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### THE AMERICAN COAL INVASION.

The coal mine operators of Nova Scotia are facing a serious situation. The St. Lawrence market upon which the prosperity of the Province's collieries depends, is being systematically invaded by American coal producers.

The collieries of Nova Scotia furnish employment, directly and indirectly, to twenty-one thousand men. Last year (1908) the total production of coal exceeded six millions tons. Total shipments amounted to about five and one-quarter millions. Of this amount a large proportion, roughly two million tons, was shipped up the St. Lawrence to Quebec, Montreal, and intermediate points.

Against United States coal there is a Canadian duty of fifty-three cents per net ton. This, apparently, is insufficient to prevent the dumping of large quantities of American fuels into Eastern Canada. Neither does the advantageous position of Nova Scotian collieries, which are either on or within easy distance of tide-water, suffice to offset the cheaper cost of production in the United States. The collieries of the latter country have a domestic market that is fully developed. They can, therefore, afford to exploit Eastern Canada. They are in a position to make temporary sacrifices that would swamp Canadian competition. Even now their efforts are causing serious embarrassment.

The situation thus created requires immediate attention. Hasty restrictive legislation is not to be recommended. But there is unmistakable need of action on the part of the Dominion and Provincial governments.

As pointed out by Mr. A. S. Barnstead, in our issue of February 1st, 1909, something can be done in the direction of lowering the cost of living in Nova Scotia. The Province is sadly in need of an agricultural population. Mr. Barnstead affirms that not five per cent. of the necessaries of life is produced in the neighborhood of the mines, and this in spite of the fact that many of the collieries are surrounded by good farming and arable lands.

At a conference between the Government of Nova Scotia and the coal men of the Province, held on January 14th, the Government's representation promised that official aid would be given in any proper direction. It was pointed out, however, that the direction indicated above, namely, the reduction of the cost of living by means of the rehabilitation of the agricultural industry, was thought to be most desirable.

Without doubt a movement of this kind would help matters considerably. But concerted action on the part of Nova Scotian operators is the first requirement. If danger threatens all alike, then the time has

arrived for a strong alliance between the Maritime coal interests. This need not be a combine. Rather should it be an operators' association, organized for the purpose of improving mining practice and lowering costs of production. Immediate good would result from this, and we believe that it would have the effect of gaining public sympathy.

It is suspected, with seemingly good reason, that there is a definite connection between the American raid upon our Eastern coal markets and the efforts of the United Mine Workers' of America to control the workingmen of Nova Scotia. This may be the case. If it is so, then one reason more is added to reasons already known that go to prove that the influence of that body is not desirable. Canadian workingmen are surely able to take care of themselves. The establishment of U. M. W. control in Nova Scotia would be an industrial and political disaster.

A fortnight ago the whole case was laid before the Hon. Mr. Fielding. The Federal Government is, therefore, in possession of all the facts. We are hopeful that effective measures will soon be promulgated. But, whatever happens, no one can assist the Maritime coal operator more than he can himself.

#### MENDELEEFF—CHEMIST.

The great Russian chemist, Mendeléeff, applied his brilliant genius and his extraordinarily wide knowledge to the development of his country's natural resources. His volume entitled "The Principles of Chemistry," illustrate this statement. The elaborate footnotes that occupy more space than the original text are, mines of information drawn from all sources. Written during the years 1868-70, the work was first rendered into English in 1891. It has passed through many editions, and has had a profound effect upon scientific thought and work.

Mendeléeff was one of the earliest and certainly the most brilliant exponent of the law of the periodicity of the elements. But he refused to permit the enticing field of pure science to engross his entire attention. To the genius of the philosopher, he added the practical wisdom and foresight of the true chemist. Everywhere he saw opportunities for applying the results of his laboratory researches, and always he urged his fellow-countrymen to exploit Russia's natural wealth for themselves. His life, indeed, is one grand argument against "secrecy in the arts." Had he been a lesser man, he might easily have become the Rockefeller of Russia. He worked as a man should work, and his name will live.

Mendeléeff own words are pregnant with inspiration and high idealism. To the younger generation of writers he writes thus: "The time has come to turn aside from visionary contemplation, from platonic aspirations, and from classical verbosity, and to enter the regions of actual labor for the common weal, to prove

that the study of science is not only an excellent education for youth, but that it instils the virtues of industry and veracity, and creates solid national wealth, material and mental, which without it would be unattainable. Science, which deals with the infinite, is itself without bounds."

#### CANADA AND AMERICA.

Merely for literary effect that unrestful person, Mr. Stephen Leacock, whose clarion colloquialisms last year set the whole British Empire on edge, has seen fit, in the last number of the University Magazine, to delete the International boundary. Mr. Leacock smiles (not without tears) at the whole American system of education. And in the term "American" he is pleased to include everything pertaining to Canada.

The young man, Mr. Stephen Leacock, is an astute and humoursome person. He is not without guile; nor is he deficient in what, during his period of foreign aberration, he would have been coarse enough to denominate "gall." But an incidental lack he does display. He rarely takes pains to collect a little information before he writes. He merely gathers—like storm-clouds—and breaks.

When Mr. Leacock deplores several things, including the unanimously low literary taste of all of us, he wails over the "standardization" of university methods and men, he forgets that the system that has produced Mr. Leacock, or that includes him as one of its cogs, cannot be incontinently damned. Hence, moreover, the horrible unfairness of sweeping us Canadians into the cesspool of Americanism! The leaven of Leacock is ours alone! The Boundary must remain!

#### THE AGAUNICO MINES DEVELOPMENT CO.

In the Toronto Police Court, on Feb. 22nd, the Agaunico Mines Development Co. was fined \$300 for non-compliance with the Ontario Companies Act. The fine was paid. The representation of the Crown, after conference with the defendant company's attorney, permitted the case to end there. Here, also, we would be glad to drop the matter. But, alas! the Agaunico Mines Development Co. is not what it seems.

Last December copies of a prospectus were distributed by agents of the Fiduciary Company, Tacoma Building, Chicago. The name of E. J. Rosenfeld appeared as president of this charitable institution.

On the cover of the prospectus is pasted a passable imitation of a representation of weathered silver-bearing smaltite that appeared originally on the front of the Canadian Mining Journal. The contents of the prospectus have little or no bearing upon the actual value of the mine, and there are several pages of absolute lies.

Before giving a few samples of these we may remark that any project that needs bolstering and padding by

such absurd prospectuses, carries its own warning to the public. The Agaunico people know that they cannot afford to tell the truth about their mine. They therefore proceed to tell something else.

The capital of the company is \$5,000,000, of which \$1,500,000 was used "for the acquisition of the property and financing of the company. The Temiskaming-Cobalt Mine, which is the property described in the prospectus, is thus offered to the public for \$5,000,000. The impression is conveyed throughout the prospectus that the Temiskaming-Cobalt is not only a silver mine, but a gold mine. It is, of course, neither. It has produced either a negligible quantity of silver or none at all. It has, we believe, large showings of smaltite and cobaltite, which minerals are extremely difficult to market.

A cheerful person, S. W. Gilbert, signs a report which is accompanied by the most remarkable map that it has ever been our fortune to see. Mr. Gilbert after declaring that "operations up to date have been carried on upon only two parallel veins," signs his name to a map that shows a "belt" of silver, one mile long and six feet wide, that he describes as "a reservoir of solid silver."

Belt No. 2, according to the same charming fictionist, consists of a belt of gold "one to two feet wide." The gold belt is also pictured luridly on the map.

Mr. Gilbert, if he is still at large, should receive attention from a commission of alienists. So also should the eminent business men of Chicago who ask anybody to swallow this bosh.

We have no time to squander upon the remainder of this pamphlet. Gilbert's report alone is enough to prove that the promoters of the Agaunico Mines Development Co. are either fools or knaves. We are exceedingly sorry to see that Mr. D. B. Rochester of the Cobalt Lake Mining Co. has permitted his name to be used by these gentlemen from Chicago. Mr. Rochester has been long enough in Cobalt to know that Gilbert's report is a pipe-dream or worse.

Mr. E. L. Fraleck, quoted by the Agaunico people as their consulting mining engineer, protested vigorously some time ago and is continuing to protest.

As a valediction we dismiss the subject with the remark that if the Agaunico Mines Development Co. published the truth about this Temagami-Cobalt Mine, and the truth is not far to seek, they would not sell one cent's worth of it to any person of sound mind.

#### CONFLICTING FIXTURES.

Much to the regret of many mining men, the dates fixed for the annual meetings of the Mining Society of Nova Scotia and of the Canadian Mining Institute overlap. A number of the members of the Institute had expressed their intention of attending the meeting of the Society; but this has been rendered almost impossible as the

first day of the Halifax gathering coincides with the first day of the Montreal convention.

In future matters should be so arranged as to obviate this regrettable coincidence. Both meetings are pleasant and profitable events in the world of mining and larger numbers of both bodies should attend both.

#### EDITORIAL NOTES.

At the first annual meeting of the American Institute of Chemical Engineers, held in Pittsburgh, on December 28 and 29, Dr. E. F. Northrup read an instructive paper on pyrometers. Among other points, Dr. Northrup alluded to the distinction that must be made between the sensitiveness and the accuracy of a pyrometer. All pyrometers should be calibrated in actual degrees, Fahrenheit or Centigrade. Resistance pyrometers are now so perfected that all temperatures from that of liquid air to 1200° C. may be indicated and observed accurately. But the instruments, to give good service, require the attention of trained specialists.

Mr. W. C. Ralston, a citizen of San Francisco, has been nominated for the office of vice-president of the American Institute of Mining Engineers. Mr. Ralston is a politician and a broker. The Mining and Scientific Press has raised its voice in protest against his nomination. Our contemporary contends, with perfect fairness, that, although the membership of the institute is heterogeneous, it is essentially what its name implies—a society of mining engineers. Hence its officers should be mining engineers.

#### PERSONAL AND GENERAL.

Mr. J. W. Evans, M.E., lately of Cobalt, has opened an office in Room 42, Lawlor Building, corner King and Yonge Streets, Toronto. Mr. Evans was one of the pioneers of Cobalt, and has a thorough professional knowledge of the district. He is also familiar with the new districts of Miller Lake and Gowganda.

The American Grondal Kjellin Co. has installed a testing plant for the concentration of iron ores according to the Grondal system at Sheridan, Pennsylvania, where ores will be received and tested free of charge.

The Grondal processes have had such an eminent success in Europe, where at present more than thirty plants are in operation, that it is time they were better known and more thoroughly understood by the iron ore producers in this country.

Mr. R. L. Broadbent, of the Dominion Geological Survey, has gone to British Columbia to make a collection of the ores and minerals of that province for the forthcoming Yukon-Alaska-Pacific Exposition at Seattle, U.S.A. The mineral interests of British Columbia being so large, the Government will make a special effort to see that they are well represented. Mr. Broadbent has had a wide experience in collecting minerals for expositions. He was in charge of this branch of the work for the St. Louis, Dublin, Milan and other great expositions of the past few years.

## DEPTH OF ASBESTOS DEPOSITS.\*

By Fritz Cirkel, M.E., Montreal.

"Asbestos found at a depth of 400 feet." This is the latest important news from that famous asbestos district, the Eastern Townships of the Province of Quebec. This intelligence is significant from the fact that the deepest asbestos mines are only 200 feet, hence the question: Where was it found? When the Black Lake Chrome & Asbestos Company, near Black Lake, had finished deepening their shaft to 400 feet for the purpose of exploring their great chromic iron ore body, they ran in a drift through a deposit of chromite and serpentine, and finally landed in asbestos veins of from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch thickness, of great silkiness and flexibility. This event at first sight would seem insignificant, were it not for the fact that the question of depth of these deposits is one of greatest economic importance.

Before entering into a discussion on the subject under consideration, I wish to state here that the question of the permanence and persistency of asbestos deposits is a delicate one. It forms a subject upon which hardly any geologist or engineer familiar with the existing conditions has ever ventured an opinion; yet from an economic point of view it is highly essential that the matter should be given close attention, since the future of that district, which furnishes almost solely the world's market with asbestos, depends a great deal more upon the depth of these deposits than on the opening of new mines; but if the writer ventures an opinion on this subject, based primarily on observations in the field, it is done more with a view to stimulate a discussion than to come forward with new and extravagant theories. Now, it seems strange to the miner who is familiar with any other kind of mining than the exploitation of asbestos deposits, that a district with a history of over 30 years has no record of any kind regarding the character of these deposits below a depth of 200 feet. As a matter of fact, there is no visible evidence in any asbestos mine of the extension of the deposits below a depth of 225 feet, and it seems also strange that this discovery should be made accidentally in a mine of another class. However, if we consider the methods employed in the exploitation of asbestos mines, and also the difficulty, or rather impossibility, of testing the ore bodies by diamond drilling on account of the fibrous nature of the rock and mineral, it is at once apparent that this lack of knowledge is due to causes arising solely out of the peculiar occurrence of the mineral.

To treat the subject under consideration from a practical standpoint, it will be necessary to consider the results so far obtained in the present depths, and see what kind of deductions, if any, can be made therefrom. In conjunction with this, reference must undoubtedly be made to the genesis and also to the structural geology of the deposits, as well as to the formations with which they are associated.

When a new asbestos company intends to start operations, the first questions always asked are: How much is there of the mineral available, what does it cost to get it out and to refine it, and what profit is there in it? These are the paramount questions of the day in all mining enterprises, and the more briefly and decisively these questions are answered the more intelligent they are to the general public and the more effective are the actual results. In almost any other class of mining the methods of exploitation are char-

acterized by the preparation for stopping or winning of the mineral through shafts and drifts. Diamond drilling is frequently resorted to in case more light is needed on the extent of the deposits, either in a lateral or vertical direction. All these means are employed in order to arrive at a satisfactory conclusion as to ore in sight before any large amounts of money are spent in expensive mining and milling plants. They enable the examining engineer to draw pretty safely his deductions.

But in asbestos mining the case is different. Here the extensive but mostly low grade ore bodies do not admit of underground working such as is generally employed in mines of other classes. In the opinion of the writer only the richer asbestos mines can follow the great example of underground mining, such as was inaugurated for the first time at Thetford by Mr. George Smith, the general manager of the Bell Asbestos Company.

As a general rule, a quarry is started on a promising spot, and this quarry is gradually widened and deepened as work progresses. Almost all the virgin properties have only surface outcrops to show, and in a few instances a pit, say 15 or 20 feet down, is all that is offered for the purpose of arriving at a valuation of this property or at a satisfactory estimate of ore in sight.

It will be asked here: Why not open up the property by shafts, sunk at different places of the ore body? An answer to this question is found in the following statement: The most irregular character of asbestos shoots, both laterally and vertically, does not admit of an intelligent exploration by deep shafts. For instance, if a shaft is started on what is considered an excellent surface showing, it may be expected that just under the surface one of these lean shoots is encountered accompanying rich deposits, and if it is found that by chance this lean shoot extends vertically for some distance, the conclusion to be drawn from these conditions would certainly be not favorable, whereas if this shaft had been sunk perhaps, say just 25 feet away, the results might have been just the opposite. A striking example of this is the shaft which was sunk by the Bell Asbestos Company twelve years ago to a depth of 137 feet in the westerly part of this property. The ground penetrated did not pay to work, and the deduction was made that that part of the property was of little value. How far this conclusion was off the mark is demonstrated now by the excellent showings exposed through the great underground workings, and that part which was originally condemned has proved to be, the writer ventures to say, by far the richest asbestos ground ever discovered in the district.

Now, what justifies then the talk of depth of these deposits if no exploitation work in shafts and drifts or through diamond drillings is done? It is only the experience in other asbestos mines that guides us in this instance, and, so far as the records show, comparatively few mistakes have been made; and it may here be stated that of all the mining enterprises in all classes and denominations, asbestos mining in the Eastern Townships has the lowest percentage records of failure.

\*Paper read before the March meeting, 1909, of the Canadian Mining Institute.

The experience in the Canadian asbestos mines teaches us:—

1. That the asbestos occurs as "vein" or "slip" fibre in pay shoots, setting through the serpentine in irregular fashion, alternating with lean ore or serpentine poor in asbestos.

2. That often rich pay shoots are encountered when approaching a granitic dike or near the contact with the schist formation.

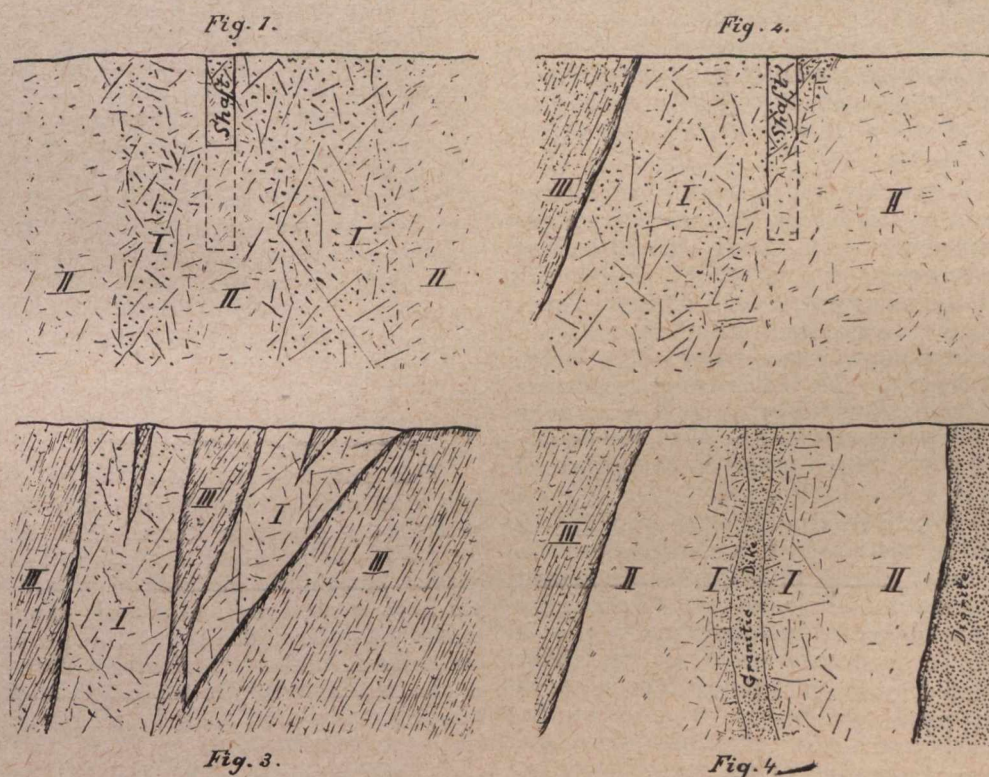
3. That the quality of asbestos at a depth of 200 feet and, as has lately been found in the shaft of the Black Lake Chrome & Asbestos Company, at a depth of 400 feet, is the same, or nearly so, as found on the surface.

4. That wherever there is a large lateral extension of serpentine, and in the latter an asbestos pay shoot the lateral extension of which on the surface is more

take the form sometimes of permanent displacements, and may cut off towards depth an asbestos deposit which on the surface showed all the requisite qualities of a pay shoot.

In the serpentine belt which stretches—as the writer will show later in a new treatise on "Asbestos"—from Range 3, Broughton, with a few surface interruptions right through the Townships of Broughton and Thetford-Black Lake area, interesting studies can be made regarding the permanence of asbestos deposits; but as time does not permit me to go into all of them, a few remarks shall here be made.

