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Editor:

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

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CIRCULATION.

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CONTENTS.

	Page.
Editorials	385 to 388
(a) The Asbestos Merger	385 386
(b) The Formation of Coal	386 386
(c) Prospecting and Holidays	386 387
(d) Sampling of Cobalt Ores	387 387
(e) Prevention of Gold Stealing	387 387
(f) One Prospectus	387 388
Sampling of Cobalt Ores, by Albert R. Ledoux, Ph.D.	388 389
New Zealand Geology	389 390
Coal Mining in Southwestern Virginia, by D. A. Patterson	390 391 392
Gowganda Mining Division, District of Nipissing, Ontario, by W. H. Collins (continued from last issue)	392 393 394
A Remarkable German Electric Mine Hoist, by Frank C. Perkins	394 395
The Determination of Tungstic Acids in Low-grade Wolfram Ores, by H. W. Hutchin and F. J. Touks	395 396 397 398 399
The Covington Coke Drawing and Loading Machines	399 400 401
Note on the Determination of Carbon and Phosphorus in steel by Andrew A. Blair, Philadelphia	401 302 403
Personal and General	403 404
Correspondence	404 405
Special Correspondence—	
(a) Nova Scotia	406 407
(b) Quebec	407 407
(c) Ontario	407 408 409
(d) British Columbia	409 410
General Mining News	410 411
Mining News of the World	411 411
Company Notes	412 413
Statistics and Returns	413 414 415 416

THE ASBESTOS MERGER.

The article on Amalgamated Asbestos that appeared in our issue of June 15 has aroused much comment. The Montreal newspapers, in conformity to that cheerful habit of most newspapers, have published either disconnected excerpts from the article, or have opened their columns to anonymous critics who make no possible attempt to meet the facts as presented by Mr. Harpell.

Here it may be wise to degress for a moment. In our May 1st issue we published an article outlining the scope and plans of the Amalgamated Asbestos Corporation. The material for this article was supplied by Mr. Fritz Cirkel. We accepted it without misgiving.

It is patent that if the Canadian Mining Journal is to fulfill its mission in Canada, it must publish nothing that tends to mislead or misrepresent. Our aim is, has been, and will ever be, to give the facts as we find them. Shortly after our May 1 issue appeared we received information indicating that Mr. Cirkel's data were incorrect. Immediately we took steps to get at the truth. This was set forth in Mr. Harpell's article. And that this article is correct in its details and conclusions we have daily more reason to believe. The newspaper criticisms, inasmuch as they avoid carefully all essentials, merely strengthen this impression.

These considerations lead us to another that is most vitally important. To our knowledge the promoters of the merger have based their prospectus, not upon the report of a disinterested mining engineer, but upon the statements and opinion of a man, Mr. Fritz Cirkel, who is an owner of asbestos properties himself and is interested financially in the Merger. This is contrary to the rules of decent business. It is particularly out of place in a \$25,000,000 flotation.

We do not know the precise conditions under which Mr. Cirkel is employed by the Mines Branch of the Federal Department of Mines. We believe that his contract permits him to undertake private work in addition to his official duties. But, whatever the arrangement, the position in which he has placed himself and the Department is most regrettable. In the first place, Mr. Cirkel, acting as a Government official, enjoys privileges that would by no means be his as a private individual. Secondly, his position as a Government technologist has given him, through his departmental publications, a standing that cannot be gained otherwise. Thirdly, for both these reasons very serious responsibilities have devolved upon Mr. Cirkel. It is incumbent upon him that he should, so far as possible, distinguish between his work as an employee of the public and his efforts as a private mining engineer

This Mr. Cirkel has failed to do. Not only has he failed to recognize his responsibilities, but he has used, and has permitted others to use, his official status for precisely those purposes that are most opposed to the usefulness of the Department of Mines and to the welfare of the mining industry as a whole. In lending his name, officially, to Amalgamated Asbestos, Mr. Cirkel ceased at once to merit the confidence of the Department that employs him.

It is not our intention to animadvert upon the moral phases of this incident. It suffices to say that Mr. Cirkel has been lamentably indiscreet, officially and professionally. It remains for the Minister of the Department of Mines to clear up a situation that is false and unsavoury. We have every confidence that he will do this right speedily.

THE FORMATION OF COAL.

Two remarkable papers appear in the May bulletin of the Canadian Mining Institute. Both were read at the last Annual Meeting in Montreal.

At that meeting there was practically no opportunity for giving these papers the discussion that they fully deserved. We hope that our readers will take advantage of our columns to effect a thorough exchange of views on the vital phases touched by these two contributions to modern scientific thought.

"Some Possible Chemical Changes in the Formation of Coal" is the title of Mr. D. B. Dowling's essay. The second paper, "Petroleum and Coals," which has already been reproduced in the Canadian Mining Journal, is from the pen of Mr. Eugene Coste. We shall glance at Mr. Dowling's paper first, and then allude to a few points that connect the two.

To the application of pressure and heat upon vegetable remains we owe the substances called coal. By a series of ingeniously plotted diagrams, Mr. Dowling illustrates the successive effects, first, of the charring of wood; second, of the gradual extraction of hydrocarbon compounds from peat; third, of the extraction of carbon dioxide; fourth, of the extraction of carbon dioxide and methane in equal parts and in various combinations with ammonium; and, lastly, of the extraction of water and carbon dioxide, and of water alone.

Of all the results arrived at, that due to the extracting from peat of seven to nine parts of water and one part of carbon dioxide, appears to duplicate most closely the natural process of coal-making. To quote Mr. Dowling: "That the greater amount of the change in formation of our coals is due to the slow process of water extraction, seems evident from the fact that the ash in the coals is not increased to a very much greater extent over that for vegetable matter than this theory would allow; and, secondly, that very few geologists will allow that the vegetable remains

associated with the coals have lost a great percentage of their carbon."

Mr. Dowling's deductions throw a clear side-light upon Mr. Coste's argument for the inorganic origin of petroleum. Mr. Coste contends that the geological history of coal is known sufficiently well to leave no room for belief in the organic origin of liquid hydrocarbons. The successive steps in the formation of coal from vegetable matter have been traced and recorded. The distillation of liquid hydrocarbons from these coals implies a large loss of carbon. All available evidence proves that this is not the case. Mr. Dowling demonstrates—for according to our present knowledge his paper amounts to a demonstration—that the loss of carbon in nature's laboratory is very slight.

This is one item on the credit side of Mr. Coste's ledger. It is a significant item, as it comes from a totally independent source.

PROSPECTING AND HOLIDAYS.

No country in the wide world affords so many clean opportunities for out-of-door holidays as does Canada. It is to be regretted that as a nation we do not use these opportunities to better advantage.

In many respects our holiday making is not only unproductive of good, but is actually a source of harmful waste. Our fatuous popular resorts and the gladiatorial games that we have copied largely from the United States, do not make for wholesome recreation.

Nothing is more noticeable than the energy with which transportation systems encourage the holiday instinct. Throughout the summer every week end is marked by the migration of hundreds and thousands of people from the crowded centres of population to suburban places of amusement, more correctly described as places of excitement. In this manner a truly enormous expenditure of money and time is incurred, mostly unprofitable, directly and indirectly, so far as the people themselves are concerned.

Suppose now that a fraction of the attention that is centred upon highly artificial forms of entertainment were diverted to the object of introducing Canadians to their unique heritage—untouched expanses of forest and prairie, threaded everywhere by noble waterways and gemmed with innumerable lakes. In other words, suppose that there came a national awakening to the need of learning more about the meaning of our undeveloped resources.

Prospecting is popularly supposed to consist in the search for the ores of valuable metals. Prospecting should be more than this. It should be the vocation of thousands of Canadian youth. Mineral veins are by no means the only or necessarily the most remunerative discoveries that the prospector may hope for. Clay deposits, marl beds, timber, farm lands, these are but a few of the objects for which the prospector may

search. And searching of this kind is work that brings its own reward whatever the tangible results may be.

Let us imagine that our railway corporations, instead of catering to the frivolous impulses of the masses and classes, were to begin a sane campaign with the object of interesting Canadians in finding out for themselves the hidden wealth of our country.

The results of such a campaign may be left to the imagination. Cheap rates for prospectors we have advocated before. This would be but an item. Should the time arrive when Canadians are fitted mentally and physically to explore our boundless stretches of unknown lands, our nations will have nothing to fear from enemies without. The vast gain in physical and moral well-being would be accompanied by an immensely increased national freight traffic. Everywhere the effect of these conditions would be reflected. Let us, then, pray for the day when our national spirit shall wake to the meaning and possibilities of prospecting.

SAMPLING OF COBALT ORES.

Our readers will notice elsewhere in this issue an article from Dr. A. R. Ledoux on sampling Cobalt ores. Dr. Ledoux is easily pre-eminent as an authority on subjects of this kind. At our request he has embodied in this article his experience and conclusions in regard to the peculiarly difficult silver ores of Cobalt. The elaborate precautions that must be taken to ensure a fair sample are set forth. This makes impressive reading.

"In the very beginning," writes Dr. Ledoux "we learned that this ore constituted a class by itself and could not be sampled accurately by ordinary methods, due very largely to the presence of nuggets and smaller particles of native silver, and to the fact that the silver is very unevenly distributed."

The fact that Dr. Ledoux does not employ mechanical samples is a point to which we would draw especial notice. The limitations of mechanical samplers are not generally known. That Cobalt silver ores may not be amenable to fair mechanical sampling, is an inference from Dr. Ledoux's article.

We invite discussion of this and other points touched upon.

PREVENTION OF GOLD STEALING.

Steps are being taken by the Victoria (Australia) Chamber of Mines to amend the Gold Buyers' Act (1907) at present in force in that State. Preventive legislation of this kind has especial interest for Canadian mine owners. For some years Nova Scotian operators have made vain attempts to promulgate laws that will make thorny the path of the gold-stealer. Similarly, the Cobalt mine managers have tried to

tackle the task of preventing the pilfering of silver. The Department of Justice, at Ottawa, has moved slowly in the matter. But hopes are entertained that effective measures will soon be adopted.

A few notes concerning the condition of affairs in Victoria will throw useful light upon the subject. On March 2, a conference was held at Bendigo for the purpose of discussing the prevention of gold stealing. Representatives of the Mine Owners' and Mine Managers' Associations were present. So also were representatives of the labor union—the Amalgamated Miners' Association. It appears that investigation had revealed the fact that about 30,000 ounces of gold had been stolen and disposed of to buyers not identified with the regular banks. This was announced from the pulpit by a Rev. Mr. Worrall. Immediately a storm of angry protest arose. The conference was called to look further into the matter.

It was expected that the members of the Association would do all in their power to remove the cloud thus cast upon them. Strange to say they would consent to nothing except conditional co-operation. Although they recognized full well the very serious position in which their whole Association was placed by these revelations of wholesale speculation, they proffered the following bargain:

"The Miners' Association is willing to co-operate (in the prevention of gold-stealing), in the expectation that the mine owners will give preference to unionists and abolish the black list."

In other words the miners were content to permit dishonesty to flourish in their own ranks unless they could impose their own conditions on the operators.

This short-sighted policy, this willingness to sacrifice principle, is too often the sign-manual of labor organizations. Particularly is it characteristic of one body, the United Mine Workers, a United States organization that is now making desperate attempts to gain control of Canadian miners. We believe that morally and socially our Canadian labor organizations are healthier than those across the border. For this and other reasons we shall continue to oppose the encroachment of the U. M. W. upon Canadian territory.

ONE PROSPECTUS.

The prospectus of the Northern Star Mining and Development Co., Limited, 197 Sparks Street, Ottawa, has been submitted to us. It is a thing of beauty.

The prospectus attributes to the vice-president, Mr. C. W. Willimott, experience and attainment that he does not possess. Mr. Willimott was attached to the staff of the Geological Survey for some years. The following statement is made on page 10 of the prospectus: "During the latter part of his service with the Canadian Government, all minerals brought to that office were referred to him for identification. His 38

years of experience as mineralogist on the Geological Survey has furnished him with knowledge that will be worth untold wealth to the Company."

Far be it from us to appraise Mr. Willimott's value. It is for us to contradict flatly the assertions quoted. The statement that all minerals brought to the survey were submitted to Mr. Willimott, is false. Further,

Mr. Willimott did not have 38 years' experience on the survey. He never was mineralogist, nor was he at any time a technical officer.

As Mr. Willimott's signature is attached to this document we wish to inform him that he has ample grounds for proceeding against whomsoever is responsible for subscribing his name to patent lies.

SAMPLING OF COBALT ORES.

By Albert R. Ledoux, Ph.D.

[Editor's Note.—This article was written at the special request of the Canadian Mining Journal.]

The first carload of Cobalt ore was received at Ledoux & Company's sampling works, at the port of New York, in February, 1905, although specimens and samples had been submitted to us in January of that year. In the very beginning we learned that this ore constituted a class by itself and could not be sampled accurately by ordinary methods, due very largely to the presence of nuggets and smaller particles of native silver, and to the fact that the silver is very unevenly distributed.

In Volume X. of the Journal of the Canadian Mining Institute, appears a statement prepared by me, showing that up to that time, February, 1907, about 18 per cent. of Cobalt ores received at our sampling works had run between 1,000 and 2,000 ounces of silver per ton; 10 per cent. contained from 2,000 to 3,000 ounces; 4 per cent. from 3,000 to 4,000 ounces; 3 per cent. from 4,000 to 5,000 ounces; 17 per cent. from 100 to 200 ounces, and 11 per cent. below 100 ounces. The highest carload handled by us up to that time ran 7,402 ounces of silver per ton, and the next in grade were from 6,000 to about 7,000 ounces.

When one considers that this silver occurs largely in native form, and is an alloy with arsenic, nickel and cobalt, the difficulty of obtaining an accurate sample is manifest. We long ago discovered that to secure an accurate sample, the coarser part of the metallics had to be removed and treated separately. The method devised by us, and followed until recently, has been quite accurately described in the paper of Mr. F. F. Colcord, published in the Engineering and Mining Journal for December 22, 1906, but it may be briefly repeated as follows:

All the ore is passed through crushers and rolls in order to reduce the material as nearly as possible to one quarter inch size. Nuggets passing through the rolls, being malleable, tend to separate them, allowing some proportion of ore larger than quarter mesh to pass through. In practice, it was not found necessary to return these larger particles to the rolls, but we leave about ten per cent. of the material larger than quarter inch. The ideal preliminary crushing would be to have the whole material pass a quarter inch screen before proceeding further.

The ore passing the crusher and rolls, is piled in two parallel ridges, which we may designate as No. 1 and No. 2 by alternate shovelling to left and right. Large silver nuggets, and coarser pieces also containing silver, are picked out by hand for separate treatment. The two ridges contain substantially half a carload

each, and are shovelled together alternately into one long ridge for the purpose of mixing (ridge No. 3). This ridge is again "half shovelled" as in the beginning, to make ridges No. 4 and No. 5. No. 5 is then half-shovelled to make ridge No. 6, the alternate or rejected shovelfuls going back to ridge No. 4. Ridge No. 6, which now contains one quarter of the original carload, is half shovelled, making a pile or cone containing one-eighth of the original carload, the rejected half going back likewise to ridge No. 4. The resulting sample is coned up into what might be called pile No. 7 and quartered down to make pile No. 8, the rejected portion returning to No. 4.

Coning and quartering is then proceeded with until pile No. 9 is reached, which will weigh perhaps a thousand pounds, all the rejects having been returned in each case to ridge No. 4.

This thousand pounds, more or less is passed through a mill, including all the metallics which have remained with it. This mill grinds the material to about one-eighth mesh, including the metallics. The material, after passing an eight-mesh screen, is turned over with shovels three times and passed through a Jones sampler, reducing it to about 40 pounds, the rejects again returning to ridge No. 4.

This 40 pounds, which now constitutes the twelfth stage of sampling, is ground through a mill until it will pass a 20-mesh screen, thoroughly mixed and again divided into two parts, one of which is temporarily held at the works, in case of need, and the other sent to the laboratory.

In the laboratory, the sample is reground and subdivided to a sample of about five pounds weight. After weighing this, it is ground in a pebble mill until it will pass a 100-mesh screen. The metallics which cannot be finely ground, are left on this screen, then weighed and suitably sub-divided to make final samples. The fines passing the 100-mesh screen are mixed and also sub-divided into several parcels, corresponding with the metallics. The final samples each consist of two parcels, one contains the metallics, the other the fines. The weights of fines and the weights of metallics from the five pound sample, are recorded on each package, so that the final assays may be calculated.

The rejects, forming ridge No. 4, represent every portion of the original carload except the negligible 40 pounds taken for a sample. The second sampling proceeds as before and finally a third sampling, and a fourth, so that four samples are taken from each carload, differing in no respect from one another, excepting that each one is taken from a bulk of a few pounds less in weight than the preceding samples.

That the average assay of the four samples accurately represents the lot, has been proved again and again by the reasonable concurrence of the assay result, as for example, in three lots:

First sampling.....	3840.00	3765.80	5090.10
Second sampling.....	3822.80	3696.60	5119.60
Third sampling.....	3829.60	3703.80	5121.60
Fourth sampling.....	3644.10	3729.90	5130.40

The metallics, which have been obtained by hand-picking the larger pieces of silver from the original lot before sampling, are weighed and handled separately as bullion. They do not constitute part of the sample taken from the crushed ore, but are melted and treated separately.

The sampling at our works is usually performed in the presence of representatives of buyers and sellers, and the former, especially, are men of long experience in the handling of ores, both at western sampling works and smelters in the east.

Suggestions have been made to us from time to time as to what might improve the process in the direction of accuracy, and in some cases, the not unnatural question has been asked why we do not employ mechanical sampling from beginning to end, if for no other reason than that it is cheaper than hand labor. Such mechanical sampling has been installed at Copper Cliff, as is well known, and the methods and results are well described in the Journal of the Canadian Mining Institute for 1908, in a paper prepared by Mr. Arthur A. Cole, of Cobalt. Mechanical sampling is likewise employed on Cobalt ores at Deloro and at Denver. In the sampling of ordinary ores, mechanical sampling long ago superseded hand sampling in all progressive works, both east and west, but there seems to be some question in the minds of assayers and others interested, as to whether the mechanical sampling produces as uniform results in Cobalt ores as does the method of shovelling into ridges and cones, as outlined above. If there be anything in the belief that mechanical sampling is not quite the equal of hand sampling on this ore, it rises from two causes:

One, the possibility that in grinding in a Ball mill or other similar device, there may be a mechanical concentration in the mill, rendering it difficult to get samples which do not show too high or too low a proportion of silver; and to another cause: that automatic sampling devices, cutting out a fraction of the lot, which is subsequently sampled down by any method, do not admit of taking more than one sample of the "whole" lot, starting practically from the beginning each time. The assumption is that the fraction taken mechanically must accurately represent the whole. In many works, mechanical samplers are set to take out one-tenth, and from two to four samples of this tenth are subsequently cut out for duplicate or quadruplicate assays, but by the slower and more tedious hand sampling, four "original" samples may be taken, starting in each case from the beginning.

Without going into all the reasons for such changes as from time to time have been introduced by Ledoux & Co., I would say that our present practice is substantially as follows, and details omitted being evident from what has preceded:

The material after being unloaded, is put through a Blake crusher, crushing the ore to about one and one-fourth inches in size. From there it runs down a chute into an elevator boot, the buckets raising and

throwing the ore into a one-inch revolving screen and passing through this into an outer screen of one-half inch holes. All that passes through this screen drops into a chute and is ready for the floor. The material not passing through this half-inch screen, together with all which has passed through the one-inch, slides through a chute into the rolls, which are set to one-fourth inch; all material not passing through the one-inch screen passes down a chute to a crusher, thence back to the elevator and so on, until all the material has been crushed and passed through the rolls. The ore after leaving the rolls, is wheeled with barrows onto the sampling floor, and put into two ridges, alternating each barrow, one to the right and the other to the left, then screened through a half-inch mesh, and all the metallics which do not pass the half-inch screen, are picked out and treated separately. Men are then placed at each ridge opposite each other, shovelling the material into one ridge.

The ore is then half-shovelled by throwing one shovelful to the right for one ridge and the other to the left for the other ridge. After dividing into two ridges, each ridge is again divided by half-shovelling to about two tons, which is coned and quartered down to about one thousand pounds remaining, and put through the rolls and mills until all the material, including the metallics, will pass through an eight-mesh screen. This is then mixed by shovelling over three different times, then put through a Jones sampler and worked down to about 35 or 40 pounds, which is put through a Hance Brothers & White drug mill and ground to pass through a 20-mesh sieve. This is sent to the laboratory and treated as described above.

