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CIRCULATION.

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CONTENTS.

GOOD BOOKS.

Bridge, auction bridge, poker, and other such devices of Satan, are as wasteful of time and energy in mining camps as elsewhere. Excessive card-playing is a misdirection of time, energy and money. It also softens the moral fibre.

Good books are the most satisfactory substitute for cards. And of good books the supply never fails.

The technical books that are turned out to-day are of high average merit. They are more carefully written, better printed, better illustrated, and are much cheaper than ever before.

A good book is stimulating. No thoughtful man can read Hoover's "Principles of Mining," or Finlay's "Cost of Mining," without profiting thereby. Surroundings and circumstances render most intensely interesting, treatises that in themselves may be arid. For instance, books dealing with metallurgical calculations may prove more exciting than an "Old Sleuth" yarn to the worker who is looking for assistance. The pleasures of recognition are of the keenest. A geological monograph may contain descriptions of rock associations that fit exactly a new district. The mine manager may find in an unpretentious volume a hint that will enable him to save the price of hundreds of books.

But it is not well to look upon books from a commercial point of view. That is best left to the publisher. The blessing of books is that they induce thought, they fertilize the mind, they soothe whilst they inspire.

Reading only books devoted to professional subjects invites mental dry-rot. Every mining man's library should be liberally sprinkled with sound, secular literature of his own choosing. The last two words are most vital. Books lose half their meaning if they are not of one's own selection. The pleasures of discovery should not be neglected.

Books gather more meaning as they mature on our shelves or in our boxes. Throughout life the reader contracts a few high literary friendships. We remember one prospector who carried a battered Keats, wrapped in silk, on all his trips. Never a night passed on which that pocket friend was not produced. Another of our bush acquaintances always puts in his pack a volume of mathematical tables and the latest text-book on certain abstruse problems. His chief delight was to test the clearness of his mental processes by tackling horribly involved mathematical questions. We doubt if the result was as beneficent as a course of Keats.

The better class of novels is not to be despised. Unfortunately few of them can be read more than once. But there are books of many kinds that are never-failing storehouses of pleasure and of profit. As pure liter-

ature alone, the Bible is supremely vivid, varied, and entrancing.

Of the poets there are Keats, Tennyson, Byron, Burns, Edgar Allan Poe, Kipling, Bret Harte, and Stephen Phillips; but few others are adaptable to the bush. Of novelists, most profitable are Smollett, Sterne, Defoe, Dickens, Charles Kingsley (and his brother, Henry Kingsley), Thackeray, George Eliot, H. G. Wells, Bernard Shaw, Maurice Hewlett, and some dozen French and American authors. But most fruitful of all is the realm of the essay. Montaigne, Sir Thomas Browne, Swift, Charles Lamb, Landor, Emerson, Macaulay, Robert Louis Stevenson, Oliver Wendell Holmes, and, in our own time, the whimsical G. K. Chesterton, can all successfully defy sleep.

Another even more entrancing field is that of biography and of autobiography. To our mind the immortal Pepy's Diary stands far above all others. And the Diary can be read at all times and seasons. It can be opened at any page with the assurance that the attention will be held. Notable among biographies are Boswell's "Johnson," Trevelyan's "Life of Macaulay," Lockhart's "Scott," and the life of Tennyson, written by his son. Besides these there are a hundred and one biographies of men who attained fame in other professions than letters. But we must not weary our readers. The world of books is infinite in variety and in scope. We have indicated our own ideas and predilections. Each of us will differ widely or otherwise from his neighbour. But to each, the wonderful temple of literature is open. And the prosaic fact that nearly every good book can be obtained in cheap and portable form, removes all obstacles. All of us will be the better off if we widen our horizon not only in technical literature, but in the general field of letters. A generous knowledge of the humanities does not tend to emasculation; it ennobles, it frees from prejudice and littleness, and it is altogether worth while.

ASBESTOS.

The principle of the "boycott," a device of Celtic origin, is not altogether bad. In its crudest form the boycott is a distressful combination of prejudice and violence. In its modern application the boycott may serve a useful purpose.

For years Canada was supreme in the production of unmanufactured asbestos. Through a combination of circumstances that supremacy is not so marked now. There is, however, one side of the present situation that should be known to every Canadian. Before touching this let us look briefly over the present status of asbestos production and asbestos manufacture.

In 1909, Canada produced 63,349 tons of asbestos, valued at $2,284,587. In the same year the Russian output was 14,654 tons, or about 23 per cent. of the Canadian production. South Africa in the same period produced more than 1,700 tons, and the United States is credited with 3,085 tons. The outputs of other countries are negligible.

As quality is a controlling element in the asbestos trade, it must be noted that the Russian asbestos is all of high grade, whilst that from South Africa, and the United States, is of lower grade. The Canadian output is reported officially at an average price of less than $40 per ton. How correct this figure is it is hard to tell. But it gives some idea of the amount of each grade sold when we learn that the prices quoted for Crude No. 1, Crude No. 2, Mill Stock No. 1, and Mill Stock No. 2, are respectively $270, $152, $53 and $25 per ton. A third grade of mill stock sells at $9.37 per ton.

It is apparent that Russia is our chief competitor and that this competition hits the most profitable end of the business. The outcome of this competition must be left to the future.

Meanwhile, it is timely to note that the manufacture of finished asbestos products is established in Canada. Heretofore, Europe and the United States have practically done all the manufacturing and Canada has been a fairly large consumer of finished products. Now Canadians have the opportunity of using Canadian-made commodities. And they should do so.

The prosperity of the asbestos industry concerns a large portion of the Province of Quebec directly. Whatever errors have been made in the financing of the chief asbestos corporation, have been sufficiently exploited. These errors, we hope, can be retrieved. The industry has a sound physical basis. The increased use of manufactured products will reflect at once upon the mining companies. And there is good reason why Canadians should call for wares made in Canada.

We can hardly expect even the most loyal Canadians to purchase asbestos goods for sentiment's sake. But we can expect them to be interested in the welfare of Canadian industries, and to give preference to Canadian manufactures.

This, we submit, is a rational and fair application of the boycott principle.

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Before closing we wish to urge once more the desirability of encouraging in every possible channel the use of fireproof mineral products in the construction of private and public buildings. This is a matter that should be put strongly before our civic, Provincial and Federal authorities.

THE HAWTHORNE SILVER AND IRON MINES.

The career of Mr. Julian Hawthorne has been that of a literary acrobat. Some few years ago he deserted the legitimate field of letters and developed a talent for compiling lurid prospectuses. In these columns and in the columns of several of our contemporaries he has been slated with utmost severity. Yet he continues his amazing gyrations as a promoter. And, of all places in the world, he has chosen London as the scene of his latest endeavours.

Such is the extravagance of Mr. Hawthorne's methods and so complete is his disregard of fact that we must confess ourselves to be convinced that he is either a fool, a knave, or a rare combination of the two. So much for Mr. Hawthorne.

We would have commented upon the Hawthorne Silver and Iron Mines much sooner had we not had cause to believe that certain responsible persons were doing their utmost to ascertain the precise value of the Wilbur iron mine, which, by the way, is the physical backbone of the flotation. Our hand was held merely because we wished to give the project the fairest possible chance. We understood, moreover, that Mr. Hawthorne himself was to be removed from the organization. Instead of this we find Mr. Hawthorne in charge of publicity in Great Britain. We find also that his methods have drawn harsh comment from leading financial critics who, naturally, think the concern that he represents is Canadian.

What we most regret, however, is that the honoured name of Dr. Robert Bell, former acting Director of the Geological Survey of Canada, has been dragged into the matter. That Dr. Bell should consent to associate himself with Mr. Hawthorne is beyond understanding. Dr. Bell is not a mining engineer. The estimation of the extent and commercial value of ore deposits is not and never has been a part of his proper duties. His opinions on these things are of uncertain commercial value. He is an explorer—a very distinguished explorer—and a field geologist. In permitting Mr. Hawthorne to capitalize his reputation, Dr. Bell has lost sight of the duty he owes to the country and to himself. It is painful to be forced to write thus of an honoured Canadian.

. . . . .

In fairness to those who have supplied the sinews of war to the Hawthorne Silver and Iron Mines, it may be stated that, to the best of our knowledge, they are reputable citizens of the United States. They believe that in the Wilbur iron mine they possess an asset of large value. They are at present pushing work systematically. But nothing can offset the stupidity of allowing Mr. Julian Hawthorne to spread himself in Great Britain.

By the latest prospectus we notice that the names of two prominent Canadians have been added to the directorate. These are Mr. A. Claude McDonell, M.P., and Mr. W. R. Smyth, K.C., both of Toronto. These gentlemen must realize that they are assuming large responsibilities. In the first place, their names are being used to lend colour to statements that are absurd and untrue. In the second place, they cannot escape the moral onus of all the acts of the promoters in Great Britain. Mr. Hawthorne's name smells to heaven. Both Canadian directors must do their best immediately to clear the atmosphere.

We are surprised that responsible journals in the old country, especially our contemporary, "The Mining Journal," of London, which decidedly should know better, accept without question the reading notices that Mr. Hawthorne has been circulating. It will now be their manifest duty to set their readers right.

Editor's Note.—As we are going to press we are informed that Mr. A. Claude Macdonell, M.P., has resigned from the board of directors.

MINING WORK FOR STUDENTS.

Mr. H. E. Haultain's letter in this issue of the CANADIAN MINING JOURNAL should be read carefully by all who are interested in the training of the young mining engineer.

In a former editorial we suggested that the professors of mining in our various universities get together and pool the possibilities of summer employment for their students, with a view to the suitable allocation of each man.

Mr. Haultain's letter shows how things are managed at the University of Toronto. The certificate that each student must hold as a record of work performed, is well conceived. But in the letter of introduction that is given the student there is a clause to which objection can be raised. Whilst it is quite true that a student should be willing to take any job that he can get, yet we doubt the wisdom of proclaiming this fact from the housetops.

Time was when the student was considered a "pink-tea" artist, an essentially frivolous and privileged being. This idea no longer holds. Our students are men. They are able to hold their own in the bush and in the mine. There is no need of undue humility. The student needs a position in which he can learn something of professional use to him. He is to be a mining engineer and not an artisan. His chief need, apart from strictly technical requirements, is to know something about business routine, managerial administration, company organization, and promotion. In the last direction, promotion, there is opportunity for the clean professional man to establish new standards. But, as a warning, we must remark that promotion is at once the most trying, the most difficult, and the least honoured branch of honest work.

Also, it is imperative that the young mining engineer should realize that his first obligation is to become a real mining engineer. He must round out his experience, mature his judgment of men, mines, and affairs; and must seek diligently to make good in all points. And one of these points is that he become an active member of the Canadian Mining Institute.

M. E.

Our opinion has been asked as to whether a person holding the baccalaureate degrees in arts and science, and, in addition, a diploma of graduation from the leading coal mining college in Great Britain, is or is not justified in writing M.E. after his name. This is a question that is susceptible of several answers.