At the "Quebec" mine the fibrous rock found on the surface in small shallow pits continued both laterally and vertically along the contact with the schist formation, and the rock is now mined in a quarry about 300 feet long, 125 feet wide and 65 feet deep. At the Broughton property the fibrous serpentine which ap-



Figs. 1 and 2.—Shafts started in good asbestos ground on surface, landing in poor ground. Fig. 3.—Productive asbestos deposit cut off by country rock. Fig. 4.—Rich asbestos ground close to granitic dike.

LEGEND: I.—Productive asbestos shoots. II.—Lean serpentine, non-productive. III.—Cambrian schist and slate.

than 100 feet in both directions, this pay shoot almost invariably, with occasional interruptions of lean serpentine, continues towards depth.

5. That exploration work in shafts alone without the running of large roomy drifts in connection with such shafts, is entirely misleading, and in the majority of cases does not materially add to the value of the property.

Now I must repeat here that the lateral extension of the serpentine as under No. 4 is an important factor in the continuity of the deposit, for the reason that small strips or lodes of serpentine are contaminated and interrupted in their continuity by traplike portions of the adjacent country rock, which are never expected to be present in an extensive development of serpentine (except granitic intrusion) like that of Thetford and Black Lake. As experience has shown, this interruption in the narrow serpentine lodes may

appear only in a few places on the surface was found to extend all along the contact, and the quarries are now down 85 feet. In both cases the fissured and fibrous condition as observed on the surface was found to continue at depth, and although there may perhaps be a change once in a while in the quantity of the vein fibre—like in the "Broughton"—this does not in any way influence the general conditions governing the occurrence towards depth in these places.

The great quarries of the "King Bros.," the "Bell," the "Johnson," the "Beaver, all at Thetford, and also the deep quarries of the "British-Canadian," show conclusively that towards depth no marked change in the quality or richness of the asbestos shoot is observed; indeed, at a depth of 200 feet they appear as continuous and as rich as ever, and taking in now the new discovery of asbestos in a depth of 400 feet in the shaft of the Black Lake Chrome & Asbestos Company, we

certainly have reason to believe that asbestos deposits have no shallow depth.

But, as I said in the beginning of this paper, there are other and, I believe, more important reasons than those mentioned above, namely, those observable after an intimate study of the geological conditions governing these occurrences.

It is now pretty well established that the serpentine of the Eastern Townships, the mother rock of chrysotile asbestos, is a secondary rock, that is to say that it is the alteration product of olivine—diorite—a rock which has its origin in the interior of the earth and broke at one time through the earth crust to the surface. It can be conclusively shown that in nearly all cases this anhydrous olivine rock was changed gradually into serpentine or a hydrous silicate of magnesia, and that subsequently through the action of certain agencies fissures were formed and filled with asbestos from solution which gave rise to the ultimate crystallization of the fibre.

For the purpose of a better conception of these physical and chemical changes and their bearing upon the persistency of the deposits it will be necessary to state briefly how all these changes in all probability were produced.

Sterry Hunt\* shows that the alteration of olivine into serpentine would result in an increase of volume amounting to over 30 per cent. Now, admitting that some of the silica or even of the material is lost in the process of hydration, there must be still a great expansion at some time of the process, and this expansion must at the same time mean increased pressure in the interior of the rock, since the surrounding formation undoubtedly did not allow of an easy expansion through increase in volume. It was thus impossible that fissures could have been formed at this stage of the process.

There seems to be no question that as soon as the process of alteration was finished, a readjustment in the rock masses took place, and this readjustment resulted in the formation of joints and slickensides such as we find them to-day in the mines, and not, as is generally supposed, in the formation of fissures. This theory is substantiated by the fact that in the mines at Thetford numerous places can be seen where these fissures (asbestos veins) cut right through joints and slickensides. The next question arises, then, how have these fissures been formed? Was it through shrinkage due to a loss in silica or due to shrinkage of the rock mass through cooling? Now, if these fissures were formed through the loss of silica, they would have been formed during the process of alteration, that is, before the joints and slickensides were formed, but that this would have been impossible is simply explained above.

The most rational explanation, and the one which seems to gain most support, is the formation of cracks caused through cooling and shrinkage of the rock masses similar to the formation of cracks through shrinkage of a gelatinous mass of iron carbonate, as in the so-called septarian nodules of clay iron stone, as suggested by Merrill. However, it is also probable that the intrusion of those granitic dikes so frequently met with in the serpentine masses has caused or facilitated to a great extent the formation of numerous fissures in the immediate proximity of these intrusions by rapid dehydration through the agency of heat. The fact that

very frequently an accumulation of asbestos veins can be noticed in approaching these intrusive dikes seems to substantiate this theory.

Now, it is obvious, from a geological point of view, that all these great radical changes which were perhaps brought about during long geological time intervals, took place not only on or near the surface, but also deep down in the bowels of the earth. It is impossible to imagine that the changes in the character of the rock, viz., the alteration into serpentine, the subsequent readjustment of the rock, the forming of fissures and the ultimate filling of the latter with a crystallization of the serpentine solution, should have been confined only to rock portions near the surface, hence we are justified in assuming that these radical changes must have affected the whole system, that is, they must have extended to great depth. We cannot at this stage of investigation conceive of any influence coming from the surface or being exerted near the latter which could have created such conditions.

There exists a great difference in the quality of serpentine and the fibre found in the Thetford and in the Broughton district, and much interest is being manifested at present in the question as to whether there is any relation between the two occurrences. Recent investigations have shown—and this is amply supported by the discoveries which have been made during the last year or two—that the Broughton serpentine belt, which occupies a straight narrow strip in Broughton Township and in the easterly part of Thetford, conformably deposited with the Cambrian schists, continues with few small interruptions into the great serpentine knoll around Thetford village, that further a gradual change can be noticed from the "slip fibre" quality as at Broughton into the vein fibre as found in the westerly part of Thetford.

This evidently goes to show that there exists a genetic relationship between the two occurrences, and it seems very probable indeed that the serpentine belt over its whole extent has its origin in one common source, but that at Broughton, where the "slip" asbestos fibre is produced, additional changes and readjustments have brought about the prevailing conditions. In order to make this clearer a first attempt has been made by the writer to tabulate the successive changes which the original rock in all probability underwent until its present state.

1. Intrusion of diorite-olivine through the earth crust from below.
2. Gradual alteration of the rock to serpentine through hydration, and perhaps loss of silica, increase in volume.
3. Slow readjustment of the rock masses, resulting in the formation of joints and slickensides.
4. Subsequent formation of fissures as receptacles of asbestos fibre, through shrinkage of the rock and also through injection of granitic dikes.
5. Infiltration of serpentinous solution from the sides of the wall through process of segregation and subsequent slow crystallization of chrysotile.
6. Second slow readjustment of the magnetic rock mass and formation of "slip" fibre.

The writer has gone more fully into the question of origin than was originally intended, but this was deemed necessary in order to follow step by step the alteration and successive changes of the original rock mass, and also to show that these most radical changes cannot have affected the serpentine near the surface alone, but also must have penetrated to greater depth.

The agencies which have brought about all these

\*Mineral Physiology and Physiography, p. 506.

changes must have been steadily at work for enormously long periods, and their cumulative effects are crystallized in what we possess now in the shape of economic asbestos deposits.

The actuating dynamic forces have been of such great drastic effect that no man, it may be said, has ever observed their equal, because the changes have been brought about so slowly or so deep down within the crust that no direct observation is possible, and

for this reason we can only infer the mode of procedure by examining closely the results. To what depth then these rock masses have been affected by all these changes to produce what is now known as asbestos rock must remain a matter of surmise, but, judging from the results which lie now before our eyes, I venture the opinion that these workable asbestos deposits extend to considerable depth, probably to several thousand feet.

## THE SILVER ISLET VEIN, LAKE SUPERIOR.

By Walter McDermott, Past President.

Paper read before the Institution of Mining and Metallurgy.

In presenting the following reprint of an old article on the Silver Islet Mine, the writer offers as excuse the fact that the occurrence of native silver associated with nickel and cobalt may prove of some interest in connection with the present experience of mining at Cobalt; also that the influence of graphite on the silver deposition, together with the existence of gas in the ancient rocks of Canada, may receive some explanation in the paper of Mr. Hixon on a "Theory of Volcanic Action and Ore Deposits." The very age of the article may be considered as some reduction of the fault of its reproduction in the face of the general rule of the Institution as to the acceptance only of original papers.

In explanation of certain portions of the article, and of the remarks as to the proper attitude of mind for mining men on theories of ore deposition it is advisable to mention that the paper was written particularly to oppose the views of an authority from Nevada who had denied the possibility of any connection between the graphite and the silver, challenged the production of any evidence to the contrary from any other mining country, and maintained that the proper direction to look for silver in future was in the slate country, not within or near the diorite.

As regards the character of the gas met with, the suggestion of its being carbonic oxide rather than the more obvious assumption of carburetted hydrogen, cannot be taken as settling the question; although it can be stated that the alternative was considered at the time.

From the private manner in which this property has been owned and worked very few details of the mine have been made public; although the vein, as developed, is in many respects remarkable and the conditions of occurrence of the silver are well worthy of attention. In the following paper it is proposed to give an account of some of the most striking features of the vein, with a comparison of the conditions determining the deposit of the silver with those in mines of other countries.

The position of the Silver Islet vein, on a small bare rock, 70 ft. by 80, three-quarters of a mile from shore and exposed to the full sweep of Lake Superior, has controlled the extent of the workings. It is not proposed here to describe the difficulties to be overcome in order to work a vein actually under water at its outcrop on a bare rock over which the waves of Lake Superior freely washed in every storm. Suffice it to say that at a great cost the matter was accomplished, an artificial island built up of cribs and thousand of tons of rock, a watertight coffer-dam sunk, and a shaft and customary workings opened.

This opening of the lode by a single shaft has limited the workings, so that although the mine has been in

active operation some six years the present depth is only about 650 ft., with a maximum extension of about 500 ft. From this small excavation, but really confined to a mere portion of it to be subsequently described, about \$2,500,000 in silver have been taken; and there is no reason why as much more may not be hereafter extracted.

The immediate country rock around Silver Islet consists of a very silicious slate, with a slight dip to the east. Through this slate a number of diorite dykes cut, running in a general north-easterly direction. These dykes, withstanding better than the slates the action of the air and water, are left standing in places as small islets or as a backbone to larger islands, in the vicinity of Silver Islet, which is itself one of the small crags of diorite left above water.

When work was first commenced on the rock, the white, clearly-marked vein could be distinctly seen under a few inches of water, cutting at right angles across the dark body of the diorite dyke, and thus having a north-west strike.

In the mass of the dyke a strong branch vein east of the main lode, and diverging to the east, could be also seen; and south of the junction of these two, a strong spur shot from the vein diverging to the west.

In addition to these two a number of smaller strings or leaders could be seen leaving the body of vein matter, but falling into it again at a greater or less distance. About 20 ft. to the south of the junction of the east and main veins, the diorite was found to be strongly impregnated with graphite, giving a black, coarsely granular, friable character to the whole rock so changed.

The walls of the vein when cutting this rock were smooth and well defined often exhibiting beautifully polished grooved surfaces, perfectly black and soiling the fingers when touched; occasionally small nodules of pretty pure plumbago occurred in the walls, some of these weighing several pounds.

The zone of this graphite impregnation extended south in the dyke for a length of about 100 ft., with an average width of about 40 ft., occupying the entire space between the east and the main lodes at this point, and extending in places a few feet outside of both.

The general form of the zone was an irregular pear shape, with the small end north, in correspondence with the approach of the two veins to each other. The mass of gangue itself consists of an irregular mixture of white and salmon coloured crystalline calcspar, carrying also carbonate of magnesia; and, in the colored portions at least quite a proportion of manganese, probably as rhodochrosite, indeed, distinct crystals of that mineral have been observed.

With the calcspar, irregularly distributed, are patches of quartz and scattered crystals. As in most vein gangues the character varies, being in places highly crystalline and at other points finely granular, while the proportion and depth of color of the pink spar and the distribution of the quartz add to local differences, and after experience become accepted as indications either favorable or otherwise to the occurrence of silver.

The width of the vein varies, but will average from 5 to 6 ft., though at one point increasing to 25 ft., and at another pinching almost out.

At certain parts of the lode "vuggs" are frequently met with, usually lined with crystals of calcspar, quartz, and often containing clay, with varying quantities of iron pyrites, galena, zinc-blende, and argentite. The silver occurs mostly native, in grains, threads, or massive, rarely crystallised; also as sulphide of silver massive, or in leaves and well-formed crystals.

Associated with the silver are found iron and copper pyrites, galena, zinc-blende, niccolite, smaltine, and occasionally stephanite and pyrargyrite have been observed.

The form of distribution of the silver is in patches and streaks from 1 in. up to 2 ft. in width and from a few inches in length up to 20 or 30 ft. These masses occur either irregularly scattered, or arranged in broken lines for a distance of 50 or 60 ft.

Many of the pockets consisted of almost massive silver, with so little intermixed rock that the mass flattened under the hammer, and would remain shattered but firmly clinging after a blast.

The fact most striking to one who examines the parts of the vein from which the most valuable ore has been extracted is the evident connection of the deposit of the silver with the region of graphite impregnation of the wall rock, and this point will be readily conceded on the following facts:—

The east vein was found in sinking to drop towards the main lode, and at about 300 ft. in depth a junction occurred.

The plumbago was found to decrease in width as the veins neared each other, and at length, at about 360 ft., it suddenly cut out on a floor, and when the graphite ceased the silver was found no more.

The east vein itself received the benefit of the graphite, and yielded much rich ore until it fell into the main vein. When branches or small strings of the vein occurred in the plumbaginous rock, silver was generally found in them, often as a sort of thin plate between the spar and the graphite walls, and outside of the veins the graphite rock itself frequently carried silver.

The west vein, lying under the footwall of the main vein, joins the latter as already stated, the plane of intersection dipping off more and more to the south as depth is attained, at the 420 ft. level the two veins running parallel for over 100 ft.

It has been in the vicinity of the junction of these two veins, and within the body of the plumbago ground, that the immensely rich bunches of silver have apparently congregated in the upper levels. The dyke itself dips to the south, and the run of silver dipping in the same direction has always remained within the diorite rock. North and south of the dyke in the slate, the vein has so far proved itself incapable of carrying silver.

A few scattered small patches of silver have been met with, but the quantity has been so small and the occurrence so seldom, that practically all past experience would pronounce the slate as unproductive. The same term, indeed, might almost equally well be applied to

those parts of the diorite which do not contain graphite; but the graphite has not been found in the slate at all.

The west vein in the upper levels yielded very rich ore while running in plumbaginous rock, but on being followed out into clean, diorite, ceased suddenly to produce. The vein is not devoid of metallic minerals, either in the slate or in the normal diorite.

Galena and zinc-blende are found plentifully scattered, but neither of these minerals carry more than forms a mere trace up to two or three oz. of silver to the ton when found outside of the plumbago ground. Within the silver bearing portions of the vein both the lead and zinc-blende are usually rich in silver, in some cases the latter metal appearing to be contained within the ore as small disseminated grains of native silver, while in other instances the silver appears to be in regular combinations as isomorphous sulphide.

This rule, however, is not by any means universal, for occasionally patches of galena or zinc-blende are found in close proximity to rich bunches of silver, and yet are almost devoid of the metal themselves. The other fact, viz., that outside of the plumbago ground the galena and zinc-blende are practically without silver has so far been without exception.

The observation of the well-defined limits of the graphite within the diorite naturally led to the supposition that the mass, being in the form of a detached deposit, further pockets within the dyke might be fairly expected in sinking. The occurrence of graphite in Cumberland as large pockets within the trap-rock lends additional force to this belief. The expectation has in a small degree been already realised.

At a depth of nearly 200 ft. below the upper mass a small isolated patch of plumbaginous diorite was found; and about 60 ft. again below this a hard pocket was met with. Neither of these last two was of any great size, the lower and larger being only about 9 ft. in length, but it is a remarkable fact that in both cases some small streaks of silver were met with, although in the ground between and above no trace of native silver had been observed.

While treating on the subject of the graphite, another occurrence apparently connected therewith may here be appropriately mentioned. At a depth of about 360 ft. it was found that many of the "vuggs" were filled with an inflammable gas. This gas, either opened upon in volume by the exposure of a large cavity or issuing under pressure from a fissure in company frequently with water, was found to burn freely, and from its negative qualities and the color of its flame, was set down as carbonic oxide.

In some cases, especially in the lower levels, the volume of gas contained under pressure was really startling, and jets of flame many feet in length were maintained for hours at a time.

In one case a flame was thrown 40 ft. along the top of a level from the sudden breaking into and the ignition of one of these pent-up reservoirs. Some men were seriously burnt in this instance, and after the flame had somewhat subsided it became possible to creep along the floor of the level and plug up the drill hole from which the jet was issuing in such manner as to leave only a small flame burning.

This regulated jet burned steadily for about six weeks before the supply of gas was exhausted. The origin of the gas has been attributed in some way to the carbon of the graphite ground, and is accepted as a further indication of the probability of large masses of plumbago below the present workings.



Whether the gas it at present forming, or has remained pent up for ages within the cavities of the rock cannot be stated with the present knowledge of its occurrence.

The only fact bearing on the question of origin so far observed is that at the part of the vein where the gas was first seen an evident decomposition of the vein matter was taking place, the rock being honeycombed, softened and generally changed in character, the change having been accompanied by a deposit of well-formed crystals of silver glance, galena and zinc-blende. This, however, was only observed at one or two points in the vein, and may merely indicate the present formation of geodes within the veins, without connection with the origin of the gas found filling these cavities.

The water percolating through the fissures of the vein appears to be clear, pure and free of acid elements, as indeed might be expected in passing through a calcareous gangue. No analysis has, however, been made of the water. In boring with the diamond drill at a depth of 300 ft. below the lowest working, gas and water were met with again.

In recapitulation of the conditions under which the precipitation of the silver seems to have taken place, it will be observed that the determination of the deposit is in accordance with most of the conditions accepted as generally favorable in other mining districts.

In some respects every mining region is a law only unto itself, but there are certain generally accepted principles that apply with more or less force to all. It would be extremely foolish for a person to go from one mining country to another and apply a local experience in the first strictly to the second without regard to actual observation in the latter.

An engineer of experience will always, in the first place, discover all he can of the actually observed facts, and if he can then make these facts chime in harmoniously with any theory of his own, he will feel confidence in directing his explorations accordingly. If there be a want of harmony between facts and theory, the practical man bases his operations on the former, and keeps the latter to himself until circumstances are more favorable.

The past experience at Silver Islet has been that the vein is only productive within the diorite dyke; that the limits of the productive portions of the vein within the dyke are determined by the region of plumbago impregnation, both in horizontal and vertical extension; and that the said productive portions of the vein are within what may be taken as the influence (if any) of the junction of an east and a west vein with the main lode.

In the following extracts from Van Cotta's treatise on ore deposits it will be seen that all the conditions named above are generally accepted as favorable to the deposit of ore; so that any explorations based on the acceptance of these conditions has not only the weight of former experience as a justification, but is in accordance with such generalization as men of science have so far deemed it proper to make.

Of course it does not necessarily follow that even should the same conditions be again encountered, immense deposits of silver will be met with; but the chances are so greatly in favor of such a result that the search for similar conditions is the only rational method of exploration for the future.

