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### EAST AND WEST.

Mr. Kipling, the chanticleer of Empire, once wrote to the effect that East is East, and West is West. He added some remarks upon the entire improbability of a meeting between the two. Indeed he went so far as to asseverate that that meeting would not take place until Judgment Day.

Several historic assertions are on record as to the precise date of Judgment Day. None of these assertions has been proved correct. Thus we have no means of judging the accuracy of Mr. Kipling's statement. Yet we are confronted with the fact that a meeting must soon take place between Canada West and Canada East. And this is why.

Nova Scotian coal operators are traditionally opposed to anything resembling reciprocity in coal as between Canada and the United States. Their reasons are obvious, numerous, and well set forth. Albertan and British Columbian coal operators are strongly in favour of reciprocity for reasons equally cogent. Heretofore Nova Scotia has had the stronger voice at Ottawa. But now the West is vocal.

Our honoured Premier, Sir Wilfrid Laurier, has but now completed an official tour of Western Canada. On not one, but on many occasions, good citizens made opportunities to pour into his ear their complaints on matters pertaining to tariff and trade. At Lethbridge, particularly, he listened to the sorrows of local coal-mine operators. The substance of their plaint was that they have reached the present limit of the domestic market and that the tariff barrier precludes them from exploiting the United States market adequately. One manager stated with great frankness that they needed the market, needed it badly, and were shut out of it because Nova Scotia desired protection from Pennsylvania and Virginia. Free trade, he claimed, would develop enormously the Western field and would reduce the price to consumers. And he added a suggestion that, if necessary, a tariff zone be established in Nova Scotia, the West being left free from restrictions.

Whilst without question it is useful to hear both sides of every debate, we fear that Sir Wilfrid will not find that the problem is as simple as it seems. In fact, it is far from being simple. Each side has a right to be heard. Neither side can be dealt with at the expense of the other. The chief difficulty lies in so adjusting matters as to do fairly by both.

A struggle at Ottawa between Eastern and Western interests would be neither expedient nor profitable. We suggest that accredited representatives of both meet on neutral ground and discuss matters fully. This has long been needed. The issues to be considered are



clear. The steps to be taken can, we believe, be made not unfair to either East or West.

Meanwhile there would be no harm in a public investigation of railway freight rates.

#### NOVA SCOTIAN TUNGSTEN MINING.

In this number of the CANADIAN MINING JOURNAL will be found a brief description of the tungsten deposits that are now being opened at Scheelite, Halifax County, Nova Scotia. The article referred to is meant to be as general as possible. At this stage it is unwise to be too specific.

A visit to Scheelite is instructive. Here is the first recent instance of an enterprise entirely Nova Scotian in discovery, exploitation, and organization. The discovery was made by two local prospectors, Messrs. Reynolds and Currie, aided by Mr. A. L. McCallum. The financial organization was undertaken by Mr. H. C. Borden, a brother of Mr. R. L. Borden, leader of the Federal Opposition. If present indications may be taken at their face value, the enterprise will be successfully conducted by the present operators. It is most gratifying, in any case, to witness the rare sight of Nova Scotians giving tangible evidence of their confidence in themselves and in their country. It is also gratifying to learn that the intimate knowledge of the mineral deposits of Nova Scotia possessed by local prospectors has been recognized. The Nova Scotian prospector may not be able to write technical papers, but he has a remarkable nose for ore.

That Mr. Faribault's diagnosis of the field is correct constitutes another feather in his already well decorated cap. Mr. Faribault's advice gave direction to the work from the first. Without the counsel of this distinguished official of the Geological Survey the mining problems might not yet have been solved.

We note with pleasure that the mine is not being over-equipped. Thus costly errors are to be avoided. The positive advantages of cheap mining, cheap and efficient labour, easy access, and ample territory wherein to work and prospect, are all evident. All in all, the mining camp of Scheelite has had an auspicious beginning and promises good things. When it is remembered that the concentrates will be the equivalent of high grade Cobalt silver ore, and that the ore itself is ideally susceptible of treatment, a standard of comparison is gained.

We shall watch with keen interest the development of Scheelite. If it lives up to our expectations, Nova Scotia will possess an industry that will attract much more than local attention.

#### PUBLICITY.

We are often filled with shame because of the paucity of general mining news in the Canadian press. It is quite true that columns will often be devoted to spectacular finds or to special promotions. But regular mining news service there is none.

Coal, iron, and steel outputs are reported sporadically from the east. Shipments from Cobalt and Gowganda are published weekly. Southwestern British Columbia ore shipments are likewise reported, and the statements of ore received at the smelters of these districts are made public. Apart from a few coal mines, the above mentioned branches of the industry are about all from which the public hear with any degree of regularity.

For instance, from the asbestos concerns of Quebec only annual statements are issued, and these are by no means complete. From the large copper-nickel enterprises of Ontario no regular statements or reports are forthcoming. And so on through the list. Numberless small concerns are hidden in perpetual obscurity.

This is decidedly not as it should be, and it behooves the powers that be to bring about a change. Statistics, provided they are timely, complete, and accurate, have a distinct commercial value. If belated, incomplete, and inaccurate, they are worse than useless. The one means of securing accuracy and completeness is to insist upon weekly returns from each and every considerable producer of coal, of ore, and of metallurgical products. Any attempt to collect figures merely from year to year is wrong in principle and uncertain in results.

The remedy for this condition in Canada lies in the hands of each province. The Mining Department of each is capable of bringing pressure to bear upon companies operating under its jurisdiction. Pressure, however, may not and should not be necessary. At worst, a system of weekly open returns may not be welcome by mine operators, but we are confident that their objections will not be long-lived.

When one examines the analytical returns made public by the Rand, one has no difficulty in perceiving their value. The public, kept fully informed as to the capacity of each plant, the value of ore mined and of reserves, has its interest constantly inspired. The direct effects of this publicity are to guide investors, to improve mining practice, and to localize and minimize waste. The operator whose reports and returns are read by thousands is not prone to careless work. He is stimulated to his highest and best.

We have spoken before of the splendid isolation of the mining industry. That isolation costs money. That isolation, also, would disappear if the public were taken into the confidence of the operator. If in nothing else, surely in the item of outputs bona fide mining companies gain nothing and lose much by the unjustifiable policy of silence.

#### THE EXPLOSIBILITY OF COAL DUST.

It is not our intention here to discuss the question of the explosibility of coal dust. What we wish to point out is that some of the factors in the case have not yet been determined, and that, therefore, final pronouncements are not in order.

At the Pittsburg Testing Station, erected by the Technologic Branch of the United States Geological Survey,



and now under the control of the newly created Bureau of Mines, experiments have been carried on for the purpose of investigating the nature of coal dust, with especial reference to its explosibility. The chief mining engineer of the Bureau, Mr. George S. Rice, has recently written a bulletin describing these experiments. Certain conclusions are outlined by Mr. Rice. Whilst the reader is informed that these conclusions are tentative, yet as they are expressed in definitive language they are fairly to be criticized. And on two points, at least, we fear that Mr. Rice has erred.

The conclusion that in ordinary conditions the dust must have originated from coal carrying at least 10 per cent. of volatile combustible matter has not sufficient basis in fact or, rather, in experiment. British experiments have proved that explosions can be obtained with charcoal dust. Mr. Rice mentions this latter fact, but apparently does not accept it.

Again, the preliminary statement that the force of the explosion of firedamp is terrific, is quite wrong. Firedamp explosions develop no terrific force.

It is not wise to overlook the fact that the British experiments have covered a much longer period of time than have those conducted in the United States. Long and unsparing study is a pre-requisite. This has not been absent in Great Britain. But we must express a candid doubt as to the fitness of the United States Bureau of Mines to rush into print concerning a subject so involved and so highly technical. It were better far to defer official reference to controversial phases until such time as the Bureau may have become more firmly established.

It is generally admitted that much is to be learned concerning coal dust. When the United States Bureau of Mines has a serious contribution to make we shall welcome it.

#### TECHNICAL LITERATURE ONCE AGAIN.

Laterly we gave utterance to the hope that the tilt between Mr. T. A. Rickard and his critics would be lively. It is. In Bulletin No. 71 of the Institution of Mining and Metallurgy, two new contributions appear. Both contributors, after a brief bow, proceed to carve Mr. Rickard and to place salt on the wounds. In an entertaining ten pages Mr. Rickard replies to each and all who have entered the lists against him.

In our opinion, Mr. Rickard has escaped with surprisingly few marks. He seems fairly to have established his position in objecting to the use of such localisms as "mullock." His objection to the misuse of the word "partially" is also sustained. But in the matter of preposition-verbs, the critics have worsted him. All this by the way. The outstanding fact is that Mr. Rickard has single-handed resisted the onslaught of many tall and fiery knights. His pen arm yet is free. A bloody wound or two can be detected. But he has emerged, if not victorious, yet by no means defeated.

And his agility has been beautiful. We had truly believed him at least temporarily disabled.

The discussion that has now been closed has indisputably aroused more and keener interest than any of recent years. To our resolute brother the profession owes a hearty vote of thanks.

#### THE QUICK AND THE DEAD.

A change is coming over general mining activities in Canada. It is not uncommon to hear of independent Canadian investors taking up abandoned mines. This is probably more the case in Ontario than elsewhere, but evidence of revival is not lacking in Nova Scotia, New Brunswick, Quebec, or British Columbia.

In Nova Scotia, for instance, old gold mines are being re-opened; gypsum and infusorial earth deposits are being again taken up; and generally there is a great deal of quiet work being done. In New Brunswick, copper is being investigated, despite the record of the past. Copper and alluvial gold are subjects of revived interest in Quebec. Ontario's western gold mines show signs of life. Of British Columbia's lead and zinc the same thing is true.

These facts, considered in conjunction with the many new activities in coal, iron, gold, oil, feldspar and so on, surely mean that the mining industry of Canada is on the eve of expansion to limits not heretofore hoped for. Statistics may not show the measure of this expansion. But, before long, even statistical statements will be affected.

#### PORCUPINE AND COBALT.

He who denies that experience teaches need only glance over the histories of Cobalt and of Porcupine. Porcupine has learned wisdom from Cobalt. The pioneers of Porcupine were in the main strong, clean men who frowned upon crookedness. So far as is humanly possible Porcupine has been developed on its own merits. Cobalt was sadly afflicted for years with bad men and bad methods. The process of weeding out was long. Porcupine has commenced weeding early. That it may be continued is our earnest prayer!

#### EDITORIAL NOTES.

Diamond drilling has brought satisfactory results in Porcupine ore bodies.

Rhodesia has established a Geological Survey. As the gold output of the colony is now about \$13,000,000 per annum, this step is not rash.

The rise in the price of tin has been phenomenal. Lately in London the spot price has reached £164 10s., whereas a week before it stood at £159.

An exceedingly rich ore shoot was recently struck at a gold mine at Renfrew, Nova Scotia. Specimens of the ore, filling a small pan, contained more than 50 ounces.



The Nugget gold mine has attracted much attention to the Sheep Creek district, B.C. It has been producing steadily for a considerable time. It was exploited by Mr. A. H. Gracey, a former student at Kingston School of Mines.

In the United Kingdom the proportion of work-people affected by changes in wages during 1909, was largest in the coal mining industry. The gain in wages in the industry was larger absolutely and proportionately than in any other industry.

A new detonator is being manufactured by a French firm. It consists of a metallic tube which is filled with tri-nitro-toluol and drawn out thin. This detonates frozen nitro compounds, and, it is claimed, reduces by 30 per cent. the amount of explosive used.

The gas wells of the Maritime Oilfields, Limited, near Moncton, New Brunswick, are yielding handsomely. One well has a flow of 5,000,000 cubic feet per day. Oil, also, has been struck in commercial quantities. A scheme is being formulated whereby Moncton and other towns will be supplied with light, heat, and power from the gas.

The Porcupine Mine Owners' Association is a recent organization formed to give clean publicity to the Porcupine camp. From the New York office news bulletins will be distributed. The object is to discredit irresponsible rumours and to circulate authentic information. Mr. C. A. Foster is president and Mr. H. P. Davis secretary.

#### BOOK REVIEWS.

**FROM PROSPECT TO MINE—BY ETIENNE A. RITTER, MINING ENGINEER,—166 PAGES—ILLUSTRATED WITH HALF-TONES AND DIAGRAMS—THE MINING SCIENCE PUBLISHING COMPANY, DENVER, COLORADO, 1910.**

A consecutive discussion of the life history of a mine and of the successive steps by which a prospect becomes a dividend-paying mine, are here set forth. Dr. Ritter has attempted with a large measure of success to clothe his thoughts in language simple, direct, and instructive. He writes especially for the investor; but his book also serves as a review for the engineer.

To the layman the perusal of Dr. Ritter's modest little book should prove alike refreshing and informing.

**ORE MINING METHODS — COMPRISING DESCRIPTIONS OF METHODS OF STOPING AND MINING IN NARROW AND WIDE VEINS AND BEDDED AND MASSIVE DEPOSITS, INCLUDING STULL AND SQUARE-SET MINING, FILLING AND CAVING METHODS, OPEN-CUT WORK, AND A DISCUSSION OF COSTS OF STOPING — BY WALTER R. CRANE, PH.D. — 219 PAGES. RENOUF PUBLISHING COMPANY, 25 MCGILL COLLEGE AVENUE, MONTREAL, AND JOHN WILEY AND SONS, NEW YORK, 1910.**

Mining methods vary with every locality. Even the

same methods will change in different hands and in different circumstances. But it is generally true that some methods are unsound in principle and that others have proved sound and adaptable. To these latter Dr. Crane devotes his attention.

The sequence of treatment is as follows: Support of Workings, Methods of Stopping and Handling Ore in Stopes, Mining in Narrow Veins and Bedded Deposits, Methods of Mining in Wide Veins and Masses, Open-cut Mining, Cost of Mining.

In several respects Dr. Crane has not made his work inclusive enough, at least, to justify the title. For instance, shaft-sinking is not dealt with, nor is the relation of the shaft to other workings touched upon adequately. But these phases have been well developed in other text-books. In the main, "Ore Mining Methods" stops a gap successfully. It will serve as a useful source of reference to Canadian operators. Mine managers are all too prone either to follow local methods blindly, or to go off at a tangent. And the mine manager can afford to do neither.

In all probability the chapters on stoping will be found most suggestive. They cover a wide range, and they are well done. The last chapter, "Cost of Stoping," will give mine managers an excellent datum point.

Typographically the book is all that can be desired.

**THE CANADIAN ANNUAL REVIEW OF PUBLIC AFFAIRS—1909—BY J. CASTELL HOPKINS, F.S.S. ILLUSTRATED — PRICE, \$3.50 NET — THE ANNUAL REVIEW PUBLISHING COMPANY, LIMITED, TORONTO.**

"The Canadian Annual Review of Public Affairs for 1909," by Mr. J. Castell Hopkins, is a volume of 660 pages packed with information regarding Canada—statistical, historical, descriptive. In this ninth year of its issue the work deals in literary and readable style with every phase of Canadian development and activity. Imperial and foreign relationships, material progress and prosperity, individual enterprise and business efforts, during the period under review.

Amongst the subjects to which sub-sections of the volume are devoted might be mentioned:

- Germany, the British Navy and Canada's Position.
  - The Meeting of the Imperial Defence Conference.
  - Position and Policy of the Dominion Government.
  - Parliamentary Events and Discussions of the Year.
  - Tariff Affairs and the Canadian Manufacturers Association.
  - Militia Conditions, Appointments and Progress.
  - Dominion Labour Legislation and Conditions.
  - The Imperial Press Conference — Speeches and Results.
  - The Chambers of Commerce of the Empire at Melbourne, Australia.
  - The British Preference and Preferential Trade Discussions.
  - The Continued Increase of British Investment in Canada.
  - Public Affairs in all the Provinces.
  - Mines and Mining Interests of the Year.
  - Transportation Affairs and Railway Expansion.
  - Financial Municipal, Trade and Other Interests.
  - Relations with Foreign Countries.
  - The Question of United States Reciprocity.
- Immense labour has been devoted to the compilation of this book. The sections on mining are extremely interesting.



# SCHEELITE.

## A New Tungsten Mining Camp in Nova Scotia.

(Written for the CANADIAN MINING JOURNAL.)

The occurrence of scheelite in small quantities in Nova Scotia has been known for some time. The first discovery of scheelite-bearing quartz veins was made two years ago (See CANADIAN MINING JOURNAL, September 15th, 1908) in the gold mining district of Moose River, Halifax County. Not until last winter were arrangements completed to commence developing the pro-

Musquodoboit, to Moose River. Except for the last two miles connecting Moose River and Scheelite, the roads are excellent. The projected railway between Dartmouth and Antigonish will pass within a few miles of the mines.

The geology of the district has been well described by Mr. E. R. Fairbault in his paper appearing in the

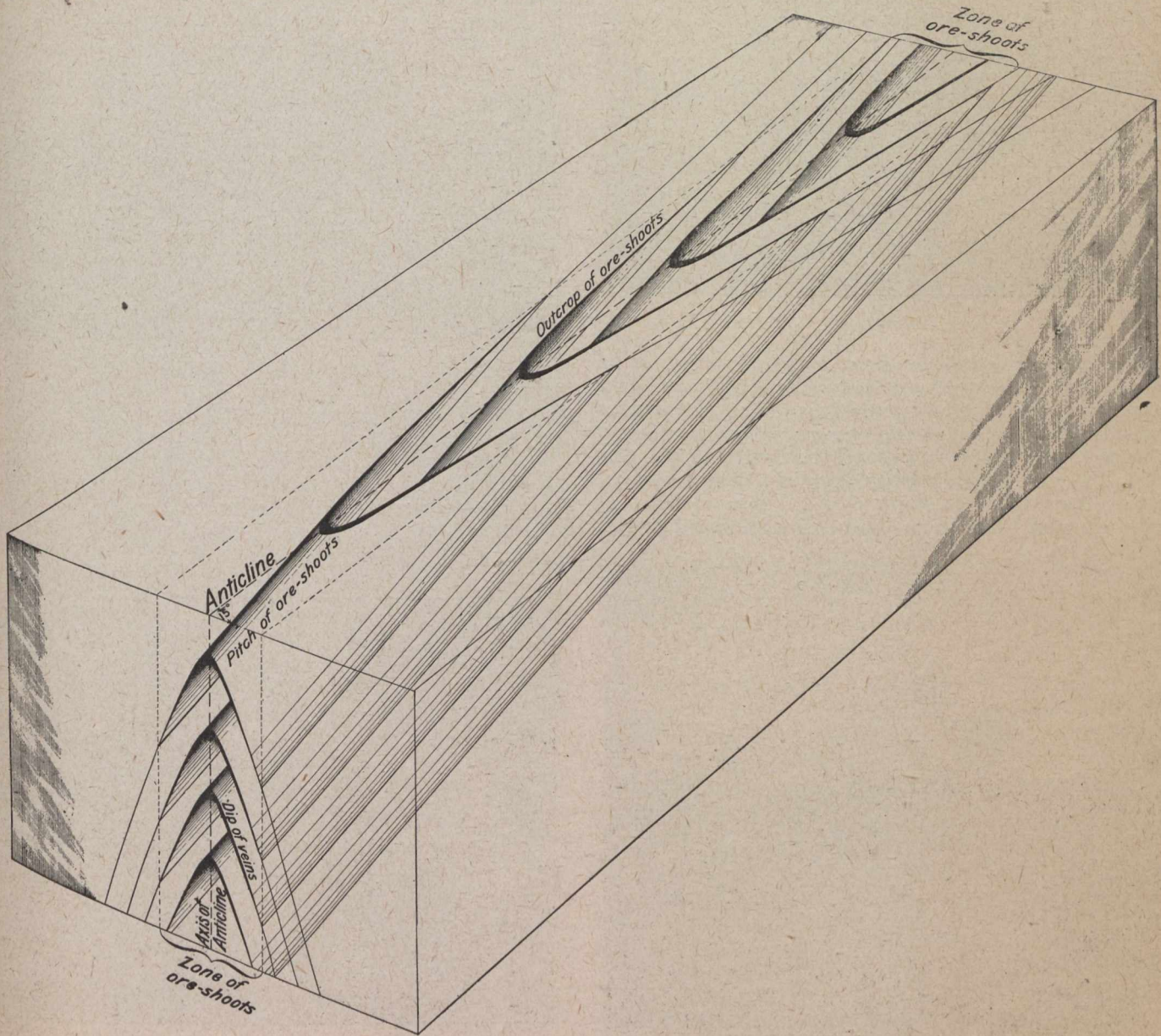


Diagram of Veins and Ore Shoots.

perty. It is now being handled by Mr. A. A. Hayward, formerly secretary of the Nova Scotia Mining Society. The syndicate that is behind Mr. Hayward is composed of Mr. R. L. Borden, Mr. M. J. O'Brien, and other prominent citizens. It was organized by Mr. H. C. Borden. Scheelite, as the new settlement has been christened, is situated 28 miles northeast of Halifax City, and lies 12 miles from the Atlantic coast. The most direct route is from Elmsdale, on the Intercolonial, through Middle

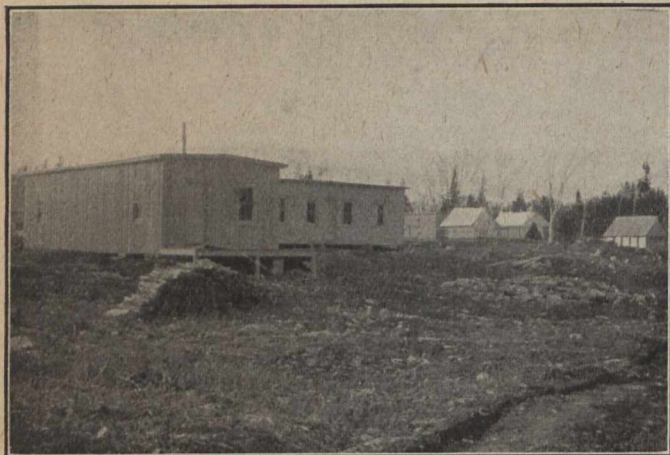
Summary Report of the Geological Survey for 1909. The rocks are the typical, altered, grey quartzose-sandstone, interstratified with beds of dark grey slate. These are the lowest strata of the gold-bearing series. They occur along the apex of the highest and most prominent anticlinal fold which passes through the Moose River gold district.

