is 18 feet above the furnace floor. The average distance centre to centre of the furnaces, is 36 feet. There are six furnaces 44 by 266 inches, 4½-inch tuyeres, 18-inch centres, 12-inch bosh, and two furnaces 48 by 260 inches, 3½-inch tuyeres, 8-inch centres, 12-inch bosh; depth of furnaces is 15 feet 8 inches. Their total treatment capacity is 4,000 to 4,500 tons of ore per diem; they are served by two 12-inch water mains, and two 60-inch blast mains placed directly at the back of the furnaces and running the entire length of the building. The furnaces have uptakes 6 feet in diameter, with damper, which can be raised if required, but this is seldom neces-

sary. Six-foot downtakes lead to an overhead steel flue-dust chamber 13 feet wide, 15 feet high, and 313 feet 7 inches long, erected 12 feet above the feed floor and parallel to the long way of the building. At one end it is connected with a brick flue 10 by 15 by 448 feet leading to a brick stack 13 feet diameter and 153 feet high; the other end is also connected with a brick flue and stack, the latter 11 feet square and 153 feet high. The steel chamber has a hopper bottom; a steel conveyor mechanically conveys the flue dust to a briquette mill in which there is a No. 2 White briquetting machine with a capacity of 50 tons per diem.

The furnaces are end-feed, and the charge is delivered to them in specially designed cars, three of which make a train 266 inches long. There are four of these trains, each moved by a 30 h.p. Westinghouse electric locomotive, and each supplying two furnaces with charge. The cars are run into the furnace and the charge dumped where required. The ore and coke are drawn direct from the storage bins into the cars in proper proportions.

Two settlers are used for each furnace, and from the second the slag flows into 5-ton slag pots or cars, which are hauled to the dump by 9 by 14-inch cylinder 14-ton Davenport steam locomotives, each one of which serves two furnaces, taking out six cars a trip. At each furnace three cars are filled with slag, while the other three are being dumped and returned. The slag haulage system equipment includes six locomotives and 52 5-ton slag cars.

No. 1 blower room is 57 feet wide by 128 feet 9 inches long, built of brick and steel, with corrugated iron roof and concrete floor. In it are 8 Connersville blowers, one No. 10, four No. 8, and three No. 7; total air capacity, 119,500 cubic feet of air per minute. In a part of the blowing engine building, are four more No. 10 blowers, each 30,000 cubic feet capacity. The aggregate air capacity is 239,500 cubic feet per minute, which, at 35 ounces pressure, is in excess of present requirements. The blowers are all belt-driven. The No. 10 machines are each operated by two 150 h.p. a.c. motors, and the others each by one 100 h.p. a.c. motor. All blowers are direct-connected to pipes which lead to one or other of the 60-inch mains.

The converter building is of steel, covered with corrugated iron on roof and sides; its dimensions are 42 feet wide by 240 feet long, with two lean-tos 23 and 32 feet wide, respectively. A 40-ton 4-motor Morgan Engineering Company crane, 42-foot span, runs the full length of the building. Matte is brought from the furnaces by a 10-ton three d.c. motor Morgan crane, with 24-foot span, which runs from end to end of the furnace building. A second 10-ton crane is kept in reserve. There are three 84 by 126-inch electrically operated converter stands with 10 shells, and one stand operated by hydraulic power, with three 72 by 100-inch shells. Matte, from 35 to 40 per cent., is converted to 98.5 per cent. blister copper, which is poured direct into moulds passed under the mouths of the converters. The blast pressure used is 12-pound. Converters are connected with 10 by 10 by 340-foot flue chambers, and thence to 153-foot brick stack, for settling of flue dust. A slag-casting machine, Anaconda type, conveys all converter slag to steel bins, whence it is taken in railway cars to furnace feed bins for re-smelting. Quartz, coke and clay are taken to relining floor in cars and motor. On this floor there are three Allis-Chalmers self-discharge mortar mills, and two 7-foot and one 6-foot 6-inch pans. A 75 h.p. motor drives all machinery. Air rammers are used for tamping the lining of shells.

The blowing engine building is of similar materials to these of the blower room; its dimensions are, width, 55 feet 4 inches; length, 212 feet 9 inches, with an L 41 feet 2 inches wide by 73 feet long. There are three engines: One 36 by 38-inch Nordberg, capacity 3,700 cubic feet of air per minute; one 34 by 34 by 36-inch Allis-Chalmers duplex, capacity, 6,000 cubic feet per minute; and one 40 by 40 by 42-inch Nordberg duplex, capacity 10,000 cubic feet per minute; total air capacity, 19,700 cubic feet per minute, which is ample to operate all four converter stands simultaneously. All engines are belt-driven, by 200, 300, and 500 h.p. motors, respectively. One motor generator set, of 200 h.p. a.e. motor direct-connected to two 85 k.w. generators, 220 volts, operates the cranes, tilts the converters, and runs the charge system. A hydraulic triplex plunger pump, 6 by 10-inch, 250 pounds pressure, operates the small converter stand, slag-casting machine, etc. A 12 by 18-inch Rand compressor drives the tamping machines.

The electric power used at the smeltery ranges from 2,000 to 2,200 h.p. Motors have been installed having an approximate aggregate capacity of 3,500 h.p., which is considerably in excess of the horse-power at present used. About 400 h.p. is generated by the company's own hydro-electric plant; the West Kootenay Power & Light Company supplies the rest of the power used, bringing it in from its generating station at Bonnington Falls, 65 miles distant, at 40,000 volts. This is stepped down to a working voltage of 440 volts at the smeltery. Connection has also been made with a power station at Cascade, 16 miles distant, so that there are three sources of power when needed. The pumps are also in the company's power house, 100 feet below and 1,000 feet away from the smeltery. Six Smith-Vaile 8 by 10-inch triplex plunger pumps have a total capacity of 4,740,000 gallons every 24 hours.

Mention of the storage bins and sampling mills was omitted earlier. There is bin storage capacity for 12,000 tons of ore and 7,000 tons of coke; also ground storage for 12,000 tons of coke. There are two Snyder automatic sampling mills, one with a bunker capacity of 500 tons and the other of 450 tons. Attached storage bins give additional capacity of 4,350 tons. Total ore storage capacity at the works is, therefore, 17,300 tons. Assay office and laboratory are well-equipped and officered. Mechanical department is large, providing for all repairs and renewals other than castings, which are obtained from a local foundry.

The Granby Company employs about 250 men at its smelting works, and something like 400 at its mines. Ore, etc., smelted during ten years to June 30th, 1910, totalled 6,491,149 tons, of which 6,263,091 tons was from the company's mines at Phoenix. During the latter half of 1910 approximately half a million tons of Granby ore was smelted, beside some foreign ore. The aggregate to the end of 1910 is, therefore, about 7,000,000 tons.

Metallurgical Conditions.

Conditions at the Granby Company's smeltery are different to those obtaining at other copper smelteries, outside the Boundary district of British Columbia, in that the Granby Company has to treat an ore giving a very low percentage of sulphur on the charge—as low as two per cent. On the other hand the ore contains silica, iron, and lime in such favourable proportions that no barren flux, neither iron nor lime is required. If it were necessary to use an iron flux in smelting Boundary district copper ores, it would not be practicable to mine and treat them at a profit, unless the price of copper was much higher than it usually is,

for the iron ore obtainable in the district in considerable quantity does not contain any marketable value. The slag from the Granby furnaces runs from 45 to 48 per cent. silica all the time, while occasionally it has contained as high as 52 per cent., which has been the maximum reached. The ore is smelted as it comes from the mine; usually it ranges from 40 to 48 per cent. silica. Smelteries in other parts generally have ores running higher than they require; on the other hand they have the advantage of a low silica content in the ore. It will be seen, therefore, that, as already stated, conditions under which the Granby Company's furnaces are ordinarily operated are quite different to those attending the reduction of copper ores elsewhere than in the Boundary district.

The low average value of Granby ores makes it imperative that labour costs shall be kept down as much as possible, consequently wherever it is practicable to use them, mechanical devices are substituted for the labour of men. This is especially the case in feeding the furnaces, there being no mixing of the charge or other handling of materials between the ore and coke bins and the furnaces. Cars, pushed by electric locomotives, receive the ore and coke direct from the storage bins and dump them into the furnaces, the mechanical arrangements being such as to admit of this being done quickly and effectively. The company's engineers have devised many appliances for labour-saving, so that economy in working methods is general throughout both mines and smeltery.

It is probable that in the early future changes will be made in the smelting practice that will admit of a further saving being made in cost of treating the Granby ores. The company has lately secured under option of purchase mines that it is believed will yield largely heavy sulphide ores. Heretofore it has been, and still is, the practice at the company's smeltery to produce a 35 to 40 per cent. copper matte at first smelting, which involves a loss in the slag of about 5 pounds of copper to the ton of ore. With the sulphide ores, above referred to, as an aid to the proposed change, it is believed that a saving will be effected, and as a consequence more profit be made out of the ores from the company's big mines at Phoenix, B.C. The ore will be smelted to a 10 per cent. matte, which will be regraded to a 45 per cent. matte for converting. It is thought that not only will the cost of converting to blister copper be less than at present, but by utilizing as fuel the heavy excess of iron and sulphur in the sulphide ores, the percentage of coke required in the charge will be reduced. It is expected, too, that the copper loss in the slag will be less by 1½ to 2 pounds per ton of ore, which, of itself, would mean an appreciably large addition to the profit to be made out of ores from the company's mines at Phoenix. Mr. Wakely A. Williams, superintendent of the smeltery, has been with the Granby Company ten years, during which time he has effected many economies in the treatment of ores.

British Columbia Copper Company, Limited.