Van Cotta, p. 44.—“The union of branches into a single lode or the reverse, the splitting up of a lode into several branches, has been frequently assigned as the richness or poverty of the same. The fact is indisputable.”

That the influence of the country rock is great, and the passing of a vein from one rock into another is attended with changes in the extent of ore deposition, and consequently that a junction of two different rocks is a favorable condition, we have the following remarks from Van Cotta:

Page 50.—“Around Freiberg the lodes in general, without distinction in regard to the character of the formation, have attained a development favorable to mining only within compact rocks in which feldspar or quartz hornblende, pyroxene, as also carbon (graphite, anthracite), or carbonate of lime, form an essential ingredient. Although to be sure the lodes are not always favorably developed in rocks conducive to a deposit of ore, and are frequently even barren of ores within them, still, when they do contain ores, it is only in these rocks; while on the other hand they are always barren and never contain ores in the unfavorable rocks.”

Page 48.—“At Kaafjord, in Finland, the country rocks consist of diorite and arenaceous clay slate. In the first the lodes are very rich in copper, in the last they are contracted and unproductive.”

Page 49.—“In South Carolina the country generally is itacolumite, talc and mica schists, and gneiss, with dykes of greenstone, phonolith, etc. Where a lode comes in contact with a dyke, intersects it, or is broken by it, a local enrichment has always taken place. This enrichment is often so considerable that many lodes have only been productive in such places.”

Page 466.—“The copper deposits occur developed at the junction of the diorite and limestone, or diorite and garnet rock.”

Page 418.—“In Cornwall, by the passage of veins from one rock into another, a change usually takes place in the amount of ore, in which the portion of lode at the junction is often the richest.”

Page 46.—“Near Freiberg the veins are enclosed in mica schist, which contains an irregular layer of black graphitic schist. The veins have only been found productive in the black schist. In the common mica schist they are poor.”

Page 265.—“We have a very fine example of a bed-like impregnation formed from a lode fissure, which principally follows but one rock, and that a coaly one, like that in which the quicksilver ores in Idria occur, and also similar to that of Braunsdorf, near Freiberg, which exerts such a favorable influence on the lodes traversing it.”

Page 507.—“Quicksilver beds in bituminous shales of Idria and St. Anna in Austria, also at Vallalta near Agordo.”

Page 400.—“At Almaden Quicksilver Mine, Spain, the immediate wallrock is usually a black carbonaceous slate, and quartzite with which hard and fine grained sandstones and slates alternate, but contain no ores.”

In addition to the examples cited above as to the favorable effect of carbonaceous matter in the country rock, some instances from the neighborhood of Silver Islet itself may be here alluded to.

At the Duncan Silver Mine, native silver with zinc-blende, galena and iron pyrites, occur in a large calcespar vein. The country rocks are diorite and slate; parts of the latter are of a black carbonaceous character, and such parts have been observed to be favorable to the occurrence of silver.

At the old Thunder Bay Mine the same fact was observed, and on a sudden change in the country rock the vein was lost, either by a throw or actual cessation of the vein.

At the Jarvis Island Mine a strong calcspar and barytes lode crosses the slates and cuts a diorite dyke. In parts of the dyke the walls showed plumbago, and in such portions the vein usually yielded rich patches of ore.

In the Pie Island vein, strings of quartz in black carbonaceous slate are rich in native silver. At the Singleton Mine a bituminous substance is reported as existing in the wall-rock.

As a summary of the examples selected from Van Cotta, the following further extracts may be given, as the generalization to be drawn:

Page 59.—“There are certain rocks which can, locally at least, be termed ore-carriers, while others are almost the reverse of this. The modifying influences of the country may be of themselves so slight that they escape observation; they may still, however, become perceptible through combination with other causes. For example, the effect of the junction of two lodes may of itself remain imperceptible, and even so the effect of a particular enclosing rock, but where they both meet—that is, where the line of junction of the former traverses the, also but slightly favorable, zone of rock—a very perceptible enrichment takes place.”

Page 53.—“We may consider it proved from all these examples that the nature of the country has exerted a certain influence on the contents of the lodes, and especially on the unequal amount of ore they contain; but the observations hitherto made can only be regarded as local, the results of which are not adapted to application, except in the localities where the observations were made. Local observations must be made concerning this influence before it can be rightly adopted as a foundation for mining operations.”

Enough has been said and quoted to prove, as clearly as such subjects admit of, that the conditions under which the silver occurs in the Silver Islet vein are not by any means abnormal, and that therefore mining operations may be safely based on past experiences, and that any other plan of exploration would be without either practical or theoretical justification.

There are several points of interest which may be given in a description of a Silver Islet vein, and a brief enumeration of a few is here added.

Although the vein is only under water the mine is not what would be called very “wet.” The water comes nearly wholly from below, streams of water in the upper levels ceasing suddenly when similar streams are cut at a lower point; the water may therefore be called legitimate mine water.

The fact has often been observed both north and south of the diorite dyke that a “throw” of the latter along the line of the vein has taken place, the diorite being found on one wall after the other has changed to slate. This “throw” was either contemporaneous with the formation of the vein fissure, or at least previous to the filling in of vein matter, as no evidence of such an extensive movement is to be seen in the vein itself; the only indication of motion afforded by “slicensides” would point rather to a vertical than horizontal movement.

In the body of the vein “floors” of varying lengths are met with and occupy a more or less horizontal position, but not in such regular form as to set down to motion of the lode.

These “floors” are merely lines of division or cleavage planes, showing no difference in the vein matter above and below, and are always of a rusty color, due doubtless to clay and the passage of water; clay, as already stated, being found in many of the “vuggs.”

Along these “floors” thin leaves and small masses of sulphides of silver almost invariably occur.

There are two very interesting forms in which silver has occasionally been found. The first form is that of thin plates of nearly solid metal. These plates were from 1-16 to 1-4 in. in thickness, and some were 8 and 10 in. square. When cut with a knife a solid surface is exhibited and yet the plates are brittle.

The cause of the brittleness becomes apparent under a glass, when it is seen that the plates are formed by the aggregation of numberless minute grains of silver, connected in a manner, but yet distinct, and so closely deposited that the cut of a knife left to the eye an apparently homogeneous surface of metal. An assay of a portion of one of these plates showed it to be 980 fine silver.

The second noticeable occurrence is the distribution of minute grains of metallic silver through a body of clear crystallized calcspar, giving the later an opaque yellowish color which on a grindstone speedily shows a bright metallic surface. Such ore is termed “clay ore” by the miners, owing to its colour, and might be easily passed by as valueless by an inexperienced person.

Some of the common forms in which the silver is found are extremely interesting, the native silver, in company often with niccolite, forming most beautiful arborescent figures through the body of the vein matter.

In the neighbourhood of “vuggs,” masses of curiously twisted threads of native silver, superficially coated with black sulphide, were frequently brought to light. A few well-defined but imperfect crystals of native silver have been observed.

At the surface of the vein, and partly exposed under water, a rounded granite boulder was found firmly embedded in the vein matter; the nearest granite in place is nearly 20 miles north on the mainland.

As a somewhat similar occurrence to the plumbago in the diorite may be given the finding of isolated and frequently large masses of a soft greenish chloritic substance. The principal mass of this dipped to the south across the dyke, and wherever it encountered the vein had a bad influence on the latter, breaking it up, pinching it, or simply impoverishing.

Work is now being pushed downwards in the diorite dyke and the vein is found strong, perfectly defined and of good character, not only at the present bottom but at the lowest point yet reached by the diamond drill. When it is considered that only nine levels have yet been sunk and that six out of those nine yielded remarkably in silver, it will be understood that the owners have good ground for expecting another prize, and for continuing work on the plan already so successful. And, in this connection, it is worthy of note that, the mine being well equipped and having all means at hand for working, including a fine stamp mill, will yield on all future discoveries an even greater profit than the operations have heretofore.

The Smart-Turner Machine Company, Ltd., of Hamilton are receiving orders for their duplex pumps from all parts of Canada. Among recent orders is one for an electrically driven rotary feed pump and receiver for the heating system of the Technical School, Hamilton. Another order is from the corporation of Medicine Hat, Alta., for two double suction centrifugal pumps.

# THE NEW TRAIL TO GOWGANDA.

In our last issue we promised more detailed information concerning the new trail to Gowganda. For the benefit of those who intend to send parties into Northern Ontario the following facts have been collected.

A Canadian Northern express leaves the Union Station, Toronto, at 5.15 p.m. daily. The train includes sleepers and dining car. Travellers arrive at Sellwood at 7.45 o'clock on the following morning. At 8 a.m. the stages leave Sellwood. Burwash stopping-place is reached at mid-day. At Phoenix, 20 miles beyond Burwash, the night is spent. Here there is accommodation for 50 men. The sleeping-room is clean and comfortable. Separate beds are provided.

## Gowganda Transport Company.

Rates on boilers, heavy machinery and other heavy articles from Sellwood to Gowganda, not exceeding 5 feet in width or height:—

	Total charge.	Number of teams supplied.	Number of men supplied.
1 ton .....	\$40 00	1	1
Over 1 to 2 tons.....	120 00	2	2
Over 2 to 3 tons.....	240 00	3	3
Over 3 to 4 tons.....	360 00	3	3

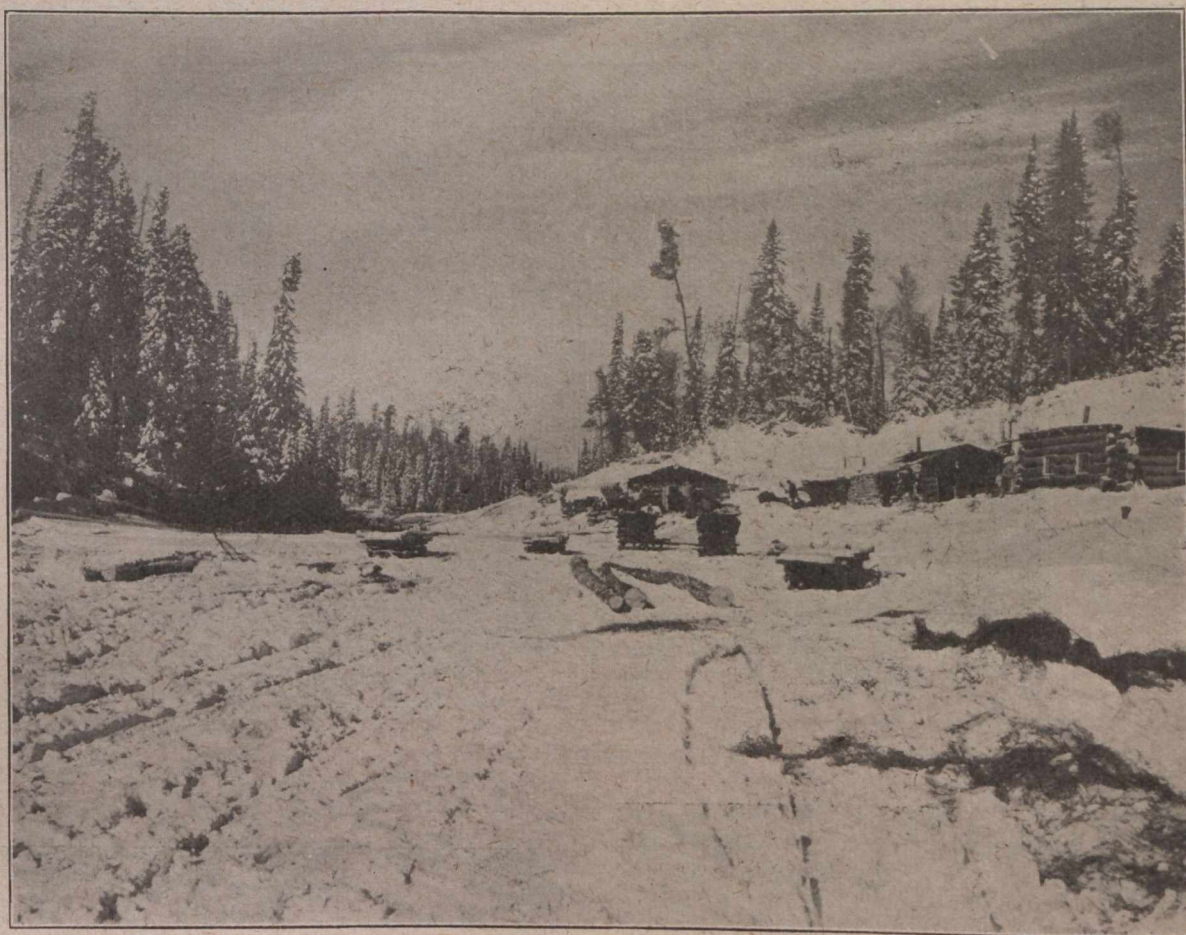


Photo by J. B. Tyrrell

BURWASH.

Shortly after noon on the second day Gowganda is reached.

A short cut through the territory of the Bartlett mines has lessened the drive from South Gowganda (Elkhorn) to Gowganda City by five or six miles.

The railway fare from Toronto to Sellwood is \$8.50, single. The sleeper costs \$2. From Sellwood to Gowganda City the stage fare is \$7, not including meals. Fifty cents per meal and fifty cents for a night's lodging are the established rates.

Mr. W. Phillips, the General Eastern Agent of the Canadian Northern Railway, Toronto, has kindly furnished us with the following provisional tariff issued by the Gowganda Transport Company:

If extra men are required to handle these articles from cars or to go along with the shipment to assist in handling, the extra charge per man will be \$2.50 per day. If owners have their own men available for this purpose, extra expenses will be avoided.

Should owners desire to handle these shipments themselves from Sellwood, the Gowganda Transport Company will provide teams at the rate of \$8 per team per day, which includes one man per team, as well as feed for horses.

Articles weighing over 4 tons are to be handled by owners only, the Gowganda Transport Company to provide teams under conditions outlined above.

These heavy shipments are to be handled over sleigh



Photo by J. B. Tyrrell

A PROSPECTOR'S TENT.



Photo by J. C. Murray

A GROUP TAKEN AT SOUTH GOWGANDA.

From left to right—Messrs. Cameron, Shaw, Errington and Cowan. Mr. Shaw is a well-known prospector; the others are officials of the Gowganda Transport Company.



Photo by J. B. Tyrrell

BURWASH STOPPING PLACE



Photo by J. B. Tyrrell

DISCOVERY POST ON A SNOW STAKED CLAIM.



Photo by J. B. Tyrrell

PHENIX STOPPING PLACE.

road, so that no delay will occur in the movement of other sleighs containing freight or passengers.

It is important to note that although the snow may last until well on in April, yet it will be well for those who intend to ship in supplies to get them in at as early a date as possible. Ample storage facilities will be provided for merchandise, canoes, etc., at South Gowganda.

Meanwhile the road is to be kept in as good condi-

tion as possible; 150 teams are in commission. A road superintendent inspects the trail daily, and no pains will be spared to bring it up to its highest capacity.

The accompanying photographs will give a fair idea of the trail, etc. We would draw particular attention to the picture that shows a "valuable discovery." Ontario inspectors will have a busy time in the coming spring.

## THE REPORT OF THE GERMAN DEVELOPMENT COMPANY, LIMITED.

III.

1908.

### Abstract of Report on the Kananaskis Coal Area. By D. B. Dowling.

The matter in Mr. Dowling's description of the part of this area leased by the German Development Company is compiled from reports made by him to the Geological Survey of Canada, and papers read before the Canadian Mining Institute.

The prospecting of this area was not difficult owing to the fact that the exposures are mostly all on the hillsides, in the gullies that run across the measures, the lower portion only being hard to expose owing to the greater accumulation of loose material from the higher slopes.

The few analyses so far made of outcrop samples show that these coals can be classed along with the Canmore coals, which are of great value as steam producers. Some of these seams may prove harder away from the outcrop or in the vicinity of the fault, but none of them should go higher than semi-anthracite in grade, except in local portions only of the seams. If a few seams do run to anthracite the market is not oversupplied and is steadily growing.

The major portion of this coal will serve for steaming (locomotive), and should be superior to anthracite for gas producer use.

Using the ratio between the volatile and fixed carbon constituents as a standard for comparison, the analyses of eight samples of the seams show that three of them are softer, or higher in volatile combustible matter, than any of the Canmore coals. Of the remainder all compare favorably with the upper or softer seams at Canmore. These Canmore coals have been in steady use on the C. P. R. locomotives in the mountains. This result is gratifying since the Canmore mines, capable of producing only 600 tons per day, was thought to be the only one in the district that could supply steam coal. If the measures near the Kananaskis be mined, the long haul from the mines on the Crow's Nest branch of the C. P. R. will be saved, and this area will become a large producer.

The number of seams discovered, as well as the undisturbed position of the measures, assure a very large total of mineable coal. Assuming that there is an average of 90 feet of coal to be mined where the whole thickness of measures is present, this amounts to 150,000 tons to the acre, or 90 millions per square mile. Allowing for dirty seams and coal left in the mine, an approximation of 65 million tons per square mile should not be excessive, or, for the total area of the company, about 500 million tons.

The Kananaskis Valley is wide where the measures cross it, and there is ample room and an excellent site for a town. The measures are cut to near the level of this valley by a small stream (Ribbon Creek), which comes from north of Mount Kidd, so that there are four points from which mining may start. The principal block of coal is north of the stream. The site there for mine works is ideal, as there is a natural terrace from which to drive tunnels, and from which loading facilities may be provided for the cars which would be below this level. This area being above the level of the river can be mined from the level entry, as in the plan pursued at Bankhead mine, affording natural drainage and very easy haulage for mine cars.

If the coal proves to be of the Canmore class the mining should be done as cheaply as at the above mine. The output will nearly all be marketed, as the fine coal is preferred by railway firemen. There will be a tendency by miners to include dirt with the run of mine, and careful picking and mining will have to be insisted upon.

In view of the fact that production of coal follows closely the increase in population, and in considering the future needs of the country, it is quite evident that if the present mines are working near full capacity, others must be opened in the near future.

The first need of the population is for domestic fuel. The next is for shipment of produce to market, and this means increased consumption of coal by the railways. Following the settlement is always the building of towns and the establishment of factories, mills, and other power users, so that not only the domestic fuel, but that for steaming and other power producing consumers, is rapidly called for.

Since the Kananaskis Valley coal grades from about bituminous to nearly anthracite, there should be a ready market for it, for both domestic and steam purposes.

1908.

### Abstract of Report on the Kananaskis Coal Lands. By James McEvoy, B.A.Sc. (Late Geologist and Chief Engineer to the Crow's Nest Pass Coal Co., Ltd.).

The Kananaskis coal lands, controlled by the German Development Co., Ltd., are situated on the Kananaskis River. The northern end of the property is 6 miles in a straight line due south of Gap Siding on the main-line of the C.P.R. The property is about 8 miles long, north and south, and its greatest width east and west is 2 miles. It comprises an area of  $7\frac{7}{8}$  square miles, or 5,040 acres.

A branch railway to reach the most suitable point of

access on the property would be 15 miles in length, and would connect with the C. P. R. at the Kananaskis bridge, a point distant 52 miles west of Calgary.

The Cretaceous rocks in which the Kananaskis coal occurs were deposited long before the Rocky Mountains were uplifted. When the uplift began the Cretaceous rocks were hardened and in a good state of preservation.

In that portion of the Kananaskis basin, in which the German Development Company's lands are situated, a great thickness of Cretaceous rocks was lifted up bodily.

