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The Canadian Mining Journal

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

Business Manager:
J. J. HARPELL, B.A.

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CIRCULATION.

During the year ending with March 1st, 1908, 91,750 copies of "The Canadian Mining Journal" were printed and distributed, an average of 3,822 per issue.

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SPECIAL CONTRIBUTORS.

Geology: Dr. Frank D. Adams, McGill University; Dr. A. E. Barlow, late of Geological Survey of Canada; Professor Willett G. Miller, Provincial Geologist of Ontario; Dr. J. E. Woodman, Dalhousie University, Halifax, N.S.

Chemistry: Dr. W. L. Goodwin, Director School of Mining, Kingston, Ontario; Milton Hersey, M.Sc., Official Analyst Province of Quebec.

Mineralogy: Professor W. Nicol, School of Mining, Kingston, Ontario.

Mining: S. S. Fowler, M.E., Nelson, B.C.; Frederick Keffer, M.E., Anaconda, B.C.; A. B. Willmott, M.E., Sault Ste. Marie, Ont.; J. C. Gwillim, M.E., School of Mining, Kingston, Ont.; J. Obalski, Inspector of Mines, Quebec; J. Bonsal Porter, M.E., McGill University; H. Mortimer-Lamb, Sec. Can. Min. Inst.; John E. Hardman, M.E., Montreal; Fritz Cirkel, M.E., Montreal; George W. Stuart, M.E., Truro, N.S.

Metallurgy: Stafford F. Kirkpatrick, School of Mining, Kingston, Ontario; A. P. Scott, Dominion Iron & Steel Company, Cape Breton.

Natural Oil and Gas: Eugene Coste, M.E., Toronto, Ont.

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MORE ABOUT THE BOOM.

The purchase of shares in recent Cobalt and Montreal River flotations is being indulged in to an extraordinary extent by men of all classes. For their guidance they rely upon brokers and promoters who, in most cases, give nothing for what they receive. In other words, thousands of misguided people are voluntarily handing out their cash to men who not only are totally incompetent to advise, but are ever most anxious to obscure the truth. In short, the eager dupes of newspaper puffs and prospectuses are providing motor-cars, residences, and dropsical bank-accounts for purveyors of engraved paper.

The net results of the present boom can be summed up thus: Some thousands of Canadians will have learned that mines are not made in printing-offices; some dozens of men who should be decorating the interior of our institutions of correction will have acquired wealth; and not a few newspapers, more particularly the Toronto World, will have enjoyed an abnormal revenue from advertising. All of which will react most detrimentally upon genuine mining and honest mining men.

The one outstanding consideration that demands our attention at present is the fact that the promoters of newspaper-advertising schemes have been able to use the names of men who pose as mining experts, but who are known to be ready and willing to sell their approval for a price. To illustrate this it is merely necessary to say that not one of the scores of wild-cats has ventured to employ a mining engineer of good standing. In the nature of things the flowery prospectus and the competent mining engineer cannot mix. And even when a respectable mining engineer has reported favorably on a prospect professional etiquette ensures his silence, and the public is none the wiser.

On the other hand, it is absurdly easy to buy, in open market, the favorable reports of any number of pseudo-experts. And, to lend dignity to the impossible effusions of these prostitutes, it is only necessary to attach the name of a few complaisant and respectable citizens to the list of directors.

Briefly, the gambling that is being carried on in Toronto and Montreal under the name of "mining" can claim no closer kinship to that industry than can Monte Carlo to the Heavenly City. The stock-in-trade for the most profitable confidence-game that modern ingenuity has devised consists in a few acres of land conveniently distant, a striking name, an alleged mining expert, an advertisement in the dailies, a few guinea-pig directors—and there you are!

That such things can and do exist in a community of sane men and women is almost beyond belief. Not

all the blame can be thrown upon those newspapers that have aided and abetted the fakirs. Nor yet upon the Provincial Government can all the responsibility be placed. There rests upon honest mining engineers, mine owners, and upon all connected with what should be the noblest and cleanest of industries, the obligation to give public utterance to their convictions. Further, the Canadian Mining Institute is called upon to throw its influence on the side of right.

But most particularly is it desirable that from our mining schools, from the men who are training the mining engineers of to-morrow, the public should receive a clear pronouncement. The profession of mining engineering requires and must demand protection from pretenders.

WAVERLEY FORTY YEARS AGO.

That indefatigable worker and versatile scientist, Dr. Henry Youle Hind, contributed largely to the literature of this country. His volumes of travel will, perhaps, keep his name green when his other labors shall have been forgotten. But to many his reports on Nova Scotian mining districts are fraught with special interest.

Dr. Hind's report on the Waverley Gold District of Nova Scotia is dated 1869. At that time, except for the use of steam, mining methods in Nova Scotia were crude and primitive. Dr. Hind remarks that on the North or Brodie, lead at Waverley there were then 23 shafts within a distance of only 1,800 feet. The average distance between the shafts was 78 feet; the greatest depth attained was 240 feet; and the mean depth 185 feet. This was also true of the Tudor, North Taylor, South Taylor, and Number VI. leads, on which over a total superficial distance of 4,800 feet, there were no less than 55 shafts. Dr. Hind not only pointed out the futility and wastefulness of a system whereby one shaft was sunk "to every superficial area of forty-seven feet square," but strongly of advised consolidation and co-operation.

He condemned also the practice of mixing quartz from different leads and crushing the whole together. "A poor lead worked at the same cost as a rich lead may neutralize all the benefits which would be obtained if the rich lead were worked alone. Each lead ought to be crushed by itself, and a statement of the result with the cost of mining the quartz recorded. . . . Plans of all the workings are also essential, showing at least monthly progress."

In those days several of the Waverley mines showed, as they do to-day, rich specimen ore. The companies that encountered sufficient quantities began to pay large dividends. Against this Dr. Hind wrote unreservedly. His advice is as necessary to-day as it was forty years ago. "The absorption of all returns to pay large dividends is as a rule as fatal an error in gold mining as in most other enterprises."

The mining costs per ton were extravagant. Dr. Hind states that as Mr. Burkner, operating on the Tudor lead, reported mining expenses of $12 per ton up to the close of 1866. A reduction to $8 per ton was then effected. But at least 33 per cent. of the gold was lost in the tailings.

At one place ten men were employed breaking and feeding 35 tons of quartz to the mill, during 24 hours. "Why should not this work be done by four men feeding a "breaker" with hopper, and moved by the surplus water power?" is the pertinent enquiry of Dr. Hind.

Mr. Burkner's sworn returns for the year 1865 to the Commissioner of Mines show a yield of 8,727 oz. 11 dwt. from 6,972 tons of ore, an average of 1 oz. 6 dwt. per ton. The total working expenses were from $10 to $14 per ton. But the miners levied on the mine, in misappropriating specimens and amalgam, to the surprising extent of "at least $50,000 to $60,000, or 2,500 to 3,000 ounces, if not more!"

There are innumerable passages that, if space permitted, we would quote from Dr. Hind's engaging pamphlet. We have indicated enough, however, to show that there were many factors militating against the continued growth and success of this rich Nova Scotian gold district. Obviously, no gold mines could long survive such treatment as that to which the Waverley mines were subjected.

The mistakes and blunders of the early gold-seekers without doubt have been repeated indefinitely in succeeding years. Probably in the smaller mines and prospects of the province they are being repeated to-day.

As a wonderfully interesting piece of history, and as a clear warning against the errors of ignorant haste and inefficiency, Dr. Hind's "Report on the Waverley Gold District" should be reprinted and distributed throughout the mining sections. At present, copies of the report are becoming more and more rare.

DISCUSSION.

In glancing through the last annual volume of the Journal of the Canadian Mining Institute, a volume, by the way, that outshines those of previous years, we notice a sad dearth of discussion. In themselves the papers are of conspicuous value. Subjects such as the smelting of Cobalt ores, the duties of mining engineers, assaying practice, are of immediate importance. But in every paper there are points that call for discussion. Intelligent, fair discussion is always illuminating. Often it is essential.

Matters of this sort rest primarily with the members of the Institute. First of all, it behooves those who intend to contribute papers to send in their manuscript early in the new year, so that the Secretary may have ample time to get them through the press. Sec-

ondly, those of the members who are able to attend the annual meeting in March should come prepared to exchange views on one or more topics.

The tendency at meetings of technical societies is to forego the reading of papers in their entirety. Usually the author reads a synopsis, and printed copies giving the full text of his paper are distributed. This is a practice that should and must be followed. Time is an all important factor in conventions of busy men. Moreover, listening to a long dissertation that can be perused much more rapidly from the printed page is a weariness to the flesh. It deadens the hearers and leaves little time for debate.

If at all possible—and it will only be possible with the prompt assistance of all intending contributors—each and every paper should be in the Secretary's hands not later than the last of January next.

We may hope then to have advance copies long enough before the annual meeting to ensure complete, lively, and edifying discussions. These, we are sure, will constitute by no means the least instructive portions of the Institute's Journal for 1909.

THE GREAT NORTHERN COAL COMPANY.

The modest province of Nova Scotia has now been included in the wild-cat belt. Under the nurturing care of Dr. Hugo Von Hagen, a lusty member of the species has sprung into life. Its ostensible home is Cumberland County. Its real habitation is in the cultivated cerebellum of the virtuous Von Hagen.

"Roach's Financial Facts," one of those generous guides to wealth and welfare, is published in New York. Its issue of August 15, 1908, is before us. Mr. Henry N. Roach is, apparently, editor and proprietor. Mr. Henry N. Roach is also sole fiscal agent for the "Great Northern Coal Company," and he takes a full page in which to tell of his faith in Von Hagen, and his love of mankind generally. But not one little fact does he impart about the property of the "Great Northern Coal Company." Facts, however, are not necessary. They are in bad taste.

How many shekels would accrue to the exotic Von Hagen and to the revering Roach (was ever man better named!) if they dealt in facts!

Quite between ourselves, Von Hagen's coal mines will never earn a dividend. Nevertheless, such is the skill of this transplanted gentleman, a regular dividend of one per cent. per month is announced in this same issue of "Roach's Financial Facts." And, once more between ourselves, the illustrious Von Hagen deserves so well of his shareholders that he should immediately and for the rest of his natural life be provided with board and lodging at the expense of a grateful nation. There are substantial residences at Dorchester, N.B., and at Kingston, Ont., wherein fitting accommodation is ready. The dear Doctor's modesty should not be permitted to interfere. Indeed he and his only less deserving associates should be given no chance to discuss the matter.

CANADIAN BANKING.

The communications received since our reference to the inadequacy of reserve against Canadian bank notes indicate much misconception on the part of the public concerning these matters.

Subsection 6, Section 65, of the Canadian Bank Act, which deals with the payment of notes of a defunct bank, is as follows:—

"Nothing herein contained shall be construed to impose any liability upon the Government of Canada, or upon the Minister, beyond the amount available from time to time out of the Circulation Fund.

Subsections 3 and 5 of Section 64 states that the Circulation Fund shall be made up by each chartered bank keeping an amount deposited with the Government of Canada equal to 5 per cent. of the average circulation of its noes. (The Act does not specify whether this sum is to be kept in gold, Dominion notes, or ordinary securities.) And, further, that this circulation fund shall continue to be held for the "sole purpose" of redeeming the outstanding notes of any suspended bank.

Subsection 9 of Section 64 reads as follows:—

"The Minister shall, with respect to all notes paid out of the circulation fund, have the same rights as any other holder of the notes of the bank: Provided, that all notes, and all interest thereon, so paid by the Minister, after the amount at the credit of such bank in the Circulation Fund, and all interest due or accruing due thereon, has been exhausted, shall bear interest at a rate of three per centum per annum, from the time such notes and interest are paid until such notes and interest are repaid to the Minister by or out of the assets of such bank."

Thus the Canadian Government takes no responsibility beyond acting as the custodian of this small Circulation Fund. Moreover, this fund, outside of the amount contributed by the defunct bank itself, is in reality nothing more than a source from which a small temporary loan may be had to meet the outstanding notes of the defunct bank. This loan is a first charge on the assets of the bank until it is paid back to the Minister.

To show how inadequate this fund is in amount, it is only necessary to quote the following figures from the last monthly Bank Statement, viz., that for October, 1908:—

Name of Bank.	Notes in circulation.	Deposits with Dom. Gov. for security of note circulation.
Bank of Montreal	$12,417,132	$600,000
Bank of New Brunswick	719,125	35,000
Quebec Bank	1,990 543	87,360
Bank of Nova Scotia	2,972,074	150,110
St. Stephen's Bank	184,790	13,000
Bank of B. N. A.	3,492,547	682,775
Bank of Toronto	3,869,839	160,000
Molsons Bank	3,122,883	145,000
Eastern Townships Bank	2,733,210	123,000
Union Bank of Halifax	1,462,897	75,000
Banque Nationale	2,105,127	90,000
Merchants Bank	4,915,628	240,000
Banque Provincial	1,130,743	45,519
Union Bank of Canada	3,263,293	150,000
Can. Bank of Commerce	9,336,545	450,000
Royal Bank of Canada	3,724,922	190,000
Dominion Bank	3,709,465	160,000
Bank of Hamilton	2,314,447	125,000
Standard Bank	1,423,692	61,000
Banque de St. Jean	14,239	11,427
Banque d'Hochelaga	2,350,906	102,996
Banque de St. Hyacinthe	43,565	16,995
Bank of Ottawa	2,895,895	150,000
Imperial Bank	3,776,027	192,458
Western Bank	504,150	27,005
Traders Bank	2,882,945	148,270
Sovereign Bank	124,420	123,569
Metropolitan Bank	1,124,116	47,200
Home Bank	968,340	35,000
Northern Crown Bank	2,107,790	76,000
Stirling Bank	781,768	33,718
United Empire Bank	177,695	12,000
Farmers' Bank	396,005	15,000
	$83,036,762	$4,574,402

SOUTHEASTERN BRITISH COLUMBIA.

There has hardly been time for a readjustment of the currents that influence the metal markets. An increased demand for silver is confidently expected at an early date. Copper is holding its own, with a tendency towards improvement. The lead market is daily showing renewed strength. For all the metals a rapid recovery—possibly too rapid a recovery—is predicted.

The election of Mr. Taft to the Presidency of the United States has been accepted as indicating that there will be no undue interference with present conditions on the part of the chief executive.

The Canadian elections scarcely left a ripple behind them. In lieu of sharply defined issues, the opposing parties appealed to the country with sentiment and scandal respectively. Sentiment won.

All of which signifies that, whereas a few weeks ago the country was in a state of suspended animation, from now on there will be renewed confidence and widening spheres of activity.

The mines and smelters of Southeastern British Columbia are sensitive to all changes in the prices of metals to a larger extent than obtains in any other section of Canada. It is cheering, therefore, to note that there is a sound economic basis for the vigorous expansion that is reported from Nelson, Sandon, Phoenix, Trail and other centres.

British Columbia has cut its wisdom teeth, and can handle a sanely constructive boom without danger to itself or others.

IRON ORE BOUNTIES.

Mr. James Conmee, M.P., speaking before the Canadian Club of Port Arthur, on Thanksgiving Day, expressed the hope that Canada would develop her vast mineral resources. The iron ore bounties, Mr. Conmee stated, should be fixed upon a sliding scale. He expressed the opinion that the bounties upon products into which foreign ores entered should gradually be wiped out, leaving those on Canadian ores still in effect.

Some such plan as this has much to recommend it. The bounties will have accomplished little good if they do not lead to the development of our own iron ore deposits.

EDITORIAL NOTES.

The tailings wheel will probably be superseded on the Rand by a tailings elevator.

British Columbia can safely boast of a scarcity of wildcat mining schemes. In her day she has had not a few. Now, however, with her mining and smelting enterprises largely under competent and responsible technical men, the howl of the feline is scarcely heard.

During the first eight months of the year 1907, the British Columbia Copper Company completed 3,667 feet of diamond drilling. In the month of March the average cost per foot reached the low figure of $1,045. In that month 540 feet were drilled in ore and lime rock, 200 vertical, 340 horizontal. The ore and some of the limstones were medium hard. Electric power was used.

THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

By F. W. Gray.

(Continued from last issue.)

Dominion No. 2 Colliery.

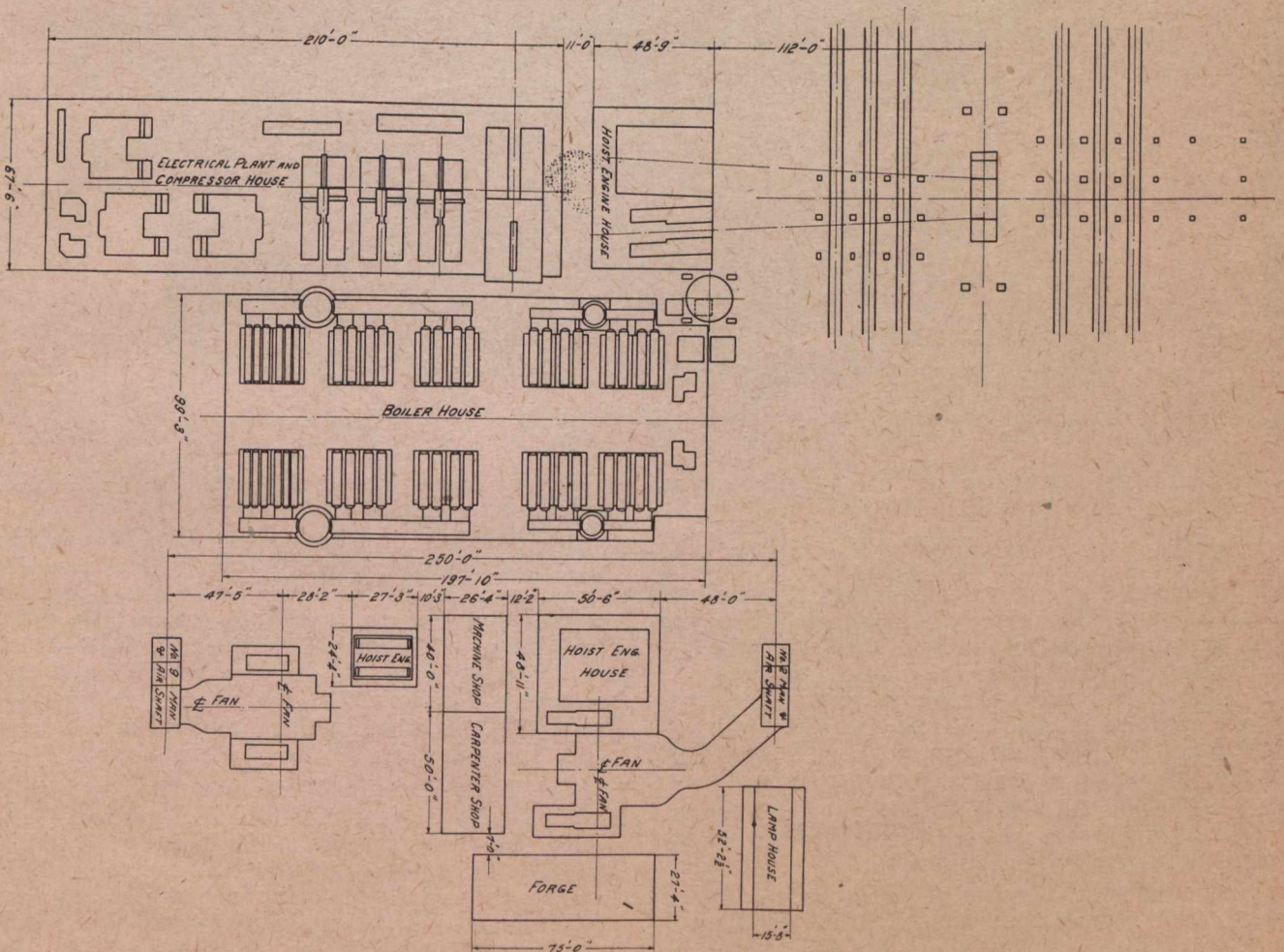
Dominion No. 2 is justly regarded as the show place among the Dominion Coal Company's collieries. It involved a very large capital expenditure, and everything was designed on a large and elaborate scale. Its central position has tended to emphasize its general importance, and successive accretions such as the Central Electric Plant, the Central Horse Hospital, and the Central Rescue Station have added to its growth from year to year. It is a cardinal article of belief in Glace Bay that Number Two is the largest colliery in the world.