Rock exposures are scarce. Hence prospecting is not easy. Indeed, it appears to require special aptitude and



experience, and to the intelligent persistence of Messrs. Reynolds and Currie is due the credit of most of the discoveries so far made.

**VEINS.**—The accompanying diagram gives a clear idea of the geological structure. The scheelite-bearing veins, interbedded between "whin" (altered quartzite) and thin layers of slate. The profound folding to which the strata have been subjected has developed the usual system of synclines and anticlines. The veins themselves have their horizontal extension east and west.



View of Scheelite.

They dip either to the north or south, according as to whether the north or the south leg of the anticlinal fold is encountered. The horizontal axis of the fold pitches towards the west. Hence, successive outcrops are found of veins that overlie each other, the overlying vein being to the west of the underlying vein. Thus a vertical section from north to south would expose a series of veins, crumpled into arches and corresponding troughs,

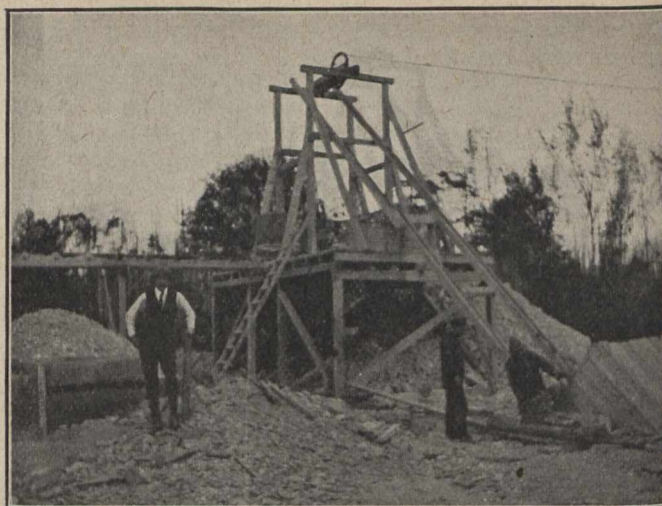


View of Dwelling Tents.

and the whole body pitching gently to the west, and, in the section, converging gradually until successive complete anticlinal folds are visible in the centre of the series.

The veins range in width from one inch to two feet. Those richest in scheelite do not exceed 6 inches, and, in general, the average width lies between 4 and 6 inches. The richest veins are usually uniform in thick-

ness. Distortion at the crest of an anticline or at the trough of a syncline may induce rolls or pockets that are abnormally thick. The vein matter is principally quartz, scheelite, and mispickel. The proportions in which these minerals are found vary within wide limits. In most of the veins scheelite is the more abundant, although occasionally mispickel predominates, and in one vein constitutes the whole. Occasional thin plates of calcite are found. But the three minerals mentioned above are by far the most important constituents. Other



Headframe at Incline Shaft.

minerals commonly associated with Nova Scotian gold-bearing veins are entirely, or almost entirely, absent. As pointed out by Mr. Faribault, the presence of tourmaline and of mica, considered in connection with the intense metamorphism of the surrounding country rock, indicates that the tungsten deposits are of profound origin.



Messrs. A. A. Hayward, H. C. Borden, and R. L. Borden

Whilst the extent of the scheelite deposition is not yet known, it has been proved to be larger, more regular, and richer than was at first supposed.

Manager Hayward is now sinking an incline shaft on the outcrop of a syncline. The tram rails are exactly over the trough, and in each wall is visible one leg of the syncline. That is, on the north wall, the south leg of the anticline begins, and the crown of that anticline



has been discovered but a few feet north. Similarly on the south wall of the shaft the north leg of the syncline next to the south is exposed. On both walls the vein matter has been allowed to remain. Examination proves these veins to be exceedingly rich. Much of the vein carries more than 50 per cent. of scheelite. All that has been exposed will mine well over 20 per cent. The shaft is to be continued to the pitch of the synclinal trough and will make easy dry mining. The hope is entertained that the ore shoot will prove continuously to follow the pitch of the measures. Up to date there has eventuated nothing to disturb this hope.

There are, excluding the incline shaft, five prospect shafts sunk on different veins. In addition, there are eight other veins cut in trenching. Some of these are rich, some lean, but all carry scheelite.

Having glanced cursorily over the camp as a prospect, let us turn for a moment to another aspect. The work of establishing the new camp was begun on April 1st. At Moose River, two miles distant, 140,000 feet of



John Reynolds.

spruce and pine timber were sawn. 80,000 shingles were also made. The frame timbers of a 5-stamp mill were cut and are now in readiness. Next the town-site was prepared. Originally about 100 acres had been cleared of timber. This ground was now thoroughly stripped of bush, a necessary step to prevent damage from forest fires. Substantial storehouses, residence, cookhouse, and stables were built. The other necessary residences are tents erected on strong wooden platforms. Over these platforms will be built wooden houses ere the snow flies. Incidentally, though perhaps the subject deserves more than incidental mention, every building and every dwelling is kept in a condition of thorough cleanliness. The cook-house is spotless. The sleeping tents are fitted with immaculate double-deck iron beds. Nowhere is uncleanness of any kind permitted. The sanitary arrangements are most effective. It is quite apparent that the men are encouraged to live up to a strict hygienic standard.

Steam is still being used for sinking. No costly machinery is on the ground, and none has been ordered. It is expected that a 5-stamp mill, equipped with suit-

able concentrating machinery, will be all that is necessary to produce dividends. It is possible that rolls and jigs may be employed instead of stamps. A mill of capacity equivalent to 5 stamps would yield at least one ton of 75 per cent. concentrates. On a great deal of the ore so far exposed the yield will be much higher. Without removing the arsenic from the concentrates they can be sold for more than \$7.50 per unit. However, the arsenic, about 3 per cent. of which is contained in the concentrates, can be cheaply and expeditiously removed by roasting.

It is probable that mining can be carried on in Nova Scotia at lower figures than can be paralleled elsewhere. For instance, the incline shaft, 6 feet by 7 feet, is constructed at a cost of \$9.50 per foot. This figure is inclusive of all surface expenses except fuel. A vertical shaft, 6 by 14 feet, was constructed at \$14 per foot, inclusive. Drifting, it is estimated, will cost \$5 per foot. In section the drift will approximate 7 feet in height and 4 feet in width. Mining costs will aggregate about \$4 per ton for breaking the ore. This includes all underground charges. Can any readers of the CANADIAN MINING JOURNAL show lower costs than these?

To refresh the memories of those who have forgotten what scheelite is, it may be well to include a paragraph or two. Scheelite is calcium tungstate, a chemical combination of lime and tungsten trioxide ( $\text{CaO.WO}_3$ ) containing when pure 80.6 per cent. of tungsten trioxide and 19.4 per cent. of lime. In some deposits copper, a very deleterious element, replaces to various extents the tungsten. In Nova Scotia, however, the only harmful element present is arsenic in the form of mispickel.

As scheelite has a specific gravity of 5.88 to 6.14, and as mispickel closely approximates this, 5.89 to 6.30, a close separation in the mill is not practicable. But it is quite practicable to roast off the arsenic.

It is altogether too soon to predict the future of Scheelite. The venture, however, is developing most favourably. If no interruptions are experienced, and if that bugbear of Nova Scotian mining, litigation, be avoided, the enterprise has all the earmarks of success.

#### MINING PROSPECTS ON UPPER FRASER RIVER, B.C.

A party of prospectors, representing a Kamloops, B.C., syndicate, after having spent the summer examining the country along the route of the Grand Trunk Pacific Railway between Fort George and the head waters of the Fraser River, lately returned to Kamloops. The "Standard," published in that town, says: "During the trip every care was taken to examine the country thoroughly both for agricultural purposes and for mineral. The country to Tete Jaune Cache contains much excellent agricultural land easily cleared, which will be along the line of railway when completed. It is, however, likely to become a mineral producing area, according to reports made by Mr. J. C. Bradley, who was in charge of operations for the syndicate, and outside of mica deposits will never produce any surprises. The mica deposits are immense, though, and the Tete Jaune Cache country may in a few years be able to control the markets of the world so far as this mineral is concerned. At Tete Jaune Cache the party met Mr. Stanley Washburn, of Minneapolis, who, with Mr. C. A. Thurston, a New York mining engineer, was examining the mica deposits at that place." (See also Geological Survey of Canada "Summary Report" for 1909, page 129.)



# MINING AND METALLURGICAL OPPORTUNITIES IN CANADA.

A. B. WILLMOTT, Mining Engineer, Toronto, Ont.

**Prefatory Note.**—In the following brief articles attention is called to some industries connected with mining, which apparently might be profitably established in Canada at once. Where data are available the market is given, and the source of the raw material indicated. I do not pretend that I have critically examined into all the conditions that make for success, but only that the subjects mentioned are worthy of careful study by investors looking for meritorious propositions.

## II.

### An Alberta Iron Industry.

The provinces of Alberta and Saskatchewan, about 500,000 square miles in area, are rapidly settling up. Already the population is in the neighbourhood of 700,000 and within a few years it will have reached the vicinity of two million, which was the population of Ontario not many years ago. This population will undoubtedly require a certain amount of pig iron for local foundries. This will probably be mainly employed in repair work, though there will also be a demand in connection with local manufactures.

At present pig iron sells in the vicinity of \$25.00 a ton at Winnipeg and at about the same figure at Vancouver. As one goes west from Winnipeg and east from Vancouver the price rises as distance increases. The price at such points as Calgary and Edmonton is at present practically prohibitory for any manufacturing purposes. At the same time local foundries would no doubt spring up at many centres in Saskatchewan, Alberta and Southeastern British Columbia, if the price of pig iron were reasonable. Prince Albert, Saskatoon, Regina, Moose Jaw, Edmonton, Calgary, Lethbridge, Fernie and Nelson should all be consuming points for a small amount of iron and at prices much above those secured in the east. The market would not be a large one, but would probably consume the product of a 50 or 100-ton furnace.

As to the raw materials for such a furnace, coke is, of course, abundant in the Crow's Nest Pass region and can probably be furnished north if required. This coke is of excellent quality and finds a large sale at the copper smelters.

A supply of iron ore is more uncertain and comparatively little is yet known of the ore possibilities. Near Kitchener eastern interests have drilled a deposit of hematite with results which were reported as very encouraging. On Bull River, north of Jaffrey, on the Crow's Nest division of the Canadian Pacific Railway, hematite deposits are also reported. At present there is no incentive to prospecting for iron ore as there has been no demand for properties and no sale for ore. Undoubtedly if a furnace were erected a number of deposits would be found. Moreover, the size of the furnace would not require any large amount of iron ore.

While the heading of this article implies that the furnaces should be located in Alberta it might, perhaps, be found better to locate on the British Columbia side of the boundary. The proposition to which I wish to direct attention is the possibility of furnishing from the ores and coke of the Crow's Nest district a local supply of pig iron for the prairie provinces and for the mining industry of southeastern British Columbia.

## III.

### Salt in the Prairie Provinces.

The prairie provinces are supplied with salt partly from the district bordering on Lake Huron in the province of Ontario, and partly from the United States, salt from the latter source being subject to an income tax. The production of salt in Ontario in 1908 is given as follows: Sales, 79,975 tons value exclusive of packages \$378,798, value of packages, \$168,019. From these figures it can be calculated that the salt, as estimated by the producer at the point of production, is worth 23.7 cents per cwt., and the value of the packages 10.5 cents per cwt.

Freight from Windsor to Winnipeg by combined rail and lake amounts to 28.3 cents per cwt., and from Windsor to Edmonton to 63.3 cents per cwt. From this it is apparent that the cost of salt laid down in Edmonton is 97.5 cents per cwt., exclusive of the freight on the packages. At Winnipeg the cost is 62.5 cents per cwt. The actual cost of salt at Edmonton is thus a little over four times the cost of the same salt in Windsor. If salt could be produced at some central point in the west and the freight rate from Windsor to Winnipeg alone saved, the producer would have as his profit not only the profits of the producer in Ontario, but also the latter's whole cost of production.

The consumption of salt in the prairie provinces is unknown, but may be determined approximately as follows: The total consumption of salt in Canada for 1908 was 391,384,000 pounds. Assuming the population at that time to have been six million and a half, the consumption per capita was sixty-one pounds. The population of the three prairie provinces is to-day believed to be one million two hundred thousand, and the consumption of salt estimated on a basis of sixty pounds per capita would thus amount to 72,000,000 pounds per annum. If a freight rate of 25 cents per cwt. were saved on this consumption the saving would amount to \$180,000 per annum.

In the west a number of salt springs are known which have furnished salt, of rather a crude character it is true, to the Hudson's Bay Company for many years. The most important of these are located along the shore of Winnipegosis Lake. James Monkman began working one of these as early as 1820. In the Geological Survey report of 1890, part E, the following springs are noted:

- Salt Creek, west of Lake Dauphin.
- Banks of Mossy River.
- Salt Point, south of Lake Winnipegosis.
- Monkmans Salt Springs, Red Deer Peninsula.
- Pine Creek.
- Pelican Bay, mouth of Pelican Creek.
- Pelican Bay, west side.
- Mouth of Bell River.
- Salt Point..
- Salt Point Peninsula, with salt near its base.
- Salt Point Peninsula, north side of its base.
- Mouth of Steep Rock River.
- Lower Red Deer River, many places.
- Banks of Shoal River.
- Mouth of Swan River.



According to Mr. Tyrrell these springs have their sources chiefly in the Devonian rocks. The salt of the springs is thought to be derived from crystals of salt scattered through the rocks rather than from beds of pure rock salt. In Ontario the salt occurs in beds of the Upper Silurian period. Silurian and Devonian rocks extend from Lake Winnipeg northwest to the Mackenzie River. There are probabilities that actual salt beds exist as well as the springs referred to above. Boring will be required to determine this point and no definite inference can be made from geology that such beds of salt will be found. The probabilities are, however, strong. With an assured market for a large consumption and with a natural protection due to freight rates there should be sufficient encouragement to take up this enterprise.

### EXPERIMENTAL WORK IN TREATMENT OF ZINC ORES.

(Contributed by E. Jacobs, Victoria, B.C.)

Last December a convention of mining men and others interested was held at Nelson, British Columbia, to consider the question of the best course to take to secure the making of experiments in the treatment of zinc ores, especially of ores in which zinc occurs in association with lead and iron. The attendance at that meeting was large and representative of the whole of the Kootenay district in particular, in which are known to exist great quantities of ore containing zinc, and this frequently with lead, in connection with which it is generally a detriment, since the shippers of such ores to lead smelters are usually penalized when there is more than a certain percentage of zinc in the ore. The meeting unanimously adopted resolutions in effect petitioning the Dominion Government to make a sufficient appropriation to admit of experiments being carried on with a view to making the utilization of the zinc ores of British Columbia and other parts of the Dominion commercially practicable.

About a year earlier works designed to smelt lead-zinc ores by electro-thermic process, using the Snyder patented process, had been completed according to plans and a commencement had been made to smelt district lead-zinc ores, but, while a certain measure of success was achieved, working costs were high and results were not such as would bring profit to those concerned. The Provincial Government of British Columbia has already aided the undertaking by a substantial money loan (\$20,000), so it was not reasonable to ask it for more. In January, 1909, a periodical general meeting of the Western Branch of the Canadian Mining Institute was held at Greenwood, and several members resident in Nelson and Slocan districts attended that meeting and secured the adoption there of the following resolution:

"Resolved—That this the Western Branch of the Canadian Mining Institute, in meeting assembled, hereby expresses its approval and appreciation of the action of the Federal Government, through its Department of Mines, in seeking a solution of the difficulties attendant on the economical smelting of eastern iron ores, by practical experiments in electro-thermic reduction, conducted at the public cost.

"In this connection this meeting recommends to the Government the desirability of aiding in and contributing to the advanced experiments which have already been made in British Columbia towards the separation and reduction of lead-zinc ores by electro-thermic energy. These experiments have demonstrated the prac-

ticability of the separation of metallic zinc from metallic lead, and its recovery as spelter from complex lead-zinc ores. Important deposits of such ores occur in this province and remain unworked through lack of economic reduction facilities. In the opinion of this meeting a solution of this problem will be of very great importance to the mining industry of the Dominion."

This resolution was duly communicated to the Dominion Government, but, so far as known to the writer of this article, no action was taken in this connection. The resolutions passed at Nelson late in 1909 were, however, persistently urged upon the Dominion Government, the entire cessation of work at the electric zinc smelter at Nelson having meanwhile taken away the hope previously existing that the difficulties in the way of continued operation of the works would be overcome. The outcome of this agitation and urgent representation to the Government was that an appropriation of \$50,000 was made and the Mines Branch of the Canada Department of Mines was authorized to make enquiries into the subject and conduct such experiments as should be deemed desirable towards arriving at a solution of the difficulties of the situation. Since then little definite information had been made public in British Columbia as to what steps had been, or were being, taken in this important matter, so the occasion of the recent visit to British Columbia of the Prime Minister, Sir Wilfrid Laurier, was considered a suitable one to again press upon the attention of the Government the urgency of progress being made towards solving the problem of the reduction of zinc ores. Accordingly, the Kootenay-Boundary British Columbia Liberal Association adopted the following resolution, among others, for submission to Sir Wilfrid Laurier at the time of his visit to Nelson on August 29th:

"Resolved—Whereas the Dominion Government has appropriated for experimental work in the treatment of zinc ores, the sum of \$50,000,

"And whereas in the opinion of this convention such appropriation is a wise and judicious one,

"And whereas British Columbia is the centre of the zinc industry in Canada,

"And whereas it is the opinion of this convention that such experimental work should be, as far as practicable, carried on in the country which will benefit from the results thereof;

"Resolved, that the Dominion Government be thanked for the appropriation already made,

"And further resolved, that the Government be urged to carry on the experimental work as far as possible in British Columbia."

The Nelson Daily News, from which the information relative to the adoption of the resolution, and the account of the statement afterwards made by Hon. Wm. Templeman, Dominion Minister of Mines, has been taken, did not state what the reply of Sir Wilfrid was. However, the matter was dealt with by Mr. Templeman at a public welcome to the Prime Minister and his party before they left the city on their return to Eastern Canada. The Hon. Minister of Mines is reported to have said:

"I may on this occasion make reference to a question in which the people of Nelson are, I know, all very deeply interested. Some years ago, at the request of the mining interests of the province, and particularly of this district, the Dominion Government secured the voting by Parliament of a sum of money as a bonus on the production of lead mined in Canada, which amount has not yet been exhausted. The production of lead during the years that have intervened has, I



believe, been maintained at a normal level. That bonus on lead has been of enormous benefit to the Kootenay district. I doubt whether without it the lead mining industry would have been as successful as it has been during the past five or six years. There has now come a time when the production of lead-zinc ores needs assistance. There are many mines in this part of the province producing low-grade ores of zinc and lead, and in numerous instances the zinc cannot be recovered profitably by reason of the difficulty of smelting zinc. An amount of \$50,000 has been voted, and since I arrived here I have heard many enquiries as to how we propose to spend that money. This is, I think, a proper opportunity to explain what we have done and propose to do further in the matter. Our first step has been to secure the services of an eminent mining engineer in London to make a report upon all the electrical zinc-smelting processes at present known in Europe. That engineer, Mr. F. W. Harbord, is now engaged in that work. (Note by E. J.—Mr. Harbord is a prominent member of several influential mining and metallurgical institutes and other societies in England. He has large experience in iron and steel manufacture, in which he was for some years engaged in the Midlands. For 14 years he was consulting metallurgist to the Indian Government; afterwards he went into private practice, and in 1908 entered into partnership with Mr. Edward Riley, of London, an eminent metallurgist, analyst and consulting chemist. He is a well-known authority on electric smelting, has visited all the principal electric furnace works in Europe, and is the author of several papers on this subject. In 1904 he was consulting metallurgist to the Commission appointed by the Canadian Government to investigate the different electro-thermic processes for the smelting of iron ores and the making of steel, in operation in Europe. In 1909 he was appointed by the Transvaal Government to report on the general metallurgical position on the Rand, especially in regard to the fuel question. He is external examiner in the Imperial College of Science and Technology, London, and examiner in metallurgical chemistry for the Institute of Chemistry. He has visited nearly all the countries of Europe; also the United States, Canada and South Africa. His firm—Riley & Harbord—makes a specialty of the examination and testing of iron and steel and other metals, fuels, iron, and manganese and other ores and minerals, copper and other alloys, cements, and the various materials used by railways and engineers generally. He is also the author of the standard book "The Metallurgy of Steel" and various technical papers read before technical societies. See the London Mining Journal's "Who's Who in Mining and Metallurgy.") We have also retained the services of Mr. Walter Renton Ingalls, New York, editor of the Engineering and Mining Journal, whose name is familiar to most mining men, I think, as the greatest zinc expert in America. We are, therefore, at the present time investigating. When we have the reports from these experts we will form a plan of procedure as to experimentation. I may say, we have received from the Canada Zinc Company, owning the zinc smeltery at Nelson, the entire record of the experiments carried on here for some months, which I believe resulted in a certain measure of success, but which were not entirely successful. This data is being considered by Mr. Ingalls, who will make a report upon it. It is proposed, as soon as we receive and consider all the information that can be obtained as to results achieved thus far in the electric smelting of zinc, to submit that evidence to the best experts we can find, the best metallurgists and

chemists on the continent and to be guided by their advice as to the experiments we shall carry on. It is proposed by Dr. Eugene Haanel, director of the Canada Department of Mines, to, if possible, make the experiments in the zinc smelting process at the works at Nelson, provided, of course, the experts recommend it. I had a conversation with Mr. Ingalls, when I was in New York, and he thought in all probability it would be found expedient to take up the Snyder process and, if possible, try to bring it to success.