It will be seen that in the second method of sampling the ore after crushing is thoroughly mixed and then divided into four lots or parcels, each of which should be exactly like the others. Each of these four lots or samples is then worked down separately, and the average of the assays of the four lots is taken as representing the carload. The reasonable concordance of the four samples is shown by the following examples, on two lots:

	Ounces of Silver per Ton.	
First sampling.....	3956.80	3001.10
Second sampling.....	3965.10	2968.80
Third sampling.....	3980.90	2954.70
Fourth sampling.....	3950.40	2982.00

NEW ZEALAND GEOLOGY.

Under the energetic management of Dr. J. M. Bell, director of the New Zealand Geological Survey, the geology of that country is receiving much more systematic attention than ever before. A new series of elaborate bulletins is being brought out, covering gradually the whole dominion. Bulletin No. 7, "The Geology of the Queenstown Subdivision, Western Otago," has just been received. In this, Mr. James Park, Professor of Applied Geology at the University of Otago, outlines the geology of the Queenstown subdivision. The report contains 112 pages of letterpress, 38 plates, 33 illustrations, and 13 maps.

In glancing over Mr. Park's notes on the economical geology of the Queenstown region, several interesting features are noticed.

The most productive gold-bearing lodes of the Mace-town district are enclosed in a comparatively soft, grey,

silky mica-schist. The gold occurs in shoots of quartz, the remainder of the lode being filled with crushed country rock. The veins are fissures with well-defined walls, the hanging wall being the more regular. The ore is free-milling, carrying varying amounts of pyrite and mispickel. The pyrite may be either barren or gold-bearing. The tendency of the lodes is to come together at-depth. Where horses of country rock (locally

called "mullock") are encountered in a lode, they occasionally show small veins or stringers of quartz of considerable richness. Occasionally, also, there are small veins of quartz running into the country rock.

In some places the stopes require very careful timbering; in others a very slight amount is sufficient. The stopes are generally taken out in 7-foot bunches and filled in again with waste to prevent subsidence.

COAL MINING IN SOUTH-WESTERN VIRGINIA.

By D. A. Patterson.

[Editor's Note.—This article will be read with interest by Eastern Canadian coal producers, since it has a direct bearing upon certain questions of the day.]

Among the mountains in the western part of Virginia lies a district known as the Big Stone Gap Coal Field, which is from year to year making greater impress on the minds of those interested in the future development of the coal industry. Here, in the counties of Lee and Wise are operations building up which make abundant promise of forming a coal mining and coking centre which will equal that of the Connelsville district in Pennsylvania. It is the intention of the writer to give, at the present time, a description of one of the above-mentioned concerns, which has been constructed during the past two years, and which is equipped with all modern devices for the economic production of coal and coke.

The Keokee Coal & Coke Company, of Keokee, Virginia, is fortunate in possessing a property of 8,000 acres with seven workable seams, containing approximately 300 million tons of coal varying in thickness from 48 to 96 inches. All coal on this property dips uniformly to the northwest on a grade averaging 2 1-2 per cent., nothing greater than 3 per cent. having been encountered up to the present. On account of the high altitude (2,500 feet) and nearness to the top of the mountain range, all mines are free from excess water; one triplex electric pump discharging all water through a two-inch line. The top, for the most part hard slate, although grey sandstone has been encountered on occasions, is of such superiority that props are used only in rooms which are driven 20 feet wide. No timbering in the main headings has been necessary. Two seams are at present being mined; one known as the McConnell, and one as the Wilson seam; the first mentioned seam being a superior coal showing an analysis of—

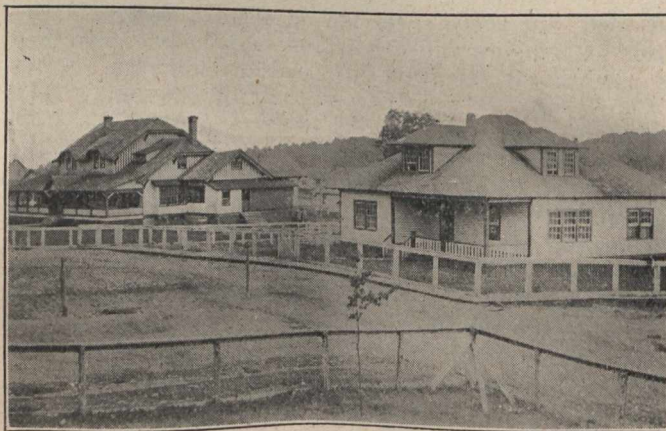
	Coal.	Coke.
Moisture	3.86	0.69
Vol. matter	34.13	0.93
Fixed carbon	56.39	90.33
Ash	5.62	8.05
Sulphur79	.65

Both these seams outcrop on the sides of the mountain and consequently give opportunity for rapid development and minimum cost in operation. Mining is done on the four entry system, the two sides of the mine being kept entirely separate; and butt entries are driven right and left on 350 feet centres.

From the mines the coal is hauled by 12-ton Goodman electric locomotives over a tramroad 3,500 feet to the tippel which was designed and built by Heyl

& Patterson, of Pittsburg, Pa. The plant is electrically equipped throughout; 3 1-2 ton gathering locomotives are used for inside haulage; Goodman chain breast machines 44 inches wide and having an undercut of six feet, are used for undermining the coal, and electrically driven fans of 100,000 and 150,000 cubic feet capacity, built by Ira E. Stevens of Chicago, are used for ventilation.

The tippel contains several innovations which are of interest in that they have proved feasible. As the loaded cars from the two mines pass through the tippel at different elevations, they are dumped, two at a time without uncoupling, by rotary dumps. These dumps are a special design of the builders and are a departure in the handling of coal. Each dump consists of three cast steel rings connected by angle tie-bars. These revolve on six 16-inch cast steel wheels and are driven by a 10 h.p. motor through three spur gear reductions;

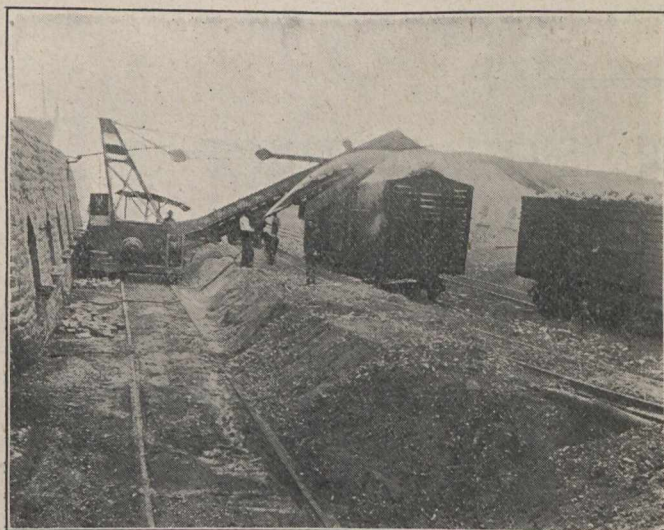


Club House and Physician's Cottage.

the master gear of the third reduction being a segmental gear attached to the central ring. The dump is started by the attendant throwing in a friction clutch and is automatically stopped at the end of each revolution. Much time is saved by this device, as coal can be loaded onto conveyors at the rate of 500 tons per hour; and the uncoupling of cars is eliminated by the use of swivel hitchings. Empty cars from the McConnell dump continue on round a spur of the mountain and return to the main line between the tippel and the mine. Return trips for the Wilson mine are switched back through the tippel behind the dump.

From the dumps the coal is deposited on pan-conveyors by means of reciprocating feeders. Coal from the McConnell Mine at higher elevation being conveyed under the Wilson dump, is kept separate from the Wilson coal which is carried on a parallel conveyor. Both

coals proceed to the crushing and screening house, at which point they are screened either separately or together; or pass on over veil plates and another set of conveyors to be loaded as "run of mine" or screened again at the railroad tracks. The screenings are deposited in a hopper which feeds two No. 4 Williams pulverizers where the coal is crushed for coking pur-



Coke Drawing Machine.

poses and carried by belt conveyors to a bin having a capacity of 1,400 tons. The disintegrated coal is evenly distributed throughout the bin by a continuous running, automatic reversing, tripper, when desired run-of-mine coal may be unloaded from the first conveyors into a Heyl & Patterson breaker which passes the broken coal to the pulverizers for further disintegration. The tippie is designed to handle 5,000 tons of coal per day; the present output being 1,400 tons per day of ten hours.

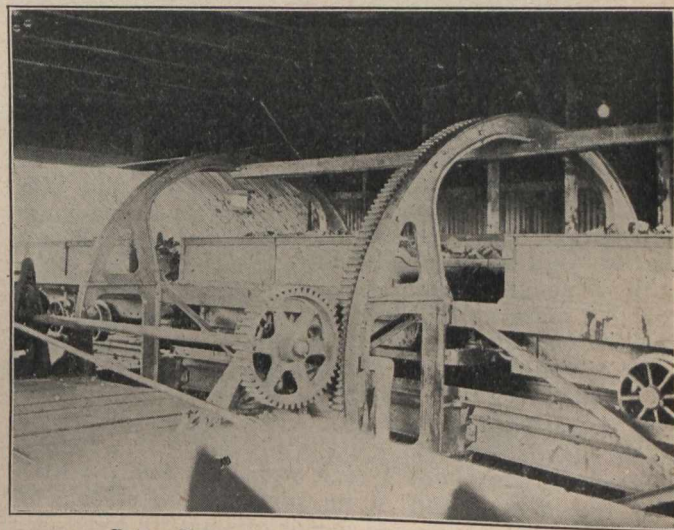


Coal Tippie, showing elevation at which coal is dumped.

The Keokee Company has built 400 coke ovens of the "bee-hive" type. These are built in two parallel batteries of 158 ovens each, and one row of 84 bank ovens. Forty-six inch doors have been constructed to facilitate the operation of Covington coke-drawing machines. These machines do away with the laborious task of hand-drawing and, although inclined to break

the coke considerably, have advantages which more than offset the losses involved. At Keokee 40 ovens or 160 tons are drawn and loaded by each machine daily. All yard trackers are laid with No. 75 steel and built on a 1.25 per cent. grade, making it possible to place empty cars under the conveyors of the coke machines without the aid of a locomotive. For haulage the company have one 60-ton Baldwin locomotive.

Behind, and adjacent to, the bank ovens a large gas flue has been built. This collects all waste gases from these ovens and is constructed of three layers of brick, one silica, one fire, and one red. The gas, coming through connecting flues from the ovens, is utilized for steam purposes and after passing through the main flue goes under the fire boxes of the boilers and up behind the bridge walls; thus preventing any injurious effect of the gases on the grate bars. The boilers, of which there are four Wickes vertical, developing 300 h.p. each have the usual fire boxes so that they can be fired by coal, if necessary; but with the collected gases from 39 ovens, burning 48 hour coke, this has been found unnecessary. The supply of heat is regulated by water-cooled dampers placed in front of the fire doors. These



Rotary Dump, showing cars in position for dumping.

are operated by hydraulic pressure obtained from the feed pumps. Further information relative to the effectiveness of the above utilization of waste gases can be obtained later, as extensive tests are being made at Keokee by the Wickes Bros. Boiler Company. It is sufficient to say that there is a saving of from 25 to 30 tons of coal per day of 24 hours.

The power house, built of grey sandstone, with composition roof, is equipped with two 300 k.w. 250-volt Goodman generators driven directly by McEwen tandem compound engines which have given admirable service during the past year. An Ingersol-Rand air compressor has also been installed to furnish power for air-lift wells, and one Latta-Martin displacement pump. All waste oil from the engines is piped to a filter below the floor. A concrete tank having a capacity of 100,000 gallons has been built in the vicinity of the boilers so that a supply of water for boiler feed can always be kept on hand.

Up to the present time 190 houses have been built for the use of miners. These are of a superior type with from three to seven rooms. The valley widens at this point, giving opportunity for the construction of buildings without the usual congestion found in

mining towns. All houses have lots measuring 75 by 150 feet.

Owing to the excellent quality of the coal in the Big Stone Gap region and its adaptability to coking, the field as a whole is essentially a coke producer. The character of the coal at Keokee makes it compare favorably with the famous gas and steam coals of the Pittsburg field which have earned very high reputations in the principal markets. There is a large coal

trade in the Carolinas and Georgia, and the manufacturing industries in these states are growing rapidly. Although the market for this coal is perhaps more limited than that for coke, its excellent quality together with favorable freight rates makes it an active competitor over an area of considerable extent.

The Keokee plant has been designed and constructed under the supervision of Mr. C. P. Perin, of New York, who is president of the company.

GOWGANDA MINING DIVISION, DISTRICT OF NIPISSING, ONTARIO.

Notes from Preliminary Report by W. H. Collins, Geological Survey of Canada.

(Continued from last issue.)

Local Distribution.

Valuable argentiferous veins were known in 1908 only in the Gowganda district, and, so far as yet known, discoveries have been confined to the diabase west of that lake. Most of them occur in the southern portion of the central diabase strip which lies a short distance from the shore and extends northward for about seven miles from Elkhorn Lake. On one of the Mann claims (T. R. 1966), now owned by Messrs. Foster, an east and west vein averaging 4 or 5 inches in width had been traced for 300 feet, the original discovery being made in the exposed face of a low diabase wall. At its surface the vein material had been weathered out for a depth of about 15 inches, and the cavity filled by a brownish mass of the decomposed matter mixed with vegetable mould and sand. Nuggets of mossy or arborescent silver were scattered richly through this dirt, and a fairly continuous spine of the same metal, sometimes an inch thick, extended along the middle of the crevice. On the adjoining claim (T. R. 1982), a vein of massive smaltite about 1 inch wide was seen; a little silver had been found at its surface, and streaks of argentite and disseminated grains of smaltite were seen in the wall rock. Aplite dikes on another claim were found to be stained by cobalt bloom, and full of disseminated chalcopyrite.

The properties owned by Messrs. Crawford and Dobie about half a mile farther south were not visited, but were generally reported to be of about the same richness as that in T. R. 1966. Immediately north of Hangingstone Lake, Mr. F. A. McIntosh was conducting active prospecting in a coarse gabbroid, locally syenitic, form of diabase, intersected by aplite dikes. A discovery of native silver has been made since then and the property sold to Messrs. F. R. Bartlett & Co., of Toronto, together with other claims located between the northeast and northwest arms.

No silver had been obtained in the eastern diabase strip, although the geological conditions appear identical and calcite veins are abundant. An exceptionally large vein, about 18 inches wide, and traceable across two adjoining claims was seen on the property of Messrs. McLaughlin and McIntosh, about half a mile northeast of the northwest arm. Mineralization in it near the surface was very slight.

In the western strip less exploration had been performed, and little could be learned about the ore deposits. Loose pieces of native silver had been found by

W. H. Margueratt in narrow fissures on Mr. R. 1798, but the vein material was not exposed.

Out side the Gowganda area systematic prospecting was in progress at only one point—Wapus Creek. Under the management of Mr. Robert Lett a group of nine claims was being stripped and trenched, with the result that numerous calcite veins had been traced through a diabase showing the same complex intermingling of basic and acid phases and aplite dikes as at Gowganda. Chalcopyrite and cobalt bloom were abundant, and smaltite had been found as disseminations in the wall rock. Lumps of native bismuth weighing several ounces had been taken from a fissure in an aplite dike, analyses of which showed it to contain silver.

Tentative exploration was being conducted along Duncan Lake and east of Firth Lake, but not with the closeness and persistence that the topography of these veins require. In general the veins seen on Duncan Lake are exceptionally rich in quartz, and gash veins are common. Chalcopyrite, pyrite, and galena are the most noticeable metalliferous minerals, but cobalt bloom stains are frequently observable.

Future Possibilities.

The present knowledge of the Gowganda area indicates it to be highly mineralized, at least in so far as number of veins and surface showings are concerned. The number of discoveries within its area of ten square miles is steadily increasing. The area, character of the mineral association and the richness of the surface showings are comparable with those of Cobalt. There is a general similarity in the geological conditions. The mineralized veins in Gowganda occur in the diabase, as do some of the good Cobalt veins. There are, it is true, local differences, but the resemblances are more pronounced than the differences, and lead to the hope that exploitation will reveal similar underground conditions. The well mineralized veins are sufficiently long and uniform on the surface to suggest similarly persistent vertical dimensions. Further geological work may reveal something definite concerning the character and size of the diabase bodies which form the country rock, and thus afford a basis for predicting their subterranean distribution. While there are grounds for hoping that the veins will persist in depth, this has not yet been proved, nor, if this is the case, that the mineralization and values are also persistent.

The relative importance of Gowganda is therefore a matter of uncertainty as yet, but it may be confidently

affirmed that for its state of development the outlook is very favourable, and the number of veins, area of mineralization and rich surface showings afford good grounds for hoping that some at least of the veins will be found to be commercially important.

The details of igneous intrusion, differentiation and mineralization may never be sufficiently understood to allow of accurate prediction regarding the location of silver deposits, but a general conception of the sequence of events culminating in their formation does permit of the formulation of certain criteria useful in the search for ores. Evidence is accumulating to show that the silver-cobalt mineralizations in the Temiskaming region are connected with a late stage of differentiation in the magma which supplied the quartz diabase and aplite. It seems reasonable, therefore, to expect ore deposits in or near such bodies, especially if they are of large size and have undergone important chemical differentiation, that is, if they contain a varied and extensive association of basic and acid phases of the diabase. Pre-existing channels to receive the mineralizers are also necessary and their distribution a matter of vital importance, but in this region they appear to have been everywhere abundant.

These conditions appear to exist quite as fully at

other foreign matter. The ore body is thought to be of vertical tabular form, occupying a fissure-like space. Its limits are not known, consequently nothing can be yet stated regarding the commercial possibility of the deposit.

Specular ore also occurs in the basal conglomerate of the Huronian series, filling the interstices between the pebbles where an original cement was deficient. At the south end of Kenisheong Lake the conglomerate appears at the water's edge, and the hematite may be observed while paddling near shore. The same thing occurs at the narrows on Duncan Lake, just south of the central expansion. In neither case is the ore in commercially valuable quantity.

Magnetite.—Keewatin iron formation exists about one-half mile to the northeast of Gowganda Lake. A brief visit was paid to some claims belonging to Mr. Cryderman where the formation is well exposed. The Keewatin, which is partially overlain by Huronian and traversed by diabase, consists of dark grey or black, banded chert or quartzite associated with chlorite schist. The dark bands, usually only a few inches in width, are full of disseminated magnetite grains. No concentrations were noticed, and the richest bands probably yield less than 30 per cent. metallic iron, con-

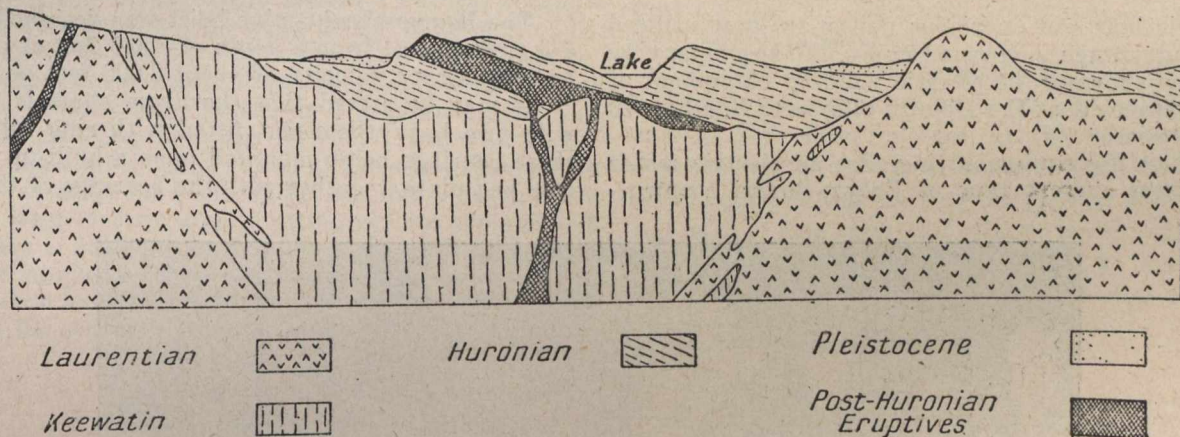


Diagram Illustrating Geological Relationships of Montreal River District.

several other localities besides Gowganda. At Wapus Creek they seem identical and, indeed, results obtained thus far indicate that some mineralization of the silver-cobalt type exists. Between Duncan Lake and the West branch the conditions require further study, but, as now known, are not discouraging.

Copper.