Two seams are worked here, the Harbor and the Phalen. The same shaft opening and surface erections serve for the two seams. This description will deal with the whole colliery, excepting only the workings of No. 9—the Harbor seam—which will be referred to when considering the Harbor seam generally.

The hoisting shaft was sunk exactly on the outcrop of the pavement of the Hub seam. The following section gives actual measurements down to the Phalen pavement; below that the figures given are estimated from the best available data:—

	Coal and Measures. Feet.	Total Depth. Feet.
Hub Seam	9.6	
	404.6	
Harbour Seam	5.6	410.0
	253.3	
Boutilier Seam	3.9	667.0
	73.5	
Back Pit	2.7	743.0
	115.6	
Phalen Seam	8.6	867.0
	160.0	
Emery Seam	4.6	1,031.0
	91.0	
Small seam (McRury?)	2.0	1,124.0
	209.0	
Lorway Seam	4.6	1,137.0

Below the Lorway or Gardiner seam lie at least three other workable seams, shown on the geological map as the Clarke, Martin and Mullins seams. Their



Plan A.—Dominion No. 2 Colliery. General Surface Lay-out.

positions and value are not, however, fully proven, and it will not be until the thicker and more profitable seams of the Sydney coal field are worked out that much attention will be paid to the lower seams. Neglecting these lower seams, however, there are at least seven workable seams of coal from the Hub to the Lorway, all easily accessible, giving an aggregate thickness of nearly forty feet of coal in the comparatively shallow depth of 1,200 feet.

The seams are so spaced that they can be worked without seriously interfering with each other, if the workings are properly laid out and ordinary precautions are taken. It is to be expected that the section shown at this point is largely that which will be found under the vast submarine areas lying off Table Head.

The shafts of No. 2 were sunk at a point where the regular contours of the Glace Bay Basin begin to be influenced by the turning up of the measures towards the Bridgeport anticline. The axis of the trough is about 1,000 feet to the north of the shafts, and indications are that the axis runs parallel to the line of the anticline and proceeds out to sea in a direction almost due east.

The sinking of the shafts was commenced in October, 1899. The Phalen seam was reached in the following June, and the regular hoisting of coal dates from 1902, since which time the Phalen seam has produced three and one-half million tons. The present monthly output is 70,000 tons, and 3,221 tons have been hoisted from the Phalen seam in one day. The largest tonnage obtained in one day from both the seams was 5,1000 tons. The territory at present allotted to No. 2 will give an ouput of 800,000 tons per annum for a period of over fifty years from the Phalen seam.

Plan A will give a general idea of the surface layout and the extent of the equipment.

The power plant consists of 20 Babcock & Wilcox boilers, rated at 6,360 horsepower. They are fired by Jones's underfeed stokers, which are fed by hand at the present time. It is probable that a coal-handling plant may be erected at a future date. The forced draft is obtained from two 8-foot Sturtevant blowing fans. The two large smokestacks are of steel, 70 feet and 75 feet high, 9 and 10 feet diameter, respectively.

The motive power for underground use is entirely compressed air, and the compressing plant is a very large one. The compressor house is of steel frame construction with walls of concrete and expanded metal. An addition was built in 1906 to house the Central Electric Plant, which will be later referred to. The new portion of the building is of steel frame and brick construction. The whole building is 210 feet long by 67 feet 6 inches wide, and 30 feet high.

The air compressors in the building are as follows:

Oue Walker compound compressor, steam cylinders 31 by 57 inches, air cylinders 32 to 51 inches, stroke 60 inches, capacity 3,000 cubic feet per minute.

Three Rand compressors, compound, steam cylinders 36 by 20 inches, air 32 by 20 inches, stroke 48 inches, each delivering 3,000 cubic feet per minute.

Two straight-line Norwalk compressors.

Dominion No. 2.

The total air compressing capacity is about 16,000 cubic feet per minute.

The bankhead is a large structure, 120 feet high to the top of the tower and 132 feet to the centre line of the pulley axle. It is constructed entirely of steel on concrete foundations, and is of exceedingly stiff and rigid design. It is covered with corrugated iron, which has deteriorated rapidly under the influence of the weather and sea air, but the actual structure of the bankhead itself is in excellent repair, and it is said to vibrate less than any of the other bankheads.

The Phalen hoisting engine is a 34 by 48 inch horizontal double engine, with slide valves, made by the Dixon Co., Pennsylvania. The hoisting drum is 10 feet 4 inches in diameter by 5 feet 7 inches on the face. The hoisting rope is 1⅝ inches in diameter, passing overhead pulleys 12 feet in diameter. These pulleys have 36 spokes 1⅜ inches in diameter. The axle is 9½ inches in diameter.

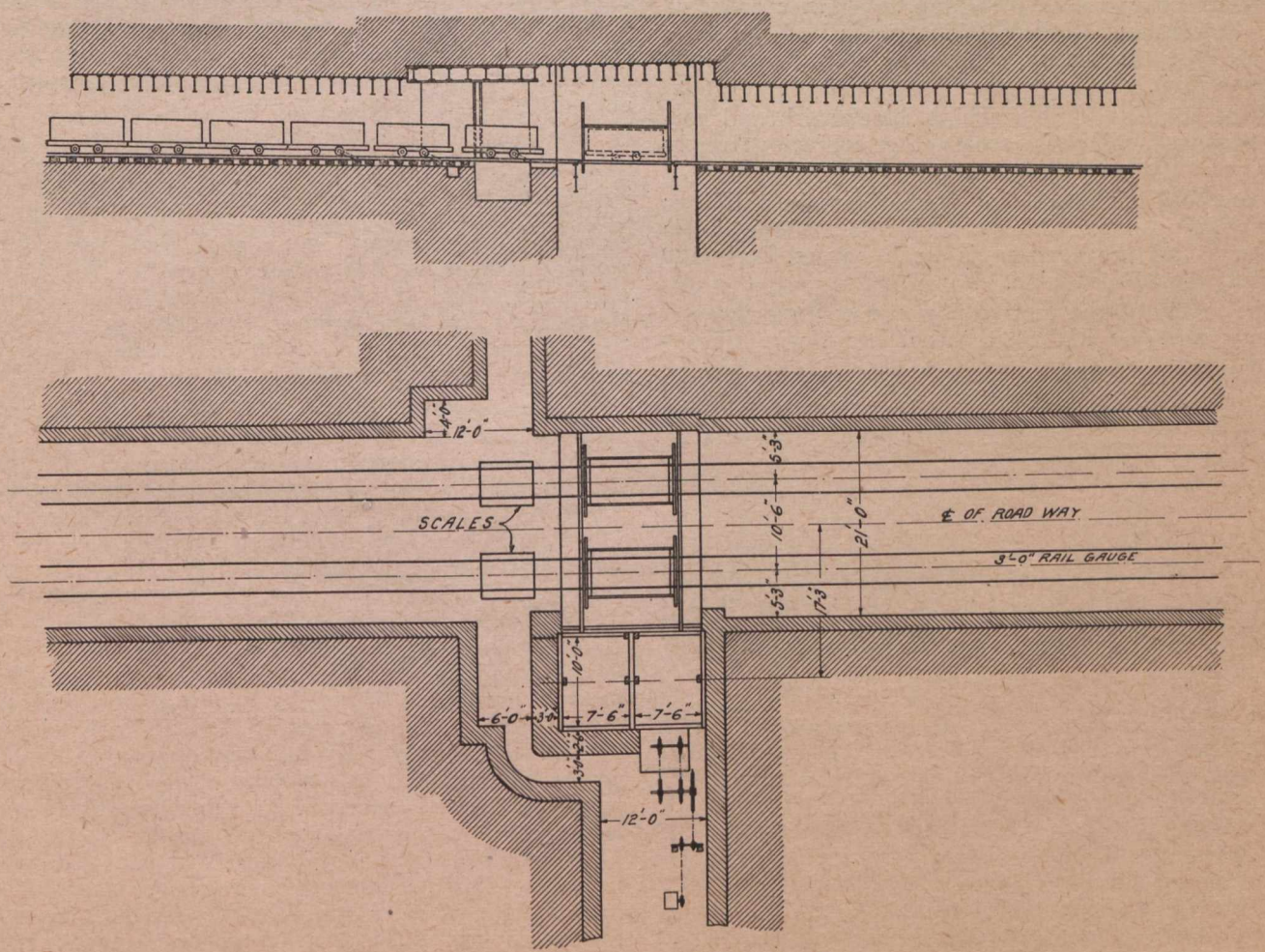
The Harbour hoisting engine is a 24 by 42 inch horizontal double engine with Corliss valve gear, made by the Jenckes Co. The rope is 1⅜ inches in diameter, and the hoisting drum 8 feet in diameter by 6 feet 4 inches.

Both these engines are housed in one building, built of steel framework and reinforced concrete, like the compressor house.

The hoisting arrangements are very interesting, particularly those for the Phalen side. The main hoisting shaft is 11 feet by 37 feet over all, divided into five compartments, two for the Harbour, two for the Phalen, and one for a pipe compartment.

The coal is brought to the shaft bottom in tubs of 2 tons capacity. It is weighed in the bottom (see Plan B), and the tubs run by gravity into the tipples, which are operated by compressed air. The tipples dump the coal into two storage chutes (see Plan C), which are so arranged by means of doors that the coal from either tipple can be put into either chute. The chutes have an inclination of 50 degrees, and the coal is retained in the chute by a swinging door fastened by a spring latch. The door is actually kept in the closed position by a counterweight passing over a pulley, the shaft of the pulley forming the hinge of the door. The counterweight is attached to a chain passing over the pulley and drawn tight across the shaft bottom, in such a position that when the cage descends the lower framework impinges upon the taut chain and draws down the door of the storage chute, which then becomes a continuation of the chute, over which its contents are discharged into the hoisting tank. By means of the lever arrangement shown, the spring latch is released by the descending cage some little time before the bottom of the cage touches the chain which operates the storage chute door.

The hoisting tank is a boxlike receptacle, with an inclined floor mounted on a pivoted framework arranged like the ordinary self-dumping cage. There are two sets of guide spears for the hoisting tank, one for the main side shoes attached to the outer framework of the arrangement, and a smaller set of spears which pass between roller guides attached to the tank itself, and serve to keep the tank from dumping should the lock slip in transit. On reaching the top the lock of the tank is released by a catch, and the tank lunges forward, tightening the side chains and opening the door of the tank, automatically discharging the contents on to the screens. The hoisting tank has a capacity of between 7 and 8 tons, but the normal load is 6 tons. The tank and framework weigh about 10 tons, which, added to the weight of the coal being hoisted, gives a total dead weight on the rope of about 16 tons. The entire arrangement is automatic from the time the tubs leave the scale to the operation of discharging the coal on the screens. Any coal that falls from the chute drops to the bottom of the shaft, and is there lifted by a bucket conveyor to the level of the pit bottom, where it is reloaded into tubs. This dropped coal does not amount to more than four tons per day.



Plan B—Plan and Elevation of Dominion No. 2 (Phalen) Pit Bottom

The hoisting arrangements of the Harbour seam consist of the ordinary self-dumping cage, and are similar to those already described at other collieries.

As the hoisting shaft is used exclusively for coal, two man shafts are provided for the two seams. Each of the man shafts serves both for the conveyance of men and for ventilating purposes, being divided into three compartments, namely, two for hoisting and one for intake air. All the hoisting shafts are used for the upcast air, in accordance with the usual pretice here. The heated upcast air prevents the formation of ice during the winter months, which would otherwise interfere very seriously with the operations. The hoisting engine of the Phalen man shaft is of the same design as the coal hoist, before described. The Harbour man hoist is a horizontal double engine 18 by 26 inch, with slide valves, made by Matheson, of New Glasgow.

The workings are ventilated by two fans; one for each seam. The Phalen fan is a Walker fan, 24 ft. dia. by 8 ft. 6 inch. across the face of the vanes. It has a rated capacity of 350,000 cub. ft. per min. at 3 inch W.G. It is cased in brick and is directly connected to a horizontal engine 20 by 42 inch., which is contained in the same engine house as the hoisting engine for the Phalen man shaft. On the other side of the fan is a brick house containing a duplicate engine as an auxiliary in case of breakdown. The Harbour fan is of similar capacity, of the Guibal type, and is cased in steel. It is directly connected to two engines, one of which is in use, the other being reserved for emergencies.

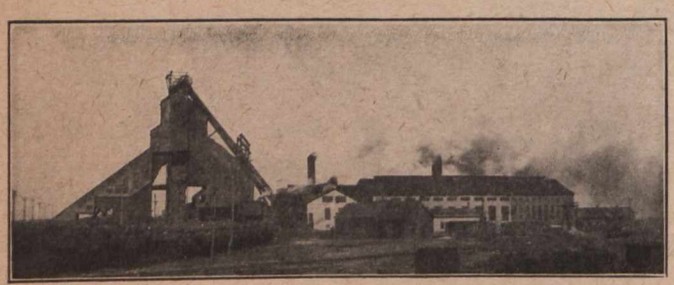
Among other surface erections are the following:

The lamphouse is 52 feet long, and has a concrete floor. It contains 1,700 safety lamps, all of the A. & B. type, with the necessary cleaning, filling and igniting apparatus.

There are also large machine, blacksmith and carpenter shops, similar to those at other collieries already described.

Some little distance away from the main buildings is the Wash House, which contains 66 lockers and is the largest of the company's wash houses. It is 120 feet long by 30 feet wide.

The whole of the motive power used underground is compressed air, and all the coal is cut with the ordinary "puncher" machines.



Dominion No. 2

No. 2 is the only one of the coal company's mines which uses compressed aid locomotives for haulage purposes. The following is a list of the locomotives in operation at the present time:

No.	Mkr.	No. of whls.	Wght.	Cylinders.	Length.
1	Porter	Four	7 tons	7" x12"	13 ft.
1	Porter	Four	10 tons	7" x14"	18 ft.
3	Porter	Four	15 tons	10½"x14"	19 ft.
1	Baldwin	Six	17 tons	11" x14"	20 ft.
1	Baldwin	Six	20 tons	11" x14"	23 ft.

The mine cars in use have a capacity of 2 tons. The gauge is 3 ft. 0 inch, and a 56 lb. rail is used on the motor roads, which have to be very solidly laid and ballasted.

The main pit bottom extends for a distance of 200 feet on the empty side of the shaft, and for a distance of 300 feet on the full side. Over the whole of this 500 feet the sides are concreted, the walls averaging 1 ft. 6 inch. in thickness. The roof is supported by I beams, 24 inch. by 25 ft. span, spaced with from 1 ft. 6 inch. to 4 ft. 0 inch. centres.

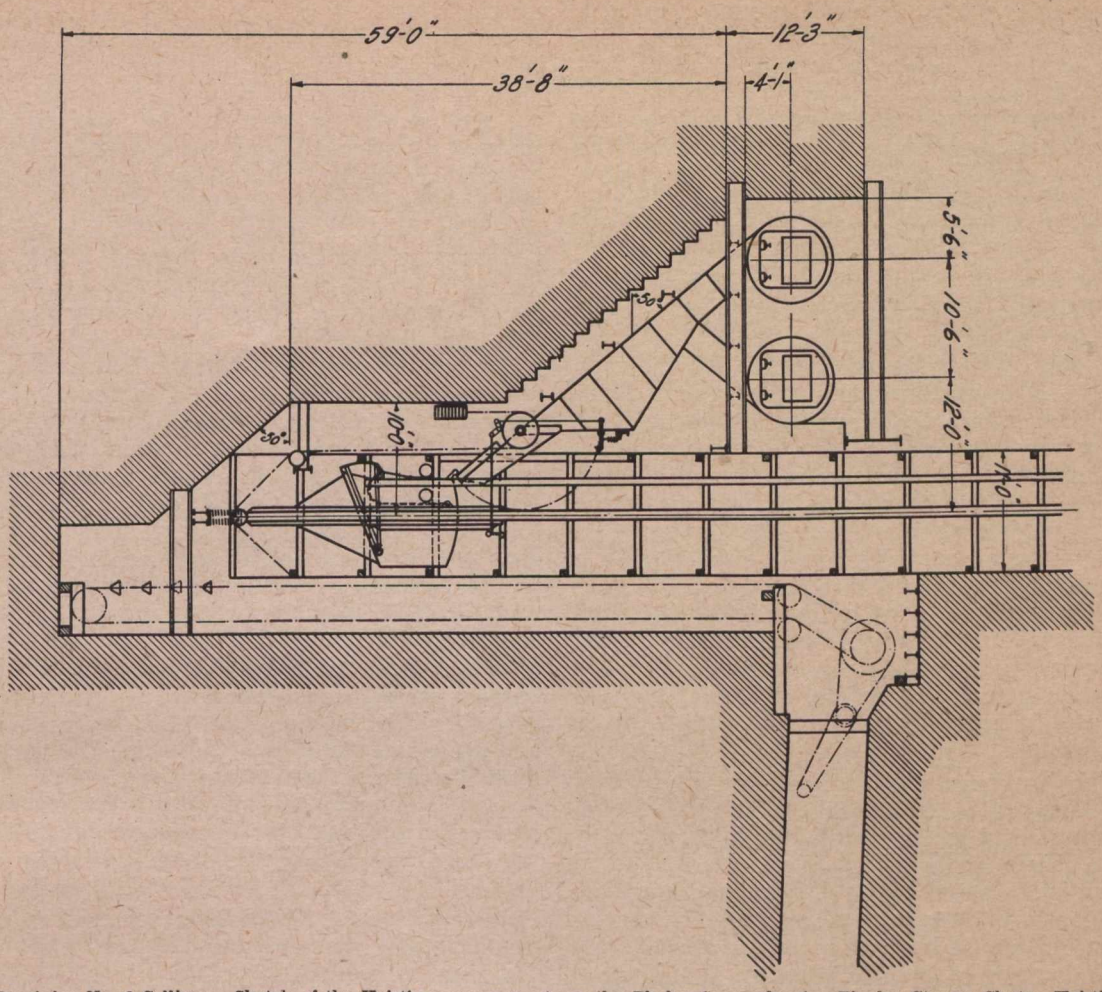
The air mains are so arranged that they can be used as water mains. Owing to the depth of No. 2, the Phalen seam is fairly dry and the heavy system of haulage in use there tends to create fine dust on the haulage ways. Every precaution is used to lessen the amount of dust, and the amount is periodically sprayed with water, more frequently in the winter months than in the summer months, owing to the greater dryness of the air in winter. In some sections the dust is swept up and taken out of the mine altogether to be used at the fires. "Permitted explosives" are used exclusively, and wherever gas is reported the firing of shots is discontinud until the place is reported clear.

The mine employs about 100 horses, and has a force of a little less than 1,000 men.

Outside the colliery fence is the Central Rescue Station, elsewhere referred to, and the Firemen's Hall. The men of No. 2 and 9 collieries have taken up the work of training in the use of the Draeger apparatus with a good deal of enthusiasm, and they were well represented in the contingent that were sent over to Sydney Mines. In striking contrast to all the modern appliances at No. 2 we noticed near the Compressor House an old Shand & Mason manual fire engine, which looked as though it had strayed from some museum of antiquities.

The town of New Aberdeen is owned by the Coal Company, who have about 730 houses at this place, including the houses of the men employed at the Hub Colliery. There are also two large boarding houses owned by the company. For a good many reasons the population near No. 2 is more cosmopolitan than at the other mines, and in addition to the native and British element one can find Germans, Poles, Hungarians, Italians, Russians, Belgians, and Frenchmen, many of whom are old residents at New Aberdeen.

Central Electric Plant.—In 1906 an addition was made to the Compressor House for the housing of a central electric generator station. There are three generating units, consisting of a Westinghouse Alternator, 550 K.W., 25 cycle, 3 phase, 125 revolutions per minute, 6,600 volts, directly coupled to a compound Goldie-McCulloch horizontal engine of 700 I.H.P. The high pressure cylinder is 20 inches, low pressure engine 40 inches, stroke 26 inches. The fly-wheel is 14 feet in diameter and weighs 60,000 lbs. The extension is arranged to admit of another unit when required. There are two exciters made by the Westinghouse Company, 75 K.W., directly connected to 12 x 12 Ideal engines. The switch-board is of black marble, eight panels. The power generated at this station is used for pumping purposes, for driving screen machinery and for colliery lighting. It is also used for driving the machinery in the Central Shops at Glace Bay. The transmission line poles are 35 ft. high, spaced not more than 100 ft. apart. The wire used is 4 in. x 0 in., of bare hard-drawn copper. The drop in voltage experienced is about 5 per cent.