"Now, I want it to be distinctly understood that this is a difficult problem. We may succeed, or we may not. It may be that we shall spend all the money and not find the solution of this problem, but we know the enormous benefit that will result to this portion of British Columbia if a commercially successful process for smelting low-grade zinc ores shall be found. We are proceeding carefully; very little money has yet been expended. We shall procure the best advice obtainable and probably carry on experiments in a small way in other places where there are experts and small laboratories in which the work may be done on a small scale. Then, when we shall be in a position to attempt smelting on a commercial scale, the work will be carried on at the smelter at Nelson."

#### LONDONDERRY STEEL.

The five-ton basic open hearth furnace of the Steel Foundry Department, Londonderry Iron & Mining Company, Limited, Londonderry, N.S., is doing excellent work, and proving, so far as known, a world's record breaker.

The regular metallic charge is 12,000 pounds, of which 40 to 50 per cent. is local sand pig iron carrying 1.25 to 1.40 per cent. phosphorus, and occasionally as high as .2 per cent. sulphur. About 20 per cent. of limestone is used.

Heats have been made—from beginning to charge to tapping—in well under four hours, and excellent quality of castings, both chemically and physically, produced. When considered that the furnace is charged by hand, and charging alone takes about two hours, the work accomplished is all the more remarkable.

Owing to the intermittent character of operations common to steel foundry practice, only two heats per day of twenty-four hours are at present taken off; but everything points to a possibility, by continuous operation, of from thirty to forty heats per week of six days.

The furnace is built for producer gas with slag chambers underneath gas and air uptakes, and regenerator chambers under charging floor. The present fuel, however, is oil.

This is the only five-ton basic open hearth furnace in Canada and was designed and built by Mr. William Brown, the company's general superintendent, who also designed and built, assisted by Mr. Frank Smallwood, construction engineer, the entire steel foundry plant. Mr. Brown was for some years open hearth superintendent for the Dominion Iron & Steel Company, Limited, Sydney, N.S., and prior to that held similar positions with several of the leading United States manufacturers.

The death-rate among underground workers in the collieries of the United Kingdom during 1909 was 1.61 per 1,000 people employed, as against 1.46 in 1908. The death-rate of the surface workers was 0.67 per 1,000, as compared with 0.76 in the previous year.



## OUR EUROPEAN LETTER.

**Miners Assembled in Convention at Brussels. Important International Labour Proposals on Questions of Working Men Inspectors, Wage Agreements, Safety, Female and Child Labour, and the Eight-Hour Day. The London Mining Market. A Survey of the Position on the Rand.**

(Exclusive Correspondence of CANADIAN MINING JOURNAL.)

London, August 19th, 1910.

Recently the mining engineers met in world's convention at Dusseldorf and the result was that all records were broken both of attendance and convention generally.

The working miner has just had his turn. In connection with the Brussels Exhibition the 21st International Congress of Miners opened on August 8th. Miners were the pioneers amongst trade unionists in the international organization of their craft, and British miners appear to have led the way. Sixty delegates attended on behalf of the Miners' Federation of Great Britain. The agenda prepared before the conference was a very full one. The appointment of working men inspectors with a practical knowledge of mining was the subject of two resolutions from Great Britain and Germany. The nationalization of mines was put down from French and Belgian sources. Three resolutions on the wages question came from Germany, France and Belgium, all containing indications of the influence of the international movement to secure for all mine workers those improvements in conditions which were obtained by the mine workers of any other special nation. France, Germany and Belgium had resolutions down seeking to secure wage agreements on similar lines to those ruling on the British coal fields.

The improvements of the methods of mining with a view to preventing accidents and securing the greater safety of the workmen was the subject of a resolution from the British miners. German miners were keen on the regulation and abolition of the employment of women and children in and about mines, and on these matters secured the undivided support of the British miners. Belgium, France and Germany all put forward resolutions on the eight-hour day, and there were four other resolutions relating to old age and invalidity pensions. France and Belgium both asked for the regulation of coal supplies, and other matters discussed were compensation for accidents, universal peace and annual holidays.

On the question of mining inspectors the German representative, Herr Friedrich Hooseman, described the German system of inspection, by which the workings are inspected twice a month by practical inspectors familiar with the method of working the mines. A feature of the German system is the appointment of a committee by the workmen at each pit, whose duty it is to make any complaints to the inspectors about the administration of the mines.

The method of appointing workmen inspectors in France was fully described by M. Cordier. The law under which workmen inspectors are appointed was passed in 1890, so the miners have had some twenty years' experience of the system. In the early days of workmen inspection there was stated to be a good deal of hostility on the part of the owners. The hostility was attributed to the fact that the workmen appointed

as inspectors were men who had been foremost as trade union leaders, and consequently the employers regarded them as enemies. This feeling of hostility on the part of the owners has been gradually dying down. The terrible catastrophe which happened at Courrières a few years ago was stated to be largely responsible for the improved feeling of the owners towards the system of workmen inspectors.

In Belgium there is also a law which provides for the appointment of workmen inspectors, but its operation is unsatisfactory to the workmen. M. Ballas explained to the Congress that these inspectors were appointed from a list drawn up by the Council of Industry and Labour, which consisted half of workmen and half of employers. The committee usually disagreed, with the result that the appointment had to be made by the Minister, who generally selected the owners' nominee.

For the first time in the history of the international movement Holland was represented at the Congress. Within the last few years mines have been sunk and coal has been raised in Holland near to the German frontier. The Dutch miners have formed a trade union. Another nationality new to these congresses followed in the person of M. Avramoff, of Bulgaria.

The debate on an eight-hour day was brief. No one opposed its legal enactment. Mr. Wadsworth, M.P., explained that in England this law had increased the number of miners employed, and had not reduced wages. It was too soon to know its effect on the frequency of accidents. A resolution in favour of an eight-hour law from bank to bank was carried unanimously.

In all the sections old age pensions were discussed and explanations were given concerning the position in each nation. Mr. Stanley, M.P., described the British system as an awakening of the public conscience, which promised many improvements on what already existed, particularly as the Chancellor of the Exchequer was meditating unemployment and sickness insurance.

On the subject of compensation for accidents all the speakers advocated the free choice by the patients of the doctor. A resolution was carried demanding that compensation should equal the entire loss of wages.

The miners of the Continent of Europe are eager to follow the lead of the British miners in the obtaining of wage agreements protected by a fixed minimum. The success of this method of dealing with wages in the British coal-fields has so impressed the coal miners of other countries that the Congress has discussed resolutions from Germany, France and Belgium asking for the regulation of wages by agreements containing a minimum standard.

The most interesting disclosure of the debate was the comparison of wages paid in the various coal-fields of Europe. As might be expected, Great Britain stands highest in the list. The figures given by Mr. Harvey showed wages at the present time in the British coal-fields to range between \$1.48 a day in Scotland and \$1.84 a day in South Wales, and the districts where wages are controlled by the English Conciliation Board. The present wage in France is \$1.44 per day, in Germany \$1.30 per day, in Holland from \$1.14 to \$1.20 per day, and in Bulgaria, which stands at the bottom of the list, the wages paid range from 28 cents to 48 cents for



12 hours, and in some cases 14 hours' work at the coal face.

Mr. Elfers, who represented the Dutch miners, frankly stated to the Congress that when they applied for a higher wage and quoted the wages paid in England, the owners told them "the economic condition of affairs in Great Britain is very different, and admits of things being done there which are not possible in Holland." The wages paid in the Belgian coal-field were not given, and though John Wilson, of Scotland, tried to obtain the figures, he failed to accomplish his purpose.

The president of the British Federation brought forward a proposal for further legislation to promote the safety of workers in mines. Mr. Edwards is a member of the Royal Commission on Mines, and with the labours of the Commission as yet incomplete he was somewhat handicapped as to what he was in a position to state publicly to the Congress, but he made so strong a case that the British resolution on the subject was unanimously accepted without discussion.

The Congress then proceeded to discuss the prohibition by-law of the employment of women in the mining industry and the raising of the age of boy labour. There is no direction in which greater strides have been made by the International Congress. When the first Congress was held at Jolimont, twenty-one years ago, large numbers of women were actually employed underground. This has been entirely prohibited while the number of surface workers has decreased.

The French representative stated that in the Calais district some 3,000 young women are employed in the loading of canal barges with coal. With a touch of gallantry he claimed that these girls were as fair and beautiful as any in Europe, but at the end of their day's work they were more like negroes than Frenchwomen. The German delegate stated that they had a law which prohibited the employment of boys underground before reaching 16 years of age, except on a medical certificate of physical fitness for the work. Some 4,000 boys were employed.

The Congress also discussed the quantitative regulation of the production of coal. The French and Belgian delegations, in agreement, demanded that in case of a general strike in a given country the Miners' Federations of the neighbouring countries should limit their production by determined abstention from work. M. Hooseman, a German delegate, remarked that the miners' organizations are not stable enough and sufficiently well organized to enable such a resolution to be put in force. He demanded that the proposal should be referred for supplementary consideration to the International Committee, and this proposal, after some discussion, was adopted. The Belgian delegation proposed then that the International Committee should allot an annual holiday of a fortnight for workers in mines in order to place a check on over-production. This proposal was adopted unanimously. Another proposal to the effect that the International Congress should meet henceforward only once in two years was rejected after long discussion.

The Congress concluded its sittings after having discussed the question of the regulation of the production of coal. The next Congress will be held in London.

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Going back home it is good to see that the mining share markets have revived considerably despite the fact that the holiday period is now well with us. South Africans are slowly climbing into favour again and the more the situation is studied with respect to the Rand

the sounder it appears. There is evidence on every side of steady progress being made, and in more than one direction there is probability of improved economy in working as time goes on. The latest information concerning stope drills points to the wide adoption of machines which will almost certainly effect a very considerable economy in development work. Whether this will have as wide an effect as is supposed in some quarters in the way of increased employment of whites is as yet a little dubious, but it would certainly seem that the position is full of possibilities in that direction. Providing that the training of white miners is carried on upon a sufficiently large scale, and in a rational manner as regards selection and organization, it would seem quite impossible that within a comparatively short period a far greater number of white miners will be available, well versed in the technique of stope drilling.

Again, we are unquestionably at the beginning of a period in which the Rand mines will be able to get their power supply very much cheaper than has been the case in time past. The actual cost for a given amount of energy is likely to be decidedly less, and at the same time there will be the facility for using electrical power in many positions where hitherto it has not been dreamt of. How far underground work may, with advantage, be done by electric installations is yet quite an open question, but judging from the success which has attended electrically-driven mining equipment in the United States, it is quite within the bounds of probability that revolutionary changes may come about on the Rand in this connection. The supply of colored labour, though it will always, of course, be subject to fluctuations, appears on the whole to be quite reliable as between one year and another, and the effective value of the "boy" is, beyond doubt, increasing. Slowly, but surely, his habits are getting more businesslike, and there is less difficulty in teaching him his lesson than formerly. This must be put against the fact that if there is any change in the rate of wages paid to the native underground workers, the change will be upwards, and not downwards. When taking a survey of the probabilities concerning Kaffirs, extending over, say, the next twelve months, the East Rand field is not likely to be omitted from consideration.

#### SUCTION GAS PLANTS IN SOUTH AFRICA.

An interesting paper on "Suction Gas Plants" was read by Mr. H. W. Miller at the last meeting of the South African Association of Engineers, Johannesburg, which may be of particular interest to those having power plants to install where there is a scarcity of water or where conditions prevail rendering the adoption of suction gas plants advisable.

The instance taken was for lighting the town of Bethlehem, in the Orange Free State, South Africa, oil engines being first adopted, three-cylinder, three-crank high-speed vertical engines direct coupled to the dynamo. Three-wire system, two generating machines of 250 volts each, driven tandem fashion, output 20 kilowatts, but the high price of paraffin oil (12s. 6d. a case) was considered a drawback, and when it became necessary to install a larger plant, suction gas engines coupled direct to the dynamos, were adopted. Single generator was decided on, a single 500-volt machine with a static transformer to give 250 volts on the outside lines, being directly coupled to a gas engine of a rated horse power of 600 h.p. The capacity of the plant is 58 kilowatts at a speed of 190 revolutions per minute. One feature was the placing of the producer in a separ-



ate room with the party wall taken up to the roof, thus keeping the engine, dynamo and switchboard as clean as possible.

Prior to the installing of the gas engine the consumption of oil by the oil engine averaged about two cases of paraffin oil per night, so that the average costs for fuel and lubricating oils was about 25s., and as the units generated per month were only from 1,500 to 1,600, the costs were extremely high.

The gas engine installed is a horizontal on the Otto cycle cylinder, 16½ inches in diameter, stroke 23 inches. Two classes of fuel were used—wood charcoal to start and afterwards a low class anthracite coal from Dundee, Natal, of the following composition: Mixture, 2.08 per cent.; volatile matter, 9.40 per cent.; fixed carbon, 72.64 per cent.; ash, 15.88 per cent.; combustible matter, 82.04 per cent.; sulphur, 3.34 per cent.; with a theoretical calorific value of 12,250 B. T. units. The cost of the anthracite coal first used was £1 6d. per ton, and of the charcoal, 50s. per ton of 2,000 pounds.

The following is a record of one week's running:

- Number of hours run, 32.
- Number of units generated, 368.8.
- Coal consumed, 1,949 lbs.
- Quantity consumed whilst engine was working, 1,742 lbs.
- Quantity consumed while standing by producer, 207 lbs.
- Gross amount consumed per unit generated, 5.3 lbs.
- Nett amount consumed per unit generated, 4.72 lbs.
- Gross cost of coal per unit, .66 pence.
- Nett cost of coal per unit, .59 pence.
- Average number of units generated per hour, 11.5 units.
- Average cost of coal per evening, 34.82 pence.
- Cost of fuel for the week's run, 19s. 11¼d.

The cost of this work with the oil engines that this plant superseded would be £7 10s., representing twelve cases of paraffin oil at 12s. 6d. per case.

Consumption of oil during the trial run was 4 pints of cylinder oil and 16 pints of machine oil, the plant being new, oil was liberally used.

The results for the four months, March, April, May and June, were as follows:

- Number of units generated, 9,229.
- Anthracite coal used, 35,500 lbs.
- Charcoal used, 11,500 lbs.
- Cost of coal, £25 6s.
- Cost of charcoal, £14 7s. 6d.
- Weight of fuel burned, 47,000 lbs.
- Cost of fuel burned, £39 13s. 6d.
- Cost of fuel per unit generated, 1.031 pence.

During these four months coal had increased in price to 23s. 6d. per ton of 2,000 lbs., and charcoal to £2 19s. 8d. per ton.

The consumption of oil and stores during the four months of March, April, May and June, were as follows:

Cylinder oil, 29 gallons at 6s.....	£8	14s.
Engine oil, 28 gallons at 2s. 6d.....	£3	10s.
Miscellaneous stores .....	£2	10s.
	—	—
	£14	10s.

This is equivalent to .382 pence per unit generated. The total costs per unit generated for fuel and stores were thus 1.413 pence. Cost of same work with the oil engines would have been £167 16s. for the four months, as against £54 7s. 8d. for the suction gas plant, an annual saving of £340.

The total cost of the suction gas plant was £2,400, of which buildings represent £900.

Another instance was given of the working of a small pumping plant at Bellbron by suction gas, where, working eight hours, 19,000 gallons of water were pumped into a reservoir from a borehole against a head of 175 feet, consumption of anthracite coal being 12½ lbs. per hour, costing 37s. per ton. Pump horse power works out at 2.12, so the consumption of coal per pump was 6 lbs. The pump was meter-driven consumption 45 units, equal to 5.625 units per hour. Quantity of electrical energy per pump horse power was thus 2,653 units or 3.56 electrical horse power. Total horse power being 60.5, the consumption of coal was 1.65 lbs. and per pump horse power, 5.88 lbs. Costs come out at one farthing per horse power hour, 81.3 pence per pump horse power hour.

Mechanical efficiency of pumping plant and motor works out at 28 per cent. Cost of pumping for fuel being only 1.16 pence per 1,000 gallons, so that the consumption of fuel per brake horse power may be calculated at 1.3 lbs. of coal.

Professor Dobson in moving a vote of thanks to the author pointed out that at Bethlehem the cost per unit for fuel, stores, wages, capital charges and water, but excluding costs of supervision and distribution was 5.6 pence per unit, a sufficient inducement for small municipalities to adopt these suction gas plants.

#### IMPORTANT COPPER MINES.

Messrs. Thompson, Towle & Company, of 15 Broad Street, New York, have prepared and published an elaborate table showing the production, estimated earnings, and dividend rate of most of the important copper mines of the United States, Mexico and Canada. There are 55 dealt with, and of these only two are Canadian, namely, those of the British Columbia Copper and Granby Companies, respectively. The particulars given relating to these are as follows: British Columbia Copper Company—Location of mine, near Greenwood, Boundary district; company controlled by Newman Erb; general office, New York, U.S.A.; present rate of copper production, 10,000,000 lbs. per annum; prospective rate of production within two years, 15,000,000 lbs.; estimated cost per lb. of copper, 8½ cents; number of shares issued and par value, 591,709 at \$5; estimated earnings per share, with copper at 11 cents per lb. 42 cents, at 12 cents per lb. 59 cents, at 13 cents per lb. 76 cents, at 14 cents per lb. 93 cents, at 15 cents per lb. \$1.10, at 16 cents per lb. \$1.27; high and low quotations for stock, in 1906 \$15 and \$12.50, in 1907 \$14.75 and \$3.25, in 1908 \$8.50 and \$3.87, in 1909 \$9.00 and \$5.87, in 1910 \$8.75 and \$4.75; last dividend paid in September, 1907, amount 40 cents per share.

Granby Consolidated Mining, Smelting & Power Company—Location of mines, at Phoenix, Boundary district; company controlled by American Metals Company; general office, New York, U.S.A.; present rate of copper production, 24,000,000 lbs. per annum; estimated cost per lb. of copper, 10½ cents; number of shares issued and par value, 148,500 at \$100; estimated earnings per share, with copper at 11 cents per lb. 81 cents, at 12 cents per lb. \$2.41, at 13 cents per lb. \$4.03, at 14 cents per lb. \$5.63, at 15 cents per lb. \$7.24, at 16 cents per lb. \$8.86; high and low quotations for stock, in 1906 \$150 and \$93, in 1907 \$152 and \$60, in 1908 \$109.50 and \$78.75, in 1909 \$110.50 and \$91, in 1910 \$111.75 and \$20; last dividend paid in December, 1907, amount \$2 per share.



## ESTIMATION OF NICKEL AND COBALT.\*

BY C. W. BADGLEY.

Dissolve 1 gram of HCl and  $\text{HNO}_3$  in a 250 c.c. beaker and evaporate to dryness. Take up with HCl and dilute to 150-200 c.c., make alkaline and then just slightly acid with HCl. Now pass  $\text{H}_2\text{S}$  through the solution to precipitate any Pb, Cu, As, etc., that may be present. Filter, wash and then boil the filtrate till all  $\text{H}_2\text{S}$  is expelled. Add a few crystals of  $\text{KClO}_3$  to oxidize the iron and boil for few minutes. Dilute and make ammoniacal and filter. If much iron is present, as in a matte or speiss, it is best separated by the ether method—see below. If there is not much iron the precipitate of the hydroxides may be dissolved in HCl and reprecipitated repeating this three or four times till the iron no longer holds back any nickel. (Shown by evaporating the solution of ferric chloride down almost to dryness in a casserole, any nickel, if present, will show decidedly green.) Or the iron may be more cleanly separated by the basic acetate separation if zinc is not present. If zinc is present the sodium acetate prevents its separation later on.