In the first place, the letters M.E. have specific significance. They imply that the person using them has actually had the degree conferred upon him by an educational corporation. Hence, a person not holding this

degree, no matter what his qualifications may be, is not justified in suffixing them to his name.

The degree of M.E. does not always imply that a man is a mining engineer. The raw college product has much to learn when he leaves college behind him. On the other hand, many men who have no degrees at all are sound mining engineers. The raw college product can honestly use the M.E. The experienced, but degreeless, engineer cannot use it.

We believe that the experienced mining man, provided he has actually operated mines, can fairly append the words "mining engineer" to his name. This implies that he is capable of directing mining operations. But, unless he wishes to follow the example of charlatans and imposters, he will not take liberties with the initials.

BRIQUETTING IRON ORES.

So many already opened Canadian iron ore deposits fall short of market requirements that mechanical concentration will sooner or later become an absolute necessity. The comminution and concentration of these ores implies in most cases the further step of briquetting. Finely-divided ore, fed into a modern furnace tends to cause scaffolding and to induce gas explosions; and where the furnace gases are utilized for driving gas-engines the objection to fines is more marked.

Iron ore briquettes, to withstand the vicissitudes of transportation, must be strong and compact. To suit the requirements of the blast-furnace they must be sufficiently porous and must not crumble when subjected to high temperatures. Moreover, the process should not be costly. These and other considerations are discussed in a paper read before the Iron and Steel Institute by Mr. C. De Schwarz, and reprinted on another page.

The conclusions reached by Mr. De Schwarz are interesting. He believes that a universally acceptable method of briquetting fine iron ore has not yet been invented, and probably never will be. Further, he states that present methods are commercially practicable only in special surroundings and conditions.

It would appear that the whole district of briquetting requires closer study. The applicability of any one process to a given ore does not imply that other ores can be similarly treated.

BRITISH COLUMBIA COAL MINE INSPECTION.

The British Columbia Department of Mines requires its mine inspectors to enforce its laws, particularly in regard to operation of coal mines. Lately, at Ladysmith, Vancouver Island, a special commissioner thoroughly investigated a charge brought against mine foreman David McKinnell for not having taken the steps required of him, in the discharge of his duty as foreman, to secure the removal of discovered gas in No. 3 mine, Extension colliery, owned by the Canadian Collieries, (Dunsmuir), Limited. The charge was brought by James S. Black, who made complaint that McKinnell had unfairly deprived him of his position of fire boss because he had reported the presence of inflammable gas in a working place. The commissioner, after hearing much evidence, decided that McKinnell had been guilty of gross negligence, in consequence of which he found him unfit to discharge his duties as overman, and required him to surrender his second-class certificate of competency, which was thereupon cancelled. The necessity for a strict observance of the coal mining regulations is persistently urged by the mine inspectors. An explosion took place in one of the Extension colliery mines on October 5th, 1909, and resulted in the death of 32 miners. This disaster emphasized the necessity for unremitting watchfulness in the mines there, as gas is found in them from time to time.

PHOTOGRAPHY AGAIN.

Generalizations are unsafe. In our last issue we congratulated McGill University upon establishing a course in photography. At the same time we remarked that we believed McGill to be the first Canadian educational institution to move in this direction.

We now learn that at the School of Practical Science, Toronto University, the chemistry and optics of photography have been a part of the engineering course for many years. Laboratory work and lectures on practical photography have been an integral part of all courses in engineering for at least five years and have been optional for a longer period.

Our apologies are due the School of Practical Science. May its shadow never grow less! May its negatives always be as welcome as that above, and may its proofs be as substantial! Also may it develop and fix itself even more firmly!

EDITORIAL NOTES.

The Nelson, B.C., Board of Trade is addressing itself to the question of the increasing freight rate on coal. It is claimed that the rate on coal should at least be as low as that on wheat. As a matter of fact it should be considerably lower. Wheat is hauled 1,200 miles for about $4.80 per ton. Consumers of coal at Nelson pay a rate for a 330-mile haul equivalent to the rate on wheat for about 500 miles. Moreover, flour, worth much more per ton than wheat, is hauled at the same rate as the latter. When it is remembered that coal supplies the most constant source of freight, and that wheat is only a seasonal freight, the disparity becomes more marked.

The British House of Lords is to be called upon to decide an important dispute between the De Beers diamond company and the Chartered Company of South Africa. The former company is the plaintiff. In 1892 it advanced $1,060,000 to the Chartered Company. This was paid back in 1896. It had been stipulated in 1892 that the De Beers company should be given exclusive diamond rights in Rhodesia. The Chartered Company claims that this agreement lapsed in 1896. The plaintiff

company contends that the Roman-Dutch law covers the case and that the agreement is still valid. The Rhodesian settlers bitterly oppose the De Beers people.

It is earnestly to be hoped that the Great Northern Railway will rebuild the destroyed parts of the Kaslo and Slocan Railway, which formerly connected Kaslo with Sandon, a distance of 31 miles. The mines between Kaslo and the summit of the divide at Bear Lake are urgently in need of rail connections to Kaslo. New development work on the Rambler-Cariboo has made large bodies of ore accessible. At the Washington mine work also is being done. At present ore is being hauled by sleigh to Three Forks, a station on the C.P.R. line from Sandon to Nakusp.

When low grade mining propositions (and "low grade" is a word that changes in meaning with each mineral) are discussed, it is well to remember that working a low-grade ore for a small margin of profit implies the existence of perfect office and technical staffs and the existence of sound and elastic financial reserves. These requisites cannot be created in a day—particularly the staffs.

The present vigorous condition of the zinc smelting industry in the United States is threatened by the depletion of the natural gas supply in Kansas. In that state are about 20 smelteries, embracing a total of 50,000 retorts. For at least 30,000 of these retorts, gas is employed as fuel. Not more than one-half of them can now be kept in commission, owing to the scarcity of gas. A reversion to coal-fired retorts will take at least two years.

The power problem at Porcupine is to be solved. The Porcupine Power Company, an organization backed by the Timmins-Dunlop-McMartin syndicate, along with Mr. A. M. Bilsky, has placed contracts for equipment for generating 3,000 horse-power on the Mattagami. Mr. H. D. Symmes is constructing the plant.

The amount for a four-fifths interest in the Hidden Creek mines, bonded by the Granby Consolidated, is reported to be $400,000. The mines are situated on Goose Bay in the Portland Canal district. The ore is said to average 3½ per cent. copper, and to correspond in silver and gold content to the Granby ores.

The London mining market has been disturbed by leakage of information. It appears that in certain quarters notice of new developments has been received a week or more before it reached the majority of shareholders. This has occurred in both Rand and Rhodesian companies.

A scurrilous correspondent has suggested that Sir Henry Pellatt's new title might appropriately assume the form of Baron Cobalt-Lake. We have not reproduced our correspondent's frivolous misspelling of "Baron," and we adjure our readers to refrain from guessing.

A most creditable special number is the Cobalt Daily Nugget Mining Industry Edition, issued by the Cobalt Daily Nugget. It is profusely and well illustrated, and the text has been carefully edited. It should be in the hands of all persons interested in our great silver district.

The prices obtaining for zinc blende in Joplin are better than they have been for some time. During the former half of November, carloads of 63 per cent. ore brought as high as $50.75 net per ton. Lead ores ran as high as $54.

Nowhere are the good offices of the Geological Survey appreciated more than in British Columbia. Reports on this year's work are looked for with great interest.

BOOK REVIEWS.

ROCK DRILLS—DESIGN, CONSTRUCTION, AND USE, BY EUSTACE M. WESTON, REEF LECTURER ON MINING, TRANSVAAL UNIVERSITY COLLEGE. 367 PAGES. PROFUSELY ILLUSTRATED. PRICE, $4 NET. McGRAW-HILL BOOK COMPANY, 239 WEST 39th STREET, NEW YORK, 1910.

The gaps in professional handbooks are being gradually and well filled. This latest addition to the list of practical books will be welcomed by many.

Until now, there has been no attempt to cover the whole subject of rock drills. We have needed, particularly, a comparison of English, Australian and American drills. Such a comparison is necessary to aid the engineer in his choice of machine for his special needs.

The successive subjects treated are: standard piston drills; hammer drills; electric drills; operating on surface and underground; piston drills using air exclusively; philosophy of drilling rock; repair and maintenance of rock drills; drill steel and drill bits; explosives and their use; theory of blasting with high explosives; examples of drill practice in Africa, Australia, and America; drill tests and contests; dust and its prevention; notes on the use of compressed air. It will be seen that the scope of the book is large and that the sequence is logical.

Among the most interesting incidentals in the book is the Chronological Table, transcribed from Messrs. Holman Brothers' catalogue. From this we are reminded that Friar Albert Magnus described an explosive powder in the year 1280 A.D. In 1412 gunpowder was manufactured in England. In 1613, most significant event, Martin Weigel, mining superintendent, of Frei-

berg, proposed drilling and blasting in mines. The next chronological ite mis also to the credit of Germany. In that year German miners introduced blasting to their backward English brothers. Tamping with clay is recorded in 1685. Two years later, German miners are known to have used straws filled with powder for blasting. Within two years, hardwood tubes and pasteboard cartridges supplanted the primeval straw. But the most important event in the evolution of the drill was the introduction of chisel-bit drills in 1749. This also was a Teutonic innovation.

The first recorded British improvement was the invention, in 1813, by a Cornishman named Trevithick, of a rotating boring machine which was used for quarrying limestone. In 1823, the electric spark came first into use, for firing a blast. In 1831, Beckford, of Camborne, invented the safety fuse. Cave, a Frenchman, invented a reciprocating percussion drill in 1851; and, in the same year, an American named Fowle, patented a direct action percussion drill. Shortly after this, compressed air came into general use. After the application of nitroglycerine to rock blasting in 1863, the development of explosives, detonators and drills was rapid.

As probably the evolution of the hammer drill is the most important of modern developments, it is worth while digressing here to notice Mr. Weston's estimate of the comparative merits of the piston and the hammer types. Mr. Weston points out that, unless one keeps in mind the fact that the rock drill is a commercial machine, one might be tempted to believe the modern hammer drill to be by far the superior machine. The weight of the hammer of the largest type of hammer drill is 15 pounds. The weight of piston, steel, etc., of a piston drill ranges from 60 pounds to 125 pounds. Thus, whilst the velocity of the hammer drill should be 16 times that of the piston drill to get equivalent effect, in practice it is only four times as great. In other words, a very high air pressure must be used to permit the hammer drill to compete at all with the piston drill. Mr. Weston expands the subject capably and well.

Most instructive are two chapters entitled "Examples of Rock Drill Practice," and one entitled "Rock Drill Tests and Contests." The former takes up 90 pages. They cover practice in South Africa and in America respectively. Many cost items are given. The chapter on "Rock Drill Tests and Contests" takes up South African tests largely.