During 1910 the British Columbia Copper Company increased the total blast furnace capacity of its smeltery at Greenwood, Boundary district, by one-third, thereby bringing its maximum treatment capacity up to about 2,600 tons per diem. This was done by increasing the hearth area of two of the three furnaces by 50 per cent. Previously all three furnaces were 48 by 240 inches at the tuyeres, and their approximate average ordinary total capacity had been about 1,800 tons daily, with a maximum of nearly 2,000 tons. Now they will average between 2,400 and 2,500 tons per diem.

The increase in smelting capacity has necessitated a corresponding increase in the plant for feeding the furnaces and taking away the molten slag; also an extension of the crane run at one end of the converter building. For slag hauling a larger locomotive, capable of handling two 25-ton slag cars at a time instead of one as in the past, has been put in. Heretofore, there have been in use two 15-ton Baldwin-Westinghouse electric locomotives for slag-handling, and three 7½-ton locomotives for furnace charging. Another charging locomotive has been added, to meet the increased capacity. The slag cars are 25-ton ladle-cars, side dumping, and each equipped with an electric motor having worm gear for tilting the car to dump its contents. The British Columbia Copper Company was the pioneer in using this style of car for slag dumping; the design has since been adopted by the Canadian Copper Company, at Copper Cliff, Ontario, and probably a dozen other smelting works, the latest being the International and the Mason Valley Company, Nevada.

The converter building is of steel, dimensions 45 by 90 feet. It has two converter stands with 84 by 126-inch horizontal shells, these taking matte of 45 to 55 per cent. copper tenor and producing blister copper 99.3 per cent. pure and carrying 20 to 50 ounces silver and 5 to 15 ounces gold per ton. The product is sent to the works of the United States Metals Refining Company, Chrome, New Jersey, for refining. The stands are tilted by hydraulic accumulators, and the shells are handled by a 40-ton 4-motor travelling crane. More converter shells have recently been added, making a total of seven. This Bessemerizing capacity is ample, notwithstanding the recent increase in the furnace capacity above-mentioned.

Electric power, transmitted from Bonnington Falls, distant more than 80 miles from the smeltery, is used in the works, in which there are installed motors having a total capacity of about 2,000 h.p. Among the motors are three of 300 h.p., each belted to one of three large Connersville blowers, which supply the blast to the furnaces.

Ore bins have a total capacity of 12,000 tons, and there is also bin accommodation for much coke, the consumption of which, with three blast furnaces running, is 8,000 to 9,000 tons monthly. A reserve of 10,000 to 12,000 tons is kept as an emergency supply should there be interruption in the regular receipt of coke from the colliery. The coke is obtained from the International Coal and Coke Company's colliery at Coleman, Alberta, distant 370 miles by Canadian Pacific Railway Company's railway line.

The company obtains the greater part of its ore supply from its own mines (including the Rawhide mine of the New Dominion Copper Company, in the stock of which it holds a controlling interest), and it endeavours to maintain an average monthly output as follows: From the Mother Lode mine, 36,000 tons; Rawhide, 20,000 tons; Wellington group, 3,500 tons; Napoleon (at Boyds, Wash.), 2,500 tons. Mother Lode and Rawhide ores are typical Boundary district copper ores, low in marketable metals; Wellington group ore is chiefly oxidized and having little value other than gold; of the Napoleon ore the sulphide goes to the smeltery, where it serves as a pyrrhotite flux to reduce the tenor of the copper matte; the oxidized ore is to be treated in a mill now being erected near the mine. There is about 100,000 tons of oxidized ore overlying the sulphide; this is to be mined by the caving system, and conveyed by an aerial tramway to receiving bins at the mill. It will be weighed at the receiving terminal and automatically

sampled at the mill receiving bins. The mill is being equipped with ten stamps, amalgamating plates, and cyanide appliances, the last to be used only if the percentage of recovery on the plates is insufficient. Capacity of mill will be 100 to 125 tons per diem.

Provision is being made for increasing the ore supply from the company's mines, and thus render its smeltery independent of custom ores, if these be not obtainable in sufficient quantity. The Rawhide output is to be increased to 30,000 tons a month, while 3,000 tons will be obtained monthly from the Lone Star. The latter is a mine situated just across the International Boundary line. It has an available reserve of 300,000 tons of gold-copper ore, of a higher average copper tenor than that from the company's other mines, beside being a good matte maker. An aerial tramway, 29,000 feet between terminals, is about completed, from the Lone Star mine to the Canadian Pacific Railway near Boundary Falls, three miles distant from the company's smeltery; its capacity will be about 20 tons an hour.

Coke is obtained from Southwest Alberta, the railway distance between the colliery and smeltery being 370 miles. With three blast furnaces running, the consumption of coke is 8,000 to 9,000 tons a month. A reserve of 10,000 to 12,000 tons is kept as an emergency supply in case of interruption in the regular receipt of coke from the colliery.

The two companies are under the management of Mr. J. E. McAllister. Together they employ 500 to 540 men, of which number 118 is the normal force at the smeltery at Greenwood. The amount of the payrolls of the two concerns (including that of the Napoleon) totals between \$62,000 and \$65,000 monthly. The approximate figures of production during 1910 are as follows: Material smelted, 456,000 tons. Contents: Gold, 25,640 ounces; silver, 85,900 ounces; copper, 7,351,000 pounds. Included in the ore receipts were the following: From Mother Lode mine, 352,000 tons; Oro Denoro mine, 11,473 tons; Wellington group mine, 19,200 tons, and Rawhide mine, 54,400 tons.

Obituary

Aaron H. Kelly, of Nelson, B.C., died at Victoria on the night of February 15. He left Nelson in January, intending to pay a visit to California, but proceeded first to Victoria, where he had an operation performed for some internal complaint. He rallied after the operation, but eventually heart trouble caused a relapse, and death ensued. Mr. Kelly was 64 years of age. He was born at Fredericton Junction, New Brunswick, where he was educated, and after leaving school engaged in business there. In 1878 he went thence to Denver, Colo., where he obtained an appointment with the Rio Grande Railway, then being constructed. Later, he proceeded to San Francisco, and after a time spent there as a mining broker, was some years prospecting in Arizona. Going north to Spokane, Wash., he was first associated with others in working mining property near Northport. In 1888 he went to Nelson, B.C., the discovery of the Silver King mine having attracted many men to that vicinity. Ever since then he has been interested in mining, and owned a number of mineral claims. Among others in which he was largely interested was the Dandy group, adjoining the Silver King, both of which properties were lately sold to a syndicate of British Columbians now preparing to operate these mines. The May and Jennie group, also near Nelson, is another property in the development of which Mr. Kelly spent much money. Eventually he

organized the Reliance Gold Mining and Milling Company, of which he was managing director. This company equipped the May and Jennie with a milling and cyanide plant. In connection with the latter, a 12-foot Hendryx agitator (the first installed in British Columbia), was put in, under the supervision of W. J. Elmen-dorf, consulting engineer, of Spokane, Wash. Afterwards much experimental work was done here by Douglas Lay, now in charge of the Van Roi silver-lead mine and concentrating mill, near Silverton, Slo-can. Latterly Mr. Kelly became interested as well in oil and coal lands. His body has been sent to Fredericton Junction for interment there.

INDUSTRIAL NOTES.

In view of the growing importance of colliery and mine ventilation, Catalogue No. 26A., recently issued by the Jeffrey Manufacturing Company, is most timely. It is entitled "Jeffrey Mine Fans." Some distinctive features of these fans call for notice. The steel casing is complete, extending to the ground line, thus doing away with the usual masonry requirements. Each fan wheel is assembled in the shop and balanced on ball-bearing rollers. All parts of the fan casing are fitted up before shipment, thus simplifying erection.

The catalogue shows illustrations of many Jeffrey installations. Useful ventilating formulæ are scattered throughout.

PERSONAL AND GENERAL

Mr. C. A. Moreing is in Porcupine.

Mr. J. L. Parker has removed from Victoria to Vancouver, B.C.

Mr. R. H. Flaherty, representing the mining interests of Mackenzie & Mann, has opened an office at Port Arthur.

Mr. Samuel W. Cohen, general manager the Crown Reserve Mining Company, has recently returned from a six weeks' trip to Europe in the interests of his company.

Mr. Percy Williams, consulting mining engineer for the Canadian-American Exploration Company, Limited, is visiting Toronto and New York. He will again

visit Toronto in May. Mr. Williams' headquarters are in Vancouver, B.C.

Mr. W. H. Trewartha-James, of Victoria, B.C., general manager of the Tyee Copper Company, is expected to return to British Columbia during April from a business visit to New York and England. During his absence Mr. E. J. Hearn has been acting manager for the company at Victoria.

Arrangements have been made to keep the office of the Canadian Mining Institute, Rooms 3 and 4, Windsor Hotel, Montreal, open from 9 a.m. until 10 p.m., for the convenience of visiting members. A record of evening attendance will be kept to determine whether the additional expense will be justified.

Mr. M. S. Davys, for years resident at Nelson, B.C., who prior to his removal to England was one of the most active mine operators in the West Kootenay district, is expected to shortly return to British Columbia, on one of his periodical visits, in connection with several mining enterprises in which he is still largely interested.

Mr. Chas. Biesel, superintendent of the Consolidated Mining & Smelting Company's mines in the Boundary district of British Columbia, has gone to Michigan, U.S.A., to examine mining property for United States people. It is reported in the Boundary that Mr. Biesel may soon enter the employ of the company with which his former chief, Mr. W. H. Aldridge, is now associated.

Mr. O. B. Smith, Jun., of Phoenix, B.C., superintendent of the Granby M. S. & P. Company's mines, recently paid another visit to Goose Bay, Observatory Inlet, to ascertain what further progress had been made with the exploration of the Hidden Creek Copper Company's mine there, which mine is being prospected by the Granby Company under its option of purchase.