Combine the several filtrates and make just neutral with HCl using methyl-orange, pheno-phthalein or litmus as an indicator. The solution should be concentrated to 150 c.c.

If zinc is present, add two drops of HCl to the neutral solution and 5 grams  $(\text{NH}_4)_2\text{SO}_4$ . Heat the solution to 50 degrees C and saturate with  $\text{H}_2\text{S}$ . If difficulty is experienced in obtaining this precipitate some of the free HCl may be neutralized by adding a few drops of a very dilute solution of sodium acetate, but not sufficient, however, to neutralize all the HCl, or nickel and cobalt will also be precipitated, shown by the formation of a grayish to blackish precipitate.

Allow the beaker to stand covered in a warm place for some time, till the  $\text{ZnS}$  settles and the upper liquid is clear.

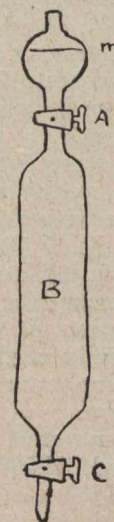
Filter and wash the  $\text{ZnS}$  with hydrogen sulphide water which contains in every 100 c.c. 2 grams of  $(\text{NH}_4)_2\text{SO}_4$  or  $\text{NH}_4\text{Cl}$ . Heat filtrate to 70°-80° C, add 10 c.c. strong solution of ammonium acetate and pass  $\text{H}_2\text{S}$  through the solution which should completely precipitate the nickel and cobalt as sulphides and leave any manganese in solution. Filter and test the filtrate by adding excess ammonia. If this darkens the filtrate repeat the precipitation with  $\text{H}_2\text{S}$ , etc., and combine the precipitates.

Dissolve the precipitated sulphides with HCl and a little  $\text{HNO}_3$  and take carefully to dryness. Take up with water and 5 to 10 c.c.  $\text{H}_2\text{SO}_4$ . This is preferable to fuming with  $\text{H}_2\text{SO}_4$ , as in that way a basic sulphate of nickel is formed which is very slow to go into solution. Cool and then make strongly ammoniacal and if any precipitate of iron or aluminium is formed it must be filtered off. To filtrate add from three to five grams of  $(\text{NH}_4)_2\text{SO}_4$  and  $\text{NH}_4\text{OH}$  in large excess and electrolyse over night with a current of 1-2 ampere.

**Separation.**—Dissolve the weighed nickel and cobalt from the platinum cylinder with hot  $\text{HNO}_3$ , as small amount as possible being used. Evaporate to dryness. Take up with 4-5 drops HCl and 20-30 drops water and then add 2-3 grams of pure potassium nitrate dissolved in the least possible amount of water, acidulated with acetic acid and filtered if necessary. The presence of cobalt is shown by the formation of a bright yellow precipitate. Stir the solution thorough-

ly and allow to stand 24 hours in a warm place with occasional stirring. Filter on a small ashless paper, wash with water containing potassium acetate and a little free acetic acid, remove the filtrate containing the nickel and wash the precipitate and filter free from potassium acetate with alcohol. Ignite the precipitate and paper carefully in a porcelain crucible, care being taken not to raise the temperature high enough to fuse the precipitate. Transfer to a small beaker, and digest in nitric acid and sulphuric and evaporate to fumes. Add 5 c.c. water and excess ammonia or ammonium sulphate and electrolyse.

Heat the filtrate from the cobalt to boiling and add a slight excess caustic potash, boil a few minutes, filter and wash with hot water. Dissolve the precipitate through the paper with HCl, make the solution neutral with ammonia, add 2 drops HCl 10 c.c. ammonium acetate, heat to 70-80 degrees C and precipitate with  $\text{H}_2\text{S}$ . Filter with  $\text{H}_2\text{S}$  water, dry and ignite. Allow to cool, add a little ammonium carbonate and heat again to dull redness to volatilize any sulphuric acid that may be present. Cool and weigh as  $\text{NiS}$  or  $\text{NiO}_2$  which contain 78.55 per cent. Ni. This precipitate is generally pure, but may be tested for insoluble and iron which should be deducted.



Separation of Iron by Ether.

Dissolve the thoroughly washed precipitate of ferric hydroxide and included nickel and cobalt, etc., with HCl and evaporate to syrupy consistency. The solution should have specific gravity of 1.100 to 1.105 for the most satisfactory separation. The tube shown is well adapted for the treatment with ether. It consists of bulb B of 200 c.c. capacity, about 8 inches long and 1 1-2 inches diameter, with stopcocks A and C at the ends. The upper one connects with a bulb D of 100 c.c. capacity with a line at m to show when the bulb contains 30 c.c.

Close both stopcocks, pour a few drops of ether into upper bulb, open A and allow the ether to run into B. Close A and warm B with the hand. Open and close C. This will make a partial vacuum in B. Transfer the solution of the chlorides to the bulb D, washing it out of the beaker with HCl (SpG 1.10) and filling D to mark m. Stand the tube in a vessel of cold water, open A and let the solution run with B. Close A and



fill bulb D with ether. Allow the ether to run slowly in B so that it forms a separate layer over the other solution. Mix the solutions by giving the tube a circular motion keeping it cool in the meantime by a jet of water playing on it, to prevent any of the ferric chloride being reduced by the ether by a rise of temperature. Finally close A, shake the tube well, open A to relieve the pressure, return the tube to the jar of cold water and allow it to stand for some minutes to give the liquids opportunity to separate. The upper stratum is the ethereal solution of the ferric chloride and the lower the hydrochloric acid solution of the other metals with usually 1 per cent. of ferric chloride. Open C, allow the lower solution to run into a small beaker, close C, and wash the end of the tube with a little water. Introduce about 10 c.c. HCl (1.10 SpG) into D and allow it to run into B. Close A, shake apparatus and allow it to stand for a few minutes. Allow the lower liquid to run into the beaker which will now contain all the nickel and cobalt. Heat this solution to drive off the ether dissolved in it, add some HNO<sub>3</sub> and evaporate to dryness. Take up in HCl dilute—make slightly ammoniacal—boil, filter and wash. Redissolve the iron precipitate and repeat the operation, adding the two filtrates together. Add these filtrates to the filtrate from the original hydroxide precipitate and proceed as before described.

\* Paper read before the Colorado Section, June meeting.—Western Chemist and Metallurgist.

**PRECIPITATION.**

An interesting paper on the subject of precipitation was recently read before the Chemical, Metallurgical and Mining Society of South Africa by Mr. F. D. Phillips, giving the results of samples taken of the solution entering and leaving the separate compartments in some of the extractors at the Knights Deep Gold Mine, the object of the observation being to ascertain what work was carried out by each compartment, and whether it was possible to reduce the consumption of zinc.

First experiment is shown below being the result of sampling a strong extractor two days after dressing. Rate of flow 1.54 tons of solution per cubic foot of zinc in 24 hours. Strength of solution 0.029 per cent. KCN, NaOH 0.005 per cent.

No. of Compartment.	Entering dwt. per ton.	Leaving dwt. per ton.	Extraction dwt. per ton.	Per cent. Extraction.	Per cent. Extraction of Original Value.
1	2.56	0.48	2.08	81.2	81.2
2	0.48	0.14	0.34	70.8	13.3
3	0.14	0.06	0.08	57.1	3.1
4	0.06	0.03	0.03	50.0	1.2
5	0.03	0.01	0.02	66.6	0.8
6	0.01	0.01	....	....	....
7	0.01	0.01	....	....	....

The author desires to know why precipitation falls off at the lower compartments, varying, as is seen above, from 81.2 per cent. extraction in the first compartment down to as low as 50.0 per cent in the lower.

As the result of the above experiment it was decided to dispense with the seventh compartment. Another series of samples were taken after a run of fourteen days, rate of flow 1.46 tons of solution per cubic foot of zinc per day of 24 hours, strength of solution 0.035 per cent. KCN., NaOH 0.0051 per cent. with the following results:

No. of Compartment.	Entering dwt. per ton.	Leaving dwt. per ton.	Extraction dwt. per ton.	Per cent. Extraction.	Per cent. Extraction of Original Value.
1	2.87	1.19	1.68	58.5	58.5
2	1.19	0.75	0.44	37.0	15.3
3	0.75	0.24	0.51	41.3	10.8
4	0.24	0.06	0.18	75.0	6.3
5	0.06	0.04	0.02	33.7	0.7
6	0.04	0.02	0.02	50.0	0.7

This experiment showed that although the value entering was 0.310 per cent. dwt. higher than in No. 1 experiment the extraction was 22.7 per cent. less in the first compartment, probably due to the solution not coming in contact with the zinc shavings. It may be mentioned that the five strong boxes were run a further three days before dressing, and, although it is here quoted that a tail of 0.02 dwt. was shown, the average of the five for the seventeen days was only 0.01 dwt., so that the working with six compartments in place of seven was considered as quite justified.

It was next decided to try a lighter packing of zinc, 330 pounds per compartment or 18.3 pounds per cubic foot, in place of 420 pounds or 23.3 pounds per cubic foot as formerly. The solution entered at 0.28 dwt., rate of flow was 1.88 tons per cubic foot of zinc per 24 hours, strength of solution 0.014 per cent. KCN., NaOH 0.006 per cent.

No. of Compartment.	Entering dwt. per ton.	Leaving dwt. per ton.	Extraction dwt. per ton.	Per cent. Extraction.	Per cent. Extraction of Original Value.
1	0.28	0.08	0.20	71.4	71.4
2	0.08	0.06	0.02	25.0	7.1
3	0.06	0.04	0.02	33.0	7.1
4	0.04	0.02	0.02	50.0	7.1
5	0.02	0.02	....	....	....
6	0.02	0.03	....	....	....

Here it will be seen that the first compartment did practically all the work, the following three compartments precipitated the same amount, namely, 0.02 dwt., the last two were useless. The system of lighter packing was also tried on the strong and slime extractors, but proof soon came from the assay reports that the system would not work except with a very high tail value, so the conclusion was arrived at that the lighter packing was inefficient and the larger weight was again resorted to.

A slime extractor was next taken and the results showed that the first compartment was in greater evidence than either the strong and the weak resulting in a precipitation of 88.9 per cent., leaving only 0.04 dwt. for the last three compartments, each of which extracted 0.01 dwt. Boxes have a capacity of 22 cubic feet to each compartment, amount of zinc 19.5 pounds per cubic foot. Rate of flow, 2.05 tons per cubic foot of zinc per 24 hours, strength of solution, 0.008 per cent. KCN., and 0.012 per cent. NaOH, sampled seven days before dressing.

No. of Compartment.	Entering dwt. per ton.	Leaving dwt. per ton.	Extraction dwt. per ton.	Per cent. Extraction.	Per cent. Extraction of Original Value.
1	0.36	0.04	0.32	88.9	88.9
2	0.04	0.03	0.01	25.0	2.8
3	0.03	0.02	0.01	33.3	2.8
4	0.02	0.01	0.01	50.0	2.8

It was considered that the dressing of these boxes could not be improved upon so they remain as before.

Regarding the cost, it will be readily understood that it would be unwise to try and obtain a very low tail value at a cost exceeding the value recovered, so some calculations were made to find out what the expense would be to precipitate on a value leaving the boxes



at 0.02 dwt. Taking an average over the twelve months ending March last, the figures including power, zinc, white and native labour, solution pumps, lead acetate and smelting, the cost came out at 0.75 dwt. per ton of solution precipitated. It will thus be seen that in precipitating at a tail value of 0.02 dwt. we were well in hand and could even afford to fill an extra compartment with zinc in each box—not a small item when it is considered that we have forty boxes in the extractors house at the Knights Deep Mine.

### ELECTRICAL TRANSPORT ON THE RAND.

In view of the almost general exclusive use of electrical power that is expected to occur at the end of the present year on many of the Rand mines, and its probable extension until the use of steam as a motive power has been practically abolished, the paper read by Mr. W. C. Brown before the South African Institute of Electrical Engineers comes at an opportune moment. The writer pointed out that the principal points of a transport scheme adopted must depend upon the output, working hours, length of track and gradients. With these points settled, the proper size of locomotive can be determined, as well as other details, while the success of the scheme will depend upon the type of motor selected, the choice lying between direct current series, polyphase induction and single phase alternating current motors.

The direct current series are so well known as not to need description, but something may be said regarding the polyphase motor, its superior points being superior design, freedom from breakdown, low costs of maintenance and general reliability. It has, however, many disadvantages when used for traction work, the overhead construction is expensive, requires two trolley lines, double sets of insulators, and heavy poles. Speed control of a polyphase motor is limited, the starting torque is inferior to the direct current series motor in addition to other minor disadvantages.

The single-phase motor has a large field of usefulness before it where moderate distances have to be covered. It is better than the polyphase and closely resembles the direct current series motor in its characteristics. Its efficiency is about eight per cent. lower, but in long lines increased efficiency can be obtained by using high voltages, which, however, under some circumstances, may become dangerous. For the Rand conditions, however, the author considers that the best type of motor to use would be the direct current series type.

Two 20-ton locomotives could haul the ore for a 400-stamp battery, and eight or nine tube mills in two 8-hour shifts, from say 4 shafts, the farthest shaft not being more than a mile, providing the track is fairly level. Where steep gradients are encountered, the following formula can be applied:

$$\text{Drawbar Pull} = W \cdot X \cdot \frac{W.2240}{N}$$

Where W = tons; X = track resistance, and N = inclination (1 in N).

The useful work of the locomotive may be regarded as .7 of the input at the motor terminals. The complete formula for total horsepower being in this case:

$$1.42 \frac{W \cdot X \cdot W.2240}{N} = \text{H.P.}$$

Where S = speed in feet per minute.

Drawbar pulls can be obtained approximately from the volts and amperes input as follows:

$$\text{Drawbar Pull} = \frac{A \cdot V}{746} \times 33,000 \times 0.7$$

$$\text{M.P.H.} \times 5280$$

$$60$$

Where A = amperes; V = volts, and M.P.H. = miles per hour.

Maximum starting effort a mining locomotive is capable of exerting is in pounds approximately weight of locomotive in pounds x .25, while the normal drawback pull can be taken as weight of locomotive in pounds x .18.

Many arguments can be brought forward as to whether a single unit of 50 tons or two of 25 tons each running in tandem as one unit should be employed. Both have their advantages and disadvantages, but the author considers that the tandem arrangement was most favourable for mining work.

Hitherto the gauge used on these fields had varied from 18 inches to 30 inches, but now that huge mills are being erected in these fields needing rapid transport, better results would accrue from the use of the local standard railway gauge of 42 inches, and, naturally, heavier rails must be used, as a scheme however excellent in other respects might prove a failure if the rails were too light. Steel tyred wheels are to be preferred to chilled iron wheels, as the former will last three times as long as the latter. Triangles for reversing purposes ought in all cases to be provided. Good shed accommodation is essential, and cleanliness in all direct current machines is necessary, but doubly so in a railway motor, neglect of which might lead to disaster.

In practice it is found to be satisfactory if the converter output is .5 of the total output of the locomotives where four or five are in use.

An instance was given of a railway where the gauge was 30 inches, rails 45 pounds, three locomotives of varying size used, weight of empty trucks 1.1 ton. Tons hauled per month, 106,920; cost per ton mile, 1.66 pence; maintenance cost per ton mile, 0.66 pence.

Cost of current, .75 pence per K. W. H. The operating cost might seem high, but this was due to the grade being 1 in 40, if the grade was level the cost would be 0.74 pence per mile. Three rotary converters 85 horsepower each, are installed, two of which are run in parallel, while the third is a standby.

The 20-ton locomotive consists of two 10-ton units coupled together and run in tandem. Each unit is equipped with two 45 horse power, 500-volt series motors. Steel tyred wheels, 33 inches in diameter, are used, the gear ratio being 5.78. The locomotives are electrically coupled by means of flexible conductors and multiple plugs, by means of which the locomotives can readily be uncoupled if required. Total drawbar pull, 7,000 pounds. Speed, 8.3 miles per hour.

Underground electrical traction has not come into extensive use as yet in these fields, but under the influence of the larger scale operations now in vogue and the better underground conditions, it cannot be expected to be long delayed.

Nova Scotia's output of gypsum during 1909 was 299,045 tons. Eleven concerns contributed to this. Only two or three of the operators attempt to turn the gypsum into manufactured products.



# PRELIMINARY NOTES ON GEOLOGY OF THE PORCUPINE DISTRICT OF CANADA.

By A. A. HASSAN.

## Introduction.

Though the presence of gold in small quantities was known in the vicinity of Night Hawk, Porcupine and Miller Lakes as far back as the year 1896, not much prospecting was done here, until a year ago, when a man by the name of George Bannerman uncovered a quartz vein containing visible gold (June 12th, 1909) in the Township of Whitney, and in less than one year about eight townships have been staked.

For different reasons gold finds and gold mining in Ontario and other provinces of Canada have met with little success, and the mining world at large

Though about 40 miles away from a railroad, transportation being by boats and canoes over lakes and rivers, and by tramping and packing over the trails, there are now at least six plants in active operation and numerous shafts are being sunk. At this writing one three-compartment shaft is down one hundred feet, showing good gold values.

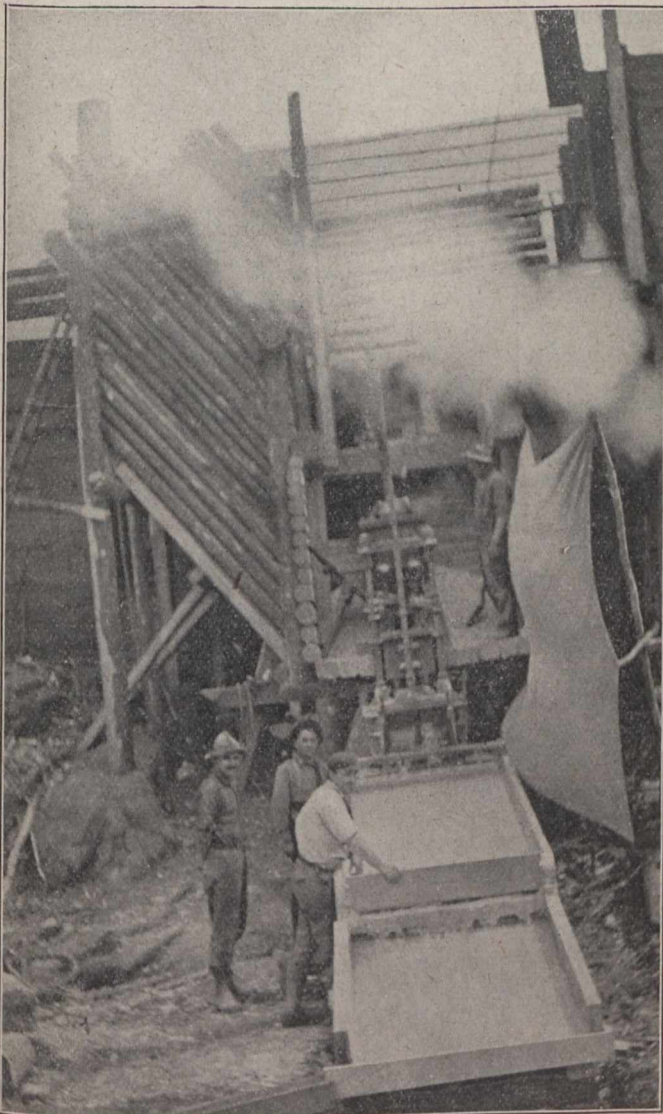
The accompanying photographs give a good idea about the vein outcrops, and the character and topography of the country in general.

Topographically the country is rather undulating flat ground with occasional swampy depressions. Some higher ridges and knolls are covered with a dense growth of moss and timber. The quartz outcrops are found mostly in the higher places, which makes prospecting comparatively easy.

Water is obtained from the several lakes, numerous springs and swamps.

## Geology.

The whole make-up of the country rock, through which the quartz lodes, dikes, or veins came up, is of an ancient Keewatin or Pre-Cambrian Age, probably of the Algonkian Period. This Keewatin is highly metamorphosed.



A 2-Stamp Mill on Timmins' Property

held a very skeptical view about Porcupine gold finds. Nevertheless, the prospectors continued the search and the assessment work persistently, with the result that they made spectacular gold finds on and near the surface.

The persistent and quiet work has proven very beneficial to the district, as wild-catting was entirely eliminated.



Dome Mining Co.

The associated pegmatites contain gold in varying quantities, graduating insensibly into granitic rocks in the outlying districts.

However, the most important phenomenon, the guide for the prospector and the inexperienced gold hunter, is the presence of great bodies of schists, and especially of the green chlorite schist, which has developed from the darker horn-blende schist.

There appears to be no doubt that a regional metamorphism took place in this part of the country, having a strike of northeast and southwest, and the accompanying dynamic pressure changed the rocks in the lines of weakness to a schistose condition.

The quartz with the gold-bearing solutions was intruded afterwards in this prepared ground of schistosity.

As the several lines of regional metamorphism run almost parallel, striking northeast and southwest, the lines of weakness have been developed almost at right angles to the regional metamorphism, striking east and



west, and in some instances northwest and southeast, where most of the quartz veins are found.