Whilst Mr. Weston's book will call for additions and revisions perhaps more rapidly than books on other subjects, yet it is distinctly a book that will help the mining engineer. In its field it is unique.

MODERN ASSAYING—A CONCISE TREATISE DESCRIBING LATEST METHODS AND APPLIANCES—BY J. REGINALD SMITH EDITED BY F. W. BRAUN—80 ILLUSTRATIONS—145 PAGES—PRICE—J. B. LIPPINCOTT COMPANY, PHILADELPHIA AND LONDON. 1910.

"The art of assaying," so goes the introductory definition, "is a branch of analytical chemistry in connection with mining and metallurgy. Its object is to obtain the value of a stated quantity (usually an avoirdupois ton) by determining the value of a small representative sample." The second last word is the keynote of the whole subject.

"Modern Assaying" is what it should be, a compact, simple, well-illustrated book. The instructions are concise and exhaustive. We are glad to notice that the gas furnace is given prominence. This is usually omitted. The free-hand drawings, illustrating the operations: crushing, sampling, grinding, weighing, etc., are a decided improvement on anything we have seen. Gold, silver, gold bullion, lead, antimony, and copper methods lytic method is the only "wot" method given for coplytic method is the only "wat" method given for copper and lead (together), for the reason that it is both rapid and simple. Useful tables are appended. "Modern Assaying," whilst by no means dealing with the whole field of assaying, is sufficiently inclusive to prove a valuable addition to every mining man's library.

PRACTICAL DATA FOR THE CYANIDE PLANT—BY HERBERT A. MEGRAW — 93 PAGES — ILLUSTRATED—SOFT COVER. PRICE $2 NET. MEGRAW-HILL BOOK COMPANY, 239 WEST 39TH STREET, NEW YORK. 1910.

To help the "Man on Shift" this volume was written. Although it is confessedly a compilation, it is not without original matter. The author, Mr. Herbert A. Megraw, while claiming little originality, hopes that the book will accomplish its object in solving the everyday difficulties of the worker in cyanide. We are sure that, in many cases, it will.

The ground surveyed is as follows: crushing and grinding, the cyanide plant, slimes, precipitation, formulæ in mensuration, tables of general weights and measures, general reference tables. The section "Precipitation" is thus divided: solutions, stoichiometry, preliminary experiments on ores, trouble, data. Under these heads, the sequence of steps is well presented. Necessary chemical equations are included and explained. Under the heading "Trouble," a lot of very helpful and practical hints are given.

CORRESPONDENCE.

EMPLOYMENT FOR STUDENTS.

November 17th, 1910.

The Editor, Canadian Mining Journal, Toronto.

Sir,—In connection with your excellent suggestions in a recent editorial on the matter of work for students and young graduates in Mining Engineering, permit me to put before you the following:

A recent regulation in regard to students in the department of Mining Engineering of the University of Toronto reads as follows: "Candidates for the degree in the Department of Mining Engineering will be required to present satisfactory evidence of having had at least six months' practical experience in work connected with mining, metallurgy or geology for which they must have received regular wages. The time may be spent on geological survey, in ore dressing, smelter or lixiviation works, in an assay office in the vicinity of mining or metallurgical works, on any work in or about a mine other than as an office man or clerk, or in prospecting. Not more than three months on geological surveys will be accepted and prospecting will only be counted as two months) and must not be submitted for more than three of the six months."

The students are supplied with blank forms calling for the following:

Date.....
Name of Candidate.....
Name of Company.....
Name of Manager of Company.....
Location of Operations of Company.....
Exact nature of work engaged in by the Candidate
.....
(Only one kind of work should be mentioned here. Use a separate sheet for each kind of work.)
Name of Boss.....
Date of starting work.....
Date of quitting work.....
Number of days actually employed on this particular kind of work.....

We certify that the above is, to the best of our knowledge and belief, a true and correct statement.

.....
Boss or Time-Keeper.

.....
Candidate.

Countersigned.....
Manager.

To students making inquiries about summer work the following letter is given:

"The bearer of this is a student in Mining Engineering in this Faculty and is desirous of obtaining work during the summer. He understands that he is to get his job from the foreman and is willing to take any job that he can get. He expects no favours nor privileges as a student except this one—that if he shows a willingness in his work he may be moved about from job to job, so as to gain experience.

This letter is to be presented to the manager or the manager's representative. Will the manager kindly advise the bearer to whom to apply for the job and if no job is vacant will he kindly return this letter to the bearer."

When I graduated there was extremely little mining work going on in this country and most of the mining students sought work in the United States or elsewhere, but now the conditions are completely changed and our students apparently have no difficulty in obtaining work in Ontario, and from all the reports that I receive I find that the majority of managers and superintendents are very good to the young men in the way of giving them opportunities for experience.

My personal ideas in regard to this work are expressed in an article entitled "The Undergraduate and the Profession of Mining Engineering" read before the Engineering Society of the School of Practical Science in 1902, part of which I quote.

"In your early years there are several very unorthodox things that I would advise. In all mining work the biggest item is for labour, and there is no other item of expenditure in which money may be lost or saved to the same extent. The human machine is not only the most used, but it is the most complex, and to be a successful mining man you must understand your workman. The best place to study your workman is alongside of him. I strongly advise every young mining graduate to work as a mucker or trammer underground in some fairly large mine. To do this properly you must do it thoroughly and drop all your engineering business, and your diploma and all that, and get into dirty overalls and get your job from the foreman and sleep in the bunk-house and keep away from the office. This I know is often advised, and in Cornwall and Freiberg there are regular practical courses underground where the students play more or less seriously at work, and learn after a fashion to swing a hammer and frame a set. Candidly I don't think much of that—I do not see that such work is of very much use, and in those practical courses you don't learn anything of the men—you don't get round to their point of view. This, to my mind, is the essential point, and my advice is to get a mucker's job and hold it at least over one pay day and over several if you can. It will hurt and it will be hard, but it will be worth it.

"Again, if you have any inclination towards carpenter's work or machine fitting or any opportunity to follow up such work, I say by all means do so. I know of no better qualification for a young man seeking mining experience than a knowledge of machine fitting. There is no part of a mine free from machinery, and the fitter is wanted everywhere and gets a job more easily than any other class of skilled or semi-skilled workman, while a carpenter can often get a job on mill construction or the like that will give him an insight into construction that he could get in no other way. These are not short cuts to success or by-paths—they are stepping stones and most valuable ones at that. I would strongly advise the mining student to spend at least one of his summers in a machine shop or in a carpenter's shop. I would consider this better than a summer spent in an assay office, on survey, or in a mine."

Yours faithfully,
H. E. T. HAULTAIN,
Department of Mining Engineering,
University of Toronto,
Toronto, Ont.

PHOTOGRAPHY AT UNIVERSITY OF TORONTO.

Editor CANADIAN MINING JOURNAL:
Sir,—

An editorial note in a recent issue of your Journal leads me to believe that you are not aware of the extent to which work in Photography is carried on in the Faculty of Applied Science, University of Toronto. In order to set matters right, I would be obliged if you would give publicity to the following synopsis of our work along this line.

In the first place, the department of photography makes annually a large number of lantern slides, blue prints and silver prints for the regular lectures in all courses as well as for any special lectures and papers delivered before the Engineering Society, either by students, members of the staff, or outsiders.

For the past five years instruction in photography has formed a part of the work in all branches of engineering, being given as a part of the course in light to students of the second year. The curriculum included blue printing and allied processes applied to the reproduction of tracings made by the students from their construction notes, to architectural plans, to designs, etc.; also photography in plates and films of tests and testing machinery as well as outside construction work both during and after completion. From their negatives the students have been required to make contact prints by various processes as well as enlargements and lantern slides. Lectures have also been regularly delivered on the application of photography to surveying and recording, and some good results have been obtained by students along these lines. The various processes of colour photography and some account of photo-lithography have also been taken up in the lectures.

With the development of the four years' course, the work has been separated from that in light and transferred to the third year in order that more time may be devoted to it. The curriculum has been considerably extended, mainly in the direction of increased practical work in the processes already enumerated and by the addition of colour photography and photo surveying.

Yours, etc.,
G. R. ANDERSON,
University of Toronto.

CONSERVATIVE.

Editor CANADIAN MINING JOURNAL:

Sir,—In a very interesting, but unsigned article, "Mining—A Business," on page 686 of your last issue, reference is made to the investor's need of engaging competent advisers. As an investor in mines (some of them holding that title only to defferentiate them from other things), I agree with the writer. But I am sorry to inform you that on the two occasions on which I had to rely upon technical advice, my faith was misplaced. These dislocations of my confidence took place in Canada—one near Cobalt, and one at Larder Lake. The two technical gentlemen (holding that title to differentiate them from other things) befooled me in two distinct ways, but two very complete ways. Later I found out that both advisers were not held in very high honour in the profession. But I had no ready way of finding this out at first.

I think, Mr. Editor, that it is a Christian duty for someone to tell the investor by what birth-marks he may be able to tell the competent engineer, or even the honest one.

I may add here, for the benefit of the writer of the article, that both of my friends were described as conservative. Knowing Canada as I do, I cannot believe that this was merely a political label.

Anyway I am now a conservative investor; and I shall not become liberal until I am able to fall in with a good engineer, or follow the one that I employ to the ends of the earth. But I don't wish to encounter another "conservative" adviser.

Yours, etc.,
P. W. HUNT.

New York, Nov. 21st, 1910.

A FEW NOTES ON GOLD PRODUCTION IN NOVA SCOTIA

(Written by J. C. MURRAY.)

The seventeen regularly constituted gold-mining districts of Nova Scotia, along with outlying prospects, produced 908,722 ounces during the period 1862-1909, inclusive. This output resulted from the crushing of 2,031,048 tons of ore. The average yield per ton is, therefore, 0.447 ounce, or $9.24.

That both total and average yields have been higher than this is altogether probable. But this is susceptible of proof only in a general way. It is known, for instance, that gold returns were very carelessly collected and recorded until comparatively recent years. It is also known that much gold stealing has always gone on. How extensive the stealing has been is a matter of opinion and of conjecture. In any case the loss both in specimen ore and in amalgam has been considerable throughout the history of gold-mining in Nova Scotia. Also it has been practically impossible to keep track of the numerous individual tributers who have made livings from working over old dumps and deserted prospects. It is safe, in the writer's opinion, to add at least 10 per cent. to the amount of gold won.

Official returns show that in 1909, the average recovered value per ton was only $4.05 per ton of ore crushed. This average has remained about the same for some years. At first sight it would seem that the general character of the ore was deteriorating. This is not quite the truth. The average yields by districts, for the year 1909, show figures running all the way from 2 ounces 4 dwt., to 3 dwt. But the Stormont district accounts for over 72 per cent. of the ore crushed, and contributed less than 50 per cent. of the gold won. In that district 42,617 tons of ore averaged only $3 per ton. The remaining 16,441 tons of ore averaged about $8 per ton. Moreover, the mill practice in the former district was probably much closer than in the many small mills scattered round the province. As a matter of fact it is as unsound to jump to the conclusion that the general tenor of the ore is lower, as it is to conclude that it is improving. There are not enough facts.

