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CIRCULATION.

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CONTENTS.

WELCOME.

Toronto has welcomed many delegations of mining men. Never before, however, has the public been so alive to the importance of the mining industry, or so interested in the proceedings of the Canadian Mining Institute.

To our English, American and other visitors from afar, we extend the warmest greetings. It may be taken for granted, no doubt, that all will have a profitable time. We hope, however, that every Canadian member of the Institute will do his best to see that our visitors lack nothing.

Here we may repeat a suggestion that has been made before. It will be well for the older members to make a point of seeing that the younger men are hospitably entreated and generally introduced to each other. To the man who knows only one or two faces in the gathering, the sessions are gloomy affairs, indeed.

Those of the visitors who wish to inspect mining districts other than Cobalt and Porcupine can easily arrange to do so. Many other Ontario mines are easily reached from Toronto. This should be borne in mind and brought to the attention of the Secretary at an early hour.

Upon all we urge the propriety of prompt and consistent attendance when papers are being read and discussed. And by all means let every member who has anything to contribute to a discussion say it promptly. The papers are merely points round which discussion should crystallize. Their value can be immensely enhanced if the several points of view are placed on record with them.

* * * * *

The Institute has never yet held an Annual Meeting that has not been the best on record. Let us see to it then that March 6th, 7th and 8th go down in history as red-letter days.

THE PICTURESQUE MR. HOOLEY.

Canada has bred a few thorough-paced financial pirates, and has imported more. In this country, however, their field has been restricted. Partly by our relative purity and partly by our reprehensible lack of imagination, we have never produced a Thomas W. Lawson or an Ernest Terah Hooley.

Of the latter it may be said that he is surpassed by no one under Heaven (above ground); neither has he his peer in sensational fiction.

An Englishman by birth, he early showed signs that he is devoid of most of the national characteristics of his fellow-countrymen. He is neither phlegmatic nor insular. Indeed, his exotic imagination, infinite daring and his disregard of conventional morality mark him as a "sport" in the evolutionary sense.

Hooley inherited a sizable fortune from his father, a Nottingham lace manufacturer. Moving to London he set up as a broker. Here, he lost no time in consummating the purchase, re-organization, and sale of the Dunlop Pneumatic Tire Co. It took him exactly three days to buy this prosperous concern for £2,000,000, and to sell it for £4,000 000, thus clearing £2,000,000 for himself. Next he purchased and re-sold a beef extract company, making £500,000.

These operations were typical. Hooley continued to acquire sound enterprises and to sell them at greatly enhanced prices. No one openly questioned his integrity. He became immensely popular and was constantly besieged by persons of title and commoners asking him to invest their money. The art of capitalizing the "guinea-pig," the avaricious lordling and the impecunious, though belted, earl, he developed to the highest pitch. His directorates read like a Court reception. He dazzled the public, he enriched many a needy peer, and, incidentally, lost his head. The crash came shortly after he conceived the idea of raising an enormous Chinese loan. Since then, deserted by his former friends, Mr. Hooley has been employed chiefly in eluding the arm of the law. At present he is spending twelve months in an English prison.

During the years of his prosperity Mr. Hooley disbursed large amounts of money in charity. To his associates he always was extremely generous. A successful coup meant prosperity for everyone who had helped him, directly or indirectly. It is worthy of note that not one of the titled persons whom he had succoured stuck by him.

In a word, Ernest Terah Hooley made money too fast. Had he been content with a modest £8,000,000, he would probably have become an honoured member of the titled ranks himself.

THE TRETHEWEY STATEMENT.

The annual report of the Trethewey Silver-Cobalt Mine, Limited, is to be presented at the meeting on February 28th. Internal dissensions are promised at date of writing. How these will result, we have no means of determining; but we think that it will be wise on the part of the shareholders to preserve the peace.

The gross revenue for the calendar year 1911, was $372,622.45; the expenditure, $221,316.04; and the net profit, $160,306.41. The corresponding figures for the preceding year were, respectively, $437,552.25; $199,-751.83; and $237,800.42. Thus there was a considerably higher expenditure in 1911, along with a notably lower net profit. Resolved into costs per ounce of silver, the total charges per ounce in 1910 were 23 cents, whilst in 1911 they ran up to 27.5 cents.

"The decrease in production in 1911 as compared with 1910," so runs the report, "is accounted for by the fact that a large proportion of the milling ore dealt with during the year was taken from old workings from which the original high-grade veins had been removed, thus reducing the average value of the mill heads with a consequent reduction in the value of the jig and table concentrates produced." The enlarged expenditure, it is stated, was incurred in underground exploration and development; and it is worthy of note that this outlay has been charged, not to capital ,but to operating account.

From the report we learn further that the east central portion of the property has been only very slightly explored. Of the 43 acres owned by the company, considerably less than 12 have been systematically explored, and preliminary work only has been performed on part of the remaining area. There may be, no doubt there is, room for difference of opinion as to the possibilities of the unworked acreage. But few will consider it wise to discontinue or narrowly circumscribe prospecting. A mine that has produced more than four million ounces of silver from a small part of its probably productive territory is not to be lightly regarded.

The company had on December 31st, 1911, a cash balance of nearly $60,000. The net value of ore in transit, at the smelter, or ready to ship, exceeded $145,-000. Other items, not including of course the book value of the mine, bring the liquid assets up by some thousands of dollars. The company is, therefore, in fairly good financial shape.

The crux of the future lies in the result of underground prospecting and development. No informed person could advocate any other policy than that of pushing development with the utmost vigour. That ore resources can be blocked out during the current year is highly probable. This should be done even at the cost of cutting down shipments. In fact, unless the management trusts to luck, there is no other alternative.

The insurgent shareholders are demanding a new directorate, monthly reports of progress, and the appointment of a consulting engineer. The second demand, we understand, is superfluous. Monthly bulletins already reach those interested. The third request is reasonable, provided always that the right

man is secured. A consulting engineer who is not entirely in sympathy with the manager is not to be desired.

It will be only decent to avoid such a foolish fuss as has been made over Temiskaming affairs. The men who control the Temiskaming needlessly gave an opening to loud-mouthed dealers in wind. Had the interests of the shareholders been consistently studied, had they been kept fully informed, the utterly silly scene enacted at the Temiskaming annual meeting would never have been enacted.

Finally, unless there is grave cause for complaint, a sweeping change of the Trethewey's directorate would be ill-advised. It takes some time to learn the business. New blood should be injected carefully and gradually.

QUEEN'S UNIVERSITY.

It has been resolved to make Queen's University a non-denominational institution. The struggle to retain a definite connection with the Presbyterian Church was protracted and bitter. It was also the manifest sign of a narrow clerical policy.

Certain citizens of Hebrew origin have been fighting at Ottawa against limiting clauses in the Bill that is intended to widen the scope of Queen's. These clauses have the effect of excluding non-Christians from office.

In our opinion these clauses are mischievous in the extreme. If the Christian religion is to be an influence for good in the future development of Queen's University, it will be all the more so if the University is thrown wide open. The use of "tests" has lost all meaning to-day. What earthly, or heavenly, right has any institution to exclude from office any class of good Canadians? If Queen's is to be national let her be genuinely national. Otherwise there is no possible reason to hope for the support, moral or financial, of the great majority of her graduates. And, as to the School of Mining, which is closely affiliated to the University, any arbitrary restrictions of the field from which professors are to be chosen will not be tolerated for a moment.

It is high time that all this blundering foolishness and non-Christian bigotry were done with.

THE INVESTOR.

Of all the errors to which the mining investor is liable that of choosing wrongly his technical adviser is the most frequently committed. This applies as well to the Canadian as to the foreign investor.

In writing on this subject we are quite conscious of being trite, of treading ground that has been covered time and time again. Yet there is virtue in repetition, especially at this stirring season.

Those who put money into the exploitation of our mineral deposits may be divided into classes. First, we have the large corporation employing its own engineers and, usually, well provided with the sinews of war. Second comes the specially organized joint stock company promoted for the express purpose of acquiring and developing one or more particular properties, and depending for its future existence upon the success of one venture. Into the third category falls the private investor who employs prospectors, acquires claims, or purchases prospects or mines.

As for the first mentioned class, no large Canadian corporation can be pardoned for employing incompetent or unsuitable engineers. Professional knowledge and attainments are not everything. The art of approaching and handling men; the knowledge of local habits, customs and traditions; and the possession of that vague but vastly important quality that for lack of a better name is termed "horse sense" are all essentials. In short, the engineer who is to do business for a corporation in this country should know Canada and Canadian temperaments, and should have a grasp of the geology of Canada and of Canadian mining history.

In many cases it is difficult, if not impossible, for mining engineers from other countries justly to appraise prospects and mines in Canada in the limited time usually at their disposal. Therefore it is wise for such engineers always to seek the guidance of a Canadian fellow-engineer.

The newly incorporated company, the second broad division, frequently expects the engineer not to write a report of things as they are, but an ardent prospectus of things as they should be.

The private investor is an uncontrollable quantity. If he goes wrong he damns mining and all that pertains thereto. If fortune smiles upon him, he takes the whole credit to himself.

It is to those who have no immediate means of directing themselves aright, the foreign corporations and investors, that we proffer a word of warning.

Many times complaints have reached our editorial ears concerning the uncertainty of obtaining a competent Canadian engineer who is able to give a straight and reliable report. These complaints, naturally, have come mainly from Americans and Europeans. And they are genuine. The outsider, other things being equal, really prefers to employ a person conversant with Canadian men and methods. But unless he has ample time to look round for himself, he is up against a real obstacle. Professional cards are not published by all engineers. Not all professional cards have "the goods" behind them. Not every practitioner who sports "M.E." after his name is competent. Among the elect only a few are specially qualified to guide the would-be investor in any one or two branches of mining. How is the stranger to judge?

This is not an easy question to answer. It must be confessed that the most experienced engineer runs the risk of blundering when he goes outside of his specialty. For instance, a professional man who has devoted most of his time to gold is seldom able to adjust his mind to the totally different requirements of iron ore mining. The coal specialist is not likely to be an authority on placers. These things are obvious enough. Yet it is not seldom that the mining engineer is placed by circumstances, or consents to place himself in the false position of posing as an expert in matters of which he knows only the rudiments.

If, therefore, the investor wishes to make sure of his man, it is apparent that strict inquiry is necessary. Where and how is this inquiry to be made? Mining engineering is not a close profession. There is no strictly professional society of mining engineers in Canada. And, as a matter of fact, casual inquiry will often elicit warm commendations of a mining engineer from his acquaintances solely because of his personality with no reference to his experience or his ability. For these and other reasons, the inquirer must go to certain sources.

For the purpose of engaging a reliable Canadian engineer, then, enquiry may be made of the Geological Survey at Ottawa, and of certain of the Provincial Departments of Mines. But the prime sources of information should be the Universities and the Canadian Mining Institue. At all the Universities lists of mining graduates are kept, and the whereabouts of each living graduate are known. The secretary of the Canadian Mining Institute, also, can supply a list of names from which a suitably qualified engineer can be picked. And, incidentally, the Canadian Mining Journal is always willing to be of service in submitting a similar list, or in obtaining specific facts relating to any given engineer.

Hence there should be no insuperable obstacle in the way. If pains be taken in seeking the right man, and if his advice be followed intelligently, then more than half the battle is won.

It may be mentioned here that English capital has been squandered in Canadian mining ventures to a greater extent than has that from any other country. The real cause, the only cause, has been the neglect of the simple precautions outlined above.

THE BRITISH COAL STRIKE.

Most ominous is the news from Great Britain as we go to press. Friday, the 1st of March, and the succeeding two or three days may witness the calling out of every coal miner in England, Wales, and Scotland. All attempts at conciliation have, seemingly, been abortive. Obsessed with the idea that they command the sympathy of all the labouring classes, and believing that their Parliamentary representatives are no longer working in their interests, the miners, or, rather, the demagogues whom the miners follow blindly, are ready to stop all work on Friday morning.

The nominal cause of this impending disaster, for disaster a strike of such magnitude will be, is the refusal of the owners to grant a minimum wage scale. The real cause is traceable to the sweeping victory of the miners some time ago when they obtained the Eight Hour Day. Intoxicated with that success, the labour leaders have been planning this final coup.

The chief hope for an eleventh hour settlement of the trouble lies in the fact that the owners may make temporary concessions pending the decision of a court of arbitration. Rumour also has it that the Government has offered to make good to the owners any loss that may be incurred by a limited trial of a minimum wage scale. But there is no certainty about this. The results of all conferences are kept absolutely quiet.

It is hardly believable that the miners can fully understand what indescribable loss the proposed strike would bring upon the whole nation. They themselves would not be the chief sufferers. Upon the poorer city classes, the strike would bring the intolerable hardships. Fuel is costly enough at all times. But when even the rich would experience difficulty in obtaining coal, the position of the poor can be left to the imagination. This is really the most serious aspect of the case.

The dislocation of international commerce, the paralysing of internal traffic and of trade generally, are necessary concomitants of even a few days of strike conditions. Protracted cessation of work would be a calamity of the first magnitude.

The significant fact is that the miners respond eagerly to the demagogue, and refuse to listen to the saner councils of their own Parliamentary representatives. No final settlement will be practicable until the agitator is muzzled. The most effective muzzle is a closer understanding between master and man.

OBITUARY.

The Late Hon. B. F. Pearson, K.C.

On the evening of January 31st, there died at Halifax, N.S., the Hon. B. F. Pearson, K.C.

Benjamin Franklin Pearson was a native of Colchester County, Nova Scotia. He was born at Truro, the county town, 67 years ago. Admitted to the Bar in the year 1881, Mr. Pearson early showed that his energies could not be confined to the practice of law. In 1889, he arranged for the purchase of the telephone rights of the Bell Telephone Company in Nova Scotia, and proceeded to organize the present Nova Scotia Telephone Company. A few years later he became the moving spirit in organizing the Dominion Coal Company and the Dominion Steel Company. Many West Indian and Mexican traction and other ventures were due to his initiative. He was an active member of the Provincial Liberal cabinet for some years, and for a long time was prominent in political affairs. The Halifax Morning Chronicle was controlled by him.

CORRESPONDENCE

MORE PETROLEUM.

The Editor, Canadian Mining Journal:

Sir,—I consider the letter of Mr. J. F. Latimer, published in the issue of the Journal for January 1st, more as an incentive for a discussion of the subject whereof he writes, than as calling for adverse or favourable comment on the letter itself, because Mr. Latimer, according to his own confession, speaks from the standpoint of a non-student of this much discussed, but, to many, intricate subject.

It is true that those combatants whom Mr. Coste has so far succeeded in arraying on his side to aid in the defence of his hypothesis "on the origin of petroleum," are few in number, but those whom he has, are of weighty authority. Can it, however, be claimed that because the number is small, therefore the theories of his adversaries are correct? They may be as much at sea as were formerly the "lateral segregationists and dissensionists," who were fighting with every weapon to hand against the "volcanic ascensionists," and who came out second best? May not this case be analogous to the war over the theories of the old Sandberger school and Van Hise's descension theory, both of which are hardly whispered to-day? I, for my part, stand at the side of Mr. Coste and say that it not only may, but is the same.

To assert that we can jump at conclusions, from what we poor mortals are able to do and to produce in our little laboratories, as to what that gigantic and mysterious laboratory, our world, is doing and producing, is rather a strong claim. Neither do little drops of oil, that have the semblance of petroleum, found here and there near to coal beds, constitute any proof.

Have the organic theorists ever figured out how many billion tons of coal would be required to produce all those millions of barrels of petroleum or the billions of cubic feet of gas that have flowed or have been pumped out of the ground? What has become of the coke or ashes? Every particle of carbon and hydrogen must have been burned out of every existing coal-bed to furnish such immense amounts of gas and petroleum as are distributed throughout our earth's crust, to say nothing of that which must have escaped thence before mankind became interested in these phenomena. Do we find coal in such an altered condition as to furnish support to the hypothesis of the "organists?"

How would it be possible to produce such conditions? Only by the intrusions of hot lava streams into coal-bed strata. Would not, however, such extensive and intensive volcanism be accompanied by rock movements, by fissuring and perhaps faulting, and would not openings and passages be produced thereby for the escape of gas, and, if you will, oil also, into the atmosphere? Even if we suppose that the more gentle action of a laccolith had been the cause, and had not occasioned such fissuring, still, would not that large mass of hot magma have produced such an immense volume of gas, and with such suddenness, that the overlying rocks, weakened, would have been rent apart by the expansion, or even by an explosion of the gases? The latter would not have had time to escape gradually into the porous rock stratum, from which they would first have to drive out the air and water. Granting, again, that these gases might have found a subterranean store room, can any one inform us what has become of the distillation "by-products," either ashes of cinders? Has the magma made a tabula rasa with every particle of the organic or mineral residues, and then filled out the space which was formerly occupied by the coal? How grateful, then, should we be to an all-wise and benign Providence, who guarded the coal-beds that still exist, against nature's metamorphic processes and spared them to serve as a subject for our own industry!

It is unfortunate for the organic theorists that we find, at a number of places, oil and gas below the coal measures and others containing organic remains. Did they arrive there by the agency of pneumatic force? If so, what became of the air and water in those porous store-rooms? Had both been driven out beforehand? If so, and the air and moisture found an outlet somewhere, which must surely have been upward, and not downward, why not also the gas and oil? For we cannot conceive that coal beds should have been buried so long and so deeply that none of the distillation products could have escaped upwards, neither is it conceivable that the water-fauna, notwithstanding their long period of burial, should have retained the fatty and fleshy parts in such a state of preservation as to be still fit for distillation. What, then of the nitrogen? "Ah, well, the nitrogen slipped slily behind the scenes and disappeared, leaving no trace behind!" A downward course of the gases, even under pneumatic pressure, against volcanic heat, would imply a defiance of every physical law that stood in their way.

I have just read an extract from a report on "the Gas Occurrence of the Kent Field," written by my friend, G. R. Mickel, who estimates the probable output at 70,000 million cubic feet. Quite a substantial volume! Were we to confine this in a square gas-holder, such a holder would be represented by a cube, each of the sides of which would be 19,130 feet long, and for the production of this amount of gas there would be required about 7,000,000 tons of good gas coal. What has become of the resultant ash and cinders? What has taken the place of the carbon and hydrogen? Gas, and perhaps oil? If so, the gas drillers and oil pumpers should be on the lookout or they might some day take an involuntary slide into the "nether world!"

Our friends on the other side of this controversy might say, "Neither the gas nor oil came from coal at all, they came from the inhabitants of our lakes and seas, from the tiniest housed creature, to the biggest ammonites, from the smallest unhoused being to the largest monster of the deep—'sea-serpents' not excluded."

Let us analyse this hypothesis somewhat closer, let us follow the different phases of the decaying process on the body of a large animal thrown into the water. First, we will see it sink down; second, it will soon swell up, through the evolution of gases produced by the oxidation of the hydro-carbons and nitrogenous parts of its interior, confined by the surrounding skins; third, it is lifted to the surface like an inflated balloon; fourth, the process of decomposition continues, the skins are punctured, the gases escape, water may or may not take their place, the body sinks down again and falls a prey to crustaces or other creatures of unrefined taste.

And this is the speedy end of flesh, fat, gas, oil and whatever else will not withstand the gnawing teeth of animals and time. In most cases, however, we will not see the body again after its first fall into the water, for it will be devoured before it has time to rise again. The above illustration holds good for our warm and moderately warm inland lakes; for the cold waters of Lake Superior or the waters of the Arctic or Antarctic regions, it must be somewhat modified. But what we observe taking place in our warmer climes we have to accept as taking place still more readily in pre- and post-carboniferous, Jurassic and later epochs and even more so in early Silurian and Devonian times, because much higher temperatures prevailed then, and very likely there were also a greater number of preying animals. Has ever an anthropologist found the complete body of a man, or a zoologist the intact body of an animal, except such as were discovered buried in ice? Or has ever a malagologist or conchologist found a mollusk of earlier periods with its interior absolutely intact, although, perhaps fossilized?

If we examine the remains of a prehistoric fauna, they appear only in rare instances to have suffered any change through either heat or crushing, through pressure, conditions which we would expect to observe if volcanism had in one way or the other acted upon them.

What would it mean to distil or press the billions and billions of cubic feet of hydro-carbon gas, and the millions and millions of barrels of oil that has existed and still does exist in the folds of the earth's crust, out of lacustrine sediments, however large they may be? It would mean that all the deposits of animal remains of which we have knowledge are absolutely insufficient to produce all the hydro-carbon masses which have been so far collected, not to mention those as yet untouched. It would also mean that all these animal remains had to be in an undecomposed condition, in order to be fit to yield the products mentioned. It is simply inconceivable that they should have remained intact for thousands of years, until a covering sufficiently thick and impermeable had formed over them to oppose the escape of the gases. Let us consider only the time necessary to form the hundreds or thousands of feet of lacustrine or marine sediments, to say nothing of the additional time required to bury these sediments under an equal, or even larger covering of later, and, perhaps, varied sediments, and consider, moreover, that, while all this was going on, mollusks, fishes and other inhabitants of the waters should have been preserved intact, in death, to await their ultimate fate, to give us their fat and grease for the comfort and "enlightenment" of the human race!