Which gold surface showings will become gold mines is at present impossible to predict and only actual development work conducted under the direction of capable mining engineers of wide experience in gold mining, can prove the existence of paying gold mines.

The most interesting and characteristic occurrence in Porcupine district in relation to the deposition of the veins, lodes or dikes, is the fact that in some cases the quartz has overflowed the schists, and in other cases the schists have overlapped the quartz. Some of the sup-

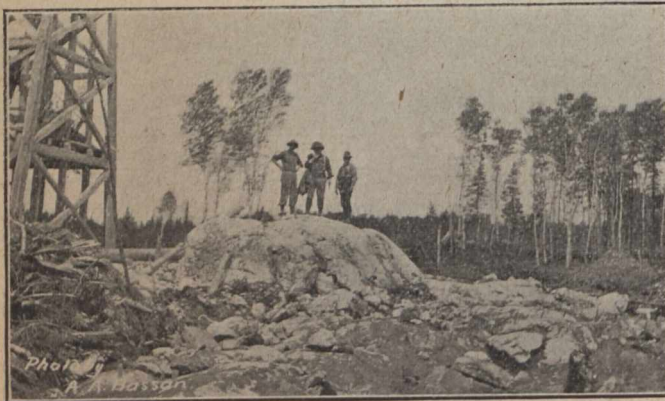


Five Shafts.

posed quartz veins found on the surface will prove only schist in depth, and vice-versa, the schist on the surface will give place to quartz in depth.

If the gold values are persistent at depth, as the Timmins three-compartment shaft has proved at a depth of 100 feet, Porcupine should have a future as a gold camp.

At this writing the Dome Mining Company also claims good gold values at a depth of 70 feet and the diamond drill cores show visible gold.



Timmins' Quartz Outcrops.

During my visit a domelike quartz vein has been uncovered with spectacular gold showings on one of the claims in Tisdale, and almost every day some surface gold finds have been made either in Tisdale and Whitney Townships, or in the Forest Reserve.

On certain claims in Tisdale Township two men obtained visible gold in every instance after each blast. Sampling is a very difficult task owing to the irregular width of the veins, as some will widen out to 30 or more feet and abruptly narrow down to several

inches or disappear in some swamp and come up again in a distance of 100 feet or so.

To get an idea of average gold values on the surface is almost impossible and only prospecting pits and shafts can give more approximate estimates.

In some instances the schist or the carbonates enclosing the quartz outcrops will assay much higher than the vein quartz itself, like in the case of the Scottish Ontario Gold Mining Company.

The Curtis or Foster vein is unique, showing transverse bands of quartz with visible gold on the surface for considerable distance. The walls are well defined in the schist, being from 10 to 20 feet wide. The accompanying photographs show the vein after trenching.

There is another smaller vein on the Foster which is opened up to a depth of about 25 feet with an incline shaft. The quartz with enclosing schist appears to be well defined.

At Oldham, Halifax County, Nova Scotia, the Oldham Sterling Gold Company obtained 2,710 ounces of gold from 940 tons of ore, an average of 2.88 ounces per ton.

In 1872 Nova Scotia derived \$59,155 from royalties on coal mined in the province. This amount stands in contrast to the sum received two years ago, \$616,933. At the time of the organization of the Dominion Coal Company, the royalty amounted to \$142,058. One year later it jumped to \$209,830. That was sixteen years ago. The increase has been constant, with the exception of a few "strike" years.

Returns to the Bureau of Mines show that the output of the metalliferous mines and works of Ontario for the six months ending June 30th, 1910, was as follows:

	Quantity.	Value.
Silver, ounces .....	12,804,992	6,260,197
*Cobalt, tons .....	189	35,657
Copper, tons .....	4,634	660,497
Nickel, tons .....	9,339	2,005,660
Iron ore, tons .....	39,497	113,082
Pig iron, tons .....	221,718	3,540,688
Zinc ore, tons .....	576	5,000

\*Only cobalt paid for included.

Shipments from silver mines aggregated 14,787 tons, of which 12,024 tons were of ore and 2,763 tons of concentrates. The former averaged 814 ounces of silver to the ton and the latter 1,017 ounces. Gowganda contributed 334 tons of ore containing 317,925 ounces of silver, and the Lake Superior district a small production, the remainder being from Cobalt proper.

The production for the corresponding period of 1909 was 11,234,382 ounces of silver, valued at \$5,379,980.

The nickel-copper mines of Sudbury turned out 9,339 tons of nickel and 4,634 tons of copper, as compared with 6,027 tons of the former and 3,741 tons of the latter for the same period last year, an increase of 52 per cent. and 42 per cent. respectively.

The production of pig iron as compared with the first six months of last year does not show a very large increase, the figures being 221,718 tons, having a value of \$3,540,688, as against 211,583 tons valued at \$3,197,759 in 1909.



## STANDARDIZATION OF ENGLISH IN TECHNICAL LITERATURE.

[Editor's Note.—We reprint herewith a communication from a bulletin of the Institution of Mining and Metallurgy. The character of the paper that caused the disturbance is sufficiently indicated by Mr. Rickard's reply, as is also the nature of the various criticisms.]

## AUTHOR'S REPLY TO DISCUSSION.

Mr. T. A. Rickard: Criticism is a compliment, even when intended to be otherwise. Thus I accept Mr. Pratt's corrections and remarks as indicating, at least, a keen interest in the subject. So far, so good. He has put my contribution through the fine sieve of his intelligence and has detected several blunders, but not as many as he claims. Some are typographical errors for which I hope to be absolved; to others I plead guilty, cheerfully.

In turn the critic makes mistakes to which I might advert, but the *tu quoque* would be wearisome and would serve no purpose, for it misses the aim of this discussion, which is not to furnish models of correctness but to lay stress on the need for intelligent interest in the subject.

It may be, as Mr. Pratt says, that my "paper is worse than the average in the matter of careless or incorrect writing"; of that my readers can judge. If it be so, it will serve as an excellent warning to those that aim at perfection. But I confess that if I were to wait until my own statements could be expressed in perfect English, I would have to postpone a useful task until the Greek kalends; on the contrary, I deem it best in speech that may be burdened with blemishes to face the searchlight of criticism, in the hope of performing a practical service with such clumsy tools as may be available. The beam in my eye may look big as seen through the distorted vision of Mr. Pratt's optic, but I despair of the day when I shall possess a vision wholly unimpaired.

For the fun of it, however, I shall make a brief reply to my critics. In the first place, I am charged with breaking an elementary rule in beginning a sentence with a conjunction. It must be remembered that my paper was intended to be read before a meeting; the conjunctions to which objection is made perform their proper function, namely, to indicate the relation of one thought to another. It is an obvious blunder to say that it is "an elementary rule of English composition" that conjunctions "should never be used to begin a sentence," for sentences are normally joined by this part of speech, the second or dependent sentence necessarily beginning with a conjunction.

Whether in referring to three words it is better to say: "All three of them ought to be scrapped" or "All three of these words, etc.," it is not profitable to discuss. For 'sloppy' and 'scrapped,' I do not apologize. As Mr. Sulman says: "It behooves us to watch that our zeal for linguistic purity does not lead us into a campaign of phrase emasculation."

"Supposititious technical article" is open to correction, but I do not like 'suppositiously'; 'supposedly' is better. It becomes advisable to reconstruct the sentence and write: "In an article supposed to be technical."

As to the illuminating remarks on the obviously satirical use of 'inspiring' in connection with words like 'muck' and 'mucker,' I have only this to say, that a joke apparently is not a joke when told to Mr. Pratt.

Mr. Sulman's observations are keenly appreciated. The delicate humour is particularly welcome in the treatment of a subject always in danger of being dulled by pedantry. Mr. Sulman and I shall continue to disagree in regard to the use of preposition-verbs, but we shall not

impute all manner of iniquity to each other because of this little difference. I venture, however, to say that there are few preposition-verbs that cannot be replaced advantageously by a verb composed of a single word. Thus the alternative to 'come out from' is not 'emerge,' which may or may not be "journalese," but 'escape.' Thus "we can escape from our inflectional thralldom." Mr. Sulman deliberately 'gets over' a difficulty that I should preferably try to 'overcome.'

Of course, the verbal dentistry to which he is unwilling to submit the names of mining companies is not the only alternative to the use of objectionable titles. He must know well enough that there is no rule for such proper names, that the censor in this case is not a grammarian but Somerset House; and that as regards proper names, in general, a man may spell his name as he pleases and christen his children as he likes.

Mr. Sulman makes a plea for the adoption or coinage of useful words. It is true, we are a polyglot race and our language does reflect the migratory history of our people. Did I not expressly say that "a language grows by such accretions; it is thus that English has borrowed from every country with which our people have traded or fought." But it were better to borrow from the wily Chinaman or the gentle Hindu, introducing a mintage that is foreign but made of pure metal, than to adopt thoughtlessly the nickel pennies and solder coins of American slang and Australian colloquialism. The emphasis is on "thoughtlessly."

Mr. Gregory will forgive me if I deny the prefix of 'professor' to one who is so competent a teacher, for I hold that 'professor' is not titular, but descriptive. However, I agree with him as to spelling reform, in general, even if I did make a bid for the use of *z* instead of *s* in words signifying agency. As regards spelling, I hold that it is not for a self-constituted board at New York to impose wholesale reform on a language that is not solely the possession of the people of the United States. The English language is the common heritage of all the English-speaking nations, and any reform must be undertaken not from an American or a British, an Australian or an African, but an English point of view. That is why I am making a fight against terms that are purely American or purely British, and likely to be unknown or misunderstood outside the place of their origin. As to 'mullock' and Chaucer: 'Mullock' may be good Old English. So is *he wasa-doing of it* and *I guess*, "but in neither case can the appeal to a dead usage—dead in polite society or in England—justify what is a modern vulgarism." I quote from 'The King's English,' an erudite and entertaining authority. Mr. Gregory asks for an equivalent to 'mullock.' Why not 'waste'? 'Mullock' has no precise meaning and no geological significance. At Bendigo the 'mullock' is a mixture of slate and sandstone, at Broken Hill it is quartzite and schist. 'Refuse,' 'waste,' 'barren rock,' 'discard'—there are many words adequate to replace a term so loose.

'Mullock' is Old English. It is a provincial word and the diminutive of 'mull,' meaning to reduce to dust or powder. It means 'rubbish' or 'dirt.' When a man's efforts are worse than futile, he is said to make "a mull (that is, a mess) of it." Perhaps I offer an unconscious illustration. 'Muck,' as used in American mines, is almost synonymous with 'mullock.' These two words are interchangeable and equally objectionable, for the rock separated from the ore in a mine is not filthy, it is not rubbish, and there is no sense in labelling it so.



In regard to 'calcination' it will serve no useful purpose to base current usage on an intermediate phrase of a word that has departed from its original meaning. The root is 'calx,' which in Latin signified a pebble or small stone; we use the diminutive 'calculus' still in surgery and mathematics, the latter application being due to the use of pebbles in making calculations. Subsequently the word was used to denote lime, and this meaning was employed at the beginning of the last century to serve as a root for the word 'calcium,' the name given to the metal separated from lime. Thus 'calc-spar' and 'calcareous' are identified with lime. In the middle ages, the chemists applied the word 'calx' to an earthy product obtained by expelling water, carbonic acid, or other volatilizable compound from any mineral, vegetable, or animal substance by the aid of heat. They also used this term to denote the powdered product obtained by heating anhydrous silica. As Mr. Sulman says, the elimination of sulphur was included in 'calcination' by medieval chemists; but the historical aspect of the case is only serviceable in so far as it gives an intelligent and complete view of the etymology. My point is that the metallurgy of sulphide ores has assumed so great an importance that it is a matter of convenience and in the interest of precision to use a different term when referring to the expulsion of sulphur—and arsenic or antimony, of course. The chemical operation of expelling carbonic acid and water is essentially different from that of dissociating sulphur. In the former case the operation is effected by the application of outside heat, while in the latter, one of the constituents of the substance treated provides most of the heat required. For this reason, the two reactions deserve distinctive names. A metallurgist working on copper ores may not see any need to differentiate between the terms, as they convey exactly the same idea to him; but a zinc-smelter objects to this interchangeability, for his furnace-charge is composed of both 'calcined' and 'roasted' ores.

The Oxford English Dictionary appears to have been unknown to my critics, except Mr. Shockley, but as it is the ultimate (in more senses than one) authority in our language, I do not apologize for quoting it. Most dictionaries require years to compile, and I do not agree with Mr. Stables that even in twenty years does a good dictionary become worthless or "out of date." It is not the function of a dictionary to note the passing phases of linguistic development, but only to record the words that have, after probation, found a place in the language.

Of course, in speaking of 'combs' of gold-bearing quartz, the reference was not to hatchways or waves, but to the comb of a cock—surely an appropriate metaphor. Possibly Mr. Stables had a smile on his face when he made this criticism, as when he objected to my reference to the squandering of a useful inflection "like a sailor on the spree." As to sailors and their sprees, and whether they squander useless money or useful inflections, I do not know, save by hearsay.

A 'vein' typifies the tabular and persistent ore deposit, and there is no reason why it should convey the idea of conformity to the strata; there was nothing in what I said to warrant such an inference. 'Seam' is not a good term for a lode of metal-bearing ore, because it carries the idea of regularity, uniformity, and conformity to the stratification. I agree that coal seam is better than coal vein, for 'vein' suggests ramification and irregularity of structure. Thus it is appropriately applied to the persistent (or continuous) tabular (between walls) ore deposit, traversing the country rock in accordance with a system of fractures that may or may not coincide

with the stratification, cleavage, jointing, or any subordinate manifestation of structure.

Mr. Stables has misunderstood the reference to the use of the word 'camp.' The objection is not to the usage when justified by an official christening, but to the indiscriminating employment of 'camp' in speaking of mining settlements. His analogies are far-fetched.

Mr. Stables ends his contribution to the discussion with a remark of which no notice might be taken if the absence of a rejoinder were not likely to be misconstrued. It is true that "the suggestions as to the uniformity of expression in technical writing would have met with greater approval had they emanated from the Council," but it happens that the Council was not unwilling that the good work should be undertaken by a member who "assumed the position of mentor in technical literature." That member hopes to be forgiven for "assuming" to write and speak on a subject to which he has devoted many years of his life, and he will not be deterred from fulfilling a useful task by supercilious critics.

As to 'mullock' and its Old English origin, I have answered that feeble argument already. If every term that has been "used by Cornishmen for over thirty years" is to be adopted by technical writers, I can promise the rest of the world a merry time. 'Laccolite' and 'tundra' may or may not, be in the "Century" dictionary; they are in the "Standard"; moreover, these terms are constantly used in the publications of the United States Geological Survey—an excellent authority. As to 'cement' and 'cementation,' I refer Mr. Stables to the "Standard" dictionary, which is later than the "Century."

Mr. Louis offers some pithy remarks, for which I thank him, even if he takes exception to my use of an occasional French or Latin phrase. I refer to Macaulay's retort to Napier.

Next I find that Mr. Shockley has taken up the challenge implied in my suggestions. Such criticism as he offers, uncompromising though it be, is indeed a compliment, for it furthers the purpose of the original paper. The aim of serious criticism is, I believe, to be penetrating but polite. Mr. Shockley has succeeded. As regards the use of *z* instead of *s* in words signifying agency, I take pleasure in quoting William Skeat: "The suffix *-izee* is both Greek and phonetic, and much to be preferred if we are to have uniformity. The suffix *-ise* is French."

Mr. Shockley objects to my use of 'solecism.' This word originally referred to the bad Greek spoken by the colonists of Soli in Asia Minor; it carried no reference to grammar. I believe my use of it is fully justified. As to 'supposititious' in the context criticized, Mr. Shockley and Mr. Pratt are both correct in their objections. It was a slip.

Whether ease of translation be a proper test of lucidity I am willing to leave to my readers! It seems so to me, having known two languages (now forgotten) before learning to speak English fluently. Mr. Shockley says that "if the hypothetical educated Frenchman could talk for five minutes with an American engineer, he would have no trouble in translating the sentence containing 'muck' and 'mucker.'" My hypothetical Frenchman lives in France and is not so fortunate as to be able to converse by wireless telegraphy with the writers of 'muck' in Nevada.

We are told that "the difficulty of translating does not depend so much on the purity of the English original as on the familiarity of the translator with his subject"; apparently the language of an English author, being rendered obscure by reason of local terms or queer idioms, is to be translated successfully by aid of the foreign translator's knowledge of the subject, this knowledge be-



ing sufficient to fill the occasional hiatus created by the unintelligible English of the original. This reminds me of a friend who is engaged in translating 'Agricola' and finds that the author used mining terms now so obsolete that only an occasional illuminating guess will suffice to make sense of the text. But this argument against the use of 'muck' and 'mullock' is not the only one; such localisms restrict the usefulness of technical literature by making it unintelligible to English-speaking persons not living in the region where such terms are rampant.

It is amusing to learn from Mr. Shockley that 'muck' is gaining ground in America; it has actually been adopted in Southern Nevada. When the New Zealander stands on London Bridge gazing at the ruins of St. Paul's Cathedral we shall go to Southern Nevada to learn how to speak English correctly, but not until then.

My critics can defend 'muck' and 'mucker,' 'paddock' and 'mullock,' as they please; they may quote Chauver or Choctaw; but the fact remains that these words are not used by men of culture anywhere, save as concessions to local slang, and the usage will die out because it is taboo among thoughtful technical writers and editors both in England and America.

Mr. Shockley has more to say concerning the translating of unfamiliar words; he says that the difficulty of translating "I am going home" into French is due "simply to the difference in idiom." He is mistaken; the difficulty is due mainly to the fact that the French language contains no word for 'home.'

As to 'partial' and 'partially,' I refer Messrs. Shockley and Allen to 'The King's English,' in which instructive volume they will find it stated on page 45, that "partially, which should be reserved as far as possible for the meaning 'with partiality,' is now commonly used for partly." Again: "The rule should be never to write partially without first considering the claims of partly." Where we have two words for two meanings, it is well to devote one word to one meaning, as nearly as we can. I do indeed "wish to avoid all ambiguous words," and in editing manuscript, whether my own or that of others, I delete words of doubtful meaning whenever practicable, choosing those that leave no room for misunderstanding. It happens that I have often noticed the confusion created by the indiscriminate use of 'partial' and 'partially,' when meaning 'in part' and 'partly.' Hence my mention of the matter.

Yes, Mr. Shockley is right in saying that "the ore shows free gold" is not the same as "the ore contains free gold." I accept the correction; the point, however, was not there, but on the use of 'at times,' when 'in places' is meant. His explanation is ingenious, but not convincing. Even if the progress of work underground be measured by the passage of time, the existence of free gold in the ore is not affected by the calendar. Of course, the man who wrote "at times" may mean that on Monday he saw free gold in the ore and on Tuesday he did not; but, in the absence of an interview (which Mr. Shockley may suppose to take place between author and reader, as between writer and translator), I surmise that he meant that gold was seen in the ore at a given place and was not visible when the drift or working had been advanced a few feet farther.

Next we come to 'preposition-verbs.' Mr. Shockley and Mr. Allen both object to my use of the term. One of them suggests 'compound' and both lay stress on the fact that some of the prepositions are used adverbially. Both, however, show that they understand what I mean and neither of them has suggested a better term. 'Compound' will not do; 'preposition-verb' suffices to indicate a verb to which a preposition is tied.

Of course, I use verbs followed by prepositions, as Mr. Shockley says, but my objection was to the unnecessary use of prepositions as part of a verb when single words of more expressive character are available. Mr. Shockley is in error in judging that I do not mean what I say; he will be correct if he states that I sometimes do not say what I mean. After all, language is an imperfect implement, like those tools "ill-adapted to the purpose" with which a golfer harries a little white ball into a small hole.

Both Messrs. Allen and Shockley have detected the error of omitting *on* after 'depend'; I stand corrected, and invite them to accept the alternative 'trusted' instead of 'depended on.' Whether a man who can and is 'depended on' is and can be 'trusted,' I leave to my readers. If Mr. Shockley prefers that "the proceedings" shall "end up with a dinner" instead of "end with a dinner," he is welcome. To me the former suggests nausea.

To Mr. Shockley my objection to preposition-verbs is a "mystery." Let me state frankly that I have found, by personal experience and by editing much manuscript from others, that the use of verbs of this kind tends to clumsy construction and to lack of precision. For one preposition-verb that serves a useful purpose there are half a dozen that are awkward excrescences. Moreover, daily work as an editor has given me sufficient warrant for saying that the tendency is peculiarly British. An American who had been to a rich mine would not say it was the finest mine he had *met with* in his travels; an Englishman would say so, but an American would say that it was "the finest he had *seen*." If *ended up with* be "a most valuable mode of expressing a shade of meaning," Mr. Shockley is welcome to it. In this and in one or two other minor matters I do not follow him nor is it necessary for me to reply. As to the Bible, if technical writing is to be modelled on that venerable and beautiful relic of old-fashioned English, we shall see strange phraseology. The Bible is inspired poetry, not technical science. Similarly it is beside the point to quote Shakespeare in this connection. We are discussing technical writing, not blank verse. I refer Mr. Shockley to Huxley, Geikie, and Raymond, if he is in search of models of scientific or technical expression.