The chalcopyrite is sometimes aggregated into bunches which yield ore specimens of such excellent appearance as to arouse interest. The ore is, however, confined to veins a few inches in width and so scattered, as to render them valueless. Occurrences of this kind characterize most of the great diabase bodies, examples of which occur on Mosher Lake, between the northeast and northwest arms of Gowganda Lake and elsewhere. The chalcopyrite is sometimes superficially altered to malachite and azurite.

Iron Ore.

Hematite.—Excellent specular and kidney ore is known to exist a short distance east of Nest Lake, but the locality was not visited owing to the more urgent requirements of other portions of the district. Specimens of the ore obtained, however, proved to be of excellent character, with little admixture of silica or

sequently the present showings cannot be considered valuable.

Asbestos—Distribution.

In the Keewatin area between Firth and Obushkong Lakes there occur masses of a basic igneous rock through whose decomposition serpentine and asbestos have been developed. The localities given in connection with the description of the Keewatin may be briefly restated. Two bodies were found. One of these was traced for a width of four claims, but nothing learned of its north and south extent. It consists very largely of green serpentine traversed by a network of fine, white weathering veins of asbestos. More extensive outcrops exist along the east shore of Firth Lake. At somewhat more than a mile from the foot of the lake a considerable mass of partly decomposed wehrlite, serpentine, and asbestos is visible. The main mass is of dark green colour, the asbestos traversing it abundantly as a series of glistening bright green threads. The seams are small, none being found more than 1/4 inch in width, but the asbestos fibres are fine and elastic. The serpentine is often coarsely fibrous, but brittle.

Origin.

Microscopic examination shows the serpentine and asbestos to be the product of decomposition of the

wehrlite, a nearly black medium grained igneous type. Alteration has obscured its original character, but sufficient of the primary constituents remain to admit of its determination. It consisted of olivine, diallage, and common hornblende, with considerable ilmenite and apatite, but plagioclase is apparently absent. Hornblende and diallage form the basis of the section in which lie abundant rounded or idiomorphic grains of olivine. The latter is completely altered to a matted intergrowth of fibrous serpentine containing scattered grains of black iron ore. Diallage persists as colourless bi-refringent remnants enclosed by a felted mass of decomposition products, chiefly long scales of talc. The hornblende is fresher and strongly pleochroic, the tints being green; its alteration begins by bleaching, followed by development of colourless fibres of low bi-

refringence, possibly serpentine. Primary ilmenite is replaced by irregular patches of leucoxene, showing gridiron structure. The final product of alteration is a soft green serpentine rock composed almost wholly of that mineral.

The limits of these masses are exceedingly difficult to define, owing to the fact that they are associated with other Keewatin rock and basic forms of the post-Huronian diabase, to which it presents considerable resemblance. The asbestos actually seen is probably too short and small in amount to be valuable, but the high commercial value of this material renders delimitation of the wehrlite masses advisable. Asbestos of very good quality has been found by Mr. George Rahn in the vicinity of Sinclair Mountain, so that this mineral may be one of the district's latent resources.

A REMARKABLE GERMAN ELECTRIC MINE HOIST.

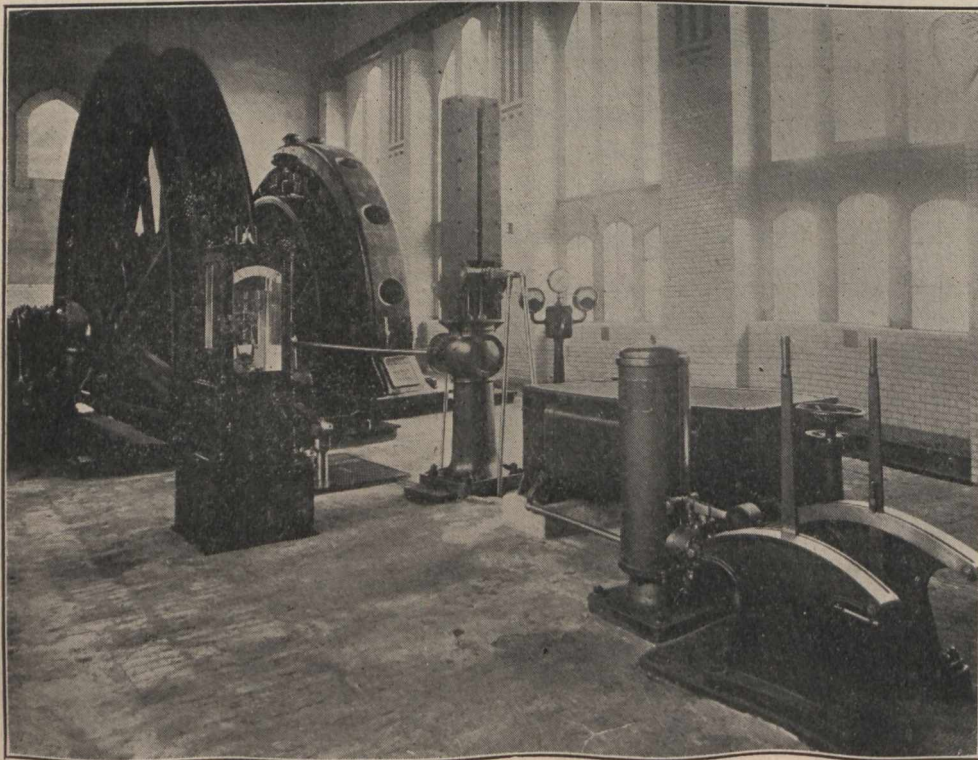
By Frank C. Perkins.

Electric hoists of enormous power are now utilized to great advantage in German mines, the accompanying illustration showing the electric winding equipment of the Mauveschacht at the Heinitz pits, near Beuthen, in Upper Silesia.

This hoisting equipment includes an electric motor of the direct current type of Brown-Boveri construc-

The Mauveschacht mine hoist was designed to raise $7\frac{1}{4}$ tons of coal from a depth of 2,530 feet at the above enormous rope velocity of about 2,000 feet per minute.

It may be stated that the drum shaft is provided with two heavy bearings, fitted with ring lubrication, these bearings being mounted upon a built-up wrought iron bed plate, together with the bearings of the motor.



tion, having a maximum capacity for an overload of 1,400 horsepower, the normal output being 565 horsepower. It operates on a circuit of 480 volts, with a speed of 24 revolutions per minute, and is directly coupled to the Keepe drum, which is $26\frac{1}{4}$ feet in diameter, provided with a balance rope having a velocity of 1,980 feet per minute.

The hoist is situated at a distance from the power station, which also supplies electric current for pumping electric ventilation, and for operating other motors about the colliery. This electric mine hoisting system was specially designed to take advantage of the good governing properties of the turbine generating plant, whereby the fluctuation in the input of the hoisting

motor supplied by it are transferred directly to the boiler plant, without causing under variations in the speed of the turbines, and at the same time with the auxiliary equipment ensuring good economy from the steam turbine.

This electric hoist is supplied by its own generator, which is driven by a steam turbine of the Brown-Boveri type, with a separate exciter, which also excites the field of the hoisting motor, as well as the field of an alternator directly connected to the same steam turbine.

The turbine operates under a steam pressure of 135 pounds per square inch and 275 degrees C., the exhaust being connected with a vacuum of 90 per cent. at the turbine to the central condensing plant.

An interesting point in connection with this steam turbine is that it admits steam at boiler pressure into the secondary expansion of the turbine, in accordance with the requirements of the hoisting motor automatically, it being provided with a by-pass, which is self-acting.

It will thus be seen that the load variation due to the hoist comes directly upon the boiler without any intermediate machinery between the mine hoisting motor and the turbine-driven generator. It will be noted that this arrangement acts as a natural accumulator or storage, the peak loads being taken care of by the boilers, which are provided with stored steam. There are a great many advantages in this method of working electric mine hoists, as it is simple, safe, and reliable, avoiding rotating flywheel masses and the intermediate machinery, and is at the same time low in cost for installation. The conversion and storage losses of the other electric mine hoisting system are avoided, and there is good economy in the steam turbine set during the intervals when electric energy is not utilized for electric hoisting by the connection of the steam turbine to the second electrical generator.

It is stated that the Mauveschacht electric hoist can be doubled as to capacity by directly connecting to the hoisting drum a second electric motor on the other side, if desired.

At the present time the electric hoist is only required to raise about one-half the above-mentioned load of coal at the high rope velocity previously stated from a depth of 1,770 feet. When the electric hoist was installed it was decided to provide for two installations, the second being added when the pit is fully developed at a later period, the shaft of the winding drum being provided with a coupling at each end.

At the present time only one end is equipped with a motor, which is capable of developing, as above mentioned, an overload of 1,400 horsepower without injury for short intervals.

This high-power electric motor is of the direct current, separately-excited type, and is mainly controlled by regulation of the generator voltage. The pressure at the motor terminals is varied from zero to 480 volts by means of a regulator in the field circuit of the generator, this arrangement reducing to a minimum the rheostatic losses. It may be stated that the main terminals of the motor are directly connected to the steam-turbine-driven, direct-current generator, and there is thus avoided all losses and annoyance of switching in main circuit regulation.

The steam turbine, as above mentioned, also drives a second generator, which is an alternator, supplying current for other motors at the mine, this second dynamo being driven in tandem with the generator which supplies the hoisting motor, and is a most essential part of this system of electric mine haulage, which allows the steam turbine to always be operated with high economy on account of the constant load it provides.

THE DETERMINATION OF TUNGSTIC ACIDS IN LOW-GRADE WOLFRAM ORES.*

By H. W. Hutchin, Associate, and F. J. Tonks, Student.

The determination of small quantities of tungstic acid by known methods is difficult, besides involving considerable time and labour. The new method described herein combines the accuracy of the mercurous nitrate method with an improvement in the attack of the mineral; viz., fusion with alkalis is replaced by digestion with caustic soda solution. The advantages gained are in time, accuracy and general utility. A single assay of a sample of ore may be completed in 2½ hours; six or more assays may be worked in a batch as easily as one. The preliminary treatment with hydrofluoric acid becomes unnecessary. The charge of ore is not limited to 1 or 2 grm., but as much as 20 grm. may be used if necessary. The use of a large charge secures greater accuracy in the determination of tailings values, exactly where accuracy is most needed.

The paper is divided into two sections. Section I. deals with the working details of the assays employed

and the tabulation of results for comparison. Section II. is supplementary and mainly an investigation of conditions affecting the two principal assays, viz., the aqua regia method and the new method.

Section I.

The methods of analysis in common use are:—

1. The aqua regia method.
2. Aqua regia method with previous treatment with hydro-fluoric acid.
3. Fusion with alkalis and subsequent determination with mercurous nitrate.

The details of these assays are given in order that the investigations may be followed.

1. Aqua Regia Method.—(All assays by this method are stated in the table under the column headed "Aqua Regia Method.")—Five grm. of the finely powdered sample are digested at the boiling point with 50 cc. of hydrochloric acid for several hours; 10 cc. nitric acid are then added and the digestion continued for one or two hours. The assay is well diluted with water

*Paper read before the Institution of Mining and Metallurgy, London, May 20, 1909.

and allowed to stand overnight. After filtering and washing, the tungstic acid in the residue is dissolved in dilute ammonia, filtered, and the ammonium tungstate acid obtained from ignition of the ammonium tungstate is evaporated with hydrofluoric acid to remove silica, and again ignited.

2. Aqua Regia Method with Previous Treatment with Hydrofluoric Acid, etc.—(Assays by this method are stated in the table under column headed "Modified Aqua Regia Method.")—Five grm. charges are evaporated with hydrofluoric acid in a platinum dish to dryness, the dried residue is subsequently transferred to a beaker with water giving a volume of about 40 cc. 5 cc. nitric acid is added and the assay gently warmed to remove the bulk of the mispickel. After well diluting and allowing to stand overnight it is filtered and the residue washed on to the paper, dried and burnt. The residue, after powdering again in an agate mortar, is decomposed by aqua regia, etc., as previously described.

Method 3. Determination by Fusion with Alkalis and subsequent Determination with Mercurous Nitrate.—(Assays by this method are stated in the table under column headed "Soda Fusion Method.")—Except for slight alterations of detail, Bollnheimer's method was followed, viz.: The silica and mispickel are removed from a 5 grm. charge as described in the previous method. The residue is again powdered and fused in a nickel dish with caustic soda and sodium peroxide. The melt, when cold, is extracted with water and diluted to 250 cc., of which 200 cc. of a filtered portion are used for the actual assay. The alkaline liquor is acidulated with nitric acid, followed by ammonia, till fairly alkaline, boiled, filtered and washed. The filtrate containing the tungsten is made neutral or faintly acid with nitric acid; mercurous nitrate solution is then added, followed by a little freshly precipitated HgO or a few drops of diluted ammonia. After warming and stirring, the precipitate settles well. It is determined as WO_3 by ignition in a platinum crucible followed by treatment with hydrofluoric acid.

New Method.—Determination by Digestion with Caustic Soda Solution and subsequently by Mercurous Nitrate.—That wolfram is decomposed by boiling or by digestion on a water bath with caustic soda solution was noted in the course of laboratory experiments on wolfram products. Investigations followed to see if the reaction could be adapted to replace the fusion with soda. With a view to its use as a solvent for wolfram in low-grade ores it was desirable first to test it on a wolfram concentrate. A sample of wolfram concentrate (No. 24) was selected which had been agreed upon by buyer and seller—its value was 63.2% WO_3 .

0.4146 grm. of the finely powdered sample was digested with about $1\frac{1}{2}$ in. stick soda and 15 c.c. of water in a porcelain dish on a water bath for 45 minutes. The assay was diluted with water, a little sodium peroxide added, filtered and washed. The tungstic acid was determined in the filtrate by mercurous nitrate after removal of silica, etc., as in previous methods. The weight of WO_3 obtained was 0.2610 grm.—62.97% WO_3 .

The decomposition of wolfram under such conditions was sufficiently complete to make possible the assay of low values. Mispickel digested with soda solution is only slightly attacked; the effect of arsenic is dealt with later.

Details of the New Method of Assay as used for Low-grade Ores, Tailings, etc. (Assays by this method are stated in the table under column headed "New Method.")—The charge taken may be from 5 grm. upwards, or better 5.6, 11.2, 16.8 or any convenient multiple of 2.8, so that the milligrams of tungstic acid obtained represent simple ratios of lb. WO_3 per ton of ore (long ton). 2.8 grm. (or multiple) is taken because only four-fifths of the solution is used for the actual assay, i.e., it is a convenient sort of "assay ton" for lb. per ton of 2,240 lb. under the special conditions of the assay. The charge is digested in a 4-in. porcelain dish with 20 cc. of a 25% solution of caustic soda (free from chloride) on a water bath for 30 to 45 minutes. The assay is next diluted, a little sodium peroxide added to oxidise any decomposition products of sulphides, then transferred to $\frac{1}{4}$ litre flask and diluted to 250 cc.; 200 cc. of a filtered portion are first acidified with nitric acid, then made alkaline with ammonia. The assay is brought to the boiling point, filtered and washed. The filtrate is made slightly acid with dilute nitric acid, and mercurous nitrate solution added in excess followed by a few drops of dilute ammonia. On warming and stirring, the precipitate settles readily. After filtering and washing the precipitate with weak mercurous nitrate solution, the paper and precipitate are ignited together in a porcelain crucible, or, if the ore is free from arsenic, in a platinum crucible. Weigh as tungstic acid; with a charge of 5.6 grm., the milligrams obtained, divided by two, give lb. WO_3 per ton.

For assays of ores and tailings the sample may be reduced to a sufficient degree of fineness in a wedgwood mortar, but for concentrates an agate mortar is necessary; fine powdering is essential. 20 cc. of a 25% solution of caustic soda is sufficient to decompose charges containing not more than 0.4 grm. of tungstic acid. The attack with soda is rapid under these conditions; 0.4 grm. of wolfram concentrate being decomposed in 15 minutes to the extent of 98% of its tungsten contents, but, as a rule, from 30 to 45 minutes is given.

Strength of Mercurous Nitrate Solution.—The solution may be conveniently prepared from mercury. From 2 to 3 oz. of mercury is digested in a large beaker or flask, with 25 cc. of nitric acid (sp. gm. 1.4) and 75 cc. of water on a hot plate near boiling point for one and a half hours, and left on the hot plate overnight. The extract, diluted to about 400 cc., will give a saturated solution with the minimum of free acid. 20 cc. is sufficient for most assays.

Where a porcelain crucible has (from the presence of arsenic in the ore) necessarily to be used, it is advisable to burn a batch of precipitates one after the other, and at the end transfer the accumulated tungstic acid to a platinum crucible for treatment with hydrofluoric acid. The loss with hydrofluoric acid is usually very small, e.g., on three assays of mineral from the battery, working with a charge of 5.6 grm., the total loss was 0.5 mg., equivalent to 0.08 lb. per ton on each assay.

In the presence of scheelite the method is not applicable since the mineral is only partly attacked under the conditions of the assay. The effect of varying charge is seen by reference to the results given in the table for samples No. 7, 10, 11, 13 and 23, in the column headed New Method.

In the table are set out assay results, by the various methods, of many kinds of products, including mineral from the battery, intermediate concentrates burnt and unburnt, finished concentrates both of tin and wolfram,

and tailings. The assays are stated in lb. of tungstic acid per ton except for No. 24, where % composition is given. The unreliability of the aqua regia methods is very evident.

Remarks on Some of the Assays.

Sample No. 7.—The residual gangue from each of the three assays by the aqua regia method and from the one by the modified aqua regia method were tested by the "soda digestion" method (i.e., the new method) for tungstic acid. Since no tungstic acid was obtained the low results were not due to incomplete attack by aqua regia.

Sample No. 10.—In both assays by the ordinary aqua regia method it was impossible to obtain a clear ammoniacal filtrate; the high results were not surprising. The aqua regia filtrates, evaporated to dryness

gram. are not conveniently treated since the fusion introduces large quantities of solids into the assay, and in addition much time is occupied with the very necessary preliminary treatment with hydrofluoric acid.

Section II.

Determination of the Solubility of WO_3 in Aqua Regia Under Assay Conditions and the Recovery of the Dissolved WO_3 from the Acid Liquors.

The following five charges were weighed out:—

Experiment.	I.	II.	III.	IV.	V.
Wolfram, mg.	80	80	80	80	80
Clay, grm.	—	2	2	—	2
Fluorspar, grm. ...	—	—	2	—	—
Mispickel, grm.	—	—	—	1.5	—

ASSAY RESULTS IN POUNDS OF TUNGSTIC ACID PER TON OF 2240 LB., EXCEPT FOR SAMPLE 24, WHERE PERCENTAGE IS GIVEN.

Sample Number.	AQUA REGIA METHOD.		NEW METHOD.		MODIFIED AQUA REGIA METHOD.		SODA FUSION METHOD.	
	Assay Value.	Weight of Charge.	Assay Value.	Weight of Charge.	Assay Value.	Weight of Charge.	Assay Value.	Weight of Charge.
1	5.4	5 grm.	9.4	5 grm.	—	—	9.0	5 grm.
2	3.4	5 "	4.9	5 "	—	—	—	—
3	12.0	5 "	14.3	5 "	6.25	5 grm.	—	—
4	1.6	5 "	8.5	5 "	—	—	—	—
5	13.9	5 "	13.5	5 "	—	—	—	—
6	1.0	5 "	5.5	5 "	—	—	—	—
7	3.5	5 "	13.7	5 "	—	—	—	—
	1.0	5 "	14.2	10 "	1.5	5 grm.	11.5	4.48 grm.
	5.8	5 "	14.1	15 "	—	—	—	—
8	1.5	5 "	7.0	5 "	—	—	—	—
9	7.5	5 "	7.5	5 "	—	—	—	—
10	24.8	5.6 "	22.0	5.6 "	14.0	4.48 grm.	—	—
	24.8	5.6 "	21.0	11.2 "	—	—	—	—
	—	—	22.4	5.6 + 4.5 grm. mispickel	—	—	—	—
11	—	—	1.85	8.4 grm.	—	—	—	—
12	95	5 grm.	1.70	16.8 "	—	—	—	—
13	94	5 "	94	1.25 "	—	—	—	—
			93.6	1.25 "	—	—	—	—
			93.0	2.8 "	—	—	—	—
14	9.8	5 "	94.0	5.6 "	—	—	—	—
			9.8	5.6 "	—	—	—	—
			Nil	5 "	—	—	—	—
15	180	5 grm.	—	—	—	—	—	—
			104	5 + 1.5 of mispickel	—	—	—	—
16	2	5 grm.	9.5	5.6 grm.	—	—	—	—
17	17	2 "	41 "	5.6 "	—	—	—	—
18	108	2 "	156	2.8 "	—	—	—	—
19	3	5 "	16.5	2.8 "	—	—	—	—
20	66	2.24 grm	90.5	2.8 "	—	—	—	—
21	234	1.12 "	262	1.4 "	—	—	—	—
22	37	2.24 "	48	2.8 "	—	—	—	—
23	—	—	1.25	5 "	—	—	—	—
			1.0	28. "	—	—	—	—
			62.97 %	0.4146 grm.	—	—	—	—
24	63.2 %	1 grm.	63.2 %	0.5 "	—	—	—	—
25	2.5	5 "	63.6 %	0.5 + 20 mg of As_2O_3	—	—	—	—
			9.0	5.6 grm.	—	—	—	—

DESCRIPTION OF SAMPLES.