Plan C—Dominion No. 2 Colliery. Sketch of the Hoisting arrangements on the Phalen Seam, showing Tipples, Storage Chutes, Hoisting Tank, and Guide Spears

The transformer houses at the collieries are built of hollow glazed earthenware blocks. A typical house is 13 feet high by 23 feet long and 17 feet wide. The roof is made four ply, 1¼ inch T. & G. covered with tar and gravel, sloping. Each house contains three 75 K.W. Westinghouse transformers, rated 3800/317 volts. The boreholes for the conveyance of electric current are drilled 9 inches diameter, cased to 6 inches. The cable for borehole transmission is usually No. 4-0 lead covered paper insulated cable.

Central Horse Hospital.—Near No. 2 Colliery is situated also the Central Horse Hospital. This building is under the charge of the veterinary surgeon of the Coal Company, who is responsible for the care of the Coal Company's horses, which number between six and seven hundred, according to the season of the year. The building contains stalls for eighteen horses, and is fitted with concrete bath for the treatment of diseased animals, and all the modern appliances for veterinary surgery. A shoeing shop is close by, where all cases of special or pathological shoeing are done under the direction of the veterinary surgeon. The veterinary surgeon also keeps his stock of horse medicine here, and it is used as a general distributing centre.

LABORATORY ROUTINE IN MODERN COPPER SMELTERS

Paper read before the Institute of Mining and Metallurgy

By H. T. Waller, Member.

The following brief description of some of the laboratory methods which the author has found most useful in connection with copper blast furnace smelting may, it is hoped, be of interest to members of this Institution. They do not by any means cover the whole of the work which the smelter chemist may be called on to do, which is, of course, extended over a very wide field. They deal, however, with the determinations which will constitute the bulk of his work at all times, and which will, owing to the volume of work and speed required, probably cause him the most anxiety at first.

What may be called the daily routine work of the smelter chemist consists in making more or less complete analyses of such samples of ores, fluxes and furnace products as may be required for the immediate use of the superintendent in charge. He will have to determine, at least daily, and sometimes more often, the principal constituents of the slag, and make frequent

determinations of copper in the matte produced by each furnace, besides making endless determinations of copper, silica, iron, lime, sulphur, zinc, etc., in ores, briquettes, flue dust, etc.

In the following scheme the analysis of slags has been considered first, as characteristic of the rest of the work. Except in special cases ½ grm. is always taken for analysis, and standard solutions are made up so that 1 cc.=1% of the substance to be determined on the ½ grm basis.

Analysis of Slags.—Copper slags, which have been properly chilled and crushed to 100 mesh, can be completely dissolved in dilute HCl when the silica is not above 40 to 45%. Only those samples which have cooled slowly and crystallised, like those taken from the dump, or those which are very highly silicious, will require fusion with alkalies for their decomposition.

Slag is sampled at the furnace by dipping a small iron rod into the stream of slag as it flows from the settler, and plunging the rod immediately into a bucket of water, or by catching some of the slag in a small iron ladle and pouring it into the water. A sample is generally thus taken every hour from each furnace. The buckets in which the samples are collected must be provided with well-fitting covers and should be kept covered as much as possible, or the sample will certainly be contaminated by splashes of matte or other cupriferous matter.

Slag which has been chilled in water is entirely different in appearance from that which has cooled slowly. It is perfectly amorphous throughout and very brittle, with a shiny conchoidal fracture. Badly-chilled slag can often be detected by its dull appearance even when finely powdered. As a regular thing the slag is analysed every 12 or 24 hours for copper, silica, iron, lime, and less frequently for zinc, sulphur, alumina and other constituents.

These determinations may be made for five or six furnaces in about two hours in a well-arranged laboratory, the chief requirements of which are, a good hearth or hot plate under a hood of fume cupboard, an arrangement for cooling flasks, beakers, etc., in running water, several Dangler blast lamps, or their equivalent, for fusions and ignition of precipitates and a row of filter flasks connected to a vacuum filter pump. For a convenient hot water supply one or two large copper tea kettles can hardly be surpassed.

Determination of Copper.—The copper present in blast furnace slags is seldom less than 0.1% or more than 0.8%. It may be determined colorimetrically as follows:—2 grm. of slag are placed in a small beaker and 50 cc. of hot water added; 15 cc. HCl are added at once while the slag is kept in suspension by vigorous stirring. Practically all the SiO_2, Fe, CaO, etc., is dissolved and can be filtered off from the black residue, which consists of copper sulphide and a little partly decomposed slag and matte.

The solution always smells strongly of H_2S, which ensures that the copper will remain insoluble. It cannot be depended on to filter quickly unless a filter pump is used, as there is often unavoidably a slight separation of gelatinous silica. The paper is ignited thoroughly in a Berlin crucible, no organic matter being allowed to remain or it will give the final copper solution a grenish tint which renders the determination worthless.

The residue is brushed into a beaker, 5 cc. HNO_3, and a few drops of HCl are added and boiled till red fumes cease to come off. It is diluted, 20 cc. of ammonia are added, boiled and filtered into a colorimetric bottle. A double precipitation with ammonia is not necessary, as the amount of iron to be separated is very small and does not carry down appreciable amounts of copper. The iron present at this stage is derived, as also is most of the copper, chiefly from shots of matte which have been included in the slag.

The standard colorimetric bottles are generally made up about once a month. They do not alter appreciably in color over a much longer period, but the ammonia attacks the glass, forming a flaky precipitate which if shaken up in moving the bottles about will cloud the solution. They are quickly renewed at any time as follows:—

0.5 grm. of copper is dissolved in a little HNO_3, the red fumes are boiled off and it is diluted to 500 cc. 10 colorimetric bottles are taken, labelled 0.1, 0.2, 0.3, etc. 5 cc. of HNO_3 are added to each, then diluted, and from a burette 1 cc. of the above solution is added to the first, 2 cc. to the second, and an additional 1 cc. to each successive bottle. 20 cc. of ammonia are added to each bottle, after which they are filled with water up to the bottoms of the labels, which are placed at the same level, so that the bottles contain about 150 cc. of solution.

The bottles are placed on a level with the eye on a narrow shelf covered and backed with white paper or tiles. It is very important that there should be only one source of light, and that it should be directly behind the observer when comparing colors. There should be space enough on the shelf between the standard bottles to allow of introducing the bottle to be tested, which is moved along till its place in the series is determined.

Since 2 grm. of slag have been taken, the fraction on the bottle corresponding divided by two will give the required percentage of copper in the slag.

A useful exercise for anyone employing this method for the first time is to place the bottles on the shelf so that the labels cannot be seen, and then to move them about at random, until the original order is destroyed. When the beginner finds that he can replace the bottles in their proper order with certainty, without looking at the labels, he will have considerable confidence in his results.

This method is very rapid, a batch of six samples being easily done in half an hour or so, the chief delay being in igniting and cooling the porcelain crucibles. The results are excellent, for though an individual determination may perhaps be 5-100 of a per cent. out through difficulty in exactly comparing the colors, the average result will be very much closer than this, as may be proved by making a composite sample of the slags done, say once a month, and determining the copper on the battery, or by some other more exact method.

Probably the only serious rival to the method given above, for separating the copper from slag, is that in which the silica is volatilised by evaporation with hydrofluoric acid.

This method has the advantage that it can be used on slags which are insoluable in HCl. It is, however, a somewhat tedious process, and necessitates the use of a re-agent, which few will care to employ if it can possibly be avoided. Then, of course, the hydrofluoric acid treatment still leaves the copper to be separated from the iron by some other means. The method here given is indeed unique in the facility with which the copper is at once separated from large amounts of iron and silica.

Determination of Iron.—The bichromate method serves all purposes for iron determination. The end reaction is quite sharp and decisive in practised hands, though, perhaps, a little tedious, which fact has led some to prefer the permanganate titration; but the great advantages in speed and reliability which the method possesses over all others entirely counterbalance this defect. 0.5 grm. of slag is placed in a beaker, 25 cc. of boiling water are added. The beaker is placed on a hot plate and stirred vigorously to keep the slag in suspension while 20 cc. of strong HCl is being added.

It is stirred till there is no longer of gelatinised slag sticking to the bottom of the beaker, and boiled for a few minutes to remove H_2S. While still hot two or three drops of $SnCl_2$ solution are added until the solution is colorless, then an extra drop or two are added, and the beaker is cooled rapidly by standing in running water. It must not be allowed to stand longer than necessary, as, when cold, the iron will oxidise even in the presence of an excess of tin chloride.

When cold, 20 cc. of saturated $HgCl_2$ solution are added, and after alowing to stand about a minute it is titrated with $K_2Cr_2O_7$. The mercuric chloride solution should produce a beautiful silky precipitate. If the precipitate is dense or heavy it shows that an unnecessary amount of tin chloride has been added. The whole determination can be done in ten minutes.

The tin chloride solution required for reduction will keep well if made up as follows:—1 lb. of stannous chloride is dissolved in 500 cc. of HCl and diluted gradually up to 2 litres. A small quantity is kept for use on the bench in a 2-oz. Schuster dropping bottle. The potassium ferricyanide indicator should be quite dilute, 0.1 grm. of the salt being sufficient for a 2-oz. Schuster bottle, in which the solution will keep well for a week or more.

The standard solution contains 4.392 grm. of $K_2Cr_2O_7$ per litre. It is standardised against pure iron wire by dissolving in HCl, reducing with $SnCl_2$, and treating as above described. 1 cc. of the solution= 0.005 grm. of iron, or 1% where 0.5 grm. of slag is taken.

Determination of Silica.—0.5 grm. of slag is moistened with about 20 drops of water in the bottom of a 3½-in. casserole. 5 cc. of HCl are added, while the slag is kept rubbed up with a short flat-topped glass rod, the casserole being placed on the hot plate and heated while stirring all the time until the silica belatinisies. This takes place in about half a minute, when the casserole with the rod in it is taken to complete dryness.

A perfectly safe and rapid way of evaporating to dryness in an open casserole, is to place it on a ring which supports the casserole just above but not touching the hot plate, while it keeps the sides of the casserole surrounded by very hot air.

Excellent rings can be made by cutting a round hole in the botttom of the small tin dishes which are often supplied for drying samples, or they can be made in the form of a short truncated cone of tin plate. It is convenient to have a dozen or more of these evaporating rings, as they are useful in many determinations.

When nearly dry, and there is no more danger of spitting, the lumps of gelatinised matter may be broken up with the rod, and the casserole placed directly on the hot plate until all sign of HCl fumes has disappeared. The residue, after cooling, is moistened with 5 cc. of HCl, a few drops of HNO_2 are added, it is diluted with hot water filtered with the aid of a filter pump, ignited and weighed.

Determination of Lime.—Lime is determined in the filtrate from the silica as follows:—The filtrate is transferred to a beaker heated to nearly boiling, a decided excess of ammonia is added, then solid oxalic acid is added from a teaspoon, stirring until the ferric hydrate has all dissolved. Ammonia is added again till there is a slight permanent precipitate of ferric hydrate, and the solution again cleared by the careful addition of small quantities of oxalic acid. It is boiled and filtered. The filter and precipitate is placed in a beaker containing 10 cc. of H_2SO_4, which has been diluted, first with a little cold water, and then with 100 cc. of boiling water. It is titrated at once with standard potassium permanganate solution, of which 1 cc.=0.005 grm. CaO, or 1% CaO when ½ grm. of sample has been taken. The standard solution contains 5.991 grm. of $KMnO_4$ per litre.

To standardise with oxalic acid, a few crystals between 0.1 and 0.2 grm. of oxalic acid are weighed out and dissolved in a beaker of hot dilute H_2SO_4, as was the calcium oxalate precipitate, and titrated at once in a similar manner. The weight of the oxalic acid taken x0.444 gives the equivalent weight of CaO.

Standardisation with metallic iron should be made at least as a check on a new bottle of oxalic acid. In which case $\frac{Fe}{2}$ = CaO.

Determination of Al_2O_3.—This is best done by direct weighing as phosphote, the method is practically as given by Blair for iron ores.

0.5 grm. of slag is taken and treated exactly as in silica determination until the silica has been separated and filtered off. The alumina, together with the iron, which must be in the ferric condition, is thus obtained in a hydrochloric acid solution. To the solution, which should occpy about 100 cc., 15 cc. of a saturated solution of microcosmic salt are added, and it is carefully neutralised with ammonia until a slight permanent white precipitate is obtained.

It is heated to boiling and carefully acidulated with HCl until the solution has cleared, taking care not to have more than about 2 cc. of HCl in excess, 25 cc. of a saturated solution of sodium thiosulphate are added, and 5 cc. of glacial acetic acid, or an equivalent amount of dilute acetic acid. The solution is now boiled for ten minutes, when a white precipitate which is easily filtered and washed, and consists of aluminium phosphate with sulphur, is obtained.

It is filtered over a filter pump, dried and ignited with its filter paper. It must be ignited very gently at first until the paper and sulphur are burned off, being finally brought to a bright red heat. The ignited precipitate is perfectly white and tender, and should show no signs of fusion. It consists of Al_3PO_4 and its weight in grm. x 84 gives the percentage of Al_2O_3 when ½ grm. of sample has been taken.

Determination of Zinc.—The method of Messrs. Von Schultz and Lowe, or its modifications, seem to be used almost universally for the determination of zinc in copper smelting.

0.5 grm. of slag is treated as in silica determination until the gelatinous silica is dehydrated. 20 cc. of a saturated solution of $KClO_3$ in nitric acid are added to the casserole, which is covered with a clock glass and taken to complete dryness on the hot plate. Just before solidification takes place the cover may be removed, drained, and left leaning up against the casserole, which is placed on an evaporating ring until all is dry. This prevents matter from spitting up and sticking to the clock glass, which would afterwards be a little troublesome to remove.

The main object of the powerfully oxidising chlorate mixture is to convert manganese into black oxide, which is insoluble during the subsequent treatment. To the residue in the casserole are now added 7 grm. of solid ammonium chloride, 20 cc. of ammonia, and 25 cc. of hot water in succession. The residue is now well rubbed with a rubber-topped glass rod until loosened from the casserole, and disintegrated and dissolved as much as possible. It is finally covered, and boiled for one minute and filtered.

The ferric hydrate thus obtained is in a very compact and granular form, and will carry down with it much less zinc than when precipitated out of solution in the ordinary way. It is, however, impossible to remove all the zinc in one operation if much iron is present, so if great accuracy is required the residue should be washed from the paper with a little water back into the casserole, evaporated to dryness, again treated with the chlorate mixture, reprecipitated exactly as before, and the two filtrates combined for further treatment. If copper is present, as shown by the blue color of the ammoniacal filtrate, HCl is added carefully until the color has just disappeared. If not, the neutralization is effected with the aid of litmus paper.

In either case 10 cc. excess HCl is added. If copper is present, about 20 grm. of granulated lead are added, and the solution boiled for about five minutes, when the solution will be colorless, and all the copper precipitated. Instead of granulated lead a few pieces of test lead foil will do equally well.

The lead and copper need not be removed from the solution, which is now ready for titration.

The solution should occupy about 75 cc., and should be titrated at about 70° C.

The standard solution contains 22.5 grm. of $K_4Fe(CN)_6$ per litre. 1 cc.=0.005 grm. zinc.

To standardise the solution about 0.1 grm. of zinc oxide is weighed out, or, better still, an amount approximately equivalent to the amount of zinc in the portion of ore taken. The zinc oxide is dissolved in 10 cc. of HCl, and diluted to 75 cc. with hot water and titrated. The indicator, which is kept in a Schuster bottle for use on the spot plate, is an almost saturated solution of uranium nitrate.

Determination of Sulphur.—Sulphur is always weighed as $BaSO_4$, 0.5 grm. of slag is treated in a covered casserole with 10 cc. of strong nitric acid, warming gently, and adding from time to time a few crystals of $KClO_3$. When all action has ceased the casserole is placed on an evaporating ring and taken nearly to dryness. 10 cc. of HCl are then added and taken to complete dryness to render the silica insoluble. It is finally taken up with hydrochloric acid, diluted with hot water, and filtered.

The filtrate is made alkaline with ammonia, and about 3 grm. of barium chloride are added. It is boiled for a few minutes, acidulated with HCl to re-dissolve the iron, again boiled for several minutes and allowed to settle well before filtering.

Barium sulphate can in this way be separated in one operation from solutions containing large quantities of iron without contamination with the latter metal, as the iron is thrown out of solution before the precipitation takes place. With a reasonable degree of washing the ignited precipitate of $BaSO_4$ should be perfectly white and free from iron. The weight of the precipitate x 27.5 gives the percentage of sudphur when ½ grm. of sample has been taken.

Analysis of Ores and Fluxes.—Under this head are considered the determinations which have to be made on the various samples of ores, etc., about to be smelted or which it is proposed to purchase. The following substances have to be determined, if present, practically in everything that goes into the furnace: copper, silia, iron, lime, sulphur and zinc. Alumina is only required when present in considerable quantity (5% or more). It is weighed with and counted as silica under ordinary circumstances, the matter insoluable in acids being generally reported as "silica." The alumina will be determined, occasionally, in the ore from certain localities to enable a deduction to be made for it from silicia in calculating furnace charges.

Determination of Copper.—The cyanide method as given below may be used for ores, matte, fluedust, etc.

1 grm. of ore or 0.5 grm. of matte is heated in a small covered beaker with 10 cc. of nitric acid. In the case of fluedust, samples or those containing oxide of iron, a little HCl should be added to assist solution.

When action has apparently ceased, 10 cc. of H_2SO_4 are added and boiled till all the nitric acid has evaporated.

It is not sufficient to boil until heavy white fumes of sulphuric acid appear. The white fumes should be seen to come off freely for at least 10 minutes, or there is danger of considerable HNO_3 remaining in the solution. Very little of the H_2SO_4 actually boils away, as the beaker is kept covered. It is cooled and diluted to about 50 cc. A bent piece of 1-16 in. sheet aluminium about 1 in. square is placed in the solution and boiled briskly till all the copper is precipitated.

The above proportion of water to acid should be adhered to pretty closely, as a more dilute solution takes much longer to precipitate. Samples having much iron and little copper also take longer. The time varies from 5 to 10 minutes.

The aluminium is removed from the solution and washed; the copper does not adhere to it seriously unless the piece of aluminium has become pitted by being used a number of times. The solution is then given a vigorous rotary motion with a stirring rod, causing all the copper to settle in the middle of the beaker. The solution is decanted off as much as possible, more water is added, stirred round, and decanted as before. Two or three such decantations are sufficient to separate all the iron, etc., from the copper, which is dissolved in 5 cc. HNO_6, boiled, diluted, made alkaline with 15 cc. of ammonia, and titrated with KCN solution in the usual way.

The standard solution is such that 1 cc.=0.005 grm. of copper, or 1 cc.=1% when ½ grm. of sample is taken. It requires of 55-60 grm. KCN per litre according to the purity of the KCN used, and depending also on the operator, as two men will not as a rule agree as to the standard.

This is probably the most rapid and convenient method having any pretensions to accuracy. The author hos, however, frequently checked the work of careful assistants who were using this method, against the electrolytic method, and found that the results were very uniformly about 0.2% low.

Determination of Silica.—0.5 grm. of ore is heated in a covered casserole with 10 cc. of HNO_3 until action ceases. (The addition of a few crystals of $KClO_3$ greatly facilitates the solution of most sulphide ores.) It is then uncovered and taken to dryness on an evaporating ring. It is taken up by boiling with 10 cc. of HCl for a few minutes and diluting with hot water.

It is filtered over a vacuum pump, the filtrate reserved for iron and lime determination, and the residue ignited in its filter paper and weighed as "insoluble." This determination will in most cases be the only "silica" required for the smelter routine work.

There will always, however, be some ores on which a determination of true silica will be required. Such a determination necessarily occupies considerably more time. It is effected as follows:—

The insoluble residue is mixed in a platinum crucible with about 2 grm. of sodium carbonate and fused until all action ceases, preferably over a Dangler or other blast lamp.