Mr. Robert Allen also has made some effective criticisms and I appreciate the reasonable tone of most of them. He begins by demurring to my use of 'British.' The English-speaking races use the same language, but with local variations; the variety in vogue in the British dominions is 'British,' as distinguished from the dialect peculiar to Americans. As a sub-dialect of the British I referred to 'Australian' and 'South African.' 'Reef' originally was Australian, it is now British, having been adopted in London and at Johannesburg, but it is not English, because it does not pass current in America. 'Continuous' is no improvement on 'persistent,' although 'persistent' is obviously preferable to 'permanent,' as applied to an ore body.

What carelessness will do to technical writing is exemplified by the title of a recent article in *The Mining World*, of Chicago: 'The Perpetuity of Vein Mines referring to the longevity of mining enterprises or the persistence of veins in depth.' In describing 'field' as "a verbal iniquity" when applied to a mining district, I did not condemn the use of it in a metaphorical and familiar sense, as in "the field of wet metallurgy." Mr. Allen's question is trivial.

As to 'scrapped,' I refer Mr. Allen to the issue of *The Spectator*, published on July 9th, 1910, where he will find a reference to the proposal "to *scrap* the existing Parliament." Co-eval' may be written with or without



a hyphen; on further consideration, I agree with Mr. Allen that the hyphen may be omitted without error, although I like to separate vowels in words beginning with *co-*, and *re-*, as 'co-operate' and 're-invest.'

Mr. Allen's criticism on the use of 'partial' and 'partially' has been anticipated in my reply to Mr. Shockley. I appreciate his humour.

His defence of the preposition-verb is laboured. The quotation from the *Westminster Gazette* does not contain a misprint, but a blunder frequently made by those that bespatter their writing with preposition-verbs. Mr. Allen insists that *met with* is "undoubtedly correct" in the sentence "The richest mine I *met with* in my travels." Did the mine come forth to meet him or did he hasten with outstretched hands to meet the mine? It is absurd to defend so feeble a colloquialism. As to whether 'devise' conveys the meaning of 'work-out,' I am prepared to say, as I wrote the sentence quoted.

Mr. Shockley exercises his imagination recklessly in depicting the man who is doing all kinds of things to ascertain what process to adopt. Mr. Allen suggests that 'devise' is to sit in a chair (the "editorial" is scarcely funny) and "*draw up*" a scheme. The fact is the consulting engineer asked one or two friends to dine with him, and when the dinner was satisfactorily concluded, they lit their cigars and discussed the question of metallurgical treatment, roughly sketching a flow-sheet. Thus they 'devised it.' 'Work out' possesses no advantage over 'devise.' We 'work out' the ore in a mine; to 'work out' is to work exhaustively, if it means anything in particular.

Incidentally, both Messrs. Allen and Shockley failed to note that the 'out' in *work out* is an adverb, for it qualifies the verb. It is a preposition used adverbially. The remark that 'away' in *done-away with* is an adverb is hypercritical, for 'with' is a preposition, and my objection is to the adverb-preposition-verb as a whole.

If 'maintain' be not a substitute for 'keep up,' then 'upkeep' is not a synonym for 'maintenance,' as I hold it to be. We use 'maintenance' in a technical sense, on railways, for example, and it is an excellent term, easily understood. 'Upkeep' would puzzle an American and confuse a foreigner.

If Mr. Allen likes to have his ore 'wetted down,' he probably would enjoy the language of a cockney waitress who asked me whether I wanted my soup "hotted up." The surface of ore when 'wetted' is not always "lowered," for the addition of moisture may set in motion chemical processes inducing a swelling of the mass. The reference is usually to preventing the dust from rising.

The criticism of 'intersect' is fanciful. If Wellington Street and Strand 'intersect' each other with propriety why should not a cross-cut and a vein do so without apology? Two lines cross each other, in one case the line of two streets, in the other case the line of an opening made by man and an older opening made by Nature.

Mr. Allen's further remarks on preposition-verbs do not require reply. I leave it to him and to others to use them, if they prefer, but I am confident that this discussion will open their eyes to the clumsy construction resulting from such usage.

I appreciate Mr. Allen's approval of my remarks on the excessive use of the indefinite pronoun. Apparently nobody cares to defend the abuse. Of course, it is absurd to quote Byron and Shakespeare; we are discussing prose in the first place, the prose of to-day, and technical prose in particular. I would paraphrase Lord Rosebery's remark thus: "The less I say about a subject concerning which I know nothing, the better it will be for you and for me." The remark, needless to say, has nothing

to do with this discussion; we must not confuse a coincidence with a consequence. Of course, Lord Rosebery might not accept my version of his statement as a faithful expression of his meaning, any more than I accept Mr. Allen's paraphrase of my remarks. He omits the 'you' and 'your,' but forgets that my statement, such as it is, was supposed to be addressed to a meeting of members of the Institution.

Mr. Richardson's contribution to the discussion is useful, although I demur to some of his arguments. Even if our language be "the product of evolution," we need not be deterred from an effort to influence its development at a few points, as at that particular point where it becomes the medium of technical information. In any event, I am unwilling to wait until the language is "dead." Again, if the best of dictionaries be (to Mr. Richardson) an insufficient authority, I marvel that he should be willing to bow to the "sanction of government and finance," as expressed presumably by politicians and promoters. When the directors of Rand companies and Government officials in Australia become authorities on Spelling then we shall go to Southern Nevada to learn English—a procedure that will, at least, have the merit of pleasing Messrs. Richardson and Shockley.

Mr. Richardson's interpretations of 'profitable' and 'payable' call for no special comment; obviously a mine cannot be 'profitable' unless it is productive. 'Payable' does not mean what Mr. Richardson says it means, and only confusion can result from defining one doubtful word in terms of another doubtful word.

This ends my reply. I note with pleasure that nobody has defended the unnecessary plural nor the excessive use of the indefinite pronoun. The discussion has served its purpose, in calling attention to careless writing and the thoughtless use of local terms. Whether those who read my paper agree with all of my suggestions, or not, is unimportant; my aim has been fulfilled, for a few of my countrymen, members of the profession to whose service the Institution is dedicated, have been compelled to "sit up and take notice" of a feature of their work usually disregarded.

Henceforth when a mining engineer takes his pen, whether an eagle's plume or a goose's quill, he will recollect the fuss made by a member of this Institution and he will hesitate, not long enough to be self-conscious but at least long enough to use words thoughtfully. I refuse to believe that the attention drawn to the technicalities of writing will deter men from contributing to technical literature; on the contrary, I hope that the interest of the subject will lead them to use the implement of written speech whenever they have something worthy of record.

#### THE PREVENTION OF MINE EXPLOSIONS.

[Editor's Note.—In view of the step taken by the Dominion Government in securing the temporary services and advice of Captain Arthur Desborough, H. M. Inspector of Explosives, part of the report issued by the United States Geological Survey, two years ago, is herewith reprinted. This report embodies the recommendations of Capt. Desborough and two other experts.]

#### RECOMMENDATIONS.

##### A.—Selecting the Explosives to be Used.

(1) We recommend that the Government of the United States examine the explosives now and hereafter used in mining, with a view to eliminating the more dangerous explosives and to improving and standardizing such explosives as may be considered most suitable for such use, these to be designated by the government 'permissible explosives.'



The term 'permissible explosives' is suggested for the reason that no explosives are entirely safe, and all of them develop flame when ignited; and we advise therefore against the use in the United States of the terms 'safety explosives' or 'flameless explosives,' as these terms may be misunderstood and this misunderstanding may endanger life.

(2) We recommend that the operators and miners of coal use only such explosives as are included in a list of 'permissible explosives,' when the same has been published by the Government, in all mines where there is risk of igniting either dust or gas, selecting that one which their own experience indicates can be used to the best advantage under local conditions.

(3) We also recommend that investigations be conducted to determine the amount of charge of such 'permissible explosives' which may be used to the best advantage under different conditions with a view to reducing danger to the minimum.

#### B.—Carrying the Explosives into the Mines.

(1) All explosives should be made into cartridges and placed in closed receptacles before being carried into the mine, and the quantity carried into the mine during one day by any miner should be limited as nearly as practicable to the quantity needed by him for use during that day. Handling loose explosives and making them into cartridges by an open light in the mine should be prevented.

(2) Detonators or caps should be handled with great care, and should be carried only by a limited number of responsible persons.

#### C.—Use of Explosives in the Mine.

(1) Shooting in or off the solid should not be practiced.

(2) The depth of the shot hole should be less by at least 6 inches than the depth of the cutting or mining. The use of very deep shot holes should be avoided as unnecessarily dangerous.

(3) The overcharging of shots (the use of a larger charge than is required to do the work satisfactorily) should also be avoided as unnecessary and dangerous. The proper standardization of explosives used in coal mining will greatly facilitate the carrying out of this recommendation. (See also 'A' 1.)

(4) Shots should never be tamped with fine coal or material containing coal. Clay or other suitable material should be supplied and used for this purpose.

(5) The firing of two or more shots in one working place, except simultaneously by electricity, should not be allowed until a sufficient interval has elapsed between the firings to permit an examination of the working place, in order to see whether any cause of danger has arisen.

(6) Before a shot is fired the fine coal should be removed from the working place, as far as practicable, and the coal dust on the floor, sides, and roof, for a distance of at least 20 yards from the place where the shot is to be fired, should be thoroughly wet, unless it has been demonstrated that the dust in the mine is not inflammable. (See also 'E' 1.)

(7) If gas is known to occur in the mine, no shot should be fired until, in addition to the watering, an examination made immediately preceding the time for firing, by a competent person, using a lamp which will easily detect 2 per cent. of gas, has shown the absence of that amount of gas from all spaces within 20 yards of the point where the shot is to be fired.

(8) Believing that such will be one of the greatest advances which can be made in safeguarding the lives of the miners, we recommend the adoption of a system of electric shot firing, in all mines where practicable, by which all shots in the mine, or in each ventilation district of the mine, may be fired simultaneously, at a time when all miners and other employees are out of the mine.

#### D.—Keeping the Mine Roadways Clean.

(1) The roadways of the mines should be kept as free as possible from loose coal which may be ground into dust, and of rubbish in which such dust may accumulate, in order to facilitate the removal and wetting of the dust.

#### E.—Wetting the Coal Dust.

(1) In all coal mines where explosives are used it is desirable, and in all mines containing gas it is highly important, that the dust on the walls, timbers and floors of the working places and roadways should be kept continually wet prior to and during the work in the mine. If, however, conditions of roof or lack of water render this general watering impracticable, at least the dust within twenty yards of each shot should be wet before each firing, and other precautions against explosions should be practised with unusual care.

It is our opinion that a system of watering which occasionally sprinkles the floor only and leaves dry the dust on the walls and timbers of the roadways is useless, and is also dangerous, in that it may generate an unwarranted feeling of security against an explosion.

#### F.—Special Precautions for Mines Containing Gas.

(1) In any mine where as much as 2 per cent. of gas can be detected by suitable method, only locked safety lamps of an approved type should be used so long as such condition exists or is likely to recur.

All safety lamps should be maintained in good condition, cleaned, filled, kept in a special room at the surface, and carefully examined both when delivered to the miner and when returned by him at the close of each day's work. A defective safety lamp is especially dangerous because of the false feeling of security it engenders.

In the filling of lamps with benzine or other low-flash oils, which should always be done at the surface, special precautions against fire or explosions should be taken.

#### G.—Use of Electricity.

(1) Electricity in mining operations offers so many advantages, and has been so generally adopted, that no reasonable objection can be made to its use under proper restrictions. The electrical equipment, however, should be installed, maintained, and operated with great care, and so safeguarded as to minimize danger from fire or shock. The fact that the effectiveness of some insulating materials is soon destroyed in most mines should not be lost sight of.

We recommend the following precautions: For distribution underground the voltage should not exceed 650 direct current or 500 alternating current, these voltages being intended for transmission to machinery operating at 500 volts direct current and 440 volts alternating current, respectively. Even lower voltages are preferable. The trolley wires should be installed in such manner as to render shocks least likely; that is, placed either high enough to be beyond easy reach or at one side of the track and properly protected.

(To be continued.)



**PERSONAL AND GENERAL.**

Mr. Martin Nordegg has returned to Toronto from the West.

Mr. Lewis Hind, of Victoria, B.C., has gone to Mexico on mining business.

Mr. J. C. Murray has returned from a visit to several mining districts in Nova Scotia.

Major Leckie went to Portland Canal, B.C., last month, to investigate conditions on some mineral claims there in which he is interested.

Mr. J. B. Turney, Fernie, B.C., for nine years purchasing agent for the Crow's Nest Pass Coal Mining Company, has resigned that position.

Mr. Charles S. Herzig, president of the Constant-Herzig Company, New York, has been appointed consulting engineer of the Jumbo Extension Mining Company.

Mr. John Hopp, of Barkerville, Cariboo, B.C., is at Harrison Hot Springs, recuperating after ptomaine poisoning, which a few weeks ago incapacitated him for work.

Mr. J. W. Astley has resigned his position as consulting engineer to the Peterson Lake Silver Cobalt Mining Company. At present he is paying a professional visit to Porcupine.

Mr. W. Yolen Williams, of Spokane, Washington, who for years directed the development of the Granby mines at Phoenix, B.C., has been examining the Cliff mine at Rossland. It is stated that Granby people are interested in its proposed purchase and operation.

A party consisting of Mr. Ambrose Monell, Capt. De Lamar, Mr. C. L. Dennison, and Capt. Lawson, recently visited Porcupine. There they examined the Dome mines in which they are largely interested. Mr. Tom Jones, manager of the Buffalo mine, joined them at Cobalt.

Mr. Herbert Carmichael, assistant provincial mineralogist, British Columbia, has been on an official visit to the Engineer mine, Atlin mining division, lately reported to have made unusually rich recoveries from small quantities of gold ore. His report to the Minister of Mines will shortly be printed.

**SPECIAL CORRESPONDENCE****ONTARIO.**

**Cobalt.**—Recent developments on the Crown Reserve have been very encouraging, and the work accomplished on two veins in particular has largely augmented the ore reserves. On the new vein found about 900 feet down the lake a raise has been put up for a distance of forty-five feet, and for this distance the vein was of good width and carried high-grade ore. Drifts on this vein are being run at the 200-foot level and there the ore is also showing up well. When the drift on the Victoria vein was in one hundred feet the values gave out, and it was believed that the end of the ore-shoot had been reached. The working was, however, carried on a short distance farther, and the high values returned. It has now been pushed some distance past this point, and the face of the drift is still in good ore.

At the drilling contest held in Cobalt recently, the Gowganda team raised the record for local miners by drilling 39¼ inches.

The McKinley-Darragh has declared the regular quarterly dividend of three per cent. with a two per cent. bonus. The works close September 10th and the cheques will be sent out on October 1st. When this is paid the company will have disbursed to the shareholders a total of thirty-six per cent. The property as a whole is in splendid shape and the Savage in particular is making great advances. The small concentrating plant is treating between thirty and forty tons of ore per day and is making good extraction. Some of the veins have also been cut on the lower level, and they are showing up extremely well.

The mill report of the Buffalo mine for the month of July shows that 3,398 tons of ore, averaging 33.75 ounces, were treated and that 88,078 ounces of silver were recovered.

The report is as follows:

Mill ran 597 hours.

Ore milled, 3,398 tons.

Average assay per ton, 33.75 ounces.

Milling Expenses—

Labour ..... \$3,262.31

Power ..... 682.78

On Lot A14 in the Gillies Limit a large gang of men have been at work all summer running trenches. Several promising veins have been uncovered and the owners have decided to install a small plant and sink on one of the best of these. A syndicate with a capital of \$600,000 has been organized to work lots 85 and 88.

Figures for the first six months of the present year show that Cobalt and the surrounding districts have produced more than a

million and a half ounces of silver in excess of the corresponding period for last year.

The production is as follows:

	Ounces.	Value.
1910 .....	12,804,992	\$6,260,197
1909 .....	11,234,382	5,379,980
Increase ....	1,570,610	\$ 880,217

This increase is largely due to the greater amount of concentrates now being produced. The proportion of ore and concentrates shipped is as follows:

	Tons.	Ounces per ton.
Ore .....	12,024	814
Concentrates .....	2,763	1,017

As there appears to be no probability of a decrease in the rate of production the total output for the year will probably exceed 26,000,000 ounces. This amounts to practically one-eighth of the world's total production of silver.

Since the City of Cobalt started concentrating their ore at the Muggley mill, they have again become fairly regular shippers. Approximately forty-two tons a day are being treated, that will average about thirty ounces to the ton. Development work under ground is proceeding on all the levels, and two veins are being drifted on. These are narrow but carry high-grade ore.

A new gold field is reported to have been discovered in Western Quebec near the Ontario border. The majority of the finds have been made in Privas Township, and fairly high assays have been obtained. The Grand Trunk Pacific will pass within a short distance of this section.

A compressor plant is to be installed on the O'Connor property which adjoins the Last Chance, near Latchford. A shaft has been sunk about sixty feet and the vein in the bottom shows considerable niccolite and some silver.

It is stated that Mackenzie and Mann have taken up a working option on 4,000 acres of iron lands near Grand Rapids, on the Mattagami River. Five diamond drills and a considerable force of men will be sent in to prove up the deposits. The options cover the Powell, Glidden, Shields and La Duke properties, which are believed to be among the best up there. The entrance of this firm into the Mattagami district is of great importance and if they take up their options, there will be plenty of capital with which to work them. Senator Flynn, of Pittsburgh, also has control of a considerable acreage, and he will send in a diamond drill.



Reports have lately been circulated regarding the position of the Kerr Lake and the possibility of the directors reducing the rate for the next dividend. On account of the large shipments of low-grade ore the reserves in the mine were reported lower than was generally supposed. In this connection it is interesting to note that the management state that the big ore shoots above the 150-foot level have not been drawn on. The rich ore being shipped comes from the 190-foot level and the new vein discovered some time ago. The low-grade shipments are drawn from an accumulation of about 1,500 tons of screenings assaying from 100 to 300 ounces per ton. The mine is keeping up a production of about 200,000 ounces a month from which the profit is approximately \$80,000.

On August 29th the T. & H. B. Company paid another dividend of 300 per cent., which is equivalent to \$23,263. This last dividend makes a total of 16,900 per cent. on an issued capital of \$7,761. Good progress is being made with the new concentrator, which the company expects to have completed about January.

An accident that might very well have ended disastrously occurred recently in the T. & N. O. yards in Cobalt, in front of the new station. The bank at this point gave way and slid into Cobalt Lake, carrying with it several freight cars. A large part of this ground has been made by filling in along the edge of the lake, and the heavy weight of the trains loosened it so that it finally gave way.

The old Green Meehan mine has been leased to Mr. E. C. Kingswell, of Ottawa, and associates. By the terms of the agreement the property is leased for five years and the new owners must spend \$30,000 the first twelve months. This property was one of the best known in Cobalt in the early days and shipped a considerable quantity of high-grade ore. No work has been done on it for some time.

A few days ago a large nugget weighing approximately 1,200 pounds, of very high-grade ore, was taken from the winze on vein No. 4 below the 400-foot level of the Temiskaming. This vein has been producing a large amount of very spectacular ore, and is one of the best in the mine. The main shaft has been sunk to a depth of 500 feet, and at this point a crosscut is being run to cut the vein, which it is estimated, is about 60 feet distant. Heavy shipments are being made from the property and the financial position has greatly improved the last six months.

The pressure of the hydraulic air has again practically reached the point at which it stood when the company first commenced operating and the management expects no further difficulties. The trouble arose over the mines using a great deal more air than they had contracted for.

A new discovery has been made at a depth of 286 feet in the shaft of the Ophir property. Where intercepted the vein showed about ten inches of calcite carrying some silver values.

At the Beaver two good finds have lately been made. The first was in the back of the stope on the 200-foot level where the values were supposed to have given out. The first round opened up a rich ore shoot. Some time ago a crosscut was started from the 300-foot level to cut this same vein. In the face of the working it shows about three inches of high-grade ore.

There is at the present time considerable activity in the Matachewan district and quite a number of prospectors are in there staking claims. The district is being widely talked up with a view, it is believed, of creating a boom there this winter. Some very good discoveries have been made, but not enough to create any excitement.

The Nova Scotia has stopped work on the Peterson Lake lease on account of the reopening of the litigation between these two companies. Good results are being obtained by the mill, but no records are as yet available as to the extraction and costs of operation.

The road from Silver Centre to the Keeley mine in South Lorrain has recently been completed, and the Wettlaufer is now shipping ore. Several cars are already bagged and in the ore house, but the roads were formerly so poor that it was practically impossible to make shipments. The Mines Power Company is rapidly completing the construction of the sub-station at Beaver Lake and power will then be ready in a short time. The Wettlaufer has a twelve-drill power-driven compressor already set up, and when power is obtained the work at the mine will be carried on on a much larger scale. The Haileybury Frontier also has a new compressor installed, and has erected a number of new buildings. The shaft has been sunk to 150 feet and a crosscut is being run to open up the vein that showed on the 65-foot level. Trenching on the Harris Lorrain, Alice Lorrain and Marathon properties has been productive of encouraging results. On the former a vein was picked up near the Wettlaufer boundary that carries smaltite with some silver. It has been decided to sink a 100-foot shaft on it. A new vein was also discovered recently on the Alice Lorrain and this will be developed immediately.