Prof. Wm. Galloway, F.G.S., of Cardiff, Wales, arrived in British Columbia about the middle of March, with the object of investigating the reported occurrence of coal on Tumbo Island, which lies in the strait between Vancouver City and Vancouver Island. He was accompanied to the property by his son, Mr. C. F. J. Galloway, B.Sc., and Messrs. Wm. Blakemore and A. E. Hepburn.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

THE ALBION MINES FIRE.

In the Nova Scotia Mines Report for 1910, Mr. Thomas Blackwood, Deputy Inspector of Mines for Pietou County, gives a full meed of credit to the usefulness of the Draeger apparatus and the trained men from the Dominion Coal Company and the Nova Scotia Steel Company in combatting the fire in the Cage Pit in January of last year. Mr. Blackwood gives a detailed account of the circumstances attending the fire, and expresses the opinion that it was purely a gob-fire caused by spontaneous combustion arising from the presence of iron pyrites together with slack coal in the old goaf. His conclusions are best given in full: "I have no grave doubts if the fire would have been put out if it had not been for the timely arrival of the Dominion Coal Company's and the Nova Scotia Steel Company's men, with the Draeger apparatus and fire fighting material. The men lost no time after their long journey in getting into their helmets and going to work. It was

soon evident after a few hours of constant and strenuous work that they would be successful in getting control, which they did after 24 hours, and that it was only a matter of time until the seat of the fire would be reached. As this is the first fire that I have had the privilege of seeing fought with the Draeger apparatus, I must say that I am highly impressed with it; in fact, I cannot do justice to its merits. I have already stated that I have grave doubts if the fire would have ever been under control without the Draeger apparatus. After what I have seen I think that every coal company should have them, or some others of a similar kind. I do not think that any colliery is complete without an outfit of this kind, as no one can tell at what time they may be required.

"I see by the press that the Mines Department of British Columbia makes it compulsory upon the coal companies in that province to be equipped with them. Legislation to the same end has been passed in England. I hope it will not be necessary for our Government to have to make it compulsory in Nova Scotia,

as the companies will see the wisdom of following in the footsteps of the Dominion Coal Company and the Nova Scotia Steel Company in having them installed in every colliery in Nova Scotia without being compelled to do so by legislation."

It is said that the Provincial Workmen's Association is sending a deputation to Halifax to request the Nova Scotian Government to take steps to ensure the provision of the Rescue Station for the collieries on the mainland of Nova Scotia. Such a provision might very easily mean the saving of valuable property, and may be even life. The usefulness of oxygen helmet apparatus for fighting underground fires is not now a matter for question. It is an established and approved fact, and there is not now a single mining country in Europe which does not compel such provision and the training of men in the use of the apparatus. The United States have recently erected a large number of stations, and with the initiative of that nation when once they commence a thing, they have fitted up a so-called rescue train, which seems to be about the last word in mine-rescue work. British Columbia and Alberta have both enacted legislation, or are in the act of doing so, and it should not be for Nova Scotia to lag behind the rest of the world, particularly when this Province can boast of having the first properly equipped station on the American continent.

In the report of the Chief Inspector of Mines in England—Mr. R. A. S. Redmayne—on the Whitehaven explosion, it is stated that the fire might have been effectually combatted in the earlier stages, "especially had the rescuers been possessed of smoke helmets and fire extinguishers." In Mr. Redmayne's conclusions he states as follows: "The almost total failure of the rescue operations constitutes a convincing argument in favour of the provision at every colliery of trained rescue brigades, and means of summoning them at short notice. The summoning could easily be effected by some form of agreed-upon signal, such as blowing the colliery steam whistle a certain number of times or continuously until sufficient help arrived."

It seems an extraordinary omission that at many collieries where an efficient surface fire brigade is kept, provided with suitable apparatus, it should not be thought necessary to have the same provision for the underground workings, where a fire is always a far more serious matter and has always large quantities of inflammable material to feed it. On the surface it is possible to take out insurance, and the fire insurance companies insist on some measure of protection. Underground it is not possible to effect insurance, because the companies recognize the infinitely greater risk of fire and the great difficulties of combatting it. Coal companies have to be their own insurers underground. This reason alone would seem sufficient to move colliery owners to take reasonable precautions against fire, particularly when it is further considered that the whole revenue of a colliery company is derived from its underground workings.

DOMINION COAL OUTPUT.

The output of the Coal Company's mines for February was 262,828 tons, comparing as follows with previous years:

| | |
|------------|---------|
| 1908 | 285,649 |
| 1909 | 209,656 |
| 1910 | 204,521 |

The individual mines produced as under:

| | |
|--------------|--------|
| No. 1 | 43,583 |
| No. 2 | 52,762 |
| No. 3 | 14,225 |
| No. 4 | 28,215 |
| No. 5 | 20,985 |
| No. 6 | 14,753 |
| No. 7 | 13,232 |
| No. 8 | 11,767 |
| No. 9 | 27,852 |
| No. 10 | 11,327 |
| No. 12 | 16,344 |
| No. 14 | 6,349 |
| No. 15 | 1,315 |

It will be noticed that there are now four mines producing coal in the Lingan district. No. 16 is the latest addition, and makes its first appearance in the output figures during February. The coal from this new field is of excellent quality, and is in great demand. During the coming shipping season between 45,000 and 50,000 tons per month will be supplied by the new mines.

At No. 2 Colliery the new screening plant and picking belts have been completed. The new exhaust-steam turbine generating plant has so far proved an unqualified success. One can go into the large power house at that colliery any time and see three 600 k.w. generating units stand idle, while the turbine is carrying the whole load of the electric power requirements, and making at the same time so little noise that a close inspection of the machinery is necessary in order to be able to tell whether or not the turbine is working. Formerly the exhaust steam that is doing this work went to waste. It is a marked lesson in possible economies of power.

The drift ice off the Cape Breton coast has been very heavy this year, and the persistently low range of temperature throughout the month of February, combined with an almost total lack of wind-storms, has helped to cement the ice-floes into unusual solidity and thickness. The shipping operations of the Dominion Coal Company have not, however, been seriously interfered with as they have been able to use the ice-free port of Louisburg. The long continued series of mild winters which have visited Cape Breton have tended to minimize the importance of Louisburg as a winter shipping port, but that it has undoubted natural advantages in this direction the weather conditions of the present winter have abundantly proved.

The jealousy which exists among the seaport towns of the Maritime Provinces is distinctly entertaining. The Halifax "Herald" and the St. John "Telegraph" both recently gave prominence to a report that Sydney harbour was blocked by an ice-barrier, which would need to be dynamited before navigation could be made possible, and that it would take a whole summer's sun to melt the obstruction. A sea-captain is reported to have told the "Herald" that in some places off the Cape Breton coast the ice was sixty feet in thickness! It is not for the best interests of the Maritime Provinces that such canards should be given prominence in reputable newspapers, and be passed along to the outside world as items of accurate news. We are very much annoyed when English and foreign papers speak of the severity of Canadian winters, but if such unpardonable exaggerations appear in Nova Scotian newspapers, what proportions will the story reach by the time it has been copied into the papers of the outside press? The real truth is that the first rainstorm will clean out Sydney Harbour in one night.

SAFETY LAMPS.

There have been two gas explosions in Nova Scotia recently both directly traceable to the use of a naked light by a mine examiner in the discharge of his duties. One case occurred at the Chignecto mine in June, 1910, and in this instance both the examiner and the boy who attended him were killed. The other case was at Sydney Mines in the early part of this year. In this instance the examiner had opened his safety lamp and struck a match, an act that caused not only his own death, but that of seven other men. In view of these incidents it is a matter for congratulation that the Commissioner of Mines for Nova Scotia is introducing two amendments to the Coal Mines Regulation Act dealing with this danger. In bringing the amendments before the House the Commissioner said:

"This bill was designed to bring about the prohibition of the use of any other than locked safety lamps in the coal mines of the province. It contained the following provisions:

"1. From and after the coming into force of this Act no light or lamps other than locked safety lamps shall be brought into or used in any mine.

"2. Provided, however, that it shall be lawful for the inspector of mines to authorize the use of electric lights in any part of any mine in which such electric lighting can be used with safety.

"3. This Act shall not come into effect until proclaimed by the Governor-in-council by proclamation published in the "Royal Gazette," fixing a date not less than three months from the first publication of such proclamation, from and after which the Act shall be in full force and effect."

In moving the second reading of the second bill the Commissioner explained that the intention of the bill was to amend rule 7a of section 46, chapter 8, of the Acts of 1908. The rule provided that every mine examiner shall at all times, while in the discharge of his duties, use a locked safety lamp, and shall, unless the deputy inspector permits otherwise, be accompanied by an employee of the owner, not less than 18 years of age, who shall also use a locked safety lamp. There was reason to suspect that the rule as read had been evaded, and that officials had carried into the mine with them a locked safety lamp and also a lamp not locked, and that this had caused an explosion with fatal results. The purpose of the bill was to amend the rule so as to provide in each case that the party referred to should carry with him a locked safety lamp "and no other lamp or light."

There should not be, and there probably will not be, any objection raised by either the mine owners or the workmen of Nova Scotia against the two proposed amendments. It is the well-known experience of many mine managers that the very workmen who have complained of the introduction of safety lamps would to-day be the last to wish to return to the use of naked lights.

QUEBEC.

The mining community is still absorbed in the radical changes which have recently taken place in connection with the personnel of the Amalgamated Asbestos Corporation and its method of operation. Mr. R. H. Martin, who for the past 25 years has been closely associated with the asbestos industry and for the past several years has been regarded as the principal sales agent for raw asbestos in the United States and on the Continent of Europe, has resigned from active connection with the company. Mr. B. J. Bennett, who has for many years been manager of the Kings Asbestos Mines, Thetford Mines, the largest producer in the camp, and who for the past year has been general manager of the Amalgamated, has also severed all connection with the company. Mr. Martin, Jr., who for the past year was assistant general manager of the corporation, has also resigned.