The following procedure greatly facilitates the subsequent solution:—

Two pairs of platinum-tipped tongs are taken, one in each hand, and the contents are poured from the crucible on its lid. Both crucible and lid are then placed in a cesserole which contains about 40 cc. of cold water. The bulk of the melt which is on the lid really slides off, while the crucible only contains a thin film which is quickly dissolved out.

The casserole is placed in a hot place until all is dissolved or thoroughly disintegrated, when the platinum is removed and the solution acidified with an excess of HCl. The casserole is placed on an evaporating ring and taken to complete dryness, and silica determined exactly as described for silica determination in slag.

The only substance likely to contaminate the silica obtained as above, is barium sulphate. If present in the ore the aqueous solution of the melt should be filtered before adding HCl, great care being taken to ensure that all the silica is in solution. The filtrate is then acidified and evaporated for silica in the usual way.

Barium remains on the filter as carbonate and can be dissolved in HCl and determined as sulphate in the usual way. This will also apply to the silica determination in slag.

Determination of Alumina.—For the purposes of the copper smelter the difference between the "insoluble" and true silica may generally be taken as alumina, and in any case it is only the alumina in the insoluble portion that need be determined, as soluble alumina is not known to exert any harmful influence on copper slag.

When a determination is desired, the filtrate from the true silica, which contains the alumina in a hydrochloric acid solution, is treated for alumina by the phosphate method exactly as has been already described.

Determination of Iron and Lime.—These are determined in the filtrate from "insoluble," as follows: The iron is precipitated with ammonia in the usual way and filtered. The precipitate is washed from the filter through a hole made in the bottom with a pointed glass rod. Hydrochloric acid is poured on, and all the iron washed through with hot water.

The solution is heated, reduced with tin chloride, and iron determined exactly as described for slags.

To determine the lime an excess of ammonium oxalate is added to the ammoniacal filtrate from the iron. It is boiled for a few minutes, filtered, and the calcium oxalate precipitate dissolved and titrated as in slags.

Determination of Zinc.—The determination of zinc in ores is precisely the same as in slags, except that the treatment for the separation of silica is not required. Many ores can be treated directly with the chlorate mixture, but, as its action is very violent on some sulphide ores, it is best to warm gently in a covered casserole with about 10 cc. of nitric acid until the first violent action ceases, then to add from time to time a few crystals of chlorate of potash.

If globules of sulphur separate out, a few crystals or a little powdered $KClO_3$ thrown on top of the globules will cause them to go into solution at once. When all action has ceased the casserole is uncovered, taken to complete dryness, and proceeded with as before described.

Determination of Sulphur.—The solution of 0.5 grm. of ore is best effected in exactly the same way as described above in the determination of zinc in ores, great care being of course taken to see that no globules of sulphur remain undissolved. It is taken to dryness, boiled with HCl, and treated for sulphur as described under slags.

Analysis of Matte.—Though anything like a complete analysis of matte is but seldom required, a great number of copper determinations must be made daily in every smelter.

For iron, zinc and sulphur, matte may be treated exactly as has been already described for ores.

Matte is sampled by dipping a small iron ladle into the stream as it runs from the settler to the conveyor, and allowing the cake of matte to cool in the ladle. Two series of samples are usually taken. One series consists of samples taken every hour, which are collected together and made into a composite sample to represent the average matte produced during each 12 hours. These must be determined for copper by some reasonably accurate method, as the results are required for record in the daily reports, and for calculating the production of copper. Besides this, a series of special samples are taken about every two hours, and more frequently whenever required. The results of these spcial samples are used in the actual control of the furnaces, and must be produced with the greatest possible expedition.

It will be necessary to use, at least, two different methods for this routine work, apart from the most exact method obtainable, which will have to be used on shipping lots if matte is shipped from the smelter and sold as such. These latter are, perhaps, always done either by the iodide or electrolytic methods. These methods have been recently described by Mr. Lowe in his "Technical Methods of Ore Analyses," and fall outside the scope of the present paper.

The average day and night samples may be done by precipitation on aluminium, followed by cyanide titration as has previously been described, while, for the special samples, the most simple and rapid form of the cyanide method is usually employed, the matte being simply dissolved in nitric acid, and the iron separated by precipitation with ammonia. This method has two serious sources of error, some copper being invariably carried down with the iron, producing low results, while zinc, if present, as is most frequently the case, interferes with the method to produce high results.

Both these sources of error can, however, be counteracted, or, at least, minimized by standardizing the cyanide solution with a matte of similar grade and known copper contents.

The following procedure was employed by the author at the United States Smelting Co.'s plant at Kennett, California, and gave excellent results, though the zinc contents of the ore, and, consequently, of the matte, varied very considerably from time to time.

The calculation may seem to be a little complicated at first, but when made with the aid of a slide rule it gives practically no trouble at all, and is fully justified by the results obtained. The details of the method are as follows:—

0.5 grm. of matte is placed in a 10-oz. beaker, and boiled with 10 cc. nitric acid until action has ceased and the red fumes are driven off (matte, by the way, never completely dissolves in HNO_3, a black residue of magnetic oxide of iron being left which, however, is free from copper). 50 cc. of hot water and 20 cc. of ammonia are now added, and the solution brought to a decided boil and filtered through a 15-cm. filter on a fluted funnel into a 30-oz. flask, which is cooled by standing in running water, and titrated when cold with the standard KCN solution.

The average matte samples for the previous day and night are thus run every morning together with all the special samples taken through the night. At the same time the average samples (two for each furnace) are also weighed out into casseroles and determined by the more accurate method.

The subjoined table, arranged for one furnace, will show how the corrected results and the daily standard for the cyanide solution are obtained:

	Rapid Method cc. required.	Approx. % Cu.	Al Method. % Cu.	Correct'd Results
1. Average day	20.2	20.4	20.6	..
2. Average night ...	16.8	17.0	16.0	..
3. 6 p.m.	16.5	16.7	..	15.7
4. 8 p.m.	16.4	16.6	..	15.6
5. 10 p.m.	16.3	16.5	..	15.5
6. 12 p.m.	17.2	17.4	..	16.4
7. 2 a.m.	17.4	17.6	..	16.6
8. 4 a.m.	16.7	16.9	..	15.9
9. 6 p.m.	16.6	16.8	..	15.8

We will suppose that the standard as determined the day before was 1 cc.=1.01% Cu. The number of cc. in the first column multiplied by this factor gives the approximate results as in the second column. These results can be available early in the morning to show what has happened in the furnace during the night.

The third column shows the true percentage as determined by the aluminium separation for the day and night average samples, from which the new standard is obtained by dividing the true percentage by the corresponding number of cc. in the first column.

A change in the zinc contents has obviously taken place since the previous day, so the new standard is taken from the average night sample thus—

$\frac{16.0}{16.8}$=0.952. This factor is then taken to be used for the day for the special samples. The fourth column shows the special night samples corrected by its means.

The method canot be expected to give very accurate results in case of a sudden change of zinc contents, but it is always possible to obtain a new standard by redetermining one of the special samples of the aluminium method.

MEETING OF THE TORONTO BRANCH OF THE CANADIAN MINING INSTITUTE

It is seldom that a more thoroughly representative body of mining men has been gathered for a meeting of the Toronto Branch of the Canadian Mining Institute than when, on the evening of November 19th, the Toronto members attended an informal dinner at the St. Charles Restaurant.

The guest of the evening was Mr. H. E. T. Haultain, whose appointment to the position of Professor of Mining and Metallurgy at the University of Toronto has been fully noted in these columns.

Before 7 o'clock the dinner was in full swing. In addition to the Toronto members there were present representatives from Montreal, Cobalt, and other branches.

When the dinner had been disposed of, the chairman, Mr. Eugene Coste, in a brief speech, alluded to the fact that the dinner had been arranged in honor of Professor Haultain. He then called upon Mr. G. R. Mickle, Provincial Assessor of Mines.

Mr. Mickle, as the former occupant of the chair of mining, tendered his congratulations to his successor. He was satisfied that Mr. Haultain would fill the position with honor to the University and to himself. He and Mr. Haultain had been students together. He had every reason to believe that Mr. Haultain could understand and sympathize with the vagaries and idiosyncrasies of his own students. Mr. Mickle concluded with a warm tribute to the vigor and ability of his successor.

Mr. J. B. Tyrrell was next called upon. After dwelling upon the need of radically modern methods of instruction in equipping mining students for present day work, Mr. Tyrrell assured Mr. Haultain of the support and sympathy of the mining fraternity under

all circumstances. "The appointment is one," said Mr. Tyrrell, "that merits and receives the fullest approbation of mining men."

The chairman next called upon Dr. W. G. Miller, who, in a most felicitous manner, dwelt upon the good fortune of the University in securing Mr. Haultain, and the equally good fortune of the Ontario Bureau of Mines in acquiring the services of Mr. Mickle.

Mr. Alex. Gray, of Montreal, spoke in terms of high appreciation of Mr. Haultain's appointment. He found it hard to determine whether the step meant more of gain to the University than of loss to the practical mining world. He desired, in conclusion, to touch upon a matter of national importance, a matter upon which clean mining men were of one mind. The present Cobalt boom had produced a distressing crop of wildcats. A few months ago the proportion of dividend-bearing shares sold and handled in Toronto and Montreal was about 86 per cent. of the whole. Now, however, the percentage had fallen to less than 34. This was an eloquent fact. Only the dissemination of mining knowledge and the hearty co-operation of decent technical men with the technical journals could remedy this. And a cure could not be effected in a month or a year; it must be a gradual and thorough process.

The guest of the evening was then called upon by the chairman. Mr. Haultain expressed his sense of gratitude for the honor that had been shown him as the incumbent of a most important office. When he had been a student at Toronto University no instruction in mining was provided. Now the whole scene was changed. The Department of Applied Science now takes care of about eight hundred students. The number of those studying mining branches in about one hundred. He had been surprised and gratified at finding such sound provision made in all the branches. The University had never advertised. The public knew little of what was being done. The members of the faculty had been kept busy providing for the phenomenal growth of the University. He wished to emphasize particularly the careful, quiet, but admirably far-sighted work done by his predecessor, Mr. Mickle. Mr. Mickle had made no display; he had resisted all temptation to indulge in trimmings and frills. But he had laid the best and soundest foundation upon which his successor could work. The University generally and the Departments of Applied Science in particular were throbbing with the spirit of growth because of just such unselfish labors as those of Mr. Mickle.

Mr. Haultain continued his convincing and incisive speech with an urgent appeal to the mining men present to come and see what was being done and to take a more vital interest in the mining students, whose ideals and convictions they could do much to mould and crystallize. He then touched upon the criminal lengths to which promoters of nefarious mining schemes were allowed to go. He strongly commended the attitude taken by Mr. Gray, and deplored the indifference of many who could assist in eradicating the evils that are now so prevalent.

During the regular meeting that followed the dinner the following resolution was unanimously passed, and the Secretary of the Toronto Branch was instructed to forward a signed copy to Sir Wilfrid Laurier:—

A Resolution Passed at a Meeting of the Toronto Branch of the Canadian Mining Institute, Held in Toronto, on Nov. 19th, 1908, With Instructions That a Copy be Forwarded to the Right Hon. Sir Wilfrid Laurier, Prime Minister of Canada.

Resolved, That the Toronto Branch of the Canadian Mining Institute desires to testify to the sympathetic and constructive interest shown by the Hon. Wm. Templeman as Minister of Mines, and respectfully expresses the hope that in the interests of the mining industry the services of the Hon. Mr. Templeman be continued. The unanimous opinion of this branch is that a break in the continuity of the Hon. Mr. Templeman's work would be most regrettable. We desire, therefore, to express the hope that you will adopt such measures as may seem best to you to retain the Hon. Mr. Templemon in charge of the Department of Mines.

EUGENE COSTE, Chairman,
J. C. MURRAY, Secretary.

The following resolution also was presented and passed without a dissenting voice:—

Resolved, That in the opinion of this meeting, the promotion of fraudulent mining schemes, abetted by newspapers, is being indulged in to such an extent that the legitimate development of the mining industry is being very seriously injured, and, further, that this meeting learns with a great deal of pleasure that the Provincial Secretary has determined to see that henceforth all advertisements conform strictly with the provisions of the Ontario Companies Act. In the opinion of this meeting such a step will do much to curtail the operations of fraudulent speculators.

ALUMINIUM AND SOME OF ITS USES

By J. T. W. Echevarri, M.I.Mech.E.

(Paper read before the Institute of Metals, First Meeting, Birmingham, Eng.

Aluminium, although discovered as far back as 1827 by the German chemist, Woehler, was not used to any extent till the electrolytic method of extraction, invented simultaneously by Heroult in Europe and Hall in America, enabled it to be produced on a commercial scale and at a price comparable with the other common metals. Since then improved methods of manufacture have enabled the price to be still further reduced, till to-day aluminium is, bulk for bulk one of the cheapest of the common metals. The following table shows the steady fall in pric eduring the last twenty years:—

Price of Aluminium per ton.

	£
1889	3,256
1891	812
1892	495
1896	163
1901	130
1905	130-170
1907	200-160
1908	100-65

On its first appearance the new metal was hailed as a panacea for all the ills the metallurgist is heir to, and its use was proposed for every imaginable purpose, from armour plate to chemical chambers, and it was

this very exaggerated idea of its scope of usefulness which in the end militated against its employment for those purposes for which it is most suited, for its failure to stand up under obviously unsuitable conditions led to a general distrust in the new metal, which it has taken years to live down.

The enormous demand and consequent high price of aluminium during the copper boom of 1906-1907 also seriously affected its development; as many of those who would have been glad to use the metal were forced by its rising price to give up their projects or to turn their activities in other directions. This large demand, however, induced the manufacturers to lay down increased plant to turn out the metal in large quantities, the benefit of which we are to-day reaping in the very low price at which the metal now stands.

Manufacture.

Aluminium is now obtained electrolytically from bauxite, a clay containing a high percentage of aluminium oxide, cryolite being used as a flux. The chief improvements that have been effected since this method was first employed lie in the exclusion of the impurities contained in the raw material, for whereas formerly commercial aluminium rarely contained more than 98 per cent. of aluminium, most of that turned out by the British Aluminium Company, Limited, to-day carries close upon 99½ per cent. of aluminium, whilst metal with as little as 0.4 to 0.3 per cent. of impurities is obtainable for special purposes. For ordinary requirements, however, such high degree of purity is unnecessary, and does not repay the extra cost of manufacture.

Imprities.

The impurities commonly met with in aluminium are iron, silicon, and sodium. Silicon renders aluminium very brittle if present in large quantities, and this drawback does not appear to be offset by any corresponding advantage. Silicon also impairs the resistance to corrosion peculiar to pure aluminium, promoting the decomposition of the metal. In this connection it is interesting to note that the thin yellow coating which forms on the inside of cooking utensils is largely composed of silicon. In high-grade aluminium the percentage of silicon should in no case exceed 0.4 to 0.5 per cent., although the metal as used in iron and steel works may contain double this amount of impurity.

Iron occurs in high-grade aluminium to the extent of about 0.2 to 0.3 per cent., and whilst somewhat impairing the ductility of aluminium in the same way as silicon, the tensile strength is somewhat improved by its presence in small quantities. The presence of iron does not appear to affect the electric conductivity of aluminium to the same extent as silicon, but has a bad influence on its non-corroding properties. Sodium is the most injurious impurity to be found in aluminium, as the resistance to corrosion is seriously lowered by even small quantities of this metal. Improved methods of manufacture have, however, eliminated all but the minutest traces of this elemen,t till to-day more than 0.006 per cent. of sodium is rarely found, half this amount being the more usual figure.

Physical Properties.

The pure aluminium of commerce is a silver white metal, with a melting point of 657 degrees C., and a specific gravity ranging from 2.56 to 2.72, according to its method of treatment. Copper having a specific gravity of about 8.8, zinc about 6.9, and tin about 7.3, it follows that aluminium is about 3.3 times as light as copper, 2.5 times as light as zinc, and 2.7 times as light as tin. The heat conductivity of aluminium is high, being second only to copper among the common metals in this respect. Its electrical conductivity is also high, being from 60 to 62 per cent. of that of pure electrolytic copper; it having, like copper, a somewhat lower resistance when soft than when hard drawn.

Mechanical Properties.

The strength of pure aluminium depends to a large extent on its method of treatment, but the following tables gives average figures for the metal in various forms in tons per square inch:—

	Ultimate tensile strength.	Yield point.	Elongation p. ct.	Modulus of elasticity.
Sand castings	5.0	2.5	25	.....
Chill castings	5.25	2.5	35	.....
Rolled bars	7.0	5	35	.....
Rolled sheet	9.0	8.5	6	.....
Drawn sections	8.75	8.5	20	.....
Hard drawn wire	15.0	13.0	25	9,000,000
Soft drawn wire	7.0	4.0	30	10,000,000

Methods of Working.

Aluminium may be melted in ordinary plumbago crucibles over a coke fire, but where quantities are to be melted a reverberatory coal furnace is generally used. The metal should not be heated above 725 deg. C., to avoid "burning," as at this temperature aluminium readily oxidises with the oxygen in the air. Sheet iron can be re-melted by submerging in the molten metal, the loss being only from 2 to 3 per cent., which is much lower than in the case of brass and similar metals.

Aluminium can be cast in either sand or chill moulds, the latter method being generally employed where a good finish is required on small plain castings. Aluminium cast in polished steel moulds has a finish equal to the best machined surface. For rolling it is cast into large slabs or blocks, which are afterwards broken down hot, the intermediate and finishing stages being done cold, the amount of annealing being governed by the temper and finish required.

Aluminium can be easily drawn into sections, tubes and wires, more or less the same methods being employed as for copper. The billet is first rolled down hot to a convenient size, and afterwards reduced to the correct section on the drawbench, cold fat being used as a lubricant. For drawing down to the finer gauges in the wire-drawing machines, paraffin is employed as a lubricant. The amount of annealing during the process depends upon the temper required. Wires from ¾ in. to 0.018 in. diameter can be drawn in this manner, these being used for practically all purposes where copper, brass or German silver wire is used.

Sections, rods and tubes in aluminium can also be made by forcing the solid metal, at a temperature of about 80 deg. C., by means of hydraulic pressure through suitable dies, this method being economical only where a great number of lengths of the same section are required, owing to the cost of the plant necessary. Soft aluminium sheets can be spun, stamped, or pressed into various shapes, cocoanut oil or other lubricant being used.

For turning, a sharp-edged tool with a good clearance should be used, and the work run at a very high speed combined with a slow traverse, plenty of lubricant in the shape of soap and water or paraffin being

used. For drilling holes a diamond or nose drill with ample clearance should be used, a twist drill being liable to seize. Screw threads can be cut with an ordinary tap, using a little light oil as a lubricant.

Aluminium can be soldered by means of the various special solders now on the market, but as such soldered joints are all more or less subject to electrolytic action in the presence of moisture, they are only suitable when protected from damp air. Welded joints, being entirely of aluminium, do not suffer under these conditions, and this method is being more extensively used now that satisfactory welded joints can be made by means of portable oxy-acetylene blowpipe equipments.

It had long been recognized that this was the most hopeful direction in which to experiment, because such joints, containing as they do nothing but aluminium, would be as free from electrolytic action as the metal itself, but the difficulty met with was in getting rid of the film of oxide, which prevented the two surfaces uniting properly. In the case of the butt welding of small rods and wires, this difficulty can be easily overcome by applying end pressure at the moment of fusion to drive out the film of oxide, but in the case of sheets and plates this method is not practicable, and recourse had to be made to some other method. Lately several fluxes have been put on the market capable of dissolving the film of oxide and permitting the metal to flow together with perfect ease. Another method of welding aluminium sheeting which shows promise of success, and which would repay further investigation, is the electric system of welding, by means of so-called spot welders; this method being extensively used for copper and iron sheet. The electric welders as used for copper and iron wire are also suitable for aluminium wire with certain modifications.

Applications.

Iron and Steel Works.—Aluminium is used in iron and steel works, for removing the oxygen from the oxides of iron, and many other substances, with which it comes in contact, the heat generated by this reaction being so great that it may be also of service in raising the temperature of large bodies of iron.