**Gowganda.**—It is reported that the control of the Boyd Gordon has passed into the hands of Buffalo people. Under the new management more extensive development will be undertaken.

Good ore is being obtained on the O'Gorman and Sweet claim near Hangingstone Lake. The shaft is down sixty feet, all in ore, and the vein, although narrow, is very high grade.

The latest discovery in the Elk Lake section is a vein of galena found near Thin Lake. The vein is from four to five feet in width and some exceedingly fine ore has been uncovered.

Samples from the different properties in Elk Lake and Gowganda have been sent to the Department of Mines. They will be displayed in the mineral exhibit at the Dominion Exhibition at Toronto.

It is reported that the Ottawa Gowganda Company, operating near Lost Lake has made a good surface discovery.

Some fairly good discoveries have lately been made on properties near Elk Lake. A small vein carrying considerable silver was found on the Ribble-Emery. No sinking has been done as yet, but a shaft will shortly be started. A rich surface discovery has also been made on a claim owned by Messrs. Otisse and Currie near Hubert Lake. Work on the Montreal James has been stopped. This is one of the Julian Hawthorne properties.

A four-inch vein of calcite carrying good values in native silver has been found on the Crawford claims in Gowganda. This property adjoins the Reeves Dobie.

**Porcupine.**—A half interest in the Sandy Falls power has been purchased by the Timmins McMartin syndicate. The power plant will be only a few miles from the mine and this property will undoubtedly be one of the heaviest users. The preliminary surveys will soon be completed. The small stamp-mill on the Timmins property is producing good results, and recently two tons of ore were treated that produced over \$200 per ton.

The stockholders of the Porcupine Gold Mines Company have authorized the installation of a stamp-mill. The company's engineer states that there are ten tons of ore on hand worth \$1,000 a ton.

On the Hylands property some free gold has been found, although but little work has so far been done. The owners have decided to put in a small mill with two stamps, as soon as the winter roads are in condition.

For the purpose of centralizing their efforts in looking after the best interests of the district, the mining men in the camp have formed a mine owners' association. The association and has elected its officers. The power and transportation question has members from many of the most important properties and those that will probably first engage its attention.



**BRITISH COLUMBIA.**

**Cariboo.**—Information received from Cariboo is to the effect that the long-continued dry weather is making the gravel-washing season a short one. Unless copious rain shall fall in the early part of the autumn, the yield of gold from the placer mines may be expected to be short of the quantity regarded as an average of production in recent years. On some placer mines there has been a "clean-up," and a resumption of operations this season will only be practicable if the water supply shall be renewed.

Additions to ditches and flumes, and the provision of more storage reservoirs, etc., is being continued on some of the properties near Barkerville, owned by Mr. John Hopp. Here, as elsewhere, shortness of water will curtail the washing season this year; thus far, however, results have been fairly satisfactory, the amount of gold recovered having been fully up to the average of seasons in which water was not plentiful. Operations on this group of mines are on a larger scale than on any other in Cariboo district.

**Lillooet.**—Placer mining is carried on along several streams, including both north and south forks of Bridge River and Tributary creeks—Alexander, Sucker and Cadwallader Creeks, and on Cayoosh Creek. There are quartz properties, too, some of which are being operated. Last year's official returns accounted for a recovery of between \$6,000 and \$7,000 in gold, and this year an encouraging increase in production is looked for. At the Ben d'Or mine there is a 10-stamp mill; at the Lorne there is an arrastra, and others at the Pioneer and Woodchuck. There is also a 10-stamp mill in connection with the Anderson Lake M. & M. Company's property on Gold Creek, a tributary of McGillivray Creek. The Wayside group, on Bridge River, is being developed by a Cincinnati syndicate. Facilities for transportation are generally lacking in the parts of the district where promising mineral claims have been prospected, but it is hoped this difficulty will be overcome in the near future. The provincial mineralogist, Mr. Wm. Fleet Robertson, is in the district, making an official investigation of mining progress and conditions, and the publication of his report should assist in drawing the attention of men with capital to the good prospects for profitable mining here.

**East Kootenay.**—Apart from operations at the St. Eugene and Sullivan lead mines, both being operated by the Consolidated Mining & Smelting Company, several mines are being developed. It is planned to erect a concentrating plant for the Aurora, situated across Moyie Lake from the St. Eugene, where a large quantity of ore has been opened by prospect workings. The Society Girl, situated about 2,000 feet higher than Moyie Lake, and distant two miles southeast of the St. Eugene mine, has had two adits driven, and during the summer wagon-road construction work was done, so that ore might be hauled to the railway for shipment. Other claims near Moyie Lake are reported to have good showings of ore, but these have not yet been considerably developed.

Placer mining is being done on Wild Horse Creek, Bull River, Perry Creek, and other streams. Of these that on Perry Creek appears to be the most important, for there a steam shovel handles the gravel and about 20 men are employed.

Coal mining in southeast Kootenay shows increased production. The output of the Crow's Nest Pass Coal Company's mines has been up to 5,500 tons on one day; the company's payroll for July required a disbursement of \$193,856. The Hosmer Mines, Limited, is producing 700 tons a day, of which half is made into coke.

**West Kootenay.**—Two mines in Ainsworth division are resuming operations, namely, the Highland, near the town of Ainsworth, and the Blue Bell, across Kootenay Lake from that place. The company working the former late last year and in the beginning of this year, got behind in its payments so had to stop work. A new company, organized recently in Vancouver, put men to work in August; its advertising methods and expenses have been such as are unusual in connection with really good

mining enterprises, yet since the mine was, some years ago, a profitable producer it would scarcely be fair to condemn it until it shall have been given a fair chance to again prove itself of commercial value. The Blue Bell, on the other hand, is being financed by French capitalists, who are stated to be providing the additional capital requisite for obtaining hoisting and pumping machinery, and making additions to concentrating mill equipment. Last year's output from this mine was approximately 60,000 tons of ore, yielding about 70,000 ounces silver and 6,500,000 pounds lead, beside much zinc concentrates put aside for marketing when conditions shall be favourable for making a profit out of it.

Slocan mines continue to make progress, with some of them shipping ore. The latter include the Ruth and Richmond-Eureka, near Sandon, and the Van Roi, Standard, Mollie Hughes and Eastmont, near Slocan Lake. Of the latter the Van Roi's production figures of ore concentrated are large, while the others have shipped crude silver-lead ore—the Standard about 900 tons, the Eastmont 600 tons, and the Mollie Hughes 300 tons. In Eastern Slocan, wagon-road communication to the Lucky Jim and Rambler-Cariboo mines has been provided and materials are being taken in to replace mine buildings, tramways, orebins, etc., destroyed by the forest fires of July. Both mines will again be shipping ore before the close of the autumn. At the Whitewater, too, matters are being shaped for an early resumption of mining, wagon-road connection being provided to give an outlet to the Kaslo & Slocan Railway at Sproules, 14 miles from Kaslo.

Activity prevails in parts of Nelson mining division. Near Nelson, at the Granite-Poorman and Athabasca gold mines, particularly, conditions are satisfactory. Road-makers are making provision for hauling from the Mollie Gibson, on Kokanee Creek, to Kootenay Lake; in the opposite direction from Nelson the Queen Victoria mine is shipping copper ore to Trail, shipments ranging from 200 to 400 tons per week. At Ymir, the Yankee Girl is most active, its shipments to Trail having reached a total for the year to the end of August of 3,700 tons of ore. Last year's production was about 3,200 tons, which averaged 1.4 ounces gold and 7 ounces silver per ton, and 6 per cent. lead. Work has been resumed at the Wilcox mine, after several years' idleness; this is a gold mine, having its own stamp mill, situated in the neighbourhood of the one-time productive big gold mine, the Ymir. In Sheep Creek camp, the Queen, Nugget, and Mother Lode are the leading mines; the last-mentioned is not now producing, but its development is on a larger scale than in any other mine in the camp. Other claims in this and the neighbouring Bayonne district are being given much newspaper publicity, but as yet they are generally non-producers. The Emerald mine, near Salmo, has this year shipped about 1,200 tons of lead-silver ore, while the Second Relief, at Erie, makes an occasional small shipment to Trail, whether of concentrate or gold quartz is not stated.

Rossland mines shipping ore are the Centre Star-War Eagle group, Le Roi, Le Roi No. 2, and Velvet. The total of the Centre Star to the end of August is approximately 128,000 tons; Le Roi No. 2 has shipped 22,000 tons, a small part being concentrate from some 10,000 tons of low-grade ore put through its concentrating plant. Le Roi is still sending from 200 to 300 tons of ore to Trail each week; the Nelson Daily News gives its total to end of August as nearly 10,400 tons, while the Rossland Miner states it at about 7,300.

The northern part of West Kootenay is not doing much productive mining at present, the only mine shown as shipping steadily being the Silver Cup, in the Lardeau, owned by the Ferguson Mines, Limited. Several other properties in that district are also being worked, but are not shipping much ore. Placer mining is still being done in the Big Bend district, Columbia River.

**Boundary.**—With the exception of a reduction in output at the Granby Company's mines, following the recent destruction by fire of one of its four shipping units, there is little change



to note at Boundary district mines. Granby tonnage is now equal to the requirements of four of its blast furnaces, instead of six as was the case prior to the occurrence of the fire. Renewals are being made at the mine, so production will probably be normal before the close of autumn. The several mines of the British Columbia Copper Company continue to ship to their smeltery an aggregate of between 8,000 and 9,000 tons per week. The Snowshoe's output is from 1,600 to 2,000 tons of gold-copper ore, shipped weekly to the Consolidated Company's works at Trail. A resumption of work at the Fontenoy and Waterloo gold-quartz properties in Camp McKinney, has been announced.

**Similkameen.**—An endeavour has been made to draw the attention of mining men to the good field the lower Similkameen district especially offers for the outlay of money in developing mineral claims. The comparatively large profits the Hedley Gold Mining Company is making—the report for the quarter ended June 30th having shown, as published, a net profit of \$99,154, equal to three times present dividend requirements, which are three per cent. quarterly, are pointed to as indicative of the possibilities of mining in this district.

**Kamloops.**—The Standard states that 25 men are employed straightening and retimbering the shaft of the Iron Mask mine, near Kamloops, and that when this work shall be completed mining will be resumed with a larger number of men engaged in the mine. The shaft is 600 feet in depth; much drifting and stoping was done in the years 1904, 1905 and 1906, and about 25,000 tons of ore was taken out.

**Coast.**—Experiments with oil as fuel in copper smelting have been made recently at the old smeltery at Van Anda, Texada Island, under the supervision of Mr. Thomas Kiddie. Results were sufficiently satisfactory to warrant a continuance of operations. It is yet early, though, to assume that it will be practicable to smelt ore on a commercial scale with oil as fuel, but there seems to be a reasonable chance of success being achieved. The Marble Bay mine is closed temporarily, so far as ore production and further development are concerned. Repairs are being made to the main shaft, and the mine workings are being wired for lighting by electricity. A comparatively large quantity of copper ore (bornite), also containing good value in gold and silver, has been shipped to the smeltery at Tacoma, Washington. Work is in progress at both the Copper Queen and Cornell mines, also on Texada Island, and near the Marble Bay mine. During recent weeks some high-grade ore, running in value to more than \$100 per ton in gold, silver, and copper, has been shipped from the Cornell.

Forest fires have destroyed the shafthouse, bunkhouses and other surface property of the Canadian-American Exploration Company on Valdes Island, but the machinery and plant were saved, the miners piling sacks of ore over them when the fire was approaching the houses. At the neighbouring Jucky Jim mine the buildings were saved owing to there being fire hose and a good supply of water available. A logging tramway, which gave connection with tide-water three miles distant, was also destroyed in places.

Portland Canal camps are still drawing attention, but published statements are now not nearly so sensational as earlier. Reports are to the effect that on five or six properties development work of some importance is being done, while the Portland Canal Mining Company is hastening the completion of the first unit of its concentrating plant so as to give its ore a bulk test as soon as it shall be practicable to do so—probably during September. There is no doubt as to the bona fides of this company, for it has done more development work than others, has constructed an aerial tramway 8,500 feet from mine to mill site, and has erected and equipped a concentrator; besides, it has put in an air compressor. Many prospectors attracted to Stewart by glowing reports, have gone to Goose Bay and other parts of Observatory Inlet, an arm of Portland Canal. Good

reports come from Hazelton, Skeena River, of finds of galena ore in the country around that town. Specimens of ores are promising and outcrops indicate occurrence of ore bodies, but not much development has yet been done. Assurances from responsible men encourage the expectation of important developments resulting from the opening of some of these ore bodies, which are situated within easy reach of the Grand Trunk Pacific Railway route.

#### SOUTH AFRICA.

**Johannesburg, July 25.**—At the Transvaal University College Mr. Lionel Phillips, one of the Rand mining magnates, in lecturing on the "Rand Gold Deposits" pointed out that mining operations on the Rand could, with profit, be carried on to a depth of at least 7,000 feet from the surface, and that, therefore, the Witwatersrand goldfield would not be exhausted during the present century.

It is generally considered here that, owing to the extremely unfavourable conditions for deep mining prevailing on the Rand, that mining operations will be possible at a much greater depth than 7,000 feet from the surface, providing an adequate method of hoisting is available, and the coming extensive use of electrical power for all mining operations on these fields seems the best likely to afford a solution to the deep winding difficulty. It must not be forgotten that on the Rand, as the mining operations deepen, the rate of increase in underground temperature steadily decreases. At first it was estimated at 1 degree Fahr. for every 82 feet, but when actually tested down to a depth of 1,000 feet, it was found to be 1 degree Fahr. for every 100 feet. Recent observations down to a depth of 3,500 feet, however, showed 1 degree for every 208 feet, and more recent tests have shown that over 4,000 feet the rate of increase was only 1 degree Fahr. for every 255 feet. There seems every likelihood of a constant decrease in the temperature gradient as greater depths are attained on these fields. Mines are working here at a depth of 4,500 feet without the slightest attempt at fan ventilation and, as a matter of fact, are dependent on natural ventilation and the compressed air used for power purposes. Eventually, it seems possible that the temperature gradient will fall as low as 1 degree Fahr. for every 400 feet or 500 feet in depth, so that as regards temperature that does not at present seem likely to form an insurmountable obstacle to deep mining on these fields. Then it must not be forgotten that the native labourer here is capable of working efficiently at much higher temperatures than the white labourer and this, again, is a valuable local asset to the prospects of ultra deep mining on these fields. The atmosphere here is also much drier than in other parts of the world, whilst the hanging and foot walls leave nothing to be desired. The blanket rugs are equally hard and capable of standing a pressure of 7,000 pounds per square inch and, even if crushed, are not like coal seams, but will still retain their value. No matter what is said to the contrary the Witwatersrand is destined to become the scene of the deepest mining operations in the world and is destined for many years if not for centuries, unless some new field is discovered to continue to be the premier gold producer of the world.

Mining engineers and managers on these fields have been much concerned of late in the proposal of Mr. Hugh F. Marriott, of the Eekstein group of mines, that, instead of the ton milled being used as the basis of mine values and costs, the square fathom should be substituted, and at the Eekstein mines this is actually being done. For a long time past consulting engineers and mine managers have been strenuously striving, with considerable success, to bring down the working costs per ton milled and several of the large mines have been striving for first position in this respect. Mr. Marriott, however, is of the opinion that in the struggle for low costs per ton milled, the profits have been sacrificed owing to unpayable ore having been out



through the mill so as to produce a big divisor and low average cost per ton milled. It is, of course, quite possible, that in the recent rage for big outputs, mills and low costs, some managers may have put through the mill unpayable ore, but not when payable ore was available; but it is difficult to see how the substitution of a square fathom for a ton milled unit will prevent the practice. Coupled with this charge, however, Mr. Marriott is about to estimate the efficiency of the mine manager by the profits produced, but in that case the risks are much greater that the rock put through the mill may not be a true record of the capabilities of the mine, as there will be an inducement to exploit the rich sections and leave the poorer stopes to the next manager. At the Village Main Gold Mine, Mr. Marriott's proposals have been carried out and the profits have been thereby increased, although less tonnage has been milled and the costs have been slightly increased, but the better results are admitted to have been produced by revaluing the mine and abandoning the stopes which were estimated as unpayable, but it is difficult to see what this has to do with the tonnage or fathomage system proposed as the practice is equally applicable to both systems. This new proposal has created some annoyance amongst the American consulting engineers and mine managers employed by the Eckstein group, several having thrown up their positions rather than attempt to carry out Mr. Marriott's suggestions, whilst one has written a strongly worded paper to one of the leading engineering institutions of the Rand, which, at the present time, is down for discussion. It would seem that more is being made of the proposals than originally intended and probably the object of Mr. Marriott in removing the tonnage unit is to get it out of the way altogether, thereby enabling the consulting engineers and mine managers to devote their sole attention to increasing the profits no matter whether the tonnage costs increase or not.

The Vogel Deep Consolidated Mine is about to be closed down, the shareholders declining to find the necessary additional capital. The circumstances are somewhat peculiar as the reef was first struck about twelve years ago, since which date the company has undergone two reconstructions. It is most unusual here for a company to be reconstructed twice after proving the reef, and the general opinion here is that the present unsatisfactory condition of affairs is due to having spent the company's capital in erecting the mill before the mine had been sufficiently developed. The first development drives showed the reef to be quite payable, but these results were not confirmed by subsequent drives and stoping operations, whilst, owing to the bad hanging wall, it was found necessary to stope wider than originally anticipated, thus reducing the average value

from eight to five dwts. It is urged that if the mill could be kept fully employed, then the mine could be worked without loss, and it certainly does seem strange that after considerable work has been done in the mine, it is found impossible to keep the mill fully employed. The difficulty is one entirely of mining and, if it was only grappled in a proper manner, it is abundantly clear that it would be quite unnecessary to close down both the mine and the mill.

The Government returns issued to-day show that the value of the Transvaal mineral output in June was as follows: Gold, £2,648,758, a decrease of £40,340 as compared with May; coal, £88,279, an increase of £3,120; silver, £7,534, an increase of £162, an increase of £3,120; silver, £7,534, an increase of coal and base minerals show a record output in value. No returns are issued monthly regarding the diamond industry.

Regarding the gold industry there were 103 mines producing in June, as compared with 106 in May; 9,853 stamps at work as against 9,912; 182 tube mills as against 177; whilst the total output in ounces of fine gold was 618,339 as against 629,873 in May. It must be remembered that June had one less milling day than May.

With regard to the coal trade there were twenty-seven collieries at work, producing saleable coal to the extent of 360,618 tons, which realized an average of 4s. 10d. per ton at the pit's mouth. The highest previous tonnage of coal sold was in May being 347,546 tons. The average selling price of coal at the pit's mouth was the lowest yet obtained in the colliery history of the Transvaal. A new coal association started on July 1st and slightly better prices are now anticipated.

The base mineral output of the Transvaal continues to expand steadily and for June the details are as under: Copper ore, 437 tons, value £8,873; tin, 306 tons, value £28,357; magnesite, 44 tons, value £132; flint, 249 tons, value £1,921; lime, 12,115 tons, value £19,200; asbestos and graphite, 5 tons with a value of £245; the total value being £58,728. The output of both tin and copper ore is expected to show a steady increase. For the other base minerals there does not seem much of an immediate future. An iron and steel industry is being started, but so far it is only intended to use up the scrap.

The half-yearly production of diamonds in the Transvaal was 1,147,779 carats of a value of £721,606, from January to June, 1910, whilst the production for the year ending June 30th, was 2,098,527 carats of a value of £1,317,479.

In the whole mining industry of the Transvaal there were employed during June 26,697 whites and 231,782 natives, the latter showing a slight decrease and the former an increase of 225.

The gold mines made an estimated profit in June of £955,170.

## GENERAL MINING NEWS.

### NOVA SCOTIA.

**Halifax.**—In view of the fact that the bounties on steel are expiring next year, the Nova Scotia papers are beginning to agitate for higher duties as a measure of compensation.

In concluding a long letter on the subject, a correspondent of the Halifax "Chronicle," says:

"At the present moment the iron industry of Nova Scotia is in jeopardy. The federal subsidies all expire by next year and are not to be renewed. They were given to obviate the necessity of levying higher protective duties on a number of iron and steel products. But if Parliament, frightened by the vociferous campaign in the West, should refuse to grant compensatory duties in lieu of them, a great catastrophe in Nova Scotia must inevitably follow.

"I have no means of knowing exactly how much capital, home and foreign, is invested in the iron and steel works and

coal mines of this province, but surmise that it is in the neighbourhood of \$120,000,000. Nor can I tell offhand how many persons are employed in them; or how many more benefit by the labour of these men and by their trade and custom. It must be obvious to us all, however, that our duty as Nova Scotians, whether we be Liberals or Conservatives, is to use our best efforts to save these, our only great industries, from the fate that just now appears to threaten them."