The coal was evidently laid down in the form of peat bogs. Conditions generally may have been more favorable for the deposition of these bogs in Cretaceous times; in any case the bogs were of dimensions both in depth and extent, vastly greater than any bogs to be seen in Canada at the present time. Successive periods of inundation and covering up with mud and sand, with periods of quiet to allow the growths of other bogs, have laid down the series in the order that is now found.

The continued subsequent depression of the land brought about an enormous deposition of material

Estimating that only 75 per cent. of the coal can be actually taken out, we have:

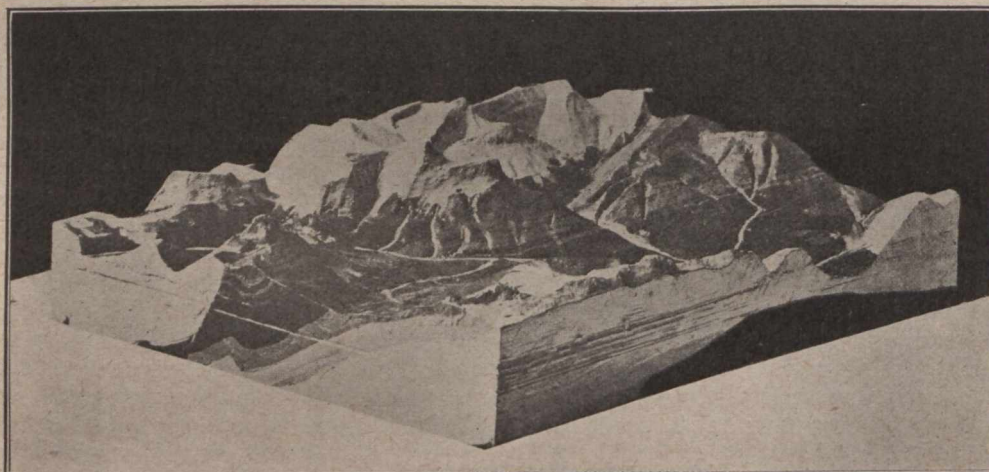
$$519,750,000 \times .75$$

$$=389,812,500 \text{ tons, which can be actually}$$

mined, or 4,000 tons a day for over 320 years. About 125 million tons of this amount can be mined "to the rise," that is, it lies above the level of the point of access, and can be lowered to the main haulage road by gravity, and it will consequently be produced at less cost.

The coal is found at the bottom of the Kootanic series, which is the lowest division of the Cretaceous. Overlying is the Dakota Group, also Cretaceous, and underlying are the Fernie shales of Jurassic age.

The coal is semi-bituminous, that is, of higher grade than ordinary bituminous. The variation in qualities as seen by the relationship between the percentage of volatile matter and fixed carbon shows a considerable range. Those coals low in volatile matter, other things being equal, are the best for domestic use; while those higher in volatile will be preferred for locomotive use. The percentage of volatile matter even in the samples lowest in that respect is large enough to show that the coal will be free burning.



A RELIEF MODEL OF THE KANANASKIS COAL AREAS OF THE GERMAN DEVELOPMENT COMPANY.

forming the strata on top of the coal series, and the weight of these overlying measures began the work of altering the peat into a lignite. The completion of the alteration into the present high-grade coal is due to pressure and heat induced by the mountain-building forces exerted along the Rocky Mountain range. The Cretaceous rocks of the Kananaskis basin are a continuation of those which outcrop at Canmore on the C. P. R., where there is an operating coal mine.

In estimating the quantity of coal so as to keep within safe bounds, let it be assumed that of the 5,040 acres in the property only 4,500 acres will be underlain by all the seams. Taking 70 feet as the thickness of workable coal we have:

$$4,500 \times 70 \times 1,500 \text{ (tons per foot acre).}$$

$$=472,500,000 \text{ tons.}$$

This should be increased by 10 per cent., on account of the extra width of the seams, owing to the angle of dip, therefore,

$$472,500,000$$

$$47,250,000$$

$$519,750,000 \text{ tons.}$$

There are two possible points of access to the coal for operating purposes, one near the west bank of the Kananaskis, near the south end of the property, and the other on Ribbon Creek, near the centre.

All things considered, it is most advisable to open the mines on Ribbon Creek. About a mile and a quarter up the stream there is a flat piece of ground abundantly large for a colliery yard and plant. The coal seams outcrop in the hillside adjoining this flat, and the situation is such that the working part of the tippie can be placed close up to the mine mouth, thus avoiding a long expensive tippie approach.

In the larger seams it will not be practicable to use the longwall system, and some modification of the pillar and stall system must be used. Whether the rooms should be driven up the pitch, or across the pitch, will depend upon the cleavage in the coal. If there is no pronounced cleavage, or if the cleavage is not more than "half on" when driving across the pitch, then that method is preferable. Working in this manner across the pitch the mine should be laid out in panels with a back-balance incline at one side. The length of the rooms on had best be about 300 feet in any case, but the length to which the incline should be driven up

must to some extent be governed by the angle of pitch. Beyond that length, especially if the coal is mining freely, one balance could not properly take care of the output.

The ventilation fan should have an ultimate capacity of 200 to 300 thousand cubic feet of air per minute, and should be constructed entirely of iron or steel, so as to be absolutely fireproof. It may be driven either by steam, compressed air, or electricity.

The output for a year or more can be taken out by horse haulage. After that time some system for handling the coal will be necessary. Next to the endless rope the compressed air locomotive is the best, and if, as is very likely to be the case, the former should be impracticable, the latter system should be installed.

1908.

**Abstract of Report on Bighorn and Brazeau Coal Lands.** By James McEvoy, B.A. Sc. (Late Geologist and Chief Engineer to the Crow's Nest Pass Coal Co., Ltd.).

The Cretaceous coal measures outcrop on the west side of the Bighorn range close to its base and it is on these measures that the properties of the German Development Co., Ltd., are located, one on the Bighorn River, where it runs around the south end of the range, and the other on the south Brazeau River, where the stream cuts a deep gap through the north end of the range itself. The same series of rock formations is met with in the Bighorn and Brazeau countries as was found in the Kananaskis.

**Bighorn.**

There are seven seams of workable thickness, giving a total of 46 feet 2 inches of coal. Six of the seams, containing 38 feet of coal altogether, do not extend through the whole of the area, and in estimating the quantity of coal available it is considered that only 1,500 acres underlain by these seams can be worked from the point of access on the Bighorn River.

Therefore,  $1,500 \times 38 \times 1,500$  (tons per foot acre).  
=85,500,000 tons.

One seam extends throughout the area, but it will be assumed that only  $3\frac{1}{2}$  square miles, or 2,240 acres of it can be conveniently worked.

Therefore,

$2,240 \times 8 \times 1,500$   
=26,880,000 tons.  
Total, 85,500,000  
26,880,000  
+10% for dip, 12,238,000

124,618,000 tons.

The character and attitude of these seams is such that very probably as much as 85 per cent. of the coal can be actually taken out.

That is  $124,618,000 \times .85$

=105,925,300 tons that can be mined or 2,000 tons a day for over 175 years.

It must be borne in mind, however, that there is more coal available in adjoining territory which can only be mined through this property, and the Coal Lands Regulations are such that this adjoining land cannot be tied up by speculators, but will be available for lease when required. The amount of coal from this source will more than double the total above given. The measures will not be entirely free from disturbances, but taken as a whole the condition and altitude of the seams are favorable as far as can be judged by

surface showings and from the development work done.

The Bighorn coal is of high grade bituminous quality, closely resembling the best of the Crow's Nest coals from Fernie, B.C. It will probably yield a higher percentage of coke than any clean coal so far known in North America.

In all probability the dip of the seams throughout the main north-western portion of the Bighorn field will be steep enough to allow the back-balance system of mining. In the southern part of the field, where the dips become less, compressed air hoists may be employed until the dips are less than  $10^\circ$ , after which by driving "slants" the coal can be gathered by horse haulage.

The cost of opening up the Bighorn mines to a daily capacity of 2,000 tons will be practically the same as for the Kananaskis, that is, for an up-to-date plant with the best type of machinery, it will be about \$1,500,000.

If one-third of the output is to be coked the cost of the ovens completely installed will be from \$300,000 to \$500,000, making a total cost of from \$1,800,000 to \$2,000,000.

**Brazeau.**

To the south of the property the coal-bearing rocks are badly disturbed, and this disturbance extends into the property itself for over a mile, decreasing in intensity.

More than twenty coal seams in all were uncovered during the season. Most of them on the banks of George River. The gross total of coal in this section is 86 feet, and of this amount 60 feet in 8 seams is workable.

Making allowance for the loss of the disturbed area and for the lands extending beyond the outcrop of the coal, there is approximately an area of 2,000 acres of productive coal lands. Taking 60 feet as the workable thickness we have—

$2,000 \times 60 \times 1,500$  (tons per foot acre).  
=180,000,000 tons  
+10% for dip of seams  
=198,000,000 tons.

Taking 85 per cent. as the proportion that can actually be extracted, we have  $198,000,000 \times .85$   
=168,300,000 tons or 4,000 tons a day for over 140 years.

The Brazeau coals, like those of the Bighorn, are of high grade bituminous quality, and show equally good coking properties. The ash in nearly all cases is terracotta colored, or, as popularly termed, they are red ash coals. Samples were tested at Fernie, B.C., and give in each case a bright and exceptionally strong coke.

The Canadian Northern Railway is to be extended into the Brazeau field and the Grand Trunk Pacific now under construction will pass within 65 miles of the property.

The grade of the valley of the South Brazeau, where it crosses the property, is about 1 to  $1\frac{1}{4}$  per cent., which is well suited for a colliery yard, and there is an easy approach for a railway.

The building of the Canadian Northern into the Brazeau field will open up at once a great market for this coal.

Beside the markets for coke in Canada and the United States, the Brazeau and Bighorn will be in the best position to fill the demand for coke in the Telkwa Valley when the large bodies of lead and copper ores there are smelted.

By far the greater part of the coal must be taken from the slope workings. The angle of dip is well suited to the back-balance system of mining.

# MINE ACCOUNTING.

By John G. Grant. B.A.\*

(Continued from last issue)

## II.

All the goods bought by a mining company to carry on its operations from day to day are called "stores." Timber, explosives, coal, ropes, tools, etc., are examples of what is covered by this general name. In preparing the revenue account for the year at the head office, the total cost of stores consumed during the year and the stock on hand at the end of the year must be known. In order to supply this information, records must be kept at the mine of all stores received there and all stores distributed. Also, a book or books must be kept showing what the estimated stock on hand is at any time for any class of goods. This latter is necessary from the fact that the orders and payments for stores, are issued, not from the mine, but from the head office, and to keep a supply on hand sufficient to meet any requirement, a knowledge of the quantity on hand, at all times, of any article, is necessary.

To record the receipt of stores either a loose-leaf or

"Stock Received" book may be used. In the case of the loose-leaf book it must be so arranged that two copies of each entry will be made, the original to be placed in the loose-leaf binder and the duplicate, (carbon copy) sent to the head office. Where the bound "Stock Received" book is used, the book itself or a certified copy of it must be sent every month to the head office. The reason for notifying the head office regularly of the receipts of stores is that all invoices are paid from there, and these invoices must be checked for prices and amounts before payment can be made.

Since the average storekeeper at a mine has no extensive knowledge of accounts, and since his duties are varied to such an extent that his bookkeeping is done "when he has time," I have deleted from the common forms of ruling the under-mentioned books all subdivisions not absolutely necessary. The form of the "Stores Received" book shown below is, I think, quite comprehensive enough for practical purposes:—

Stores Received Book

Date	Name	A/c Charged	Folio in Ledger	Quantity		Description
				No	Weight	

It will be noticed that the storekeeper is not concerned in any way with the cost of the goods received. His business is to keep an account of the quantities and weights and to keep separate the different classes of goods received. The latter requisite is satisfied by the entry in the "Accounts Charged" column. In this column is entered the name of the articles received, such as wire rope and hemp rope, hammers, shovels, etc., and a separate account opened for each in the "Stores Ledger" mentioned below.

The distribution of stores provides an opening for

dishonesty and waste, particularly the latter. If the goods were handed out at the request of any workman, no adequate check can be made as to what quantity should be on hand, and as to the rates of consumption of any class of goods. No stores should be delivered by the storekeeper except on a requisition signed by the mine manager or some responsible foreman. These orders should be made and signed in duplicate by means of a carbon sheet, one to be handed to the storekeeper, the other to be kept by the manager. The requisition form may be prepared after the following form:—

Requisition for Materials

Quantity		Description	Where to be used
No	Weight		

No. ....

Date ....

Signed .....

It is imperative to demand requisitions for all stores distributed. Workmen will be much more careful in the use of explosives, etc., when they have to ask the foreman to sign an order for each new supply. Also,

contracts made for sinking shafts, etc., on the basis of the company supplying the stores leave an opening for

\*Chartered Accountant, Toronto, Ont.



a wasteful use of stores which can only be curtailed by the storekeeper insisting on a requisition signed by the company manager. Contracts like the latter are seldom made, and this very fact would aid the contractor in rushing his work at the expense of stores he does not

have to furnish, without being detected and called to account.

These requisitions are entered in a "Stores Delivery" book, of which the following is a simple and sufficient form of ruling. This is, like the "Stores Received" book, a bound volume.

Stores Delivered Book

Date	Where Used	A/c Credited	Folio	Quantity		Description
				No.	Weight	

The column, "Where Used," is most important, as each shaft, cross-cut, main level, drain, etc., should be charged with the materials from the storehouse used in making them when making up costs at the end of the year. The column "Accounts Credited" is just the same as the "Accounts Charged" column in the "Stores Received" book.

A book called the "Stores Ledger" is kept, to which both of the above books are posted, the folio column in each book having numbers referring to the page in the Ledger on which is kept the particular account mentioned in the "Accounts Charged" and "Accounts Credited" columns. The receipts are posted to the debit of the accounts, and the deliveries to the credit of the accounts. The difference between the two must

be the stock on hand at any time. Of course, the difference is of no value unless the books are kept posted up all the time, as they should be. If posting is neglected, requisitions will be sent in to the storekeeper for goods which are not on hand. When goods are ordered through the head office and several days must necessarily elapse between the giving of the order to the head office and the receipt of goods. Close watch must therefore be kept and requisitions sent to the head office for goods, the stock of which is running low, in ample time for the goods to be received before the balance is exhausted. This may mean the saving of several days' time on contract work, etc., and the result is obtained by the storekeeper simply keeping his accounts posted up to date. The requisitions sent to the head office should be as follows:—

Storekeeper's Requisition

Article	Date of Last Supply	Quantity of Last Supply	From Whom Purchased	Present Stock	Remarks	No.	Date

At the close of the year the inventory of stores on hand is taken, and the Stores Ledger balances afford a most valuable check on the accuracy of the stocktaking. An explanation should be given for any discrepancies shown by the check, and there will always be a

few differences, no matter how carefully the work during the year has been done.

In the next article I will take up the questions of wages books, analysis of costs, and the forms to be sent to the head office.

(To be continued.)

**MINE WATERS.**

By A. C. Lane, State Geologist of Michigan.

Abstract by R. E. Hore, Dept. Geology, Kingston, Ont.

At the June, 1908, meeting of the Lake Superior Mining Institute, Dr. Lane read a paper which contains an abundance of data regarding the waters of the copper and iron mines of the Lake Superior district.

A large number of chemical analyses are given and it is shown that both in iron country and copper coun-

try the surface waters are comparatively soft. With increasing depth the amount of chlorine increases. The calcium percentage increases also, so that we may say that calcium chloride is present. These waters seem to have been buried with the strata, and may be called connate waters. At depths greater than fifteen hundred feet their strength is not uncommonly greater than that of sea water.

Of the numerous analyses discussed in the paper two are here given as typical of the lower and upper levels:

No. 96 Quincy Mine, dripping on 55th level, north of No. 6 shaft. Analysis by Dr. Fernekes.

Cl. ....	176.027	grams per litre.		
Br. ....	2.200	"	"	"
Ca. ....	86.478	"	"	"
Na. ....	15.188	"	"	"
K. ....	.411	"	"	"
SO <sub>4</sub> .....	.110	"	"	"
SiO <sub>2</sub> .....	.020	"	"	"
Fe <sub>2</sub> O <sub>3</sub> and Al <sub>2</sub> O <sub>3</sub> .....	.010	"	"	"
Mn. ....	.004	"	"	"
Cu. ....	.016	"	"	"
CO <sub>2</sub> .....	none	"	"	"
Ni. ....	.006	"	"	"
Sr. ....	trace	"	"	"
Ba. ....	none	"	"	"
Li. ....	none	"	"	"
Mg. ....	.020	"	"	"
Boron. ....	trace	"	"	"
Sum .....	280.489	"	"	"
Difference .....	.011	"	"	"

Total solids determined 280.500 " " "

No. 110, South Kearsage, No. 1 shaft, dripping at 9th level. Analysis by Dr. Fernekes.

Cl. ....	.702	grams per litre.		
Ca. ....	.0912	"	"	"
Na. ....	.414	"	"	"
SO <sub>4</sub> .....	.075	"	"	"
SiO <sub>2</sub> .....	.035	"	"	"
Fe <sub>2</sub> O <sub>3</sub> .....	.030	"	"	"
Sum .....	1.3472	"	"	"
Difference .....	.0028	"	"	"

Total solids determined 1.350 " " "

Two facts stand out very prominently. The much greater percentage of chlorides in deep waters and the reversing of the quantitative relations of calcium to sodium.

In No. 96 it is worth noting that calcium and sodium chlorides form 99 per cent. of the total salts, and sodium bromide three-fourths of the remainder.

The determination of the character of the mine waters has aided materially the study of the origin of the ore deposits.

It seems safe to assume that some of the Keweenaw

conglomerates and amygdaloids were filled with sea water and contained some chlorides. Warmed by heat given off from slow cooling lava sheets, these waters attacked the lavas and produced the chlorite and zeolites so characteristic of the melaphyres. Hence much of the water was absorbed, in formation of hydrous minerals, and what remained was relatively stronger in chlorides.

On further cooling water was drawn in from the outcrop and a second set of alterations took place with deposition of minerals at the contact of the soft and hard waters. Copper deposited especially with calcite prehnite and epidote.

The formation of copper from chloride solutions has been accomplished in the laboratory by Dr. Fernekes. The end products are actually the common products of the veins and the most abundant constituent of mine waters—calcium chloride.

In the secondary changes of the mine waters and in all the reactions leading to the deposition of copper there was accumulation of sodium in the mine waters. After the copper was formed sodium accumulated to such an extent that sodium minerals were precipitated.

R. E. HORE.

#### SUCCESSFUL USE OF THE "BRAT" OXYGEN REVIVING APPARATUS.

(Excerpt from "Gluckauf" of January 30th, 1909).

The "Grossherzog von Sachsen" Colliery, Dietlas, Germany, report that a successful demonstration of the usefulness of the "Brat" reviving apparatus recently occurred at this time. On the 27th November a number of the workmen were more or less asphyxiated by a sudden outburst of carbon-dioxide gas. Some who had already been given up for dead by the doctors were brought back to consciousness and their lives saved by the use of this device.