What, now, about the hypothesis of the "Plutonists?" I think that every geologist, mineralogist, naturalist, or whosoever has interested himself in the structure and the material of which our globe consists, be it from its earliest history to the most recent times, will have found that carbon in different forms has been ejected from the interior of our globe, either in combination with various magmas, or exhaled in combination with different gases, and at all periods, not only in minute, but often in considerable quantities, it being then distributed over and throughout large areas of our earth's crust. In this connection I may also mention that doubtless immense quantities were diffused into and throughout our atmosphere, forming later a partial source for plant and animal life. But the careful observer will have also found that organisms containing carbon were not in existence prior to Cambrian times, at least, there is no trace of any such organism having been discovered, for Logan's and Dawson's Eozoon Canadensis was an erroneous determination.

Let us briefly review those rocks in which we have discovered carbon in larger or smaller quantities. I shall take my examples from our two most western districts, these furnishing examples of the oldest rocks of our earth's crust more plainly than any of which I have knowledge.

Beginning with the oldest representatives, the Keewatin, we find in numerous places carbon in the form of graphite. Next in order, in the Laurentian granites we find carbon dioxide in the miarolites. In the pre-Cambrian we find the next oldest deposits in the following order: Graphite in the ejectments of our trap volcanoes, distributed over a considerable area and thickness, a graphitic diabase heavily saturated, gabbros containing graphite in veinlike deposits, peridotites with graphite granules, heavy coatings of graphite along the walls of our trap dykes, in our silver veins, and a very inflammable carbon hydrogen gas in the same veins, anthraxolite in fault fissures of archaean rocks and Animikie slates, the latter also saturated in places with hydrocarbons. The last in order in our districts would be the Keewenawan or Nepigon dolomite, and the last ejected diabase rocks, containing considerable quantities of graphite.

Now, what can be shown to have occurred in the earliest history of our globe, in our locality, has also been taking place in other parts of the world, and in later epochs perhaps upon even a larger scale, but better retained, in larger masses, in porous rocks, where the gases could lodge and condense. If all those carbon gases from the still active mofettes and solfatara were caught in subterranean store rooms, natural gas and naphtha would be constantly produced. It is possible that in earlier periods the metallic carbides may have been more abundant towards the surface of the molten interior, securing an easier channel for escape, while now, owing to the greater pressure exerted by the thicker envelope of the earth's crust, they are more compressed and, therefore, more confined. However, we learn that, in the Baku fields, the naphtha is still flowing, and is welling out a number of places; if this is the case, then the same phenomenon is occurring in our Athabasca River field, where naphtha and tar are oozing out of the banks of the river, having, as a result, asphalted the river bed to an almost smooth floor. In the Baku fields we have historical evidence that the "holy fires" have been burning there for thousands of years, and from Athabasca we know that the Indians and half-breeds have painted their dwellings with this product for many years. In 1894 the Dominion Government drilled a well on Pelican Portage on the Athabasca River, striking the gas at 800 feet. It shot out with such tremendous force that all hope of stopping it was abandoned, and the well has been flowing ever since.

Now, when a person is told that these enormous stores of gas and oil are produced by the distillation of organic substances, he wonders whether he is not being made the target of a poor joke.

Proof of the unsoundness of the organic theory could be brought forward ad infinitum, but I am afraid that

I have trespassed to the limit of the space that you, Mr. Editor, can allow me. I would only desire to add that, if in my arguments I have trespassed upon ground which Mr. Coste can claim to have covered, I ask for absolution, because I have not had the pleasure of studying Mr. Coste's contributions on this subject, except one only, and that published several years ago.

F. HILLE, M.E.

Port Arthur, Ont., Feb. 1, 1912.

LAKE OF THE WOODS.

The Editor The Canadian Mining Journal,
Toronto, Ont.

Sir,—Owing to my duties in the Legislative Assembly I have not had the time I should like to prepare an article on the possibilities of the Lake of the Woods, Rainy River and Manitou mining districts. However, since you were good enough to ask me to write a short letter of my opinion on this subject, I am glad to avail myself of your kind offer in order to reach the mining and investing public through your valuable paper.

I have noticed with a great deal of pleasure the references your Journal has made from time to time concerning these districts, and particularly the able article, which appeared recently, written by Mr. Carter, former Government Inspector of Mines.

While we who live in the districts named above rejoice in the good fortunes of those now engaged in gold mining in the Porcupine districts, and the strong tone the discoveries in that country have given to the mining of precious metals generally in Ontario, yet we feel that we have in the Lake of the Woods country just as good properties and prospects as they have in the Porcupine country. We say that if we had some of the experienced and capable men who are now operating in the Porcupine country, plus the capital they have behind them that in a year from now the Lake of the Woods would make a different showing. We have had a bad "black eye" attributable to many causes, but I think Mr. Carter's article explains former conditions far better than I can.

I believe that as a result of the Porcupine discoveries and the re-establishing of Ontario's claim as a gold producing country we have felt the benefit of the faith which the mining investing public have become imbued with as a result of those discoveries. During the past two years a great deal of quiet work has been done in the Lake of the Woods and adjoining districts, with a result that to-day we find the St. Anthony working in the Sturgeon Lake district, and other steady work going on around it to a smaller degree. The old Laurentian, now known as the Great Golconda, in the Manitou district, is at work again, as well as other properties in its neighbourhood. The Bewick-Moreing Company is developing a promising prospect at Dryden, some sixty miles east of Kenora on the Canadian Pacific Railway, as a result of which quite a stir of activity is going on in that section; and in the Lake of the Woods proper we find Buffalo people steadily carrying on work at the old Scramble property. This is a large low-grade proposition, which when worked on a large scale, as proposed, by electrical power, should instil faith into the doubting public. The transmission line is under construction, and power will be obtained from the town of Kenora, which owns and operates a valuable developed water power The engineer in charge of this work is Mr. Charles Brent, M.E., whose past experience in that country has undoubtedly proved of great value, since the cautious and workmanlike manner in which the present development work is being carried on, without a word being said or any blowing of trumpets, spells success. I understand that a consolidation of certain valuable mines and prospects has been made by Judge Fishback, of Chicago. The famous "Ophir" property, the subject of so much litigation in former years, forms, I believe, the nucleus of the consolidation. A company with a $5,000,000 capital has been formed to work these properties, and for some time past steady development work has been going on at the Ophir under the management of Mr. R. B. Nickerson, M.E., of California. The Olympia mine on Shoal Lake, adjoining the "Mikado," has been working quietly for some time in a small way, and I understand that five stamps have been dropping for some time with good results. I know that gold bars have been produced, but to what amount I cannot say. Other properties were worked last summer, by way of development only, and doubtless will resume next summer.

Some months ago a Winnipeg syndicate did a lot of diamond drilling on a large body or iron ore on Stormy Lake, south of the C.P.R. station of Dinorwic, and I am told that the results were entirely satisfactory. The work was supervised by an engineer from Robt. W. Hunt & Company, of Chicago. After drilling through five hundred feet of high-grade magnetite, work was suspended.

Some eighteen miles from Kenora, Dr. Scovil and Captain Kendall have done considerable work on some copper properties. Results have apparently been satisfactory.

I recite some of these instances, and there are plenty of others, simply to show the extent of the mineral fields of Northern Ontario, which, by the way, cover some thousand miles west of the T. & N. O. Railway (Toronto newspapers in general to the contrary notwithstanding), and the great chances for the mining public to investigate for themselves, and not simply to turn us down because others have told them that the districts I speak of are no good.

To repeat, if in the days of our glory we had had the men of experience now operating in Porcupine, plus the money they have behind them, plus the modern methods they are now using of winning the gold, the history of the Lake of the Woods would have been very different, and the Annual Report of the Bureau of Mines during the past fifteen years would have made very interesting reading as regards these districts and their gold production.

Yours very truly,

H. A. C. MACHIN.

Legislative Assembly, Toronto,
Toronto, 21st February, 1912.

OPPORTUNITIES IN THE WEST.

(Written for the Canadian Mining Journal.)

The history of mining development in Canada shows that it goes forward by sudden impulsive movements following the announcement and proving of the latest "discovery." This was particularly true of placer mining; but it is also true of lode mining—in a more moderate form, however. In the later case there is a more permanent industry established and left working after the "stampede" has passed on to the next strike.

It so happens that the public eye is so focussed on the better known fields that other districts, perhaps equally worth while, but not so well advertised or known, are comparatively neglected. An illustration is to be seen in the marvellous development of mining in Northern Ontario on the one hand and the comparatively neglected opportunities for investment in the northern portions of our two Western provinces.

From Edmonton, Alta., westward to the Pacific coast along the lines of the two new transcontinental railways, a distance of 800 miles, there is only one producing mine, viz.: a colliery with an output of about 100 tons of coal a day. It is not to be inferred from this, that the country traversed by these lines is without valuable mineral deposits, on the contrary many (a very great many) discoveries have been made and recorded, but, as a rule, little development work has been done.

The number of recent discoveries having rich surface showings in the Bulkley Valley, should have awakened more interest than they have done. The term Bulkley Valley is used here to include such adjoining areas as the Babine Mountains, Hudson's Bay Mountain, Roche a Boule, the tributary valley of the Telkwa, and part of the main valley of the Skeena River. Some spectacularly rich samples of bornite with native silver have been brought in by prospectors. On a few of these properties considerable work has been done; but in the great majority of cases no serious attempts have been made toward development.

There are also other promising districts along the route of these two railways, for example, the valley of the North Thompson River, the vicinity of the Yellowhead Pass, and around Tete Jaune Cache.

Turning to the question of coal mining we find, first, that in the neighbourhood of Edmonton there are numerous properties containing lignitic coals which would be a profitable investment if operated economically and with a small plant. Going westward there is a gradual improvement in quality until, at the edge of the mountains, the highest grade bituminous coals are found. There should be, in fact there inevitably will be, a great development in the coal mining industry of this part of the country; but, probably for the reasons first given above, this development is much slower than it should be. Why should Pennsylvania coal be used for locomotive fuel at Edmonton and westward of Edmonton when there is, on the main line of the railways, coal of just as good quality and equally suitable for locomotive use?

It is of particular interest to note that farther west on the Skeena River there is a field of hard coal. It is distant 100 and 125 miles respectively from tidewater and from present railway lines. When transportation facilities are available this field will play an important part in the Western coal supply.

OPPORTUNITIES IN THE IRON INDUSTRY IN CANADA

Written for The Canadian Mining Journal by A. B. Willmott.

A study of the Trade and Navigation Returns of Canada shows the following importations of iron and steel goods:—

	1908	1909	1910
Imports of iron and steel subject to duty	$51,485,456	$33,083,397	
Imports of iron and steel free of duty	10,334,242	7,310,034	
Total imports	$61,819,698	$40,393,431	

Many of these articles are highly manufactured and we can hardly expect that their production should be undertaken in Canada. The weight of these iron and steel manufactures is largely unknown. Included, however, in the figures presented above are a large number of partially manufactured products which could well be made in Canada and of which the tonnage is known. These are given in detail below:—

Imports of Some Iron and Steel Products of Which the Quantities are Available.

Material.	Twelve Months ending March, 1908. Short Tons.	Twelve Months ending March, 1909. Short Tons.	March, 1910. Short Tons.
Pig Iron	212,290	58,591	
Ferro-products and chrome steel	17,661	13,206	
Ingots, blooms, billets, puddled bars, etc.	21,222	8,887	
Scrap and scrap steel.	69,213	26,212	
Plates and sheets	126,172	101,317	
Bars, rods, hoops, bands, etc.	98,631	69,818	
Structural iron and steel	373,871	162,735	
Rails and connections.	52,706	32,543	
Pipes and fittings	25,090	18,309	
Nails and spikes	2,741	1,432	
Wire	57,046	39,452	

Forgings, castings, and manufactures.	22,357	13,092
Total.	1,079,000	545,594

With the importation of iron and steel goods varying from $40,000,000 to $62,000,000 a year there should be many opportunities for profitable investments in the iron and steel industries. The character of the opening will vary with the locality selected. Markets, source of raw material and transportation facilities as well as labour costs must be considered in looking into the possibilities of new ventures. These opportunities may be discussed in a general way province by province.

British Columbia.

This province has yet but a small population, but is rich in natural resources and a huge development is now taking place. Numerous railways must be built, bridges constructed, elevators, wharfs, manufactories and other buildings erected, all of which make extensive demands for iron and steel goods. Owing to high railway freights the province is best served at present by importations from abroad, by vessel. Pig iron, which may be taken as an index, sells around $23.00 and is furnished largely from Great Britain. Freight and duty alone amount to $9.00 a ton. This is a protection in favour of the British Columbia producer of pig iron which will be largely permanent in character and amounts to practically fifty per cent.

The raw materials for the establishment of an iron industry exist in abundance in British Columbia and all are very conveniently located for cheap assembly. Iron ore, coal and limestone all occur within a few miles of the sea and near the centre of population. The iron ores are largely magnetites, high in iron, low in phosphorus, but contaminated with sulphur. The consumption of pig iron in the province is, of course, small, owing to its high cost. With cheaper pig iron undoubtedly a large number of consumers would spring into existence. Many supplies for lumbering, mining and railways could be produced more cheaply on the coast than they could be imported from abroad.

Alberta and Saskatchewan.

These two provinces are very rapidly settling and the demands for pig iron for foundry purposes are bound to increase enormously. At present pig iron, owing to the long distance it must be transported, sells at $25.00 to $27.00 a ton. If pig iron could be furnished at a reasonable price local foundries would spring into existence in all the larger towns and cities. Repair work on agricultural implements, local manufactures, stoves, cast-iron pipe and other things would speedily make a demand for the output of a local furnace. The mining camps of the Crow's Nest Pass and South-Eastern Kootenay would also furnish a market.

It is believed the raw materials for such an enterprise could be cheaply assembled at some point on the Crow's Nest Pass Railway. Coke and limestone of excellent quality are abundant and good hematite ore is also reported, though little is yet definitely known about the quantity.

Manitoba and Western Ontario.

In Manitoba again there is already a considerable demand for pig iron for foundry purposes and, as in the Prairie Provinces, the price is unduly high, because of the length of transportation from producing centres. Manitoba is, however, not as favourably situated as Alberta, owing to the absence of suitable coal. On the Winnipeg River, however, in the adjoining part of Ontario, numerous water-powers occur. If there is any place in the Dominion where electric smelting of pig iron would be successful it would seem to be in this vicinity. Water power is cheap, coke is dear; the market for pig iron is at hand and the price of pig iron made by coke is unduly high. Moreover, in Western Ontario large quantities of iron ore are known, though frequently these are somewhat off grade. At several points the ores are low in iron, due to admixture with silica, but are reasonably free from phosphorus, sulphur and titanium. These could be undoubtedly concentrated and the concentrates smelted directly in an electric furnace. On the Atikokan River are larger deposits of ore high enough in iron, but contaminated with sulphur. This, however, does not seem to be objectionable in the production of electric pig. The project of such a plant operating at Kenora or some similar point where power is cheap and transportation good, seems to be worthy of careful consideration.

Ontario and Quebec.

In the central part of Canada are located the bulk of the iron furnaces of Canada. Here also are most of the manufactories working up the pig iron into a higher state of production. At the same time, as shown in the statistics given at the beginning of this article, there is a tremendous importation into Canada of iron and steel goods and it may be safely asserted that the bulk of these importations are made into Ontario and Quebec. A study of the Trade and Navigation Returns of the various importations will richly repay persons looking for investments.

Another line of investment in Ontario and Quebec would be the production of iron ore for sale to existing smelters. The following table shows the production of iron ore in Ontario and also the consumption:

	1909	1910	1911
Production	263,893	230,656	
Consumption	763,851	822,174	

From this it is apparent that Ontario is smelting about three times as much as she is producing. The case is even worse for a part of the Ontario production is exported and so still more has to be imported. There are numerous known occurrences of iron ore throughout the province awaiting exploration and development.

The Maritime Provinces.

The iron industry of the Eastern Provinces centres at Sydney, Cape Breton, though there are also furnaces on the main land of Nova Scotia. By far the larger part of the iron ore is imported from Newfoundland. Ore is also furnished from Bathurst, New Brunswick, and Torbrook, Nova Scotia. Coal and coke is of local origin near the furnaces. The plants at Sydney are particularly well located for the assembly of raw material cheaply. It would seem, however, as though the iron ores of these two provinces might be developed more energetically than has been done and so supply a larger part of their own requirements. Iron and steel industries depending on the pig iron, billets and rods made at Sydney should be economically located in that vicinity. Again a study of the Trade and Navigation Returns should prove valuable.

NORTHERN ONTARIO—*THE LAND OF PROMISE*

Written for the Canadian Mining Journal by

Ben. Hughes.*

Four years ago in Northern Ontario there was one hectic spot of furious and, to a certain extent, spurious activity at Cobalt. North, south, east, west as far as the mining industry was concerned, there was a vast wilderness of pre-Cambrian rocks untravelled except by the lumberman and the trapper. In Coleman Township the promoter and the broker raged up and down, beyond its bounds the grey timber wolf still pursued the deer and the forest acknowledged the overlordship of moose and bear. Pioneered by the few Western men in the camp the Ontario farmer's son and the Ottawa Valley lumberjack were commencing to spread far and wide in search of the little calcite vein. A few men were coming down with fairy stories from Larder Lake, and, presently, the most shameful capitalizing of the stunted jackpine and the frozen lake would prevail to the north. The daily press wittingly or unwittingly gave itself unreservedly to the pronouncements of the mining fakirs, and the country school teacher and small shopkeeper bled their treasured dollars into the hands of get-rich-quick gentlemen in Toronto. The air rang with ecstatic shouts of Cobalt! Cobalt! Cobalt!

To a measurable extent the mining industry has become decentralized, or, rather, the calcium light that burnt so brilliantly on Cobalt in the early days, has now been transformed into a search light sweeping the northern woods. When Cobalt has fallen into the hands of the lessees, as it surely will some day, there will be Gowganda and South Lorrain still to remind the outer world that Northern Ontario is argentiferous. Beyond the height of land it appears to be as futile to look for silver in payable quantities as it is to discover the yellow metal in the Temagami and Temiskaming regions, and it is a matter of great probability that Porcupine will be reinforced and buttressed in the days to come by a number of small mining settlements set here and there hundred of miles apart in the bush north and south, east and west of that wonderful colonizing agency, the Transcontinental

Take what we have to-day. There is a mine and a prospect at Swastika, a mine and a prospect at Larder Lake, and some prospects at Munro and Painkiller. All are worthy of investigation and the expenditure of money. So far these smaller centres of activity have not produced, but if they were all as competently managed and as comfortably financed as the Swastika is to-day, gold bars might be a daily item in the express lists. Till Porcupine demanded the attention of the mining world it was common policy to put an ex-lumberman in charge of a prospect, because he knew how to timber a shaft, or a bookkeeper, because he could check the men's time, or a railroad constructor, because he could break rock; but although a mining engineer could do all of these things he alone was not called. For many years the St. Anthony mine soaked up good English sovereigns, now under a competent engineer, it is furnishing gold bars for the Canadian capitalists who have bought it. And there are many St. Anthonys in Northern Ontario.

Before advancing to a discussion of the probabilities of mineral Northern Ontario it would be wise perhaps to establish a firm basis by detailing the probabilities.

There are many engineers of sound judgment and sane vision who are daring enough to declare that 1911 will not prove to be the peak load year of Cobalt's productivity, and that with the Nipissing mill transmuting its enormous dump piles into bullion and the advance of several other properties the high water mark of 32,000,000 ounces will be maintained and more than maintained. It is at any rate certain that there will be but a slight falling away and that Cobalt may be accounted the outstanding figure in the world's silver mart for years to come. When an eminent Scotch engineer went through the drifts of the Nipissing he saw twenty-ounce ore left in the walls and exclaimed that that was what they were producing dividends with in the West.

As Cobalt last year for the first time seriously undertook to make a profit out of her low-grade ore; when the Nipissing low-grade mill is operating it will be possible to estimate what ore can be mined at a margin of profit. Within the last year there have been alarums and excursions, in the geological world, faiths have been unsettled and judgments shaken and Cobalt has already benefited by the fresh outlook obtained to no mean extent. While the promoter and the broker serenaded Cobalt, and the public bought her stocks at many times par, the mining engineer packed his trunks for flight every time he lost values in his vein; to-day there is no longer a searching of hearts and a "firing" of men when a "face" that contained a dividend yesterday shows the worth of a few nickels to-day. The Cobalt engineer of 1912 is planning tennis courts as well as mills.