1 to 9 inclusive.—Samples of mineral from the battery containing mispickel (1.5% As), cassiterite (SnO_2), copper pyrites (25% Cu) and associated lode minerals:—quartz, felspar, mica, fluorspar chlorite and tourmaline.
 10 and 11.—Artificial mixtures of wolfram concentrate and tailings (free from arsenic and wolfram). The calculated value of 10=22.4 lb WO_3 , of 11=1.9 lb. WO_3 .
 12, 13, 14 and 15.—Finished tin concentrates from the magnetic separator, the % of tin varies from 65 to 73
 16, 17, 18, 19 and 20.—Various unburnt intermediate concentrates prepared from mineral similar to samples 1-9. Their approximate values for arsenic are:—16=1.5%, 17=5%, 18=20%, 19=23%, 20=12%.
 21 and 22.—Samples of burnt intermediate concentrates with 1% of arsenic retained mainly as arsenate.
 23.—A rich arsenical concentrate (24.5% As and 5% Cu) prepared by the Elmore Oil Process from mineral containing wolfram
 24.—A sample of finished wolfram concentrate
 25.—A sample of tailings

and tested for tungstic acid, yielded a trace only. From the acid filtrate of the assay by the modified aqua regia method, tungstic acid equivalent to 6 lb. per ton was recovered by evaporation, making a total of 20 lb. The increased solubility of the tungstic acid can only be accounted for by the supposition that fluorides influence the solubility.

The effect of mispickel, or more correctly of arsenic, on the solubility of tungstic acid in aqua regia is seen by reference to the two assays each of samples 14 and 15 in the column headed "Aqua Regia Method."

The assays of samples 11 and 23 indicate the usefulness of the new method in accurately determining exceedingly small values.

The method involving fusion with alkalis and subsequent determination with mercurous nitrate is a very good one, and the results are reliable. It is, however, unsuitable for frequent use; larger quantities than 5

(The tungstic acid in each of experiments I., II., III. and V. was 50 mg.; experiment IV. contained 60 mg., the extra amount being carried by the mispickel added.)

To each 50 cc. of HCl were added and boiled until the decomposition of the wolfram was complete; 10 cc. of nitric acid were then added and digestion continued for 30 minutes more.

The assays were well diluted and allowed to stand overnight. As noted at the time of dilution in experiment I., the WO_3 soon commenced decomposition in a finely divided form, but took a long time to settle; in experiment II., the presence of the clay somewhat masked the appearance, which seemed very much like experiment I., except that it settled quicker; experiment III. settled readily with a clear liquor and no very decided appearance of WO_3 visible most decidedly

less than in experiment I.; experiment V. settled at once with no appearance of WO_3 .

Their appearance next morning was not very different, except that the assays containing fluorides showed a tendency for WO_3 to salt out at the surface and in places where a glass rod had touched the sides of the beaker.

Each assay was filtered and washed. The WO_3 in the residues was determined as usual with $AmHO$, etc.—the weights of WO_3 obtained being:—

I.	II.	III.	IV.	V.
48 mg.	56 mg.	20 mg.	12.4 mg.	2.4 mg.

The ammoniacal filtrates in experiments II. and III. were turbid, II. was particularly bad and was not improved by repeated filtration—the WO_3 obtained even after treatment with hydrofluoric acid was far too white to be accepted as reasonably pure.

Recovery of the dissolved WO_3 .—The acid filtrates were evaporated to dryness and the residues gently ignited. After dissolving in a mixture of 5 cc. HNO_3 and 10 cc. HCl the solution was well diluted and allowed to stand for 12 hours. By comparison the order of recovery was easily perceptible by eye, but the actual amounts recovered as determined in $AmHO$, etc., were:—

I.	II.	III.	IV.	V.
1 mg.	9.5 mg.	26.0 mg.	3.0 mg.	45.0 mg.

It is very probable that in experiment I. the WO_3 obtained was really due to a faint turbidity.

The experiments prove conclusively the effect of fluorides and arsenic on the solubility of WO_3 in aqua regia. The effect of the former may be eliminated by evaporation, but the effect of the latter is more pronounced and difficult to eliminate.

Attempts were made to recover WO_3 from arsenical liquors by the following methods, but with only partial success, since lime is rarely absent from ores.

(The only practicable method would seem to involve a fusion of the residues from evaporation of the liquor with sodium carbonate.)

The aqua regia filtrate after evaporation was again taken to dryness with 10 cc. HNO_3 to expel chlorides. The residue was digested with soda solution for 15 minutes, filtered and washed. The WO_3 was then determined by mercurous nitrate after removing silica, alumina, etc., by ammonia, and the arsenic by magnesia mixture.

In the assay of sample No. 20 referred to in the table the acid filtrate yielded WO_3 equivalent to 6.0 lb. per ton by evaporation, and a further amount equivalent to 10 lb. per ton by the method described.

In addition to determining factors which may cause low results in the aqua regia method, the possibility of factors tending to give high results by the "soda digestion," or new method, was recognized and investigated.

The burnt concentrates, in addition to a little unburnt mispickel, always contain small quantities of arsenate, so that arsenates would certainly be present in the soda extract.

The Action of Caustic Soda on Mispickel.—In working the assays by the soda digestion method, a yellow coloured solution was always obtained when mispickel was present, the richer the sample in mispickel the more pronounced being the colour. Dilution and addition of a little sodium peroxide removed the colour, the change being accompanied by a small precipitate of ferric hydrate. In the first instance, in seeking for

evidence of attack of mispickel by soda the alkaline liquors were tested for sulphide with lead acetate and found to be free, but as it is more than probable that iron sulphide would be formed in the first stage of attack the test was not conclusive. Using magnesia mixture, arsenic was detected in the assay liquors, the precipitate of silica, alumina, etc., also carried small quantities of arsenic.

Detrmination of the Amount of Decomposition.

1. Rich Arsenical Concentrates.—The sample used was No. 23 (see description in the table). A 5-grm. charge was digested with soda as in an assay, diluted, treated with peroxide of sodium, filtered and washed. The silica and alumina were removed as customarily and the arsenic in the filtrate obtained, separated by magnesia mixture giving 18 mg. of magnesium pyroarsenate, equivalent to 13.5 mg. of As_2O_5 .

2. A Typical Sample of Ore (containing 1.5% As).—4.48 gm. of sample No. 7 (description in the table), treated as in 1., gave 3.5 mg. of pyroarsenate = 2.6 mg. of As_2O_5 . The amount of decomposition, though small, could not be ignored, more especially as in weathered ores such as dump samples and old tailings, and also in burnt concentrates, the proportion of arsenic soluble in soda might be considerably more.

The Effect of Arsenic in the Mercurous Nitrate Method.

Two solutions were prepared:—

1. A solution of As_2O_5 in dilute HNO_3 strength 1 cc. = 1 mg. As_2O_5 .

2. A solution of WO_3 in dilute ammonia, strength 1 cc. = 1 mg. WO_3 .

(a) The Behaviour of Mercurous Arsenate on Ignition.—100 cc. of the arsenic solution was (after carefully neutralizing) precipitated with mercurous nitrate; the precipitate after filtering, washing and drying, was detached from the paper and ignited over a Bunsen burner in a porcelain crucible for 10 minutes. The residue, which was still yellow and showing slight signs of fusion, weighed 0.2774 gm. On further ignition over a large burner the product fused and volatilized, leaving a small whitish residue of 2.5 mg. Its appearance suggested corrosion of the crucible.

The experiment was repeated with another 100 cc., but the paper and mercurous arsenate were burnt together; an ignition of five minutes over a moderate Bunsen flame was quite long enough to volatilize the product, leaving a small white infusible residue of 1.8 mg.

40 cc. of the arsenic solution treated in the same manner left a residue of 1 mg.

The presence of the filter paper during the ignition of mercurous arsenate by acting as a reducing agent facilitates its decomposition and volatilization.

100 cc. of the tungstic acid solution treated in like manner yielded .0990 gm. WO_3 , and .0988 in duplicate.

(b) The Behaviour of Mixed Mercurous Tungstate and Arsenate on Ignition.

	I.	II.	III.
WO_3 solution taken.....	100 cc.	100 cc.	100 cc.
As_2O_5 solution taken....	10 cc.	50 cc.	100 cc.
Weight of WO_3 obtained.	.0997	.1005	.1005
Less correction for residue from As_2O_50995	.0995	.0987

The three experiments, conducted like the previous ones with arsenic, viz., paper and precipitate being

burnt together, show that the effect of arsenic is a negligible factor in products containing 100 lb. WO_3 per ton or less, even ignoring the correction for the residue obtained from the arsenic solution.

(c) The Separation of As_2O_5 from WO_3 by Magnesia Mixture.

WO_3 solution taken	50 cc.	100 cc.
As_2O_5 solution taken	20 cc.	30 cc.
WO_3 recovered030 grm.	.0972 grm.

In the two experiments IV. and V. the arsenic was removed by magnesia mixture previous to the determination of the WO_3 .

For experiment IV. the magnesia mixture was made from ordinary calcined magnesia. The loss of .019 grm. of WO_3 is the effect of lime contained by the magnesia. For experiment V. the magnesia mixture was made from magnesium ribbon.

As to whether the separation of As_2O_5 from WO_3 is actually attended with a slight loss of the latter the authors do not feel justified in stating an opinion; further investigation was discontinued.

The Effect of Arsenic Added in the Form of Mispickel.

(d) 2.24 grm. of the sample 23 (see description in the table) were digested with soda, diluted, treated with peroxide, and filtered into 100 cc. of the ammonium tungstate solution. By so doing the conditions of an actual assay were obtained with freedom from sampling error. The joint liquors assayed for WO_3 without removing the arsenic give: .1010 grm. WO_3 , subject to a deduction of 1 milligram for WO_3 contained by the 2.24 grm. charge of sample No. 23.

(e) Ore No. 10 with a charge of 5.6 grm. and 4.5 grm of mispickel added assayed, without the removal of arsenic, 22.4 lb.

(f) 1.25 grm. wolfram concentrates (refer to Table No. 24) was digested for 75 minutes with 7.5 grm. caustic soda dissolved in 20 cc. water. The extract was treated with a little peroxide, diluted to 250 cc. and filtered. Two portions of 100 cc. each of the filtrate were assayed for tungstic acid by precipitation with $HgNO_3$, to one portion 25 cc. of the arsenic acid solu-

tion were previously added, to the other no arsenic. 0.3180 grm. of WO_3 was obtained from the former, 0.3162 grm. from the latter, the percentage of WO_3 being 63.6 and 63.2% respectively.

General Remarks.

The authors have found the new method exceedingly useful for assays of battery pulp and tailings. The records obtained over a long period are such as to enable the wolfram losses to be apportioned to the respective products with a degree of accuracy hitherto unattainable. The comparison of losses when crushing to different sizes is not only possible, but has been attempted with success. Screening tests, whether of battery pulp or tailings, may be attempted with confidence. An example of the method on a sample of tailings is given:—

A charge of 11.2 grm. was used for each of the assays.

By direct assay the sample gave 4.75 lb. WO_3 per ton. The slime was separated from the sand by decantation with water and the sand separated into two portions with a 60 sieve. The three products were then assayed for WO_3 .

Screening Test of Tailings.

Description.	% by Weight	Assay Value.
Left on 60 sieve ..	22.6	0.5 lb. WO_3 per ton.
Passed 60 sieve	53.8	4.0 " " " } Average
Slimes	23.6	11.7 " " " } 5 lb. per ton.

For work of this kind the new method is not only more accurate, but is speedier than any other method.

The method is applicable to most wolfram ores; there may be some ores where the presence of particular minerals may necessitate modifications of the assay.

In conclusion it has been brought to the authors' notice that the use of caustic soda has been patented as a process for the production of tungstate of soda from wolfram; the investigations were conducted quite independently.

THE COVINGTON COKE DRAWING AND LOADING MACHINES.

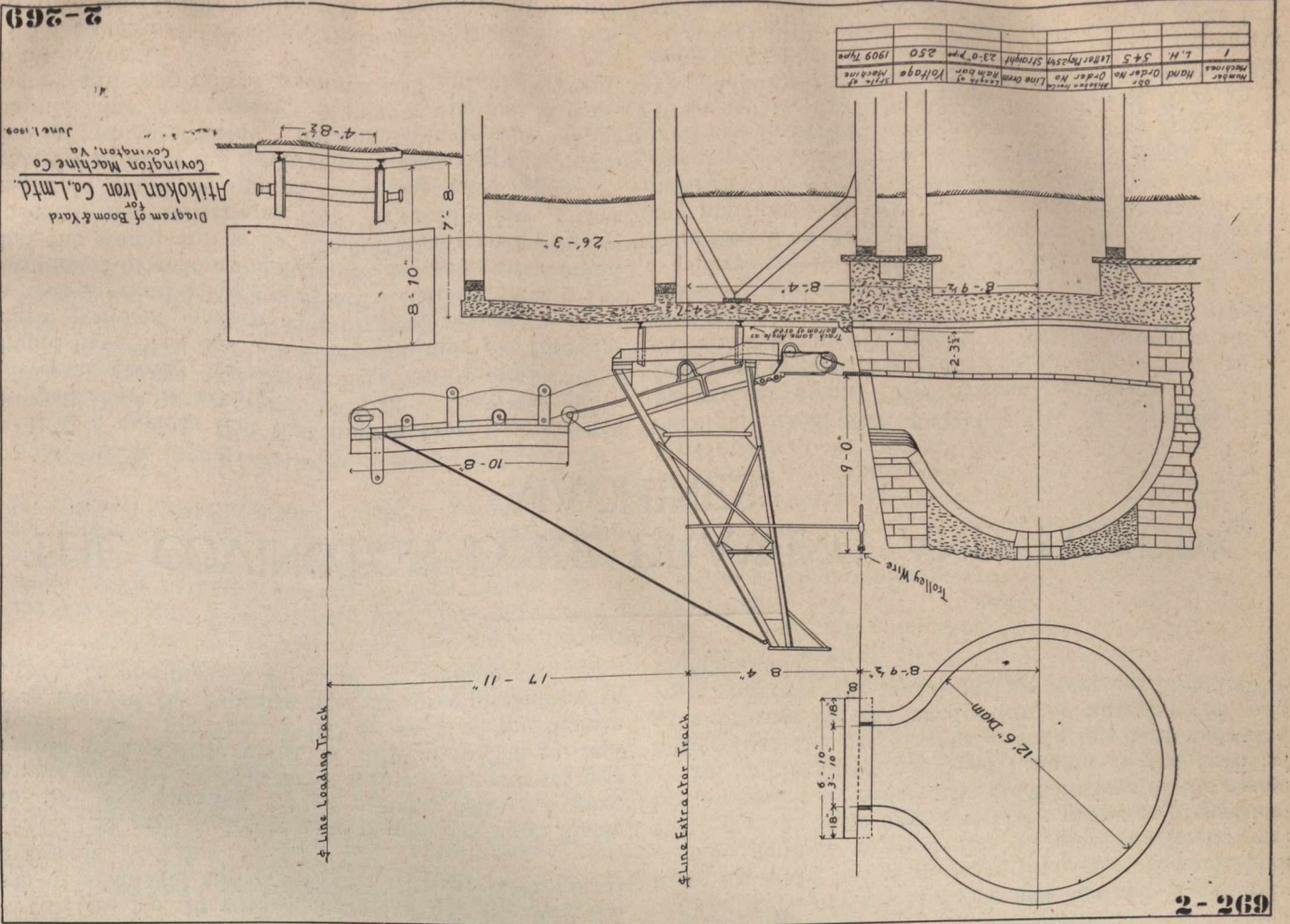
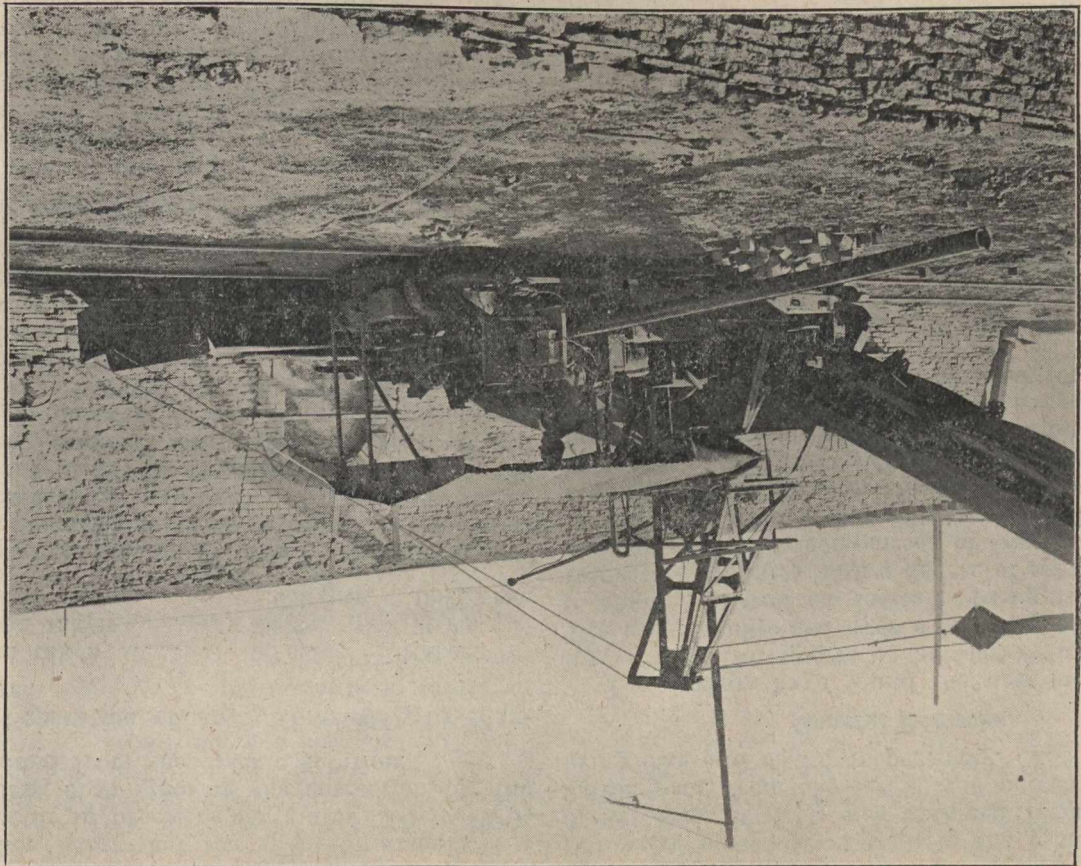
It is a curious fact that human inventiveness has stopped short in several industries. With strangely universal apathy, certain devices and methods that should have been obsolete fifty years ago, yet form integral parts of modern metallurgical plants.

One survival is the stamp mill. Admirable as is the equipment of modern gold mills, no one can contend that the stamp mill is an efficient mechanical contrivance. It is an inheritance from the middle ages. Other instances could be quoted. But the most glaringly wasteful of all is the bee-hive coke oven, for the operation of which a totally disproportionate amount of manual labor is necessary. Moreover, the loss in heat-energy and by-products amounts to from 30 per cent. to 50 per cent.

That such patent and prodigal wastefulness has survived so long is astonishing. One reason is, of course,

the light initial cost of the bee-hive as compared with by-product ovens. The natural antipathy of old-fashioned operators to change, is another. Both are insufficient to justify the unprofitable employment of men when a machine can do the work with far greater efficiency and despatch.

There is now installed at the plant of the Atikokan Iron Co., Port Arthur, Ont., a coke drawing and loading machine that is revolutionizing the operation and construction of coke ovens. Its effect upon operating expenses is clear when it is stated that with it two men can draw and load into cars the coke from 30 to 40 ovens per day, thus doing the work of from 10 to 13 men. In the construction of new ovenyards the machine makes it unnecessary to include expensive yard walls, fills, and cuts, as it delivers the coke into the cars on a level siding.