The "Brat" apparatus is made by the Westfalia Company, and differs from the first forms of simple oxygen administration in that not only is pure oxygen under pressure forced into the lungs of the unconscious person, but by the use of an injector the compressed oxygen stream is used to exhaust the lungs of all poisonous and deadly gases which have been breathed in. Briefly, this apparatus will strongly deflate and inflate the lungs of an unconscious person, and simulate natural breathing.—Communicated to "Gluckauf" by Bergassessor Grahn.

## BOOK REVIEWS.

**Metal Statistics, 1909.** Published by the American Metal Market and Daily Iron and Steel Report, 81 Fulton Street, New York.

From statistics issued by prominent authorities, particularly from the reports of Messrs. Henry R. Merton & Co., Limited, Aaron Hirsch & Sohn, and other like sources, this handy little pamphlet has been compiled. To the buyer or seller of metals it should be invaluable.

The metal section includes figures dealing with the production, consumption, and price movements of metals. Iron and steel, copper, tin, spelter, lead, silver, antimony, metal duties, and price equivalents are the headings.

**Economic Geology of the United States.** By Heinrich Ries, A.M., Ph.D., Professor of Economic Geology at Cornell University. Second Edition. 451 pages. Illustrated with half-tones, maps and diagrams. Price, \$2.60 net. Published by the Macmillan Company of Canada, Limited. Toronto, Ont., 1907.

In the second edition of Dr. Ries' book the statistics have been brought more nearly up-to-date, and all observable errors have been corrected. Also a second appendix has been added, containing a list of the more important papers published since the appearance of the first edition.

The ground covered corresponds with that gone over in the elementary course in economic geology in

Cornell University. Non-metallic minerals are given precedence over metallic minerals. Modes of occurrence geographical distribution and uses of minerals are given due prominence.

Dr. Ries confines his attention exclusively to the United States. Doubtless the inclusion of information bearing upon other countries would have made a much larger volume necessary. Yet it is probable that had the author added a chapter or two on Canadian and European minerals and mineral markets he would have enhanced the value of his work.

"Economic Geology of the United States" has filled a specific demand across the border. It should be read by Canadian educationists. The need of some such publication on Canadian economic geology was never more apparent.

**Gold: Its Geological Occurrence and Geographical Distribution.** By J. Malcolm Maclaren, D.Sc. One colored plate and 278 illustrations; 687 pages. Published by The Mining Journal, London, England. 1908. Price, 25 shillings net.

The systematic study of ore deposits has become one of the chief activities of modern geologists. In many cases the owners of large mines employ economic geologists to control exploratory work. Thus the economic phases and applications of geology are occupying more and more attention. This is as it should be.

Dr. Maclaren has written this volume on "Gold" with the object of arranging scientifically data already published, and of presenting facts not before known by his readers. He tells us in his preface that "it is believed that absolute progress in the science of ore-deposits will, in the future, be made largely, if not entirely, by induction reasoning." He sets out, therefore, to arrange, in readily accessible form, the salient facts of the deposition of gold.

The book falls naturally into two parts. Part I., which occupies 117 pages, defines the general relations of gold deposits. First the broad principles of cosmology are considered. Then fissures, underground waters, fissure filling, secondary enrichment, are touched upon. After further treating the physical and chemical qualities of gold and of compounds of gold, a classification of gold deposits is given. This closes Part I.

Part II. consists of a descriptive outline of the gold deposits of the world, arranged by continents. Wherever the importance of a district warrants it, geological data, mining conditions, costs, etc., are given. The book is profusely illustrated.

There can be little question as to the need of boiling down the stupendous mass of geological and mining literature that has been produced, and is being produced. Much that is worth preserving would be lost to the reading public were it not for the energy and enthusiasm of men like Dr. Maclaren. Compilation of scientific data is a task for which few men are fitted. It is irksome work. The conscientious compiler is not unlike the mountain that labored and brought forth a mouse. He must read countless periodicals and look up numberless references. He must condense and select and reject from masses of figures and facts. Then he must mould the residue into a coherent and balanced whole.

Dr. Maclaren, unlike most English writers on technical subjects, gives evidence of having followed closely the best literature of his own and other countries.

His bibliographical references are exceedingly complete and creditably up-to-date. To say the least, this is not generally the case with our trans-Atlantic brethren. Too often their citations from other authors date back ten, twenty, or thirty years, and do not include recent writers at all.

In Part I. the author's treatment of the origin of auriferous deposits is clear. His diction is dignified, his style forceful, and his reasoning convincing. That he has acquired a thorough knowledge of the science of ore deposition is apparent from the appositeness of his allusions, and the skill with which, in very limited space, he sketches the present status of the science.

We have stated that Dr. Maclaren's style is commendable. In one respect, however, it is open to criticism. This is his frequent use of the split infinitive. It may be argued that this is an infirmity of many great and good writers. Nevertheless, it is a fault as ungraceful as it is unnecessary.

We believe that Dr. Maclaren's book will speedily be recognized as a sound, capable and comprehensive treatise on a subject that will never lose interest.

**Mining Methods in Europe.** By Lucius W. Mayer. Mining Engineer, 169 pages, illustrated with drawings and photographs. Hill Publishing Company, 505 Pearl Street, New York. Price, \$2.50 net.

The general scarcity of literature on the subject of underground attack incited Mr. Mayer to write this volume. Mr. Mayer, after extended journeys of observation through Great Britain and parts of Europe, has described, from an American point of view, some of the more interesting and important mining methods of Europe.

Ninety-four pages are assigned to descriptions of mining methods in England and Wales. The remainder of the book touches on various phases of mining in Germany, France, and other countries.

Whilst nearly every chapter contains useful data, Chapter VI., "Longwall Methods of Mining Flat Seams," is particularly suggestive. We concur heartily with the author that the advantages of this system are not appreciated on this continent. Canada is probably ahead of the United States in coal-mining practice, but both countries have much to learn from Great Britain and Europe.

"Mining Methods in Europe" is not a compendium of European mining practice. But it contains many descriptions that should prove helpful, especially in Canada. The book is exceedingly practical and, because of the variety of subjects treated, it is easily readable. It is essentially a mining engineer's book.

We cannot forbear noticing that Mr. Mayer is needlessly inexact and inaccurate in his use of words. On page 24 and 25, occurs the sentence, "The possibilities . . . is not beyond reason." This may be merely a typographical error. But on page 29 we find the word "infers" misused. In describing "Retreating Longwall," Mr. Mayer writes thus: "In general, retreating longwall infers," etc., etc. "Implies" and not "infers" is obviously what is meant. On page 30, also, there is an inexcusable blunder. Only from the context is it possible to guess what Mr. Mayer is driving at when he states that "Not alone does the action of the air ameliorate the quality of the coal . . ."

Whilst these symptoms of literary sloppiness cannot be overlooked, we do not hesitate to commend Mr. Mayer's book as highly practical, interesting, and, in matters of technical detail, carefully wrought.

## PERSONAL AND GENERAL.

Mr. H. L. Brown, E.M., has been appointed manager of the Silver Cross Mine at Cobalt. Mr. Brown has had experience in the United States and Mexico, and is said to be one of the best in the profession.

The Secretary of the Canadian Mining Institute has forwarded us the following communication. It appears only at the urgent solicitation of a number of literary Canadians. Hereafter we shall charge advertising rates for all flowing numbers:—

Dear Mr. Lamb,—I have spent several most delightful hours since yesterday reading your notes on the trip. They bring back so many pleasant memories, and some of them so vividly that they seem to have produced a temporary "brain-storm," during which I have semi-consciously jotted down some supplementary notes, as per attached slip:—

'Twas on the plains of Calgary,  
Out westward quite a way,  
Some engineers both brave and proud  
Had stopped to spend the day.

A cattle king, Pat Burns by name,  
Had hailed them as his guests.  
"My friends," said he, "of cowboy fun  
I think we'll go in quests."

"Yes, yes," they cried in unison,  
"This is the woolly West.  
Bring forth your cowboys, bronchos, steers,  
We'll have naught but the best."

"'Tis well," cried Pat, and in his eye  
There danced a little gleam.  
"Go on there, men, just let 'em out;  
We'll show what's to be seen."

But hark, there comes a muffled roar:—  
"The steer!" A cloud of dust,  
and each brave feels his only chance  
Is climb, or run, or bust!

One sprints behind a friendly pole,  
'Twas a record-breaking dash.  
Could he repeat it? I think not,  
Though great the prize in cash.

Another climbed the stoutest post,  
And grinned in fiendish glee.  
Said he, "While I am up thus high,  
The steer, he can't get me."

A third one, gentle as a Lamb,  
Was—well, we don't know where.  
But anyhow he took some notes  
Which were preserved with care.

And these, prepared in faultless style  
Under his watchful eye,  
Will not permit us to forget  
The trip of the C. M. I.

Yours sincerely,

H. RIES.

Judges of literary merit will have no difficulty in conceding that Dr. Ries' great epic entitles him immediately to take rank with such distinguished poets of this class as Homer, Dante, and Mr. J. C. Murray. He

has unquestionably a brilliant career before him. His style is dramatic, yet smooth and even. His disregard for the conventional laws of metre evidences genius. The only fault we have to find—and this no doubt may be attributed to youth and inexperience—is that the climax is tame and unworthy of what comes before; and, while admitting that to take liberties with the original production of genius is a proceeding not as a rule to be countenanced, we have considered the circumstances sufficiently important to suggest to the author the addition of the following lines:—

But the true hero of this tale,  
With modesty most rare,  
Omits to note in the above  
What he was doing there.

How single-handed, quite alone,  
He circumvented that steer,  
And rescued from a tragic fate  
A gallant engineer.

And thus the Ries-on "why we're here"  
Remains for me to tell.  
We're here because we took along  
A brave man from Cornell.

H. M. L.

## CORRESPONDENCE.

To the Editor Canadian Mining Journal.

Dear Sir,—The Hon. Mr. Drummond's letter, which appeared in the Montreal Star, and also in the issue of the Maritime Mining Record of January 13th, on the development of Wabana Mines, by the Nova Scotia Steel and Coal Company, is certainly interesting from more points than one.

It seems to me that a little further explanation is necessary before the public, like a boa-constrictor, can swallow a goat, horns and all.

First, Mr. Drummond says, "The extent of the Scotia's areas is some 38 miles." The mine map (dated early in 1907), from the Newfoundland Government, shows the company's submarine holdings to be 19 areas, of one-half square mile each. These, together with the whole total area of Bell Island, would not make the extent of area as given in Mr. Drummond's letter.

We are pleased and proud of Mr. Chambers' record-breaking feat in driving the slopes, but I fail to see how one pair of slopes, driven on one vein just to tap the area of 9½ square miles, can prove the extent of the three veins supposed to be contained therein; particularly when one of these veins over-lies the one on which the slopes were driven. If this is true of Wabana, why will it not apply to Nova Scotia? I will venture to say that Mr. Drummond has knowledge of more than one pit, trench, or shaft in Nova Scotia, that has tapped more than eleven feet of ore, with greater length of vein than is shown by the pair of slopes driven at Wabana.

Again, Mr. Drummond says, the driving of these slopes had an element of risk. "Who knew how soon a fault or clear cut-off might be encountered?" Has this element of risk been totally removed? The length of these slopes to tap the submarine areas is 5,160 feet. To get through to the outer boundary the distance is something over 6,000 feet. The extension east and west, as given by the Mines map, is three miles, yet we would infer from Mr. Drummond that the element of risk has all been removed. I would like to ask in Mr.

Drummond's own words, in the further development of these areas, "Who knows how soon a fault or clear cut-off may be encountered?" Also, who knows how much and what kind of a roof is over the upper vein, or if there is sufficient to allow it to be worked with safety?

Another point in Mr. Drummond's letter which is hard to understand, that is, how he makes his calculations to get 2,500,000,000 tons of ore.

He says, "The sinking of the slopes has proven beyond peradventure that there is ore of excellent quality in twenty square miles of the company's areas, with the probability, amounting to almost a certainty, that the three seams underlie all of the remaining eighteen miles of the territory."

Let us assume that the total area, twenty square miles, as containing three seams having an aggregate thickness of twenty-five feet. Twenty square miles equals 557,568,000 square feet, or multiplied by the thickness of the ore, equals 13,939,200,000 cubic feet. The specific gravity of Bell Island ore is 4.14, or 258.75 pounds per cubic foot. We, therefore have:

$$\begin{array}{r} 13,939,200,000 \times 258.75 \\ \hline = 1,803,384,000 \\ \hline 2,000 \end{array}$$

tons as the possible total that could be contained in this area.

As it is impossible for the company to have this area at Wabana, let us get down nearer the facts.

In 1899 the Nova Scotia Company sold to the Dominion Steel all their holdings at Wabana, excepting the upper (now middle) vein. They afterwards secured 19 submarine areas, of one-half mile each, being beyond those sold to the Dominion Steel and the Dominion Steel secured five more areas again beyond and adjoining those taken by the Nova Scotia Company.

In 1900 the Nova Scotia Company equipped and began operating the middle or upper vein, and have carried on extensive operations ever since. This vein has a total length on outcrop of a little over 7,000 feet, and a width considerably less than one-half mile.

For easy computation, although excessive, let us say the company has a total area at Wabana of ten square miles. It will be readily seen, that instead of having 1,803,384,000 tons as above, we only have 901,692,000 tons, as the quantity of ore at twenty-five feet in thickness that would be possible for this area to contain.

But this quantity cannot be considered available. I think Mr. Drummond will agree with me that if the company can win seventy-five per cent. of this they will be doing remarkably well. We, therefore, have as an available ore supply 676,296,000 tons less the amount already taken from the land area, and less the difference between the estimated twenty-five feet over the whole areas and the known average thickness (8 feet) of the one vein which the company own on the land area. Of course, this is all, providing there are no faults, clear cut-offs, etc., etc., in the submarine areas, and that there is sufficient roof over the upper vein to work them with safety.

Yours respectfully,  
W. F. JENNISON.

Truro, N.S., Feb. 12th, 1909.

#### MINERAL VEINS IN THE MONTREAL DISTRICT.

It would probably be difficult to find more striking examples of the value of criticism and discussion than the two papers by Dr. Barlow and Mr. Hore that appeared in recent issues of the Canadian Mining Jour-

nal on the above subject, as the result of my letter in your issue of December 15th. These two papers are important contributions to the literature of our cobalt-silver ore desposits, and should be read by everyone who is interested in the character of these desposits.

The letters undoubtedly clear up several points which were somewhat obscure in the original papers, and Mr. Hore's excellent classification of the mineral veins adds greatly to the clearness of the subject, and forms a basis for further discussion.

It is evident that Mr. Hore and I are essentially in accord as to the character and origin of the mineral veins, except in the matter of names; but, as the clear and distinct use of names is necessary for the proper representation of ideas, it may be well to say a few words farther on this point.

With regard to the present usage of the words like "dike" and "vein," Professor J. F. Kemp, in his "Handbook of Rocks," third edition, 1906, page 182, gives the following definition of dikes: "Intrusions of igneous rock in fissures, not to be confounded with 'veins,' which are precipitated from solution." On page 15, he again says of dikes: "They, therefore, constitute elongated and relatively narrow bodies of all sizes, from a fraction of an inch in thickness and a few feet in length, to others a thousand or more feet across, and a mile in length." Chamberlin and Salisbury, Geology, Volume I., page 564, express themselves thus: "Fluid rock forced into fissures and solidified there, forms dikes." Norton, Elements of Geology, page 261, has this: "The sheet of once molten rock with which probably a fissure has been filled, is known as a dike."

It is true that some of the older geologists use the terms "dike" and "vein" rather loosely and interchangeably; but with modern geologists the general usages are those given by Prof. Kemp in the quotation cited above. And both Dr. Barlow and Mr. Hore agree with me in considering that the aplite or pegmatite filling the fissures in the Montreal River District has flowed into these fissures as a molten igneous rock, and, therefore, by the definition given above it has formed "dikes." They also probably agree with me in considering that the calcite veins were deposited from aqueous solutions, and are true veins.

It is, therefore, advisable to conform to the general usage of geologists and authoritative writers on ore desposits and call these narrow aplite bodies dikes and not veins.

In regard to the probability of silver being formed by magmatic segregation from the aplite, Mr. Hore says in effect that the meanings which we apply to the phrase are different, and he explains that he meant a magmatic concentration of the silver, etc., in the residual fluid portion of the diabase before it solidified completely, rather than the "fractional crystallization," which took place in the formation of the Sudbury nickel desposits. The theory of the magmatic segregation of ore desposits was elaborated very fully by Dr. Barlow himself in his study of the Sudbury nickel ores, and in a discussion of his and Mr. Hore's papers, it was only reasonable that I should take the Sudbury desposits as types of the process. But it is not necessary to take my unconfirmed statement with regard to the meaning of this phrase. Dr. Barlow himself defines magmatic differentiation as follows: "The division or differentiation of a more or less viscous magma or fused mass of rock, into chemically and mineralogically diverse parts, which on cobbing yield correspondingly different types of rock."

(Nickel and Copper Desposits of the Sudbury Min-

ing District. By A. E. Barlow, Ann. Rep., G. S. C., Volume 14, Part H., page 125, 1904.)

Dr. R. Beck, in the "Nature of Ore Deposits," 1905, page 11, writes of magmatic segregation as follows: "In some cases of concentration of the ores, either into stock-like masses or into bands has taken place in the rock either before or during its solidification from the molten condition; then magmatic segregation or secretion being of primary origin, will be considered first in this work," and "Although concentrated in compact masses, the ore of these magmatic deposits is exactly the same as that which occurs in sparsely-scattered particles through the enclosing rock, in which the ore minerals are necessary constituents."

"This particular fact is the most important argument for the truly primary nature of such deposits, and enables one to discriminate between magmatic segregation and those accumulations of ore that have been formed through secondary processes in an eruptive mass."

Thus it will be seen that the ore must have been a primary constituent of the molten rock, and must have been separated out where it is at present found. If it has been precipitated from aqueous solution after the rock had solidified, the phrase "magmatic segregation" as defined by Barlow and Beck, does not apply. Now if it can be shown that the silver is a primary constituent of the aplite, such evidence would be an exceedingly interesting addition to our knowledge of silver deposits. But Dr. Barlow does not seem to me to prove this, and Mr. Hore, in his original paper, states that: "The ores were deposited from solutions which followed the aplite intrusions"; and in his last letter "it is implied that silver was in solution after most of the magma had solidified."

Dr. Barlow does not use the term "magmatic segregation," but he makes the definite statement that "not only the native silver, but also the characteristic sulphides and arsenides began to be introduced with the first pegmatite (aplite) filling. These metallics did not wait for the reopening of the pegmatite, and the introduction of more abundant aplite." "The pegmatites . . . are themselves the ore bringers." These statements seem to me clearly to imply the presence of primary metallics in the pegmatites, and consequently the existence of a type of silver-bearing deposit unknown, and until very strong proof can be shown of the existence of such conditions it seems more rational to accept the present explanation of the formation of such veins; namely, that they are formed by deposition of the minerals from aqueous solutions subsequent to the formation of the pegmatite (aplite) dikes.

I accept with pleasure Dr. Barlow's statement that there was no uncertainty in his mind as to the laccolitic character of the diabase; but it was quite impossible, without explanation, for me to undersand his use of the word "profound," for it does not appear in any dictionary accessible to me as a synonym of "widespread." The Imperial Dictionary gives its meaning as "deep . . . descending far below the surface . . . having great depth." No indication of any meaning which would indicate horizontal extension is given, neither would the original derivation of the word indicate such meaning.

J. B. TYRRELL,

Feb. 19th, 1909.