There is no reason at all why Gowganda should continue to be the Cinderella of the silver North. There are two mines there to-day, both of them privately owned and amply financed: it is most probable that if they had been exploited as the Bartlett was, they would be unproductive holes in the ground even as the Bartlett is to-day, and therein lies the secret of Gowganda's failure. If the Montreal River district is to make good it must be in the diabase; the Miller Lake-O'Brien is entirely in the diabase and at 250 feet shows more ore and better than at the hundred-foot level, and the Millerett has found no bottom to the ore in its eruptive rock yet. The Government spent $90,000 on a wagon road, over which it costs $30 a ton to haul ore. By the expenditure of another $27,000 on the road (not on the contractor), it will be possible to cut down the rate by a third and the operators who were lured out of the silver field to Porcupine will try their fortune once again in Gowganda.

Elk Lake will get its railroad, but it is to be feared that its treasures are to be found rather in the raising of the tall timothy and the pitted tuber than the production of precious metals.

South Lorrain is and always has been a one mine camp; but there is no reason why it should so remain.

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* Special Correspondent, Porcupine and Cobalt.

The probable zone of productiveness is narrow, extending along the contact between the diabase and the Keewatin. Until the Lewisohns, of New York, obtained control of the Wettlaufer mine statistics of progress were freely given and these were all favourable. The ore was high grade and in fairly continuous bodies. For the past year and a half there has been raised a wall of reticence, and as the Wettlaufer is the only mine where any effective mining has been attempted the South Lorrain camp has been almost unheard of and development has been at a standstill. There appears now to be another change of policy for monthly statements are promised. The only property that has had a chance has produced $222,000 in dividends and is on a 5 per cent. per quarter basis, with a million ounces reported as reserves. As to the future it is intimated that "another ore body has been discovered on the bottom level" and all mining men fortunate enough to penetrate beyond the reticence of the management are enthusiastic of the possibilities of the Wettlaufer. The Bellellen, after exhausting its first batch of high-grade ore, has found hope again in two shafts and half a dozen other properties discovered that smaltite veins on the surface quite frequently made good ore below before they exhausted insufficient treasuries and shut down until market conditions should be more propitious. It is reasonable to suppose that the revival in silver prospects that is surely coming will find South Lorrain a singularly opportune field. The Keeley, now under option to the Wettlaufer Lorrain Mining Company, the Bellellen, the Beaver Lake Mining Company and the Little Keeley are the more prominent prospects that have possibilities.

The future of Porcupine as the home of two large mines and half a dozen minor gold producers is almost assured. The Hollinger report placed companies in the favoured Pearl Lake zone on a firm and stable basis, and the magnitude of the Dome's preparations should instil a like confidence among those who have stock in or are financing any of these companies, who acknowledge the Dome as the sun in their heavens. When the Dome Mining Company threw up its option in the Cripple Creek country, it for the nonce wiped that section of the belt off the map as far as speculative interest was concerned; but so inadequate has been the exploration given to the outlying townships from McArthur on the south to Godfrey on the northwest, that the moss may be stripped from many a vein destined to make a mine yet. Shaw, for instance, contains claims that have so far amply rewarded the work undertaken and McArthur can show quartz with plenty of visible gold in it. There are disbelievers yet in the future of the camp among the learned; but there are to-day more real optimists among the techincal men in Porcupine to the square yard than there were to the square mile in Cobalt at the same stage of its development. Vulgarly speaking Porcupine has to produce or "bust" in the next twelve months; but there is very little expectation that there will be any explosion.

The prospective success of the Northern Ontario gold camp has warmed into life innumerable prospects and man-mangled mines all over the province. When the mills are running and the results are evident to the uninitiated, the gold fever is likely to be of a rather virulent type once more.

So far all profitable mining operations have been in the precious metals. Neither copper nor iron zinc nor lead has produced a dollar above expenses. Every fall and spring there are rumours of the discovery of a "mountain of iron" back in the bush somewhere; but there it remains despite the world's need of it. There is a deep-seated belief that sooner or later cinnabar will be discovered and confirmation is lent to this by the fact that quicksilver is undoubtedly present in some of the Cobalt ores. Unfortunately the mercury found on the gneiss boulder in the middle of the Groundhog River was placed there by the hand of man and not by Providence; but the Indian tales of the "medicine stone" found on the coastal plain of Hudson's Bay undoubtedly relate to cinnabar.

The many uses the laboratories of the world have discovered for nickel has induced a great stirring of interest in the Sudbury field, and, while the International Nickel Company will still control, it promises to have rivals. The importance of the Sudbury field is seldom realized; so rich is the ore that if an upheaval of nature were to close down the mines the navies of the world would have to suspend their programmes of construction until they were reopened or another field discovered.

There will soon be published by the Temiskaming & Northern Ontario Railway Commission a report compiled by their mining engineer, Mr. A. A. Cole, showing the consumption of farm and garden produce by the miners of Cobalt. In the deserts of Nevada and Australia the camps had perforce to import all their meats, all their vegetables for the men and fodder for the cattle in crates and in boxes and cans. Last year, directly above the La Rose vein, which has yielded millions in silver, a crop of potatoes was grown three to four hundred tons to the acre. In Casey Township the Casey Cobalt is set in the midst of a farming community, and not ten miles north of Cobalt is land that can and will produce all the food stuffs that the miners of the whole region will require. The average number of men last year employed at twelve Cobalt mines was 2021, and the average wage paid per man per year $869, so that the spending power of the miner is obvious. The miner has cash and will spend it generously for what he wants, the settler has farm produce, but not enough cash to afford one meat meal a day; the exchange is merely a matter of better intercourse and transportation. When the farming lands of Temiskaming are properly opened up every additional drill runner or mucker put on the staff of any mine in Northern Ontario should mean the widening of the market for Northern Ontario produce. The two industries exist side by side and should be mutually supporting. So the many minor scourges that exist among men depending entirely on canned foods would disappear and the settler would have an assured market.

Within ten years Northern Ontario should be able to exist irrespective of Eastern bases, the prospector blazing the road into the wilderness and pushing back the frontier, the miner digging from the rocks the specie to pay the settler, the colonist tilling the soil to feed them all, a great and mutually dependent trinity of pioneers.

MINERAL OCCURRENCES AND INVESTMENT OPPORTUNITIES

Written for the Canadian Mining Journal
by L. O. Armstrong.

[Editor's Note.—At the request of the Canadian Mining Journal, Mr. L. O. Armstrong, Colonization and Industrial Agent of the Canadian Pacific Railway Company, has given the following brief outline of the mineral occurrences along the line of the Canadian Pacific Railway. For some years the Colonization and Industrial Department of the Canadian Pacific Railway has been collecting specific data pertaining to these matters. This article, of course, is intended only as a superficial presentation. Any readers who are interested can obtain from Mr. Armstrong or from the Canadian Mining Journal much fuller details.]

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It will no doubt interest your readers to have a cursory review of the outstanding opportunities for mining investment in those parts of Canada which the Canadian Pacific Railway serves, or which are directly tributary to this line.

Nova Scotia offers us probably the best and largest gypsum deposits in North America, also many other alluring prospects and mines. Selenite, lime rock, salt springs, and iron ore are found on the Windsor and Annapolis Railway near the towns of Scotch Village, Clarksville, Kennetcook, and Truro, in a well-timbered country with ample water powers. Near Clarksville is the famous West Gore antimony mine, the ore of which carries payable amounts of gold. The clays of the country would repay close examination. They furnish a first-class industrial opportunity.

In New Brunswick are very large bodies of high-grade gypsum, granite, marble, limestone, freestone, slate, mineral and salt springs, nickel, antimony, manganese, graphite and iron ore. Galena and copper have also been discovered and worked to some extent. St. John, New Brunswick, offers many inducements as an industrial centre. From Debec Junction come interesting reports of iron, copper and coal. St. Stephen, New Brunswick, asks for an iron foundry, and tells of undeveloped nickel deposits with valuable water powers.

Crossing the boundary into Quebec, we find very interesting alluvial gold deposits with occasional gold veins now being worked in the County of Megantic, on the Chaudiere River, which has a 500 h.p. waterfall available. Springhill, Quebec, reports gold; Scotstown, copper and gold, with a good opening for an economic plant. At Eastman, asbestos is found, also copper and iron.

The Quebec Central Railroad runs through one of the best mineralized portions of the Province of Quebec. Copper, asbestos, chrome ore, iron ore, limestones, and other economic minerals found here, make it a very attractive field. The rail and water connections are good, either from Quebec, Montreal, Portland, Boston, or New York. On the north shore of the St. Lawrence, east and west of Quebec, and in Eastern Ontario, are some of the largest titaniferous iron ore deposits in the world. The Province of Quebec has large and rich deposits of this ore, enough to supply the world for many centuries at the present rate of consumption. There are rich clays and limestones along the north shore of the St. Lawrence, between Quebec and Montreal. The oldest iron furnaces in Canada are at Radnor Forges, near Three Rivers.

The water power development is already very large, and there is more power to develop on the St. Maurice River. The development of the iron industry has barely begun.

There is natural gas on the north shore of the valley of the St. Lawrence. In the Laurentian Mountains between Quebec and Ottawa, is a vast untouched territory. The few prospectors that have worked there have found magnesite, graphite, and titaniferous iron ore. Large bodies of these minerals are well situated as to railway facilities, and there is water power to be had almost everywhere.

Graphite, magnesite, and mica are found between Labelle, north of Montreal, Grenville, and Ottawa. There are extensive and rich bodies of natural phosphate (apatite) in this section of the country. The phosphate and graphite are now being worked profitably. Half a million horse-power could be developed if necessary at several points in this district.

At East Templeton there is a body of feldspar of good quality. On the Gatineau River, north of Ottawa, are mica, phosphate, gold, marble, graphite and dolomite. There are splendid water powers in the Ottawa Valley from Ottawa to Waltham, and along the Canadian Pacific Railway from Ottawa to Port Arthur, and Fort William, Ontario.

No one need be reminded about the rich silver and gold deposits in the eastern part of the Province of Ontario, at Cobalt, Gowganda and Porcupine.

The enormous peat deposits of Quebec and Ontario are being developed and may become important industrial factors. The supplies of limestones, clay, and shale for cement making in the northeastern and northern portions of Ontario, and pretty much all through Southern Ontario, are almost inexhaustible. There are large deposits of "Leda Clay" at Carleton Place, near Ottawa. Renfrew has valuable limestone deposits which are being worked. This is a fine hardwood country, with abundant water powers. At every station you will find prospectors with claims to sell. The country is mineralized very generally; but investments have been made and development done in but few places. Southeast from Sudbury, between Sudbury and Toronto, there are numerous deposits of feldspar and other economic minerals.

Of the world's largest nickel deposits in the Sudbury region, much has already been written. No visitor from abroad should go through the country without stopping off long enough to see the nickel copper

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smelters and mines of the Canadian Copper Company. A large development is taking place at the junction of the Canadian Pacific and Canadian Northern, near Romford Junction, C.P.R. east of Sudbury, by the Mond Nickel Company.

On the Sault Ste. Marie branch, which runs from Sudbury to Sault Ste. Marie, Ontario, there are very promising gold finds and silver and copper discoveries at several points. The copper mines at Massey Station are well known. At Cutler both copper and nickel have been found. North of Blind River, Thessalon, Bruce Mines, and Desbarats, are large copper veins. At Desbarats, Ontario, and on St. Joseph Island nearby, are immense deposits of white silica sands, analysis of which show it to be suitable for the manufacture of glass, for moulding sand, and for high-class white concrete.

Nature has furnished Desbarats (Wilson Channel) with a natural dock with deep water, doing away with the necessity of dredging or construction. Good cement rock, clay, and shales are found here; but on the north shore of Lake Huron and Lake Superior they are generally very scarce. Sault Ste. Marie is now a progressive iron manufacturing centre, famous for its rail mills, with large developed water power and many other industries that are worth visiting. The future of the town as a manufacturing centre is assured. Extensive deposits of iron ore on the Algoma Central and on the Canadian Pacific Railway will form the future supply of the Sault Ste. Marie furnaces for years to come.

Coming back to Sudbury and following along the north shore of Lake Superior, we find iron, copper, zinc and platinum. In fact at nearly every station one can obtain news of promising mineral claims. At Schreiber, Pearl River, Rossport, Nepigon, and Hurkett, also at Loon, Beck and MacKenzie Stations, all in Ontario, magnetite and hematite deposits have been discovered.

Port Arthur and Fort William are in an old silver mining country, in which a new and growing interest is being displayed. New developments are under way at the present moment.

Of the coal deposits of Saskatchewan and Alberta, it is impossible here to write at length. Suffice it to say that large Canadian, American and European investments have been and are being made. The coal, silver, lead, copper, gold, zinc and iron deposits of British Columbia have been dealt with so frequently in these columns that I need not touch upon them specifically. It may be well to point out, however, that the opportunities in British Columbia are not confined to these commodities. There are many chances for sound investment in the quarrying of such economic minerals as marble and limestone. (Editor's note.—Our readers are here referred to a lettergram from the Nelson Boad of Trade, which will convey a very fair idea of the variety of mineral deposits that one small section of British Columbia offers.) On the coast the natural facilities for establishing large iron and steel works are unexcelled. Fuel, flux and ore can be obtained at tide water, shipped in vessels and assembled at a suitable manufacturing and distributing centre on tide water also.

TO THE INVESTOR

LETTERGRAM

GOLD MINING IN THE LAKE OF THE WOODS DISTRICT.

Letter from the Kenora Board of Trade. R. H. Moore, Secretary.

The Lake of the Woods District, embracing two or three hundred square miles of country, only a small fraction of which has been touched by the bona fide miner, presents to-day one of the best opportunities for investigation that lie before the mining investor. The lake itself is a body of water 120 miles long by an average width of 20 to 40 miles, dotted with numberless islands. Throughout the length and breadth of the district there occur great bodies of gold bearing ores. These are found from end to end of the lake shores with surface veins in some cases running from three to as much as 60 feet in width. Assays have shown that the gold contents range from a low figure to $100 per ton. This, of course, does not represent the general average of all the veins encountered; but values running in the neighbourhood of $100 have been encountered so frequently that it is a matter of no surprise when assays show that amount.

The opportunities for systematic investigation by the mining man have never been better than they are to-day. Certain companies that are operating mines on the lake east and west of Kenora, are at the present time going ahead with the erection of new buildings, and are pushing development work. More and more miners are being required every month. The results of actual mining have in most cases been splendid in the past, and should be even better in the future. Lack of adequate funds, poor management, law suits, and cheap stock companies have all combined in the past to achieve the disastrous results that culminated in the depression of 1897. But the lesson has been of value, and the immediate future should show that this district has tremendous possibilities.

The varied opportunities offering themselves in this district are impressive. In addition to the great gold bearing ore fields spread through the entire districts, there are prospects of copper, iron, mica, and other minerals spread everywhere throughout the country. One copper prospect is situated thirty odd miles from Kenora. Samples have been taken from this particular property that have given very high results. In the spring, this prospect on which considerable work has been already performed, will be diamond drilled, and much will be learned concerning its possibilities. East of the lake, and not more than 50 miles from the shores, there is a great wedge of iron ore, one of the largest bodies of its kind discovered. It is yet entirely unworked, although very favourable analyses have been reported. The water powers lying untouched and unoperated near this ore body, present an added induce-

ment to any responsible corporation. The occurrence of these iron ore bodies is not confined to this one locality. They are to be found north, south, and east. Lack of railroads through the district is the one great handicap at present. It has restrained legitimate enterprise to a very great extent. Except along the line of existing railways, the district has received no important attention. Since the opening up of the Canadian Northern to the south of the lake, and the building of the National Transcontinental to the north, mining interests have shown a steady improvement; and while no shouting has been done about our district and its possibilities, every day adds to the number of returns from the working mines hereabout. We are convinced that our prospects deserve and will receive the attention, not only of the Canadian and American investor, but also of the Transatlantic capitalist as well.

LETTERGRAM FROM THE NELSON (B.C.) BOARD OF TRADE.

Nelson, B.C., Feb. 19, 1912.

Canadian Mining Journal, Toronto, Ontario:

Capital that is available to be applied to deep mining has an almost unlimited field for profitable investment in the Kootenay district. Hundreds of prospects showing ore in the lowest workings, afford reasonable assurance of returns if taken scientifically and systematically in hand. The majority of the operating mines of Kootenay are handicapped by the necessity of paying their own way through the development stage, instead of being at liberty to develop at depth, and leave the profits to come later. In addition to these opportunities for judicious application of capital, numerous properties that are developed to the point of deep mining, but are at present in financial straits, are available for acquisition by large mining corporations. A large class of properties that are profitable only when handled on a large scale are those in which extensive ledges of low grade ore occur. For instance, the silver lead properties of the Ainsworth Mining Division, and similar low grade deposits in the Slocan District.

Execrable management was responsible in early days for the financial failure of many first class properties, some of which are now well known producers. The Queen Gold Mine of Sheep Creek, in twelve years has produced three-quarters of a million dollars, and the Standard Silver & Lead Mine at Silverton, last year opened a width of 83 feet of clear ore on the fifth level, thus justifying the faith of the capitalists interested.

The present rise in the price of metals enlarges the range of profitable operation, and the prospects for the coming year indicate substantial increase over the recent annual output which exceed seventeen million dollars. 87 properties shipped ore last year, and the output was thirteen million dollars. The decrease was due to difficulties in the fuel situation. The supply of coke is now assured, and the difficulties have been removed. In a fifteen year period the Kootenay and Boundary Districts produced 98% of Canada's lead for that time, 59% of Canada's copper, 37% of the silver, and 20% of the gold. The Kootenay zinc industry will be developed when a commercially successful process of reduction shall have been discovered. The first steps are now being taken to exploit the lode platinum. The iron and asbestos deposits are still virgin.

American and local capital is extensively invested in this magnificent field, which, strange to say, is consistently overlooked by English and Eastern Canada investors.

H. H. CURRIE,
Sec. Nelson Publicity Bureau.

LETTERGRAM FROM THE SHERBROOKE (QUEBEC) BOARD OF TRADE.

Sherbrooke, Quebec, Feb. 19, 1912.

Canadian Mining Journal, Toronto, Ontario.

Within a radius of 40 miles of the city of Sherbrooke, there are some 65 to 70 properties on which copper has been discovered, and upon which development work has been carried out. Some of these properties have been brought to the producing stage. They are all situated on or near one of the following four railways: The Grand Trunk, the Boston & Maine, the Canadian Pacific, or the Quebec Central. All of these railroads centre in Sherbrooke. These properties were first opened as far back as 1875. At that time the low price of copper and the high cost of freight and treatment, combined to make mining operations unprofitable.

In addition to these more or less developed properties, we have compiled a list of 220 prospects. It is the belief of well-informed people that a customs smelter and sulphuric acid works established here, would be the basis of a thoroughly safe investment.

Sherbrooke is the commercial centre of the asbestos districts, from which 90% of the world's demand for this mineral is supplied. There are still opportunities for safe investment in this branch of mining.

Important operations are now being carried on in the Chaudiere valley, by which it is expected that splendid results will be obtained from gold hydraulicking. Active work will commence in the early spring. These are only three of the more important branches of mining in our district.

The mineral wealth of the eastern townships is by no means limited to these three.

CHAS. E. BRADFORD,
Sec. Board of Trade.

LETTERGRAM FROM THE SYDNEY BOARD OF TRADE.

Sydney, N.S., Feb. 19, 1912.

Canadian Mining Journal, Toronto, Ontario:

(Editor's Note.—The following very brief lettergram indicates only in a rough way the field for mining investment in the district tributary to Sydney, N.S. Our readers will appreciate what it means to the investor to be able to secure workable coal deposits on or near tide water on the Atlantic. Of the other minerals mentioned, it may be said that the gypsum trade is susceptible of wide expansion on a sound industrial basis.)

Among the openings near Sydney for the mining investor, is the chance of securing 7½ miles of coal areas 3½ miles from Sydney. Prospecting is going on at present, and one seam of coal 4 feet thick has been discovered. A body of copper ore has been partly developed at Barachois. The property covers one square mile. The vein is 16 feet wide.

Several manganese, iron, and gypsum properties are owned in this vicinity, but no data are available.

Sydney Board of Trade.

EXTRACTS FROM REPORT ON THE BRULE LAKE COAL CLAIMS

Belonging to the North Alberta Coal Syndicate.