A co-ordinate diagram of the gold-outputs of Nova Scotia is about the best guide. This shows a high peak for the year 1867, when 27,314 ounces were extracted, an average of about $16.75 per ton. Seven years later, 1874, a depression is observed, the yield being but 9,140 ounces, the average also dropping to about $13.50 per ton. A slight peak in 1877 (16,882 ounces), is followed by a depression to 10,756 ounces in 1881. There is then an almost constant ascent, until in 1889, the production reached 26,155 ounces, won from 39,160 tons of ore. A uniform decline then followed until in 1893 the output was only 14,030 ounces from 28,040 tons of ore. Again there follows a continuous rise up to the year 1898, in which 31,104 ounces were won from 86,331 tons of ore. This, by the way, is the largest annual yield on record. After fluctuating between 27,000 and 30,000 ounces for four years, the output gradually fell to its present level.

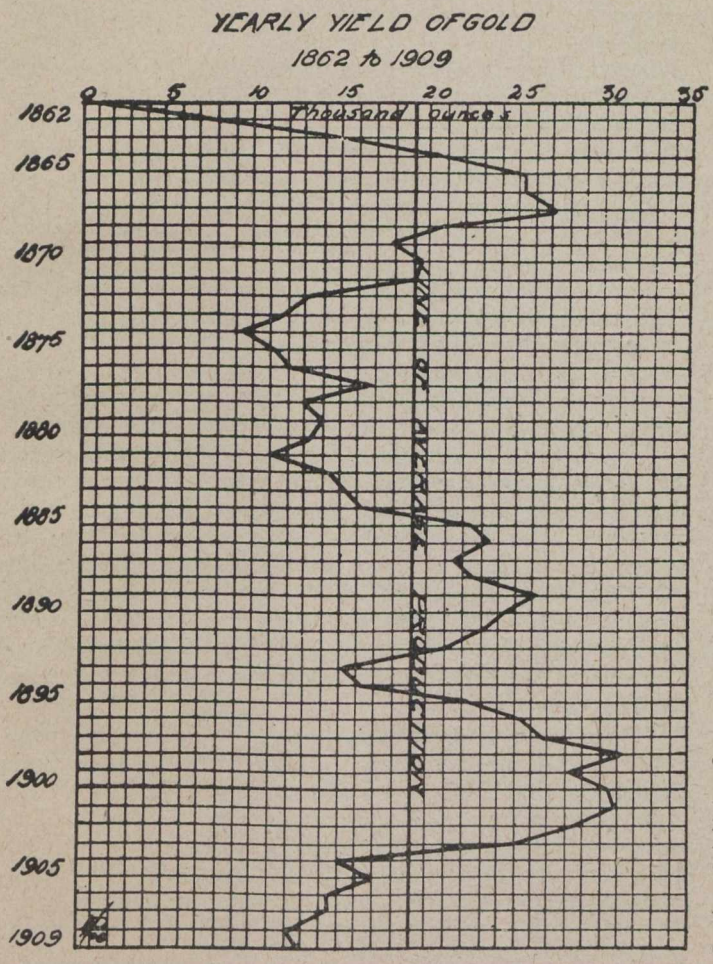
From all that can be learned the tide has just turned and Nova Scotia is about to ascend the scale again. In fact, the turn came last year. It may be noted that the first period of depression, 1867-1874, covered just the same length of time as does this last period, 1901-1908, exactly seven years. There is no need of placing mystic significance in this number "seven." But it is a recognized fact that depressions and ascensions are recurrent. It is a fact, too, that the mining investor cannot overlook in studying the question of investment.

Referring again to the average yield of the ores, up to the year 1893 the average extraction per ton was well over $10 per ton. In some years it exceeded $25 per ton. From that time on, especially in the years of largest tonnages, the yield per ton fell. It is now rising, along with the tonnage.

There are, of course, many reasons, too many to enumerate, that are advanced to account for the falling off. The best argument is careful and productive work. This is going on gradually.

Looking over the life records of the different districts, I find that Sherbrooke leads with $2,907,039 to its credit. Next comes Stormont with $2,148,008. The former district's ores averaged about $10 per ton, the latter's about $5. Waverley ranks next, $1,329,630, with average per ton of $9; then Oldham, $1,216,012, with average per ton of $23; Caribou and Moose River, $1,088,310, with average per ton of $5.50; Renfrew, $858,313, with average per ton of $16; Uniacke, $834,976, with average per ton of $14; Montagu, $797,767, with average per ton of $29; and so on through the list.

The records outlined above lead one to ask several questions: Is the mining engineer of to-day better fitted to tackle Nova Scotian gold mines than was the old operator? I believe decidedly he is. He has better training, better machinery, better financial backing, better transportation, and all the experience that has



been won before to guide him. Are the gold mines of Nova Scotia exhausted or nearly exhausted, or are the richer deposits worked out? My answer is decidedly in the negative. Why have they not been a success? The answer to this is too complicated to give here, and I would not give it in any case. There has been enough controversy already. Is there yet a good chance for investment? Yes, for investment controlled carefully and well proportioned to the operation in view. Are the possible winnings worth the attention of important investors? The answer to this is part of the formulæ of draw-poker—you must pay to find out.

Let me repeat finally that the signs point to increased production of gold in Nova Scotia. The size of this increase will depend upon the amount of money carefully invested in promising property. The increase will of course mean profit to some one. I believe that the competent mining engineer can guide the careful investor into those profits for a period longer than seven years.

American Mining Congress

The thirteenth annual session of the American Mining Congress was held in the City of Los Angeles, California, September 26th to October 1st, 1910.

Unusual interest centres in the Mining Congress this year, arising principally from its effective and successful fight for the creation of a Bureau of Mines, which was formally established on July 1st. This demonstration of ability to cope with problems affecting the mining industry has brought to the organization increased strength and influence, and the more liberal support of mining men. The Los Angeles session of the Mining Congress will probably be, in many respects, better than any so far held.

The work of the Mining Congress involves much more than the discussions at its annual sessions. An important part of its working machinery is its dozen or more committees, each of which is appointed for the investigation of some particular problem. This work is done during the time intervening between sessions.

During the past twelve months committees of the Mining Congress have been giving their attention to some questions of vital importance to the mining industry. These committees will report to the Los Angeles meeting and their reports will be submitted to the convention for its discussion and ratification.

These committees, with the name of the chairman of each, are:

General Revision of Mineral Land Laws, E. B. Kirby, St. Louis, Mo., Chairman.

Smelter Rates, Harry L. Day, Wallace, Idaho, Chairman.

Federal Legislation, John Hays Hammond, New York, N.Y., Chairman.

Mining Fraud Legislation, Thomas E. Kepner, Reno, Nev., Chairman.

Alaskan Mining Laws, Henry R. Harriman, Seattle, Wash., Chairman.

Coal Tax Insurance and Workmen's Compensation, John H. Jones, Pittsburgh, Penn., Chairman.

Standardization of Electrical Equipment—In Coal Mines, Samuel A. Taylor, Pittsburgh, Pa., Chairman; In Metal Mines, General Irving Hale, Denver, Colo., Chairman.

Trade Relations between United States and Silver Using Countries, J. Frank Watson, Portland, Ore., Chairman.

National Forest Reserves, Col. A. G. Brownlee, Denver, Colo., Chairman.

The mooted conservation question was one of the most interesting subjects to come before the convention, and one which resulted in hot debate. Mining men, particularly in the western states, are becoming aroused over the possibility of the adoption by the national congress of the legislation proposed in the Nelson conservation measures (Senate Bills Nos. 5484 and 5486 to 5492 inclusive), all of which have an important bearing upon western mining conditions.

These bills are meeting with little approval and it is expected that at the Los Angeles session the Mining Congress will determine upon a plan of actively opposing the passage of the legislation during the next session of Congress, or of working for amendments which will be more favourable to mining development.

CONTRIBUTION TO THE PHILOSOPHY OF SHIPMENT SAMPLING

By JOSEPH T. MANDY, E.M., Ph.D.

Modern sampling consists of two kinds

(1) Mechanical sampling

(2) Hand sampling.

In general practice, where large amounts of material are constantly handled such as at smelters, mechanical sampling, on account of the dispatch of the work, and the resulting economy therefrom is, with few exceptions, carried on. It is a well-known fact nevertheless, that two distinct and diametrically opposed schools exist to-day. The mechanical sampling squad, led by the pioneers of this method, Messrs. Brunton, have, generally speaking, their stronghold in the Western States; the hand samplers in the East. Both schools are continually at loggerheads, and at times the fight has been waged with great energy. This opposition of views has always proved a mischief-maker between eastern ore shippers and western purchasers, the shippers being the aggressors, and some very hard words have been spoken.

Although most smelters, both eastern and western, carry on the bulk of their sampling mechanically, there always comes a stage in the process when hand sampling is resorted to, perhaps for the sake of convenience, perhaps for other reasons; nevertheless the method is generally a combination of mechanical and hand. Perhaps the mechanical people claim that after a certain point has been reached (for a certain bulk) hand sampling can give better and more accurate results than machine sampling. It is, perhaps, questionable whether machine sampling is practicable after a certain point.

Boiling down the whole practice of sampling, it resolves itself simply into a matter of averages. Nobody claims that commercial sampling (by any method) is mathematically accurate; errors are bound to occur in individual samples where the greatest of care is taken. These errors can be either in favour of the purchaser or of the seller, and here the law of chance enters into play; namely, the chance is taken that these errors will average up in the long run; so that at the end of, say, a year's shipments, the likelihood is that the sum of errors in favour of the shipper will equal the sum of errors in favour of the purchaser. However, it is advisable for the interests of both parties that some method be carried out that will cut the chance of errors down to a minimum. Considering these points, it is apparent that, so far as is consistent with economical operation, the greatest pains to bring about accuracy is necessary to obtain the best results.

Too frequently in discussing errors of sampling one hears the remark, that "they will average up in the long run." This is relying too much on chance. The real significance of the science of sampling is absolutely lost, as sampling is devised to reduce the number of chances taken. To sum up the situation, the fundamental law of accuracy in sampling may be laid down thus:

"The amount of accuracy obtainable in sampling varies inversely as the chances taken." Eliminate the chance of an error, and the sampling has that chance more of being accurate.

The ideal form of sampling a shipment is taking the whole amount, smelting it, obtaining its products in commercial form and paying the shipper for same. Here, chance for error in the valuation of the lot is practically entirely eradicated. This is, of course, not practicable. Some method has therefore to be devised which will enable the purchaser and seller to place an accurate valuation on the shipment in question, before the shipment goes to the furnaces to be mixed with other materials.

A small part of each shipment is therefore usually taken out of the total as a sample. This part should therefore be representative of the value of the total. There are ways and ways of taking this small part; from the rough grab sample to the intricate methods of proportional division.