Mr. W. J. Sharpe, M.E., recently of Pittsburg, Pa., has been appointed general superintendent of the Amalgamated Asbestos Corporation, with residence at Black Lake, from which point he will personally conduct the operations of the company. Mr. Sharpe is enacting strict rules of economy, notably the concentration of the several office forces to one principal office, at the King Asbestos Mines, Thetford Mines, with only the really essential clerical work performed at each of the several mines. Aside from strict economic method of working there will be no decided change in method of operation, rather following the plan of gradual improvement while the plants are in operation.

Work in Thetford Mines, Black Lake, and East Broughton has been very quiet since the first of the year, and indications point to active operation being resumed about 1st April. The effect of the slowing down for the winter months has been to reduce the surplus asbestos stocks very considerably. The long and the short grades of fibres are pretty well cleared, with only the paper stock in excess. A plan has been suggested by some of the mining companies whereby the amount of paper stock can be reduced by grading it into the longer and shorter grades, and thus obviating the difficulty of having one grade in excess while the other grades are not sufficient to meet the demand.

Mr. C. H. Parker, for several years millwright for the Johnson Company, has accepted a position with the North Western Asbestos Company, at Casper, Wyoming, and leaves for his new position on the first of April.

Mr. J. M. Forbes, recently with the Wagner Electric Company, Montreal, has been appointed local manager for the Black Lake Consolidated.

"Harry" Williams, one of the old landmarks of the asbestos industry and for several years general superintendent of the Asbestos & Asbestic Company, at Danville, Quebec, has resigned his position and will represent mining interests in Porcupine.

Several of the mining companies had representatives in the U. S. A., and on the Continent during the past winter negotiating for the sale of asbestos. Among these were Messrs. R. H. Martin, B. J. Bennett, A. H. Martin, Walter Raleigh Kerr, W. J. Woolsey, Edward Slade, A. S. Johnson, W. R. Leventritt, George Rumble, and Col. J. J. Penhale.

One of the most important and significant mining deals yet concluded in the district took place in Arthabasca on the 13th instant, when the Ward-Ross property, west half lot 27, range V., Thetford, was sold by public auction for \$710,000 to Mr. Frank Ross, of Quebec City. It is understood that the Martin-Bennett interests will control the enterprise, and operations have already begun preparatory to opening up the property. This property adjoins one at present owned by the King Brothers, Limited, and the two will be worked together. Both properties are known to be valuable, and, their location being right in the centre of the Bell & Johnson properties, give every indication of being a large producing concern.

It is interesting to note that the Ward-Ross property was the first shipper of asbestos in the district. The Ward brothers shipped their first carload in May, 1879, the second shipment being made by the Johnson Company in September of the same year. Some years afterwards the Ward Brothers became involved in litigation with the Q. C. R., with the result that the property passed out of their hands into the hands of the Johnson Company to the extent of three-quarters undivided interest. Mr. A. S. Johnson, of the Johnson Company, was the principal opposing bidder at the sale.

The Dominion Gold Fields of Canada, Beauceville, Que., has been purchasing large quantities of machinery for the new hydraulic plant which is to be erected in the placer holdings of the company, during the coming summer.

The East Canada Smelting Company, at Weedon, Que., is still operating vigorously and reporting a valuable and increasing production. The copper ore is shipped largely to the Nichols Chemical Company, at Capelton, Que., for the saving of the sulphur values for their chemical works, the resulting matte being shipped to the United States for refining.

A great deal of disappointment has been expressed over the Preliminary Report on the Chibougamou Region. It is felt that if the report had emphasized the fact clearly that the conclusions arrived at were merely to enable the Provincial Government to decide whether it were advisable for them to build a railway into the district at once or not, and not to be taken as any criterion of the wealth of the vast hinterland, it would not then be taken as a deterrent force to the prospector who might be inclined to go into this district. The Report agrees that the rock formation is all that could be desired, in fact, equally favourable in every way to the formation which extends across northern Ontario to Labrador coast. The practical mining man knows that had the party which made the report spent their time on a plot of fifty square miles their conclusions could only be taken as an outline of the geological formation and in no way final as to mining possibilities of the area; in fact, we have noted that the report made by the geological agents covering the Cobalt region, but a few years prior to the discovery of vast riches there, in no way revealed the economic wealth of that camp. Dr. Miller has wisely intimated that the geological party should confine their efforts to mapping given areas and leave the work of finding minerals to the prospector. Among mining men it is felt that a vast stretch of country containing such excellent showings and rock formations must hold an immense store of minerals, and it only remains for the government or private capital to encourage the prospector in order to have these riches speedily revealed.

ONTARIO.

COBALT, AND OTHER SILVER AREAS.

The principal factor in the Cobalt situation is still the lack of power. The McKinley-Darragh, Cobalt Lake, Nipissing, Kerr Lake, Coniagas, Buffalo, Crown Reserve, Townsite, Temiskaming, Trethewey, City of Cobalt, Hudson Bay, and O'Brien are now all using their own compressors. Many of these properties, however, have outgrown their compressor capacity since the customs air was introduced into the camp. These have now to curtail their operations and production. The consequence of the failure of power falls heavier on the prospects that have no plants of their own. These have had to shut down entirely. Probably a thousand men have lost employment since the first of the year through these causes, and the mining companies are worse off than if they had been running with their own power all the time.

Not until the thaw releases the waters of the Northern Ontario rivers will there be any relief. The British Canadian has absolutely no air at all and the Cobalt Hydraulic is in little better position. The cause is the same in both cases, the power plants were too big for the head of water obtainable.

The break-up is expected about April 10, but until then it is useless to expect any relief. The electric power from the plants is not affected and the mills have been able to run at full capacity.

During the month of February the Nipissing mined ore estimated at a net value of \$185,332, and shipped ore of net value of \$90,400. Air conditions alone are responsible for the drop. Development particularly was retarded very much indeed.

The principal development at the Nipissing was at shaft 122, where, after drifting 350 feet to the east on a stringer of the main vein at the 165-foot level, a shoot of rich ore was encountered.

Mr. Hugh Park, of the Nipissing, and Mr. P. A. Robbins, of the McKinley-Darragh, have examined the Keeley mine at South Lorrain for the liquidator of the Farmers Bank, and have made their report on the matter.

There is very little chance that La Rose will increase the dividend rate at the quarterly meeting. Both the Princess and the Dawson have practically had to restrict their operations to stoping out what there was in sight owing to the failure of customs air.

The Barnett properties at Elk Lake have recently yielded a very promising surface showing. There is an ore body 60 feet long by twenty inches wide of calcite and aplite, in which the leaf silver can be easily discerned. Several good surface finds have been made in the vicinity but owing to lack of interest and transportation conditions little work has been done.

The new 20-stamp mill is now running at the Hudson Bay mine, Cobalt. It is on the straight concentration plan first introduced into the camp by Mr. Bourne, at the Northern Customs plant. Underground, two new high grade stringers have been cut at the 100-foot level. There now appears a disposition to put some of the stock of the \$3,500,000 company on the market.

On the Alice Lorrain Silver Mines, in South Lorrain, at the bottom of a 26-foot shaft, some niccolite and a little native silver have been discovered in a wide and strong vein. The Alice Lorrain took over the holdings of the Elkhart Mining Company.

The Nipissing made the largest bullion shipment from one mine last month, when they sent out 105 bars weighing 106,430 ounces, valued at \$49,675.

In all probability the Northern Customs Concentrator Company will build a 60-stamp mill at some place in the centre of the Kerr Lake camp. They are already assured of enough ore to feed twenty stamps for some years. The Lawson is willing to make a contract for another 20 stamps, and the Kerr Lake has now come into line also. Low grade ore will also be sent for treatment from the Hargrave, the Bailey, and other mines in the section.

On his European trip, Mr. S. R. Cohen, general manager of the Crown Reserve, who has just arrived back in Cobalt, made a contract with the Kingdom of Saxony for the delivery of ore containing nearly three-quarters of a million ounces of silver for the smelters and refineries in that country and ultimately the currency.

Mr. A. A. Cole, for the T. & N. O., and Mr. Mickel, for the Ontario Government, have inspected the Gowganda and Elk Lake properties with a view to seeing if their prospects justify the building of a railroad into the country.

The King Edward mine, on Cross Lake, has been abandoned. The company as a last resort put down a shaft to the 500-foot level and did some drifting. Not finding any more ore they shut down before reaching the contact, which is believed to lie another hundred feet down. Last year the report shows a deficit of \$23,152.

The mine captain and the shift boss of the Temiskaming mine were severely censured by the jury inquiring into the death of Albert Sullivan, killed by a blast in a winze. The Government will institute a suit against the company.

The Millerett mine, of Gowganda, has found high grade and milling ore in the diabase area at the 150-foot level. Drifting both ways from the shaft a narrow high grade streak has been cut in the middle of several feet of milling rock. The vein was of smaltite carrying low silver values at the 70-foot level.

It has been decided to erect a 20-stamp mill on a plot of ground leased from the Nipissing Company at the south end of Cobalt Lake for Cobalt Lake ore. Since the opening of the year fifteen or sixteen cars have been shipped and these have realized \$30,000 gross.

The death of Mr. M. T. Culbert, manager of the O'Brien mine, was as unexpected as it was deplorable. He went to Toronto with the confident expectation of pulling through the operation for appendicitis with success. He has been in the camp for six years, ever since mining commenced on the O'Brien, and during all that time he has been a conspicuous figure. Around him on the O'Brien had grown up a small village with miles of underground workings and a big mill, all created under his superintendency. Mr. Culbert was considered the foremost geologist of the camp. He was this year elected the president of the Temiskaming Mine Managers' Association, and has always been prominent in Institute work.