By James McEvoy.*

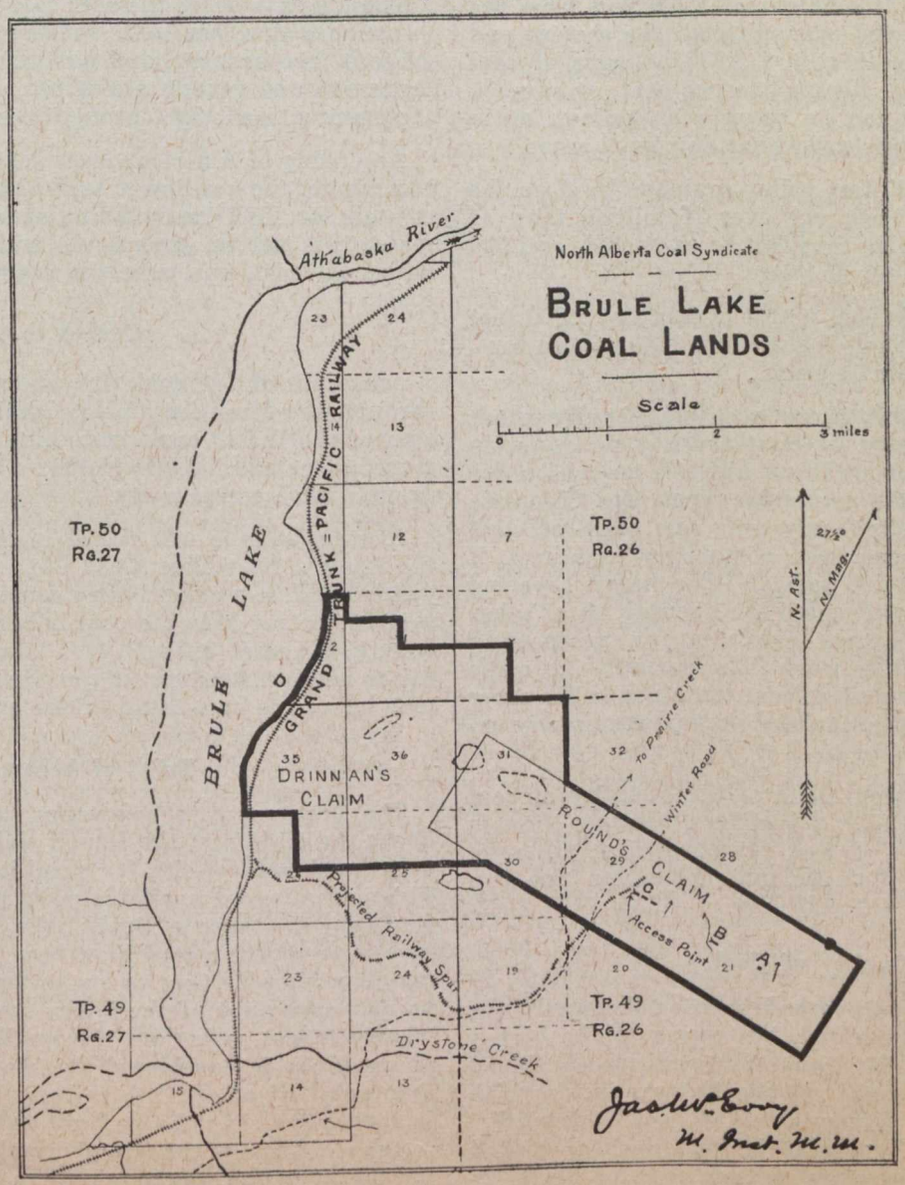
The Brule Lake Coal Claims herein referred to were discovered and staked in the interest of the North Alberta Coal Syndicate in July and August, 1910. They are situated as shown on the attached plan on the east side of Brule Lake, on the main line of the Grand Trunk Pacific Railway, and distant 197 miles westward from Edmonton. Two claims were staked, the Round claim containing 2,560 acres, and the Drinnan claim containing about 2,500 acres.

The combined length of the claims is 5¾ miles and their width from one mile to 2½ miles. Their greatest length runs with the direction of the strike of the coal, which is N. 57½ degrees W. astronomical.

It has been a matter of comment for years that no coal like the best of the Crow's Nest had ever been found directly on the line of the Grand Trunk Pacific. The reason that so many exploration and prospecting parties failed to discover it is now evident, as there were no natural exposures of the coal on the property, and the Kootanie Series of rocks which carry the high grade coals were only to be seen at one spot in the thick woods.

Geology.

The Kootanie Series of rocks referred to are the bottom beds of the Cretaceous formation and are the same horizon as the Crow's Nest coal-bearing measures. Where they come near the surface they are covered by a varying thickness of clay, sand, gravel and detritus. Their position shows them to be a part of the northeast side of the large anticline caused by Folding Mountain, and their dips to the southwest at angles of 65 degrees and over show that the measures are slightly overturned.



*Mining Engineer, Stair Building, Toronto

The underlying rocks of Jurassic Age are almost continuously exposed along the southwest side of the Round Claim for a length of 2½ miles. These are quite uniform and show no appearance of faults or breaks which is very strong evidence that the coal measures alongside will also be without disturbances.

Prospecting work uncovered a seam of coal at two points on the eastern part of the Round claim. The first or discovery point "A" being 1,130 feet and the second "B," being 580 feet above the best access point on this part of the property. These two openings show that the coal runs as expected parallel to the Jurassic rocks to the southwest. The seam is 10 feet thick, running with the length of the claim and dipping to the southwest at an angle of 65 degrees.

No section of the floor or roof rock could be seen, but where they were uncovered adjoining the coal they were both light grey shale approaching fine grained sandstone in composition. The walls were strong and even, ringing true under the hammer, and gave promise of light costs for timbering.

Quantity of Coal.

In the hill rising to a height of 1,200 feet from the point of access (C) and occupying all the eastern end of the Round claim, there are 3,200,000 tons of coal above drainage level. Eighty-five per cent, or say 2¾ million tons of this can be actually taken out, or in other words, 1,000 tons a working day for 9 years.

In a depth of 2,000 feet below drainage level on the Round claim only, there are over 16 million tons, of which, say 13½ million tons can be extracted, or 1,000 tons a working day for 45 years.

The total available coal within a depth of 2,000 feet in the Round claim alone is therefore 16¼ million tons, or 1,000 tons a day for 54 years.

In addition to this there are undoubtedly other seams on the property, at least there is no doubt in the writer's mind about it, as there is no reason for believing that in this particular spot the Kootanie series of rocks should carry only one seam of coal, when, wherever it has been completely examined, it carries 6 to 9 workable seams. The heavy covering of surface material prevented the opening up of other seams in the limited time available for prospecting work. Without further work it is impossible to make an estimate of the amount of coal contained in the other seams, but a very large tonnage may be reasonably expected.

No mention has been made of the quantity of coal on the Drinnan claim, as the surface covering there is very deep and the coal was not uncovered, although there is no doubt whatever that the seams also run through this part of the property.

Quality of Coal.

The coal when first reached was, as is usually the case, soft and disintegrated, but owing to the higher pitching attitude of the seam, this condition continued for a considerable depth. At the distance in, to which the test tunnel was driven, about 60 feet horizontally, with about 25 feet of cover at the face, the coal showed its true character for about 40 per cent. of its thickness, which was firm and well set and will yield a strong bright lump coal. The remainder of the seam was still affected by surface waters percolating through and depositing more or less earth or ash material.

The seam at the face of the tunnel was sampled in three parts, No. 1, No. 2, and No. 3, and the following are the assays as determined by the Milton Hersey Co., of Montreal:—

No. of Sample	Moisture	Vol. Comb Matter	Fixed Carbon	Ash	Sulphur	B.T.U.
No. 1...	0.16	21.46	69.46	8.92	0.65	13,679
No. 2...	0.16	19.20	67.90	12.74	0.44	13,247
No. 3...	0.09	19.99	69.87	10.05	0.38	13,726

The average of these by the proportional thickness represented by each sample is:—

Whole Seam	0.13	20.21	69.12	10.54	0.48	13,558

The colour of the ash was in each case grey.

The moisture is abnormally low, due, no doubt, to a dry condition of the atmosphere during transportation of the samples.

When greater depth is reached, the ash contents will no doubt be reduced.

These assays show the coal to be a very high grade bituminous one, but with sufficient volatile matter to make it free burning, and particularly well suited for locomotive and general steam use. It burns readily in the open with a bright orange flame.

According to American classification, this coal would come under the heading of semi-bituminous, which term is used for high grade bituminous coals. This term, however, is not in general use and would be, to some minds at least, misleading if applied to our Western coals.

Coking.

A sample of the coal was taken to Blairmore, and through the kindness of Mr. Coulthard, general manager of the West Canadian Collieries, was coked in the retort ovens at Lille. It yielded a bright coke of great strength and good porosity.

Another sample was coked in the beehive ovens of the Crow's Nest Pass Coal Co., at Fernie, B.C., and yielded a strong coke, but of somewhat darker colour, thus indicating that the coal is best adapted for quick coking in retort ovens. This is no detriment, for as far as new construction is concerned, the beehive oven may be said to be a thing of the past.

Point of Access.

The best point to commence mining operations is about the middle of the Round claim, where there is a very good natural site for a colliery yard, and plant This is the lowest available point on the property, except near the shore of Brule Lake, where, as stated before, none of the seams have been opened. As it may take considerable time to locate the seams at the latter point, on account of the heavy cover, and as it is advisable to get early into the market, the access point above given is considered the most desirable for the first point of attack. A railway spur nearly 5 miles in length will have to be built to take down the coal to the main line of the Grand Trunk Pacific. The route for this spur line was roughly located upon the ground and is shown on the plan. It will be easy to construct

and should not cost more than $15,000 a mile at the outside.

Method of Mining.

The development of the mine should be planned to keep pace with the demand for coal, but without ever forcing the mine beyond its reasonable capacity. As the demand will be small for the next twelve months, only a correspondingly small outlay on plant is all that will be required for some time.

Two main entries, a haulage way with the return airway underneath, should be driven the full width of the seam, and working three shifts a day without interruption. The airway, being underneath, can be used as a drainage level in order to keep the main haulageway in a good dry condition. The coal obtained from this work will probably be sufficient for the first six months and by that time rooms, or rather chutes, can be driven up for an increased output. In all probability, the development work can be pushed ahead rapidly enough in the coal to the rise to meet all requirements up to 1,000 tons a day, but if not, a slope can be driven to open up another lift of coal below the main level.

The coal to the rise can be lowered directly to the main level by chutes. Whether these chutes are driven straight up the pitch or on slants is a matter of opinion amongst operators, with the weight of opinion somewhat in favour of the latter in high pitching seams.

In such a seam as this large mine cars can be used to advantage, as the haulage problem is of the most simple kind and the trouble of cars getting off the track can be reduced to a minimum.

Cost of Mining.

To attempt to give figures for the cost of mining is, within certain limits, only guess-work, but even considering the present known seam alone and not counting upon the other and larger seams which may be opened up and which may yield much cheaper coal, the cost will be moderate. Some of the reasons why the cost will be low are as follows:

(a) For some years, in all probability, no hoisting or pumping will be required.

(b) The haulage system will be very simple, being confined to the main entries and leading directly to the tipple.

(c) The seam is wide enough to allow all entries to be driven without rock-work, and consequently no rock or waste will have to be hauled out of the mine.

(d) With a return airway driven below the main entry, the haulageway will be kept dry, and this means a large saving in haulage costs.

(e) The mine is well adapted for using large cars and where conditions are favourable for such cars, the cost of handling is reduced.

Unless unforeseen difficulties are met with, and there is no evident reason to anticipate them, the labour cost may be expected not to exceed $1.25 per ton.

Markets.

Until the main line of the Grand Trunk Pacific is pushed farther westward and until the portion of the line now approaching the property is ballasted and settled so as to be in good condition for heavy freight traffic, the demand for coal at this point will not be large. It should, however, be a steadily increasing demand of from 50 tons a day to commence with, up to say 300 tons daily for local consumption at the end of the first twelve months. By that time the condition of the road will be favourable for heavy shipments to more distant points.

This would be a demand most suitable for a new colliery to keep up with and at the same time push its development ahead to get ready for its normal output.

There is no coal of equal quality within the same distance by rail from Edmonton, which is the centre of a network of railways. Additional lines to radiate from the same centre are projected. Notwithstanding the lang haul of over 400 miles, practically all the locomotive coal used at Edmonton comes from the Crow's Nest district.

The market for this coal, however, will by no means be limited at Edmonton, the advantage it has over other high grade coal at this point being emphasized to show its command of the market at a large central distributing point.

Crow's Nest coal wins its way in the market as far eastward as Brandon, and this Brule Lake coal will go to the same point, and perhaps a little farther to the City of Winnipeg itself, where at present practically all the coal used comes from Pennsylvania.

There is a rapidly growing demand for a coal of this grade throughout the prairie provinces for domestic use as well as for small and large steam plants.

Not only is this coal so well situated, geographically speaking, but being on the Grand Trunk Pacific, it will have the advantage of the cheaper haulage cost over the well-known low gradients of that road.

To the west, when the Grand Trunk Pacific is finished, a large market will be opened, not only for railway and domestic use, but also to supply the needs of smelters and furnaces in the copper and lead camps of the Telkwa Country.

As the coals of the Pacific Coast are sold at a high price, and as they are of a somewhat lower grade than the Brule Lake coal, the latter will have for its market all the territory to the west to within 100 or 150 miles of the coast.

The Canadian Northern Railway is projected to pass along the west side of Brule Lake and an easy connection can be made with that line, either to the east or west of the property by a short haul over the Grand Trunk Pacific. The Canadian Northern cannot afford to use on this part of its line, coal brought from the collieries to the southeast by a long roundabout haul via Edmonton. It will be forced in its own interest to use the good coal which is at the spot. The construction of the Canadian Northern will, therefore, create a market in the same way as will the Grand Trunk Pacific.

Taking all the factors into consideration, it would seem evident that in the near future there will be a large demand for coal, possibly within three years, up to 2,000 tons a day, and eventually double that amount.

Situated as this property is in such a commanding position, it will be able to get the best of the prices prevailing.

Summary.

(a) An excellent high grade steam coal particularly well adapted for locomotives as well as for general steam use.

(b) A compact, well-selected area sufficient to cover the access points and to yield all the coal required for a period beyond which we do not need to look at present, but at the same time an area which is not unduly swelled by useless barren lands, upon which money would be wasted in rentals every year.

(c) A most desirable situation on the main line of the Grand Trunk Pacific Railway just at the edge of the mountains, with markets to both east and west.

(d) A high pitching seam with both good roof and floor, which experience in the mountains has shown will yield cheaper coal than the lower dipping or undulating seams.

(e) One seam already opened, 10 feet thick, wide enough to ensure freedom from that very objectionable item of cost, viz.: rock work.

(f) A reasonable, not to say confident, expectation of other seams being found.

(g) General conditions which permit an efficient plant to be installed at moderate cost.

I had the advice and able assistance of Mr. R. G. Drinnan in carrying out the season's work.

Respectfully submitted,

JAMES McEVOY.

Toronto, November 2nd, 1910.

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BRULE LAKE COAL MINES.

Toronto, Ont., 29th November, 1911.

North Alberta Coal Syndicate, Toronto, Ont.:—

Dear Sirs,—I herewith submit a short account of the work done on the above property during the season just ended.

Starting from Edmonton on May 15th, 1911, with a party of miners, we reached the property at Brule Lake, Alberta, on May 17th, 1911, returning again to Edmonton on November 4th, 1911.

On arrival work was immediately commenced at the two access points on the property, marked "C" and "D" on the plan, with a view to locating coal seams and tracing them along the line of outcrop. From the letters that were forwarded to you monthly, reporting progress, you are no doubt familiar with the detail of the work done and it will not be necessary to go into this matter again at this time.

So far as the work at the point marked "D" on the plan went, nothing but negative information resulted. The surface covering of sand and boulder clay was so thick and so saturated with water that we were unable to penetrate it at any point with the facilities at our command.

Altogether, twelve test pits were put down in this vicinity, varying from twenty to eighty feet in depth, and in no case did we reach bed rock.

Early in the month of August I came to the conclusion, so far as this part of the property is concerned, that sufficient information had resulted to show that at no point easy of access to the railroad would it be possible to sink a shaft to reach the coal measures without going considerably below the level of the water in Brule Lake. The only alternative would be to drive a tunnel from a point near the railroad, and at an elevation of about forty feet above same, back to where the coal measures outcrop at that elevation; and then open up by means of a slope driven in the coal seam. This tunnel might be anywhere from one-half mile to one mile in length.

Under such conditions, even if the coal measures were found to exist here with a fair amount of regularity, I do not think that it would be a suitable place for an operation. Certainly the operating costs would be higher than at the access point marked "C" on plan. This would also be the case after adding a fair amount for handling the coal on the branch line necessary to enable operations to be established at this point.

The results from the work done at the other access point on the property, marked "C" on plan, were more encouraging. Four coal seams were located in this vicinity and traced for short distances along the line of outcrop. Two of the seams found are of workable thickness, being 4 feet and 14 feet respectively. Rough levels were taken to fix approximately the position of railroad yard and tipple, and at tipple level tunnels were driven in both the four and fourteen feet seams. An upper tunnel was also driven in the fourteen feet seam about sixty feet in elevation above the main tunnel.

On an aggregate 325 feet of tunnelling has been driven on the 14-foot seam and this has shown that the seam at this point is more or less irregular in thickness, varying from 9 feet to 28 feet. A crumpling of the measures, of only local extent, however, has caused this irregularity, but that it will disappear or at least be greatly modified when the tunnels are driven a few hundred feet further, I do not think there is any doubt.

The appearance of the coal in this seam, at points passed through in the tunnel where the seam was not abnormally thick, showed it to be a good firm coal, free from impurities; and rough tests made on the ground would justify the assumption that it is a high grade bituminous coal of coking quality and with all the properties necessary for a good steam fuel.

An analysis of an average sample of the seam taken from the face of the upper tunnel, gave the following results:

Moisture at 100 degrees C....	0.02 per cent.
Volatile hydro carbon.....	20.83 per cent.
Fixed carbon	66.35 per cent.
Ash.	12.80 per cent.
	. 100.
Sulphur	0.647 per cent.

The 4 feet seam contained a number of bands of shale mixed with the coal where it was first opened up. Although these bands were not continuous, and varied in number and thickness as the tunnel progressed, still at the end of 100 feet of tunnelling no great improvement in the nature of the seam had taken place. This tunnel is also in the disturbed zone and I have no doubt the thickness and quality will improve with further driving.

A considerable amount of work was done in an endeavour to locate the 10 feet seam (found last year), at the access point marked "C" on plan. This we were not successful in doing, as the point where it should outcrop is in wet ground and the water in the test pits prevented bed rock being reached. We traced this seam, however, from the point marked "B" on plan, about one-half mile down the hill along the line of outcrop, but from there to the point "C" the cover proved too heavy for work of this nature. Over the area on which the 10 feet seam was traced the measures were very regular and show that the disturbed zone at the point "C" does not extend that far.

After finding the 14 feet seam, and locating it at the access point "C," most of the work thereafter was confined to developing this seam to some extent, in order to find out what underground conditions were likely to be. So far as it went, this information was favourable to cheap underground operating costs. The seam lies at an inclination of 65 degrees from the horizontal, steep enough to allow the most economical methods of working to be adopted. The coal itself is easily mined without the use of explosives, and the rate to the miner should not exceed 55 cts. per ton. The haulage and maintenance costs will not be high and when an output of 500 tons per day is reached, the total cost should not exceed $1.50 per ton.

In estimating the amount of coal available for mining, on the property, I have confined my estimate to the 14 feet seam and to that portion of the property lying between point "C" and the eastern edge of the property, a distance of about 2 miles. In this area there is above water level about 3,500,000 tons of coal. Below water level to a depth of 2,000 feet, there is fully 10,000,000 tons of coal available. Taking the full amount estimate, viz.:—13,500,000 tons and assuming an average of 270 working days per year, there would be sufficient to maintain an output of 1,000 tons per day for 50 years from this seam alone.

As the property stands at present I would say that the work done has yielded sufficient information to justify the installation of a small plant for the operating of the 14 feet seam at the point marked "C" on plan. The question of the existence of a sufficient quantity of coal on the property, of the quality of the coal, and of the cost of production, has been, to my mind, satisfactorily established, and therefore the property is now in shape for development and operation.

In figuring on a probable market for the product of the mine, the strategic position of the property plays an important part. It is situated at the entrance to the Yellowhead Pass through the Rocky Mountains. Through this pass, to-day, two transcontinental railroads are being built. On both sides of the pass there is a vast territory, being opened up by these railroads, as yet only in the first stages of settlement and development. As all the railroads already built or likely to be built to serve this new territory must converge at this point to pass through the mountains, it places the property in direct communication with a very extensive market. No large area of coal lands containing this grade of coal is known to exist close enough to this new territory to rank as a competitor. The only competition, therefore, will come from other collieries opened up in the Jasper Park coal field. With such a large territory to serve, extending into Saskatchewan on the east and British Columbia on the west, a good market is practically assured for all the mines that could be opened in this coal field.

To connect the colliery, which would be located at the point "C," with the main line of the G.T.P. Railway, a branch of 5 miles in length will have to be constructed. This branch line, so far as I can judge, would not be a costly line to build, and the grade would not be excessive for this class of railway.

Yours faithfully,

ROBERT G. DRINNAN.