To discuss different methods would need a volume of many pages, and is not within the scope of this article.

In ore shipped in 25-30 ton carload lots, the procedure generally is to obtain about 1-25th (1 ton) of material representative of each lot, and subsequently to reduce this down to a package of 125 grams of material representing the value in the entire 25 or 30 tons. As the bulk of the sample is gradually cut down, greater care is necessary, as the effect of error increases with the decrease of bulk.

Sometimes in shipping material in lots of several carloads of fairly uniform ore, the initial reduction in bulk is brought about by taking every 2nd, 3rd, or 4th, etc., car, as a sample car, and reducing this down in the usual way, and taking the average of the results as being representative of the value of the total number.

As was stated earlier in this article, the ideal method of valuation is the delivery of the total commercial product. It naturally follows that, as this is impracticable, and as valuation has to be carried out by the valuation of a fraction of the total, the greater the number of fractions of the total that can be obtained and valued and averaged, the greater will be the accuracy of the final average. It is thus evident that each additional fraction of the whole taken for a sample is a "chance" on the side of accuracy and vice versa.

Of course it is absolutely impossible in general practice to continue sampling the lot over and over again either by hand or mechanically in order to obtain numerous fractions. It is usually not economical to go over the entire carload more than once. More than this is rarely done. The 1-25th obtained should be reasonably representative. As this smaller bulk is more easily handled, the representative amount taken out of it can be readily duplicated two or more times. This duplication, although assuring greater accuracy of the sample taken out of the 1-25th, does not increase the accuracy of the final sample on the whole lot by the same amount. It is therefore very necessary to exercise extreme care and pains in obtaining an accurate and representative 1-25th.

I.—MECHANICAL SAMPLING.

Modern mechanical mill samplers all operate by taking the whole of the ore stream for a part of the time. The old machines acted vice versa.

We will first consider the general method employed in a mechanical sampling mill, and pay particular attention to the possibilities of error.

Mill Feed.—Sampling mills can have different feeds. The material can be fed either from (1) a hopper, or (2) directly by hand (shovelling from a feed plate).

(1) Hopper Feed.—This is without doubt the best feed. The total material to be sampled, or as much of it as is deemed necessary, can be dumped into the hopper before the machinery is started up. This insures a constant flow of material to the initial machine (jaw or gyratory crusher, etc.). The flow can then be regulated to suit the capacity of the machine by means of a bar gate. This insures a more or less constant stream of ore to the first cutter (Brunton oscillating, Vezin, etc.).

(2) Hand Feed. Using this method, the material is shovelled from the feed plate into the first machine. The feed plate is fed either by shovelling directly out of the car, or as is sometimes the case with box cars, fed from wheelbarrows. It can be readily seen that such a feed is bound to be exceedingly intermittent, and unless some satisfactory device is installed between the first machine and the first cutter the feed to the latter will be very erratic and intermittent. The feed regulator or flow retarder most generally used, is the shaking table. The beneficial effect of this particular machine is open to criticism. It undoubtedly causes a separation of particles of ore, according to size and specific gravity, and is therefore liable to do more harm than good. A hand feed to a sampling mill is, however on first principles to be avoided. Few modern sampling plants are fed in this way; nevertheless, instances of it do exist.

The advantage of uniformity of sizes of particles.—A big step towards obtaining an accurate sample from the mill is the reduction of the material to as uniform a size as is possible. It is evident that the finer the material is crushed the greater will be the uniformity of size of the particles. It is, however, inconsistent with economical practice to bring about too great a reduction in size. In this the smelting end has to be considered. Furnace losses, or extra expense for briquetting, would result from too fine a material. A happy medium has therefore to be found. Whereas a smelter would object to crushing the total material to say 1-4 inch in size before taking a first cut, they will agree to two or more cutouts each preceded by a reduction in size, the final being about under. say 1-4 inch.

No hard and fast rule can be laid down regarding what size the material should be before the first sample cut of it is taken. This depends entirely on the character and nature of the ore. For most ores, however, a reduction to 1-inch size at least, before an initial sample cut is taken would be necessary. Very frequently 1-2 inch is essential for good work. This latter would be the case for a "spotty" class of ore like Cobalt low grade silicious material. For Cobalt high grade a much greater reduction, with removal of metallics, would be necessary.

In machine sampling the initial sample cut is generally of 1-5, taken by a Brunton oscillating or revolving Vezin sampler.

The feed spout to these machines should be either smaller than, or the same size as the sample compartment, never larger.

The accuracy of mechanical samplers is open to criticism. It is this very point that has caused so much hot feeling between the adherents of mechanical sampling and the supporters of hand sampling. Hand samplers claim that in any cutter the cutting edges have to advance far beyond the sides of the feed spout before the larger particles will enter the sample or reject compartments, during which time the larger particles are going into the wrong compartment and an undue proportion of fines into the proper compartment. The mechanical

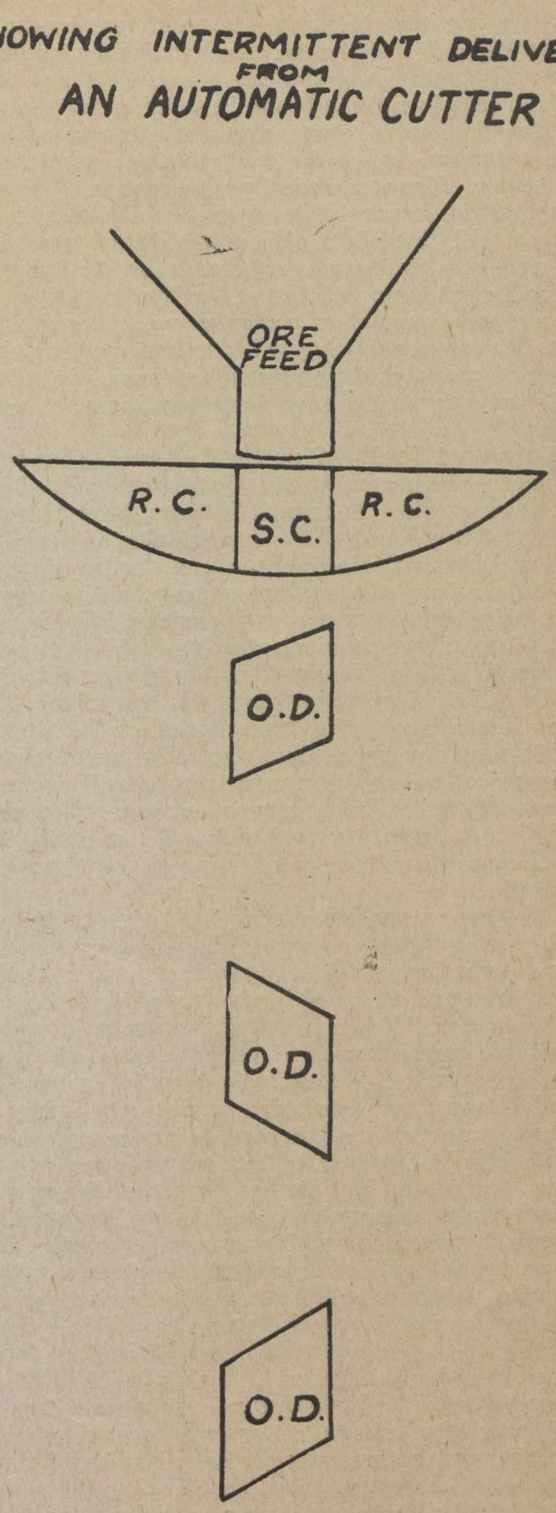


FIG. 1.

people acknowledge this, but argue that as sampling is a matter of averages any way, the chances are that for the total number of swings or revolutions the sampler makes, the extra amount of fines due to this going into the reject compartments will equal the extra quantity

of fines going into the sample compartment by the right proportion and vice versa, the result being that the errors will average up, and cancel out. This may or may not be true. Again hand samplers claim that the values in a stream of ore are never the same for every section of that stream, which fact is liable to accentuate the above error. The mechanical people reply with the same theory of the chance of averages, which may be true too, but still there is a chance that it may not be so. However, the hand samplers' contention that there is a chance for selection of sizes and values to take place in the mechanical samplers generally used is undoubtedly right. Consequently they wish to remove that chance, and as they cannot devise a machine which is not liable to the same error, their only remedy is not to use any machine.

Intermittent Feed.—After the first sample cut is taken by a mechanical sampler, the most constant feed before the cut was taken is turned into an intermittent one (fig. 1). On account of the irregularity of distribution of values that is liable to occur in a stream of ore, enemies of mechanical sampling put forth the argument that a reject cutout may coincide with a high value section and so the mechanical sampler is liable to cause a selection of values. There is no doubt that this chance does exist, but there is just as much chance that the reverse will occur with the chances that for the total number of swings or revolutions the selection of high and low in reject or sample compartments, will average up and cancel out. With a very intermittent feed such as would result from a shovel fed mill, an extra chance for inaccuracy due both to selection of values and quantity is added.

These chances for inaccuracy due to intermittent feed should certainly be eradicated and no very great difficulty to overcome them is apparent. Remove the intermittent feed and a chance for inaccuracy is removed.

It is claimed that the intermittent stream of ore from the sample compartment of an automatic sampler, becomes constant after passing the set of rolls usually placed between two samplers, in order to bring about the necessary reduction in size before a second cut is taken. This is, however, not entirely the case; the rolls do tend to retard the stream, but the delivery from them to the next sampler is not much improved. The intervals between the different patches of the stream are somewhat bridged over, but the stream, although not quite so irregular, still retains the unevenness induced by the previous sampler, so that it is fed to the subsequent sampler intermittently. It is, therefore, apparent that even with a sampling mill with the best of hopper feeds, a feed regulator is very necessary after the first sampler, and before every subsequent sampler.

Another case of inaccuracy claimed by hand samplers against machine samplers is, that during the swing or revolution of the machine coarse particles of ore coming into contact with the sides of the cutting planes are liable to get knocked into the wrong compartment.

In the ordinary revolving Vezin when this does occur the coarser pieces will always get knocked out of the sample scoop into the reject. With the Brunton flip-flap (stream diverter) it is less liable to occur, whereas with the Brunton oscillating cutter the coarse particles can be thrown either into the reject or sample compartments, the error consequently having a chance to average up. Considering this point, however, it is undoubtedly bad practice to use a Vezin revolving scoop for, at any rate, material coarser than ¼ inch. Some samplers may even consider it bad practice to use this machine for any class or size of ore.

With the Brunton oscillating cutter, the elements of chance and averages again enter into play. However, although the fault outlined above does exist in the Brunton, it is certainly a point for debate whether it is possible for it to make any difference in the final sample, on account of the large quantity of the same as compared with the very small amount of material erroneously deflected. It is certain, in the majority of cases at least, that the error due to this cause will not affect the final result of the sample to the same extent as say furnace or other errors in the final commercial assay of the sample pulp.

The great point, however, in favour of machine sampling over hand sampling is the eradication of the personal element.