9 Toronto St., Toronto.

Editor Canadian Mining Journal:

Dear Sir,—In your issue of February 15th I have read with some interest a letter from Mr. E. Percy Browne, criticizing Prof. Haultain's article on "The Mill Test for Gold versus the Assay."

In the course of this, Mr. Browne says that he has been following for three or four years mine sample assay values in a large gold mine, comparing them with actual results. He says that "though these samples were taken as carefully as possible, always taking large samples, usually in duplicate, the results did not accurately represent the value of the ore." Farther on he quotes a paper by Prof. Richards and Mr. Bugbee, showing "the impossibility of valuing a free milling gold ore by sampling and assaying." This quotation is in italics, which I take to be Mr. Browne's, and from this I infer that the words quoted accurately represent his opinion.

There are one or two points which, to my mind, require elucidation. Are the samples in the mine referred to by Mr. Browne taken systematically at close intervals in all shafts, drives, raises and winzes on the vein? If they are not, then I cordially agree with Mr. Browne, that they are of little value, however large they may be.

If they are taken systematically, then what is the nature of the deposit worked? Is it a quartz vein, and, if so, how wide is it? If it is so wide that one ordinary-sized drift will not expose both hanging and foot walls, then samples, even though taken at regular intervals, will not cover the whole width of the vein, and so will be incomplete and unreliable. Or again, are the gold values very unevenly distributed throughout the ore? In such a case, samples, unless taken at very close intervals, would no doubt be little more than an indication. But I think that all these points must be considered before making or quoting such a sweeping assertion as that of Messrs. Richards and Bugbee.

Probably in no gold mining centre in existence is mine sampling more systematically and successfully carried out than on the Witwatersrand; and it is invariably found there that the results obtained in ore valuation from systematic mine sampling fully justify the reliance placed in it by mine managers and consulting engineers.

Samples are taken at 5-foot intervals on all workings on the Reef, and large scale stope and assay plans are kept, on which the full particulars of each sample are entered at the spot whence the sample was taken; and the theoretical gold content of any block of ore as calculated from the assay plan always tallied closely, in my experience, with the actual gold extracted from the battery and cyanide works.

In the development of new properties mill tests are never dreamed of, as the system of sampling is considered to give as accurate an idea of the value of the ore as any mill test would.

I was a sampler myself first, and later a surveyor, on two of the best known mines on the Rand; as the one I took the samples, as the other I had the making up of all the returns from the mine, mill, cyanide and assay office, and I can testify to the accuracy with which a valuation of a free milling gold ore can be made by this method, given suitable conditions and proper care.

Furthermore, a one or two ton sample for a mill test, to be really representative of the ore mined, should be taken, like the mine samples, from many different places in the workings, care being taken that the sam-

ples from the different places are approximately equal, to prevent any part of the mine being unduly represented in the composite sample sent to the mill. I will venture to say that in nine cases out of ten no such elaborate selection is practised, the ore for the mill test being taken probably from the bottom of a shaft, or the face of a drive, and, therefore, being of about as much value as one isolated mine sample taken at the same spot would be.

Apologizing for taking up so much of your valuable space,

Yours truly,

J. D. RAMSAY.

Traders Bank Bldg., Toronto, Ont., Feb. 22, 1909.

Editor Canadian Mining Journal:

Dear Sir,—In the Canadian Mining Journal of February 1st, I noticed your paragraph regarding an article written by Mr. Alex. Gray, in which he attempts to instruct the Crown Reserve how to figure its cost of production. Your correspondent says: "I do not care to take sides in this controversy." I wish to state that there has never, at any time, been any controversy between Mr. Gray and myself. As general-manager of the Crown Reserve Mining Company, I presented a yearly report to the stockholders of the company, extracts from which were published by the newspapers. Without taking time to see the report, and probably to demonstrate his "keen scent," Mr. Alex. Gray at once published an article in the Montreal Star, in which he attempted to criticize my statement of costs, a matter with which he was not familiar. The natural result was that his deductions were absurd.

I am, as you know, not a newspaper writer, and have neither the time nor the inclination to start what you call a "controversy," but I know that you are interested in the facts, and that you will "take sides" with the truth, so am enclosing a copy of the ore production and cost sheet taken from my annual report, which gives shipments and values in detail, together with mining costs.

Trusting that this will make the matter clear in your mind, I am,

Yours very truly,

SAMUEL W. COHEN.

CROWN RESERVE MINING CO.

Ore Production High Grade 1908

Ship't No.	Date	Weight (lbs)	Ounces Silver	Gross Value	Freight & Test	Net Value
1	Feb 27	13,386	23,096.82	12,711.10	1,179.63	11,531.47
2	May 13	39,870	170,350.09	89,985.63	4,212.67	85,772.96
3	June 15	40,538	64,948.90	34,211.83	1,913.42	32,298.41
4	July 23	43,041	118,955.20	61,217.32	3,330.39	57,886.93
5	Aug 18	52,769	88,724.10	45,171.64	2,532.36	42,639.28
6	Sep 24	59,096	119,190.49	59,878.49	3,323.83	56,554.66
7	Oct 20	122,343	188,000.40	92,002.50	5,257.82	86,744.68
8	" 27	55,168	58,405.15	28,735.30	1,729.48	27,005.82
10	Nov 4	78,317	162,583.10	82,088.14	4,289.14	77,799.00
11	" 14	62,720	153,773.80	77,584.13	4,056.72	73,527.41
12	" 27	58,740	129,228.00	64,937.07	3,902.89	61,034.18
14	Dec 4	54,867	116,071.00	58,325.68	4,734.04	53,591.64
15	" 11	57,900	115,800.00	58,189.50	4,796.37	53,393.13
19	" 22	57,821	115,642.00	58,110.10	4,486.60	53,623.50
Bullion Sales		1,542	13,122.24	6,616.72	628.44	5,988.28
Sales of Samples		1,763	7,678.84	3,839.42	60.00	3,779.42
Totals		799,881	1,645,570.13	833,694.57	50,433.80	783,170.77
Low Grade						
9	Oct 24	69,943	9,147.14	4,516.57	950.30	3,566.27
10	Nov 4	28,088	4,032.35	2,026.25	386.93	1,639.32
11	" 14	51,118	5,623.71	2,825.92	610.90	2,215.02
13	" 28	125,600	16,700.00	8,391.75	1,005.90	7,385.85
16	Dec 15	62,940	4,644.15	2,333.72	660.05	1,673.67
17	" 17	60,000	8,437.50	4,239.84	793.13	3,446.71
18	" 19	64,000	4,800.00	2,412.00	720.72	1,691.28
Totals		461,689	53,384.85	26,746.05	5,127.93	21,618.12
Total Production						
High Grade	799,881		1,645,570.13	833,694.57	50,433.80	783,170.77
Low Grade	461,689		53,384.85	26,746.05	5,127.93	21,618.12
On hand Dec. 31	*40,000		100,000.00	50,000.00	0.00	50,000.00
Total	1,301,570		1,798,954.98	910,350.62	55,561.73	854,788.89

(650,785 Tons)

Estimated \*

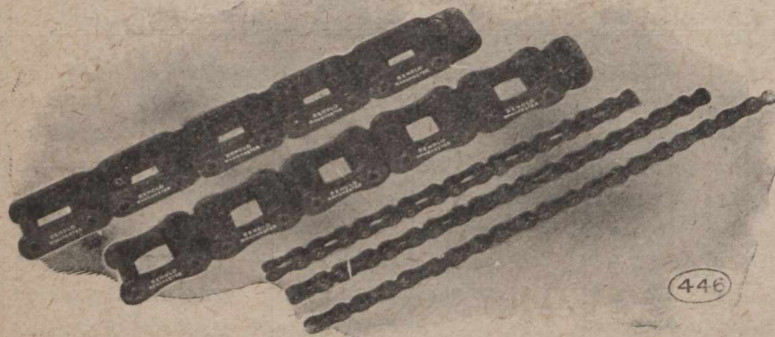
Value of Ore Per Ton	
High Grade	4156.71 oz
Low do.	231.25 oz
Cost of Ore	
Operating Expenses— including Development and all charges except construction & marketing	\$ 50,406.76 Per oz 2.802¢
Marketing Expenses including smelter deductions	
Freight, Treatment, Head Office expenses, handling ore, etc.	84,666.80 4.706¢
Total Expenses	135,073.56 7.508¢
Total cost of Buildings, Plant and Equipment \$71,000.00	

COAL AND COKE DIVIDEND.

A dividend of 1 1/4 per cent., or \$35,000, was paid on the stock of the International Coal and Coke Co., on Monday,

February 1. The company previously paid in dividends \$336,000, which, with the present dividend, makes a total of \$371,000.

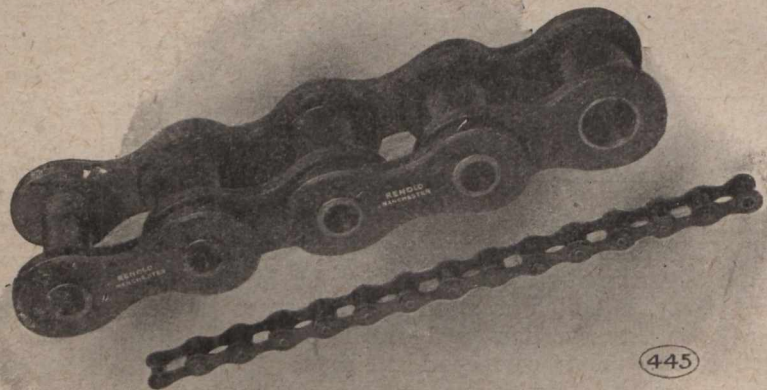
## INDUSTRIAL PAGE.



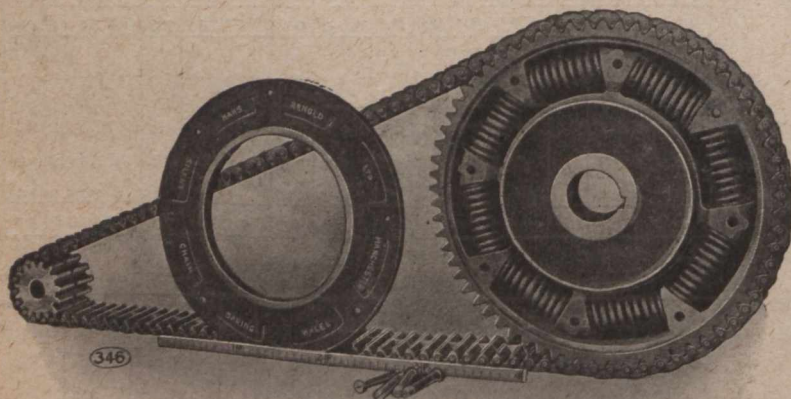
RENOLD BLOCK-CHAIN.

**Renold Driving Chains**—Hans Renold, Ltd., Manchester, England. Jones & Glassco, Montreal, Canadian Agents.

The manufacture of chains for textile machines was begun by Mr. Hans Renold in 1879, with a staff consisting of one man and a boy. In December of the same year a chain was supplied to James Starley for use on his first chain-driven cycle. Since that year the Renold works have grown from a small rent-



RENOLD ROLLER-CHAIN.



RENOLD SPRING-WHEEL PARTLY ASSEMBLED.

ed room into an establishment employing 700 men. The output of the factories is confined to chains, sprockets and sprocket cutters.

Apart from the greater general efficiency claimed for chain-driving, and its known advantages over spur wheels, it is often the only satisfactory method where oil, moisture, or heat are present.

The Renold Catalogue explains fully the principles involved in the three types of chains mostly used, the forms of sprocket teeth, and the principles of chain gearing, etc. Installations of chain-drive in the Renold plant are described at some length, and outside installations are touched on in the concluding section of the catalogue.

The accompanying illustrations will prove interesting to all users of power.

## SPECIAL CORRESPONDENCE

## NOVA SCOTIA.

**Glace Bay, Feb. 18.—Eight Hour Commission of Enquiry.**—This commission have commenced their tour, and on the 15th of February they visited Cape Breton, taking evidence at the Steel Works in Sydney. The following day the commission visited Sydney Mines. On the 17th and 18th they held sessions at Glace Bay, where evidence was given by representatives of the P. W. A. and of the Dominion Coal Company. Dr. Magill, the chairman of the commission, is a painstaking gentleman, who takes his mission seriously. We think he will make a valuable report.

**U. M. W. A. versus P. W. A.**—War a l'outrance has been declared between the local labor organization and that from the States. The P. W. A. has lately adopted a stiffened attitude, and is awakening from its lethargy. It is gradually permeating the minds of the miners that for 20 years they have had industrial peace, coupled with a continual industrial development and a steady increase in the standard of living and the rate of wages, and the feeling of apathy with which the inroads of the U. M. W. A. were first regarded is gradually changing to a marked resentment at the present action of that body. Possibly never before in the history of organized labor has one union



made deliberate war upon another. In the present case the U. M. W. A. came uninvited into Nova Scotia, and has made a persistent endeavor to disrupt that province's native labor organization; has attempted through the courts to obtain possession of its accumulated funds, and has harried the native organization by every means in the power of an unscrupulous body of men with purely selfish ends to serve. The indignation of the P. W. A. members is therefore not at all to be wondered at, especially when it is considered that there are whole States in the Union where the miners are unorganized where the energies of the U. M. W. A. might very legitimately be employed.

**Journalese.**—One of the Sydney papers reproduced from some source unknown a beautiful specimen of "journalese" applied to mining. Some of the scientific information conveyed by the gem may be quoted for the guidance of mining students. We are told: "Mining engineers and chemists recognize three kinds of mine gases. They denominate these gases fire-damp, after-damp and white-damp. Fire-damp is the only one of the trio that is explosive. It is a gas given off by coal under the influence of the heat of the earth." This is somewhat interesting, and may be news to students of mine gases. Again, the writer tells us that a careless miner will sometimes tamp his shot with "paper instead of clay," which is the cause of many mine explosions! We are further instructed that after-damp is a non-explosive and irrespirable gas composed of carboic acid gas. It is therefore no wonder it is so deadly. "Carboic acid gas" must be a dreadful mixture. It is eclipsed, however, by white-damp, which our writer goes on to say is "a heavy white vaporous gas, plainly visible to a naked eye. It seeks the ground, and hovers there like the miasmatic vapors one sees where malaria abounds. It is non-explosive, but its fumes are deadly, and he who breathes it perishes instantly." This is truly wonderful, and it is a pity the author of this journalistic triumph did not meet a little white-damp before he commenced to instruct the public as to the nature of mine gases.

#### ONTARIO.

**Cobalt.**—The leases on the Peterson Lake are being worked steadily, and good results obtained. The Kerry Mining Co., which has a lease on the Peterson Lake, has struck a good vein of ore, about two inches wide, carrying cobalt and native silver, at 95 feet in depth.

The Crown Reserve has struck a new vein carrying high-grade silver. This company is installing a new Sullivan straight-line air compressor with a capacity of 1,200 feet of free air per minute.

The new plant at the Cochrane mine commenced operations on the 15th. The plant consists of a 60 h.p. boiler, a 25 h.p. hoist and a four-drill Ingersoll compressor. Sinking has been started in the shaft from the present 50-foot level, and the intention is to carry the shaft to the 150-foot level. The buildings at the mine are all complete, and a force of 16 men are at work.

A surface vein has been discovered on the John Black extension. The discovery consists of a cobalt vein carrying native silver, and varies in width from 9 to 14 inches.

Mr. Geo. M. Colvocoresses has been buying a plant of machinery for the Blackburn mine of Miller Lake. The plant consists of two locomotive boilers of 35 h.p. each, two Ingersoll straight-line compressors, with a combined capacity of 700 feet of free air per minute, two hoists and five drills.

The Bartlett mines in Gowganda has placed an order for ten machine drills.

The Wetlaufer mine in South Lorraine is going to put in a gas producer plant and a compressor.

Isaac H. Johnston, of the Boyd-Gordon property in Gowganda, has placed an order for an 80 h.p. boiler, a ten-drill compressor, a hoist and machine drills.

On the Bailey property, which is operated by the Cobalt Central, a short drift has been driven from the second level. The vein being developed is about 4 inches in width, and carries smaltite and silver. The Cobalt Central Concentrator, with the addition of the machinery, has now a capacity of nearly 100 tons per day.

The Nipissing Reduction Co., which is at present milling the dumps of the Nipissing Mines Co., is treating about 80 tons per day.

The Muggley Concentrator has just finished milling several thousand tons for the Nova Scotia mine. A meeting of the directors is to be held in Toronto on the 18th, and the question of doubling the capacity of the plant will be considered.

Mr. George Vanderbilt, of New York, was in Haileybury on the 14th, consulting with several of the prominent mining men of the district.

Mr. J. Obalski, of Quebec, was in Cobalt for a few days looking over some properties.

#### BRITISH COLUMBIA.

**Rossland.**—The shipments at the Centre Star mine are gradually approaching the standard tonnage, now that the smelter has treated all of the surplus ore that accumulated during the temporary shut-down. During the past week the Centre Star group shipped 3,370 tons, and it is the intention to increase this until the standard figure is again reached. Extensive development work is being done on the 15th and 16th levels of the Centre Star and the other deep levels of the company's property, and it is the intention to ship a much larger tonnage this year than during 1908, provided the copper market remains strong and the red metal approaches a normal price. The production of the Consolidated Mining & Smelting Co. of Canada, Ltd., for the calendar year 1908, embracing operations at the company's mines in Rossland, Moyie, Sandon and Phoenix, and the smelter and refinery at Trail, may be grossly figured at \$5,044,198. The lead stacks at the smelter turned out 51,022 tons, and the copper furnaces produced 267,384 tons. The metallic production was: Gold, 116,314 oz., value \$2,383,327; silver, 2,100,457 oz., value \$1,102,846; copper, 3,753,139 lbs., \$506,460; lead, 35,999,145 lbs., \$1,050,455, making a total of \$5,044,198.

The fuel supply at the Le Roi mine has improved, and most of the regular force has been put back to work again. Development work is being prosecuted with vim on the 1,750-foot level toward locating the continuation of the shoot that has produced such good ore on the 1,650-foot level. The company's consulting engineer, W. A. Carlyle, is in the camp, looking over the work and property of the company. The action of the Board of Directors of this concern in writing off the annual statement old figures that were mere stuffing is to be approved. The Le Roi mine has not yet seen its best days, and it looks as though the present Board of Directors were determined to clear up the office and recording end of the business so that the real situation at the mine can be readily ascertained by the average stockholder. It will no doubt take a little time to accomplish this, but in the end the operation will have a gratifying effect.

At the Giant-California last week W. Y. Williams, of Spokane, consulting engineer, went over the work in the mine. It is said that the results obtained so far in this work have not been all that the operators would like.

Messrs. Whitford and Jenkins have resumed work on the Blue Bird, and will do development work for a while, merely shipping what ore accumulated in the course of this work.

**Boundary.**—The Consolidated M. & S. Co. has resumed shipments to the Trail smelter from the Snowshoe mine. The B. C. Copper Co. shipped a small tonnage from the Oro Denoro last week, this being the first lot sent to the smelter since the cold weather. The manager of the B. C. Copper Co., J. E. McAllister, has gone East to attend the annual meeting, where it is ex-

pected some definite action will be taken in regard to the dividend policy of the company. The net earnings of the British Columbia Copper Co. for December were \$46,500. The production of copper by this concern during the last seven months of the calendar year 1908 was 6,731,351 lbs., and the net earnings were about \$232,609. They have about 6,000 tons of good ore lying on the dumps at the Athelstan mine, Wellington camp, where development work is proceeding with satisfactory results.