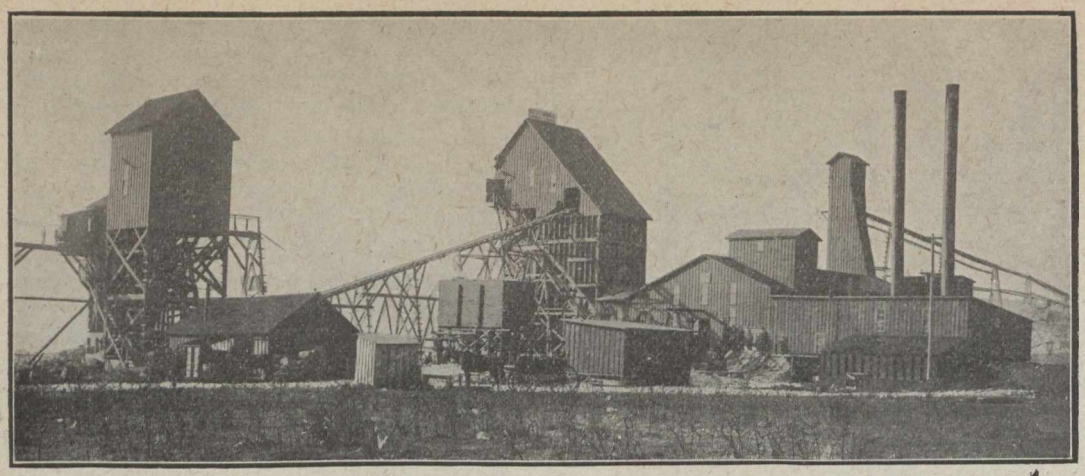
MINING AND MILLING IN THE JOPLIN DISTRICT

*Written for The Canadian Mining Journal, by J. J. McLellan, M.E., Webb City, Mo. Photographs by E. A. Collins, B. Sc., Mining Engineer, 104 Metcalfe St., Ottawa.

The mines in south-west Missouri, south-east Kansas and north-east Oklahoma, may be divided into three classes.

First, the soft ground mines, among which will be included those mines in which the ore, whether blende or galena, is contained in mud which fills the cavities and interstices between the boulders, usually flint, that go to make up the ore body. The ore frequently occurs in large masses, completely filling the spaces between the boulders and in some cases even completely surrounding them. The usual occurrence is in crystals varying in size from minute particles to large masses weighing several hundred pounds. These deposits vary in size from small "pockets" containing a few tons, to larger "bunches" extending over several acres, frequently interspersed with barren "ribs." The hardness of these deposits varies with the length of time the ground has been drained, from very soft, running ground, requiring careful timbering, even that "spiling" be driven ahead in roof and sides, while in other cases, by careful work, most of the ore can be removed without timbering, as it is possible to cut drifts from fifteen to twenty-five feet wide, that will stand long enough to mine out the deposit. Frequently these ore bodies are quite rich, and are very profitable despite their small extent, occasionally running as high as fifty per cent. blende and galena.

The second division will include harder deposits of disseminated ore, which are frequently adjacent to and occasionally underlie the soft ground deposits. From a financial standpoint, these are our most profitable mines, for while they do not average so rich as the softer deposits, they are frequently of considerable extent, sometimes covering more than an acre, and having a thickness of over one hundred feet. These depo-



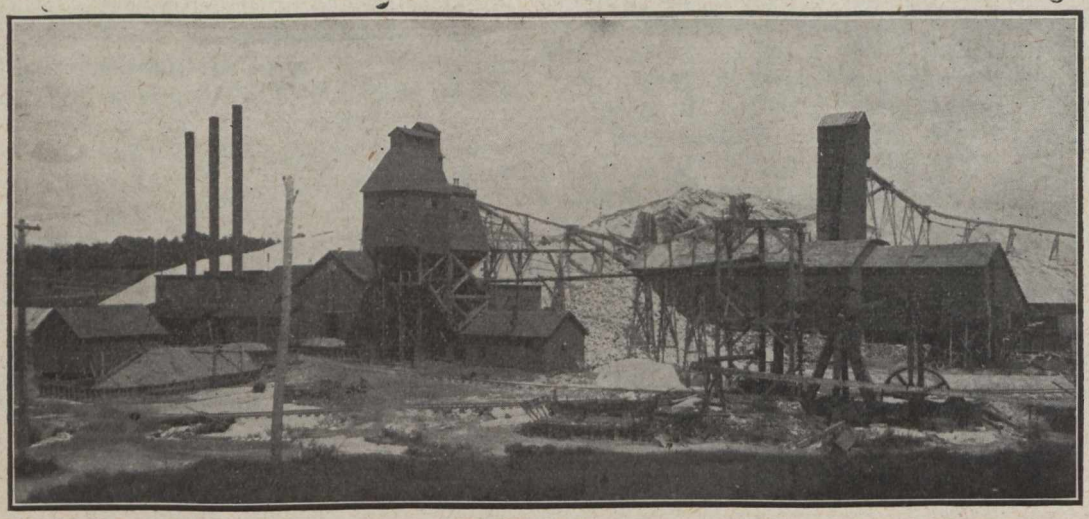
Red Dog Mining Company Plant

sits vary in richness up to ten, and in rare cases as high as twenty-five per cent. of ore.

In the third division will be considered what are commonly known as "sheet-ground" deposits. These are the deepest deposits as yet worked at a profit, and in them the typical form is a horizontal or nearly horizontal stratum of ore-bearing flint from six to twenty-six feet in thickness, the average being between eight and ten feet. These deposits are usually found under mines, where the amount of capital invested need not be so great, though the cost of locating a profitable mine is quite likely to be very much greater.

Breaking the "Dirt."

Little need be said of this feature in soft ground, as it is largely a matter of using a pick with energy, and occasionally "spudding" some holes into the heading or stope to be shot with from one to two pounds of



Mill on Soft Ground Formation

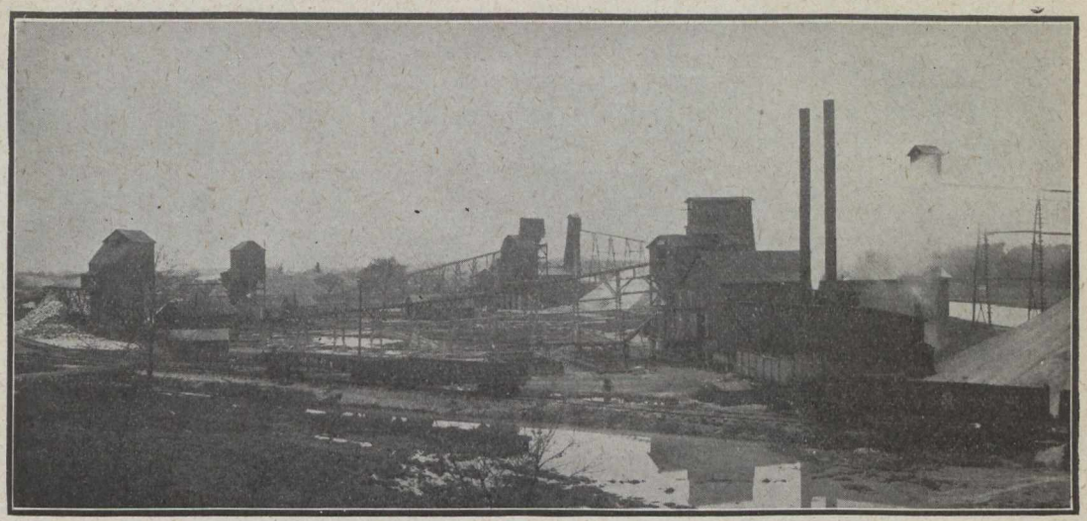
a considerable thickness of limestone, and have limestone below them; they are the leanest as well as the deepest that are commercially available. As a rule they are unprofitable when ore (blende) recedes to a forty dollar basis, which is a fair price when spelter is 5.20 St. Louis. These deposits average quite large and in numerous cases have been mined out over areas exceeding forty acres in extent. During the years 1906, and preceding the panic in 1907, when the price for blende ranged from $45 to $50 basis, there was very large investment in sheet ground mines which were unprofitable during the period following the panic, when prices ranged between $34 and $40 per ton, only exceeding $40 for a few periods of short duration. On this account sheet ground mining has fallen into ill repute as an investment and recent developments in the district have been in the direction of soft ground dynamite. In some mines which are quite dry, it is profitable to use air drills and mine in much the same manner as in the disseminated deposits. In the disseminated ore bodies the top of the ore is mined out first and then the lower portion by successive understoping. When the whole ore body is mined from one level it is usual to carry a heading of seven or eight feet and then to carry successive stopes of from eight to ten feet each. It is common practice to mine only the upper part, say thirty feet, of the ore at one time, and in case the ore body has greater depth, a second or third stope follows until the bottom of the deposit is reached. This custom is partly due to drainage difficulties, partly to the fact that most of the properties have quite limited capital for development, and must begin producing as soon as possible.

The pillars are left in thin ground as much as pos-

sible and frequently are much too far apart for safety. Some of these mines have air drills, almost invariably 3 or 3¼ inch piston drills. Some of them still use hand drills, the men working in pairs. In some mines "snake holes" abound and are of considerable assistance. "Snake holes" are cracks or interstices among the boulders, either water courses or merely cracks that have not been entirely filled by deposition.

The sheet ground mines require air drills for their successful operation. Where the thickness of ore does not exceed twelve feet it is usual to work the whole face from a column. Each pair of "machine men" is expected to drill a round each day, a "round" is usually four holes, but in some cases where the equipment is first class and the rock not too hard, five holes are required for a day's work. The depth of hole is usually equal to the height of face and the average footage per drill is about forty feet. Where the height of face exceeds twelve feet the common practice is to carry a heading of seven or eight feet and carry the remainder of the ore as a stope. The stope holes are drilled from the floor of the mine and as flat as possible, the dip rarely exceeding ten degrees. One drill on a tripod will keep up stope for from six to ten drills in the heading.

The spacing of pillars depends upon the particular mine under consideration, as some mines require pillars every thirty feet, while others are safe with sixty foot spacing. The pillars are usually staggered so that there shall be no lanes in which the roof (usually a stratum of soft yellow flint about six inches thick, more or less firmly cemented to other similar layers or to the limestone above), can not fall over any great area, without a pillar to catch the "slab." These slabs are frequently posted when they are suspected of having pulled loose from the rock above.

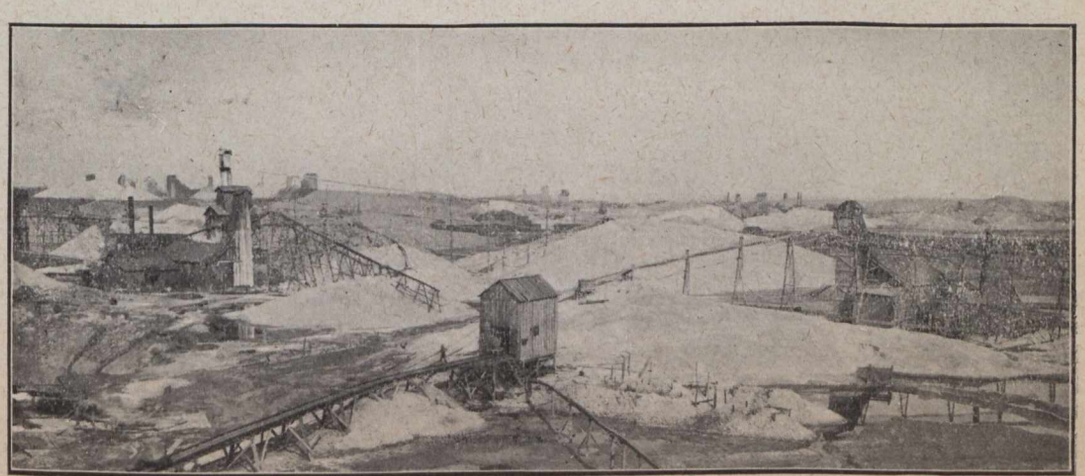


Typical Mill With Incline Tramway

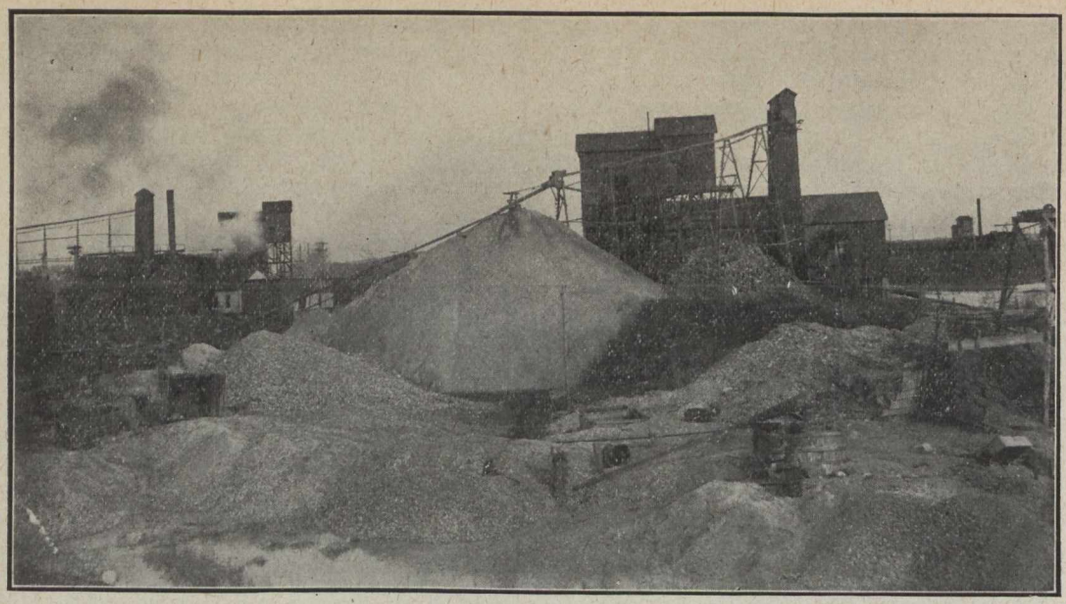
It is usual to use about fifty pounds of forty per cent. dynamite to the round, and a round will break from twenty to sixty tons, depending on the height of face. The holes are nearly always "squibbed" with from one to two pounds of powder to make a "pocket" at the end of the hole so as to confine the charge at the point of greatest efficiency. Stope holes are often squibbed more than once with successively larger loads, until the pocket will hold more than a hundred pounds; such a hole will break as much as two hundred tons of dirt.

Mucking and Tramming.

The mucking is done by hand labour, most often as piece work. The ore is loaded into cans or cars holding from ten to twelve and one-half cubic feet. The cans set on small cars, with eight inch wheels, which run on a track of eight or twelve pound rails, with from fourteen to sixteen inch gauge. The shoveller



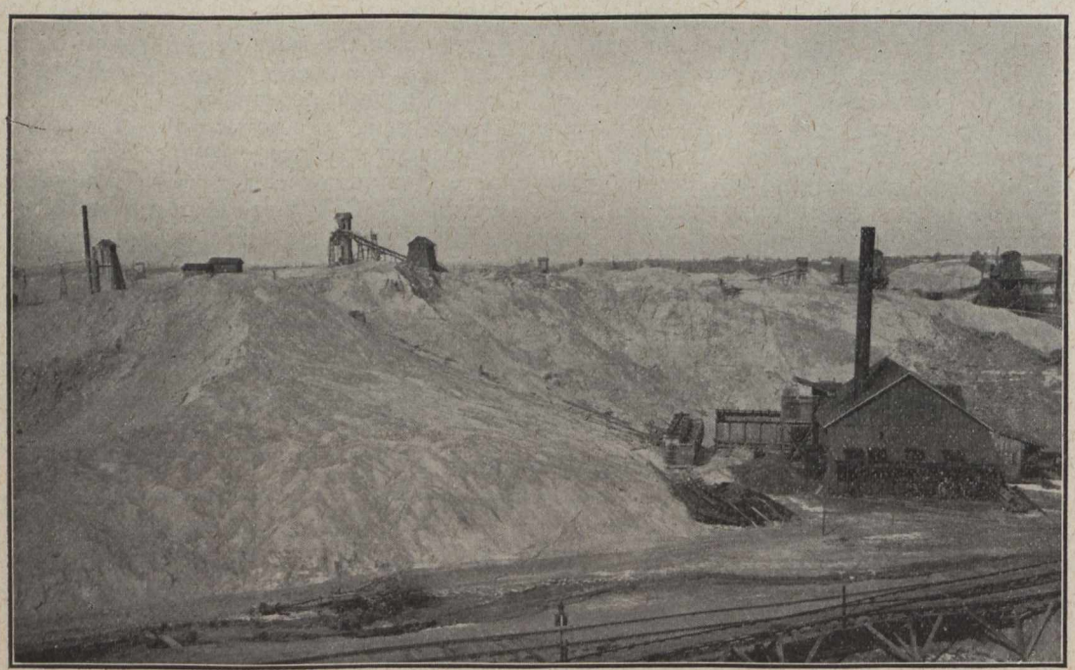
General View of Webb City



Typical Mill on Sheet Ground

usually pushes his can to the shaft, but where the "run" exceeds two hundred and fifty feet, it is common practice to run to a lay-by from which point the cans are taken to the shaft by a "mule" either two or four-legged, this depending on the mine. The four-legged mules will haul from two to eight cans to the trip and bring back as many empties. When the height of face exceeds sixteen feet it is common practice to furnish boards to the shovellers, these boards are of two inch oak plank twelve inches wide by ten to twelve feet long. Where cars are used, they are either dumped into skips, in which case they are of about the same capacity as the cans, or are pushed onto self dumping cages and are much larger.

Underground runs are comparatively short, for when the distance from the shaft grows troublesome, it is common practice to sink a new shaft, equip it with hoister and storage hopper and connect it to the mill hopper with an inclined tramway. This practice is frequently economical, for the shafts are usually five by seven feet, less than two hundred feet deep and are sunk and timbered for from five to fifteen dollars a foot, depending on the nature of the ground. One important advantage is increased hoisting and storage capacity.



General View Showing Tailing Pile

Hoisting.

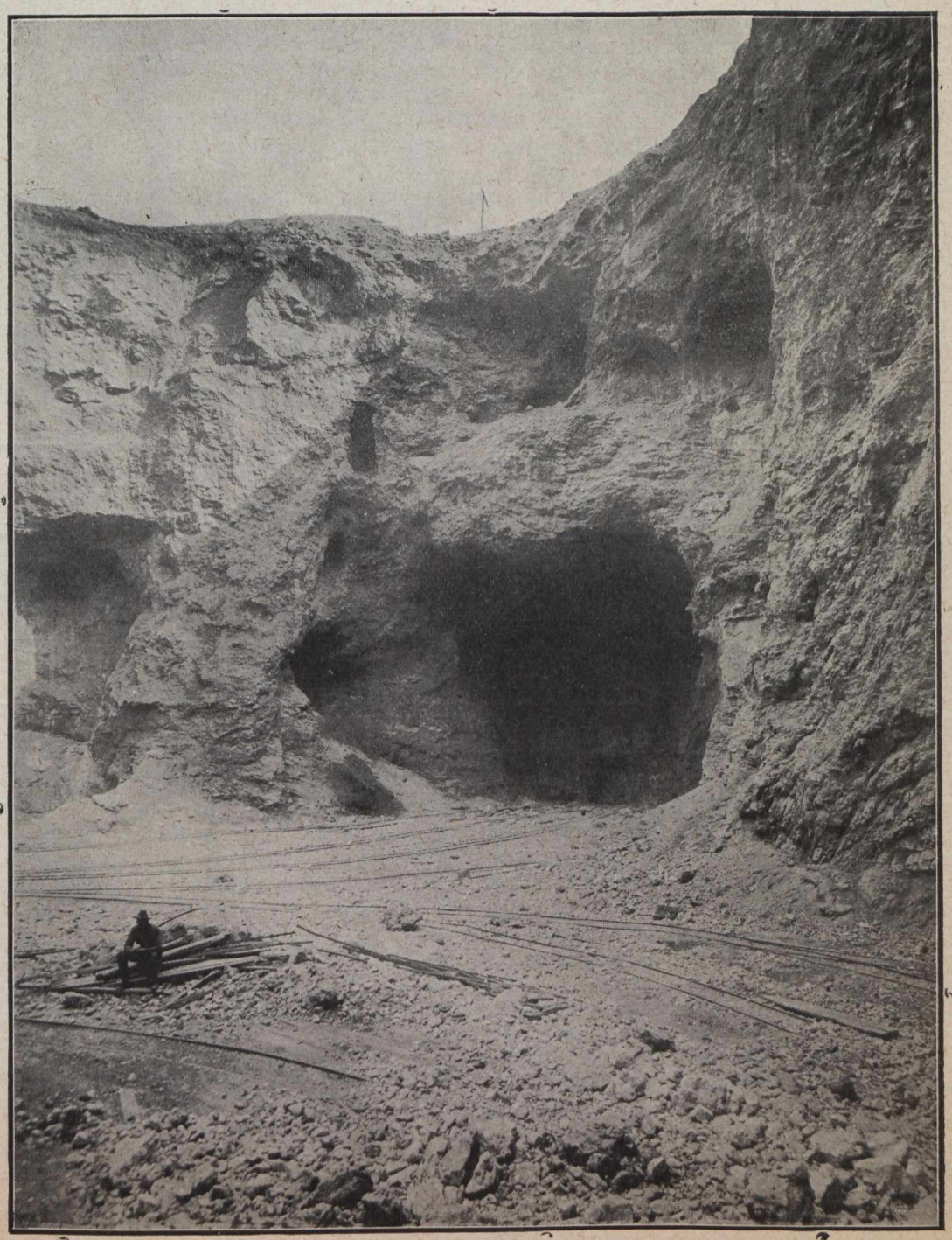
The hoisting is usually done with small geared hoists. The common type of hoist has an eight by eight, or eight by seven, upright engine, geared to a twenty inch drum. The cable is usually five-eighths inch, though half-inch is occasionally used. The "tub-hookers" and

hoistermen have become quite expert and it is quite common to hoist six hundred cars, each containing a half ton of dirt, besides handling the men and the sharp and dull steel; for the blacksmith shop is almost invariably on top, in an eight hour shift and with a total pull of about two hundred and forty feet. The record for the district is over nine hundred cars with such a hoist.