Arrangements have been made for the installation of ten more stamps at the Temiskaming, raising the capacity of the concentrator by a third. The company decided to pay the regular 30 per cent., without the bonus, at the quarterly meeting. The lack of power, the expense of developments at the Peterson property at North Cobalt, and on the Pearl Lake claims at Porcupine, reduced the income.

According to the annual report of the Wettlaufer Lorrain Silver Mines, the production last year amounted to 265 tons, containing 230,000 ounces. The development on the third and fourth levels had doubled the ore reserves, till now they stood at between 3,500,000 and 4,000,000 ounces. The company declared its intention of shipping a car of high grade every month.

PORCUPINE, AND OTHER GOLD AREAS.

There is now no fear of an early thaw and the break-up is not looked for until about April 10. Last year the roads became impassable by the middle of March and completely disorganized the plans of late shippers. With the added time operators ought to be able to get in all their supplies before the break-up. The steel is now laid to Frederickhouse and it is expected that freight can be carried the first eight miles by April 2. The railroad will be into Porcupine by July 2.

The Burns and Goad claims in the Redstone section have been taken over on a long option by Mr. C. R. Poe, of Chicago, and the vendors have already received ten per cent. of the purchase price—about \$100,000.

The Ellis Foster properties, the option on which was thrown up by the Hudson Bay Company of Cobalt, have now been taken up by Colorado capitalists, of which Mr. P. W. McCaffery is the agent. Work will be commenced at once.

Extensive sampling is being done on the Rochester veteran claim of the Porcupine Central.

J. J. Byrne and Jack Hollinger have staked claims at Hobon, 250 miles west of Sudbury, near the point where the Algoma

Central meets the Canadian Pacific. Reliable prospectors say the new field looks good. Free gold has been found in big quartz veins.

Excellent time is being made on the Heinze property, the West Dome. The shot drills are being put down at the rate of 14 feet a day. Three shafts will be sunk under contract on the Pearl Lake Gold Mines claims, each shaft to be put down a hundred feet.

At the annual meeting of the Miller Porcupine Gold Mines it was decided to sink three shafts to the 100-foot level on the vein. The directors elected were Alex Miller, president; A. J. Murphy, J. Willocks, J. Arthur Griffith, and George Bannerman, directors.

Work at the 200-foot level of the Hollinger continues to reveal fine ore bodies. At the 200-foot level there is a vein of quartz ten feet wide apparently every whit as spectacular as at the hundred foot.

A two-stamp mill has been ordered for the Preston East Dome, but it will not be delivered until the railroad gets in. A small boiler and hoist are on their way into the property.

It is stated that the average assay from the cores on the Ross property have run \$14.10. The dike upon which the diamond drill has been working runs uninterruptedly for several claims.

Mr. A. G. Kirby, manager of the Nova Scotia Cobalt, has also been appointed general manager of the Moneta Gold Mines in Poreupine. This company has been organized with a capital of \$2,000,000, half of which will remain in the treasury and the remainder be sold to the public. The president of the company is Sir Henry Pellatt.

The syndicate represented by the Bewick, Moreing & Company house has bought a considerable block of Hollinger stock though the control of the company still remains with the original syndicate.

ALBERTA.

CONFERENCE OF COAL MINE OPERATORS AND MINERS' REPRESENTATIVES.

The agreements between the coal mine operators and the miners being about to expire (on March 31) a conference of the parties concerned was called to discuss the terms of a new agreement. This conference was opened at Calgary, Alberta, on March 1st.

WESTERN COAL OPERATORS' ASSOCIATION.

Prior to the date the conference was called for, there was a meeting of the Western Coal Operators' Association, which includes the following coal mining companies (in alphabetical order):

Operating in Alberta:—

Alberta Railway & Irrigation Co. (Galt Colliery) Lethbridge.
Bankhead Mines, Ltd., Bankhead, near Banff.
Canadian Coal Consolidated, Ltd., Frank.
Chinook Coal Co., Lethbridge.
Davenport Coal Co., Burmis.
Diamond Coal Co., Diamond City.
Hillcrest Coal & Coke Co., Ltd., Hillcrest.
H. W. McNeill Co., Ltd., Canmore.
International Coal & Coke Co., Ltd., Coleman.
Leitch Collieries, Ltd., Passburg.
Maple Leaf Coal Co., Bellevue.
Royal Collieries, Ltd., Lethbridge.
West Canadian Collieries, Ltd., Blairmore.

Operating in British Columbia:

Corbin Coal & Coke Co., Corbin, Crow's Nest district.
Crow's Nest Pass Coal Co., Fernie, Crow's Nest district.
Hosmer Mines, Ltd., Hosmer, Crow's Nest district.
The Operators' Association elected the following officers: President, Lewis Stockett, Bankhead (re-elected); Vice-President, P. L. Naismith, Lethbridge; Secretary-Treasurer, W. F. Little, Canmore.

DISTRICT 18, U. M. W. OF A.

District 18, United Mine Workers of America, has twenty-five locals, four of which are in the Crow's Nest district of British

Columbia and the remainder in Alberta. W. B. Powell is president; C. Stubbs, vice-president, and A. J. Carter, secretary-treasurer. The Locals in British Columbia are at Corbin, Fernie, Hosmer, and Michel; those in Alberta are at Bankhead, Beaver Creek, Bellevue, Blairmore, Burmis, Canmore, Coleman, Carbondale, Cardiff, Diamond City, Edmonton, Frank, Hillcrest, Lethbridge, Lille, Maple Leaf (Bellevue), Monarch Mine (Elcan), Passburg, Royal Collieries (Lethbridge), and Taber (two). The membership of District 18 on January 1, 1910, was 4,976; on January 1, 1911, it was 5,827. Its disbursements in 1910 were as follows: Officers' salaries and expenses, \$5,009.75; relief, \$15,087.99; "District Ledger," \$14,654.90; law costs, \$4,910.50; printing, \$1,011.38; all other expenses, \$10,530.37; total, \$52,104.90.

OPENING OF THE CONFERENCE.

The conference was opened, as already stated, on March 1. Lewis Stockett announced the names of the companies comprising the Western Coal Operators' Association, representatives of most of these being present. Beside the district representatives of the U. M. W. of A., there were present W. Rogers and Chas. Garner, both members of the International body of the U. M. W. of A.

The following were appointed a Scale Committee: For the operators, James Ashworth, R. W. Coulthard, W. F. McNeill, L. Stockett, and O. E. S. Whiteside; for the miners, A. J. Carter, J. O. Jones, W. Lees, D. McNabb, W. B. Powell, J. E. Smith, and C. Stubbs.

It was arranged that suggestions from the miners be submitted to the operators on Friday morning, March 3.

PROPOSALS OF MINERS AND REPLY OF OPERATORS.

The miners' proposals were as follows:

1. The fixing of contract rate on all new work before the general agreement is discussed. This applies to all longwall work in No. 1 north, No. 1 south, No. 2, No. 3, No. 9, Coal Creek. Also to No. 3, Michel. Also to No. 8 south, Michel, the latter being in connection with new work. Also to longwall, Blairmore mines, Frank mines, Bankhead mines.

2. The elimination of inequalities in price paid through the district on timbering, and the contract mining rate at Michel mines Nos. 3, 4, 5, and 7. Also contract mining rates at Bear Valley, Lille, Lethbridge, A. R. and I., Royal Collieries, Canmore, and Hillcrest.

3. The adoption of general provisions of the agreement as a basis of negotiations, with amendments to be introduced as the clauses are dealt with and additions to be submitted.

4. The same day wage scale as is provided for in the agreement between the Montana Coal Operators' Association and District 27, U. M. W. of A., with proportionate advances on all work not covered by the agreement mentioned, the engineers and mechanics classified.

5. An advance of 5.55 per cent. on all contract and dead work after adjustments are made.

6. A uniform price list for supplies.

7. All agreements to expire on the 31st day of August, 1912.

Reply of operators:—

In reply to the suggestions of the representatives of District 18, U. M. W. of A., the Scale Committee of Western Coal Operators' Association would suggest:

1. In regard to the fixing of contract rates on all new work before the general agreement is reached. These prices are matters of concern under the old individual agreements, and are questions that this Scale Committee has no authority to act on, except for the making of rates to govern the same after March 31, 1911, and will have to come up in the ordinary course of the making of the agreement, and not having any special preference over other clauses or rates. We would suggest that all contract rates be dealt with in accordance with provisions that may be provided for in the new agreement.

2. The elimination of inequalities in prices, etc., is a matter that has not any special preference over other clauses, but must

be taken up in the ordinary course in the making of a new agreement.

3. We will accept the general provisions of the present agreement as a basis of negotiations, with such amendments as may be agreed to.

4. We cannot accept the Montana scale of wages for the reason that the conditions and hours are not the same.

5. The mining rates of this district are already very high, and the present market price of coal will not permit of general increase.

6. We agree to a uniform list for supplies as far as possible.

7. We see no reason for changing the date of the expiration of the agreement, and suggest that next agreement expires March 31, 1914.

In view of the suggestion made in Section 3, we are now prepared to take up the general provisions of the present agreement clause by clause.

CHECK-OFF CLAUSE BARS PROGRESS.

The proceedings of several days following the reply of the operators to the foregoing proposals of the miners are shown in the following despatch from Calgary to the District Ledger, Fernie, under date Calgary, March 9. An introductory note reads: "Any press reports that differ in substance from this despatch are inaccurate." The despatch follows:

"Both parties have been occupied since Saturday, 4th inst., in an effort to arrive at some understanding with regard to the check-off clause, which, of necessity, practically interprets the question of closed shop or otherwise.