There is little doubt that as the above errors in mechanical sampling do exist, debate upon them may affect some improvement, which, even if it eliminates one chance for error is a step further in the direction of accuracy.

Let us consider hand sampling from the same point of view as that from which we have considered mechanical sampling.

II.—HAND SAMPLING.

In considering hand sampling one feature stands foremost as its drawback. This is the personal equation, which is ever present. This is a feature that for accurate and satisfactory sampling it is essential to eliminate absolutely, and it is chiefly responsible for the evolution of mechanical sampling. It is never advisable in sampling ore shipments to allow either a directly or indirectly interested person to handle the material in any way. Manipulation by interested parties is liable to occur even unconsciously, and apart from the actual conscious or unconscious liability for manipulation there is ever present suspicion, which is likely to cause bad feeling between shipper and purchaser. As was stated earlier in this paper, even where the bulk of the sampling is carried out by mechanical devices, there invariably comes a stage where hand sampling is resorted to.

In all commercial valuations, however, when the sampling is carried out by one of the parties interested (generally the smelter which is the purchaser) the other party invariably has his representative on the ground, and it is part of his duties to guard against this manipulation. But this precaution is not sufficient. It is clear then that when hand sampling is carried out entirely on a particular shipment of ore, the chance for manipulation is present during every operation; whereas in mechanical work it is at any rate eradicated for a part of the time. Hand samplers claim that with the class of labour employed to carry out the work, the operations practically resolve themselves into mechanical operations. This may be true during the period of breaking in a gang of men, but is offset by the imperfect way the work is carried out during this time. The men then learn the work, and in a very short time, no matter how ignorant they may be, know what they are doing and why they are doing it. Occasionally a case may occur such as was brought to the writer's notice where a man being broken in by the foreman was put to mixing a small pile of ore previous to quartering, by coning the material up six times. He had completed the third cone and was told to cone the ore up again, whereupon he threw down his shovel and looked at the foreman, saying, "Do it yourself, what do you think I am—a fool?" Thereupon he quit and complained that the foreman was imposing upon him. This incident goes to

show that a workman wants to know what he is doing. The personal equation is the Nemesis of hand sampling.

Non-Uniformity of Sizes of Particles.—The drawbacks attendant upon non-uniformity of size of particles apply in the same way to hand as to mechanical sampling. The influence of gravity, etc., on inaccurate work is perhaps more accentuated in hand sampling as will be shown later. It is an absolute impossibility to bring about even an approximate uniformity of size by any known method.

Frequently in hand sampling a reduction in bulk is brought about by fractional shovelling before any reduction in size of material is introduced; this cannot be too forcibly condemned. Again, an imperfect mixture is ever present in the ore, and the whole bulk of the shipment represented by patches of different values. Where a mixture is attempted it is carried on either by ridging or coning, both of which, instead of mixing the material bring about a concentration of certain particles and consequently of values, due to the segregation of sizes which invariably occurs in these operations; all this despite the much higher cost of the work.

Fractional Shovelling.—This is generally used to bring about a reduction in bulk, either from the ore as located for shipment, or from a pseudo-mixture in a large cone. or from ridges. Every fourth or fifth, etc., shovelful is laid to one side for a sample, the remainder being rejected. The sample is then supposed to represent 25 per cent. or 20 per cent., etc., of the total. It will be acknowledged that this is an extremely raw and unscientific method. In the first place the size of the shovelful is liable to vary very considerably. In fact it is the experience of the writer that the tendency is for the last shovelful of material taken (the sample shovel to be the smallest. In four shovel sampling, for instance, a workman may reject three large shovelfulls and take one smaller for a sample. Even if these all came from a patch of material of uniform value, the percentage represented in the sample is wrong. Although the reverse may even occur, the error is still present. At its best, if large and small sample shovelfuls alternate, the chance for error is ever present. Again, as the portion of the pile from which a sample shovelful is taken is entirely at the discretion of the workman, considerable room for unscrupulous and prejudiced manipulation is present.

Coning and Quartering.—This is the old Cornish method of reducing bulk, and where carried out accurately in absolute fairness and without prejudice can be productive of good results.

Even considering this, however, the chances for errors, both physical and personal, are very great. The operations consist in piling up the ore into a cone, then drawing this out into a cake and dividing it into four equal quarters. Two opposite quarters are then taken and treated in the same way, until the desired reduction in bulk is obtained. A series of this reduction in bulk generally precedes a reduction in size by rolls or other machine which is followed by another reduction in bulk, etc.

The coning is supposed to bring about a thorough mixture of the ore which, as will be shown later, is not the case. To produce a fairly true cone, the following two rules have to be strictly adhered to:

(1) Drop the material on the cone, do not throw it.

(2) Drop the material exactly on the apex.

If these are not strictly observed ,the axis of the cone will invariably be thrown, resulting in a very inaccurate quartering.

For really good work in coning the breadth of each charge dropped should not be any greater than the diameter of the apex. This tends to distribute the material evenly around the periphery. When it is larger it falls on the sides, and is not distributed around the periphery.

Segregation of Sizes of Particles on a Cone.—The most common operation in hand sampling ore is the coning and quartering of the material. It is also usually carried out to reduce the bulk of the sample from the mechanical mill. This method is generally looked upon as fairly safe. The possibilities and chances for errors are, however, great, and as these operations are generally carried out on a reduced bulk of the total shipment, the possible errors are such that their effect can be far reaching, and cause an absolutely inaccurate final result. The common contention that the coning of a pile of ore causes a mixture of the material is a fallacy. In reality the effect of coning is to cause a concentration due to the segregation of particles.

Some samplers think that because the fines collect around the axis of the cone, and that when the cone is drawn into a cake and quartered, if the axis of the cone has been thrown, the cone will fall into one quarter which will consequently contain an undue amount of fines. That this contention is wrong is shown by the following data of experiments carried out by the writer. The experiments also show what the real action taking place in coning is, and its effect on the accuracy of the final result of the sample.

DATA SHOWING

SEGREGATION OF DIFFERENT SIZED ORE PARTICLES IN A CONE

WEIGHTS AND PERCENTAGES OF SIZES IN EXPERIMENTAL SAMPLE

12 MESH OVERSIZE	11,926 GMS	35 594 %
16 MESH OVERSIZE	7219 GMS	20 335 %
16 MESH UNDERSIZE	16,355 GMS	46 070 %
TOTAL	35,500 GMS	99 999 %

TABLE SHOWING SEGREGATION IN FOUR SECTIONS OF A CONE

	SECTION	SIZE	WEIGHT GMS	PERCENT	PERCENTAGE OF TOTAL AMOUNT OF EACH SIZE IN EACH SECTION	PERCENTAGE OF SIZE-DISTRIBUTION IN "CLOAK"	VARIATION OF SIZES IN "CLOAK" FROM TRUE DISTRIBUTION	VARIATION OF SIZES IN "CORE" FROM TRUE DISTRIBUTION
CLOAK	APEX							
	A	12 M O	263	19 395	2 205			
		16 M O	193	14 380	2 701			
		16 M U.	898	66 224	5 491			
	B	12 M O	917	23 185	7 690	22690	-10 904	
		16 M O	647	16 359	8 962	16924	- 3411	
		16 M U	2391	60 455	14 619	60385	+14 315	
	C	12 M O	2271	22 944	19 042			
		16 M O	1732	17 498	23 992			
		16 M U	5895	59 557	36 044			
CORE	D	12 M O	8475	41 757	71 063			+ 8 173
		16 M O	4645	22 891	64 344			+ 2 556
	BASE	16 M U	7171	35 341	43 846			-10 729

A sample of ore was taken containing known weights of 12 mesh oversize, 16 mesh oversize, and 16 mesh undersize. This material had all passed a ¼-inch screen. The material was very carefully coned up. The cone was then divided into four sections, as shown in Fig. 2, and screen tests run on each section. The results are shown in the accompanying table, and a very evident segregation of size varying in each section is apparent.

It will be noted that the concentration of coarse particles (12 mesh) of ore increases from the apex of the cone to its base. The ratio of this increase also grows in the same direction. The concentration of this size is more accentuated in the bottom section (base section D), which will be the "core" of the resulting "cake."

The concentration of medium size (16 mesh oversize) also increases in the same direction as that of the 12 mesh oversize. The ratio of concentration also grows in the same direction. In this case, however, the concentration is not so accentuated. With the finer particles (16 mesh undersize down to dust) the concentration is the reverse of the coarser ore; the same going from the base to the apex. The ratio of the increase between the base section (D) and the three higher up being very marked. In the sections A, B, and C there is 14.315 per cent. too much of this material, and in section D 10.724 per cent. too little.

From the above it can evidently be deduced that the ratio of concentration of coarse ore from apex to base increases as the size of the ore particles.

In the base 1-4, D, of the cone there is too much coarse and too little fines; in the upper 3-4 there is too much fines and too little coarse.

Now, in drawing out the cone into a cake the base section, D, of the same, practically remains intact, and becomes what has been termed the "core" of the "cake"; the three upper sections, A, B, and C, being distributed fairly evenly around and above it, forming what we will term the "cloak"; the percentage of each size in the "cloak" must therefore be reckoned to the total weight of the same (Fig. 3).

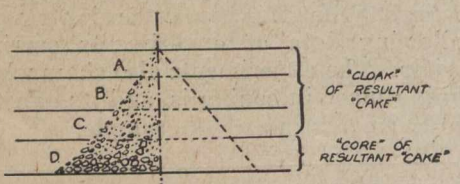


FIG. 2 TO ILLUSTRATE SEGREGATION OF SIZES IN A CONE

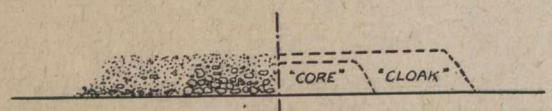


FIG. 3. SHOWING PERSISTANCE OF SEGREGATION IN RESULTANT CAKE

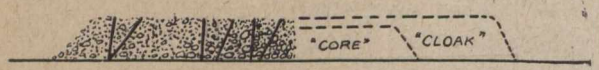


FIG. 4. SHOWING DIP SAMPLE SECTIONS AND CONSEQUENT ERROR DUE TO "CORE" AND "CLOAK"

It is thus evident that the "cloak" contains an excess of 14.315 per cent. 16 mesh undersize, a deficiency of 3.411 per cent. 16-mesh oversize, and a deficiency of 10.904 12 mesh oversize.

The danger of the possible effect of error due to this cause on ores in which the highest values are restricted either to the coarse or fine particles cannot be too greatly appreciated.

In quartering the resulting cake, if the quarters are not marked off absolutely accurately, it can be seen that the correct proportionate distribution of coarse and fines will not be represented in the individual quarters.

In building a cone by shovelling, it can be clearly noticed how this segregation does not take place for the first two or three shovelfuls—that is, until the cone has assumed its definite shape, and the angle of slope remains constant. The point at which this takes place is generally higher than the final thickness of the cake, so that the segregated fines around the axis are then distributed fairly evenly on a plane parallel to the base of the cone when same is flattened into a cake.