Recently a hoist with two eight by fourteen vertical engines direct-connected to a twenty inch drum has been put out by a local firm, and with it the record has been raised to ten hundred and thirty-five cans for a total pull of three hundred feet, in an eight hour shift. With such a hoist the writer was able to attain an average of forty one hundred cans per week (six eight hour shifts to the week) for twenty-three consecutive weeks, besides handling men and steel.

Concentration.

In discussing the concentrating mills we will consider only the larger plants typical of the sheet ground mines, as the other plants built for the short lived soft ground mines are comparatively small and incomplete. The dirt from the hoister is dumped upon a grizzly, usually made of steel rail with a flange planed to a width less than the ball of the rail. The separate bars are drilled at each end for a three-quarter inch rod and the bars are held apart by gas pipe washers. The ball of the rail is placed up and the bars are spaced from four to eight inches depending upon whether the drift breaks coarse or fine. The large boulders are culled, and those

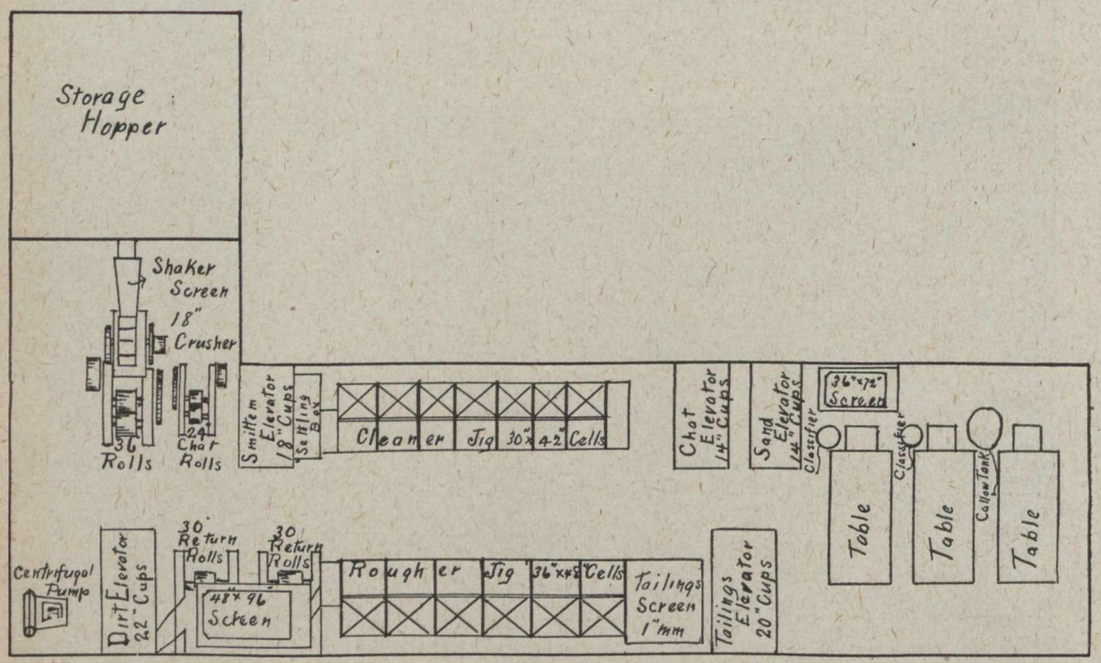


An Example of Soft Ground or Pocket Formation

containing ore are broken by cull hands; one cull hand will ordinarily handle about three hundred cans in an eight hour shift. The storage hoppers which receive the dirt vary in size from one hundred to five hundred tons.

The dirt is fed by a crusher-feeder, who operates a gate by means of a rack and pinion. There is frequently a shaker screen, usually one inch mesh, which is suspended and shaken by an eccentric. The over size from the screen goes to a jaw crusher and is crushed to about two inches, thence to Cornish rolls and then to a dirt elevator which raises the product to a revolving screen usually one-half inch mesh. The oversize from the screen returns to other Cornish rolls and thence to the dirt elevator and to the screen again, while the undersize goes to the rougher jig.

The rougher jig is generally a six compartment affair, with thirty-four by forty-eight inch cells. The rougher discards from seventy-five to eighty per cent.



of the waste and gives an efficiency of about eighty per cent. and partial concentration of ores that carry less than five per cent. blende and galena; in richer ores the efficiency is much greater. The bed draw-offs are operated by the attendant jig-man, except the last two, which are commonly allowed to draw continuously. The product from these last two, along with other bed products not clean, and the hutch product from the last cell, go to the chat elevator. A chat is a piece of ore more or less firmly attached to or surrounded by the gangue. The chat elevator delivers its load to the chat rolls, for further grinding, and then it goes to the dirt elevator for another trip over the rougher.

The hutch product from the first five cells of the rougher is called smittem and goes to the smittem elevator and thence to a dewatering tank and to the cleaner jig. This jig usually has seven twenty-eight by forty-two inch cells. Where there is galena in the ore the first two compartments are used for it, the first to clean it and the next for the zinc-lead middlings, which latter are returned to the smittem elevator. Occasionally where the galena is in considerable quantity the first three cells are used, two to clean and the third for the contents exceed the lead. The jigman also attends to the regulation of the beds on the cleaner, the clean ore goes to the bin for concentrates, while the chats go to the chat elevator. The hutch product goes to the bin also, except that from the last cell which is usually returned to the smittem elevator for another trip over the cleaner.

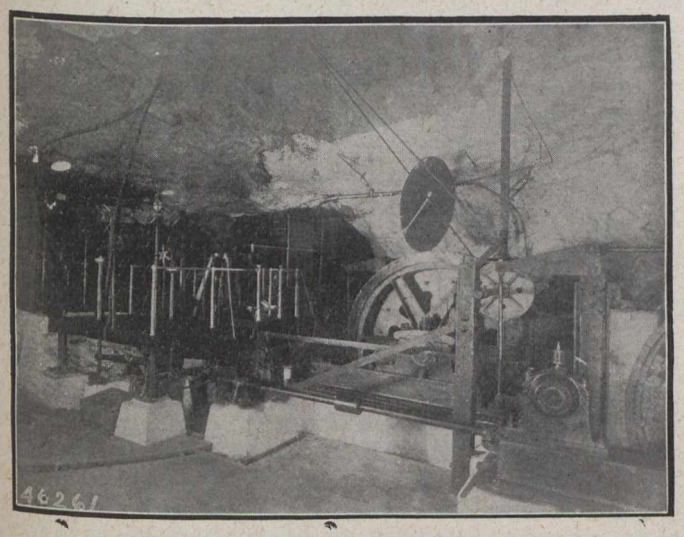
In a few of the mills the chats are put through a one-eighth inch screen and sent to a chat or sand jig, which may be used as either a rougher or a cleaner or even both, by cleaning on one or two cells of it, and roughing on the others. Where the ore is very chatty this is good practice.

The tailings from the rougher are partly dewatered, in the best practice screened of their fines, and sent to a tailing elevator. The fines from the rougher go to settling tanks or thickeners, from the thickeners to a sand elevator and thence to tables after screening out the product above one millimeter, which coarse stuff is usually sent to the chat elevator. All of the tailings from the cleaner are settled and undergo the same middlings, but this is not good practice where the zinc treatment as the fines from the rougher. The milling practice of the district can be greatly improved in its methods of treating its fines, there are very few slimers, and a comparatively smaller number of plants have adequate settling and classifying capacity; in fact, very few have sufficient table capacity to treat what fines they attempt to handle.

A floor plan of a typical three-hundred ton Missouri mill (three hundred tons in ten hours), along with some photographs of plants and workings are shown.

ELECTRIC POWER FOR UNDERGROUND WINDING AND HAULING ENGINES

Owing partly to the great depth at which mining operations are now carried out, and partly to the distribution of the mineral, winding and hauling engines have frequently to be installed underground. Such engines range from the small single drum haulage used for pulling tubs up an incline, to the large double drum winding engines used in South African gold mines when the ore is being worked at too great a depth for hoisting to the surface in one stage.



General View (Interior). New Heriot Gold Mining Company

In the early days of mining, hand winches were used for raising mineral in subsidiary underground shafts, whilst boys on ponies were, and in many cases still are, used to transport the material. In the majority of cases, however, the necessity of increased outputs led to the introduction of steam engines for haulage. This made it necessary for the steam raising plant to be installed underground, or the steam had to be taken down the main shaft from the plant at the surface. In both cases difficulties had to be overcome, for either the condensation losses were enormous, or else exceptional care had to be taken in the arrangement of the boiler flues, especially in the case of coal mines. In spite of these drawbacks, steam haulage has had a useful career, and even now is doing good work.

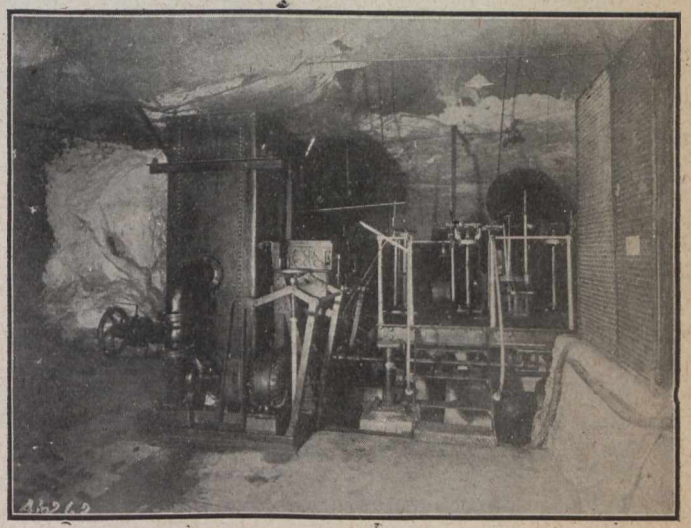
In deep mines, where steam could not readily be operated underground, compressed air was tried, with varying degrees of success. Certainly there were no condensation losses, as with steam, but other serious troubles had to be faced. The system was uneconomical unless pre-heaters and inter-heaters were used in conjunction with compound engines. Exhaust valves and ports would freeze, and altogether it has been found that, no matter how well designed or arranged, compressed air equipments are not ideal for underground winding or hauling engines.

During the time that the above mentioned developments were taking place, electric power was quietly making headway. Only a short time elapsed between its introduction as a source of motive power and its application to haulage. Some mistakes were made at first, totally unsuitable motors and control gear were used, but still the results were not entirely unsatisfactory, and steady progress has been made until to-day electricity is practically the only power to be seriously considered by the majority of users of underground work.

Steam and compressed air haulage are being ousted from their positions, there being many cases on record where engines of these types have been converted to the electric drive, or replaced by entirely new electric engines. Wherever new equipment is required, arrangements are usually made to install electrical apparatus.

Perhaps the greatest field for underground electric winders is among the gold mines of South Africa, for it is there that the greatest developments have taken place in deep level mining. The final depths to which the gold mines will be carried can scarcely be predicted. Even now mines exceeding 4,000 feet in vertical depth are preparing to extend their operation for an additional 5,000 feet. This of course entails winding in two or more stages since the limit of depth for one engine is in the neighbourhood of 8,000 feet.

Although not designed for such great depths, nor for an extremely great output, the underground electric



Controller and Driver's Platform. New Heriot Gold Mining Company

hoist at the New Heriot Gold Mining Co., Ltd., Denver, Transvaal, is very interesting. The service for which it was designed is:—

Depth of shaft, 1080 feet.
Incline, 45° to horizontal.
Weight of rock, 5,000 lbs.
Weight of skip, 3,000 lbs.
Weight of rope, 1,840 lbs.
Maximum speed, 2,000 feet per minute.

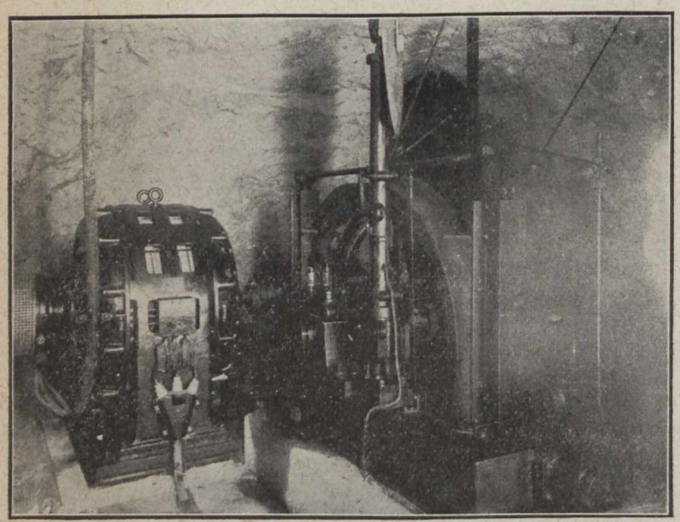
All parts of the hoist were designed to pass through an opening 7′ 8½″ x 3′ 6″, so as to permit it to be taken underground and along a drive some half a mile long. The approximate general arrangement of the hoist in its station underground is indicated in the view shown

in Negative 9125. From this it will be seen that the headgear and ore bins are cut out of solid rock. The mechanical parts of the hoist such as drums, bedplate, gears, etc., were supplied by Messrs. Robey & Company, Limited, through the British Westinghouse Electric & Manufacturing Company, Limited, who supplied the entire electrical equipment.

There are two winding drums, each 6 ft. in diameter and 3 ft. wide, arranged in tandem, but displaced sideways in relation to each other, so as to obtain a good lead from the sheaves. The drums are driven through single reduction double helical cut gears at a ratio of approximately 3:4:1, by means of a 500 B. h.p. (1250 h.p. maximum), 2,000 volt, 3-phase, 50-cycle, 375 r.p.m. slip ring induction motor, which is shown in Fig. 2 (B. 9124).

The speed and direction of rotation of the motor are governed by the liquid controller shown in Fig. 3 (B 9114). The controller is of the type usually supplied for winding engines, the resistance liquid being continually circulated over cooling coils by means of a small centrifugal pump, and the resistance in the rotor circuit varied by altering the depth of immersion of the iron electrodes connected to the slip rings. The reversal of the motor is carried out by two independent three-pole oil switches, either one of which can be closed at a given time, but not both at the same time.

Fig. 4 (B 9125) shows the driver's platform, and its arrangement in relation to the drums.



500-h.p. Hoist Motor. New Heriot Gold Mining Company

At the rear of the platform is the main switchboard, equipped with an overload release oil circuit breaker, with inverse time limit relay, and integrating watthour meter and an oil circuit-breaker for a small transformer, used to supply power at a low voltage to the small pump motor on the controller, and other auxiliary apparatus. The main oil circuit-breaker is arranged to be mechanically tripped from the emergency device seen in front of the driver's platform, in case that device should for any reason fail to act.

The emergency device is designed to drop heavy weights automatically across the foot brake levers in the event of over-winding, failure of power supply, or any other contingency necessitating sudden and powerful braking. A lever is provided on the platform so that the driver can operate this emergency device should it be necessary.

While the hoist described is representative of the best modern practice, it is but one of the many to be found in the South African Gold Fields, either in successful service or in course of erection. Among the largest are four recently ordered from the British Westinghouse Company for the Jupiter Gold Mining Co., Ltd. Each of these winders has two drums 10 feet 7 inches in diameter and 4 feet wide, designed to haul a rock load of 1,200 lbs. at 2,000 feet per minute, for 4,500 feet, up an incline of 38 degrees to the horizontal.

THE DEVELOPMENT OF FINE GRINDING IN CONNECTION WITH GOLD ORE TREATMENT

By Henry Hanson.*

Some years ago the stamp stood practically alone as a fine grinder where wet crushing was used, but of late years the tube mills and grinding pans have made great inroads upon the former work of the gravity stamp and to-day the stamp is being relegated to the position of a primary crusher.

In the old school the ore was reduced to a fineness where it would give up its gold to the quicksilver. The subsequent cyanide treatment of the plate tailings, if any, was largely confined to the sands, the slimes being avoided instead of sought.

The circumstances leading up to the first successful attempt at fine grinding on a large scale may be summarized as follows:

A telluride sulphide ore of an uncommon type, rich in gold, did not yield its values by the ordinary method of treatment. Smelting under the conditions obtaining at the time was economically unprofitable, as only the very high-grade ore could stand the cost. Experiments with a view of treating the bulk of the lower grade ores of the Kalgoorlie mines were carried on, first by roasting the whole product after crushing, secondly, by wet crushing and concentration, roasting of the concentrates, leaching of the sands and filter-pressing the slimes.

* Metallurgist, the Dome Mine, Porcupine, Ont. Paper read before the Porcupine Branch of the C.M.I.

The results obtained were in no way satisfactory.

At this juncture the London Hamburg Gold Recovery Company, Limited, had completed the Hannan Brown Hill mill, which was designed for the treatment of oxidized ores, being a dry crushing plant, followed by leaching the sands and filter-pressing the slimes.

Dr. Ludwig Diehl, who was the metallurgist for the London Hamburg Gold Recovery Company, Limited, and who made the Hannan Brown mill a success, was then induced to turn his attention to the treatment of telluride sulphide ores. After a series of experiments, Dr. Diehl determined that by grinding to a fineness not previously attained, the gold could be satisfactorily recovered from the raw ore. The problem then was to find or develop some machine that would satisfactorily and economically reduce the ore to the fineness required. Pans were tried, but did not give the product desired. The tube or pebble mill that was so extensively used by cement manufacturers, was adopted by Dr. Diehl as a fine grinder.

The first mill of this type was installed at the Hannan Star mine, Kalgoorlie, by Dr. Diehl. It was such a success that when the Hannan Brown Hill Company, controlled by the Bewick Moreing, reached the telluride sulphide zone, it was decided to erect a stamp mill with tube mills used as secondary grinders. Since then the tube mill as a fine grinder has found its way to all important gold and silver bearing ore deposits in the world.

Much may be said as to the further field for the tube mill. There are still possibilities of carrying on fine grinding to a greater point than is yet reached, but it is impossible to establish any arbitrary rule as to the point to which fine grinding may be carried on with an economical success.

The additional recovery obtainable by reducing the ore to a fine state of division varies greatly on different ores and on different grades of ores and it always becomes a question of whether the better percentage of extraction will compensate for the additional cost of reducing the ore to a slime and offset the possible higher treatment cost of a slime product. The relative initial cost of a sand and a slime treatment equipment and the expense entailed in making changes in plants already in commission must be considered. In fact it would require a careful weighing of the many phases of the problem by each mine before making a decision in the matter, but as cheaper power is coming into use and better facilities for handling the slime are offered by the various filters, I am more and more of the opinion that the field for the tube mill will be greatly broadened in the near future.

The tube mill is a simple and efficient machine with the operating details well worked out. It may, however, be possible to run two mills in tandem, each mill of suitable size and design for its particular class of work, the product of the first tube being delivered to a classifier where the fines are thrown out and the oversize fed to the second mill for further grinding. This scheme, so far as I know, has never been tried out where the tube mills were designed with a view of handling the two products. No data is therefore obtainable. Yet it would appear that such an arrangement would be much simpler than the introduction of different type machines such as rolls or Chilian mills between the stamps and tube mill.

The tube mill has been used very little where a product passing a 35-mesh screen was considered fine enough. Here the stamps have mastered the situation. It may not be economical to use the stamps and tube mills jointly to obtain a 35-mesh product, yet, with the present facility for fine-grinding, experiments along this line should prove valuable. In some instances, I believe it would be good economy to increase the stamp duty by using coarse screens and regrinding the resulting product in tube mills, even though this made it necessary to put some of the stamps out of commission. Whenever the stamp is followed by the tube mill more elasticity is obtained, for it is an easy matter to keep a plant in balance and obtain the desired product when a change in the screen practice at the stamps results in a corresponding change in the final product from the tube mill.