"Operators insist on elimination from agreement of any clause that makes or tends to make it of a closed shop nature, and insist on renewal of the discrimination clause at present in force to apply to the whole of the operators. On Monday a sub-committee was appointed consisting of A. J. Carter, C. Stubbs, L. Stockett, and W. F. McNeill, to discuss the matter to see if some understanding could be arrived at. Miners have insisted from the first on retaining with the Crow's Nest Pass Coal Company and the Frank and Corbin Coal Companies, the check-off clauses, which are at present in force with these companies, failing the acceptance of a similar clause to govern the whole of the Western Coal Operators' Association. Later on the miners' representatives submitted a general clause to cover whole of mines comprised in Operators' Association, this latter providing for irrevocable check-off forms being signed by all workers, and the local secretaries to examine register of employees. Operators state that this tends to closed shop and will not entertain same. Both sides insistent and discussion of other portions of agreement tied up pending settlement of this question.

"Full conference re-convened this morning, when sub-committee reported that after careful deliberation they were unable to recommend any action for the joint committee. The conference was thereupon adjourned to March 20th inst."

In brief explanation of the foregoing, it may be mentioned that under the check-off system, all workers, whether members of the union or not, are required, before commencing work with the company employing them, to sign a form authorizing the deduction from their wages of the dues of the local union. This enables the union to make use of the company as a means of supplying information relative to all men it employs and for collecting dues from the men. The three companies above-mentioned as having granted the check-off system in the past did not join with the Operators' Association at the time of its making its last agreement with the U. M. W. of A., but made individual agreements. In the spring and summer of 1909 there was a long fight over the closed shop question, but the Operators' Association remained firm, keeping the various mines represented by its members idle until eventually its contention for open shop was agreed to on behalf of the miners.

ENFORCING COAL MINES REGULATION ACT IN ALBERTA

Contraventions of the Coal Mines Regulation Act of the Pro-

vince of Alberta have led to prosecutions, with the consequences stated below:

W. P. Williams, manager of the Lille colliery of the West Canadian Collieries, Ltd., was fined \$40 for employing to act as a fire boss a man who did not possess the necessary certificate of competency; and John T. Griffiths, the man so employed, was fined \$25.

— Pearson, a fire boss at the West Canadian Collieries, Ltd., Blairmore mine, was fined \$5 for non-compliance with regulations in connection with shooting.

Geo. Darbyshire, of Burmis, was fined \$10 and costs for having returned to his place in the mine after a shot had been fired and before the place had been examined by the fire boss. T. Tonge, the fire boss whose duty it was to have returned and examined the place before operations were resumed in it, was fined \$20 and costs for having failed to do so.

Thomas Rawson, a fire boss, was charged with handing matches to miners for them to fire their own shots, but was dismissed, owing to the papers in connection with his prosecution having been irregularly made out.

The District Ledger, the United Mine Workers of America newspaper published at Fernie, B.C., made the following comment: "The above cases were all prosecuted at the instigation of J. T. Stirling, Provincial Inspector of Mines, and we hope that the experience of these law-breakers will have a deterrent effect upon others, but if not and they are discovered, that the punishment meted out will be more severe, as it is imperative that mining, hazardous even under normal conditions, should not be knowingly made more so by wilful disregard of laws and common sense."

On March 5th the fire bosses employed in coal mines in western Alberta met for the purpose of forming an organization for mutual aid and benefit, inasmuch as they are not eligible for membership in the United Mine Workers of America. After discussion, organization was effected, and the following officers were appointed: T. Bradley, Hillcrest, president; J. Finlayson, Frank, vice-president; R. Ridley, Blairmore, secretary-treasurer.

BRITISH COLUMBIA.

It is singular what little regard for facts some men have. A recent case was that of the publication in a British Columbia daily newspaper of "A Page for the Wage-Worker," from which the two excerpts printed below have been made. The first one ran thus: "Through the fighting proclivities of Messrs. Hawthorthwaite and Williams, Socialist members of the British Columbia Legislature, the Coal Mines Regulation Act has been amended to meet the approval of the miners. Strict enforcement is all that is needed to make the legislation along these lines the best in the world." This comment is in strong contrast to that of one of the supporters of the Provincial Government who, when the bill was before the House, most emphatically condemned the two Socialist members named, each representing a coal mining constituency, for having abstained entirely from joining with the miners in giving to the Deputy Minister of Mines and the Chief Inspector of Mines, information that would be helpful in making the bill thoroughly useful and effective in securing the safe working of the coal mines of the Province, as far as could be done by legislation. Several amendments of minor importance offered by these Socialist members when the bill was before the House were accepted by the Government, but practically every important change in the Act was made by the Government after conference between its officials and miners at the mines, all the coal-producing districts of the Province having first been visited by the officials for the express purpose of ascertaining the views of both mine operators and miners before completing the bill for submission to the local Legislature.

The second excerpt follows: "The coal miners of Michel, B.C., have decided to no longer accept the reports of Government appointed inspectors as to the presence of gas in the workings. Recent fatalities in Alberta, nearby, have aroused a determination on the part of the miners to either have inspectors of their own or cease work wherever it is felt dangerous to enter the mines. The

outcome of such action will probably force the Government to accede to the request of the Socialist members of the House." Well, not only did the Government persist in its refusal to permit the coal mine inspectors to be appointed by the miners, but the secretary of the local miners' union at Michel sent to several newspapers, for publication, his distinct denial that the miners there objected to the Government mine inspectors; on the contrary, he wrote that the men had every confidence in those officials. Their stated grievance, to secure the remedying of which they stopped work for a few days, was in connection with the running of the ventilating fans, and the company made an improvement in this connection, and in other ways met the claim of the miners for arrangements they considered necessary for their protection when working in the mines. Further, the inspectors of the local mines at Michel, which is in British Columbia, have absolutely nothing to do with mines in Alberta, the latter province having its own laws and regulations, so that if there has been any laxity in observing them the British Columbia officials are entirely free from blame, since they have no jurisdiction outside of this province. No doubt this is known to the more intelligent of the English-speaking or English-reading miners, but to those who are ignorant or illiterate it may not be known, hence the cunning of writers of such mis-statements.

SLOCAN—A syndicate of men interested in restoring to Kaslo the commercial advantages that accompanied the operation of the Kaslo & Slocan Railway prior to the destruction by fire last summer of a number of railway bridges and trestles between McGuigan and Sproule's, has been negotiating with the Provincial Government with the object of obtaining from this source substantial monetary aid essential to the renewal and repair of the damaged parts of the railway, and for ore-shipping facilities at Kaslo, but at the time of writing nothing definite has resulted. The syndicate has offered to buy the railway from the Great Northern Railway Company for a comparatively small sum, and to operate it after putting it in working order, so as to provide transportation facilities for mining properties from McGuigan to Kaslo, these including the Rambler-Cariboo, Lucky Jim, Whitewater group, Utica, and other mines about McGuigan basin and Whitewater camp, and as well for a number of properties situated up the south fork of Kaslo Creek, which have waggon road connection with the railway seven or eight miles from Kaslo. It is thought that if nothing comes of present negotiations, there will be but little chance of the railway being operated again, at any rate for several years.

The only mine in the part of Slocan district affected by the stoppage of traffic on the K. & S. Railway that has been shipping ore this year, notwithstanding existing unfavourable conditions, is the Rambler-Cariboo, but now that the snow is melting the road between the mine and Three Forks, on the C. P. R. Company's line from Sandon to Nakusp, via Slocan Lake, much heavy hauling can not be done. By the middle of March about 600 tons of ore had been received at the Trail smeltery from the Rambler-Cariboo, which was nearly as large a quantity as was received from that mine during the whole of 1910, the damage done by last summer's

forest fires having prevented shipment during the greater part of the latter half of the year.

In other parts of Slocan district progress is being made, with mining activity around Sandon, New Denver, and Silverton. Only two mines are maintaining a substantial production, namely, the Richmond-Eureka and the Standard, though several others are expected to make a fairly large output of ore later in the year. It is probable the Standard will add considerably to its tonnage during the latter half of the current year, for it has lately been announced that a concentrating mill is to be erected and equipped, a compressor plant put in for machine drill and general power purposes at the mine, and an aerial tramway constructed from mine to mill. Meanwhile development work is being continued in adits Nos. 5 and 6, and large bodies of ore are being opened ready for extraction. Mention was made last month of progress being made with the work of equipping the Van Roi mill, situated higher up Four-Mile Creek than the Standard; also, of the Hewitt-Lorna Doone group, owned by the Silverton Mines, Ltd., and having much ore available for stoping.

ROSSLAND—The output tonnage of this camp for the first quarter of the year may be placed at about 55,000 tons of ore shipped crude to the smeltery, and approximately 2,000 tons of low-grade ore concentrated at a local plant. The Consolidated Mining & Smelting Company's Centre Star group has produced nearly two-thirds of this quantity, with the mines of Le Roi No. 2, Ltd., next in tonnage, and then Le Roi. The production of the last-mentioned mine during the three months has totalled more than 3,000 tons.

The exploration of properties in the south belt of this camp has recently again been urged, and a proposal made that, say 20 men should each subscribe \$500, the \$10,000 to be thus obtained to be used in a systematic search for ore, and its development if found, the company to be a development company only, exploring properties held under lease and option of purchase, and, in the event of success, the proved property to be disposed of to capitalists to be worked on a larger scale. No steps have yet been taken to carry this proposal into effect, but it is being discussed in the camp and its feasibility being considered.