**Halifax.**—The Nova Scotia Steel Company, since the re-lighting of the blast furnaces, has been putting all previous records for daily production far in the rear. Before the improvements in this direction were completed, the average daily output was 180 tons; since that time the average has been greatly increased. One day the output was 230, and on another it reached 275 tons.

**Sydney, Sept. 10.**—Manager Butler, of the Dominion Iron & Steel Company, said to "The Star" this morning: "Enquiries



are being received from Australia, South Africa, India, and other places for our rails, but as long as the Canadian demand keeps up to the output we are not very particular about the foreign orders. One more Bessemer furnace will be erected," said Mr. Butler. "The order has already been placed, and the work will be begun this fall. It will take about three months to complete the work. Unskilled labour is hard to obtain here." Mr. Butler said the new immigration law requiring foreigners to have \$25 before entering the country no doubt has an effect here. In reply to a question as to when the new blast furnaces would be ready for operation, Mr. Butler stated that it would be about six months. The steel work on the new furnaces, which was being done by the Canada Foundry Company, was being held back by several unforeseen delays. The Steel Company has bonded the iron areas at St. George's Bay, Newfoundland. There is a vast deposit of red hematite at this place.

#### NEW BRUNSWICK.

**St. John, Sept. 9.**—At a meeting of the shareholders of the Disrael Asbestos Company here to-day, it was decided, after a very lively discussion, to reorganize, pay off indebtedness and proceed with development work.

#### ONTARIO.

**Kenora, Sept. 2.**—Gold mining operations received an added stimulus Wednesday, when R. B. Nickerson, manager of the Mikado mine, brought in \$1,200 gold bullion from the mine, the result of two days' run from the debris. The twenty-stamp mill will commence running in less than two weeks, and, as there is a good showing of ore in the stopes, returns are expected to be large. The Mikado mine, which is fifteen miles out on the Lake of the Woods, has been closed down for some seven years, and its reopening marks a new interest in this district.

#### ALBERTA.

**Medicine Hat, Sept. 1.**—In the closing hours of Sir Wilfrid Laurier's tour, the tariff question has again become paramount.

This time the city council and coal operators of Lethbridge pointed out to the government that reciprocity with the United States would enable the operators to find a market for their surplus supply in Montana. The United States farmers, seizing upon the premier's presence again, stated that they were satisfied with his utterances with reference to the tariff, but claimed that Hon. George P. Graham's idea of railway liability was not acceptable.

The coal industry around Lethbridge has attained a large growth, and, although the present supply is equal to the demand,

new mines which are now opening will require a more widely extended market. Montana imports a considerable quantity of Lethbridge coal in summer time, but, as the local demand increases in winter, the supply for export falls off. Several members of Sir Wilfrid's party inspected shaft No. 6 of the Alberta Railway & Irrigation Company this morning, and "The World" correspondent was informed that people in Montana regarded the tariff against Lethbridge coal as a hardship, as being so far removed from any other source of fuel supply. Alberta coal enters that state without competition. It is estimated that \$9,000,000 is invested in the coal industry around Lethbridge, and about 1,400 to 1,500 men are employed. The output of all mines cannot so closely be estimated, but the one in question has sufficient coal in sight to keep the plant busy producing 1,800 tons per day for 20 years. A farmer may drive up to the pit mouth and receive dusty diamonds for \$3.85 per ton. The dealer in Lethbridge gets \$4.50 per ton delivered, while Winnipeg is said to pay \$8. The railways, however, are the worst sinners, and it virtually costs more to carry coal than to produce it. Local officials told the premier plainly that exclusive railway charges were killing the industry.

#### BRITISH COLUMBIA.

**Fernie, Sept. 2.**—The inquest to inquire into the circumstances surrounding the death of James Robey, who had his back broken in Coal Creek mines, was held in the provincial building last night. Only three witnesses were examined, and as none of these actually saw the accident, it was impossible to determine exactly how it happened. The jury came to the conclusion that the man had been killed by a runaway mine car and that the victim himself was responsible, for the reason that he had used a defective chain. The jury also recommended that the officials of the coal company use more care in seeing that the chains and other equipment in their mines be kept in good condition.

**Nelson, Sept. 2.**—A deal has been consummated by which L. B. Orchard and principals of Toronto buy an interest in the Evans group, situated on White Fish creek, a tributary of the St. Mary's River, about 20 miles west of Marysville, for \$10,000 cash. The owners are William and Charles Evans, of Marysville, James Lemmon, of Moyie, and William McAllan, of Nanaimo. The claims carry copper, gold and silver, while a trace of nickel is known to exist. The ore is of medium grade, the veins running nearly east and west through a diorite formation. Stuart J. Schofield, of the Dominion Geological Survey, classes this formation as being identical with that of the copper-nickel mines of Sudbury, and speaks very highly of the district. Mr. Orchard is at present in England with a view to interesting further capital in the development of the group.

## MINING NEWS OF THE WORLD.

#### WEST AFRICA.

The West African Chamber of Mines states that the gold yield of the colony for July was 15,564 ounces, valued at £58,551, a decrease of 1,630 ounces, or £12,437, as compared with the preceding month.

#### RHODESIA.

The total output of gold from Rhodesia for the month of July is cabled as 46,367 ounces, valued at £195,233, as against 51,016 ounces, valued at £214,709, in the previous month. This is a decrease on the month of £19,476. There were 173 gold producers last month. The output of other minerals for last month was: Silver, 18,723 ounces; lead, 61 tons; coal, 16,267 tons; copper, 5 tons; chrome ore, 3,304 tons; asbestos, 81 tons.

#### UNITED STATES.

**New York, Sept. 1.**—Yukon Gold declares the regular quarterly 2 per cent. dividend, payable October 1st.

**Chicago, Sept. 2.**—Following a conference between committees of the Illinois Coal Operators' Association and the Illinois body of the United Mine Workers of America yesterday, it was announced that the end of the strike of forty thousand coal miners is in sight and that to-day will probably see the end of the dispute which began April 1st.

**Rhyolite, Nev., Sept. 3.**—The Montgomery Shoshone is making a record for low cost of mining and milling which compares favourably with the most economical mining projects in the state. During the month of July, the cost sheet showed \$1.90 per ton for mining, and \$1.90 per ton for milling, or a total of \$3.80 per ton.



**Joplin, Mo., Sept. 3.**—Word comes from Iola from an apparently reliable source that the Lanyon zinc smelters of that place are being wrecked and will be moved to Springfield, Ill. It is stated also that the acid works of the United States Zinc & Chemical Company are being razed and this plant will be taken to Kansas City, Kan., where this company has another large sulphuric acid factory.

**Cripple Creek, Colo.**—The production from the Cripple Creek district for August, as compiled from figures given out by mill managers, was \$1,314,200, the highest production for any month of the year. The tonnage was 69,800. In comparison with July the values are \$64,000 greater and the output is estimated at 17 tons more. The rich ore totalled 4,100 tons, exceeding July by 500 tons. The Golden Cycle report shows a gain of 2,000 tons over last month, or a gain of \$5,000 tons in two months.

**Leadville, Colo., Sept. 6.**—August was the banner month of the year so far as the monthly output is concerned, reaching 74,000 tons of all classes of ore. The increase over the preceding month is due principally to the extra tonnage shipped from the outlying districts, and during the present month the tonnage from these districts should be increased over that of August. The increase over that of August, 1909, is fully 10,000 tons, due to the general revival of mining throughout the entire district. The outlook for the present month is that the tonnage will be increased materially, as the ore bodies caught during the month of August in the Yak tunnel, Cleveland, New Monarch, Dinero tunnel, etc., have been further developed, which will permit all of them to increase the daily output. It is also expected that the new shaft on the Colonel Sellers will be completed this month, and when it starts hoisting ore the daily tonnage will be increased fully 250 tons.

## COMPANY NOTES.

### CANADIAN WESTINGHOUSE DIVIDEND.

The Canadian Westinghouse Company has declared the regular quarterly dividend at the 6 per cent. rate, payable October 10th.

The T. & H. B. Company has just paid dividend No. 27, of 300 per cent. This is the sixth dividend of a like amount paid this year by this pioneer company.

In the closing months of 1908 the Canadian Iron and Foundry Company, Limited, the Canada Iron Furnace Company, Limited, and John McDougall & Company, were consolidated under the style, The Canada Iron Corporation, Limited. The majority of the shares of the Londonderry Iron & Mining Company, Limited, were also incorporated in the merger. The new company has blast furnaces in Ontario, Quebec and Nova Scotia, with foundries in the same provinces, and iron mines in these provinces and in New Brunswick as well.

For the short period ended May 31st, 1909, the net earnings were \$146,743.39, on a preferred capital of \$2,759,000. During the present year £100,000 bonds in the treasury have been sold, so that the present amount outstanding is \$2,920,000. An increase has been made this year in the preferred stock, which now stands at \$2,909,000, and of the \$5,000,000 common authorized, \$4,832,300 is now outstanding.

The annual report for the year ended May 31st, 1910, has just been issued, showing net earnings of \$18,994.22. Accounts and bills payable are \$2,533,490, against \$1,505,640 last year.

The company were unfortunate this year in having two disastrous fires, namely at Montreal and Three Rivers, which undoubtedly made serious inroads into the profits.

### BRITISH COLUMBIA COPPER COMPANY PROFITS.

The British Columbia Copper Company reports net revenue for August as \$32,500. Copper was produced at 7.7 cents per pound. Only two furnaces were in operation.

### TEMISKAMING COMPANY PROFITS.

In August the Temiskaming mine showed a profit of \$103,969. The net value of ore produced was \$125,984.

### LA ROSE AND NIPISSING.

Directors of both the Nipissing and La Rose Companies have been notified of meetings to be held September 19th, when dividend action will be taken. Regular dividend will be forthcoming—3 per cent. and 2 per cent. extra on Nipissing, and regular 2 per cent. on La Rose.

Nipissing is maintaining a monthly yield of about 400,000 ounces. The Kendall vein, which was uncovered several years ago, has proved a bonanza for the company, and it has to date contributed \$2,000,000 to income.

La Rose has recently uncovered at a depth of 135 feet in the Princess mine a vein which has assayed between 3,500 and 4,000 ounces, and which is looked upon as a second "Kendall." If the vein holds good for a distance of 100 feet with similar values the company's dividend requirements at the present rate for a full year are assured from this one section of the property.

La Rose has paid in dividends during the past year \$600,000, but its treasury position will probably show a much improved condition in a few months.

## STATISTICS AND RETURNS

### CROW'S NEST OUTPUT.

The output from the Crow's Nest collieries for August amounted to 109,000 tons, as compared with 73,000 tons during August of last year, an increase of almost fifty per cent. The output during this year has shown a substantial increase over last year, when, of course, the company had not fully recovered from the first of August, 1908. At the same time by August of last year production was again on its normal basis, which makes the

present large increase the more encouraging. The figures for the past four months compare as follows:

	1910.	1909.	Increase.
May .....	92,900	54,000	38,900
June .....	116,450	83,400	33,050
July .....	104,000	72,000	32,000
August .....	109,000	73,000	36,000
Total .....	422,350	282,400	139,950



**CONSOLIDATED ORE RECEIPTS.**

The Consolidated Mining and Smelting Company of Canada reports ore receipts at Trail smelter for the week ending September 3rd as 7,536 tons; year to date 320,711 tons.

**HILLCREST SENT 18,000 TONS.**

August shipments of the Hillcrest Collieries amounted to 18,000 tons. Development work is steadily progressing. The new slope is down 125 feet, in a 16-foot vein of first-class steam coal.

**RAND GOLD OUTPUT.**

The August gold output of the Rand is estimated at 640,000 ounces fine.

Comparison of the value of the August output, on the basis of the above estimate, is:

August, 1910, \$13,760,000; August, 1909, \$12,988,000.  
 July, 1910, \$13,565,000; August, 1908, \$12,484,000.  
 June, 1910, \$13,278,000; August, 1907, \$11,788,000.  
 May, 1910, \$13,468,000; August, 1906, \$10,812,000.  
 April, 1910, \$13,147,000; August, 1905, \$9,102,000.

**COBALT ORE SHIPMENTS.**

Both Kerr Lake and La Rose were out of the shipping last week, and the total output from the Cobalt camp was unusually small, the ore consigned being only 478.95 tons. The Nipissing sent out only three cars. The Central, shut down for a short period, is now running again for the benefit of the creditors and they sent out a small car of concentrates. The Colonial is another "occasional" that has started up operations again. From their mill they shipped 23 tons to Denver, Colorado.

The shipments for the week ending September 9th, in pounds, and approximate values were:

McKinley-Darragh, 5 h.....	242,390
Nipissing, 3 l.....	192,180
Crown Reserve, 1 h 1 l.....	141,450
O'Brien, 1 h.....	66,270
Buffalo, 1 h.....	62,140
Hargraves, 1 l.....	60,000
Temiskaming, 1 l.....	60,000
Central, 1 h.....	46,910
Colonial, 1 h.....	44,580
Trethewey, 1 h.....	41,990
11 h, 6 l.....	957,910

The shipments for the week ended September 9th and for the year 1910 now read:

	Week ended Sept. 9th.	Year to date.
Nipissing.....	96.09	4,203.09
La Rose.....		4,105.37
Kerr Lake.....		3,714.47
Crown Reserve.....	70.72	2,339.07
McKinley-Darragh.....	121.19	1,397.68
Temiskaming.....	30.00	814.70
Buffalo.....	31.07	801.70
Chambers-Ferland.....		610.23
Right of Way.....		609.23
Coniagas.....		612.92
O'Brien.....	53.13	372.08

Trethewey.....	20.99	378.42
Drummond.....		336.76
City of Cobalt.....		236.94
Little Nipissing.....		213.93
Cobalt Central.....	23.45	243.13
Hudson Bay.....		201.22
Hargraves.....	30.00	170.53
Townsite.....		144.67
Cobalt Lake.....		117.30
King Edward.....		111.12
Silver Cliff.....		106.28
Colonial.....	22.29	105.59
Beaver.....		57.53
Provincial.....		32.05
Waldman.....		31.99
Rochester.....		30.37
Wyandoh.....		24.15
Casey.....		17.90
Total.....	478.95	22,015.67

**COBALT SHIPMENTS.**

The Cobalt mining district is producing more silver at a lower cost than at any previous time in its history, notwithstanding a marked decrease in speculative interest.

For the first seven months of 1910 Cobalt shipped a total of 18,029 tons of ore, as against 29,942 tons for the whole of 1909, 25,265 tons in 1908, and 14,788 tons in 1907. During the first year of Cobalt's existence, 1904, the total output was 158 tons. At the present day the output is about 15 per cent. of the total production of the world.

In the following table is shown the number of ounces of silver and their values for the several years since 1904:

	Tons.	Silver, Oz.	Value.
1910†.....	18,029	15,491,000	\$8,320,336
1909.....	29,942	25,885,985	12,456,301
1908.....	25,654	19,437,875	9,133,378
1907.....	14,788	10,023,311	6,155,341
1906.....	5,335	5,401,766	3,667,551
1905.....	2,114	2,451,356	1,360,503
1904.....	158	206,875	111,887
Total.....	96,020	78,898,188	\$41,205,297

† Seven months.

**COBALT ORE SHIPMENTS.**

Following are the shipments from the Cobalt camp for the week ending August 26th, and those from January 1st to date:

	Aug. 26. Ore in lbs.	Since Jan. 1. Ore in lbs.
Beaver.....		180,617
Buffalo.....	59,240	1,484,198
City of Cobalt.....	60,140	482,875
Chambers-Ferland.....		1,149,100
Cobalt Central.....		293,286
Cobalt Lake.....		260,900
Cobalt Townsite.....	66,000	302,840
Colonial.....		148,900
Coniagas.....		1,119,616
Crown Reserve.....	181,090	4,545,110
Drummond.....		664,200
Hargraves.....		281,170
Hudson Bay.....		360,825
Kerr Lake.....	480,000	6,944,640
King Edward.....		221,296
La Rose.....	170,320	8,193,341



McKinley-Darragh	180,260	2,484,189
Nipissing	445,340	7,922,047
O'Brien		822,146
Peterson Lake		432,420
Provincial		65,000
Right of Way	111,420	1,191,637
Rochester		60,750
Silver Cliff		212,770
Standard Cobalt		147,992
Temiskaming	120,000	1,428,080
Trethewey		725,380
Waldman		63,992
Wyandoh		48,300

Ore shipments for the week ending August 26th were 1,873,810 pounds, or 936 tons.

Total shipments from January 1st to August 26th were 42,237,617 pounds, or 21,118 tons.

**TORONTO MARKETS.**

Sept. 9.—(Quotations from Canada Metal Co., Toronto).

- Spelter, 5½ cents per lb.
- Lead, 3.65 cents per lb.
- Antimony, 8 to 8½ cents per lb.
- Tin, 38 cents per lb.
- Copper, casting, 13.25 cents per lb.
- Electrolytic, 13.25 cents per lb.
- Ingot brass, 9 to 12½ cents per lb.

**Coke.**

- Sept. 7.—Connellsville Coke (f.o.b. ovens).
- Furnace coke, prompt, \$1.60 to \$1.65 per ton.
- Foundry coke, prompt, \$2.10 to \$2.25 per ton.

Sept. 7.—Tin (Straits), 36.20 cents.

- Copper, Prime Lake, 12.75 to 12.87½ cents.
- Electrolytic copper, 12.50 to 12.60 cents.
- Copper wire, 14.00 cents.
- Lead, 4.47½ cents.
- Spelter, 5.55 cents.
- Sheet zinc (f.o.b. smelter), 7.50 cents.
- Antimony, Cookson's, 8.20 cents.
- Aluminium, 22.00 to 22.50 cents.
- Nickel, 40.00 to 47.00 cents.
- Platinum, ordinary, \$34.00 per ounce.
- Platinum, hard, \$36.00 per ounce.
- Bismuth, \$1.85 per lb.
- Quicksilver, \$46.00 per 75-lb. flask.

**SHARE MARKET.**

(Courtesy of Warren, Gzowski & Co.)

**Miscellaneous—September 9, 1910.**

	Bid.	Ask.
Amalgamated Asbestos	..	15
Dominion Coal Company	..	..
Dominion Steel Company	..	..
Nova Scotia Steel	83½	84½
Granby	32	34
Consolidated Smelting	65	75
Crow's Nest Pass	No. quotation	..
Dominion Steel Corporation	..	62

**Cobalt Stocks—September 9, 1910.**

Amalgamated	.02½	.06
Bailey	.07	.07¾
Beaver Consolidated	.30⅝	.30⅞
Big Six	.02	.04
Buffalo	1.85	2.40
Chambers-Ferland	.18½	.19¼
City of Cobalt	.26¼	.27
Cobalt Central	.06	.08
Cobalt Lake	.15	.15¾

Coniagas	4.50	5.00
Crown Reserve	2.79	2.81
Foster	.11	.12¾
Gifford	.07½	.07½
Great Northern	.08⅝	.09½
Green Meehan	.04	.04½
Hargraves	.25½	.26¼
Hudson Bay	100.00	110.00
John Black	.03	.04
Kerr Lake	6.60	6.75
La Rose	3.78	3.80
Little Nipissing	.18⅝	.18⅞
McKinley Ex. Div. 5 per cent.	.94	.95
Nancy Helen	.04	.05½
Nipissing	10.70	10.85
Nova Scotia	.24½	.24¾
Ophir	.29	.35
Otisse	.03	.03⅝
Peterson Lake	.22¾	.23
Right of Way	.24	.25
Rochester	.17	.17½
Silver Leaf	.06¾	.07¼
Silver Bar	.04¾	.05¼
Silver Queen	.07	.11
Temiskaming	.79⅝	.79¾
Trethewey	1.30	1.33
Watts	.03	.08
Wettlaufer	.65	.72

**New York Curb—September 9, 1910.**

Boston Copper	14¼	14¾
British Columbia Copper	4⅝	4¾
Butte Coalition	18	19
Canadian Mines	6¼	6⅝
Chino Copper	15½	15¾
Davis-Daly Copper	1¼	1½
Ely Consolidated	.30	.32
Gila Copper	..	..
Giroux Mining	6½	6⅝
Goldfield Consol	8	8⅝
Greene-Canadian	6⅞	7
Hareuvar Copper	10	15
Inspiration Copper	7½	8
Miami Copper	18½	18¾
New Baltic Copper	3	7
Nevada Con. Copper	20¼	20½
Ohio Copper	1½	1½
Rawhide Coalition	.10	.11
Ray Central	2	2½
Ray Consolidated	17¾	18¼
Union Mines	1	1 1/32
Yukon Gold	3 15/16	4

**SILVER PRICES.**

		New York cents.	London pence.
August	23	52⅞	24⅝
"	24	52⅞	24⅝
"	25	52⅞	24⅝
"	26	52⅞	24⅝
"	27	52⅞	24¼
"	29	52½	24⅞
"	30	52⅝	24⅞
"	31	52⅝	24⅞
September	1	52⅞	24⅝
"	2	52⅞	24⅝
"	3	52¾	24⅞
"	5	Holiday	24⅞
"	6	52⅞	24¾
"	7	52⅞	24⅝