In other words, when the stamp and tube mill are used jointly it is easy to determine whether the complete sliming of an ore increases the net profits or not. On ore where complete sliming is not economical, it is quite possible that it is good practice to reduce the ore to a fineness which gives a greater percentage of slime than can be economically obtained in a single stage stamp reduction.

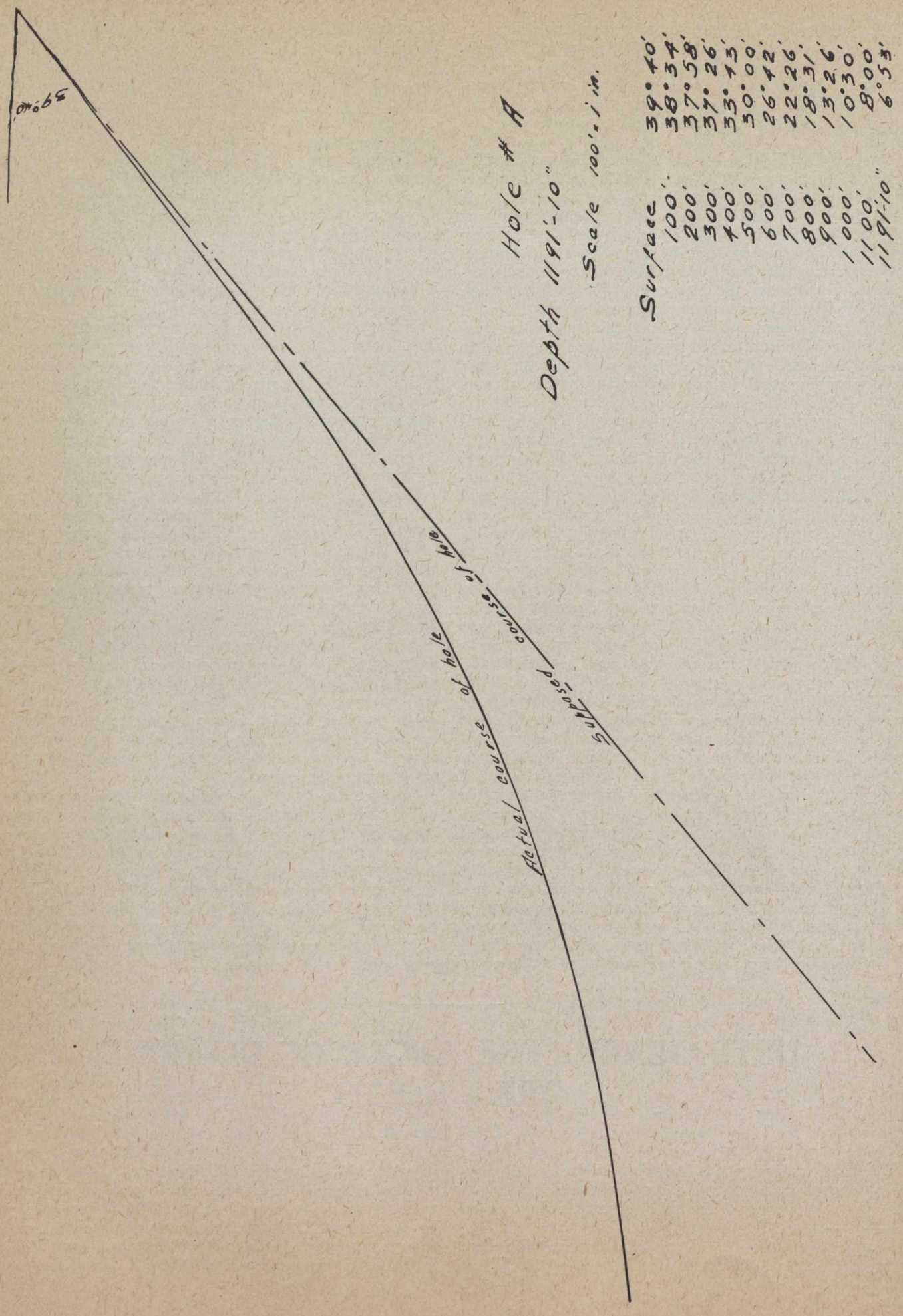
On the Rand, where stamps are followed by tube mills without "all-sliming," the standard of fineness has been brought up to 90-mesh, instead of 60-mesh as formerly, the additional recovery obtained fully justifying the increased cost of fine grinding. If it was economy to increase the fineness of the final mill product on the Rand where power is high as compared to mining districts where water power is available, it is reasonable to suppose that fine-grinding machines have still a field to cover.

DETERMINING THE ANGLE OF DIAMOND DRILL HOLES

By G. C. Bateman.*

Diamond drilling in the Porcupine district has played an important part in the determination of the extent and character of the ore deposits, although on account of the irregular distribution of the gold, the results obtained must be considered as indicative, rather than conclusive evidence of the values that may be obtained with depth. In many parts of the world the surveying of diamond drill holes has been brought to an exact science, but as far as I am aware, little

* Mining Engineer, the Dome Mine, Porcupine, Ont. Paper read before the Porcupine Branch of the C.M.I.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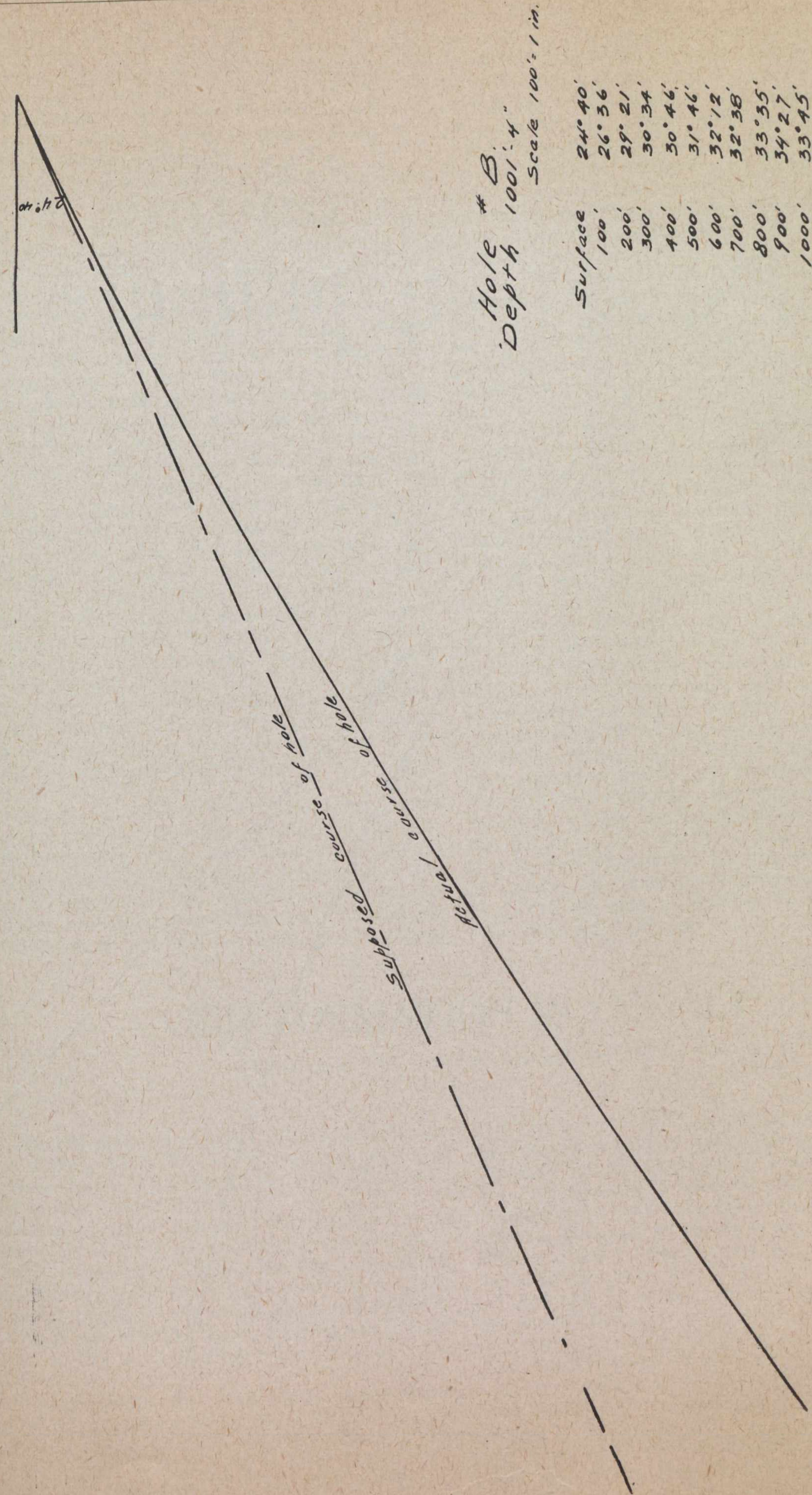
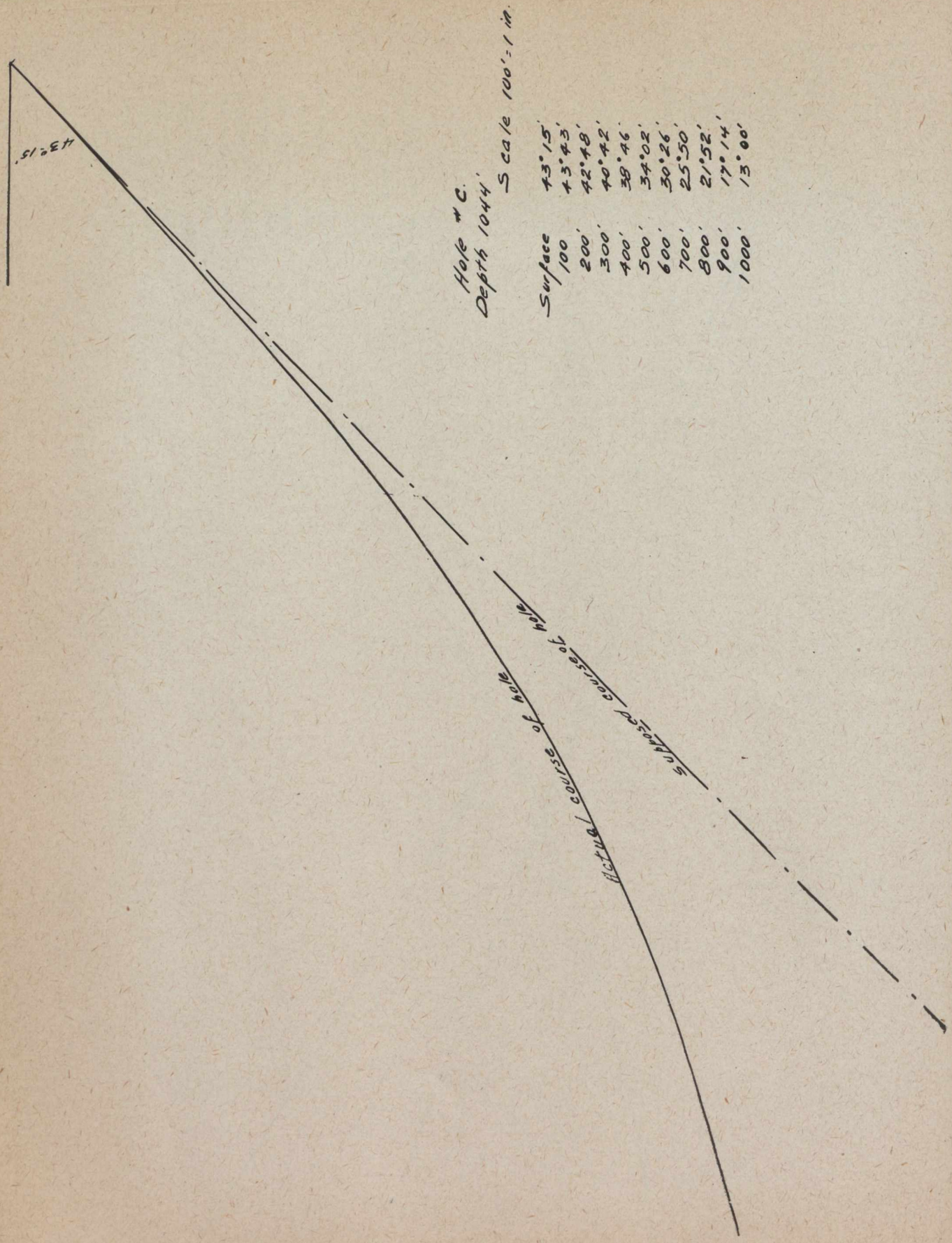
Depth 1191'-10"
Scale 100'=1 in.
Surface 39°40'
100' 38°34'
200' 37°58'
300' 37°26'
400' 33°13'
500' 30°00'
600' 26°42'
700' 22°26'
800' 18°31'
900' 13°26'
1000' 10°30'
1100' 8°00'
1191'-10" 6°53'
Natural course of hole
Supposed course of hole


Hole # B.
Depth 1001' 4"
Scale 100' : 1 in.
Surface 24°40'
100' 26°36'
200' 29°21'
300' 30°34'
400' 30°46'
500' 31°46'
600' 32°12'
700' 32°38'
800' 33°35'
900' 34°27'
1000' 33°45'
24°40'
Supposed course of hole
Actual course of hole


Hole # C.
Depth 1044'
Scale 100' = 1 in.
Surface 43°15'
100' 43°43'
200' 42°48'
300' 40°42'
400' 38°46'
500' 34°02'
600' 30°26'
700' 25°50'
800' 21°52'
900' 17°14'
1000' 13°00'
43°15'
Actual course of hole
Supposed course of hole

attention has been paid to the matter in Porcupine. At the Dome mines it was desirable to obtain some idea as to the true angle of the hole, and as we were without apparatus of any kind, we were forced to evolve a method of our own, and, although the methods in use are rather crude, the results obtained are believed to be very nearly correct.

The important thing for us to find out was the deviation that the hole made from the angle at which it was started. The deviation in the other plane was not considered as on account of the drilling being at right angles to the strike of the formation, the hole would not be likely to run off much. In addition we had no apparatus at our disposal for surveying this.

For determining the dip of the hole, small bottles partly filled with hydrofluoric acid are used and readings are taken every 100 feet. The bottles are about 29-50 of an inch inside diameter and 2½ inches long. It is, of course, necessary that the sides of the bottle should be absolutely parallel to the sides of the drill rods. In order to insure this a 6-inch sleeve that screws on to the end of the core barrel was used. A piece of brass was turned down and fitted tightly into the sleeve, which was then put in the lathe and a hole turned in the brass centre, of a sufficient depth and diameter to hold the bottles and not allow for any movement. The brass receptacle is fitted with a water tight screw cap. This is essential, because if the brass container is not watertight the pressure of the water in the deeper parts of the holes will force in the cork and spoil the record. The bottom of the sleeve is fitted with another cap, which prevents anything touching the brass container. This was found to be necessary as caves frequently occur in the hole, and if the unprotected brass strikes these the bottle is apt to be broken.

A number of experiments were carried on before we determined the best strength of acid and the proper length of time for it to etch. It was finally found that one part of acid and one part of water gave the best strength, and that if this was allowed to etch for thirty minutes, a good ring was obtained. This length of time will do up to four or five hundred feet in depth, but as the time it takes to handle the rods increases the acid must be allowed to etch proportionately longer, as the wash of the acid in pulling up the rods, tends to obliterate the markings on the bottle. The pure acid is of very little use as it frosts the glass to such an extent that the marks on the bottle are unreliable.

An important point to be considered in this work is the correction for capilarity. If allowance is not made for this, the calculations will be of little use. This correction was found to vary from nothing to 6 degrees, depending on the angle of the dip, the greatest variation occurring where the angle is about 45 degrees. For vertical, or flat holes, there is, of course, no correction. In order to determine a standard factor to use for the different angles an arm protractor was set up in a horizontal position. On the arm, bottles, partly filled with acid, were placed, and different readings taken every five degrees, between 10 degrees and 80 degrees from the horizontal.

When the angle of the ring etched on the glass is obtained the results are platted, the different angles of dip being allowed for fifty feet on each side of the hundred foot mark, at which the readings are taken.

In order to survey the holes from which the drill has been pulled off, a stout reel equipped with 1,000 feet of ¼-inch cable is used. To the end of the cable a 10-foot core barrel is attached and the readings are taken the same as described above. This works very well between 90 degrees and 35 degrees, but is of no use for holes flatter than the latter angle.

By this very simple method several thousand feet of diamond drill holes have been surveyed and, as far as we have been able to ascertain, the results obtained very closely approximate the actual conditions. The variation of the holes from the angle at which they were started is usually very marked. In every case, so far, with one exception, the angle has become flatter. In one hole 1,400 feet in depth, the difference between the actual end of the hole, and the point where it was supposed to end has been as much as 600 feet, and in another case a hole which was started at 40-degree angle ran off until at a depth of 1,200 feet the angle was less than 7 degrees.

VEIN FORMATION IN COBALT

(Written for the Canadian Mining Journal by J. B. Tyrrell.)

At the Quebec meeting of the Canadian Mining Institute in March, 1911, Mr. C. W. Knight presented some sections showing the structure of the silver-bearing rocks in the Cobalt district.

In a discussion which followed the presentation of this address, Mr. J. B. Tyrrell spoke as follows:—

The light which Mr. Knight has thrown on the structure of the country in his interesting paper and in his geological sections will be of great assistance to anyone who is interested in the study of the origin and occurrence of the silver-bearing veins in the Cobalt camp.

I would like to emphasize what I said at the annual meeting of this Institute in Toronto in 1907* in the discussion of a paper by Dr. C. R. Van Hise on "The Ore Deposits of the Cobalt District, Ontario," and also in a paper which I wrote for the Canadian Mining Journal** in the same year. I then drew attention to the fact that the ore-bearing solutions would appear to have come up at the latest stage of the diabase intrusion, probably in the same vent through which the diabase itself had risen, and that they had spread out laterally beneath the relatively impervious diabase sill and had descended into the fissures which had been formed by the subsequent cooling of the rocks beneath the diabase. In this way the bottom plane of the diabase was the plane or zone from which the silver-bearing solutions had been immediately and finally derived, and consequently most of the veins in the district had

* Journal Can. Min. Inst., Vol. X., 1907, p. 58.

** Vein Formation at Cobalt, Ont., by J. B. Tyrrell, Can. Min. Jour., Aug. 1st, 1907, pp. 301-303.

been filled from above rather than from below, although this downward filling was part of the deep-seated and not of the vadose circulation. "The fissures would be widest and most extensive close to the diabase and would gradually pinch out, and disappear at a distance from (below) it. This distance must, of course, be computed from where the diabase was originally, before any of it was removed by erosion."

Beginning at the Western end of Mr. Knight's section we must recognize that this diabase sill certainly did not terminate where it terminates now, and that its western end was not the extreme end of the sill in that direction when it was formed, but that the sill must have covered a considerable stretch of the country to the west and that both it and the rocks which rested on it, if there were such rocks, have long since been eroded away. Following westward the rise of the bottom of the sill as it is known to occur beneath Peterson Lake we see that it must have rested on the hill occupied by the eastern portion of the Nipissing property, and that the rich veins on this property were therefore formed close to the base of the diabase, just as the silver-bearing veins beneath Peterson Lake are found to cling to the bottom of the diabase.

Where the Huronian conglomerates and schists immediately underlay the diabase sill they favoured the formation of the silver-bearing veins, but where the Huronian was not present and the Keewatin rocks immediately underlay the diabase the silver-bearing solutions descended into these rocks and formed veins in them.

A Member.—Might you not, then, reasonably expect to get silver in the Keewatin rocks of the vicinity of Sasaginaga Lake?

Mr. Tyrrell.—As you proceed farther and farther from where the diabase at present occurs you necessarily become more and more uncertain as to whether it flowed over that particular district or not, and, even if it flowed over or covered it and has now been eroded away, whether a considerable depth of the rocks which originally underlay it have not also been removed by erosive agencies. If, for instance, the diabase and two or three hundred feet of the rocks underlying it have been removed from a certain district it is quite possible that rich silver-bearing veins may have been present, and that they may have been entirely removed.

Near the eastern end of Mr. Knight's section we see that the diabase sill dips fairly steeply beneath the underlying Keewatin rocks. The Temiskaming mine is located in this part of the country and is underlain by the Keewatin, which is again underlain by the sill of diabase. In this case the silver-bearing solutions which gave rise to the mineral veins would seem to have proceeded upwards from the diabase rather than downwards from it. As a general rule I think that the bottom plane of the diabase was much the more likely zone or plane to carry enriching solutions, but in this case the enrichment would appear to have gone up from the top of the diabase.

In the Gowganda district most of the veins which carry silver are in the diabase itself and, unfortunately, we know very little about the character of the veins in the rocks immediately underlying it.

PERSONAL AND GENERAL.

Mr. Sydney Smith, of Cobalt and Porcupine, was in Toronto on professional business on February 20th.

Mr. Martin Nordegg has left for Western Canada. He will return to Toronto early in March.