COAST—Reports received from Portland Canal district about the middle of March indicate that the season may be expected to be favourable to a resumption of mining operations earlier this year than last. The snow is said to be melting quickly and as a consequence it is thought probable work will be resumed a month earlier than in the spring of 1910. There has not been much information published lately relative to the work done during the winter on the few properties where a suspension was not necessary. The most cheering news to those interested in the progress of the camp was that relative to the first shipment in considerable bulk from a local mine, the Portland Canal Mining Company having sent down to Stewart between 400 and 500 tons of iron concentrate, containing value in gold. This shipment was consigned to the Tyee Copper Company's smelting works at Ladysmith, Vancouver Island. The silver-lead concentrate produced by the company's concentrator is to be shipped to the smeltery at Tacoma, Washington, U.S.A.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax, N.S., March 17.—Controlling interest in the tungsten mine located at Scheelite, near Moose River, Guysboro County, has been sold by A. A. Hayward to a syndicate composed of prominent Canadians. The price for the interest is about a quarter million dollars, and outside of the coal mines is the biggest ever made in Nova Scotia.

Sydney, March 17.—A mining deal has been completed here within the past week, whereby the property of the Colonial Coal Company, whose areas are situated at Little Bras d'Or has been purchased by a company of American and English capitalists,

who will operate the colliery. The price said to have been paid was \$200,000. W. A. MacKay retains an interest in the new concern, and it is known that there are several other prominent local men interested. The new company will make a number of improvements to the equipment of the colliery, and a busy summer is anticipated in that district.

QUEBEC.

Montreal.—It was rumoured to-day that Mr. J. N. Green-shields and associates have secured options on some of the biggest producing asbestos mines in Russia.

It is stated in the same connection that Mr. Slade, of the Black Lake Company is in Russia looking over the situation on behalf of Mr. Greenshields.

In a measure the Russian properties, though of low grade ore, were responsible for the flooding of the markets in 1909-10 and the present negotiations no doubt are with a view of adjusting the supply of raw material to the advantage of all concerned.

ONTARIO.

Toronto, March 18.—As expected, the Ontario Government has come to the aid of Little Nipissing Silver Cobalt Mining Company. On motion of Hon. W. J. Hanna, the rules were yesterday suspended to allow the introduction of a bill to authorize the company to take the necessary steps with regard to capitalization to cover issue of six hundred thousand stock.

Porecupine, Ont., March 18.—In point of development the Vipond, or under its chartered company name, the Porecupine Gold Mines, ranks next to the Dome and the Hollinger. A month ago the Vipond cut the No. 2 vein at the 100-foot level, which, on the surface, has been stripped for 200 feet and shows an ore body 160 feet long.

Kenora, March 11.—An interesting mining case was heard on Thursday and Friday at Kenora, before S. Price, of St. Thomas, mining commissioner for Ontario. The case hinged on four iron claims which were acquired at different times, and in which several local parties have interests, situated near Dinorwic. The properties were taken up some years ago, originally, and it was only when an endeavour to establish a title was made by one interested party some months ago it was discovered that the other owners had not parted with their interests or were not willing to dispose of them. All the various interests were represented by lawyers, with the exception of E. R. Reese, of Winnipeg, who, while not actually interested, is stated to have the iron claims now in question under option of purchase.

No decision was given by Commissioner Price at the time, as, owing to the mass of evidence produced, it will require some con-

siderable time to go over the record. However, it is likely that his decision will be rendered within a week or so.

BRITISH COLUMBIA.

Nelson.—That there is sufficient ore ready to be taken out of the workings of the Nugget mine to keep the mill in operation during the three months of April, May, and June, when the melting of the snow causes trouble with water and makes operation difficult, was the statement made by W. B. Pool, manager of that well known Sheep Creek property, last night. Mr. Pool came in with a brick, the product of one month's run of the mill, which assays in the neighbourhood of \$5,000.

Silverton.—The new concentrator that has been erected in connection with the Van Roi silver-lead mine has been completed, and has started operations. The last piece of machinery has arrived at the mine and the plant has been started. The necessity for the new concentrator arose from the impossibility of the Van Roi Mining Company securing another long term lease of the Wakefield mill, which it has operated in the past, including last year.

Vancouver, B.C., March 15.—If negotiations now under way are carried out the Vancouver exhibition will this year have one of the finest and most attractive mining and mineral exhibits ever made in the Dominion. The management is taking special action on this line and aims to present an exhibit which shows all phases of the work. At a meeting of the board of control of the association yesterday, H. B. Brown, owner of the Bulldog mine at Hedley, discussed the matter with the managers. He said one of the chief difficulties would be the shipment of ores from the mines to the grounds, but laid before the managers plans for securing an extensive exhibit of minerals as well as the installation of a working stamp mill. After discussion Manager Rolston was instructed to take the subject up with mining companies and endeavour to arrange for a mineral exhibit which would adequately represent the interests.

COMPANY NOTES

WESTERN COAL & COKE COMPANY.

The annual report of the Western Coal & Coke Company contains a statement by E. B. Greenshields, president, and Charles Fergie, managing director. The latter's statement refers to the physical part of the company. Mr. Greenshields' report is in part:

For the past year the attention of the directors has been given to the developing work, and proving the reserves of coal. The main entries are four thousand feet in coal, and the main hoisting slopes are down over one thousand feet, where the coal has been found in fine quality and in regular ground. The seam of coal has been opened up on each side of the Beaver Creek valley, giving two entries into the coal. The result of the work this year shows that the physical condition of the property is even better than anticipated, and the coal reserves greater than estimated, and the directors are very much pleased to be able to state that the mine is now in a position to ship coal in paying quantities. The report received this week from the superintendent is that everything at the mine is in a very satisfactory state, and he expects by this fall to be able to ship one thousand tons of coal a day. As you are already aware, the coal has been thoroughly tested

on the Canadian Pacific Railway with most satisfactory results, and its coking quality has also been proved.

Your directors have made arrangements to have the railway built this summer to connect the mine with the Canadian Pacific Railway at Pincher.

A careful survey has been made of the ground, and a good route chosen which shortens the distance to 13 miles. The road will be built by a separate company, but this will be controlled by the Western Coal & Coke Company.

The difficulties that have been met with in the past history of the company seem at last to have been overcome, and the present prospect is bright with the promise of the successful operation of the mine in the near future, and of its being a large producer and shipper of the best quality of bituminous coal.

LA ROSE DIVIDEND.

The directors of La Rose have declared the regular quarterly dividend of 2 per cent., payable April 20, to shareholders of record March 31. Books close April 1.

STATISTICS AND RETURNS

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending March 17, and those from Jan. 1, 1911, to date:

| | Mar. 17. | Since Jan. 1. |
|-------------------------------|-------------|---------------|
| | Ore in lbs. | Ore in lbs. |
| Barber ..... | ..... | 6,000 |
| Beaver ..... | ..... | 551,513 |
| Buffalo ..... | ..... | 551,513 |
| Chambers-Ferland ..... | ..... | 256,900 |
| City of Cobalt | 66,000 | 252,280 |
| Cobalt Lake | 61,420 | 1,146,990 |
| Cobalt Townsite ..... | ..... | 289,740 |
| Coniagas | 69,400 | 934,180 |
| Crown Reserve | 65,000 | 508,670 |
| Hargraves ..... | ..... | 41,100 |
| Hudson Bay ..... | ..... | 122,350 |
| La Rose | 61,200 | 1,105,720 |
| Kerr Lake ..... | ..... | 721,592 |
| King Edward ..... | ..... | 40,000 |
| McKinley-Darragh | 65,190 | 1,312,940 |
| Nipissing ..... | ..... | 1,606,240 |
| O'Brien ..... | ..... | 271,320 |
| Peterson Lake (Little Nip) .. | ..... | 58,430 |
| Right of Way ..... | ..... | 318,260 |
| Silver Cliff ..... | ..... | 98,180 |
| Standard Cobalt ..... | ..... | 44,813 |
| Temiskaming ..... | ..... | 363,419 |
| Trethewey | 48,100 | 229,700 |
| Wettlaufer ..... | ..... | 60,022 |

The shipments for the week were 436,310 pounds, or 218 tons. The shipments from Jan. 1 to March 17 were 10,897,470 pounds, or 5,448 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the figures of the ore production and movement for the week ending March 18, and for the year to date:

BOUNDARY SHIPMENTS.

| | | |
|--------------------|--------|---------|
| Granby | 25,601 | 237,868 |
| Mother Lode | 8,400 | 67,599 |
| Snowshoe | 1,868 | 22,338 |
| Rawhide | 112 | 33,052 |
| Jack Pot | 1,520 | 6,826 |
| Number Seven | 49 | 612 |
| Other mines ..... | ..... | 2,377 |
| Total | 37,547 | 370,672 |

ROSSLAND SHIPMENTS.

| | | |
|----------------------------|-------|--------|
| Centre Star | 2,971 | 36,947 |
| Le Roi No. 2, | 420 | 5,106 |
| Le Roi No. 2, milled | 300 | 3,300 |
| Le Roi | 63 | 2,878 |
| Other mines ..... | ..... | 217 |
| Total | 3,754 | 48,448 |

SLOCAN-KOOTENAY SHIPMENTS.

| | | |
|--------------------------|-------|--------|
| Sullivan | 1,021 | 7,343 |
| St. Eugene, milled | 2,775 | 30,525 |
| Richmond-Eureka | 57 | 614 |
| Ruth | 70 | 235 |
| Rambler-Cariboo | 70 | 646 |

| | | |
|-------------------------------|-------|--------|
| Queen, milled | 420 | 4,410 |
| Granite-Poorman, milled | 250 | 2,750 |
| Nugget, milled | 110 | 1,210 |
| Wilcox, milled | 75 | 825 |
| Emerald | 124 | 841 |
| Standard | 31 | 391 |
| Yankee Girl | 96 | 1,104 |
| Mollie Hughes | 21 | 29 |
| Molly Gibson | 58 | 249 |
| Number One | 27 | 27 |
| Vancouver | 26 | 26 |
| Other mines ..... | ..... | 1,596 |
| Total | 5,231 | 52,821 |

The total shipments for the week, including the estimated milling, were 46,530 tons, and for the year to date, 471,941 tons.