The efficacy of small quantities of aluminium in preventing "porosity" is also very marked. Porosity is due to the partial disengagement of gases absorbed during melting, which are imprisoned as the metal cools. Aluminium appears to have the property of combining chemically with these gases and producing an innocuous slag.

It frequently arises in small works that a casting requires two "blows" of the cupola. In this case the difficulty of keeping the first tapping hot while the second charge is running down may be readily overcome by adding from time to time small quantities of aluminium to the metal in the ladle. The rise in temperature obtained effectually prevents the metal from excessive cooling.

For the purpose described, the metal may be employed in various forms. An alloy known as ferro-aluminium, consisting of about 90 per cent. of iron and 10 per cent. of aluminium, is used by many iron and steel founders, this material being so brittle that it is a simple matter for the user to break off the right amount to suit his own requirements. The use of ferro-aluminium has, however, been largely superseded by that of the pure metal, which is generally supplied in the form of notched bars and half-round bars, easily cut up into small pieces for use.

Some steelmakers use aluminium in a form known as "granulated." This consists of a powder which may vary in coarseness from that of rice down to that of sifted sugar. Where the heating effect of the burning metal is alone required granulated aluminium may be profitably used, and is generally mixed with sufficient smith-scale to provide the oxygen necessary for its combustion.

The makers also supply iron and steel founders with aluminium in small uniform pieces weighing exactly ⅛ oz. and ¼ oz. each respectively, so that the user is saved all trouble of weighing, and can add any predetermined percentage of aluminium to his iron or steel with a minium of delay and inconvenience.

A further application of this principle has been made in the "Thermit" welding process invented by Dr. Goldschmidt, where the heat of combustion of aluminium and oxygen is made use of to raise the temperature of iron and steel castings, etc., to the welding point.

Aluminium Castings, etc.

Aluminium is used for many purposes in the building of motor cars, where stiffness combined with lightness is desired. Among these may be mentioned crank-cases, gear-boxes, carburettors, radiators, and dash-boards, besides many small details, such as control levers, lubricators, etc., and it is, besides, finding a large and increasing outlet with engineers, brass-founders, and others, for a variety of general castings.

For castings, it is found of advantage to alloy the metal with copper, zinc, or nickel, which increases the strength and makes it easier to work, without materially increasing the weight.

Sheet Aluminium.

When rolled into sheet, the uses of aluminium are too numerous to mention, as the light metal is every day finding its way into new channels in competition with older metals. The reason for this will be easily seen when it is remembered that at to-day's prices a rolled sheet 6 ft. by 3 ft. by 1-16 in. thick, having an area of 18 square feet in—

Aluminium	weigns	16	lbs.	and at	1s.	1d.	per	lb.	costs	17s. 4d.
Brass	"	49½	lbs.	"	0s.	6½d.	"	"		26s. 10d.
Copper	"	52	lbs.	"	0s.	7½d.	"	"		33s. 7d.
German silver	"	50	lbs.	"	1s.	2d.	"	"		58s. 4d.
Pure tin	"	42½	lbs.	"	1s.	5d.	"	"		59s. 10d.

Other thicknesses of sheets, tubes, rods, beadings, mouldings, angles, channels and other sections will, of course, be in similar proportion.

In the early days of aluminium, sheets composed of copper alloys were used to some extent in connection with shipbuilding. It has, however, since been demonstrated that for all such work only pure aluminium of the best quality should be used, and there is little doubt that naval constructors will find pure aluminium sheets, channels, mouldings, rivets, etc., of great assistance in partitions, ceilings, deck and chart houses, and similar portions of large ships, above the water line, where reduction of top weight is of importance in connection with the stability of the vessel. In 1901 a quantity of large aluminium plates was used in the chart house of the steamship Celtic, and the owners report that the condition of the material is satisfactory.

Aluminium Tubes.

Large quantities of specially pure aluminium tubes are being used for various purposes in connection with acid work, under which condition the pure metal re-

mains practically unaffected. In order to demonstrate the usefulness of aluminium tubes for steam coils, etc., some tests were made at Milton Works some time ago with the following results:—

Length of tube. in.	Gauge.	O/s diameter in.	Tested to lbs. per sq. in.	Remarks.
12	10	3¼	1,200	Expanded to 1-32 in. in middle but returned to original size on release of pressure.
12	12	2 11-16	1,200	Ditto (barely 1-32 in.).
12	14	2	1,200	As above, with rather less expansion.
12	14	1⅛	1,200	Perfect. Would probably stand considerably more.
12	19	1⅛	1,200	Ditto.

All the above were afterwards tested at 100 lbs. per square inch for half an hour, with the exception of the second on the list, which was under the steam test for 12 hours without apparent injury. This tube was, after the steam test, subjected to a second test of 1,200 lbs. hydraulic pressure without showing any signs whatever of fracture.

Electrical Industry.

As a conductor of electric current aluminium has a large and increasing field of usefulness, the difficulties at first met with in regard to jointing, etc., having now been overcome. The saving that can be effected by using aluminium in place of copper for overhead conductors is so large that in countries where long overhead transmission lines are in vogue the lighter metal practically reigns supreme. In this country there has not been up to the present the same opportunities for long distance bar overhead transmission lines, but during the past few years there have been erected many short distance aluminium lines for lighting and power requirements in connection with works, collieries, etc. With the increasing use of electricity for motive power purposes, aluminium conductors are being adopted much more extensively in such directions, engineers and consumers alike appreciating the immense saving in capital outlay secured thereby. Further, at the present low price of aluminium, the saving in cost of the bare conductor is so large that there is an extensive field for the metal for insulated underground cables, even taking into account the increased amount of insulation necessary for the somewhat larger cable.

Aluminium as used for electrical purposes has a conductivity equal to about 61 per cent. of that of pure electrolytic copper, so that to obtain the same conductivity it is necessary to increase the sectional area by 64 per cent. above that of copper, corresponding to an increase in diameter of 28 per cent. for a round conductor. Copper being 3.3 times heavier than aluminium, we see that the somewhat larger aluminium conductor will still weigh less than half of the equivalent copper conductor, the larger cooling surface of the aluminium conductor being a further factor in its favor.

For bus-bars and back connections in switchboards aluminium is also finding an increasing use, the saving in weight allowing of lighter supports and framework, which means additional economy over and above the saving in cost of the conductor. For the front of switchboards, aluminium is also eminently suitable for such fittings as bolts, lamp-holders, instrument cases, etc., the effect against a dark marble board being very pleasing.

There are several satisfactory methods of jointing aluminium conductors, according to the conditions under which it is called upon to work.

For small diameter wires as used for making up into cable the usual butt welded joint is made either in the flame of a blowpipe or by means of the electric welders as used for copper.

For bare stranded cables the usual method is to weld the two ends together by pouring molten aluminium into a cigar-shaped mould previously clamped around the joint, but where high tensile strength is required a mechanical joint may be used, so designed as to give a wedging action when pulling tight in order to ensure good electrical contact.

For insulated underground cables it is not always practicable, to use welded joints on account of the confined space when working in closed boxes, and in this case either a mechanical or a soldered joint may be used, where the joint is afterwards protected from atmospheric influence. The simplest method is to slip a tube over the two ends of the cable with a slot through which the solder can run. The resistance of such joints is somewhat higher than in the case of welded joints, but they compare very favorably with copper joints made on the same principle.

The tensile strength of hard drawn aluminium wire is equal to about half that of a copper wire of equal section, but allowing for the increased size of an aluminium conductor to obtain the same conductivity as for copper, this figure is raised to about 75 per cent., the difference being more than compensated for by the decreased weight of the aluminium cable.

Alloys of Aluminium.

The alloys of aluminium in common use are confined almost exclusively to combinations of the metal with zinc, copper, and nickel. In general, the proportions of these metals which can with advantage be added to the light metal, do not largely exceed 20 per cent. in the case of zinc, 6 per cent. in the case of copper, and 5 per cent. in the case of nickel. A very interesting and valuable—especially for marine work—series of alloys, known under the name of aluminium bronzes, is also produced by the addition of aluminium in quantities up to 10 per cent. to electrolytic copper.

Salt is purified by melting in the new and rapid English process. The crude rock-salt is fed automatically to a table contained in a large furnace, is then fused, and runs into troughs, from which it is drawn at one side of the furnace into large caldrons. Air is forced into the molten mass, and lime is added. The impurities sink to the bottom, and the upper portion is ground and screened, while the lower part is used for chemical manure.

In the novel tool-tempering apparatus of W. Rosenhain, as exhibited at a soiree of the London Royal Society, the metal is heated in a vacuum tube, and at the required temperature—shown by a thermo-electric indicator—is quenched by admitting water. The new silica tubes admit of sudden cooling from redness or greater heat.

Lead-wool consists of pure lead cut into fine strips by machinery, and is put up in pound skeins of yard-long threads. For making tight joints it is simply laid in the joint socket and pounded in with a caulking tool. It welds into a solid mass, filling every interstice, and it ensures more thorough work than results from using molten lead.

COBALT COMMENTS

By Alex. Grey

Nova Scotia Co. Prospects.—Statements contained in the annual reports of the consulting engineer and the secretary-treasurer of the Nova Scotia Silver-Cobalt Mining Co. offer commingled consolation and qualified promises of dividends, of which shareholders were beginning to wonder if l'appetit vient en mangeant. The company concerned is exceptional in that its mining area is in the Keewatin. It is capitalized at $2,000,000, all issued, and valued in the market at about $1,200,000. The character of the directorate and technical control is a guarantee that what there is will out, and it is urged that they are doing their utmost under stress to "make a satisfactory showing in the shape of dividends to the shareholders." As they are among the most representative mining capitalists engaged in the Northern Ontario fields, with many "irons in the fire," as they have not been identified with hurdle-racing markets, there is a measure of justification for the complaint registered by Mr. Benjamin B. Lawrence that "many stockholders fail to appreciate that it is impossible to do two things at the same time, namely, open up a property as this has been opened up, and make substantial earnings while you are doing it."

The mine that pays for its own development is the exception. Cobalt's mines have done it in greater degree than those of any other camp, because their virtues were naturally necessitous. They had to provide their own working capital, pay brokerage charges, meet vendor considerations. Owing to the Nova Scotia being so well groomed those who fancied the stable's choice should not be impatient; yet the situation seems to call for exchange of views rather than censure on either hand. The issued capital constitutes a liability to meet which reliance is placed in owned and leased ground adjoining and under Peterson Lake. Elsewhere 1,100 feet of driving and 500 feet of cross-cutting in the Keewatin "were unsuccessful in finding any regular or permanent ore chute. Some very rich ore was mined in various portions of the property, but the occurrence was mostly in small pockets, which although rich in silver, failed to yield any substantial quantity."

So writes Mr. Lawrence and nothing could be more to the point. A cross-cut disclosed what is particularized as "the pay chute" and as the Nova Scotia had only 40 feet of it, thirty acres were leased for 10 years from the Peterson Lake Company. The vein has since been followed for 200 feet; there is about 50 feet of "backs," and the values occur "as native silver scattered through the vein filling for a width varying from 5 to 10 feet." A winze proved the ore body to a further depth of 25 feet "in the Peterson Lake ground," and it is the opinion of Mr. Lawrence that "within 60 days we should have sufficient ore exposed to warrant our producing ore in quantity, say from 30 to 40 tons a day, which should yield a handsome return."

So far as these representations go, they reflect the thoroughness with which explorations have been prosecuted. They are insufficient for the speculative position, and those who grumble at this have only themselves to blame. Capital liabilities as against ore disclosed is somewhat Cobaltesque, but the $75,000 spent upon plant, the "two working shafts and some 1,900 feet of development in drifting, cross-cutting, sinking and raising," and the lease of adjoining territory known to contain the extension of "the pay chute," must suffice for speculative coteries who rarely take into account the idiosyncracies of "the vein calcite." However, during the twelvemonth ending August 31, 149 tons averaged $765.10 per ton or $114,000 in the gross. In August, 28 tons shipped averaging $603.57, or $16,900 in the gross, permitted a profit of $8,000 after paying working costs of $8,978. This is at the rate of 4.80 per cent on capital and if tonnage to be developed broadens this dividend aspect, there is the added assurance from Mr. Lawrence that "concentration" of the ores "inasmuch as the values are scattered through substantial widths, requiring the handling of a heavy tonnage," will be superseded by a process capable of "a large tonnage." Mr. Lawrence is "happy to say that it now looks as if" the separation "problem would be solved" to the "entire satisfaction" of shareholders. Taken in connection with the statement of Mr. Jacobs that the Nova Scotia management "will undoubtedly handle a very much larger quantity of material than is generally the case of Cobalt," the practical process evolved by Mr. Lawrence will be a welcome demonstration. It and the developments of another year should prove the perseverance or otherwise of the Nova Scotia ore bodies. If the section is inadequate the directorate are strong enough to find something that will be all-sufficient to obviate permanent disappointment. Meanwhile there is difficulty in subscribing to the pronouncement in the Unted States Investor of October 1 that "it is estimated by well-posted mining men that upwards of $1,000,000 worth of good ore is blocked out."

McNicol and Pickens, miners of Butte, established a world's record for rock drilling by driving a hole 56 5-8 inches, 7-8 inch bits, into a solid block of granite in 15 minutes at the Spokane Interstate Fair competition. The performance, which was witnessed by 20,000 men, women and children, netted them $750. McNicol weighs 215 pounds, while his partner is 15 pounds lighter. They used 20-pound sledges. One of the features of their work was the dexterity displayed in changing drills, this being done without missing a single stroke. The best previous record was 55 inches, drilled by Bradley and Frathey, of Spokane, five years ago. Other teams in the contest this year were: McGilvray and Erickson, of Silverton, B.C., 52 7-8 inches; Naylor and Anderson, of Burke, Idaho, 43 3-4 inches, and Johnston and Dunn, of Silverton, B.C., 43 1-8 inches.

For slow-speed pumps in the Rand mines, South Africa, a novel fly-wheel has been adopted. High freight rates make iron and steel machinery very costly, and the use of concrete rims for the fly-wheels of ten pumps is stated to have realized a saving of about $10,000. The fly-wheels are driven by electric motors through worm gear about 20 revolutions per minute. Each wheel is 14 feet in diameter, with cast iron bosses in which sixteen spokes of four-inch tube are screwed, and the rim has a base and an outside of ¼-inch sheet iron strips, separated by distance pieces. The strips are bolted together, the concrete rim between being 13 inches wide and 13 inches deep, strengthened by four ¼-inch wires interlaced with the distance pieces. The weight of the wheel is 8,000 pounds, and that of the rim 6,000 pounds.

CORRESPONDENCE.

Editor Canadian Mining Journal, Toronto:

Dear Sir,—I have read with a great deal of interest the paper by Mr. O. N. Skelton on "The Taxation of the Mineral Resources in Canada." I have probably had a better opportunity tha nanyone else of studying this matter during the last year, but do not consider it proper for me to enter on a discussion of any of the principles or subjects which are contentious, and I shall therefore merely qualify some of the statements made about the working of the Act taxing the mineral resources in Ontario, which are misleading without some explanation. In the first place, the results for the year 1907 (the year the Act came in force) are obscured by the fact that there was at first no limitation of the amount which might be deducted from the provincial tax by the municipalities for income tax, the Act having been amended in that respect since. There is no definite basis in the Municipal Assessment Act for determining what the income of a mine is, whereas the mode of computing the provincial tax is very specific and clear. Moreover, the municipalities claimed the right to assess the estimated income for the current year, whereas the provincial tax is based on results of the preceding year. It was therefore inevitable that the two assessments should clash and make the results very erratic.

The amount given as collected under the Supplementary Revenue Act is taken from the Provincial Treasurer's statement, which was for the calendar year of 1907. As the tax was not due until the first of December, 1907, a great deal of it—fully one-half, in fact—was not paid until 1908, and does not appear in the statement at all. In the same way the statement for 1908 will be too large, as it will include these taxes for 1908, which will probably be paid in before the end of the year, the tax now being payable on October 1st. A statement which is complete, except so far as acreage tax is concerned, will appear in the Report of the Bureau of Mines. It is impossible even at the present time to say what the actual amount of the acreage tax paid for the year 1907 will be, as payments are coming in almost daily for 1907 and 1908.

Further on the statement is made that 300,000 acres were forfeited in Ontario for non-payment of the tax of one cent per acre in the year 1906. As a matter of fact the time limit when forfeiture can take place under the old one cent tax has not yet arrived, and there is still over a year to run before anything can be forfeited under the two cent tax. The slaughter will probably be immense when the time limit for the present two cent tax expires and forfeiture takes place. The 300,000 acres referred to were cancelld for non-payment of rentals, which is, of course, an entirely different thing.

The suggestion that acreage taxes should be grauated, being low for the first few years after acquisition and changing from year to year, appears to me most impracticable, judging from my experience of the difficulty of distributing the information among the thousands of holders of mining lands that a tax of two cents per acre was due. A tax changing from year to year would entail endless work and consequently a great deal of expense, and would only exasperate the owners of mining lands. It must be borne in mind that the amounts are usually small, and the holders scattered far and wide, and therefore whatever tax is levied should be as simple as possible, and should not be constantly changed.

The tax on natural gas is considered in the paper as virtually an export tax. It is a great deal more than that, as it has proved a most efficient means of preventing the waste of natural gas by operators who are indifferent about gas, but are seeking oil. This waste destroyed incredible quanties of gas in the old Essex field, and contributed probably mainly to its rapid depletion, and was going on at an alarming rate in other fields in Ontario when the Act came in force.

Yours truly,

G. R. MICKLE.

Toronto, November 16th, 1908.

Editor of the Canadian Mining Journal:

Sir,—I enjoyed your Calgary effusion very much. Some one, though, gave you the wrong "steer" about it. The fact is, that I am the only one who knows exactly what transpired; fear deprived the others of their powers of observation, i.e., our secretary in his description talks about the "steers being led out of the corral." I have modestly but peremptorily "to resign that proud eminence" as the hero of the occasion—in favor of our worthy President. I was standing near him when the steer charged. Did he, panic-stricken, impale himself on the barbs of a wire fence or climb a post? His hungry eyes—as did forty other pairs—swept the far-flung vista, but no St. Charles oak spread forth its beneficent branches anywhere over that treeless plain. Whether, like the British man-of-war in the harbor of Apia, Samoa, which headed for the open sea when the other battleships, vainly attempting to anchor, were dashed to pieces on the rocks, he preferred the open plain, eagerly longing to pit his agility against the steer's; or whether, that acuteness of observation in the field which is at once the envy and despair of his geological colleagues, enabled him to espy the telegraph pole, will probably never be known. Suffice it, he hurled himself across the intervening space like a mountain torrent in the spring or Frank Law after a servant girl's savings. Did he look behind him? He disdained to, and besides there was no time for it. The goal was reached, the race was won, and all records broken. The time for the hundred dash is only an official record in sporting circles. We of the Institute can boast of having a President who has covered the hundred yards faster than any man the world has ever seen.

In regard to our Secretary, his grey molecules were gyrating at such a terrific rate that he thought the steers were being led out of the corral on a string.

Yours for truth,

THE MAN FROM COBALT.

Cobalt Ont., Nov. 13, 1908.

The Pulsometer Engineering Company, Ltd., Reading, England, were awarded a gold medal by the International Jury of the Franco-British Exhibition. The medal was awarded for their exhibit of a new patent Desicating and steam air pump, the invention of Mr. H. A. Fleuss, who is also the inventor of the celebrated "Geryk" vacuum pump, to which a silver medal was awarded at the St. Louis Exposition in 1904.

BOOK REVIEW

A Manual of Underground Surveying.. By Loyal Wingate Trumbull, M.E. Illustrated. 251 pages. $3 postpaid.. The Hill Publishing Company, 505 Pearl Street, New York, 1908..

The practice of mine surveying, like assaying, has in America developed characteristics that distinguish it from British and European practice. Mr. Bennet Brough's text-book, excellent as it is acknowledged to be, is more especially adapted to the requirements of mining engineers in Great Britain than in this country.

Mr. Trumbull's volume is the first attempt to embody in one volume the best features of American mine surveying. It is a careful compilation of material selected from magazines, technical publications, and catalogues. To this material are added descriptions of methods actually in use in many important mines. These have been contributed at Mr. Trumbull's request, and it has been his object to select only the most approved methods.