The Granby Company will very likely proceed with the work of enlarging the other seven furnaces at the smelter so that they will have the work finished early this summer. When this work is completed the capacity of this big smelter will be increased by over 1,000 tons, giving the company a capacity of 4,500 tons per day. The Granby Consolidated expects to mine and ship 25 per cent. more ore this year than was the case during 1908. The production during 1908 was 23,639,984 lbs. copper, as against 15,514,000 lbs. in 1907 and 19,779,000 in 1906, which was a comparatively heavy year. From this it will be seen the output for 1908 was 8,125,000 lbs., or about 52 per cent. more than in 1907. The Boundary output for 1908 was the heaviest in the history of that district, but 1909 bids to exceed that year unless more than the usual number of drawbacks intervene.

The Reorganization Committee of the Dominion Copper Co. plan to buy in the property of the company at foreclosure sale and transfer it to the New Dominion Copper Co., which will issue the following securities: \$500,000 of 6 per cent. 10-year income bonds, convertible into stock at \$5 par, and 250,000 shares of common stock, par value \$5. It is proposed to give the present bondholders new stock for their bonds on a basis of 210 shares for each \$1,000 bond. This will take up about 168,000 shares of the new stock. The company's creditors will receive 20,000 shares of new stock, in the proportion of 20 shares for each \$100 due them. The present shareholders, upon turning in their old stock and subscribing at par for the new bonds at the rate of \$100 of new bonds for each \$100 of the old stock, will receive a bonus of 10 shares of new stock. This will take about 50,000 shares; the underwriters will take about 12,000 shares, making up the total issue of 250,000 shares. This committee has been authorized to sell the property, if after thorough investigation as to working costs, cost of raising capital, etc., they deem it advisable, but they may not sell for less than \$800,000, so the report goes. It is rumored that the Consolidated Mining & Smelting Co. is making an effort to get hold of the property of this company and work it. The report is, anyway, that the mines will be in operation in five or six weeks.

**Nelson.**—The Montezuma, on Kaslo Creek, Maestro, No. 1, at Ainsworth, and the Bunker are being operated by H. Giegerich. Mr. Giegerich is getting excellent results from his operations on these claims. The management of the Krao Mining Co. is arranging a consolidation of adjacent mining properties with a view to driving a 1,500-foot tunnel into the property, which will tap the ore bodies of the Krao at about 1,200 feet depth, and will at the same time do away with a deterrent factor of mining in that locality—the water, which has flowed into the lower workings of the Krao to such an extent that it is not considered economical to try and pump it. The Krao was sold to Butte mining men about a year and a half ago for \$125,000. The Rambler-Cariboo mine in this district had the same trouble with water in the lower levels until the company drove its long tunnel, and many of the prospects in this locality cannot be worked out account of the heavy volume of water that gushes from the fissures in the rock at certain periods of the year.

The International Coal & Coke Co. paid another dividend of 1¼ per cent. on February 1st, amounting to about \$35,000; this makes a total of \$371,000 profit that the company has shared with its shareholders to that date. The International Coal & Coke Co. has one of the most complete plants in the Crow's Nest district, and has worked steadily along while many of the other

properties have only worked intermittently. This concern has large reserves to open up yet, development work being advanced in this direction as time goes on.

The Yankee Girl Gold Mines Ltd., is shipping the product of the mine to Northport smelter. The future outlook for this property is bright, and the ore body looks better with every "shot" fired. The ore is being sacked—a couple of hundred sacks per day.

The Winslow group in the Lardeau has been bonded for \$60,000. Another gold brick, valued at \$4,000, was shipped from the Queen mine last week. Work is proceeding with the usual regularity at mine and mill at this property.

The spring snowslides in the Slocan have begun to move early, and have already carried away a number of buildings at the Hewitt mine, Silverton.

**Vancouver.**—Mr. C. H. Dickie, president of the Portland Mining Co., states that the company is negotiating for and will soon put in an aerial tramway and smelter at the property, which consists of 12 claims situated at the head of Portland Canal. A strong fissure vein carrying gold, silver and lead, has been developed on 6 of these claims, there being about 20,000 tons of ore available for stoping.

Forty promising mining claims situated at Maple Bay, Portland Canal, have been taken over by the Associated Mining Co., of London, Eng. Considerable development has been done on this group, and about 12,000 tons of good ore shipped out. It is the intention of the above-named company to equip the property and work it on a large scale in the near future.

#### YUKON.

**Dawson, Jan. 1.**—The Dominion of Canada can well be proud of the splendid achievement of its most northwesterly domain, Yukon Territory, for the important work it has achieved during the year of 1908 and for the new work it is to undertake during the new year.

While the output of the Yukon Territory has aggregated one hundred and fifty millions during the eleven years of active mining operation, it is hoped that more than this sum will be produced in the next ten years. Not only placer, but quartz and copper are contributing to the mineral output of the Territory.

New methods of mining are coming to the fore as a result of experience and the application of energy and industry. Canada has reaped millions in trade from this territory, and will reap millions more during the next decade. The older provinces well can afford to encourage this coming new province for selfish, if not for more lofty, purposes. While the old time individual miner is being crowded to the outskirts in this territory and is working ground not altogether so rich as was the rule in the past, his invaluable efforts of empire pioneering are unrelaxed, and the heaven will have its effect.

At the same time that the individual is striving to open new placer and new quartz fields, an element new to this territory is taking hold with greater effort than even dreamed of in early days. Capital has come to the aid of the prospector, and many low grade placer and mineral propositions are being brought into the working list.

While quartz enterprises are in their infancy, it is to be chronicled with much significance that this country of scarcely more than ten years' standing in the mining world has some of the finest quartz fields open, and a not insignificant sum invested in working machinery. In the Whitehorse end many tons of copper are being mined and shipped to the smelters daily, and the time rapidly is approaching when this output will be greatly multiplied. The White Pass Railway began during 1908 the construction of a branch line of railway into these copper fields, and intends to push construction again, probably as soon as the snow disappears. It is predicted that this line in time may cross to the Kluane and White River

copper fields, both of which have engaged the serious attention of copper prospectors for several seasons.

The southern end of Yukon also is to be credited with the installation of the first concentrator in the entire Yukon basin from St. Michale to the head. The concentrator is at Conrad, and is working daily in treatment of ores from the Conrad mines, which are controlled and being worked by a syndicate represented by Colonel Conrad. The capacity of the concentrator, the Colonel recently announced, is to be doubled by next season.

The Conrad properties are but a few of the many now held in the Conrad and White Horse districts, and splendid leads are being developed from that part of the country.

In every section of the Yukon as one progresses from the southern end northward the same hopeful spirit prevails among the prospectors, and mineralized properties are being investigated as rapidly as the prospector can carry on the double work of progress and self-sustenance.

Near Dawson the quartz properties have so taken a hold on the faith of the people that scarcely an individual in the country has not awakened to the possibilities, and nearly every other man, whether he be a dweller in city or country, has an interest in hard rock properties.

Although none of the quartz properties near Dawson have progressed like these of the southern end to the condition of production and shipping of ore, some have extensive work under way, and have shipped sample lots. Never was there greater activity in the staking of quartz in the Klondike proper, that is within 50 miles of Dawson, than during the year just ended, and perhaps never were so many people of the country reinvesting their northern earnings in quartz claims in this district as just now.

One of the most promising quartz localities is that of the dome between Dominion Creek and the Hunker-Bonanza side. Nearly the whole ridge is taken, and leads have been followed in many directions along the various side streams. Owners are organizing to develop, and it is expected that the year of 1909 will decide the fate of many claims. From samples of ore obtained from surface leads and from shafts and tunnels of 20 to 50 feet deep, there should be a vast quantity of unusually high-grade gold-bearing quartz in workable quantities in the many miles of the famous old ridge. The most extensive work on these properties so far undertaken is by the Davison people, who are running a tunnel from the 400 ft. level through the mountain. Work has been under way with day and night shifts for some time, and it is expected that mechanical drills will be employed before long.

In the Twelvemile and Lepine districts, along Hunker and Bonanza, particularly at the head of these two streams, and to some extent at the head of Eldorado, the quartz enthusiasts are working. Tunnels are being run in every direction. Certain Dawson people are opening the famous Lone Star again, and declare they are sure of success.

On Williams Creek, Merritt Creek and other streams in the area between Dawson and White Horse much energy is being expended on the opening of copper, and splendid samples have been received in Dawson.

One of the most promising propositions ever tackled in the north is the conglomerate of the Indian River district. Several faithful hard-rock miners have been working there for years, feeling sure they can demonstrate the wealth of the locality. The property is simply a great gravel deposit bound together with a hardened cement, through which is scattered gold. It is conceded that the property is not of high grade, but it is so readily accessible and so vast and unbroken in quantity that it is declared to be one of the safest and surest hard-rock propositions. The Mackinnon Brothers, who have mined on the Rand, declare this a similar proposition, and have demonstrated the richness of the property. Capital already is inter-

ested in various Indian River conglomerates to the extent of testing, and it may be that 1909 will see important results.

From northward of Dawson, even to the Arctic coast, comes news of the ever busy prospector looking industriously for new mines, and eyes are being kept open for quartz as well as placer. The Firth River, in Yukon Territory, flowing into the Arctic Ocean, may be the scene of the next big placer strike. Jim Smith and others are prospecting there, and a number of reports of gold being found on the stream and in the vicinity are drifting back from time to time.

Up the Pelly River, another great valley district of the North, many streams have been proven the last year to carry gold, and prospectors have brought down pannings which, when shown in Dawson, have excited the greatest interest, and stimulated afresh the longing to locate the paystreak.

Bob Henderson, discoverer of the first gold in the tributaries of the Klondike River, has spent the last two summers on the Pelly, and has brought down many small vials carrying samples of gold he secured there on various streams. Henderson intends to make the Pelly his future home, and he declares that it is only a matter of time until the Pelly shows a gold field as productive as the Klondike.

The year of 1908 has seen its greatest operations in the neighborhood of Dawson in the way of hydraulic and dredge mining.

No less than 18 large dredges are at work in the territory, and three to six more are expected to arrive this year. The type of dredges now being brought here cost laid down and ready for operation not less than \$150,000. The gravels which they are working are, on the whole, lower grade than those operated by the old-time individual miners, but are yielding splendid returns.

Some of the dredges ran into such rich pay that they paid for themselves in a half season or less, and it is said that the Bear Creek dredge, on the Klondike River, paid for itself almost within the first month it was operated, and that during the summer of 1908 it did almost as well as in its initial summer. That dredge has handled more gravel than any other in the territory, and has travelled more from its original position. Being in the open river of the Klondike, it worked this fall until November 9, when it shut down only because its fuel supply was exhausted. It was thought that the dredge might have a run until Christmas had it not been for the want of wood.

The dredges on the Guggenheim properties on Bonanza and Hunker worked steadily through the season, driven by electricity from the power station on the Twelvemile River, 30 miles distant. These machines are among the finest types of dredges in the world, and their tailing piles are like mountains. It is understood that the returns have been very satisfactory, particularly on the Anderson concession, and at 90 below, where pay yielding three dollars and more to the yard is said to have been secured on both these properties. One stretch on the ground at the mouth of Bonanza is understood to have run even better than that.

All the dredge companies are progressing, and are planning to expand, a most favorable indication.

The Guggenheims have eight dredges and three electrical conveyors, which are dredges without the barges, and are moved instead on rolling giant steel frames, and operate so that they afford the great advantage of cleaning every inch of bedrock, and getting much gold not obtained by the dredges.

The Bonanza Basin Company has one dredge, which is one of the most fortunate in the country, and works almost in the very townsite of Dawson.

Other rich dredging properties are: Walker's Fork, where Russel King's companies have two fine gold ships; the lower Fortymile, where the Consolidated Gold Dredging Company of Alaska has two dredges making most successful records; the Stewart River Company, recently organized, which has one

dredge ordered, and may order others for this year; and the Yukon Basin Company, headed by former Governor Ogilvie, with one dredge, and holding 120 miles or more of submerged ground, an area greater than that of the Guggenheim holdings in Yukon. The Ogilvie people have one dredge ordered for this year, and may make it three. Dan Matheson, superintendent of the company, leaves in a few days for the outside to confer in regard to the work.

The Consolidated Company in the Fortymile district will have new machines this year, and others may swell the number.

The dredging success has turned many other eyes this way, and numerous rich streams in the Klondike and Fortymile districts, and in the Circle, Fairbanks, and other Yukon fields, are being investigated by agents of various investors.

Several large power schemes are being formulated for the various properties. The rich adjacent coal fields, as well as the splendid water streams, are being brought into the power service, and millions in the aggregate will be expended in getting their energy enlisted.

The hydraulic properties of the many rich streams adjacent to Dawson have been in greatest prominence during the last year. Thirty or forty concerns have hydraulic plants within 50 miles of Dawson, and are working so inexpensively that they are getting profit from a vast area that the old-time miner could

not work at an advantage. All these advances mean increased Yukon output.

The Guggenheims alone have invested \$12,000,000 near Dawson, and will invest several millions more.

The great number of men on ditch, dredge, hydraulic and other mining work, aside from the private enterprises near Dawson, during the summer of 1908, meant the expenditure of millions for wages and supplies. Most of the miners and other employees were induced to remain in the territory for the winter, and the fundamental work of prospecting and opening new properties is thus greatly facilitated.

The extensive work of installation of new dredging and hydraulic plants, including 12 miles of ditch the Guggenheims will build up Bonanza this summer, will mean the distribution of much more money, and ensures grubstakes for an army of prospectors for the next year. By the year 1910, or a year later, the Guggenheims expect to have their great properties working in every portion.

All told, Yukon Territory never was at a more promising stage, and on a more permanent basis. It has begun to produce nearly all the vegetables needed within its borders, and thus will keep a vast sum of money at home.

Reinvestment is becoming more common, capital is headed this way together with labor, and the destiny of the North is assured.

## GENERAL MINING NEWS.

### ONTARIO.

**Cobalt.**—The west drift of the Cobalt Lake mine is out under the lake several hundred feet from the main shaft, at a depth of 154 feet, and is within a very short distance of the boundary of the station grounds.

La Rose is beginning to realize to advantage the large amount of underground development already done, and during the last few months has been blocking out ore much more rapidly by reason of being able to work machines in so many drifts at once on its numerous veins.

The shaft on the Pontiac has been sunk on the vein to a depth of over 25 feet, and 20 sacks of first-class ore have been taken out. The company has installed a small plant, which is now in operation, and night and day shifts are kept at work.

The Crown Reserve has shipped 100 tons of high-grade ore to Beer, Sondheimer & Co., Hamburg. This is the biggest shipment ever sent to Germany, is said to be the most valuable consignment of Cobalt ore ever sent out of Canada for treatment.

The City of Cobalt main shaft is now down 225 feet, and is getting argentite from a vein 8 inches in width. It is said to be the finest argentite seen in camp, and will go about 10,000 ounces of silver to the ton.

While no ore has as yet been shipped from the Ottise, a quantity of valuable ore has been sacked up and stored in the ore-house. This was taken from No. 1 vein in course of development.

The Silver Cross is now working at the 70-foot level on No. 2 vein, where cobalt ore is being bagged.

The Gifford is working night and day shifts, and the main shaft is now down 60 feet and timbered all the way.

The main shaft at the Badger is down 223 feet. It is an incline shaft sunk on the vein for its entire depth. It is a cobalt, calcite and silver vein carrying native silver. The first level is at a depth of 100 feet, and drifting has been done east and west for 224 feet. Stations have been cut at the 200-foot level, and drifting is to be started. The new plant consists of a 12-drill Sullivan compressor and two 100 h.p. boilers, electrical plant, etc.

**St. Catharines.**—Natural gas was struck here at a depth of 200 feet by men boring for pure water on the Kinleith Paper Company's property on the old canal bank. This is the first strike of natural gas at or near St. Catharines. The boring will continue.

### ALBERTA.

**Lethbridge.**—The Scranton Coal Mining Co. and the Central Mining Co. have consolidated under the name of the Scranton Coal Company. This company controls 1,500 acres of coal lands, and is now producing at the rate of 500 tons per day, and expects to raise the output from 800 to 1,000 tons per day within a month.

**Frank.**—The C. A. C. & C. Co. are at work developing the coal deposits half way between Turtle and Goat Mountains. Four years ago a shaft was sunk some 300 feet. A powerhouse was built, but was abandoned. Now the company are pumping out the shaft and use it as an air shaft. They intend sinking another shaft to strike the vein and operate it as a new development. The company have about 150 men at work at present.

### BRITISH COLUMBIA.

**Rossland.**—W. A. Carlyle, consulting engineer of the Le Roi Co., is engaged in making an examination of the workings for the purpose of outlining a further plan of development. The explorations in the Le Roi continue on the 1,750-foot level for the purpose of locating the ore shoot, which is now being operated satisfactorily on the 1,650-foot level.

The Rossland Miner," in answer to a correspondent inquiring concerning the Big Four mines and an emergent call issued by the Big Four management for more money, has the following to say: "So far as operations of this company are concerned, no work is now in progress on its properties in this camp, nor has there been any that we know of for several years past. We have no means of knowing how much money has been collected by the management of the Big Four in the shape of assessments or from the sale of shares, but is a certainty that the amount expended on the properties for the past five years has been

small." In the opinion of the "Miner" the Big Four Company is a "wildcat" concern, pure and simple, and the constant raising of funds by means of assessments and so-called "emergent calls" is nothing less than fraudulent.

**Trail.**—Mr. W. H. Aldridge, manager of the Trail smelter, which is owned by the Canadian Pacific Railway, regarding the company's mineral and smelting properties in the West announced that the company has made a long contract for the whole of the Le Roi No. 2 output at Rosslund, something like 100 tons of ore per day, for treatment at the smelter. As this mine ships the highest grade ore in the Rosslund camp and has paid dividends for a long period regularly, it is felt that a good stroke of business has been done.

"The company is now treating 40,000 tons of ore per month at the Trail smelter," Mr. Aldridge says, "and the gross value of the monthly output is over \$400,000, \$4,800,000 worth per annum, of which 40 per cent. is gold, 22 per cent. silver and lead each, and 16 per cent. copper.

"The ores are being supplied largely from the company's properties which are located in the Boundary, Rosslund, East Kootenay and Slocan districts. The company also occasionally purchases copper ores from Idaho.

"So far as the general condition of the mining industry in the Canadian West is concerned, Mr. Aldridge says that notwithstanding the present low price of copper, lead and silver, the output of the mines continues large, and the general result under the circumstances is fairly satisfactory.

"The coal mines in British Columbia and Alberta are working at their full capacity, and everything indicates that the consumption will continue large.

"The C. P. R., which began the development of its own coal areas not long ago; has now a large installation, including steel tipples and coke ovens, at Hosmer, and are increasing their output from the property slowly.

"Most gratifying results are being obtained from the new method that has been adopted at the Bankhead mine in Alberta, where hard coal dust, which formerly went to waste, is being turned into an exceedingly profitable output. The consumption of soft coal dust for steam purposes has long been a practical proposition, but hard coal dust long defied manipulation. Five hundred tons per day of briquettes which are made from hard coal dust are now being produced and used for locomotives as well as domestic purposes."