B. C. COPPER COMPANY'S RECEIPTS.

GREENWOOD, B. C.

| | | |
|-------------------|--------|---------|
| Mother Lode | 8,400 | 67,599 |
| Rawhide | 112 | 33,052 |
| Jack Pot | 1,520 | 6,826 |
| Other mines ..... | ..... | 240 |
| Total | 10,032 | 107,717 |

GRANBY SMELTER RECEIPTS.

GRAND FORKS, B. C.

| | | |
|--------------|--------|---------|
| Granby | 25,601 | 237,868 |
|--------------|--------|---------|

CONSOLIDATED COMPANY'S RECEIPTS.

TRAIL, B. C.

| | | |
|-----------------------|-------|--------|
| Centre Star | 2,971 | 36,947 |
| Snowshoe | 1,868 | 22,338 |
| Sullivan | 1,021 | 7,343 |
| Le Roi No. 2, | 420 | 5,106 |
| Le Roi | 63 | 2,878 |
| Number Seven | 49 | 612 |
| Richmond-Eureka | 57 | 614 |
| St. Eugene | 183 | 1,523 |
| Ruth | 70 | 235 |
| Rambler-Cariboo | 70 | 646 |
| Emerald | 124 | 841 |
| Standard | 31 | 391 |
| Queen | 115 | 528 |
| Yankee Girl | 96 | 1,104 |
| Mollie Hughes | 21 | 29 |
| Molly Gibson | 58 | 249 |
| Number One | 27 | 27 |
| Vancouver | 26 | 26 |
| Other mines ..... | ..... | 4,082 |

The total receipts at the smelters for the week, including concentrates, were 42,898 tons, and for the year to date, 431,104 tons.

TORONTO MARKETS.

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

- Spelter, 5.50 cents per lb.
- Lead, 3.65 cents per lb.
- Antimony, 8 to 9 cents per lb.
- Tin, 43 cents per lb.
- Copper, casting, 13 cents per lb.
- Electrolytic, 13 cents per lb.
- Ingot brass, 8 to 12 cents per lb.

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

- Summerlee No. 1, \$23.00 (f.o.b. Toronto).

Summerlee No. 2, \$22.50 (f.o.b. Toronto).
 Midland No. 1, \$19.50 (f.o.b. Toronto).
 Midland No. 2, \$19.00, (f.o.b. Toronto).
 Hamilton No. 1, \$18.00 (f.o.b. Hamilton).
 Hamilton No. 2, \$17.50 (f.o.b. Hamilton).
 Clarence, \$19.00 (f.o.b. Toronto).
 Cleveland, \$19.00 (f.o.b. Toronto).

GENERAL MARKETS.

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

COKE.

March 21.—Connellsville Coke (f.o.b. ovens).
 Furnace Coke, prompt, \$1.60 to \$1.65 per ton.
 Foundry Coke, prompt, \$2.00 to \$2.15 per ton.
 March 21.—Tin (Straits), 41.00 cents.
 Copper, Prime Lake, 12.50 cents.
 Electrolytic copper, 12.25 cents.
 Copper wire, 14.00 cents.
 Lead, 4.45 cents.
 Spelter, 5.65 cents.
 Sheet zinc (f.o.b. smelter), 7.50 cents.
 Antimony, Cookson's, 9.50 cents.
 Aluminium, 21.00 to 21.50 cents.
 Nickel, 40.00 to 45.00 cents.
 Platinum, ordinary, 41.50 per ounce.
 Platinum, hard, \$43.50 per ounce.
 Bismuth, \$2.00 to \$2.10 per lb.
 Quicksilver, \$52 per 75-lb. flask.

SILVER PRICES.

| | New York. | London. |
|---------|--------------------------------|--------------------------------|
| | cents. | pence. |
| March 8 | 52 ⁷ / ₈ | 24 ³ / ₈ |
| " 9 | 52 ⁷ / ₈ | 24 ³ / ₈ |
| " 10 | 52 ³ / ₄ | 24 ⁵ / ₈ |
| " 11 | 52 ³ / ₄ | 24 ⁵ / ₈ |
| " 13 | 53 ¹ / ₈ | 24 ¹ / ₂ |
| " 14 | 53 ¹ / ₈ | 24 ¹ / ₂ |
| " 15 | 52 ⁷ / ₈ | 24 ³ / ₈ |
| " 16 | 52 ¹ / ₂ | 24 ¹ / ₄ |
| " 17 | 53 | 24 ⁷ / ₈ |
| " 18 | 52 ³ / ₄ | 24 ⁵ / ₈ |
| " 20 | 52 ⁵ / ₈ | 24 ¹ / ₄ |
| " 21 | 52 ⁵ / ₈ | 24 ¹ / ₄ |

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

MISCELLANEOUS.

| | March 23rd, 1911. | |
|------------------------------------|--------------------------------|------|
| | Bid. | Ask. |
| Amalgamated Asbestos | 12 ⁷ / ₈ | .... |
| Black Lake | 15 ¹ / ₂ | 16 |
| Dominion Coal | .... | .... |
| Dominion Steel | .... | .... |
| Dominion Steel Corp. v-div. 1 p.c. | 58 | 59 |
| Granby | 34 | 35 |
| Consolidated Mining | 40 | 50 |
| Nova Scotia Steel | 100 | .. |
| Crow's Nest Pass | .... | 74 |

COBALT STOCKS.

| | | |
|---------------------|---------------------------------|---------------------------------|
| Amalgamated | .... | .... |
| Bailey | .04 ³ / ₄ | .05 ¹ / ₄ |
| Beaver Consolidated | .36 ⁵ / ₈ | .36 ⁷ / ₈ |
| Buffalo | 2.10 | 2.30 |
| Chambers-Ferland | .11 | .11 ¹ / ₂ |

| | | |
|------------------|---------------------------------|---------------------------------|
| City of Cobalt | .17 | .17 ³ / ₄ |
| Cobalt Central | .07 | .09 |
| Cobalt Lake | .18 ³ / ₄ | .19 |
| Coniagas | 6.95 | 7.20 |
| Crown Reserve | 2.67 | 2.70 |
| Foster | .06 | .08 |
| Gifford | .02 | .03 |
| Great Northern | .18 ¹ / ₈ | .18 ¹ / ₂ |
| Green Meehan | .03 ⁵ / ₈ | .03 ⁷ / ₈ |
| Hargraves | .18 | .19 |
| Hudson Bay | 100. | 110. |
| John Black | .... | .... |
| Kerr Lake | 6.25 | 6.50 |
| La Rose | 4.58 | 4.65 |
| Little Nipissing | .04 ⁵ / ₈ | .05 |
| McKinley | 1.72 | 1.73 |
| Nancy Helen | .02 | .03 |
| Nipissing | 10.90 | 11.00 |
| Nova Scotia | .13 ¹ / ₂ | .14 ¹ / ₂ |
| Ophir | .10 | .20 |
| Otisse | .01 ¹ / ₂ | .01 ³ / ₄ |
| Peterson Lake | .09 ³ / ₄ | .10 ¹ / ₄ |
| Right of Way | .05 ³ / ₄ | .06 |
| Rochester | .03 ⁵ / ₈ | .03 ³ / ₄ |
| Silver Leaf | .03 ¹ / ₂ | .04 |
| Silver Bar | .... | .... |
| Silver Queen | .03 | .04 ¹ / ₂ |
| Temiskaming | .72 | .73 ¹ / ₂ |
| Trethewey | .94 | .97 |
| Watts | .... | .... |
| Wettlaufer | .90 ¹ / ₂ | .95 |

PORCUPINE STOCKS.

| | | |
|-------------------|---------------------------------|----------------------------------|
| Hollinger | 9.29 | 9.40 |
| Monita | .28 | .30 |
| Preston East Dome | .45 | .45 ¹ / ₂ |
| Porc. Gold Mines | .64 ¹ / ₂ | .65 |
| Porc. Tisdale | .08 | .10 |
| United Porc. | .09 | .12 |
| Porc. Imperial | .19 | .20 |
| Porc. Central | .54 | .59 |
| Swastika | .55 | .58 |
| Dome Extension | .49 | .51 |
| Pearl Lake | .53 | .54 |
| West Dome | 3.19 | 3.19 ³ / ₄ |

NEW YORK CURB.

| | March 23rd. | |
|------------------------|--------------------------------|--------------------------------|
| | Bid. | Ask. |
| Brit. Col. Copper | 6 | 6 ¹ / ₄ |
| Butte Coalition | 17 ¹ / ₂ | 18 ¹ / ₂ |
| Chino Copper | 22 ¹ / ₄ | 22 ¹ / ₂ |
| Davis-Daly Copper | 1 ⁷ / ₈ | 1 ⁹ / ₈ |
| Ely Consolidated | 24 | 21 |
| Giroux Mining | 6 ¹ / ₈ | 6 ¹ / ₄ |
| Goldfield Consolidated | 6 ⁵ / ₈ | 6 ³ / ₄ |
| Greene-Canadian | 6 ⁷ / ₈ | 6 ¹ / ₂ |
| Harcuvar Copper | .... | .... |
| Inspiration Copper | 7 ¹ / ₈ | 7 ¹ / ₈ |
| New Baltic Copper | .... | .... |
| Miami Copper | 19 ¹ / ₄ | 19 ¹ / ₂ |
| Nevada Con. Copper | 18 ⁵ / ₈ | 18 ³ / ₄ |
| Ohio Copper | 1 ¹ / ₂ | 1 ³ / ₈ |
| Rawhide Coalition | .... | .... |
| Ray Central | 1 ³ / ₄ | 1 ¹ / ₈ |
| Ray Consolidated | 17 ³ / ₈ | 17 ¹ / ₂ |
| Union Mines | 1 ¹ / ₈ | 1 ¹ / ₄ |
| Yukon Gold | 3 ⁷ / ₈ | 3 ¹ / ₈ |