In drawing out a cone into a cake. a slight segregation of particles also takes place, when the material is drawn to the periphery of the cake and the larger particles roll down the sides to the base.

Sometimes dip samples are taken from the surface of a cake, after marking the same off into squares, when a sample is taken out of each square. That this cannot be too vehemently condemned is evident.

Also frequently in taking moisture samples, the material is coned up and then flattened out into a cake, and the sample taken from the surface of the same. Such a sample will always show an increase over the actual moisture, on account of too great a proportion of fines (coming from the "cloak") being taken (Fig 4).

CONCLUSION.

From the above comparative analysis of hand and mechanical sampling, it is the writer's opinion that in all fairness it should be readily acknowledged that the odds in favour of accurate work ,are overwhelmingly on the side of the mechanical mill—this, even regardless of the personal equation in hand work. The chances for error are very much less, as also are the effects of the possible errors.

With the conversion of the intermittent feed in a modern mechanical mill to a constant one, by the installation of a suitable machine, the results of the process will be greatly improved. There is also no reason why the bulk reduction of the final mill sample, say 1-25 or 1-125, should not, in every case, be carried out mechanically by using, say, the Jones Riffle, which is entirely superior to the Cornish coning and quartering. In this way the personal element will be reduced to a minimum, and the greatest chances for error will be eradicated. The Jones Riffle can be installed in combination with automatic feeders and the whole process thus remain a continuous one.

With these two improvements, the two main imperfections of the modern mechanical sampling mill using the Brunton machines will be removed, and the results will leave little to be desired.

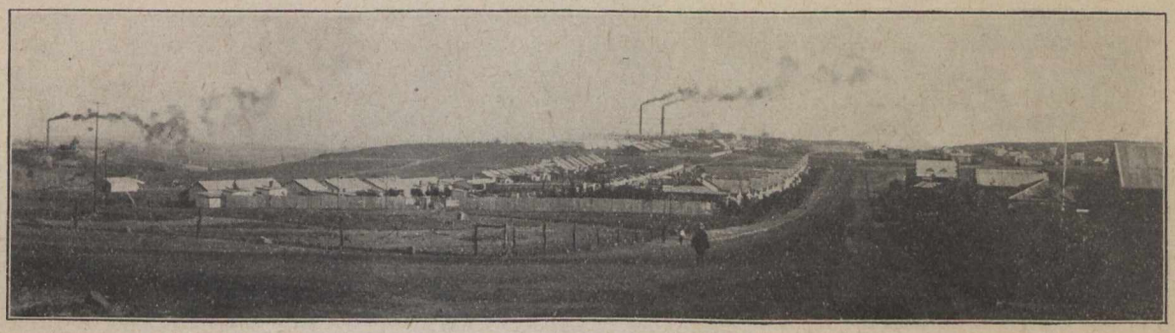
On August 1st, the JOURNAL published some information relative to the intention of the government of British Columbia to bring into operation legislation requiring the establishment of mine-rescue stations at coal mines in the province, and the decision to equip three government stations as well. Mention was also made of the fact that the government had ordered three complete sets of Draeger apparatus for its own stations. It is pleasing to now learn that about the middle of October the chief inspector of mines for British Columbia, accompanied by the deputy minister of mines, proceeded to Crow's Nest Pass district to establish there the first of the government stations. The two others, to be established on Vancouver Island, will have attention as soon after the work at Hosmer, Crow's Nest Pass, shall be completed, as shall be practicable. It has been stated that the coalfield in the Nicola Valley district will be similarly provided with mine-rescue apparatus and facilities for its use in case of need. It is plainly evident, therefore, that the government of British Columbia is in earnest in its determination to leave nothing undone that is within its power to require shall be done towards protecting the lives of the miners employed in the coal mines of the province.

During the last fiscal year the Dominion Government paid $340,542 in bounties on lead.

THE PREMIER DIAMOND MINE—THE WORLD'S LARGEST CRUCIBLE

Written for the CANADIAN MINING JOURNAL by
JAMES CUMMING.

The Premier Diamond Mine may be styled the Ninth Wonder of the World. It has to be seen to be appreciated. Its actual discovery is disputed by a Mr. Williams, who avers he made the then owner of the Prinsloo Farm aware of his discovering diamonds as far back as 1898, and is at present engaged in a gigantic law suit against the Transvaal Government and the Premier Diamond Company to recover a quarter of a million sterling for so doing. But the historical discoverer is put down as Sir Tom. M. (then Mr.) Cullinan.



View of Village showing Nos. 2, 3 and 4 Gears in the distance

The date of the discovery is mentioned as November, 1902.

The area of the mine is equal to 3,482 claims each of 900 Cape square feet. The English measurement reads 3,344,500 square feet or about 78 acres. Each claim measures 30 by 31 feet.

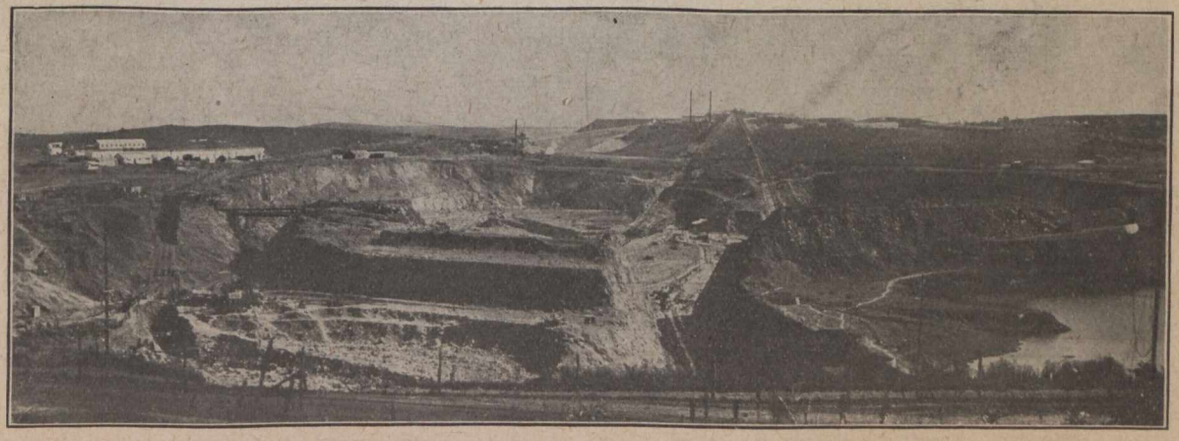
Possessed of a permit obtained from the secretary at the Johannesburg office, I proceeded by rail, via Pretoria, and alighted, after an interesting journey, at the up-to-date station called Cullinan, named after the discoverer, and situated 25 miles east of Pretoria.

The mine is adjacent to the town, and is surrounded by a double row of barbed wire fencing with several closely guarded entrances and exits. The fences are about ten feet high, separated one from the other by fifty feet, along which armed guards patrol.

When one enters by the main gate where he presents his permit, and signs his name and address, he is within easy distance of the mine. A very few steps bring you to the edge of the crater, and as you look at the busy hive beneath, one gets dizzy at the moving scene viewed from the giddy height.

The mine is being worked in levels or terraces, each 50 feet in depth. Before one level of this area is stripped another level is half done, and so the work of digging out the big hole will go on until a depth of 1,200 feet will have been reached, at which depth some other method of extraction will have to be devised as it may not be possible to continue the system of open working below that depth with safety to those employed. It will take forty to fifty years to reach the 1,200 foot level at the present rate of output of 22,000 to 24,000 tons of rock per day of 24 hours.

Bore holes have penetrated the magma to a depth of nearly 1,100 feet with satisfactory results, so much so that Mr. F. G. S. Wells, the works manager, who guided me through the mine and plant, and who is, by the way, the finder of the famous Cullinan diamond, declared that the mine would be alive and working when every person living to-day in Africa would be dead.



View of Mine from Kopje at back of Native Hospital (looking west). Showing Mine Workings, Nos. 2, 3 and 4 Gears and No 2 Compound and Fences.

The physical features of the pipe area vary greatly in character. The soil is red owing to the presence of iron dissolved out of the neighbouring diorites. Beneath the sub-soil, and for a distance of 50 feet, the colour is yellow because of decomposition, and below the water level the true "blue" ground is reached and so continues downward.

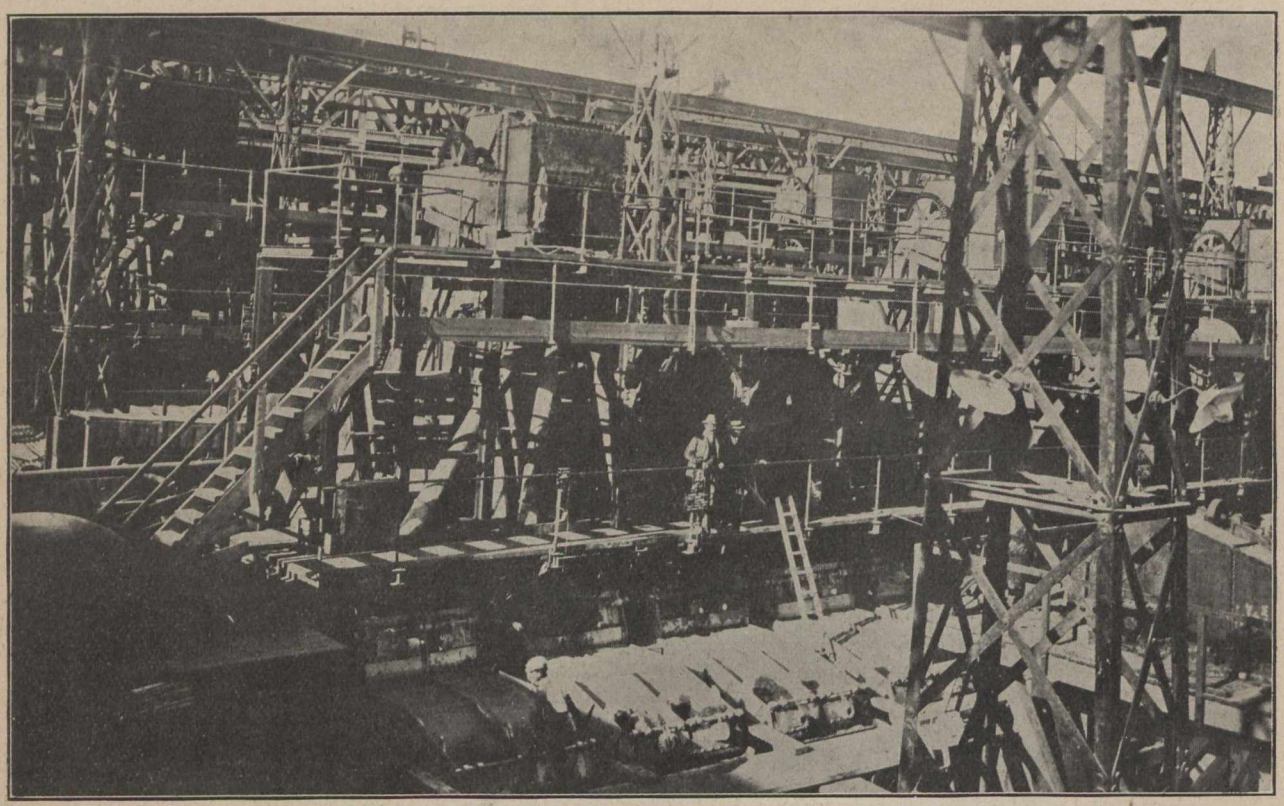
The "blue" ground also varies in colour, showing more carbon where it is blackish, sulphur where yellowish, and predominating in iron where reddish.