A knowledge of plane surveying is presupposed. Neither the theory nor the methods of ordinary surveying are touched upon.

Copious bibliographical notes are appended to several of the chapters. These should prove most instructive.

Chapter I., on instruments, includes a readable dissertation on the history of the transit. The chapter comprises 63 pages, and is clear and well illustrated.

Then follow chapters on "Meridian," "Underground Practice," "Carrying the Meridian Underground," "Survey of Secondary Openings," "Record of Survey," "Uses of the Mine Maps," "Making the Map," "Map Filing," "Bore-Hole Surveys," "Methods of Various Engineers." The last chapter gives the United States Deputy Mineral Surveyor's examination. A good index completes the volume.

In glancing through this manual, we have been impressed with the practical tone that pervades each chapter. It is pleasant to notice that such subjects as sampling, assay-maps, bore-hole surveys, waterproofing maps and blue-prints, are not neglected. Indeed the book is thoroughly modern, practical, and well-arranged. The most critical can ask for no more than this.

The Journal of the Canadian Mining Institute, 1908. Edited by the Secretary. Volume XI. 616 pages. Illustrated. Published by authority of the Council at the Secretary's Office, 413 Dorchester Street W., Montreal, August, 1908.

As an annual record of the work and growth of the Canadian Mining Institute, and as a permanent source of reference on many mining and metallurgical subjects this volume is considerably more significant than its predecessors.

In all there are forty-one papers, which may be grouped roughly into those dealing with the geology and metallurgy of Canadian iron ores; those dealing with fuels; one on graphite; one on gold; six describing the geology, mining, concentrating, and metallurgy of Cobalt silver ores; seven touching on the ores and mines of British Columbia. In addition there are nine papers on miscellaneous subjects, and four excellent descriptive papers contributed by students.

The general index, compiled by Mr. F. Nicolas, of Ottawa, is the work of a finished index-maker.

It will be seen that the range of subjects covered is wide. Not only is this the case, but nearly every paper is of a high degree of excellence.

The editor, Mr. H. Mortimer Lamb, is to be felicitated upon the contents and appearance of Volume XI. Clear type, good paper, excellent half-tones and diagrams, along with careful editing, are features to be commended.

China-Clay: Its Nature and Origin.

In the Transactions of the Manchester Geological and Mining Society, Vol. XXX., Part XX., there appears an exhaustive article on the nature and origin of china-clay, by Mr. George Heckling, B.Sc.

"Kaolin," or china-clay, is prepared by directing on to the "rock" (decomposed granite) in the quarry a head of water, which sweeps the material away to a series of catch-pits. In these pools the suspended material settles, the coarsest particles in the first, the finer material in the next, until the last poor gets only the finest mud. This last, when dried, is the best china-clay, and appears to the eye perfectly homogeneous. But both coarse and fine materials are composed of varying proportions of quartz, mica, kaolinite, and tourmaline. In the coarse settlings quartz greatly predominates, while tourmaline, biotite, and white mica make up the remaining material. In the finer material quartz and tourmaline diminish, while mica increases and soon preponderates. In the very finest claps, kaolinite and white mica make up 90 per cent. of the total, and quartz almost the whole of the remaining 10 per cent., tourmaline forming 1 per cent. or less. This composition is usual in good clays.

China-clay-rock is the result of the complete weathering of igneous masses in situ. Most common sediments are probably the result of less complete weathering, in which the material is removed so soon as decomposition has proceeded far enough to set it loose.

Asbestos wood, which seems to be attracting attention as a new structural material, is made chiefly from asbestos fiber, and is about two-thirds as strong as ordinary wood and takes a higher polish. It is as easily worked as oak and maple, while nails hold in it better. The material is now usually made in sheets three by four feet in size, and is adapted for roofing and walls, but it can be panelled for wainscoting or doors, or moulded into ornamental trimmings.

A novel device for measuring the hardness of metals is called the scleroscope by Albert F. Shore and Dr. Paul Herould, its inventors. A steel ball weighing 40 grains, made extremely hard by a special process, is enclosed in a glass tube, and the hardness is indicated by the reboudn as the ball is dropped on the metal under test. A scale measures the height of rebound. On this scale 100 is the average hardness for carbon steel, and proves to be the safety limit for steel tools after reheating and tempering. The instrument is valuable in making tools of standard hardness.

EXCHANGES.

The Engineering and Mining Journal, November 14, 1908.—Mr. John A. Church, writing on "The Principles of Machine Sampling," predicts a largely extended use of sampling machines in the close future. "At present," says Mr. Church, "the work done is so irregular that I feel it is high time the whole engineering profession should . . . determine what can be done to improve the work." The closely guarded results of tests from one establishment cannot do anything like the good that will be derived from a series of comparative resamplings from every mill in the country.

On copper ores containing 2, 3, and 4 per cent. copper a campling variation of 5 lb. metal per ton of ore should be made before reaching the sample grinder.

Mining World, November 14, 1908.—The first installment of a paper on the Coeur d'Alene mining district, Idaho, by Dr. J. P. Rowe, appears in this number.

The principal producing portion of the district is wholly within Shoshone County. The axis of the Coeur d'Alene Mountains borders the district on the east, and nearly all the present profitable mining is done on the western slope of the Coeur d'Alene Mountains and on the north side of the south fork of the Coeur d'Alene River. The district east and west extends 20 miles north and 11½ miles. The producing territory is being constantly added to. Good roads, plentiful water, and good railroad service are features of the district.

Many of the best producing mines are worked to a depth of 2,000 feet by the tunnel method. Gravity alone is used for draining many of the mines and for handling the ore, although in the longer tunnels electric power is installed.

A prospector named Thomas Irwin located a quartz claim near the Mullan road, a few miles east of Kellogg, in 1878. Next year the famous Prichard Creek was discovered. Three years later placer gold was found on Prichard, and many claims, including the Widow, were staked. The year 1884 saw a general gold-seekers' rush. In a few months the town of Eagle sprang into being, trails were made to the Northern Pacific Railroad, and telegraphic communication was established. Later, the town of Murray became the centre of placer mining. Near it were the rich Widow, Gillette, and Myrtle claims.

In 1884 the town of Wallace (then known as Placer Centre) was founded, and some of the best silver-lead mines of the south side were located, including the Gold Hunter, the Helena-Frisco, and part of the Hecla. The next year witnessed the discovery of the famous Bunker Hill and Sullivan mines. From early in 1886 crowds from Murray and other outside towns flocked to the lead-silver district, especially to the country around Warden and Kellogg. The Bunker Hill and Sullivan ore was at that time hauled by wagons, boat, and rail to Helena, Mont.

In 1890 the beach gravels near Murray were worked vigorously. Narrow gauge and standard gauge lines had now entered the camps, and the larger mines operated their own concentrators. During the period 1892-4 most of the mines were closed on account of labor troubles and high freight rates. In 1898 many mines were consolidated by the Federal Mining and Smelting Company. The Hercules mine showed up rich ore in 1901, and made millionaires of several of the heaviest stockholders.

The Snowstorm copper mine was developed in 1903. Since then the district has grown steadily.

Mining Science, November 12, 1908.—An article of a series dscribing the Boston Consolidated Company's concentrating plant appears in this issue. The plant is situated at Garfield, Utah. Nissen individual-mortar stamps, installed in batteries of 4 weighing 1,500 lb., 6-inch drop, 106 to the minute, discharge through 26-mesh screens. The ore is crushed to ½ mm. particles before it passes the screens. The pulp is run into four 3-compartment spitzkasten, the overflow from the last compartment going to 12 Callow tanks. The concentrating equipment consists of two rows, 11 in each row, of No. 5 Wilfley tables, set head to head, receiving classiged feed; 12 Callow tanks, one No. 5 Wilfley table, and 17 Johnston suspended vanners complete the equipment.

PERSONAL AND GENERAL.

Mr. John E. Hardman has returned to Montreal after a prolonged absence on business connected with Canada Iron Corporation, Limited.

Mr. A. A. Cole, mining engineer to the T. & N. O. Commission, has thoroughly recovered from his recent illness.

Mr. A. P. Scott has resigned the position of chief chemist for the Dominion Iron & Steel Company, Sydney, N.S., to accept an appointment as metallurgist to the General Electric Company at Schenectady, N.Y. Mr. Scott did brilliant work in connection with Steel vs. Coal lawsuit.

Mr. G. H. Gillespie, now of Madoc, Ont., has returned from New York.

Dr. W. G. Miller, president of the Canadian Mining Institute, has been nominated by the Montreal branch as president for the year beginning March, 1909.

It is reported that Mr. James Gayley, first vice-president of the U. S. Steel Corporation, has tendered his resignation of that position, and that he will be succeeded by an officer of the Carnegie Steel Company. Ill-health is the cause of Mr. Gayley's resignation.

Mr. J. Parke Channing has been elected a director of the Kerr Lake Mining Co., in place of Mr. J. A. Jacobs.

Announcement is made that a law partnership has been formed between Mr. Edwin W. Kearney, of Haileybury, and Mr. E. Ainslie Wright, B.A., of Renfrew, to succeed to the practice of the late Harvey D. Graham. The new firm will be known as Graham, Kearney & Wright, and will continue to carry on a general law practice with permanent offices in the Graham-Hennessy Block, Haileybury, Ont.

Mr. H. Gardner, of London, Eng., one of the largest shareholders in the Granby Company, was a visitor in Phoenix for a couple of days last week, being shown through the mines by Manager A. B. W. Hodges. Mr. Gardner is in charge of the London office of the American Metal Co., which handles a large amount of Granby copper, Mr. Jacob Longcloth being president of both it and the Granby Company. Mr. Gardner is also largely interested in Montana and California mining, and is combining business with pleasure in a tour of the properties. He is accompanied by Mrs. Gardner.

Mr. Frederic Keffer, consulting engineer of the B. C. Copper Co., with a staff of assistants, was engaged for ten days this month making a complete examination of the Rawhide and Brooklyn mines of the Dominion

Copper Company. The examination has been most exhaustive, and samples for assaying have been taken from every lead in each of the properties. Previous to commencing the work here the Sunset mine, in Deadwood camp, and the Mountain Rose, in Summit camp, were thoroughly examined, so that in concluding the investigation at the Rawhide and Brooklyn Mr. Keffer was able to compile a detailed report on the Dominion Company's mines.

Notice has been given that after November 1st, 1908, the headquarters of the Canadian Mining Institute and the library of the Institute will be Rooms 3 and 4, Windsor Hotel, Montreal.

The fragility of incandescent gas mantles is a serious drawback to their use, but a more durable fabric seems to have resulted at last from the experiments of German chemists. The mantles now so familiar have a tissue of cotton or ramie on which oxides of thorium and cerium have been precipitated. Attempts to use other natural fibers have failed, and the successful new material is an artificial silk made by dissolving cellulose in ammoniate of copper. This silk mantle takes up thorium nitrate, which ammonia changes in the fiber to hydroxide of thorium. The thorium silk does not absorb moisture like the old mantles, and it has many times as great resistance to shock.

Powdered sulphur mixed with oil is claimed to have frequently relieved hot bearings in steamship machinery, but a lubricant much stronger still is sulphuric acid. On one occasion, after repeated trouble from heating, the dilute acid was allowed to drip slowly upon the working bearing. In half an hour the part was cooled, when the acid was washed out, and the ordinary oil was applied. The cure was permanent.

Slag Cement.—A material equal to the best Portland cement is now claimed from blast-furnace slag as a product of the Cowper-Coles process. The slag is taken while still molten and raised to greater heat by means of an electric resistance furnace, the necessary amount of chalk being added, and then certain reactions are brought about by electrolysis. High-grade cement is thus obtained at very low cost.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, Nov. 20.—St. Lawrence Shipments.—With this week the 1908 season closes for the St. Lawrence. Notwithstanding all the difficulties that have been met with from forest fires and fog, the start obtained through the early opening of navigation has been maintained, and shipments will be in excess of any previous season. The Dominion Coal Company's shipments will total 1,340,000 tons, which is about 225,000 tons greater than last year.

Steel-Coal.—At the time of writing, it is supposed that the Steel-Coal appeal is being heard before the Privy Council in London. Before this issue of the Journal appears it is possible that we may know the result of this protracted legislation. The Montreal Star humorously states that the latest news from London is that Mr. James Ross says, "We will win," and Mr. Plummer says, "We will win." If these gentlemen made the remarks attributed to them, their grammar must have fallen on evil times.

U. M. F. A. vs. P. W. A.—Mr. John Moffatt, the Grand Secretary of the P. W. A., has been committed to the Supreme Court on a charge of perjury, at the instance of the partisans of U. M. F. A. in this neighborhood. The charge appears to be one of technical inaccuracy in an affidavit made by Mr. Moffatt in connection with the injunction which the U. M. F. A. obtained against the officers of the Grand Council. The trial is to take place on the 26th November, this date having been fixed in order that the Court might be acquainted with the judgment of the Supreme Court in the matter of the appeal of the U. M. W. A. against Judge Drysdale's dissolution of the injunction referred to. The full bench in Halifax unanimously dismissed the appeal. A large portion of the evidence in the perjury charge is identical with the evidence given in the appeal against the dissolution of the injunction.

From the rather mixed explanation just given it will be seen that a good deal of litigation is going on between laborites down here. It may eventually dawn upon the members of the miners' unions that paying lawyers is an expensive game, to which, like the making of books, there is no end. It looks as though the U. M. W. A., having failed in their attempt to get hold of the defense fund of the P. W. A., are determined to wasate it in legal fees.

Elections and Trade.—The Halifax Herald is surprised that there should be a depression in the coal trade after Mr. E. M. Macdonald's promises before the elections, saying that this gentleman had claimed all credit for the prosperity of the coal trade in Pictou. That may be, but is it not a little ridiculous for any political party to claim credit for prosperity or to be blamed for the opposite state of affairs? Under the representative form of government that obtains in Canada, as in other parts of the British Empire, prosperity or otherwise is not a matter of governments. It is a matter of the application of the laws of supply and demand. At election times all kinds of promises and threats are exchanged, and the direst forebodings are mixed with the most roseate prophecies according as one's political sympathies may tend. Yet the steady development of the nation goes along unchecked. Canada has not prospered during this past decade because her government has been Liberal or Conservative. She has prospered because she has drawn nearer and nearer to the glorious destiny reserved for her, and no matter who had been in power, this period in her history could not have been delayed any longer. This is a cardinal principle of British institutions. No matter what the nature of the administration, in the end the policy of the country remains immutable. Around election times the opposing candidates revile each other, and the newspapers become reminiscent of the "Eatanswill Gazette." But, after all, the Government does not do anything foolish or ill-advised. That is why most people are amused rather than impressed by such vaporings as were indulged in by the Halifax Herald regarding Norwegian shipping and the desperate straits of the schooner captains. Should any responsible Cabinet be so foolish as to act on the Herald's advice and immediately and violently upset the principal industry of the province, the Herald would be the first to cry out, and the usual colored headlines would be in evidence.

The Herald is not the only sinner, for its bitter rival (on paper), the Halifax Chronicle, has just received a well-deserved slating from the P. W. A. lodges. This latter paper made some very uncalled-for remarks on the result of the Cape Breton elections, stating that the miners were ungrateful, and had "stabbed their best friends in the back." This was because the Liberal candidate was defeated. Now, what right has any member of Parliament to pose as a special friend of any section of his constituency? He is in Parliament to represent his constituency, not to obtain favors for them. The statements made by various members of Parliament that they have obtained such-and-such benefits for their constituents, such as a postoffice, a wharf, or other public conveniences, betray a perverted sense of political duties. It used to be understood that members of Parliament were sent to the legislature to make laws and decide the policy of the country, not to act as a sort of glorified parish council debating about the parish pump. It is a sad fact to admit, but somehow the byword, "to the victor belongs the spoils," is firmly fixed in our political ideals.

Rescue Apparatus.—With our friends in the United States, to think is often to act. It is not very long since the three foreign experts made their report on the conditions in American mines, and it is only a short time since the Government's Central Rescue Station was erected in Pittsburg. In the past month, however, three serious fires have been fought successfully by men wearning the Draeger apparatus. The fires occurred in the Greensburg No. 1 Mine of the Keystone Coal & Coke Co.; the Hazel Mine of the Pittsburgg-Buffalo Co., and in the No. 1 Mine of the Washington Coal & Coke Co. The fires in the Washington Company's mine and in the mine of the Pittsburgh-Buffalo Co. were fought by men from the Government station. Further details are not to hand, but evidently the Pittsburgh station has soon got down to real business.

NEW BRUNSWICK.

The Canada Iron Corporation has lately taken over extensive Vanadian iron foundries, together with mining interests of the Drummonds. Mr. J. J. Drummond, of the above-mentioned corporation, accompanied by Mr. W. F. C. Parsons, chief mining engineer at Londonderry, N.S., was in St. John on the 17th of November, and on the following day left for Fredericton to hold a conference with the Provincial Government relative to the construction of the railway which the company intends building from their Gloucester iron deposit to Bathurst, the length of the road to be about twenty-five miles, with 80-pound rails, and of the best construction. Mr. Drummond recently interviewed Mr. O. Turgeon, M.P., concerning improvements at the entrance of Bathurst harbour, and expressed a hope that the Government would undertake the necessary work.

Relative to the merger herein referred to, Mr. Drummond denied the statement that the Drumond interests had been sold to an English syndicate. Five of the old directors were on the Board of the new corporation, and four new English capitalists were added. The control remains in Canada.

The corporation's capital si $8,500,000, and would likely be increased to $10,000,000.

Among the concerns included in the merger, Mr. Drummond mentioned the following: The Londonderry Iron and Mining Company; the Canadian Iron and Foundries Company, with plant at Londonderry; The Annapolis Iron Mines; foundries at Three Rivers, Montreal, Hamilton, St. Thomas, and Wort William; Canadian Iron Furnace Co., including the Radnor Furnaces, P.Q.; the Midland Ontario Blast Furnaces; the Drummond Char coal Furnaces, and the Georgian Bay Engineering Works. The corporation had also an interest in the Bathurst properties, the Drummond Mines at Cobalt, and Bessemer Iron Mines in Hastings County, Ontario, and other mines.

Mr. Drummond states also that a number of men are at work at the Gloucester mines uncovering the ore, and it is hoped to be able to start on a much larger scale in the spring. Immediately proper facilities are provided, the company will begin to ship ore, and will in due time establish a blast furnace at the mines.

It has been learned that the Local Government will consider favorably the matter placed before Premier Hazen by Mr. Drummond.

A party of engineers is now at work on the preliminary survey, and in the event of the grants being obtained, the final survey will be made this winter. The mines will in all probability be opened up in the spring, and ore will likely be ready for shipment by the time the railway is completed.

Upon trade conditions depends the development of the mines, and should these prove satisfactory, ore wil in the course of time be smelted on the spot. It is not the intention that the business proceed like in the pulp industry, in which the raw material is being shipped away and outsiders allowed to reap the profits of manufacturing

Mr. G. W. Ganong, ex-M.P. for Charlotte County, is interested in a copper property near Springfield, on the New Brunswick Coal and Railway Company's line. A seam of copper eight feet wide, which can be treated at but little cost has been opened up. Associated with Mr. Ganong in the venture are two Colorado mining men. Work has been suspended until the spring.

ONTARIO.

Cobalt, Nov. 21.—A topic that is being discussed on the street corners is Professor Hidden's break about Crown Reserve. Prof. Hidden stated that a hose had been played on the face of the vein for obvious purposes. Mr. Cohen denies this. Some one in Montreal and some one else here put up money to prove that Hidden is wrong. The Crown Reserve people claim that nothing is hidden. Hidden claims that all things are Hidden. And so on.

Cobalt is to have a daily paper. The "Cobalt Nugget" is undertaking to appear every 24 hours.

The Chambers-Ferland has installed an air compressor purchased from the O'Brien mine. A contrast has been made with the American Smelting and Reduction Company of Denver for ore under 1,000 ounces; 250 feet of drifting is the amount done up to date at the 100-foot level.

Andrew Osman and John Aha, two Finlanders, were killed at the Beaver Mine on the evening of Monday, November 16th. While they were being lowered in the bucket the bucket tipped and both men were hurled to the bottom of the shaft. Both were killed instantly. A boy of seventeen years of age was running the hoist.