Mr. Robert Bryce and Mrs. Bryce, formerly of Cobalt, are in Toronto for a short visit.

Major J. Edwards Leckie is soon to leave Cobalt to take up work in the West. Major Leckie's departure will leave a gap in Cobalt that can never be filled. He has made himself a popular institution, besides performing the multifarious functions of a good and active citizen.

Dr. W. G. Miller, Mr. J. M. Clark and Mr. W. F. Ferrier attended the recent meeting of the American Institute of Mining Engineers in New York.

Mr. R. B. Lamb has returned to Toronto.

Prof. William Nicol, of the Kingston School of Mines, spent the 18th and 19th of February in Toronto, arranging for additional equipment for the Mineralogical Department.

Mr. E. A. Collins has moved his headquarters from Ottawa to Kingston.

Mr. Ben Hughes was in Toronto recently. He will be one of the Porcupine delegates to the C. M. I. annual meeting.

Mr. P. Kirkegaard has returned to Toronto.

Mr. Walter Boyd, of the Geological Survey, visited Toronto on February 17th.

Dr. J. MacIntosh Bell, formerly director of the New Zealand Geological Survey, visited Toronto on February 21st. Dr. Bell, who has just returned from travelling through Turkestan, is again on his way to that country to make a series of geological examinations for London clients. In September next he will again visit Canada.

BRITISH NOTES ON CANADIAN COAL.

"Coal Age," a coal mining journal published in New York, recently printed an abstract of a report showing the world's production of coal, issued by the British Home Office Department, in which the following information concerning coal in Canada is given: The oldest coal fields in Canada which have been largely developed, are situated on the seaboards of the Atlantic and Pacific Oceans. On the Atlantic side of the continent, bituminous coal is being mined from thick seams of true Carboniferous age at the Sydney (Cape Breton), Pictou, Inverness, and Cumberland fields, in Nova Scotia. The coal of the Pacific Coast, generally bituminous, belongs to the Cretaceous age, and is derived from collieries at Nanaimo, Extension, and Comox, on Vancouver Island, British Columbia. The thick seams of bituminous coal, which exist in the vicinity of the Crow's Nest Pass, are now being worked on an extensive scale, and a large quantity of the coal mined is converted into coke for use in the smelting industry in British Columbia. All these coals are of Cretaceous age.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Dominion Coal Outputs.

The output of the Glace Bay mines for January was less than the previous January, but during February better weather conditions have prevailed, and at the 15th the outputs were 30,000 tons ahead of 1911. The output for February will probably be about 325,000 tons, which will bring the figures for the first two months of the year to about 600,000 tons, or 50,000 tons in excess of the 1911 figures.

The Springhill mines are doing very well, and the output on occasional days has gone over 1,700 tons. The output for February will probably reach 34,000 tons, making a total for the year of 72,000 tons. This figure is 52,000 tons in excess of 1911 outputs for the same period.

The total increase in the combined outputs of the Glace Bay and Springhill collieries will amount, therefore, to roughly 100,000 tons over January and February, 1911, a beginning which augurs well for the rest of this year.

The Dominion Coal Company has recently ordered ten Draeger apparatus, with the necessary oxygen pump, store cylinders and various accessories for its new rescue station, which is intended to serve the Lingan Collieries. These mines are situated about ten miles from the main station at No. 2 Colliery, and it has been considered advisable to have a substation within easy reach of the new mines. The company has also purchased two "Pulmotors," devices for automatically administering oxygen to injured or unconscious men. This device is a very clever mechanical contrivance which imitates the action of the human lungs in a manner which is almost uncanny. Dr. Professor Roth, of Lubeck, Germany, has made many experiments with this apparatus, and thus describes one experiment with a surgical subject: "On setting the Pulmotor in operation, the air bubbled up through the water; but a gentle pressure, with the finger, on the windpipe, caused the bubbles to cease immediately. At the same time the cavity of the chest and the diaphragm moved in an admirable manner, in fact, the quiet breathing of the cadaver was astonishing at first sight." To most laymen it certainly would be "astonishing," and the Professor's statement has the flavour of a very grim joke.

The Coal Company has also ordered ten apparatus with the various accessories for its Springhill collieries, and a rescue station will be erected there some time during the coming season. A "Pulmotor" will be purchased also for Springhill.

When the proposed extensions are carried out the Dominion Coal Company will have three rescue stations, equipped with fifty-five Draeger apparatus and four oxygen resuscitators. So far, the Coal Company has never had occasion to use its apparatus in its own collieries, but should the necessity ever arise, it is the intention that the equipment shall be adequate.

COMPANY NOTES

Kerr Lake directors have declared the regular quarterly dividend of 25 cents a share, payable March 15th. The company used to pay double this, but cut it in two the last year. A disbursement of 25 cents a share means $150,000. With the payment on March 15th, the company will have paid out 129 per cent. on its capitalization, as follows:

	P. C.	Amount.
1905	½	$ 15,000
1906	4½	135,000
1907	8	240,000
1908	15	450,000
1909	23	690,000
1910	40	1,200,000
1911	10	300,000
1911	10	300,000
1911	8	240,000
1911	5	150,000
1912	5	150,000
	129	$3,870,000

AMALGAMATED ASBESTOS.

The balance sheet of the Amalgamated Asbestos Corporation, as at 31st December, 1911, has been issued. It shows that profits for the year were $98,003.90, compared with $396,799.07 bond interest for year. The profits for the year were insufficient to meet operating charges, being $54,914.92 short of the sum required, so that with $396,799 bond interest not paid, the total deficit is $451,713.

The assets include $693,665, inventories, $172,689, accounts receivable, $47,927 and cash on hand, $19,887.

Liabilities include $87,452 accounts payable and pay-rolls, $328,840 bills payable, $233,333 bond interest accrued, $118,640 contingent account, and $17,248 reserve.

PLENARUM MINES.

Toronto, February 22.—The annual meeting of the Plenarum Mines, Limited, was held here yesterday in the office of the secretary, Alexander Fasken, a handful of shareholders attended and the meeting was purely formal. A brief report on the property containing little information was presented. The report was prepared by Mr. R. B. Watson. The old directors were re-elected. These are David Fasken, president; E. P. Earle, R. B. Watson, W. S. Edwards and Alexander Fasken.

AMALGAMATED RE-ORGANIZATION.

At a meeting of the bondholders of the Amalgamated Asbestos Corporation, Limited, held in Montreal, January 25th, 1912, this committee was appointed to submit a plan for the re-organization of the company.

The committee presents herewith a plan which will be submitted at the bondholders' meeting, February 29th, 1912, which presents their conclusions after an exhaustive examination of all available data and information, bearing upon the company and its affairs.

Your committee deem it unnecessary to go into the past history of the company further than to state that the result of the operations of this company since its organization lead to the conclusion that the original capitalization involving a fixed charge of $400,000 per year, was excessive.

It should also be stated that the results have been materially affected by difficulties in obtaining practical management and a general demoralization in the market for asbestos.

Your committee have had in mind the following features which they deem essential to a plan:

1. A fixed charge so low that under no circumstances would the company at any future time face a default.

2. Ample cash capital.

Given the present property vested in a company with a low fixed charge and ample cash capital, with the benefit of proper business management, whatever form of capitalization may be adopted, the holders of securities representing this capitalization will receive all possible benefits from the operation of such property.

The average annual earnings of the properties over a period of three and a half years, has been not less than $250,000. The plant is capable of an annual output of thirty thousand tons.

A conservative estimate of the profit which should be obtained would be $8 per ton, or a total of $240,000, per year. Under normal conditions with the business free from cut-throat competition, profits should exceed this amount.

However, your committee has deemed it unnecessary to consider the possible profits of the business, believing that if the company is put right, as to capitalization and management, the best results must come as a consequence thereof.

It is only fair to say that the conditions under which these properties have been operated during the past two years have been abnormal and the greater part of the time subject to unnatural conditions, which have reduced the profits below a reasonable basis. While during this time trade conditions both in the States and on the continent of Europe have been unfavourable, they now show signs of improvement.

The property in the hands of the reorganized company will constitute the most important factor in the business of producing the material for the asbestos trade.

The company is dealing in a product for which there is a legitimate and naturally increasing demand.

With the producing end of the business put upon a sound business basis, the raw material should command prices which would result in a satisfactory profit.

If re-organized on the basis of the plan herewith submitted the company will be in a position to withstand any periods of stress to which it may be subjected, as it will have in its treasury cash and quick assets, amounting to approximately $1,000,000.

The carrying out of the plan proposed must necessarily be accomplished through a foreclosure of the first mortgage on the property, which, however, will not necessarily involve any extended delay.

In recommending this plan to the bondholders, the committee do so with the assurance of its approval by a large percentage of the total bonds outstanding.

Respectfully submitted,

J. E. ALDRED,
Chairman.
U. H. McCARTER,
H. J. FULLER,
Committee.

February 16th, 1912.

Plan.

A new company to be formed under some suitable name to be decided upon, with the following capitalization:

First Mortgage, 30-year, Sinking Fund, 5 per cent. Bonds.—

Authorized issue	$5,000,000
Issued	2,875,000

6 per cent. Participating Preferred Stock—

Authorized issue	$4,000,000
Issued	4,000,000

Cammon Stock—

Authorized issue	$2,875,000
Issued	2,875,000

Note:—

Additional bonds to be issued only with the consent of two-thirds of the preferred stock.

After the preferred stock shall receive 6 per cent. dividends, and the common stock 5 per cent. dividends, any dividends paid shall be shared pro rata by the preferred and common stock.

Basis of exchange of old securities for new, and sale of new bonds to provide cash capital:

Holders of $8,000,000 old First Mortgage Bonds to receive in exchange $2,000,000; new First Mortgage, 30-year Sinking Fund, 5 per cent. Bonds: $4,000,000, new 6 per cent. Participating Preferred Stock; and $2,000,000, new Common Stock.

In other words, the holder of $1,000, par value old bonds will receive $250 new First Mortgage Bonds, $500 new 6 per cent. Preferred Stock, and $250 new Common Stock.

To provide cash working capital, it is proposed to sell $875,000 new First Mortgage 5 per cent. Bonds, these to be offered as follows:

To the old bondholders for subscription pro rata $500,000 bonds at 85 per cent. and accrued interest, with 100 per cent. bonus of new Common Stock, and to the old Preferred Stock holders for subscription pro rata $375,000 at 85 per cent. and accrued interest, with 100 per cent. bonus new Common Stock with the understanding that in case any or all of the bonds offered to the Preferred Stockholders are not subscribed for, unsubscribed bonds shall be at once reoffered to the old bondholders for subscription pro rata on the same terms.

STATISTICS AND RETURNS

COBALT ORE SHIPMENTS.

	Week Ending Feb. 17.	Year to date.
Beaver	59,801	59,801
Buffalo	60,939	297,585
Can. Gowganda	.....	15,967
Casey Cobalt	.....	500,000
Chambers-Ferland	.....	64,000
City of Cobalt	.....	132,673
Cobalt Lake	.....	75,080
Cobalt Townsite	59,000	252,700
Colonial	.....	40,000
Coniagas	.....	443,649
Drummond	 180,000	300,000
Crown Reserve	.....	136,528
Hudson Bay	 61,905	188,807
Kerr Lake	 64,000	216,559
La Rose	 229,804	793,531
McKinley	 226,019	766,518
Millerette	....	38,000
Miller Lake-O'Brien	 41,500	96,500
Nipissing	 125,076	507,221
O'Brien	 64,097	257,990
Right of Way	.....	71,766
Temiskaming	....	216,969
Trethewey	....	84,563
Total	1,172,141	5,556,407

The total shipments for the year 1911 (unofficial) were 26,763 tons; for 1910 (official), 39,977 tons; in 1909, 30,096 tons; in 1908, 25,463 tons; in 1907, 14,000 tons; in 1906, 5,126 tons; in 1905, 3,144 tons, and in 1904, 153 tons.

COBALT ORE SHIPMENTS.

With a further shipment of 25 bars of bullion the Nipissing brought its total shipments for the week ending February 10 to a value of $97,766.77, this amount with the shipments made by the O'Brien, the Crown Reserve and Campbell & Deyell bringing the bullion shipments of the week to the record figure of $122,781.92.

This is the largest amount of bullion ever to be shipped out of Cobalt in one week, the high price of silver aiding in breaking the record for value although the weight of bullion shipped, 188,077.48 ounces also constitutes a record for quantity. The bullion shipments for the week are as follows:

	Ounces.	Value.
Nipissing	143,213.90	$97,766.77
O'Brien	19,570.00	11,253.23
Crown Reserve	15,000.00	9,720.00
Miscellaneous	7,293.58	4,081.92
Totals	188,077.48	122,781.92

The bullion shipments for the year to date are:—

Nipissing	$198,806.60	324,232.90
Crown Reserve	51,800.40	93,728.08
Temiskaming	13,459.96	24,924.00
O'Brien	18,886.32	32,292.09
Nova Scotia	21,500.00	31,710.00
Buffalo	4,900.00	9,000.00
McKinley-Darragh	1,390.37	2,528.00
Miscellaneous	3,802.00	6,670.94
Totals	$321,203.80	545,766.12

The ore shipments for the week amounted to a total of ten cars, six high and four low. Features of the week's shipments were the coming into the list of the Drummond with two cars of low-grade, the first ore to be sent out by the mine this year, and the shipping of two high-grade cars by Temiskaming. Chambers-Ferland is again absent this week from the list and so far this year has only sent out one car, as compared to an average last year of two cars shipped each month. The shipments for the week in pounds are:—

Nipissing, 2 l	144,920
Temiskaming, 2 h	133,212
Drummond, 2 l	120,650
McKinley, 2 h	120,452
O'Brien, 1 h	71,592
La Rose, 1 h	65,339
Kerr Lake, 1 h	41,056
Total	697,221

The shipments for the week and year to date in tons are:

	Week Feb. 10.	Total.
La Rose	32.67	291.86
Coniagas	35.78	221.92
O'Brien	35.78	96.93
Right of Way	.....	35.88
Chambers-Ferland	.....	32.00
McKinley-Darragh	60.22	268.53
Nipissing	72.46	191.11
Hudson Bay	31.42	62.95
Buffalo	28.12	57.31
Crown Reserve	22.45	68.25
Cobalt Townsite	65.29	88.79
City of Cobalt	66.33	66.33
Trethewey	42.28	42.28
Colonial	20.00	20.00
Kerr Lake	20.57	51.03
Cobalt Lake	37.54	37.54
Drummond	60.32	60.32
Temiskaming	66.60	66.60
Totals	348.61	1,759.72

BRITISH COLUMBIA ORE SHIPMENTS.

The feature of the ore shipments to the Consolidated smelter for the week ending February 17th, is the increase in the Standard tonnage, which has grown steadily. The Standard shipped over half as much last week as has been shipped from the mine during the rest of the year to date. The shipments from the Le Roi are also steadily increasing, being 300 tons heavier last week than in the previous week.

Consolidated's receipts and ore production:—

	Milled for week.	Milled to date	Shipments for week.	Shipments to date.
Rossland—				
Centre Star	....	.....	3,576	20,492
Le Roi	....	.....	1,259	6,152
Le Roi No. 2	300	2,100	326	2,835
Bluebird	....	.....	.....	33
East Kootenay—				
Sullivan	....	.....	280	825
St. Eugene	....	2,100	.....	401
Ainsworth—				
Utica	....	.....	.....	132
No. 1	....	.....	66	170
Slocan—				
Standard	300	1,800	467	1,294
Van Roi	800	5,600	125	611
Hewitt	....	200	.....	25
Rambler-Cariboo	....	.....	36	222
Slocan Star	....	.....	.....	24
Richmond Eureka	....	.....	62	241
Noble Five	....	.....	.....	124
Whitewater	....	.....	.....	43
Ruth	....	.....	34	145
Ottawa	....	.....	.....	28
Eastmont	....	.....	.....	30
Fidelity	....	.....	.....	26
Apex	....	.....	.....	36
Daly	....	.....	.....	41
Nelson—				
Arlington	....	.....	86	470
Nugget	....	.....	.....	22
Granite-Poorman	250	1,750	.....	28
Queen	250	750	.....	70
Foreign—				
Knob Hill	....	.....	58	603
Hope	....	.....	.....	20
Northport	....	.....	.....	34
Totals	1,900	14,300	6,375	35,077
Granby Smelter Receipts—				
Granby	....	.....	23,068	148,939
B. C. Copper Company's Receipts—				
Mother Lode			7,400	52,637
Emma			639	4,029
Athelstan			....	227
Rawhide			346	3,118
Jackpot			301	2,483
Unnamed			....	227
Totals			8,686	62,721

SILVER PRICES.

	New York cents.	London pence.
Feb. 10	60⅜	27¾
" 12	Holiday	27 13/16
" 13	60⅝	27⅞
" 14	60	27⅝
" 15	59⅝	27 7/16
" 16	58⅛	26¾
" 17	58½	27
" 19	59⅛	27 5/16
" 20	59⅜	27 5/16

SHARE MARKET.

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

New York Curb.

	Bid	Ask
Braden	...	...
B. C. Copper	3⅞	4
Butte Coal	22⅝	23
Davis-Daly	⅝	¾
Giroux	4 5/16	4 7/16
Greene-Cananea	7¾	8
Inspiration	18¼	18⅜
Yukon Gold	3⅜	3½
Goldfields Cons.	....	....
Nevada Hills	2¼	2⅜
Miami	....	....
Granby	....	....
Ray Central	2	....
Chino	....	....
United Copper	1¼	1¾
Tenopah Mining	7	7¼

Cobalt Stocks.

	Sales. Low	High
Bailey	.01⅞	.02
Beaver Consolidated	.47¼	.47½
Buffalo	..... Asked	1.35
Chambers-Ferland	.12¼	.....
City of Cobalt	.10	.10¼
Cobalt Lake	.28	.28½
Coniagas	6.80 Bid	.....
Crown Reserve	3.03 Bid	.....
Great Northern	.09¼	.....
Gould	.02¾ Bid	.....
Gifford	..... Asked	.03
Green-Meehan	.01⅜	.....
Hargraves	.07	.....
Kerr Lake	3.00	.....
La Rose	3.86	.....
McKinley-Darragh	1.81	.....
Nipissing	7.40	.....
Nova Scotia	.... Asked	.05
Ophir	.07	.....
Otisse	.00¾	.....
Peterson Lake	.07¼	.....
Rochester	.02½ Bid	.....
Right of Way	.07	.07¾
Silver Leaf	.03¼	.....
Temiskaming	.36	.36¼
Trethewey	.52	.62
Wettlaufer	.77	.78

Porcupine Stocks.

	Sales. Low	High
Apex	.07 Bid	.....
Dobie	.60	.....
Crown Charter	.16½	.17
Dome Extension	.42	.43½
Eldorado	..... Asked	.08½
Foley-O'Brien	.32 Bid	.....
Hollinger	10.90	.....
Jupiter	.44 Bid	.....
Moneta	..... Asked	.19
N. Ont. Exp.	..... Asked	4.50
Pearl Lake	.20½	.....
Porcupine Central	3.62½	3.70
Porcupine Imperial	.05	.05¼
Porcupine Northern	.94	.97
Porcupine Tisdale	.03	.03½
Porcupine Southern	1.12½	1.15
Preston East Dome	.06	.06¼
Rea	1.06 Bid	.....
Standard	.21	.....
Swastika	.23	.23½
Vipond	.44 Bid	.....
United	.02¾	.....
West Dome	.40	.....

Sundry.

Island Smelters	.09	.09⅛
Canadian Marconi	..... Asked	.04

TORONTO MARKETS.

Feb. 22 (Quotations from Canada Metal Co., Toronto).

Spelter, 6.50 cents per lb.
Lead, 4.25 cents per lb.
Antimony, 7 to 9 cents per lb.
Tin, 45 cents per lb.
Copper, casting, 14.75 cents per lb.
Electrolytic, 14.75 cents per lb.
Ingot brass, 7 to 12 cents per lb.

Feb. 22.—Pig Iron (Quotations from Drummond, McCall & Co., Toronto).

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

GENERAL MARKETS.

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

Coke.

Feb. 20.—Connellsville Coke (f.o.b. ovens).
Furnace Coke, prompt, $1.80 to $1.90 per ton.
Foundry Coke, prompt, $2.20 to $2.35 per ton.

Feb. 20.—Tin, straits, 42.90 cents.
Copper, Prime Lake, 14.45 cents.
Electrolytic copper, 14.37½ cents.
Copper wire, 15.25 cents.
Lead, 4.00 to 4.10 cents.
Spelter, 6.77½ cents.
Sheet zinc (f.o.b. smelter), 8.25 cents.
Antimony, Cookson's, 7.25 cents.
Aluminium, 18.50 to 19.00 cents.
Nickel, 39.00 to 40.00 cents.
Platinum, ordinary, $46.00 per ounce.
Platinum, hard, $48.50 per ounce.
Bismuth, $1.80 to $2.00 per lb.
Quicksilver, $46.00 per 75-lb. flask.