**Phoenix.**—Granby officials estimate an increase in copper output during 1909 of 25 to 30 per cent. The enlargement of the furnaces will be finished by June, and will give a smelting capacity of from 4,500 to 5,000 tons per day as against 3,200 at present.

The B. C. Copper Company's production for the calendar year 1908 amounted to 6,731,351 pounds. This is for the last

seven months only, as the mines were closed down during the first five months of the year.

A 5-foot ledge of copper ore has been cross-cut on the Woodburn property of the Phoenix Mining, Smelting & Development Co. The tunnel has now reached a distance of 450 feet.

**Nelson.**—James McMartin has taken over the bond on the Kootenay Belle and Mother Lode groups in Sheep Creek, and a new era is expected in the development of that camp.

A company with the title of the Osoyoos Mining Co., Ltd., has been formed to take over a group of coal properties near Princeton in the Similkameen Valley. The company owns about 1,900 acres of land situated between the Similkameen and Tulameen Rivers. Considerable drilling has done, and one hole bored to a depth of 863 feet passed through 17 seams with an aggregate thickness of 50 feet 6 inches. It is expected that the V., V. & E. Railroad will, in the near future, pass alongside the mines.

**Vancouver.**—The reorganization committee of the Dominion Copper Company has formulated a reorganization plan based on the committee's opinion that the large amount of new capital required to develop the property and the small profits from the low grade ore may make it advisable to sell the property. The plan of reorganization is for the committee to purchase the property at foreclosure sale and transfer it to the new Dominion Copper Company, which will issue the following securities: Five hundred thousand dollars at 6 per cent. ten year income bonds convertible into stock at par, \$5 per share; 250,000 shares of common stock of par value of \$5 per share. Present bond holders will take new stock for their bonds on the basis of 210 shares of new stock for each \$1,000 bond. This will absorb 168,000 shares of new stock. Creditors will receive 20,000 shares for each \$100,000. Present stockholders subscribing at par for the new bonds on the basis of 100 of bonds for each \$1,000 of present shares will receive a bonus of 10 shares of new stock for each 100 shares of the present stock. Underwriters will receive 12,000 shares of the new stock. If the committee deems it advisable to sell the property it is restricted to a minimum price of \$800,000.

**Nanaimo.**—The South Wellington Coal Mines Co. is making steady progress. One hundred men are at work in the mines and as many more are engaged in construction about the property. At present several hundred tons are being mined weekly and this output will be greatly increased as the mine is opened.

**Barkerville.**—The Canadian Creek Mining Company has purchased the machinery on the derelict Seymour Baker dredge at Quesnel. This machinery will be installed on Slough Creek, where prospect shafts have been sunk and satisfactory results obtained.

## MINING NEWS OF THE WORLD.

### GREAT BRITAIN.

A colliery disaster occurred at West Stanley, about 12 miles from Newcastle-on-Tyne, on Feb. 16th. Two explosions were followed by a fire, which prevented any attempt at rescue for some time. Finally a rescue party sent down the following day succeeded in bringing up 37 men alive. About 110 lives were lost.

The first colliery rescue station in South Wales was opened at Aberaman on Jan. 23rd.

The tin alluvial deposits of Cornwall, which have not been worked for some time under the impression that they were exhausted, are now receiving attention. Operations recently begun on Goss and Tregoss moors in Central Cornwall have been successful in extracting tin in paying quantities.

The Minister of Labor will introduce a measure in the Legislature dealing with miners' pensions. The project under consideration provides for a minimum pension of 360 francs per annum at 60 years of age. The funds will be provided by contributions from employers and workmen supplemented by Government subsidies.

### GERMANY.

The production of coal in Germany for 1908 was 148,621,201 tons, an increase of 5,398,315 tons as compared with the output of 1907. The output of coke for the year fell off from 21,938,038 tons to 21,174,956 tons.

The annual congress of German miners opened at Berlin on Feb. 1st about 300 delegates being in attendance. A resolution

was unanimously adopted demanding Imperial legislation for the supervision of collieries by independent inspectors, representatives of the mines having no connection with colliery owners.

#### RUSSIA.

On the western portion of the Amur Railway, now under construction, gold has been discovered in such quantities that the laborers are quitting their work to search for gold and have been largely successful. The Government proposes to station troops along the line to protect the gold deposits.

Extensive deposits of wolframite and precious stones have been found on the Shirloff Hill, near Borsya Station, in the neighborhood of Manchuria.

#### AUSTRIA.

A deposit of coal has been discovered near Grain-an-der-Donau, Lower Austria.

The Nordbahn Railway has erected 144 Hoffmann coke ovens in four batteries at Vienna.

#### ITALY.

The British Consul at Palermo reports that the Sicilian sulphur trade has not been affected in any way by the recent earthquake.

#### AUSTRALASIA.

The Broken Hill labor dispute is being adjudicated by the Federal Arbitration Court at Melbourne. Two men have been sentenced to six months' imprisonment each for assaulting officials of the Broken Hill Proprietary mine.

The finding of a gold nugget of 81½ oz. at Talga Talga, Western Australia at a depth of 9 feet is reported.

The mineral production of New South Wales for 1908 is valued at £8,609,607. The gold output was 224,792 oz. valued at £954,854. The yield of coal was a record one, being 9,147,025 tons valued at £3,353,093, the production having doubled during the last ten years.

#### SOUTH AFRICA.

A large company is being found in London for the purpose of establishing electrical works in the Rand on an extensive scale. The capital will be in the neighborhood of £2,000,000. The company intends to supply power to the mines.

Several syndicates found for the purpose of working the mica deposits in the Zoutpansberg district have proved failures owing to the heavy expenses curtailed by lack of railway facilities, and the insufficient working capital available. Another enterprise of this character has been undertaken to work claims covering 334 acres on the Oliphant River.

The gold output of the Transvaal for 1908 was 7,052,617 oz. valued at £29,957,610, which constitutes a new record. The production of 1907 was 6,451,384 oz. of the value of £27,403,738.

#### UNITED STATES.

Heavy snow and rain storms on the Pacific Coast have caused considerable interruption to mining and smelting operations. Many plants were obliged to close down.

The Phelps-Dodge copper smelting companies have filed complaints with the Interstate Commerce Commission at Washington against the Baltimore & Ohio and other railroads, alleging discrimination in transportation rates for coke shipped to smelters in Texas and Arizona.

The new 87-ft. blast furnace of the Washoe smelter in Deer Lodge Co., Montana, claimed to be the largest in operation in the world, was recently blown in. The two other blast furnaces are 51 ft. in length. The smelter is producing from 300 to 400 tons of copper daily.

The new electrolytic plant of the Elkhorn Electro-Metals Co., Jefferson County, Montana, was put in operation early in February.

The United States Steel Corporation has decided to introduce the Heroult electric furnace and steel process. One 15-ton Heroult furnace will be built at the South Chicago works of the Illinois Steel Co. and one of the same capacity at the Washburn & Moon plant at Worcester, Mass., in connection with the American Steel & Wire Co.

#### MEXICO.

A revival of the zinc industry of Chihuahua is noted as a result of an American decision placing carbonate in the calamine class as duty free for importation into the United States. Several large American firms have closed contracts with zinc producers and a number of mines are under option.

The old Promontorio silver mine in the Cusihiuriachie camp, Chihuahua, has been acquired by the Potter-Palmer estate, of Chicago, for \$125,000.

## COMPANY NOTES.

### NOVA SCOTIA STEEL CO.

Nova Scotia Steel Co. will not resume dividends at present on the common stock. The profits of the company for the year 1908 were \$734,701.53, as compared with \$944,790.66 for the year 1907. The amount at the credit of profit and loss account on January 1st, 1907, was \$1,202,604.39, which, with profits for the year 1909, make a total of \$1,937,305.92 to credit of profit and loss account on December 31, 1908. Out of this sum \$76,745.50 has been transferred to the credit of special reserve funds, of which \$50,000 is the usual allowance for depreciations, and \$13,745.50 is for blast furnace renewals (being 25 cents a ton on the output of pig iron during the year), and \$13,000 is for depreciation in the value of ships. The balance to the credit of the special reserve accounts is now \$857,225.93.

The balance carried forward to the credit of profit and loss is \$1,219,221.07, as compared with \$1,202,604.39 on the 1st of

January, 1908. The sum of \$321,735.08 has been expended during the year on capital account.

### DIVIDEND PASSED.

The directors of the Silver Queen Company, at the annual meeting recently, under the advice of President Culver, decided to pass the dividend for the current quarter.

The company has hitherto paid 12 per cent. in 3 per cent. quarterly dividends, and on two occasions bonuses were added.

F. L. Culver, the president of the company, discussing the action of the directors, said: "It was entirely on my advice that the directors decided not to pay the usual dividend. We have plenty of money on hand, but we have run into a lean streak, such as most mines experience in their development. In the interest of the shareholders I thought it wise to hold the money we have in order to keep up the development until we got into good paying ore again."

Mr. Culver thought that with active work the mine would again be put into a condition entirely satisfactory to the shareholders.

**RIGHT-OF-WAY ANNUAL MEETING.**

The directors of the Right of Way Mining Company announced at the annual meeting that the company is to be placed on a 6 per cent. quarterly dividend basis, with whatever bonus in addition may be considered advisable.

It was decided that for the quarter ending March 31 of this year a 6 per cent. dividend along with a 9 per cent. bonus, will be paid. The shareholders of the company, regarded as one of the luckiest of the many Cobalts, listened to a statement of the year's operations, showing that the value of the output was \$218,000 and the portion paid to the Temiskaming & Northern Ontario Railway Commission totalled \$49,000.

After all the expenses incidental to development, etc., were paid, there was a net balance of \$83,000, out of which two 7 per cent. dividends were paid. The balance, along with that carried from the previous year, leaves \$154,000 to the credit of profit and loss. Included in that is the amount of the La Rose judgment.

The board of directors elected were as follows: Messrs. Geo. Goodwin, T. A. Beament, A. W. Fraser, K.C., Dr. J. F. Kidd, all of Ottawa, and J. G. Turriff, M.P.

**BIG SIX COMPANY DIVIDEND.**

It is reported that the Big Six Silver Cobalt Mines, Ltd., have sold four of their mining claims. The company have authorized the payment of a dividend from the proceeds of this sale. They have retained ten properties, which they propose to develop, including one at Miller Lake and one adjoining that of the Mother Lode Mining Co. at Elk Lake. On the Elk Lake claim a shaft has already been sunk 75 feet on an eight-inch calcite vein, and it is intended to continue this shaft to the 150 foot level.

**BUFFALO MINES BONUS.**

The Buffalo Mines, Ltd., have declared an extra dividend of 1 per cent., payable March 1, 1909, to stockholders of record Feb. 20, 1909.

La Rose net earnings for January were at the rate of 19 per cent. per annum, the result being obtained from ore averaging considerably less than \$300 per ton, and very little stopping being done.

In these net figures allowance also is made for all expenditure on affiliated properties, which is, therefore, being charged against the earnings of the one claim.

**TEMISKAMING MINING CO.**

The annual meeting of the Temiskaming Mining Co. was held on Feb. 20th. The financial statement presented was highly satisfactory and met with the unanimous approval of the shareholders present.

There was no decision in regard to the dividend for the current quarter, and it is supposed that this will be at the regular rate of 24 per cent. per annum. The quarterly dividend will be made on March 6. The election of directors resulted as follows: President, B. E. Cartwright; R. T. Shillington; vice-president; Alex. Faskin, secretary-treasurer, and J. L. Wheeler and R. A. Cartwright.

**NIPISSING'S CASH ASSETS.**

On February 1st Nipissing had in its treasury, after the payment of \$300,000 dividends, \$755,000 in cash. Before the time arrives for the next dividend this item should have again reached the \$1,000,000 mark.

**McKINLEY-DARRAGH ANNUAL MEETING.**

At the annual meeting of shareholders of the McKinley-Darragh-Savage mines, held here, a financial statement for the year was presented, showing cash in hand Jan. 1, 1908, of \$111,448.72, receipts from sales of ore \$345,792.01, interest \$2,287.65, total \$459,528.38. Of this amount additions to plant took \$46,231.39, operation and development \$139,921.66, dividend \$202,309.71, directors' fees \$150, salaries \$13,026.90, and other expenses \$11,276.02, leaving cash on hand at the end of 1908 of \$46,612.70. It will be noticed that no mention is made in the above figures of the amount of ore in transit, or due from the smelters to the mine. It is understood a large payment was made by the smelters to the McKinley-Darragh Company, after the above figures were computed.

**STATISTICS AND RETURNS.**

**BRITISH COLUMBIA ORE SHIPMENTS.**

The following are the shipments for the week ending Feb. 6th, 1909 and year to date in tons.

Boundary Shipments.		
Granby . . . . .	21,941	89,115
Mother Lode . . . . .	9,744	39,564
Boundary . . . . .	19	19
Snowshoe . . . . .	4,655	13,081
Other mines . . . . .	.....	1,071
<b>Total . . . . .</b>	<b>36,359</b>	<b>142,850</b>
Rossland Shipments.		
Le Roi No. 2 . . . . .	1,095	2,487
Le Roi No. 2, milled . . . . .	260	1,140
Centre Star . . . . .	3,764	9,315
Other mines . . . . .	.....	3,054
<b>Total . . . . .</b>	<b>5,119</b>	<b>15,996</b>

**Slocan-Kootenay Shipments.**

Total . . . . . 3,091 15,819  
 The total shipments for the past week were 44,560 tons, and for the year to date 271,297 tons.

**Granby Smelter Receipts.**

Grand Forks, B.C.		
Granby . . . . .	21,941	89,115

**B. C. Copper Co.'s Receipts.**

Greenwood, B.C.		
Mother Lode . . . . .	9,744	39,564
Snowshoe . . . . .	2,630	3,850
Other mines . . . . .	.....	1,050
<b>Total . . . . .</b>	<b>12,374</b>	<b>44,464</b>

**Consolidated Co.'s Receipts.**

Trail, B.C.		
<b>Total . . . . .</b>	<b>7,399</b>	<b>26,141</b>

**Le Roi Smelter Receipts.**

Northport, Wash.

Other mines .....	536	4,582
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The total Smelter receipts from the various mines for the past week were 30,053 tons, and for the year to date 114,751 tons.

The following are the shipments for the week ending Feb. 13th, 1909 and year to date in tons:—

**Boundary Shipments.**

Granby .....	25,569	114,684
Mother Lode .....	16,360	55,924
Snowshoe .....	4,152	5,230
Oro Denoro .....	60	1,650
Other mines .....		221
<b>Total .....</b>	<b>46,141</b>	<b>177,512</b>

**Rossland Shipments.**

Le Roi No. 2 .....	1,107	3,594
Le Roi No. 2, milled .....	260	1,300
Centre Star .....	2,307	11,722
Le Roi .....	1,351	4,313
Other mines .....		92
<b>Total .....</b>	<b>5,025</b>	<b>21,021</b>

**Slocan-Kootenay Shipments.**

<b>Total .....</b>	<b>3,807</b>	<b>19,487</b>
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The total shipments for the past week were 54,973 tons, and for the year to date 318,020 tons.

**Granby Smelter Receipts.**

Grand Forks, B.C.

Granby .....	25,569	114,684
Mother Lode .....	7,308	54,180
Snowshoe .....	2,050	30,320
Oro Denoro .....	30	1,080
<b>Total .....</b>	<b>34,957</b>	<b>200,364</b>

**B. C. Copper Co.'s Receipts.**

Greenwood, B.C.

Mother Lode .....	9,053	48,617
Oro Denoro .....	30	1,080
Other mines .....	496	3,850
<b>Total .....</b>	<b>9,579</b>	<b>53,547</b>

**Consolidated Co.'s Receipts.**

Trail, B.C.

<b>Total .....</b>	<b>6,628</b>	<b>31,544</b>
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**Le Roi Smelter Receipts.**

Northport, Wash.

Le Roi .....	1,351	4,313
Other mines .....	160	1,780
<b>Total .....</b>	<b>1,511</b>	<b>6,093</b>

The total smelter receipts from the various mines for the past week were 52,675 tons, and for the year to date 291,548 tons.

**CROW'S NEST PASS COAL OUTPUT.**

The output for the collieries of the Crow's Nest Pass Coal Company for the week ended Feb. 20th was 16,488 tons, or a

daily average of 2,748 tons. For the corresponding week of last year the output was 21,205 tons, a daily average of 3,534 tons.

**COBALT ORE SHIPMENTS.**

Following are the weekly shipments from Cobalt camp, and those from Jan. 1st, 1909, to date:—

	Week ending Feb. 13. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo .....		88,280
Coniagas .....		271,905
Crown Reserve .....	41,970	595,210
Cobalt Central .....		81,238
Chambers-Ferland .....		142,000
City of Cobalt .....	61,000	279,930
Kerr Lake .....		205,097
King Edward .....		53,920
La Rose .....	194,140	1,749,560
McKinley-Darragh .....	40,000	308,080
Nipissing .....	128,957	1,308,122
Nova Scotia .....		401,390
Nancy Helen .....		40,000
Peterson Lake .....		81,560
O'Brien .....		127,880
Right of Way .....		244,715
Silver Queen .....	65,000	65,000
Temiskaming .....		310,000
Trethewey .....	92,530	277,930
Temiskaming & Hudson Bay .....		324,060
Muggley Cone. .....		72,900

The total shipments for the week ending Feb. 13 were 623,597 pounds or 306 tons.

**SILVER PRICES.**

	1909.	New York. cents.	London. pence.
February 6 .....	6	52 $\frac{3}{8}$	24 $\frac{1}{8}$
" 8 .....	8	52 $\frac{1}{4}$	24 1-16
" 9 .....	9	52 $\frac{1}{8}$	24
" 10 .....	10	51 $\frac{7}{8}$	23 15-16
" 11 .....	11	51 $\frac{3}{4}$	23 $\frac{7}{8}$
" 12 .....	12	51 $\frac{1}{2}$	23 $\frac{3}{4}$
" 13 .....	13	51 $\frac{1}{2}$	23 $\frac{3}{4}$
" 15 .....	15	51 $\frac{1}{2}$	23 $\frac{3}{4}$
" 16 .....	16	51 $\frac{1}{4}$	23 $\frac{3}{8}$
" 17 .....	17	51 $\frac{3}{8}$	23 11-16
" 18 .....	18	51 $\frac{1}{8}$	23 9-16
" 19 .....	19	50 $\frac{3}{4}$	23 $\frac{3}{8}$

**MARKET REPORTS.**

Feb. 19.—Connellsville coke, f.o.b., ovens:—

Furnace coke, prompt, \$1.65 to \$1.75.

Foundry coke, prompt, \$2 to \$2.15.

**Metals.**

Feb. 19.—Tin, Straits, 28.25 cents.

Copper, prime Lake, 13.12 $\frac{1}{2}$  to 13.37 $\frac{1}{2}$  cents.

Lake, arsenical brands, 13 to 13.25 cents.

Electrolytic copper, 12.87 $\frac{1}{2}$  to 13 cents.

Copper wire, 15.25 cents.

Lead, 4.02 $\frac{1}{2}$  cents.

Spelter, 4.90 cents.

Sheet zinc, 7.50 cents.

Antimony, Cookson's, 8 cents.

Aluminium, 22 to 24 cents.

Nickel, 40 to 47 cents.

Platinum, \$22.50 to \$23.50 per ounce.

Bismuth, \$1.75 per pound.

Quicksilver, \$44.50 per 75 lb. flask.