Montreal River.—During the latter part of October your correspondent left Latchford for Elk Lake City. The journey takes ten hours, and is broken by three portages, none of which exceeds half a mile. Pork Rapid portage, about a third of a mile long, has a tramway for freight. On the other two portages freight is hauled by cart or sleigh. At Pork Rapid is a good eating-house. The return journey took eight hours.

The boats were loaded with provisions and supplies. Little machinery was visible. Between Elk Lake City and its sister city, Smythe, on the west side of the lake, only 100 yards of water intervene. Both settlements are well situated. The townsites are so placed as to secure good drainage and plentiful water. There are four comfortable, well-heated, clean hotels. The grub is as good as can be found in any such places, and considerably better served than usual.

At the time of your correspondent's visit the snow was eight inches deep on the level. Consequently it was difficult to see the country to advantage.

Several properties, including the Otisse and Downey, were visited. The Downey lies half way between Elk Lake City and Silver Lake. Silver Laké is six miles from Elk Lake City.

No real mining was being done. At the Downey 30 or 40 bags of silver ore have been taken out. At the Otisse a considerable amount of trenching has been done. But now all energies were directed to putting up bunk-houses for the winter. Most of the buildings gave indications of being very substantial.

The general impression formed by your correspondent was that there is no such thing as a mine in the district. In fact, development work is hardly properly in swing. It will take at least six months of continuous work to get beyond the first stages of development. Unprejudiced visitors will admit that what this and the rest of the Montreal district offers is a fine chance for putting some money into investigating the promising surface showings. But nowhere is there anything that should be or can honestly be called a mine.

Investors should see that every cent of their money goes towards finding out what the Montreal River veins mean.

BRITISH COLUMBIA.

Rossland.—Mining has been quiet but steady throughout this district for the past two weeks. Elections on both sides of the boundary line have withheld immediate action in several matters that were pending, but now that the vacant offices have been filled those behind the mining industry here can put their plans into operation, well knowing what political interests they will have to deal with for several years to come.

The operations at the big mines during the past fortnight were along the regular lines, and a steady output was maintained. The tunnel being driven by the Le Roi No. 2, Ltd., on the Surprise claim is being rapidly bored. In this adit a new record for driving has been made for the camp. Messrs. Sexton, Swanson, Piper, and Jacobson, who have the work in hand, beginning October 5th reached the 180-foot mark on November 5th. They used one machine drill, working two shifts, and did their own blasting, etc.

The Centre Star during the last couple of weeks has shipped 3,700 to 3,800 tons per week, the Le Roi 1,600 to 1,900 tons, and the Le Roi No. 2, Ltd., from 400 to 600 tons, making the average weekly shipments a little over 6,000 tons per week. The average shipments from the camp are heavier than they have been for some time.

Among the small mines, the St. Elmo and I. X. L. appear on the shipping list, 3 35ton car of select ore having been shipped from the St. Elma to the smelter and a 3-ton shipment from the I. X. L. A considerable quantity of gold-bearing ore was taken from the I. X. L. in the early days, but the main lead was lost, and although several lessees have spent time and money digging for it, they have received but little reward for their labor. The ore is of an altogether different formation from that found in the Le Roi and other mines, but a few paces away being a quartzite and carrying gold both in a free state and associated with a base metal. No one would be surprised any day to hear that some one who had leased either the I. X. L. or O. K. mines had opened a duplicate of the rich pockets encountered in these mines in the early days, for all are confident that the main ore body is still to be located in the heart of the O. K. mountain.

PHOENIX.—Nothing unusual has happened in this district for several weeks. In Dominion Copper affairs there is very little that is new, and it is not expected that any important movement will take place until the reorganization proceedings have been carried through.

The Granby mines, the Mother Lode, and Oro Denoro of the British Columbia Copper Co., and the Snowshoe and Phoenix Amalgamated of the Consolidated M. & S. Co., are the only properties shipping at present. District shipments are being maintained at 34,000 to 35,000 tons per week. For the week ending November 14th the shipments were: Granby, 20,037 tons; Mother Lode, 11,566; Oro Denoro, 950; Snowshoe, 2,800. Including these shipments, which amount to 35,353 tons, the output of the district totals up 1,239,292 tons.

Henry Bahrs and associates have taken up the option on the Golden Zone group recently dropped by men interested in the Daly Reduction Co. Mr. Bahrs is now in Boston working on this deal. The Golden Zone group comprises the Golden Zone, Irish Boy, British Columbia, and Silver Bell claims. The showing on these claims is much similar to the ore found on the Nickel Plate group, the ore carrying gold, silver, and some nickel and cobalt. The work so far done on the claims has been in a development way, and consists of open cuts, glory hole and two shafts 35 and 50 feet in depth. A five-stamp mill was but lately installed at the property, which may be used for mill tests at certain periods of the year. Just now this mill is not in operation, owing to scarcity of water.

Development on the Bruce mine is giving good results. There is a splendid showing of chalcopyrite on the property carrying gold in a paying quantity.

Nelson.—The wonderful water power that is available at Bonnington Falls, and which is destined to play an important part in the future of the mining industry of Southeastern British Columbia, is now making its might felt in this district, and the machinery at the Silver King and Queen Victoria mines will soon be operated by electrical energy from the power plants on the Kootenay River.

The West Kootenay Power & Light Co. is developing 30,000 horsepower in two plants at Bonnington Falls, which is distributed over heavy voltage lines to Trail, Rossland, Grand Forks, Phoenix, Greenwood, and Nelson.

The City of Nelson also has an up-to-date power plant situated above the plants of the West Kootenay Co., and in addition to lightin gthe City of Nelson are competing with the West Kootenay Co. for the business of the mines.

The Van-Roi Co. are planning to do 1,000 feet of tunnelling and development. Work will be begun in the near future.

Development at the Ymir mines is being prosecuted in the direction of the big lead that it is thought lies beyond the old vein and farther in than the short section of vein recently uncovered 800 feet northwest of the old workings. The discovery of large and small fragments of "float" above the hill from the old workings led to the hypothesis that a large vein existed in the unexplored ground above the mine, and work carried out along these lines has given most encouraging results. It is expected that a new and valuable ore body will be opened up before the work has progressed much farther. The 80-stamp mill is capable of handling a large tonnage of ore; in one year the company having crushed 69,505 tons, from which a profit was derived of $40,000. Further working costs are expected to appropriate $4 per ton.

Vancouver.—A new seam of good quality coking coal has been opened up in the Bulkley district, about five miles from Telkwa. This seam is forty feet thick.

The Iron Mask, the leading mine of Kamloops district, has been disposed of to Minnesota capitalists. This mine has not been working for a couple of years, on account, it is stated, of financial difficulties. The showing of ore in the mine is very favorable, and there is an up-to-date hoisting and air compressing plant on the property. Upon the Iron Mask, to a great extent, rests the future of copper mining in Kamloops district.

George Patterson, an old prospector from the Yukon, recently took up a homestead near Sedgewick, Alberta, and the prospecting fever being still strong within him, he dug around and found a big deposit of auriferous gravel on his place, assays from which gave from $6 to $30 per ton. It is supposed that the deposit is of glacial origin. There is considerable excitement over the find, but considerable work will have to be done before the true value of the discovery will be known.

GENERAL MINING NEWS.

NOVA SCOTIA.

Halifax, N.S., Nov.10.—The transfer of the Drummond Iron Ore properties at Londonderry, Torbrook, and Bathurst to a wealthy English syndicate, headed by Sir James Heath, has been consummated, and very shortly the blast furnaces at Londonderry will be put in operation again to test the quality of the Bathurst ores. This is good news for Londonderry, and this section of Colchester, as the shutting down of the blast furnaces has caused general depression in the Colchester mining town and surrounding districts.

Sydney, Nov. 17.—It is reported that McKenzie & Mann are making an effort to purchase the Mabou coal mines at Inverness. These are conceded to be superior to any in Nova Scotia as to quality. The present owners are handicapped through lack of financial backing, and once this past summer were compelled to close the mine for a time, and at present it is only working on half time.

McKenzie & Mann own the Inverness Railway, which branches from the Intercolonial and runs past the Mabou deposits, and should they become purchasers, they could afford through superior shipping facilities to sell their product much cheaper than the present syndicate.

Halifax.—The Eastern Trust Co., receivers of the Boston Richardson Mining Co., have, as a result of the operation of the mine for the month of October, received a brick of gold weighing 579 ounces.

Halifax, Nov. 20.—With the sailing of the steamer Ocean from Sydney on Friday next the Dominion Coal Company's shipments up the St. Lawrence will discontinue for the season. The total quantity going in that direction this year was 1,345,000 tons, inclusive of a shipment of next Friday, an increase of about 200,000 tons over last season.

ONTARIO.

Craigmont.—Operations have been resumed at the plant of the Canada Corundum Company, at Craigmont, after a shut-down of some eleven months. The entire property of the Canada Corundum Company has been leased on a royalty basis to the Manufacturers' Corundum Company, Ltd., a corporation organized by Mr. D. A. Brebner, late secretary-treasurer of the Canada Corundum Company. The plant will for the present be run on a 12-hour shift, and with the improvement of business conditions in the United States a ready demand for the company's product is being met.

Cobalt.—During the month of October the La Rose Consolidated Mines shipped 17 cars of ore from their mine. Out of these cars five of them were high-grade, and the remainder were of a medium or lower grade. At the main La Rose mine a force of 170 men are engaged in active mining operations.

On the Violet property a force of ten men is engaged in surface prospecting. Several trenches have been dug, and up to date six well-defined veins have been caught. These will run from one to six inches in width of calcite. It is quite probable that a new shaft will be started on the property during the coming winter.

The only work being done at the University mine is the sinking of a new shaft. This shaft was sunk on three small veins, whose continued width made five inches, and the ore carries native silver. The shaft is down 45 feet, and will likely reach the 100-foot level before any drifts are driven on it. Only one machine is engaged in this work, and a force of twelve men are employed on the property.

During October the Nipissing Company mined ore of an estimated value of $121,445, and shipped ore of a nestimated value of $127,518.

The most important events of the month included the cutting of three cross veins on the 145-foot level of the Kendall; favorable prospecting developments in the diabase on R. L. 305 and R. L. 408; and the increased possibilities of cutting the La Rose vein at the Promise shaft, in view of recent developments by a neighboring company.

A recent trainload, consisting of about 600 tons of silver ore shipped from various parts of Cobalt, consigned to the American Smelting and Refining Company, Denver, Col., routed via T. & N. O. Railway to North Bay, Canadian Pacific Railway to St. Paul, in connection with the Chicago, Burlington & Quincy Railway, made the fastest time that has ever been accomplished on freight between these two points. The time occupied in transit was only four days and twenty-two and a half hours, this as against time via other routes of eight days.

ALBERTA.

Calgary, Alta., Nov. 18.—When the matter is taken up in earnest, it is believed a considerable supply of petroleum will be produced in Alberta.

From the American boundary on the south to Lake Athabasca, several hundred miles north of Edmonton, there are signs that the underlying rock is saturated with petroleum, while along the Athabasca River the deposits appear at or near the surface. Natural gas and oil pour out of the river banks and the bed of the stream for over 100 miles.

Near Pincher Creek some successful oil and gas well have been bored, and the Western Oil & Coal Consolidated, which has leased 13,000 acres of the most promising land surrounding that town, is now actively engaged in drilling for both oil and natural gas.

BRITISH COLUMBIA.

Kaslo.—At the Reco mine 4,000 sacks of ore are ready for shipment. As soon as rawhiding commences, shipments to the Trail smelter will be started.

Victoria.—The Daily Colonist says: "What ought to have a stimulating effect on mining affairs in this province is the announcement that Le Roi No. 2 mine, at Rossland, has declared another dividend, making a total of six shilling a share for 1908. This property is making an excellent showing, which is indicated by the fact that the shares have made a further advance in price on the London market, and the management is to be congratulated."

Nelson.—Electric power from Bonnington Falls is being installed at the Silver King mine, nine miles from Nelson. Power is also to be installed at the Queen Victoria mine.

Nelson, Nov. 14.—While the principal feature in the mining in the Boundary is the pushing forward of the development work upon the Phoenix Amalgamated, belonging to the Consolidated Co. of Trail, where the owners expect confidently to have a mine equalling the Granby in point of capacity and while in Rossland there is steady prosecution of work upon the older properties and a good deal of leasing going forward in some of the lesser mines, in the Slocan the activity is still marked. Sandon is again resuming something of her old aspect with the prosperity derived from the working of the Whitewater and other mines. On Slocan Lake the Vancouver, while not shipping to any extent, is steadily developing. The site for the new mill there has been graded and preparations made for its erection in the spring. On Kootenay River a power line has been brought into the Queen Victoria mine where now nearly one hundred miners are employed and on the Granite nearly opposite the mill has recently been running some very good ore.

The alterations to the Bluebell mill have been completed and the mine is now in a position to maintain a large output. A new mill is being projected to work conjunctly the Mother Lode and Kootenay Belle, and a larger mill is being planned for the Nugget, while at the Queen in the early spring a

cyanide plant will be put in. In the meanwhile a two mile flume has just been completed, insuring the present plant against any lack of water. A power line 25 miles long is being surveyed to connect the Sheep Creek properties with the main line of the West Kootenay Power Company.

Kalso.—The Consolidated Mining and Smelting Company is reported to be after the Ivanhoe mine at Sandon. The Ivanhoe comprises a group of twenty-six claims, lying north of the Slocan Star. It shipped for years, but has been closed since 1905. The ore is composed of zinc-blende and galena.

Nelson.—With the beginning of winter on the higher slopes of the mountains properties which have been developing all summer are now beginning to ship under more advantageous conditions. While this is particularly true of the Slocan, other properties in Rossland and in the Boundary are also coming to the front as shippers.

The event of the week is the proving of a parallel lead on the Nugent mine on Sheep Creek. The Sheep Creek district hardly one year old and which has now an output of close on 700 tons weekly is negotiating for power to run its properties on a more economical basis.

In Rossland the Silver Belle mine, not shipping since 1896, is again to the front, while the I.X.L., an old Spokane proposition is again under lease. The Centre Star mine with a shipment of 4,677 tons for this week is a record, while the Trail smelter with its receipts of 9,953 tons has again established a record.

YUKON.

Vancouver, Nov. 7.—"Provided circumstances warrant we will next season complete construction of the spur from the main line into the mineral zone of the White Horse copper camp; seven miles, or half of this road, was built this summer." This statement was made by A. L. Berdoe, general manager of the White Pass and Yukon route.

"This season we constructed the heaviest portion of this spur, and carried it through some distance beyond the Arctic Chief mine, and to a property known as the Best Chance. Beyond that point the work is all light, and I believe that inside of two months the rails can be put down on the remainder of the spur. The road built this season was exceptionally heavy, as we had to contend with large rock cuts and muskegs. The work was performed in a thorough manner, and when operations were stopped on September 15 we had really done more than we expected to this year.

"At Skagway ore bunkers with a capacity of 5,000 tons were built ready for service. These are loacted right off the end of Moore's wharf and ore-carrying steamers will be loaded directly from the bunkers.

"Despite the fact that the depression had its effect on mining activity as had also the low price of copper, I am very glad that our company decided to build a portion of the spur last summer, for the reason that it was possible for us to obtain plenty of labor, something we could not have done in any ordinary year.

"While the north suffered from the depression this year in common with the rest of the country I am certain that next year conditions will be much improved. Of course, where placer mining is carried on with dredges operators are always one year behind the adoption of their plans owing to the fact that it takes that length of time to get their machinery and equipment built and laid down on the ground. This being the case it was not to be expected that any large new plants would be installed in the Yukon this year because in the fall of 1907 it was impossible to interest capital in even the certainty of a Klondike gold mine. Next year will be a prosperous one in the north."

More work is being done on Dominion Creek this winter than any time during the last two winters. Many lays are being worked and a large number of the owners are participating in the opening of the ground.

Upper Dominion is not so busy as that portion around Granville, but is far from being dead. Many claim owners and laymen wil have large dumps out by spring as evidence of their activity.

From No. 33 down there is much activity. Foley Bennett on 34 and 35 has 19 men on his ground, some working as laymen.

On 76, 80, 96 and 97 many men are engaged in mining as laymen. On 2 below Hufford, Campbell, McQueen and Mexican Jack are working a lay. A number of laymen also are working on Caron's ground on 10.

Frank Morrison, the heaviest Dominion operator, who did much open cutting during the summer, is preparing to operate in the coming summer on a larger scale than ever, but is not taking out dirt just now. Pete Rost, who also has become a big summer operator, is not working any men just now, but is on the creek and may be making a winter showing before long. Cason Brothers and Lemore & Modren were among those who made big open cuts on Dominion during the open season.

The claims mentioned individually in the foregoing are but a few of those working on Upper Dominion this winter, but enough to indicate there is something doing on the famous old creek.

Transferring Dredge.

The Yukon Gold Company will transfer one of its dredges now on a creek in the Atlin District to Dawson next season. A report to this effect is brought by a recent arrival from the Atlin district. It seems that the dredge, which has been in the Atlin district the last two or three seasons, has encountered too many boulders there. The impractibility of operation of that ground with a dredge is admitted, and the big machine is to be moved to the Dawson district, where gravel and other conditions are favorable.

Steam shovels have had better success in the Atlin district. When they encounter boulders they can work around them and leave them to be swung out of the way by derricks.

Hydraulic mining also is demonstrated to be a great success in the Atlin district. The ground is little if any frozen, and the season is long.

One Atlin operator adopted an unique means of digging a ditch several miles in length for bringing water to his property. He built a scow, launched it in a lake, mounted a steam shovel on the scow, and began digging along a certain grade from the lake toward his hydraulic location. By following the proper grade, he eventually made a first-class ditch with water running through it, and the steam shovel on the ground ready to assist in the work. The shovel was wrecked a time or two during the digging of the ditch but no serious damage resulted.

There was an explosion of fire damp in the Radboo mine at Hamm, Westphalia, Germany, November 12th, which probably will result in heavy loss of life. Already twenty-seven bodies have been brought to the surface and 300 men are still underground in grave peril. Four hundred miners were working in the pit at the time of the disaster. About 7 have been brought to the surface. Of these a majority are more or less injured, and one has since died. One hundred and fifty men are in shaft No. 2, and it is believed that all are doomed. Rescuers arrived from all directions and the work of getting below was at once organized. These efforts, however, were necesarily slow and attended with extreme difficulty. One of the shafts, together with its elevator cage, has been completely burned out. An improvised cage was sent down with a corps of rescuers, who made heroic efforts to reach their comrades. At one o'clock the fire had made such headway that the rescuers had to be called back to give way to the fire fighters, and the flames are still spreading. The vicinity of the mine is surrounded by police. A total of thirty-five bodies had been brought to the surface up to 4 o'clock this afternoon. Eighteen of the men who got out alive are severely injured. No hope is entertained for the 300 men still below ground.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

Monmouthshire coal-owners have decided to establish a rescue station.

The Hickleton Main colliery, near Doncaster, claims to have established a new record, in winding in one day of 13 hours 4,072 tons of coal from one shaft.

GERMANY.

The greatest mine disaster in many years occurred on Nov. 12th at the Radbod coal mine, near Hamm, Westphalia, an explosion being followed by a fire. Of 380 miners only about 40 escaped, many of them badly injured. Many dead bodies have ben taken out, the attempts to rescue the emtombed men being fruitless owing to the headway made by the fire.

RUSSIA.

There was a record output of iron ore in 1907, the total amounting to 4,227,419 tons exclusive of manganese ore exported from Poti, which were 881,322 tons, as compared with 464,016 tons the previous year. There was an increased demand in Germany for South Russian iron ore, 1,613,000 tons being shipped to that market, as against 535,000 tons in 1906. A marked increase was also shown in the production of pig iron.

SWEDEN.

Sweden is resorting to peat as a fuel in order to avoid dependence upon British coal. The country is stated to possess the largest peat deposits of any in the world, excepting Russia, and many inventions to utilize peat in the form of briquette and powder are being experimented with. The railways have been making trials with British coal, Swedish coal and peat, separately and mixed, to ascertain the most economical form of fuel. The total extent of the peat deposits is estimated at 8,000,000,000 tons.