To-day, in the Pennsylvania coke regions there are over 120 of these machines, the Covington coke drawing and loading machines, installed. More than 4,000 ovens are served. The manufacturers are the Covington Machine Company, Covington, Virginia.

The accompanying half-tone shows the machine in operation. The diagram shows a cross section of the Atikokan yard as arranged for the machine.

The 1909 Covington machine is an improvement on its predecessors. The conveyor and drive-chains are of manganese steel. All important gears are of cast steel, and bronze bushings have supplanted cast iron in all bearings.

As now constructed the machine requires only a distance of 27 inches from the line of the bottom of the oven to the line of the top of the machine track, as

against 41 inches required by earlier models. Little or no grading is required.

The ram-carriage is now moved by a small motor, thus doing away with the arduous manual labor required by the hand-wheel and screw of former models.

One operator can easily handle the machine all day long.

The extractor and conveyor trucks may be uncoupled thus allowing the extractor to move up and down the track while drawing the oven, the conveyor remaining stationary and depositing the coke at one point in the car.

Altogether the Covington machine, inasmuch as it does away with distressingly arduous manual labor, and saves money in erection and operation of ovens, is an innovation that should be welcomed in Canada.

Note on the Determination of Carbon and Phosphorus in Steel.*†

By Andrew A. Blair, Philadelphia, U.S.A.

It will be remembered that in the last paragraph of the joint report on "Comparison of Methods for the Determination of Carbon and Phosphorus in Steel," by Baron H. Juptner von Jonstorff (Austria); Andrew A. Blair (United States); Gunnar Dillner (Sweden); and J. E. Stead, F.R.S., Member of Council (England), it was stated that "the committee are continuing their investigations, and are endeavouring to ascertain whether or not hydrocarbon gases do escape when steel is dissolved in cupric potassium chloride, and the reason for the discrepancies shown above, the results of which will be presented on some future occasion."

On October 23, 1906, the following results were sent to Mr. J. E. Stead, and were reserved by him in the hope that other communications would be forthcoming from the other members of the committee. As I am given to understand that no such communications have been received, I suggested that my report should be presented independently at the May meeting, 1909.

In accordance with the programme suggested by Mr. Stead, I have made the following experiments, having previously obtained supplies of drillings of No. 1 and No. 4 International Standard Steels as prepared for the use of the International Committee and of the "Special Arsenic Standard" prepared for the American Committee.

The advantages to be gained by the use of these steels in an investigation of this character is apparent.

The analysis of these steels is as follows:—

No. 1 International Standard.

	English Committee. Per cent.	Swedish Committee. Per cent.	American Committee. Per cent.
Carbon	1.414	1.450	1.440
Silicon	0.263	0.257	0.270
Sulphur	0.006	0.008	0.004
Phosphorus	0.018	0.022	0.016
Manganese	0.259	0.282	0.254

*Supplement to the Report presented in October, 1904. Journal of the Iron and Steel Institute, 1904, No. 11, pp. 221-273.

†Paper read before the Iron and Steel Institute, London, May, 1909.

No. 4 International Standard.

	English Committee. Per cent.	Swedish Committee. Per cent.	American Committee. Per cent.
Carbon	0.151	0.170	0.160
Silicon	0.008	0.015	0.015
Sulphur	0.039	0.048	0.038
Phosphorus	0.078	0.102	0.088
Manganese	0.130	0.130	0.098

Special Arsenic Standard.

	Full Analysis. Per Ct.	Determinations of Phosphorus.	
		Analyst	Phosphorus Per Ct.
Carbon	0.466		
Phosphorus	0.098		
Manganese	0.720		
Sulphur	0.043	P. W. Shimer	0.098
Silicon	0.296	C. B. Dudley	0.099
Copper	0.056	T. M. Brown	0.104
Arsenic	0.185	A. A. Blair	0.098
		W. P. Barba	0.095

In composition these steels vary sufficiently to cover practically all classes of ordinary carbon steels, and the results obtained should furnish evidence of the accuracy of the different methods used, taking for granted the skill of the analyst and the care exercised by him in carrying out the work.

Determination of Phosphorus.

By the regular method for phosphorus adopted by Sub-Committee on Standards of American International Steel Standards Committee, and described in the Journal of the Iron and Steel Institute, 1904, No. I. p. 239:—

	Phosphorus. Per cent.
No. 1 Standard	0.016
No. 4 Standard	0.088
Special Arsenic Standard	0.098

By the Eggertz method 2 grammes of steel used.

The precipitate of ammonium phosphomolybdate was filtered on an asbestos felt in a Gooch crucible, washed with water and molybdate (1-1), then with 1

per cent. nitric acid, and dried for two hours at 110° C. and weighed. The precipitate was then dissolved in dilute ammonia acidulated with sulphuric acid, reduced and nitrated as in the first method:—

	Weight of Ammonium Phosphomolybdate.	Phosphorus (factor 0.153).	Phosphorus by Titration.
No. 1 International Standard.	0.0210	0.017	0.017
No. 4 International Standard.	0.1046	0.085	0.085
Special Arsenic Standard..	0.1273	0.104	0.104

I have made many determinations in other steels by these two methods, and the results agree very closely in all cases. In the committee's methods the results are obtained in much less time and with less labour than in the Eggertz method. The question of weighing the precipitate of phosphomolybdate or of dissolving, reducing, and titrating it, seems to be largely a matter of custom or personal preference. I believe the titration method to be the more rapid of the two, and I use it continually with perfect satisfaction and confidence.

Determination of Carbon.

The suggestion of Baron Juptner that hydrocarbons are evolved when steel is acted on by ammonium or potassium cupric chloride seems reasonable, and the facts in regard to it should be determined positively.

In addition to the two International Standards, there was prepared for me by the Midvale Steel Company of Philadelphia (for whose kindness in this matter I wish to make suitable acknowledgment) a sample of steel containing about 1.2 per cent. carbon, one bar annealed at 550° C., one annealed in lime, and one hardened.

These samples were all treated as follows: A factor weight (2.7276 grammes) was introduced into a 400 cubic centimetre Erlenmeyer flask fitted with a stopper carrying two tubes, one reaching to the bottom of the flask and connecting with the supply of properly purified oxygen and air, and the other beginning just below the stopper and connecting with a copper tube filled with oxide of copper. The copper tube passed through a gas furnace and was heated to a bright red. The copper tube was connected with an ordinary purifying train consisting of a U tube filled, one end with anhydrous cupric sulphate and the other with solid cuprous chloride, and a second U tube filled with dried calcium chloride. To this purifying train was attached an absorption apparatus consisting of a Liebig bulb containing potassium hydrate and a drying tube containing dried calcium chloride. A guard tube containing calcium chloride completed the train. The absorption apparatus was weighed, the entire train connected, and 200 cubic centimetres of the potassium cupric chloride introduced into the Erlenmeyer flask. A current of purified oxygen was passed through the apparatus until the steel and the deposited copper were dissolved, when air was substituted for the oxygen. The absorption apparatus was then weighed. The current of oxygen passing through the liquid in the Erlenmeyer flask carried forward any gases generated by the action of the copper salt on the steel, and complete oxidation was insured by the red-hot oxide of copper in the tube. It was found that the deposited copper had a tendency to cement the steel drillings into a compact mass very difficult to dissolve in the

excess of copper salt. This was overcome by mixing the drillings with coarse ignited quartz sand, so that, aided by an occasional shaking of the flask and the gradual heating of the solution by the radiant heat from the furnace, complete solution was effected in about two hours.

The residue on the flask was filtered on an asbestos felt in a platinum boat and burned in the regular way in a platinum tube in a current of oxygen. The result served as a check on the work. When the neutral copper salt was used there was always a heavy deposit of basic ferric chloride or ferric oxide in the solution, and at the end of the operation it was necessary to introduce into the Erlenmeyer flask about 30 or 40 cubic centimetres of hydrochloric acid 1.1 specific gravity to dissolve it. This was generally done when air was substituted for the oxygen.

The determinations were checked by direct combustion of the drillings in a platinum boat, partly filled with ignited alumina, in a platinum tube in a current of oxygen. The tube was heated to intense redness, and the operation was conducted exactly as described on p. 134 of the sixth edition of the "Chemical Analysis of Iron," and by solution of the drillings in acid potassium cupric chloride, filtration and combustion of the residue in oxygen. The results are shown in the following tabulated statement:—

No. 1 International Standard.

	Carbon Per cent.
Combustion of evolved gases from acid solution of potassium chloride.....	0.000
Combustion of residue from flask.....	1.451
Combustion of evolved gases from neutral solution of potassium cupric chloride.....	0.001
Combustion of residue from flask.....	1.396
Direct combustion of drillings.....	1.459
Solution in acid potassium cupric chloride and combustion of residue.....	1.446

No. 4 International Standard.

	Carbon Per cent.
Combustion of evolved gases from acid solution of potassium chloride.....	0.005*
Combustion of residue from flask.....	0.142
Combustion of evolved gases from neutral solution of potassium cupric chloride.....	0.000
Combustion of residue from flask.....	0.141
Direct combustion of drillings.....	0.157
Solution in acid potassium cupric chloride and combustion of residue.....	0.158

Sample Annealed at 550° C.

	Carbon Per cent.
Combustion of evolved gases from acid solution of potassium cupric chloride.....	0.003*
Combustion of residue from flask.....	1.252
Combustion of evolved gases from neutral solution of potassium cupric chloride.....	0.004*
Combustion of residue from flask.....	1.246
Direct combustion of drillings.....	1.259
Solution in acid potassium cupric chloride and combustion of residue.....	1.258

Sample Annealed in Lime.

	Carbon. Per cent.
Combustion of evolved gases from acid solution of potassium cupric chloride.....	0.006*
Combustion of residue from flask.....	1.251
Combustion of evolved gases from neutral solution of potassium cupric chloride.....	0.005
Combustion of residue from flask.....	1.236
Direct combustion of drillings.....	1.253
Solution in acid potassium cupric chloride and combustion of residue	1.252

Sample hardened.

	Carbon. Per cent.
Combustion of evolved gases from acid solution of potassium cupric chloride.....	0.002
Combustion of residue from flask.....	1.257
Combustion of evolved gases from neutral solution of potassium cupric chloride.....	0.012
Combustion of residue from flask.....	1.252
Direct combustion of drillings.....	1.280
Solution in acid potassium cupric chloride and combustion of residue	1.267

These samples were all ordinary carbon steels, but as experience has shown me that on chrome-tungsten steels the direct combustion method gave much higher results than the combustion of the residue from treatment with potassium cupric chloride, a high chrome-tungsten steel was treated with the following result:—

	Carbon. Per cent.
Combustion of evolved gases from acid solution of potassium cupric chloride.....	0.002
Combustion of residue from flask	0.543
Direct combustion of drillings.....	0.692
Solution in acid potassium cupric chloride and combustion of residue	0.567

The results of these experiments lead me to the conclusion that the opinion I expressed in 1891,* that there was no evolution of hydrocarbons when steel was treated with a copper salt, was absolutely correct. There is abundant evidence to show that, as I then stated, there is a "solution of the carbonaceous matter by the alkaline salts in the absence of an excess of acid," which is not precipitated by the subsequent addition of acid. The agreement in the results obtained by the direct combustion process and the combustion of the residue from the solution of the steel in acid potassium cupric chloride is so very close that I think that either method may be considered capable of yielding correct results. I now use the direct combustion method practically to the exclusion of all others, because it requires less work, and the results can be obtained in a shorter length of time. I am, therefore, in this conclusion heartily in accord with Mr. Stead; but by using a platinum tube I find no difficulty in obtaining correct results, no matter how thick the drillings may be, for I have made a number of determinations by burning coarse drillings directly and breaking up portions of the same lot of drillings until they passed through a fine sieve and then burning them, obtaining results rarely differing more than 0.005 per cent.

*In this case the absorption apparatus lost weight.

*Journal of Analytical and Applied Chemistry, vol. 4, p. 121.

I made several determinations by the Swedish direct combustion method, but did not obtain results sufficiently accurate to repay me for the trouble and work involved. Perhaps if I had had more time, or if I had been forced to use this process because the others were not available, I might have been more successful. Mr. Dillner's assertion that the direct combustion method is not suitable for pig irons does not accord with my experience. By mixing the sample of pig iron with an equal weight of low carbon steel or electrolytic iron, I have had no difficulty in getting results that agreed perfectly with those obtained by solution in potassium cupric chloride and combustion of the residue. This is equally true in regard to ferro-chrome and all other iron or steel alloys with which I have had experience.

The secret of success in this process is the rapid heating and combustion of the steel, for the heat furnished by the oxidation of the metal is sufficient not only thoroughly to oxidize the material, but to melt the resulting oxide into globules. It occasionally happens that the melted oxide runs through the bed of alumina and fuses to the bottom of the boat, to which it adheres so closely that it can be detached only by melting potassium bisulphate for a long time in the boat. The thin platinum cover which I use to prevent the spattering of the oxide on the inside of the tube is frequently perforated by the fused material.

The method is used in several large steel works, where one operator with four tubes makes as many as forty combustions in a day.

I have been informed by Mr. Stead that his results and researches fully confirm the fact that there is no evolution of hydrocarbons when steel is treated with copper salt in the manner described in the original report, and that later investigations have proved that the direct combustion method is par excellence the best and most accurate for the determination of carbon in steel.

PERSONAL AND GENERAL.

Mr. O. N. Scott has returned from a professional visit to Madoc, Hastings County, Ont.

Mr. Elias Rogers, president of the Crow's Nest Pass Coal Company, is to visit British Columbia early in July.

Dr. A. E. Barlow, who is superintending prospecting and development operations on the claims of the Miller Lake syndicate, Miller Lake, is ill in Montreal.

Mr. F. H. Sexton, director of Technical Education, Halifax, N.S., was in Toronto early in June. Mr. Sexton is travelling in the interests of the new Technical College.

Mr. C. J. Tompkins, late of the Accounting Department of the Dominion Coal Company, has been appointed Secretary-Treasurer of the Imperial Coal Company, Frank, Alta.

Messrs. Burr & Fergusson, civil, hydraulic and mining engineers, announce that they have opened offices in suite 216-217, Loo Building, corner Hastings and Abbott streets, Vancouver, B.C.

Mr. R. G. Edwards Leckie returned on June 18th from a visit to Vancouver. He is now on his way back to British Columbia to spend some time in looking over mining properties in that province.

"Sic Semper Tyrannis. The engagement is announced of Miss Frances Muriel Cronyn to Mr. H. E. T. Haultain, son of the late Major-General Haultain. The wedding will take place in September.

At a meeting of the Lake Superior Corporation held in New York on June 11, Mr. Charles D. Warren, of Toronto, was elected president and Mr. T. J. Drummond, of Montreal, second vice-president.

Mr. E. S. Moore, formerly identified with the Ontario Bureau of Mines, has taken his Ph.D., *summa cum laude*, at the University of Chicago. He has accepted the appointment of Professor in Geology in the Pennsylvania State College.

Mr. R. B. McKay, who graduated from the School of Mining, Kingston, in 1904, is visiting Cobalt. For the past five years Mr. McKay has been engaged in contract mine surveying in the gold camps of British Columbia and Nevada. He is now making Cobalt his temporary headquarters.

Mr. Angus W. MacDonald, who for the past two years has filled the position of employment agent for the Dominion Coal Company, has been appointed general superintendent of the Dominion Coal Company, at Lethbridge, Alta. He will assume his official duties on the 1st of July.

The resignation of Mr. J. Obalski from the position of Superintendent of Mines for the Province of Quebec, has just been announced. Mr. Obalski will take up private practice with headquarters in Montreal. His numerous friends throughout Canada will wish him continued prosperity. For many years Mr. Obalski has been a prominent and useful member of the Canadian Mining Institute and he was this year elected vice-president.

Dr. Henry M. Ami, after 28 years of continuous and faithful service on the staff of the Geological Survey of Canada, retires on July 1. Dr. Ami's health has not been as satisfactory of late as his friends would wish, and his physician has advised him to discontinue his regular duties. Dr. Ami's early training was received at Ottawa. At McGill University he studied for four years under Sir William Dawson. Since his graduation he has been identified with the Geological Survey. His work has received recognition from foreign scientific bodies. He is a fellow of the Geological Society of London, and of similar bodies in Switzerland and the United States.

Members of the Canadian Mining Institute who were able to be present at the Montreal meeting last March, will remember with unmixed pleasure the several talks given by Dr. A. C. Lane, State Geologist of Michigan. The whimsical humor that tinged many of Dr. Lane's utterances was thrown into relief by an undercurrent of practical seriousness and sane idealism. Like Dr. Kemp, he used his wit not wantonly but well. It has just been announced that Dr. Lane is to leave the Michigan Geological Survey. He has accepted an appointment at Tufts College, where, naturally, a wider sphere of work will be assured. Dr. Lane's name, however, will always be associated with the geology of the Lake Superior region. He is, and has been, one of that thoughtful school of geologists who succeed in connecting geology with mining. We wish him all success in his new appointment.

Correspondence.

Editor Canadian Mining Journal:

Sir,—Your special correspondent from Glace Bay, in your issue of May 15th, in his elaborate defence of the Dominion Coal Company's hostility to reciprocity in coal, bears the earmarks of being official and authoritative, and his production, therefore, may be considered as presenting the most favourable view of that company's course of procedure.

The writer summons Hon. Robert Drummond to his aid, and quotes that gentleman's latest revised opinion that Cape Breton coal cannot compete with West Virginian in New England, and he fortifies his opinion by declaring that "Mr. Drummond knows what he is talking about when on the subject of coal." Would "Glace Bay" guarantee that Mr. Drummond knew what he was talking about when he used to assert directly the contrary of what he now states? Was his education incomplete when he formerly extolled reciprocity as the salvation of the Nova Scotia trade, and did he only graduate as a coal expert when he fell under the tuition of the Dominion Coal Company?

Mr. Drummond is expected to be somewhat responsible for his utterances in the Legislative Council. In his speech on 29th March, 1893, when the Whitney Syndicate matter was up, Mr. Drummond argued strenuously (1) there could be no coal combine, (2) there could be no material increase in prices, (3) that Nova Scotia coal could retain the Quebec market in spite of the remission of duties, and finally, (4) "with the duty removed there would be no trouble whatever in sending coal into the United States market." His opinion was so strong on that point that he even hazarded the opinion that if there were facilities for receiving it, "we could send it now in spite of the duty."

Can Mr. Drummond now turn around and convince us that all he has written and spoken about coal markets until a recent date is balderdash and humbug? To-day he ridicules those who believe in an open market as "credulous or deceitful." It is fair to ask which was he during the many years when he promulgated the doctrine of reciprocity? "Glace Bay" quotes him as stating: "At the present time West Virginia coal is selling f.o.b. Boston at \$2.30 per ton, and on cars at \$3.00." Such figures have no basis of fact whatever. The Coal Trade Journal, of New York, on 12th May (page 364) quotes coal at Mystic at \$3.15 and upwards for spot business, and New River and Pocahontas on cars at a higher rate. On the 19th, the same excellent authority says: "George's Creek operators are hard hit, the same as the Pennsylvania operators, but they are maintaining prices fairly well on a basis of \$3.35 to \$3.50 in cars at Mystic. . . . Some of the larger shippers continue to maintain a price on the basis of \$2.50 f.o.b. shipping point." Thus the Trade Journal pretty effectually disposes of Mr. Drummond's quotations. For a number of years the Dominion Coal Company supplied the Boston and Maine Railway at Boston with steam coal at \$2.80 against 67 cents duty. Compare the net price (\$2.13) with the present low prices there, which make a margin of at least one dollar per ton in favor of Cape Breton coal, and a larger margin when brisk times give an upward tendency in prices.

The grand objection of the Dominion Coal Company to reciprocity is the alleged lack of discharging facilities in New England and the necessity of creating them. "Glace Bay" demands: "Would any sane Board of Directors be justified in expending huge sums . . . to

provide costly discharging facilities?" From which we are left to infer that the coal people in New England are behind the times, and still hoist coal with a tub, block and pulley! I do not think it would surprise "Glace Bay" a bit to be informed that some of the finest coal-discharging plants in the world are to be found in New England, because the Dominion Coal Company is constantly using some of them. There is no danger that the American coal operators will shut out Cape Breton coal from their use, because, except in one instance, they are not owned by the operators at all, but by local dealers, who always welcome healthy competition, which is said to be the life of trade. Thus the huge bugbear to reciprocity raised by the officials of the Coal Company vanishes into thin air!

"Glace Bay" asks us to believe that the Dominion Coal Company is a benevolent institution operated in the public welfare. He asserts it "is a beneficent business enterprise that has greatly increased the prosperity of the country; . . . that the incorporation of that company was the inception of the greatest impetus ever given to the Maritime Provinces." "Jumping" the price of coal up (say 50 per cent.) is doubtless an instance of the "beneficent" policy of the company to promote the public prosperity and welfare! The jump in price is fully endorsed and justified by "Glace Bay," who admonishes me to learn that it is proper and right to salt the home market, in the advice that I should "take an elementary course in the law of trade and learn how it is that Canadian cheese and Nova Scotia apples can be purchased for less in London than in Sydney."

A knowledge of trade seems not so much lacking as an appreciation somewhere else of sound business morals. If the coal and other minerals of the province are owned by our people, they ought to be operated more in their interests than in the interests of outside communities. If, however, corporations and combines have succeeded in ousting them from their heritage and can defy them, they might as well submit and pay the tribute that brigands in all ages have demanded.

This province wants cheap coal for home consumption. What benefit is it to mine cheap coal for outside communities? If an expansion of the coal trade from two to five millions of tons means dear coal at home and cheap abroad, the less our people have of it the better. If our coal fields are a provincial asset destined to impoverish our people in order to increase the wealth and prosperity of others, our coal mines had better be closed.

To skin home consumers of coal to the limit and call it "beneficent" is a variety of benevolence worthy of Dick Turpin, who, "going through" the hapless wayfarer, bids him to kindly remember him for sparing his life.

The collapse of the Dominion Iron and Steel Company would have been an enormous misfortune to thousands of people financially interested, yet that was the "beneficent" result aimed at by the Coal Company when it refused to supply that company with coal at any price, and then, when forced to renew the supply, raised the price from \$1.28 to \$3.05!

Hon. Mr. Drummond, "who knows what he is talking about," etc., did not, before his conversion, view

the "jump" in prices as a beneficent act. He wrote on 26th May, 1905:—

"I have all along since 1901 maintained that the operators made a great mistake in so largely increasing the price to coal consumers. . . . The operators jumped the price too much and too quickly."

"Glace Bay" quite correctly sets forth the conditions of mining by the Dominion Coal Company, which he alleges "cannot be excelled on this continent. . . . It possesses what is probably one of the most valuable bituminous coal deposits in the world, and has a plant which always astonishes visiting engineers by reason of its completeness and extent."

Why, then, fear West Virginia coal in neutral markets?

I ask of what commercial value is any industry that cannot stand alone—that requires to be bolstered up by protective duties to give it a high-priced market? Why should "one of the most valuable coal deposits in the world" fear competition in its own home market against rivals handicapped by hundreds of miles of inland rail carriage? Why should the earnings of other industrial classes have to come to its aid to keep it alive?

The capital of the company is \$23,000,000, consisting of \$5,000,000 of 5 per cent. bonds, \$3,000,000 of preferred stock and \$15,000,000 of common stock. The latter was originally issued as a sort of bonus, so that the real capital is \$8,000,000, the interest on which is \$460,000 per annum. The average annual net earnings of the company may be set down briefly as \$1,800,000, which is about 23 per cent. on the capital originally invested. About two-thirds of this enormous income, deducting interest, is wrung from the people of Nova Scotia. The Coal Company's employees number about 5,200, only 2,600 of whom are skilled miners. To keep these employed at good wages Dominion Coal advocates allege that high prices for coal are necessary. Assuming that the people of the province pay only \$520,000 above their legitimate coal bill—and it is much more—the other classes in the community, the farmers, lumbermen, fishermen, gold miners, mechanics, etc., are paying \$100 per head of the employees to sustain the coal industry, over and above what they paid previously to 1900! Does this enormous sum reach men in the coal pits? Not a cent of it. The company puts its coal on the cars for about \$1.20 per ton. This includes all labor bills. The miner receives not one cent more whether sales are made at \$1.28 per ton or for \$3.05 per ton. It is all the same to him. Therefore the high prices extorted by the combine on the plea of wages is pure charlatanism.

W. C. MILNER,
Secretary Free Coal League.

May 31st.

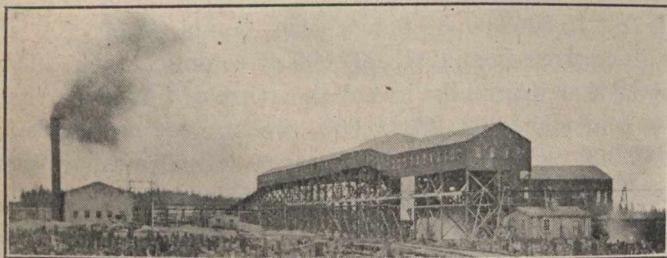
SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, N.S., 18th June, 1909.—Exhaust Steam Turbines.

—What will be, we believe, the first exhaust steam turbine engine in Canada is shortly to be erected in the Central Electric Power House of the Dominion Coal Company at Glace Bay. For several years past exhaust-steam turbines have been in successful use on the continent of Europe, and they have come into especial prominence in colliery work in the Westphalian coal-field of Germany. In recent years it has been found possible to introduce very great economies in boiler-coal consumption at collieries, and one does not often find to-day that the best coal goes to the fires, as too often it used to do in the old days. Nevertheless the peculiar nature of colliery power demands have not conduced to the most economical use of steam, particularly in the case of large hoisting engines, and the modern exhaust-steam turbine seems particularly adapted to meet such conditions. At the present time many of the collieries in England and Scotland are installing turbo-condenser plants and their future extended use seems assured.

The plant to be installed at Glace Bay will consist of one 1,000 k.w. generating unit. The turbine will be of the Rateau design, impulse type, and will utilize exhaust-steam at about atmospheric pressure, or 15 lbs. absolute. It is not yet decided whether the condensers will be jet condensers or barometric type. The circulating water will be taken from a large natural reservoir adjoining No. 2 Colliery. The single generating unit referred to will not utilize the whole of the exhaust steam which



No. 12 Bankhead, Dominion Coal Co., Glace Bay, N.S.

is available at No. 2 Colliery, and if the projected plant proves economical it is expected that another unit will be added.

The current generated will be conveyed by high tension transmission line to the group of new collieries now in course of development in the Lingan-Victoria District. The course of the pole-line will be across Lingan Bar, and the line generally will be very substantially built in order to withstand the high winds which sweep across this Bar in the winter time. The current will be stepped-up to 20,000 volts, and delivered at the collieries at this voltage. The distance from the generating station to the Lingan collieries is about nine miles.

The power at No. 12 Colliery, which is the first of the new group, will be largely steam, but at the other collieries it is expected that all the auxiliary surface engines, such as screen-engines, fan-engines, etc., will be electrically driven. It is also intended to deal with the mine water by means of electrically driven pumps, and the current will be taken underground through transmission boreholes as is the practice at the existing collieries. For the present, at any rate, the haulage will be driven by steam-power. Whether electrically driven haulages will be installed later will depend on the local conditions as they develop, but a certain amount of auxiliary, steam-power will have to be provided at these collieries, or otherwise they would be too entirely dependent on the transmission line.

So far as we are aware no use has as yet been made in this country of small electrically-driven rotary air compressors

operated underground by transmission lines from the surface. Where electric current can be transmitted through boreholes of a convenient depth this is an economical method of driving coal-cutting machinery, as it saves the expensive compressed-air mains which are otherwise necessary, and it further avoids the necessity of taking electric current into the coal face.

The U.S. Senate and Nova Scotian Coal.—The Washington Congressional Record of June 8th contains a speech of the Hon. Stephen B. Elkins, Senator for West Virginia, during the debate on tariff rates on coal and petroleum which took place on the 2nd of June. Following are some of the "facts" which Senator Elkins told the Senate about Nova Scotian coal, which we cannot do better than quote as they were spoken: "Nova Scotia," said the Senator for West Virginia, "has about a thousand miles square of coal, containing four veins of coal whose average thickness is about ten feet, making about six thousand million tons of coal, two-thirds of which is as good as West Virginia coal." It would be interesting to know where this valuable coal deposit is situated in Nova Scotia. The particulars given do not agree with any coalfield we have ever heard of in this Province, except the remarkable areas which are controlled by Dr. Hugo von Hagen. We have often wondered where the coal was coming from to fulfil that five million ton contract which the shareholders of the Great Northern Coal Company were told had been closed for delivery in 1909. It is quite evident that there must be a coalfield in Nova Scotia known to certain persons in the United States which our Canadian Geological Survey has completely overlooked.

Senator Elkins gives a tabular statement of analyses of various coal seams said to be worked by the Dominion Coal Company. They make a surprising list, being as follows:

Victoria	Gowrie
Springhill	Caledonia
Acadia	Reserve
Intercolonial	Lingan
Reserve	International
Nova Scotia	Gardner

We always knew the Dominion Coal Company had a fine property containing numerous seams, but it may be news to the shareholders of this company to know how extensive their property really is.

What is really the most astonishing part of this extraordinary speech was Senator Elkins' assertion that the U.S. Government had been defrauded to the extent of \$1,000,000 of duties caused by evasion of the law by the Nova Scotian operators. The Senator stated "most of the coal imported as slack (from Nova Scotia) was ordinary coal, and should have paid a duty of 67 cents instead of 15 cents. . . . To make this slack question clearer I will go more into detail. It seems that in loading the Nova Scotia coal after it was mined into the railway cars it was dropped from an unusual height. This broke up the coal considerably. Then in unloading it into the boats taking it to Boston it was passed through a tube 60 feet long, with breakers. This also broke up the coal, so that by the time it reached Boston it would nearly all pass through a half-inch screen, and therefore most of it was sent down as slack by the Custom House officer and paid only 15 cents a ton duty. Most of all these importations were made by the New England Gas Company, which has 40 bye-product coke ovens near Boston, and the finer the coal the better it is suited for making coke so this company not only got its coal in on a 15-cent duty but it was prepared just to suit its purpose.

This extract is worthy of the Secretary of the Free Coal League at his best. The reference to the "tube 60 feet long, with breakers" rather puzzles us. We gather that someone has been amusing himself at the Senator's expense. Perhaps, however, the reference is to the Robins belt-conveyor at Louisburg Pier which is used to load slack coal into vessels. This conveyor is about 600 feet long, and is used to take coal from the slack pocket to the hatch, and has a loading capacity of 700 tons per hour.

The facts of the case are these: The Dominion Coal Company has a contract with the New England Gas Company to supply slack coal for use in the coke ovens at Everett. This coal is all slack that is taken from under the screens in the ordinary process of screening, and it is only because of the fact that it is slack coal that the Dominion Coal Company has not sent a pound of round coal to the New England States since the spring of 1906, nor are they likely to.

Senator Elkins gives some figures to show the great importance of the coal industry of the United States, which we quote and take them as correct, for it is but reasonable to suppose that his figures with regard to the United States will be accurate, notwithstanding the fairy tale about Nova Scotia with which the Senate was amused. In 1908—a dull year—the coal production was 419,000,000 tons, worth \$500,000,000 at the mouth of the mine. If the money involved in transportation be added the sum involved in this great industry is \$800,000,000, and three million people depend upon it directly for a living. Then the Senator speaks of the production of Nova Scotia as being 5,800,000 tons per annum, and states in another part of his speech that with her present development Nova Scotia cannot supply much more coal than she now does. After this statement the Senator gets off the following doleful prophecy: "There are Americans and Canadians waiting to see if coal is put on the free list to buy coal lands in Canada, and if they should, and open new mines, they will ultimately take the New England market, I think, except for the very best quality of coal, and in a few years take all the New England market. The result of this would be so disastrous, so ruinous, and demoralizing to West Virginia, Maryland, and Eastern Pennsylvania, that these states can never consent to the lowering of duty on coal." Truly the United States must be in a parlous condition. The entire Canadian coal production to-day is ten million tons per annum, or expressed as a fraction it is one forty-one-millionth of that of the United States, and if reciprocity in coal should have occurred the result to the States will we are told be 'disastrous, ruinous and demoralizing!' How very consistent!

If Canadian coal lands appreciate in value and contents as we have known them to do when bought by certain American citizens we do not wonder that Canadian competition looms so large in the eyes of the Senators. The prospectus of the Great Northern Coal Company read as follows, in part: "The property owned by this company is very valuable. It consists of three square miles in the heart of Cumberland County, which is famous as the largest coal district in Nova Scotia. Each square mile contains about 37,000,000 tons of coal, or in all about one hundred and eleven million tons (111,000,000 tons). Figuring this coal at 11 cents per ton, which is the value given coal in the ground, gives this property a cash value of \$12,200,000. Twelve million two hundred thousand dollars. Think of it! This means that every share of stock has nearly \$500 back of it. It means that the Company will be mining coal when our grandchildren are married one hundred or two hundred years from now." This is the description of a certain Nova Scotian coal property by a gentleman who advertises as Henry N. Roach, 373 Fifth Avenue, New York, and who publishes a weekly newspaper known as "Roach's Financial Facts." A description of the same property by a Nova Scotian mining engineer says "in my opinion it would require a very large outlay to put this mine

in condition for a daily output of 300 tons, and such a development would not be warranted by the present holdings." This same mine produced in 1908 the large output of 2,726 tons, of which amount the former owners raised 1,287 tons.

Comparisons are odious, but we feel bound to remark that a great deal of the information which is disseminated in the United States with reference to Canada is, shall we say, "roachy" in character.

QUEBEC.

Mr. J. E. Hardman, S.B., of Montreal, was in Thetford recently, looking over some Asbestos ground for a client.

The Montreal fiscal agents of the Compton Gold Dredging Co., having failed to make good on their agreement to provide funds for a dredge, by May 1, Kennedy & House, of Beebe, are now calling for the return of their property, as other parties are ready to take it up and put on a dredge this season.

It is reported that the Eustis people are about to re-open the nickel property at Brampton Lake.

The asbestos Merger, and the sale of a few properties has had the usual effect, namely, farmers having a show of serpentine, or hornblende, expect to get anywhere from \$25,000 to \$100,000 for a few acres, while one with any real asbestos goes up out of sight. And there will be the usual result. It is one of the unfortunate things about mining—people will lose their heads, eventually be disappointed and blame anything and everything for their own folly. We have yet to see what the ultimate result of the merger with its \$25,000,000 capitalization will be.

Meanwhile, prices are on the aeroplane. The writer had an option on 100 acres last season for \$1,500, and allowed it to expire. Now the owner has leased it for \$10,000 and gets \$100 per month during life of the option. Truly, there's a time to catch bears.

The Eastern Canada Smelter Co., which has an option on Mr. J. McDonald's copper property in Weedon, is sinking a new shaft. Some handsome ore from the property can be seen in the Company's office, Sun Life Building.

A meeting of the Directors of the Eastern Canada Mines Company was held recently and properties offered the Company discussed, and several declined. Plans were made for taking over of some promising claims, and the business of the Company put on a satisfactory basis.

The Company has a deal in prospect on one of its holdings, Le Chat Noir, a large placer.

Mr. Geo. Lewis, M.E., and Mr. C. A. Parsons arrived in Sherbrooke, June 15, and with Mr. Kenneth E. Kennedy drove to the property near Little Lake, recently purchased from Mr. Parsons by New York people. Mr. Lewis is here for the purpose of advising on the best means of working the placer ground, and also of examining the quartz veins on the property.

ONTARIO.

Cobalt.—On June 4 a general meeting of the shareholders of the Temiscaming & Hudson Bay Mine was held to discuss a plan for the recapitalization of the company. It is proposed to form a new company having a capital of from \$3,500,000 to \$5,000,000, the shares being of a par value of \$1.00. The issued stock of the present company is only 7,761 shares of a par value of \$1.00 each, but the true value of each share is so great that the stockholders have a commodity that, while of

great value is not easily disposed of to advantage. There seems to be a general feeling in favor of some scheme of recapitalization whereby the shareholders will have certificates that may easily be bought or sold on the exchange. Although no definite arrangement was decided upon at the general meeting it would not be surprising if some action were taken in the near future. Up to date this company has returned to the shareholders, dividends to the extent of 13,300 per cent. on the issued capital.

At the Ophir Mine the foundation for the compressor is finished and the compressor will probably be in place by about June 8. The boilers are being bricked in and the management expect to have the plant in running order about June 21.

The shaft of the Hargraves has reached a depth of 275 feet, and at this level a cross-cut will be driven. Some work has also been done at the 75 and 175 foot level, but up to date good silver values have not been encountered.

The directors of the Trinity Mining Company have decided to go into liquidation. This company owns two claims in Coleman Township.

The values have given out in the new vein at the Beaver, at a point where a change in direction of the vein occurred. This, however, is a common thing with the veins in this locality and the management expect to get the values again in a short distance. The diamond drills working in the mine have struck two new calcite veins which have not been found as yet to carry silver values.

There have been two accidents within a week, caused by drilling into missed holes, whereby four men were very seriously injured. It is too much to say that a more rigid mine inspection would have prevented these accidents, but it is undoubtedly true that it would prevent some of the fatalities occurring. The inspection given the Cobalt camp is excellent, so far as it goes, but the inspector has altogether too much work to do, to give this district the attention it deserves. A permanent inspector for the camp is badly needed, and the Government is greatly to be censured that one has not been appointed before this. Neglect of this matter has already caused the loss of too many lives.

The Nipissing Central Railroad Company has completed their surveys for the electric line to be run between Cobalt and Haileybury, and the contract for building has been let to the Nova Scotia Construction Company, of Sydney, C.B. Work will be started at once and it is estimated that the cost will be about \$125,000. Power will probably be obtained from one of the companies bringing power into the town.

The cyanide plant of Buffalo Mine, to be operated in connection with the present mill, is about completed and will probably be started about the 1st of July. For the fiscal year ending May 10th the average assay of the mill rock was 43 ounces and a total saving of 86.4 per cent. was made. The average value of the concentrates was 1,500 ounces. Commencing with July a complete monthly statement will be issued to the stockholders giving the details of the mining operations and cost and profit of the ore milled and mined.

A new company known as the Lang Caswell Cobalt Mines Company, Limited, has been formed to take over the holdings of the Lang Caswell Syndicate, which consist of 440 acres in the first concession of Lorraine. The capital of the new company is \$1,500,000, all of which was subscribed for by the directors at a meeting held a short time ago. A shaft, sunk to a depth of over 60 feet is being continued to the 100-foot level. Another shaft will be sunk to the same depth on the best showing on No. 1 property, and these two workings will be connected by a cross cut.

The Pontiac Mine has shut down for the time being owing to the fact that the workings have progressed beyond the point

where steam can be successfully used for the drills. It is understood that negotiations are under way for the purchase of air from the King Edward or the Silver Cross Mines, and if such are satisfactorily completed, work may be resumed. In the meantime surface prospecting is being carried on.

Mr. M. McCallum has resigned his position as superintendent of the Pan Silver and he will be succeeded in that capacity by Mr. J. A. Skeene. The No. 4 shaft has reached a depth of 215 feet and at this point a station is being cut. A cross cut will be run to tap No. 4 vein.

The Silver Cliff Mine has a force of 30 men at work doing development on No. 1 and 2 veins. These workings will probably be connected about the last of June. Work of any great extent will not be undertaken until the hydraulic air is ready.

A strike has been made on the No. 7 vein of the King Edward in the raise, 45 feet above the 150 foot level where the vein widened from a mere stringer to between 2 to 4 inches of high grade ore. No. 7 vein runs parallel to No. 5, on which a new ore body was discovered a short time ago. A prospecting tunnel is being driven into the hill from the side of Cross Lake, but nothing of value has as yet been discovered. The mill is putting through about 20 tons of ore a day.

The Townsite Mine is to open up again about the 1st of July. The necessary capital was raised by the issue of debentures to the amount of \$100,000, which were largely subscribed for in England.

The Nancy Helen Mine is getting ready to commence their diamond drilling operations from the 190-foot level of the main shaft. Other underground operations have been suspended in the meantime.

The main shaft of the Wettlauffer Mine in South Lorraine has been sunk 70 feet, and in the first 60 feet \$15,000 worth of ore was taken out.

The capacity of the mill at the Reddick Mine at Larder Lake will be increased by the addition of a tube mill. Twenty men are employed in sinking the shaft, trenching and cutting timber. At the Cleopatra Mine, a large force of men will be employed this summer in prospecting the surface. It is believed that Mr. George Taunt, who is a prominent stockholder in the Chesterfield and the Lucky Boys, is trying to arrange for a lease of the mill on the Harris Maxwell for the purpose of making a mill run of the ore from the former properties.