AUSTRALASIA.

The coal in the Mackenzie River district, Queensland, is attracting attention. An examination to be made by diamond drill on a group of coal-prospecting areas extending for 25 square miles, near Tryphinia, on the Central Railway. The Mount Morgan Gold Mining Co. is interesting itself in exploration for coal near Bluff, where they have large buildings.

SOUTH AFRICA.

Increased activity at the diamond mines is reported. The Premier is making preparations for a greatly increased output and is installing a new plant capable of treating 15,000 loads per day. At the Voorspaed mine, Orange River Colony, washing operations have been begun with a new plant, the yield averaging about 20 carats per 100 loads.

A number of amalgamations of mines in the East Rand are being carried through. The Modderfontein Extension and Transvaal Lands and Mines Proprietary Syndicate have been merged, and among other amalgamations in process are those of the Chimes West and Benoni and of the Van Ryn Deep and Kleinfontein Deep.

UNITED STATES.

Mr. Samuel Newhouse, of Salt Lake, has purchased the Silver Peak Valcalda mines at Blair, Nev.

The Croesus Gold Mining and Milling Co., eperating the old Plumbago mine, near Alleghany, Sierra Co., Cal., is installing one of the most complete electric power plants in the State, and will considerably extend their workings.

The Fink furnace, which it is claimed will save half the cost of fuel, is to be tested on a commercial scale at Garfield, Utah, on the premises of the Boston Consolidated Mining Co., where a plant capable of treating 100 tons a day is being installed. The device consists of two revolving revedberatory furnaces, a central fire-box and a cluster of air pipes installed between the furnaces. By the revolution of the furnaces during the heating process it is claimed that new surfaces are constantly exposed where the heat blown in is most intense. It is asserted that blister copper can be produced with one melting, and that no coke will be required.

All the Arizona mines of prominence are very busy, and the total copper output for October is stated at 27,862,000 pounds. This was the largest monthly product this year, and from present indications Arizona will probably head the list as the largest producer of copper for the year 1908. For the first ten months of this year the Arizona production is estimated at 28,952,270 pounds more than that for Montana during same months. The Copper Queen mine is now the largest single producer with a monthly output of over 8,000,000 pounds.

The Greene mine is getting on its feet again, and for the month of October obtained an output of 3,854,000 pounds of copper, 95,506 ounces of silver and 698 ounces of gold. The new improvements are said to have resulted in reducing costs to less than to cents. The old plant was able to turn out 50,000,000 pounds of copper per annum, but the new management figure on a future production much larger than formerly.

Six men were instantly killed in a mine-cage accident at the Ellsworth mine, Washington Co., Pa., on Nov. 16th. Owing to a break in the machinery the cage fell 285 feet to the bottom of the shaft.

INDIA.

The Indian Government has authorized the construction of a railway from the Gurakushinilt Hill to Kalamati, where the Tata melting works will be established.

The production of coal was greater in 1907 than in any previous year. Bengal produced 9,993,348 long tons, valued at u2,208,091, and the output of the other provinces was 1,153,991 tons.

MEXICO.

There has been great activity in prospecting for and developing oil lands in different parts of Mexico, and several American syndicates have obtained options covering extensive tracts in the States of Tamaulipas, Vera Cruz and Ciapas. A number of drilling outfits have been brought from the United States.

COMPANY NOTES.

Mr. E. F. B. Johnston, K.C., presided at the meeting of shareholders of the Foster Cobalt Company, Nov. 5th, and explained the details of the report.

The company is said to have had three valuations on its ore dump, and these have varied from $15,000 to $50,000.

That part of the report dealing with the finances is as follows: "The present stock of ore on hand ready for shipment consists of about 30 tons of ore high in Cobalt, but low in silver. The prospects for early shipment of high grade ore is uncertain, depending entirely upon the results of the development indicated above.

"The results of some concentration done on ores from the dumps confirm the belief that these dumps contain values variously estimated at from $15,000 to $50,000. During the coming winter months when transportation is cheap, large quantities of this ore will be sent to the concentrator, where arrangements are in effect under terms distinctly favorable to the company."

Live Assets.

The financial statement submitted to the meeting showed the following live assets. Cash on hand and in bank, $17,342.18; due from smelter and ore sales, $24,185.42; accounts receivable, $476.44; supplies on hand, $2,379.56; total, $44,383.60. Also there is the ore in the ore house and in the dump variously estimated as worth sums up to $50,000. To offset the assets are wages due and accounts payable aggregating $4,454.74, so that deducting these, and valuing the ore at $18,000, the mine has $53,028.86 to the good, wherewith to operate, easily enough to run for another year if no further values are extracted.

The operating account for the year showed that $39,000 had been spent in ore extraction, and $37,000 in development, other expenses bringing total expense for the year up to $198,835.49. This is offset by $76,461.13 as the result of ore sales, $145 for rents, $1,099.60 from interest and exchange, and the balance $31,129.74 has come from the balance brought forward from last year of $82,624.13, reducing the present balance, as per balance sheet to $51,494.57.

Practically no objecting to the course of the directors were expressed at the meeting. The old board of directors was re-elected by acclamation.

The dividend on the Buffalo mine stock is now at the rate of 32 per cent. per annum. In a letter to the shareholders President Denison says that the increase would have occurred earlier, but he was waiting for a better silver market. The company apepars to have had the usual trouble crushing the ore, which is very hard, and Mr. Denison states that the capacity of the machinery did not come up to recent expectations. However, the new electric water pump, the cyanide plant, etc., have, in the president's words, "meant increased production at less expense and an increased revenue from what has been an accumulating, though heretofore idle, asset, namely, the ore going on the dump piles." The company will use the funds received from the distribution of the treasury stock to enlarge the concentrating and cyanide plants. The president says that dividends have ben paid from earnings, while development work progressed, and that there are now ore bodies in sight of greater value than he ever expected to see in this or any other Cobalt property.

A meeting of the bondholders of the Dominion Copper Co., Ltd., for which a receiver was apointed some time ago, will be held on November 30th at the office of Guggenheimer, Untermyer & Marshall, No. 37 Wall Street, to receive a report from the trustee of the bondholders as to the action which has been taken, and to consider such other matters as may be brought before the meeting.

The La Rose Mines, Ltd., makes the following preliminary statement of production and earnings for October:

	Tons.	Silver contents. Ounces.	Net value.
Shipments.	541	199,271	$88,890
On hand Oct. 31.	94	102,454	47,456
Total.	635	301,725	$137,346
Less on hand Sept. 30	142	106,287	49,930
October production	493	195,438	87,416
Estimated expenses..	...	.....	23,207
Net profit for October	...	.....	64,209

Total for June, July, August, September and October silver contains 1,230,180 ounces; net profit, $484,853.

The annual meeting of the Green-Meehan Mining Company was held on November 7th. It was explained that the reason work was stopped on the mine was because the values petered out, and the directors wished to wait to see how other mines succeeded in their experiments as to how much ore was to be got deeper down.

Whilst this explanation was accepted, it may be termed an explanation only by courtesy.

The work was stopped on December 15th, 1907, and preparations to continue it were started a week ago on information received, but not vertified, as to the ore to be found at a depth.

The money in the treasury will enable the company to keep working for some time. Two hundred thousand shares of stock were put in to operate the mine two months before the work stopped.

The shareholders were not satisfied with the reasons advanced as to why the work stopped, but E. B. Ryckman, the chairman, said they were the only reasons he had. They said that not sufficient effort had been made by the dicetors to carry on the worik.

An engineer was asked recently to go up and take charge of the mine. Ii ts three-quarters full of water, and the trench is two-thirds full. This water has been accumulating ever since work stopped. It is estimated that $200 will take it all out.

One director sold 14,000 shares to a friend, but of the 700,000 shares held by directors that is the only sale known.

The chairman was asked why the treaspry stock was not sold when it was around 170. He said the reason was that the expert said there was enough value in sight to run the mine, and they had made so much in the first couple of months that they decided not to sell.

There is about $25,000 worth of low grade ore now on the property.

Twenty-seven thousand dollars will be spent to see if any results are to be obtained from the mine.

The chairman said that the directors have spent $50,000 of their own money.

They expect to sink the shaft at an expense of $40 per foot.

At the annual meeting of shareholders of the Cobalt Townsite Mining Company, Limited, held at North Bay, a new board of directors was elected, consisting of Eric H. Rose, London, England; Thos. Plunkett, New York; Rupert Simpson, Simcoe, and W. R. P. Parker, Toronto. The new officers of the company who were elected were: President, W. R. P. Parker; vice-president, Rupert Simpson; treasurer, E. H. Rose.

The reports of the managing director and of the manager of the mine were received and considered, and were of a satisfactory nature.

It is said that there have been some recent strikes of unusual value on the property, and a strike on the Right of Way of a vein traced into the property of the Cobalt Townsite Company.

At a meeting of the directors of the Tretheway mine on November 13th it was decided to make a 10 per cent. distribution of profits on December 15th. The company will not adopt the practice of declaring dividends at stated intervals, but will disburse the profits among the shareholders whenever a sufficient surplus accumulates in the treasury.

The last dividend of $2 a share on Granby Consolidated will make $4 for the year.

The dividend record of Granby is as follows, on basis of $100 par value:

1908	$4	1905	$3
1907	9	1904	0
1906	12	1903	1

The initial payment was made December 16th, 1903.

STATISTICS AND RETURNS.

Returns to the Bureau of Mines show that the output of the metalliferous mines and works of the Province of Ontario for the nine months ending September 30th ,1908, was as follows:

		Value.
Arsenic, tons	464	$19,892
Cobalt, tons	480	80,623
Gold, oz.	2,504	40,797
Silver, oz.	12,223,834	6,141,090
Copper, tons	5,892	837,559
Nickel, tons	7,760	1,494,693
Iron Ore, tons	166,088	448,532
Iron Pyrites, tons	13,417	43,948
Pig Iron, tons	189,287	3,098,661

Shipments from the Cobalt mines during the period amounted to 18,325 tons, including 480 tons of concentrates. Arsenic in the above table represents only the quantity recovered by reduction works in Canada, and cobalt only the cobalt contents of shipments for which mine-owners received returns.

INTERCOLONIAL COAL CO.

Shipments, Oct., 1908	18,304
Shipments, Oct., 1907	19,973
Decrease, Oct., 1908	1,669
Shipments, 10 months, 1908	210,296
Shipments, 10 months, 1907	222,547
Decrease, 10 months, 1908	12,251

CUMBERLAND RAILWAY AND COAL CO.

Shipments, Oct., 1908	28,992
Shipments, Oct., 1907	nil
Increase, Oct., 1908	
Shipments, 10 months, 1908	305,516
Shipments, 10 months, 1907	213,409
Increase, 10 months, 1908	92,107

INVERNESS RAILWAY & COAL CO.

Shipments, Oct., 1908	25,506
Shipments, Oct., 1907	22,275
Increase, Oct., 1908	3,251
Shipments, 10 months, 1908	218,236
Shipments, 10 months, 1907	198,847
Increase, 10 months, 1908	19,389

ACADIA COAL CO.

Shipments, Oct., 1908	26,308
Shipments, Oct., 1907	31,987
Decrease, Oct., 1908	5,679
Shipments, 10 months, 1908	265,389
Shipments, 10 months, 1907	262,230
Increase, 10 months, 1908	3,159

CROW'S NEST COLLIERIES.

The output of the Crow's Nest collieries for the week ending November 6th was 19,634 tons, a daily average of 3,272 tons.

The output of the Crow's Nest Pass Coal Company collieries for the weey ending November 20th was 19,927 tons, a daily average of 3,321 tons. Week ending November 22nd, 1907, 18,508 tons, a daily average of 3,085 tons.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from Cobalt camp and those from January 1st to date:

	Week end. Nov. 7. Ore in lbs.	Since Jan 1. Ore in lbs.
Buffalo	104,000	1,016,950
*Coniagas	64,430	1,097,288
Crown Reserve	120,000	714,688
City of Cobalt	670,000	1,306,300
Foster	140,000	437,300
La Rose	197,000	7,528,970
McKinley-Darragh	285,000	2,859,770
Nova Scotia	40,000	487,675
Silver Cliff	46,100	98,100
Townsite	40,600	292,300
Temiscaming	63,360	994,980
T. & H. B.	60,000	2,133,666
Tretheway	60,000	2,102,476

The total shipments for the week were 1,287,490 pounds, or 643 tons. Total shipments from Jan. 1 to date are 36,541,756 pounds, or 18,278 tons.

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

	Week end. Nov. 14. Ore in lbs.	Since Jan. 1. Ore in lbs.
Chambers-Ferland	60,000	443,890
City of Cobalt	61,700	1,368,000
Kerr Lake	61,400	1,152,794
La Rose	395,500	7,924,470
Nispissing	293,740	3,235,350
O'Brien	255,180	6,101,337
T. & H. B.	60,000	2,193,666

The total shipments for the week were 1,187,520 pounds, or 593 tons. Total shipments from Jan. 1 to date are 39,251,056 pounds, or 18,627 tons.

COBALT ORE SHIPMENTS.

Fololwing are the weekly shipments from Cobalt camp and those from Jan. 1 to date:

	Week end. Nov. 21. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	.....	1,016,950
Coniagas	.....	1,097,288
Cobalt Lake	.....	404,623
Crown Reserve	116,000	830,688
Crown Central	40,860	527,935
Chambers-Ferland	.....	443,890
City of Cobalt	.....	1,368,000
Drummond	.....	1,291,520
Foster	.....	437,300
Kerr Lake	.....	1,152,794
King Edward	.....	127,240
La Rose	217,990	8,142,460
McKin.-Dar.-Savage	180,700	3,031,470
Nipissing	299,680	3,535,030
Nova Scotia	.....	487,675
Little Nipissing	.....	40,110
Nancy Helen	41,500	408,977
Peterson Lake	.....	41,237
O'Brien	127,600	6,228,937
Right of Way	62,159	1,300,770
Provincial	.....	143,310
Silver Leaf	.....	372,900
Silver Cliff	60,000	158,100
Silver Queen	.....	158,100
Silver Queen	.....	1,556,390
Townsite	.....	292,300
Temiskaming	60,000	1,054,980
T. & H. B.	.....	2,193,668
Tretheway	64,000	2,166,470
Watts	.....	561,680

The total shipments for the week were 1,270,480 pounds, or 635 tons. Total shipments from Jan. 1 to date are 40,478,606 pounds, or 20,239 tons. The total shipments for the year 1907 were 28,081,010 pounds, or 14,040 tons, valued at $6,000,000.

B. C. ORE SHIPMENTS.

The following are the ore shipments for the past week ending November 7, and year to date:

BOUNDARY SHIPMENTS.

Total	37,024	1,203,275

ROSSLAND SHIPMENTS.

Total	6,797	250,966

SLOCAN-KOOTENAY SHIPMENTS.

Total	3,361	103,590

The total shipments for the week were 47,184 tons and for the year to date 1,557,831 tons.

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C.

Granby	22,367	887,544

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	11,779	276,183

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	9,953	273,789

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Le Roi	1,268	66,509
Queen	27	837
Other mines	225	5,821
Total	1,520	73,161

The total receipts for the past week were 48,379 tons and for the year to date 1,538,279 tons.

BOUNDARY SHIPMENTS.

Granby	20,035	907,579
Oro Denoro	950	53,286
Mother Lode	11,566	230,113
Snowshoe	2,249	24,521
Phoenix Amal.	76	394
Other Mines	....	22,248
Total	34,866	1,238,141

ROSSLAND SHIPMENTS.

Centre Star	3,120	150,689
Le Roi	2,017	68,526
Le Loi No. 2	478	25,583
Le Roi No. 2 Milled	260	9,440
Bluebird	34	160
Other Mines	....	2,477
Total	5,909	256,875

GRANBY SMELTER RECEIPTS.

Whitewater Milled	700	25,700
Poorman Milled	125	9,675
St. Eugene	642	22,732
Queen	27	864
Queen Milled	420	8,910
North Star	36	3,801
Second Relief Milled	145	2,490
Arlington, Erie	34	2,284
Richmond	24	2,262
Kootenay Belle Milled	70	1,900
Bluebell	182	1,442
Standard	21	1,165

Rambler-Cariboo	20	1,046
Reco	22	393
Slocan Star	33	382
Westmount	23	370
Nugget Milled	100	270
Jessie Bluebird	26	84
C. H. Pollen	2	2
Other Mines	....	20,363
Total	2,642	106,135

The total shipments for the past week were 43,417 tons and for the year to date 1,601,151 tons.

GRANBY SMELTER RECEIPTS.

Grand Forks, B.C.

Granby	20,035	907,579

B. C. COPPER CO.'S RECEIPTS.

Greenwood, B.C.

Total	12,516	285,939

CONSOLIDATED CO.'S RECEIPTS.

Trail, B.C.

Total	7,223	281,012

LE ROI SMELTER RECEIPTS.

Northport, Wash.

Le Roi	2,017	68,526
Queen	27	864
Other Mines	298	6,119
Total	2,342	75,509

The total receipts at the various smelters for the past week were 42,116 tons and for the year to date 1,557,641 tons.

The output of pig iron in the United States will hardly exceed 15,500,000 tons for 1908. This is less than has been recorded since the year 1900. The output for 1907 was 25,781,361 tons.

The out put of copper from the Michigan mines for October is reported at 19,943,340 pounds, which is 736,385 pounds more than the September figures. Lake Superior production for the first ten months of this year is estimated at 188,030,129 pounds, as compared with 190,013,414 pounds returned for the same months last year.

Butte mines are estimated to have produced during October 28,864,410 pounds of copper, and for the first ten months of 1908 the total of 210,845,730 pounds. The Anaconda and Boston & Montana both did better than in September, and these two producers showed an output last month in the aggregate of over 15,000,000 pounds. Montana production since January is estimated at 13,591,477 pounds below that for the first ten months of last year, but at the recent rate of output the differences should be wiped out.

During the nine months ending with September the exports of ores and metals from the United States including the following:—

	1907.	1908.	Changes.
Aluminium, value	$259,984	285,711	I. $25,727
Copper, fine, lb.	280,056,017	520,609,477	I. 240,553,460
Copper in ore, etc., lb.	9,267,464	7,254,638	D. 2,012,826
Iron ore, tons	158,243	191,408	I. 33,165
Iron pig, tons	60,109	30,508	D. 29,601
Nickel metal, oxide, etc., lb.	6,979,881	8,026,950	I. 1,047,069
Quicksilver, lb.	345,297	185,089	D. 150,208
Spelter, lb.	785,498	4,556,301	I. 3,770,803
Xinc ore, tosn	13,991	21,056	I. 7,065
Xinc dross, lb.	16,520,771	13,555,081	D. 2,965,690

The following are the figures of German consumption of foreign copper for the months of January and September, 1908: Imports of copper, 122,55 tons; exports of copper, 6,393 tons; consumption of copper, 116,162 tons, as compared with consumption during the same period in 1907 of 87,480 tons.

Of the above quantity 112,829 tons were imported from the United States.

MARKET REPORTS.

Nov. 20.—Connellsville coke, f.o.b., ovens:—
Furnace coke, prompt, 5$1,75 to $1.85.
Foundry coke, pormpt, $2.15.

Metals.

Nov. 20.—Tin, Straits, 3.03 cents.
Copper, prime Lake, 14.4 to 14.5 cents.
Lake arsenical brands, 14.4 to 14.5 cents.
Electroliytic copper, 13.125 to 14.25 cents.
Copper wire, 15.75 cents.
Lead, 4.35 cents.
Spelter, 5.05 cents.
Sheet zinc, 7.5 cents.
Antimony, Cookson's, 8.25 cents.
Aluminium, 25 cents.
Nickel, 40 to 47 cents.
Platinum, $22.50 to $23.50 per ounce.
Bismuth, $1.75 per lb.
Quicksilver, $47 per 75-lb. flask.

Silver Prices.

November	10	49 7-8	23 1-16
"	11	50 3-8	23 5-16
"	12	50	23 1-8
"	13	49 7-8	23 1-16
"	14	49 7-8	23 1-16
"	16	50 1-8	23 3-16
"	17	50 1-8	23 3-16
"	18	50	23 1-16
"	19	49 7-8	23 1-16
"	20	49 7-8	23 1-16