There is considerable disappointment around Gowganda, as there is not the number of people going into the country that was expected. On the whole the Miller, Everett and Shanty Lake sections seem to be the best and there is a good deal of work being done on the properties there. The Everett Silver Cobalt Syndicate have erected two permanent camps at Everett Lake and are employing 100 men. This company has twenty-one claims that were purchased from the Miller Lake & Everett Mines Co., Limited. A find of silver has been made on Cartwright's Claim, adjoining the Blackburn Mine on Everett Lake. The vein was traced from the latter property. The Blackburn is one of the most promising mines in the new district, and now has a complete plant running. On McRae's property at Shanty Lake there is silver showing in eleven veins, and considerable development work has been done. The German Development Company has a force of men working on their properties at Shanty Lake. On the Burns property, in the same section, a new two-inch vein of high-grade ore has been encountered. On June the 5th there was a rush to Smoothwater Lake where silver was reported to have been found. There is only a small diabase area, however, and there is a good deal of staking on the quartzite. The Welcome Lake section is receiving considerable attention at the present time and several promising discoveries are reported to have been

made. There was also a small rush to Duncan's Lake but most of the prospectors returned not greatly enthused over the prospects. A small rush has taken place to Rapid Lake, which is to the north of Temagami. The Government is strictly enforcing the law that permission must be obtained before doing any work and the filing of work will not be recorded unless such permission has been granted. So far the stakers around Shining Tree Lake have been refused permission to work on account of the value of the pine. There are now two passenger canoe companies operating between Stoney Creek portage and Gowganda, carrying passengers in one day. The rates are \$9.00 for the return trip. Stoney Creek portage is thirteen miles above Elk Lake and is reached by gasoline launches. One of these companies, known as the United Mining & Transportation Co., also handles freight, and they now have eighteen large freight canoes in service. The rate for supplies is \$7.50 per 100 pounds. This same company has two teams of horses for handling freight on the portage into the east branch of the Montreal River. The new line of boats, known as J. R. Booth's line, operating between Latchford and Elk Lake in competition with the Upper Ontario Navigation Company, has rendered the service much better for passengers. The Government is building a waggon road between Elk Lake and Gowganda, and the preliminary surveys have been completed. It is estimated that the distance will be cut down about seven miles and also that the muskegs and heavy grades will be avoided. It will not be long before mail will be brought into Gowganda by pack horses. At present only first-class mail is carried. The first newspapers for three months arrived in camp on June 10th. Mr. A. A. Cole, engineer for the railway commission, made a trip into the district to look into the resources to see if they warranted railway construction.

The town of Elk Lake has had a very rapid growth since last fall and it can supply more first-class hotel accommodation than Cobalt. Surveys have been made of Mountain Chutes to estimate the available power to supply the Elk Lake mines at Silver Lake, six miles to the west of Elk Lake, there are four or five plants installed and running. The Big 6 at Miller Lake is now working part of its plant and it is expected that the rest will soon be running.

The directors of the Temiskaming Mine, at their meeting held a short time ago, decided not to declare the regular quarterly dividend of 6 per cent. They state that the Company intends to erect a concentrator with a capacity of from 75 to 100 tons a day. They also wish to build up a large cash and ore reserve. It is understood that the mine is rather short of ore.

New York parties have taken over the Monarch Claim, lying to the west of Sosagmaga Lake, and a force of men has been started doing surface prospecting. The claim consists of twenty acres.

The Silver Cliff Mine has been sold to Pittsburg capitalists. Captain Jeffrys, formerly of the Chambers-Ferland, will take charge of the operations.

During the coming summer the Coniagas will double the output of their present mill. Thirty stamps will be added and also the necessary tables. No addition will be necessary to the crushing and jiggling end as the capacity is already 300 tons a day. The smelter at Thorold, which started to take custom ores a short time ago, is working up to its full capacity.

BRITISH COLUMBIA.

The Boundary.—It was in 1898 that the shade known as Dominion Copper interests took the first degree; later on the Montreal & Boston Consolidated took the floor, and put the concern through the second; in the fall of 1905 Salt Lake and

New York capitalists undertook to put on the good old third, and between the whole team the Dominion Copper certainly had quite a time of it. When old Dominion came in blindfolded for the third he had a prosperous sort of look, but a few whirls of the goat—or lamb—and he lost his coat of anticipated dividends; then off came the bright waistcoat of expected profits, and he tumbled into a ragged old coat of loss and increasing debt and was soon sliding down an incline to goodness knows where. The big bump occurred in Vancouver, B.C., on June 4th, when the property of the Dominion Company was bought by the Chas. Hayden interests of New York for \$261,500. This amount will not go far toward paying the \$800,000 outstanding bond issue and the interest thereon, to say nothing of the other debts of the company which will likely go begging, with the exception of the amount due the miners for wages, which the buyers of the property "consider" should be paid prior to anything else. It seems strange that the Protective Committee, if they had the backing they claimed, did not put in an appearance at the Vancouver sale, the property being bid in at only \$1,000 over the reserve price; the Hayden interests, represented by M. Weinman, being the only bidder. And then a short while ago it was said that one or two of the big Boundary consolidations had offered \$350,000 or over for the Dominion mines. They must have been observing some unwritten rule of mining etiquette when they did not get in and bid, and yet it may be that these big concerns have their hands full and do not wish to undertake the development work that ought to be done in these mines. It is taken for granted that a new company will be organized along the lines already set forth by the Reorganization Committee, to take over the property recently acquired, which comprises the Rawhide, Brooklyn, Stewindler and Idaho claims, the Boundary Falls smelter, mining machinery, supplies, etc.

The Granby shipments are running about 20,000 tons per week. At the Grand Forks smelter four of the enlarged furnaces are now in operation, numbers three and four having been blown in a week or ten days ago. The altered furnaces are giving very good satisfaction, and the work of augmenting numbers five and six has been started. It is hoped that the whole battery of eight furnaces will have been gone over by October. Many small additions are made to the Granby plant each month working toward higher efficiency. An 8x12 triplex pump was placed on the 400-foot level of the mine last week, where it will serve the dual purpose of taking the water from the mine and forcing it to a supply tank 500 feet up the hill.

For the week ending June 12th the Snowshoe mine shipped 2,950 tons of ore, this being the largest week's shipments from this property this year. The Sally mine also appears on the shipping list with 23 tons to Trail smelter, making a total of 39 tons for this high-grade property since May 22nd.

It should certainly be gratifying to the mining interests of this Province to note the amount of work the Geological Survey of Canada is planning to do here this year. This work will be carried out on a broader scale than ever before, and in most instances the parties are already in the field. The Tulameen section of the Similkameen district, Phoenix, the Slocan, Sheep Creek, West Fork of Kettle River, Texada Island, Vancouver Island and the Hazelton section of Skeena River are to be given attention and data compiled that will be of inestimable value to future mining operations in the districts named.

It is stated that the capitalists for whom M. K. Rodgers has bonded the Nickel Plate group intend to operate the property on an up-to-date scale when arrangements are finally made. The property has been thoroughly sampled, and those interested have all the available data at hand to help them in planning for intelligent future work. The group consists of the Nickel Plate, Sunnyside and Woodland Fr. claims, and the 40-stamp mill is situated at the foot of the hill near Hedley. Some glory-

hole work has been done on the large lodes, this ore generally averaging \$14 per ton; some of the veins assay \$80 per ton, while frequently very rich pockets have been opened up.

Rossland.—The Le Roi 2, Ltd., has let a contract for the deepening of its main (Josie) shaft from the 900 to the 1,200 level. This work has not been undertaken without due study of conditions and much diamond drill exploration in the ground to be opened up. Rich ore bodies have been located below the 900-foot level in Le Roi 2 ground, and it is expected that similar ore will be opened up from the 1,200 level to that found in Le Roi ground at about this level. The work of sinking this 300 feet of shaft will cost over \$18,000.

Rumour is persistent that the Le Roi will resume work in the near future, but while it is understood Mr. McMillan is making good headway in London, it is not likely that work will be started on the proposed development for another month or two. A local syndicate has expressed its willingness to take over and work the Le Roi on a lease, but it is not likely that the Le Roi Company could afford to lease its mine at this time.

A rich-looking vein from two to three feet wide has been located on the War Eagle claim of the Consolidated group. It is probable that this vein upon development will prove as rich as the Peyton vein of the Le Roi and other very rich surface lodes that have been uncovered on that property, the claims of the Le Roi 2, Ltd., etc. Last week at the Consolidated smelter at Trail another large furnace was blown in, giving this plant four big copper furnaces in addition to its lead stacks. The expansive spirit of the Consolidated again made itself evident during the past week, when the Alice mine at Creston was secured by this concern. The Alice is a silver-lead mine of promise, and will prove a valuable acquisition to the mining and smelting operations of the Consolidated.

As we suggested at the end of last year, there has been a small increase in the metallic production of this province, while

the coal mines about held their ground. A preliminary report on the mineral production of Canada shows that the increase for the Dominion amounted to nearly half a million of dollars. Silver showed an increase of 72 per cent., for part of which increase the lead bounty may account, although it is shown that lead showed a slight falling off. The total output was a little over \$87,000,000. Gold showed an increase, most of this being taken from the lode mines of the Rossland-Trail Creek district. The copper increase was 14 per cent. the Boundary mines taking out seven millions pounds more than during the previous year. The lead, amounting to \$1,920,487, was all mined in British Columbia. The coal production is shown as 2,329,600 tons, value \$7,280,000, against 2,364,898 tons mined in 1907.

Vancouver.—There are several big syndicates that will do extensive development work on the rich copper deposits of Moresby Island this summer. The outlook for this district seems bright. The deposits are large, rich in copper, gold, and silver, and will flux very readily. The Japanese owners of the Ikeda group on Ikeda Bay were in a manner pioneers in this rich district. There are now 65 men working at this property, nearly all Japanese. About 1,000 tons per day is being shipped to the Tyee smelter, Ladysmith, V.I., the freight rate being \$1.50 per ton. Average ore found at depth in the hill assays 7 per cent. copper and \$3.50 per ton in gold. The hand-sorted ore carries 12 per cent. copper, \$5 gold, and as high as 60 oz. silver per ton. The Granby people have interested themselves in a group of copper properties on the west coast of Moresby Island, as have also a couple of big American mining syndicates, and if the values are found at depth as good, or anywhere near as high, as are now found on the surface, the Moresby Island district will be an important factor in the copper market in the not distant future.

GENERAL MINING NEWS.

Sydney, N.S.—The Steel Company is making a new record at the blast furnaces and open hearths. For several days past three blast furnaces turned out over 900 tons a day. The open hearths produced nearly 14,000 tons the first half of the month. One furnace produced recently in one day of 24 hours 450 tons. All departments of the plant are running at high pressure and June is expected to be a big month.

QUEBEC.

Sherbrooke.—A. W. G. Wilson, of the Mines Branch, Ottawa, is making Sherbrooke his summer headquarters. He is to report upon the mining properties and activities of the Eastern Townships.

The Ascot Copper Mine, south of Acton, was purchased some time ago from the Hon. Henry Aylmer. The property comprises 275 acres. It is being equipped with machinery. Mr. John McCaw, of Sherbrooke, is in charge. Very rich, self-fluxing copper ore is being worked.

ONTARIO.

Cobalt.—Fifteen parcels of the Gillies limit were disposed of by tender for a total of \$74,000.

Port Arthur.—The Atikokan furnace is soon to be blown in. A new coke drawing machine has been installed by General Manager J. Dix Fraser.

Madoc.—There is promise of greatly renewed mining activity in and around Madoc and in outlying districts.

SASKATCHEWAN.

Near Paynton a discovery of gold and silver was made early in June. A rush ensued at once. No particulars are yet to hand.

ALBERTA.

Strathcona.—On Friday evening, June 11, two miners were severely burned by an explosion of gas in the Twin City coal mine.

BRITISH COLUMBIA.

Phoenix.—The only bidder for the Dominion Copper properties at Phoenix was Charles Hayden, of New York. The sale took place at Vancouver on the morning of June 4th. Mr. Hayden's bid was \$261,500. This was accepted. The pro-

perties near Phoenix include the Brooklyn, Idaho, Stenwinder, Rawhide, and Mountain Rose mines. Mr. Hayden will operate these properties. In response to an enquiry concerning the unpaid wages of Dominion Copper workmen, Mr. Hayden telegraphed his assurance that these, as the most sacred of all debts, should certainly be paid in cash in full.

Moyie.—The tailings from the St. Eugene concentration at Moyie are being utilized by the C.P.R. for ballast.

Rosslund.—A contract has been let for sinking the main shaft of the Le Roi No. 2 from the 900 foot to the 1,200 foot level. The dimensions of the tunnel will be 7 x 16. Sinking will progress at the rate of about 75 feet per month.

Phoenix.—The Granby Consolidated Company has presented three lots to the town of Phoenix, as a site for a large public

school. The building at present used is too small and is inconveniently near one of the company's ore crushers.

A company has been formed to develop the Buster mineral claim on the West Fork.

Vancouver.—On June 7 a shipment of bar silver from the Consolidated Smelter, Trail, B.C., passed through this part, en route to China. The value of the shipment is estimated at about \$30,000.

Nelson.—News has been received of the death of Mr. R. J. McPhee at Spokane, on June 13. Mr. McPhee was a native of Prince Edward Island. He was formerly an active figure in mining in Nelson and the Slocan.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

On May 28 the South Wales coal-owners distributed to all their workmen a notice terminating their contract of service on June 30th. This affects 150,000 men.

Scotch steelmakers in private conference have agreed to reduce ship plates and angles 10 shillings per ton for prompt delivery.

The position of the Scotch coal trade is most acute. Owners are arranging to enforce a reduction in wages of 12 1-2 per cent. The miners are holding out for a minimum rate of 6 shillings per day. Eighty thousand miners are involved in this dispute.

AUSTRIA.

The Galician oil producers have entered into a contract with the Standard Oil Company, by which the latter have undertaken to build a number of reservoirs for raw oil. The Galician oilmen will pay a rent of £75,000 for four years, after which half the reservoirs will become their property and half will remain with the Standard Oil Company. The contract is very favorable to the Standard Oil Company, as the rent must be paid whether the tanks are full or empty.

SOUTH AFRICA.

Thirty-five Rand companies report an increase of profits for May of £37,104.

Great activity continues on the Randfontein Estate. Large orders of machinery have been delivered. The western Rand Estate is to be operated on a large scale.

MADAGASCAR.

The Madagascar Oil Development Company, a new Anglo-French petroleum undertaking, has been formed for the purpose of

exploiting the recently discovered oil-region on the west coast of Madagascar. The products will be imported free into France as Madagascar is a French Colony. Foreign producers have to pay a duty of 90 francs per ton on crude petroleum, and 120 francs per ton on refined.

NEW ZEALAND.

The output of gold from New Zealand mines during May amounted to 46,525 ounces, valued at £185,271, as against 45,017 ounces, valued at £179,487, during the corresponding month last year. The output of silver was 175,958 ounces, valued at £17,492, as against 164,635 ounces, valued at £16,670 during May, 1908.

UNITED STATES.

Cripple Creek district produced \$1,360,838 in gold during May. This yield came from 57,835 tons of ore, an average per ton of \$23.74. Apparently these returns are incomplete as no reports were received from Stratton's Independence mill.

Mining costs are being reduced to very favourable figures at Goldfield, Nevada. One company reports the following costs: Stopping, \$2.82 per ton; development, \$1.10 per ton; transportation 13.3c. per ton; milling \$2.44 per ton, total \$6.49 per ton.

The total production of gold in the Tonopah district, Nevada, for the week ending May 28, estimated to be about \$140,000.

A copper smelter, to cost one million dollars, is to be erected at Parker, Yuma County, Arizona.

The largest gold dredge yet constructed is being equipped at Mangold, Yuba County, California. It will cost, when completed, about \$200,000.

The Standard Oil Company has commenced oil-drilling operations at Oakland, Douglas County, Oregon. Leases have been secured on 30,000 acres of land.

The copper mines of Utah exceeded all previous records during the months of April and May. In each month the output of copper went over 10,000,000 pounds.

COMPANY NOTES.

The International Nickel Co. has declared an initial dividend of 1 per cent. on the common stock, payable September 1. It is believed in well-informed quarters that the rate will be paid quarterly.

The Crown Reserve directors have declared the regular quarterly dividend of six per cent. and bonus of nine per cent. on the stock, payable July 15, to shareholders of record June 30. Books close from July 1 to July 15, inclusive.

During May the Nipissing Company mined ore of an estimated net value of \$151,930 and shipped ore of an estimated net value of \$168,224. This compares with a production of estimated net value of \$149,739 in April and estimated net shipments of \$96,492 in that month.

The Nipissing Mines Co. has declared the regular quarterly dividend of 3 per cent. and an extra dividend of 2 per cent., payable July 20th. Books close on June 30th and reopen July 15th. The statement submitted at the meeting showed a surplus as of June 14th of \$1,092,000, consisting of cash on hand, ore at the smelter, in transit and at the mines.

Following is the report of Manager Paul E. S. Couldrey on the Le Roi 2 for the month of April, which was issued from the London office of the company on May 25th:

The output for April was approximately 2,610 tons. Development work has been done as follows:—

400 Foot Level.—The 400 cross-cut was advanced a distance of 68.5 feet, and ore was drifted on for a distance of 54.5 feet. Total distance, 123 feet. The average assay met with was 1.21 oz. gold and 3.2 per cent. copper, over a width of 12 inches. Twelve samples were taken. The ore will probably be found to extend farther either into the foot or hanging wall than the above 12 inches would seem to indicate.

900 Foot Level—Cutting Pocket—A drift of 45.5 feet was put in here to connect with place where bottom of pocket will be.

East H. Intermediate Drift.—This was advanced a distance of 71 feet and broke through into East H., No. stope. The average assay met with here and in the stope was .53 oz. gold and 3.8 per cent. copper, over a width of 1 foot 9 inches. Twenty samples were taken.

301 Stope.—This stope has broken through to tramway tunnel during the month. The average of samples taken was 1.12 oz. gold and 2.3 per cent. copper, over a width of 2 feet 3 inches. Thirty-four samples were taken.

42 Stope.—This stope is still very spotty, especially at the east end. As we get further up, however, we shall confine our attentions more to the good ore at the west end. Eighteen samples were taken, the average assay of which was .27 oz. gold and 1.1 per cent. copper, but the ore is too scattered to give any definite width.

423 Stope.—This stope, which has only been attacked in the level itself, and not taken out in the back up to the present, shows an average of 2.06 ozs. gold and 5.0 per cent. copper. Nineteen samples were taken and the average width over which they were taken was 3 feet 3 inches. There are several streaks lying side by side, however, and the total width of ground taken

out is very wide, being 22 feet at the east end with ore still showing in the footwall. The average assay taken across the whole width, including waste and everything, would of course be lower than the above, but the ore from here is quite easy to sort, and the grade of ore picked out after sorting should not be less than the above. This ore also exists on the 500, but there it is much shorter in length being cut off by two converging dykes.

428 Stope.—This is really a large raise which has been started so that a chute can be put in and work started at a later date for the ore met with in Diamond Drill Hole No. 160. One stringer about 6 inches wide assayed 1.14 oz. gold and 3.8 per cent. copper, but it pinched out almost immediately.

Stope 32 (500).—The waste pillar of ground met with in this stope is now giving way to good ore again. The average assay from the back of this stope was .96 oz. gold and 5.4 per cent. copper, over a width of 21 inches. Forty-two samples were taken.

East H. No. 1 (500).—There is a little more ore to be taken out of here yet and it may in one place go through to the 300 level. The average assay met with was .53 oz. gold and 3.8 per cent. copper over a width of 21 inches. Twenty samples were taken.

702 Stope (700).—No fresh ground was broken here, but stulls are being put in, and we hope to start breaking ore very soon.

Shaft Timbering.—This was completely finished on April 21, and the unloading pocket was started the same day. We shall push the work as rapidly as possible, and start sinking immediately afterwards. Two drills will be put in pocket raise as soon as there is room for them.

At a meeting of the directors of the Temiskaming Mining Company on June 12, at Haileybury, it was decided to pass the dividend for the current quarter. The directors at the meeting arranged for the erection of a concentrator on the company's property without delay.

The following official statement to the shareholders was issued afterwards, signed by B. E. Cartwright, R. T. Shillington, J. L. Wheeler, R. H. Cartwright, and Alex. Fasken:—

"In view of the fact that your directors have decided not to pay a dividend for the current quarter, they think it well to explain to the shareholders the present condition of the mine and outline the future policy.

"Your directors believe it to be in the best interests of the shareholders to build up a large cash reserve and ore reserve and take advantage of the low-grade ore already produced and being produced daily in development work and production of the high-grade ore.

"Our production of high-grade ore is being maintained, the ore bodies proving as rich as ever at the 250-foot level and by means of a winze to a depth of 300 feet.

"Up to date no revenue has been obtained from the low-grade ores, and at a conservative valuation the ores in the dumps ready for concentration, will net the company \$500,000, and in addition to this there are being produced an average of 100 tons per day of concentrating ores of an average net value of \$15 per ton.

"Your directors think that advantage should now be taken of the low-grade ores, and are proceeding to install a concentrating plant with a capacity of from 75 to 100 tons per day, at an estimated cost of from \$75,000 to \$100,000, and expect that the plant will be in full operation before the end of this year.

“The installation of the plant should add at least \$400,000 yearly to our net revenue, and there is sufficient ore in sight to maintain the output of the plant for many years to come.

“Your directors have the fullest confidence in the future earnings of the company, and invite all shareholders to make a personal inspection of the mine.”

The following is the proposed plan under which the reorganization committee of the Dominion Copper company are now working. The committee, which purchased the property at the foreclosure sale, will transfer it to the New Dominion Copper company which will issue the following securities: \$500,000 of 6 per cent. 10 year income bonds, convertible into stock at par, \$5 per share; 250,000 shares of common stock of a par value of \$5 per share. Present bondholders will take new stock for their bonds on the basis of 210 shares of new stock for each \$1000 bond. This will absorb 168,000 shares of the new stock. Creditors will receive 20,000 shares of new stock in the proportion of 20 shares for each \$100. Present stockholders upon turning in their present stock and subscribing at par for the new bonds on the basis of one hundred dollars of bonds for each \$100 of present shares will receive in addition to the bonds subscribed for 10 shares of new stock for each 100 shares of present stock, this calling for 50,000 shares. Underwriters will receive 12,000 shares of the new stock which will account for the entire 250,000 shares.

The Dominion Coal Company has declared the regular quarterly dividend of one per cent in the common stock, payable July 2,

to stockholders of record June 18. Books close June 18 to July 2, inclusive.

At the Annual Meeting of the Chambers—Ferland Mining Co. The important items in the statement of assets were: Cash in bank, \$54,799; ore in transit, and at smelter, \$21,544; ore on hand \$15,257.

The statement showed a balance, including these items, of roughly, \$82,000. The property was stated to be in satisfactory shape, and nothing was said as to the prospect of a dividend. The Chambers-Ferland being in a condition of development, the payment of a dividend is still in the prospective.

The other business of the meeting was the re-election of the old board, as follows: W. C. Chambers, president; Harper Armstrong, vice-president; Alexander Fasken, secretary-treasurer; Arthur Ferland, W. B. Russell, George H. Sedgwick, and A. P. Struthers.

LA ROSE CONSOLIDATED MINES COMPANY.

A dividend at the rate of 3 per cent. for the quarter ending 31st May, 1909, and a bonus of 1 per cent. has been declared upon the outstanding capital stock of the company, and will be paid 20th July next to shareholders of record at the close of business on 1st July, 1909. By order of the Directors, the transfer books will be closed from the close of business on 1st July, 1909, and remain closed until 10 a.m. on 21st July, 1909.

Dated the 17th day of June, 1909.

LA ROSE CONSOLIDATED MINES COMPANY,
D. A. Dunlap, Secretary-Treasurer.

STATISTICS AND RETURNS.

The Kerr Lake Mining Co. reports its output for May at 220,000 ounces of silver. The main drift on No 7 vein at the 150-foot level was driven 72 feet on a continuous pay streak, and the ore showing for this 72 feet is stated to be as good as any in the history of the mine. The pay averages ten inches in width, and is of the average high-grade ore. A new vein showing high silver values was discovered by trenching on the east side of the property.

COBALT ORE STATEMENT.

For the Week Ending June 12th, 1909.

Nipissing Mines, Am. Smltg. & R. Co., Denver....	61,400
Nipissings Mines, Nipissing M. Co., Bergen J.....	62,500
Nipissing Mines, Am. Smltg. & R. Co., Denver....	65,480
Nipissing Mines, Am. Smltg. & R. Co., Denver....	64,640
Nipissing Mines, Am. Smltg. & R. Co., Denver....	66,130
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Drummond Mine, Montreal R. & S. Co., T. Mills..	50,000
Drummond Mine, Montreal R. & S. Co., T. Mills..	50,000
Drummond Mine, Montreal R. & S. Co., T. Mills..	50,000
Drummond Mine, Montreal R. & S. Co., T. Mills..	50,000
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	200,000
Buffalo Mines, Can. Copper Co., Copper Cliff....	49,300
La Rose Mines, Am. Smelting & R. Co., Denver	65,000
Kerr Lake, Am. Smltg. & R. Co., Perth Amboy....	58,900
Right of Way, Montreal R. & S. Co., T. Mills....	85,729
City of Cobalt, Am. Smltg. & R. Co., Perth Amboy	53,000
McKinley-Darragh, Am. Smlt. & R. Co., P. Amboy	58,500
Crown Reserve, Can. Copper Co., Copper Cliff....	60,390
Chambers-Ferland, Am. Smltg. & R. Co., Denver..	60,000
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Total	1,010,969

COBALT ORE STATEMENT.

For the Week Ending June 19th, 1909

Nipissing Mine, Can. Copper Co., Copper Cliff....	64,920
Nipissing Mine, Am. Smltg. & R. Co., Denver	61,550
Nipissing Mine, Am. Smltg. & R. Co., Denver	61,550
Nipissing Mine, Am. Smltg. & R. Co., Denver	85,100
Nipissing Mine, Am. Smltg. & R. Co., Denver....	63,895
Nipissing Mine, Am. Smltg. & R. Co., Denver	60,673
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Crown Reserve, Penn. S. Co., Carnegie.....	43,200
Crown Reserve, Can. Copper Co., Copper Cliff	59,400
Crown Reserve, Beer-Sondheimer, New York.....	60,056
Crown Reserve, Can. Copper Co., Copper Cliff....	60,757
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	223,413
La Rose Mine, Am. Smltg. & R. Co., Denver	65,000
La Rose Mine, Can. Copper Co., Copper Cliff....	65,533
La Rose Mine, Am. Smltg. & R. Co., Denver	65,158
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	195,691
Cobalt Central, Can. Copper Co., Copper Cliff	55,000
Temiskaming, Am. Smltg. & R. Co., Denver	52,800
Buffalo Mine, Can. Copper Co., Copper Cliff.....	46,900
Coniagas Mine, Coniagas R. Co., Thorold.....	61,700
McKinley-Darragh, Am. Smlt. & R. Co., P. Amboy	59,362
T. & H. B., Deloro M. & R. Co., Deloro	60,400
City of Cobalt, Am. Smltg. & R. Co., Denver....	65,000
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Total	1,217,954

The gold yield of New South Wales for the month of May was 13,041 ozs., valued at £42,039. The yield for the five months was 90,153 ozs., valued at £324,452.

COBALT ORE SHIPMENTS.

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

	June 19. Ore in lbs.	Since Jan. 1. Ore in lbs.
Buffalo	46,900	567,624
Chambers-Ferland		659,440
City of Cobalt	65,000	874,522
Cobalt Central	55,000	363,023
Coniagas	61,700	807,005
Crown Reserve	223,413	2,774,539
Drummond		200,000
Kerr Lake		929,558
King Edward		141,180
La Rose	195,691	6,156,417
McKinley-Darragh	59,362	884,422
Nipissing	397,688	6,042,970
Nova Scotia		480,810
Nancy Helen		83,400
Peterson Lake		200,540
O'Brien		909,976
Right of Way		1,709,471
Silver Queen		255,335
Temiskaming	52,800	1,224,860
Trethewey		1,037,838
T. & H. B.	60,400	855,260
Muggley Consolidated		72,900

Ore shipments to June 19, 1909, from Jan. 1, are 27,231,090 pounds, or 13,615 tons. Total shipments for week ending June 19 are 1,217,954 pounds, or 608 tons.

B. C. ORE SHIPMENTS.

The following are the ore shipments for the past week ending June 5 and year to date:

Boundary Shipments.		
Sally	23	95
Granby	19,640	406,066
Snowshoe	2,290	48,527
Other mines		22,814
Total	21,953	477,502
Rossland Shipments.		
Centre Star	3,885	69,787
Le Roi No. 2	574	13,446
Le Roi No. 2, concentrated	43	127
Le Roi No. 2, milled	260	10,300
Other mines		9,325
Total	4,762	102,985
Slocan Kootenay Shipments.		
Richmond Eureka	40	1,683
Van Roi	20	227
Ferguson	31	31
Silver King	104	1,800
Blue Bell	134	2,348
Whitewater Deep	24	1,521
Rambler Cariboo	41	391
Yankee Girl	41	380
North Star	91	91
Queen, milled	420	9,030
Granite-Poorman, milled	250	5,350
Whitewater Deep, milled	700	15,200
Kootenay Belle, milled	70	1,440
Second Relief, milled	145	3,220
Nugget, milled	110	2,370
Blue Bell, milled	900	19,400
Other mines		14,004
Total	3,121	78,486

The total shipments for the past week were 29,836 tons and for the year to date 658,973 tons.

Granby Smelter Receipts.

Grand Forks, B. C.		
Granby	19,640	406,066
Other mines		270
Total	19,640	406,336

Consolidated Co.'s Receipts.

Trail, B. C.		
Centre Star	3,885	69,787
Snowshoe	2,290	48,527
Le Roi No. 2	574	13,446
Le Roi, No. 2, concentrates	43	127
Sally	23	95
Richmond Eureka	40	1,683
Van Roi	20	227
Ferguson	31	31
Silver King	104	1,800
Blue Bell	134	2,348
Whitewater Deep	24	1,521
Rambler Cariboo	41	391
Yankee Girl	41	380
North Star	91	91
Other mines		7,672
Total	7,341	148,226

The total smelter receipts for the past week were 26,981 tons and for the year to date 704,345 tons.

The following were the ore shipments for the past week ending June 12th:

Boundary Shipments.

Granby	19,970	425,036
Snowshoe	3,137	51,664
Other mines		22,915
Total	23,107	499,615

Rossland Shipments.

Centre Star	3,272	73,059
Le Roi No. 2	525	13,971
Le Roi No. 2, milled	260	10,560
Other mines		9,452
Total	4,057	188,042

Slocan, Kootenay, Shipments.

St. Eugene	614	9,351
Blue Bird	10	10
Hot Punch	16	16
Queen	38	253
North Star	30	61
Yankee Girl	23	403
Lucky Jim	150	638
Whitewater Deep	330	1,851
Ruth	120	540
Last Chance	90	90
Queen, milled	420	9,450
Granite-Poorman, milled	250	5,600
Whitewater Deep, milled	700	15,900
Kootenay Belle, milled	70	1,510
Second Relief	145	3,365
Nugget, milled	110	2,480
Blue Bell, milled	900	20,300
Other mines		10,734
Total	4,066	82,552

The total shipments for the past week were 31,230 tons and for the year to date 770,219 tons.

Granby Smelter Receipts.

Grand Forks, B.C.		
Granby	19,970	425,036
Other mines		270
Total	19,970	425,306

Consolidated Co.'s Receipts.

Trail, B. C.		
St. Eugene	664	9,351
Snowshoe	3,137	51,664
Le Roi No. 2	525	13,971
Centre Star	3,272	73,059
Blue Bird	10	10
Hot Punch	16	16
Queen	38	253
North Star	30	61
Yankee Girl	23	403
Other mines		7,153
Total	7,715	155,941

The total smelter receipts for the past week were 27,685 tons and for the year to date 733,030.

L. Vogelstein & Co., New York, report the following figures of German consumption of foreign copper during the months January-April, 1909:—

Imports of copper.....	49,323 tons.
Exports of copper.....	2,703 tons.
Consumption of copper.....	46,620 tons.

As compared with consumption during the same period in 1908 of 53,810 tons. Of the above quantity 45,026 tons were imported from the United States.

TORONTO MARKETS.

Metals—June 22—(Quotations from Canada Metal Co., Toronto.—These prices are slightly higher than wholesale prices obtainable on large orders.)

- Spelter, 5½ to 5¾ cents per pound.
- Lead, 3½ cents per lb.
- Antimony, 8½ cents per lb.
- Tin, 31 cents per lb.

Copper—

- Casting, 13¾ cents per lb.
- Electrolytic, 13¾ cents per lb.
- Lake, 14 cents per lb.

Ingot Brass, 10 to 14 cents per lb.

Coal—

- Anthracite, \$5.50 to \$6.75.
- Bituminous, \$3.50 to \$4.50 for 1¼ inch lump.

Fig Iron—June 22—(Quotations from Drummond, McCall & Co.)

- Summerlee, No. 1, \$21.75 (f.o.b. Toronto).
- Summerlee, No. 2, \$21.25 (f.o.b. Toronto).
- Midland, No. 1, \$17.75 to \$18.00 (f.o.b. Midland).

MARKET REPORTS.

Coke.

June 18.—Connellsville Coke, f.o.b. ovens:—
Furnace coke, prompt, \$1.50 to \$1.60 per ton.
Foundry coke, prompt, \$1.80 to \$1.90 per ton.

Metals.

June 18.—Tin, straits, 29.50 cents.
Copper, prime lake, 13.50 cents.
Electrolytic copper, 13.125 cents.
Copper wire, 15 cents.
Lead, 4.35 to 4.40 cents.
Spelter, 5.45 cents.
Sheet zinc, 7.50 cents.
Antimony, Cookson's, 8.25 cents.
Aluminium, 21 to 24 cents.
Nickel, 40 to 47 cents.
Platinum, \$22.50 to \$23.50 per oz.
Bismuth, \$1.75 per lb.
Quicksilver, \$44.50 to \$45.00 per 75-lb. flask.

SILVER PRICES.

	New York. Cents.	London. Pence.
June 5.....	53¼	24½
“ 7.....	53	24¾
“ 8.....	52¾	24¼
“ 9.....	52⅞	24 5-16
“ 10.....	52⅞	24 3-16
“ 11.....	52⅞	24¾
“ 13.....	52⅞	24 3-16
“ 14.....	52⅞	24 1-16
“ 15.....	52¼	24
“ 16.....	52⅞	24½
“ 17.....	52⅞	24½
“ 18.....	52¼	24

MARKET NOTES.

Silver.—During the first week of June, India was a buyer of cash silver, but a seller of forward. Business was large. The Punjab crop forecasts are distinctly favorable. Wheat will, it is estimated, exceed the average output by 22 1-2 per cent. Other crops show up even better. Thus prospects are good for a strong silver market throughout the year.

The Commission appointed by Governor Hughes to investigate the methods of various exchanges, reported thus upon the Metal Exchange:—“Similar, but equally deceptive, is the method of making quotations on the Metal Exchange. In spite of the apparent activity of dealings in this organization in published market reports, there are no actual sales on the floor of the Metal Exchange, and we are assured that there have been none for several years. Prices are, however, manipulated up and down by a quotation committee of three, chosen annually, who represent the great metal selling agencies as their interest may appear, affording facilities for fixing prices on large contracts, mainly for the profit of a small clique, embracing, however, some of the largest interests in the metal trade.

“These practises result in deceiving buyers and sellers. The making and publishing of quotations for commodities or securities by groups of men calling themselves an exchange, or by any other similar title, whether incorporated or not, should be prohibited by law, where such quotations do not fairly and truthfully represent any bona fide transactions on such exchanges. Under present con-

ditions, we are of the opinion that the mercantile and metal exchanges do actual harm to producers and consumers, and that their charters should be repealed.'

Remarkable pegging activity is reported from the West Rand. 8000 claims have been pegged since September.

Up to June 1 three drills had withdrawn from the public competition now in progress.

The Rooiberg tin mines started milling on May 31.

Of the 7,734 Chinese in the Transvaal on April 30, seven died during May and ten were removed, leaving 7,717 in the country on May 31st.

The Transvaal Government has appointed a Commission to inquire into and report upon the question as to whether any portion of the moneys accruing to the Crown from the leasing and disposal of rights of mining in Crown lands, etc., should be paid to any class of persons, and if so, to what class or classes, and in what proportion.

COMPANY NOTES

Directors of La Rose Consolidated Mines declare the quarterly dividend of three per cent., along with a bonus of one per cent.

Total production, June 1st, 1908, to May 31st, 1909, one year:

Shipments.	Tons.	Ounces Silver.	Net Value at Mine.
June-December, 1908 ...	325,777	1,498,592	\$671,286
January, 1909	58,145	291,349	132,597
February, 1909	50,280	220,938	99,237
March, 1909	49,281	131,345	55,187
April, 1909	64,984	309,944	137,128
May, 1909	56,956	496,004	226,043
Total shipments	6,054.25	2,921,174	\$1,321,480
On hand May 31, 1909...	1,109.19	89,656	42,891
Total production	6,164.44	3,010,831	\$1,364,372
Sundry income (interest and ground rentals).....			1,518
			\$1,575,497
Marketing expenses		\$203,231.19	
Concentrating		6,375.20	
Operating expenses at mine.....		272,318.67	
			\$481,925
Net operating profit for one year.....			\$1,093,572
Construction accounts			23,574

A number of cities and towns in the United States may obtain their light, heat and power direct from peat bogs in the near future. The statement is made by Federal experts that millions of dollars worth of fuel lies undeveloped in the swamps and bogs of the country, awaiting only the genius and business ability of the American before it drives the wheels of progress. Its value, on a basis of \$3.00 a ton, roughly guessed at by experts of the Geological Survey, who have been studying the peat deposits for some time, is more than thirty-eight billion dollars—more money than is represented in all the property, stock, implements and buildings owned by the farmers of the United States.

With the coal supply being used at a tremendous rate, peat is expected to become a most important auxiliary fuel and one that will prolong the life of the coal itself. An important fact which leads the experts to believe that peat will soon come into

quite general use in certain parts of the country is that it is as a rule found in quantities in regions far removed from the coal fields, so far that the cost of transporting the coal amounts to several times the cost of the fuel itself at the mines.

The states containing the greatest amount of peat are the eastern Dakotas, Minnesota, Wisconsin, Michigan, Northern Iowa, Illinois, Indiana, Ohio, New York, the New England States, New Jersey, portions of Virginia, North and South Carolina, Georgia and Florida.

A thorough investigation of the peat resources is now being undertaken by the Geological Survey, not only as to the amount of peat and its location, but also its use. Prof. Charles A. Davis, of the Technologic Branch, has general charge of the investigations, while Prof. Robert H. Fernald, consulting engineer in charge of gas producer tests, is endeavoring to find the value of peat as a fuel for heating and power purposes. The latter but recently returned from a trip to Europe where he investigated the uses of peat and found the older countries much farther advanced along this line than the United States. Professor Fernald returns with the belief that peat will soon be extensively used in the United States. In Ireland, he found that peat was being used generally for domestic purposes, but not by the manufacturing establishments. "Sweden is dotted with peat deposits and its bogs are now being extensively utilized for power purposes," says Prof. Fernald. "During the last eight years new bogs have been constantly added to the list until bogs producing from 2,000 to 5,000 tons of dry peat for power purposes per year are found on every hand. The consulting engineers who have installed some of these plants are unquestionably working in the right direction, placing the power plant directly in the peat bog and transmitting the electric current to the surrounding towns. The current is being used for manufacturing purposes and also for lighting both the streets and houses. The installation of the power plant in the bog or at the mine has been advocated in this country by the Technologic Branch of the Survey for installation of several thousand horse power only, yet this principle is applied in Sweden to small plants and may be feasible in certain parts of this country."

"Another development in the line of peat industry which promises splendid returns is the use of peat in by-product recovery gas plants. From these plants both gas for power and sulphate of ammonia can be obtained in commercially paying quantities. Both the utilization of peat for producer gas and for producer gas and for the recovery of sulphate of ammonia are perfectly feasible with American peats. Although the work done on peat at the Survey experiment plant has been limited, it has been demonstrated that gas for power can be made easily from both Florida and Massachusetts peat."

Professor Davis, who has just issued jointly with Edson A. Bastin, a bulletin on peat is optimistic on the future of peat, yet he believes the development of the industry should be accompanied by great caution.

"The operation of a gas engine at the experiment plant on peat in one or two tests has shown that this fuel is but little inferior to many grades of soft coal now on the market and superior to some in the quantity of power gas produced," says Professor Davis. "I believe the day is coming soon when cities located near the peat bogs and away from the coal fields will obtain their power and light from peat. I understand that Florida is to have a power plant soon that will use peat as fuel and will transmit the electricity to Jacksonville.

In the development of this industry, however, it must be remembered that peat contains from 85 to 90 per cent. water as it comes from the bogs. All but 15 to 20 per cent. can be dried out by exposure of the peat to the air. In burning peat in gas producers to make power gas, this peat will burn successfully with 40 per cent. moisture, which is impossible in a furnace."