In the centre of the area are two great dikes which look like miniature Bass rocks in a firth of diamondiferous magma. These divide the two mines which are nearly round in shape. They are composed of indurated sandstones and quartzites and are gradually being removed.

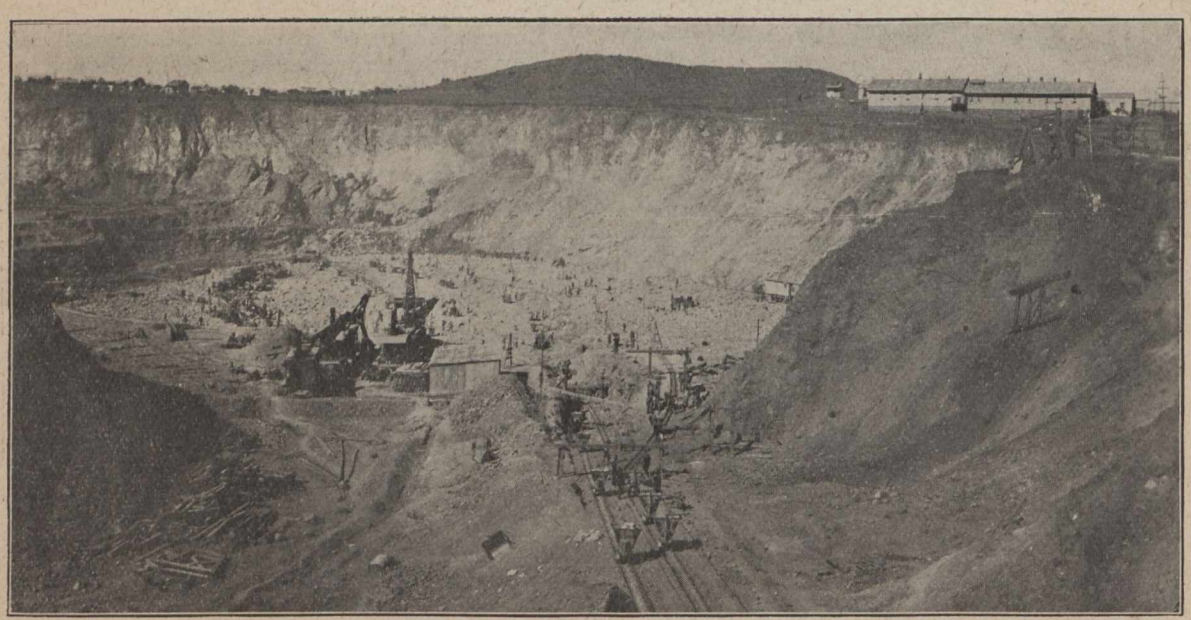
Three sets of endless haulage gear with a continuous stream of trucks—each of one ton capacity—are in constant operation between the mine and the crushing, washing, and sorting machinery. These gears never cease working unless through accidents.

Workmen are always in the mine, one shift relieving the other, and so the work goes on. Six thousand natives are attacking the faces in the different levels of the two areas at one time, while others attend to the ever-moving long double lines of trucks, one line full, one empty, as they travel to and from the machinery. The loading up is done as the trucks pass along the faces of the open cuttings, which expedites the work.

The system of quarrying the rock is unique. The usual process of a jumper and a striking hammer is not in evidence. Two boys handle a long length of 7-8-inch octagonal steel. They lift and let it fall alternately much in the same manner as a steam jumper drilling machine does. By this means two boys bore several



No. 4 Gear Pulsator-Plant, 2nd T eatment. Back view.

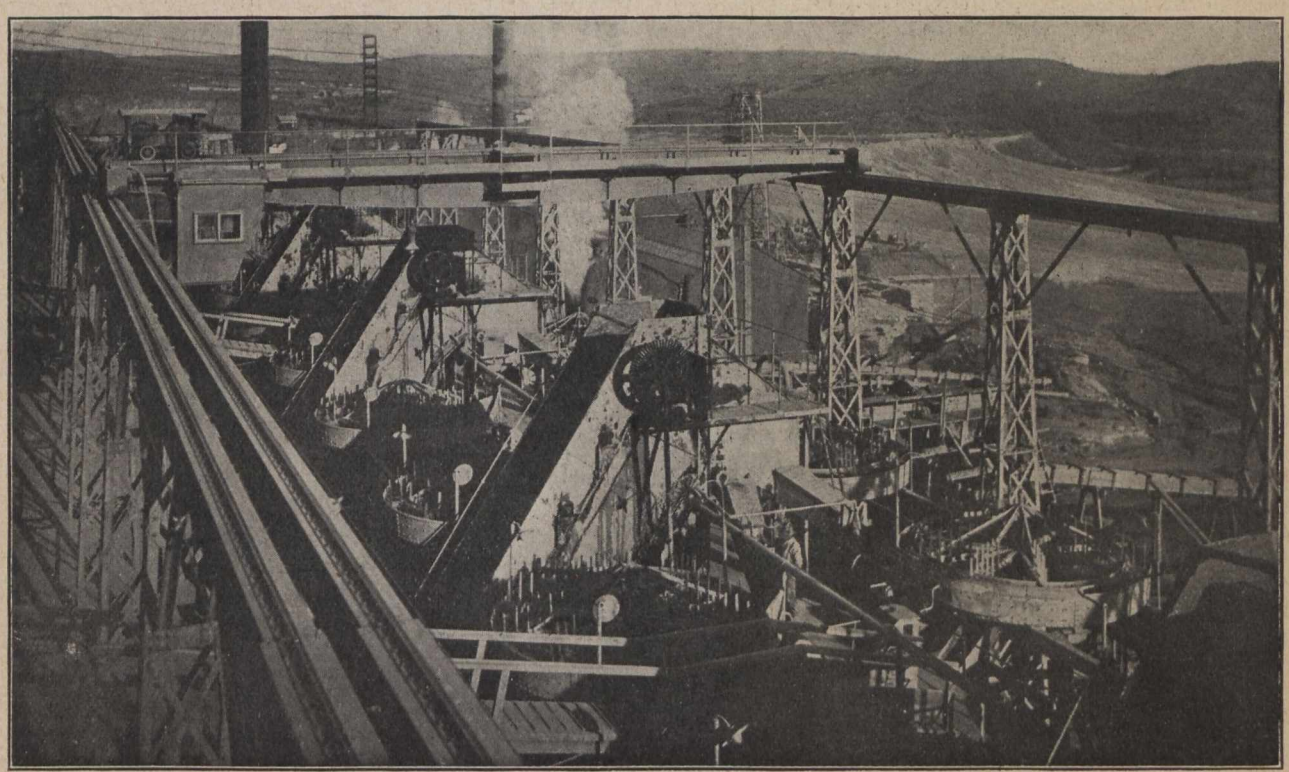


View of No. 1 Mine, showing Native Hospital in the distance and endless haulage gear.

three feet holes each shift of 10 1-2 hours. At the end of every shift the blasting is done. One ton of dynamite is used every shift, at a cost of £100.

When blasting is about to be commenced every soul is warned to clear out of the danger zone. To see the boys scurrying to a place of safety is a sight never to be forgotten. Others are less cautious. They become callous and indifferent to danger by daily experience and get underneath piles of old sacks raised high enough for them to crawl under, and there they remain during the disintegration of the diamond bearing rock and in this way escape the showers of falling debris. Strange to say very few accidents occur.

The only thing that suffers is the electric lighting plant which is installed round every working face. To obviate this, and save the expense of constant repairs, four strong search lights are under construction. They are being built on the edge of the rim of the pipe. By this light at night the workmen will see as well as in daylight.



No. 3 Washing Plant (portion) taken from No. 3 Bridge. Boiler House and Engine Rooms in background.

Needless to say the sorting and washing machinery is colossal. It would need to be, for up to the 31st October, 1909, 27,508,044 loads of ground had been treated, from which diamonds weighing 8,435,208 carats had been recovered to the value of £7,790,000.

The ore is automatically tipped—the trucks never stopping—into Comet crushers which pulverize to pieces of three inches. These pieces pass on to rotating washers and sets of corrugated rollers and then to pans where the washing process still further reduces the stuff into pulp and separates the diamondiferous rock from the waste. The first named goes on to pulsating gear of a complex character running down and brought up again by an endless system of pipes and small dredging buckets respectively until it passes over a series of jigging tables on which the diamonds are held fast by an eccentric motion as they pass over a fatty substance smeared thickly on the pulsating plates. The grease is then scraped off, placed in a cauldron, boiled, and run off. Then the diamondiferous matter is again washed and is now ready for the sorting tables.

The Premier mine became famous because of its enormous pipe. It can put all the other mines of Kimberley easily into its area and have space to spare. It added to its reputation when the Cullinan diamond, of world-wide fame, was unearthed. This stone was presented to His Majesty, King Edward VII. The stone originally weighed 3,032 carats, and, after it was cut into three magnificent diamonds, now takes a foremost place among the Crown jewels of the British Empire. Recently another beautiful stone was discovered weighing 191 carats and valued at £16,000.

The mine is owned by the Transvaal Government and the Premier Diamond Company, the first named having six-tenths and the second named four-tenths of the whole concern.

The asset to the Government is a large and profitable one. Its share of profit for the year 1909 reached £438,811 out of diamonds realizing altogether £1,454,917.

No less than 13,000 natives, and 800 Europeans are employed on the mine. The town of Cullinan is maintained by them. They run their own stores on the co-operative system, also hotel, chemist shop, and other auxiliary stores incidental to any town.

Sir Tom M. Cullinan is the chairman of the co-operative stores. To his efforts the mine, stores and town owe their existence.

Sir Thomas is also the chairman of the company and enjoys the fullest confidence of the Union Government.

Late reports from Broken Hill South Blocks are to the effect that during October the ore milled assayed 16.1 per cent. lead, 2.48 ounces silver, and 9.51 per cent. zinc. The cost of mine development was 3s. 1.96d. per ton; of ore extraction, 7s. 5.03d. per ton; of ore treatment, 5s. 1.75d. per ton; and general expenses, 1s. 1d. per ton. Total working costs, 16s. 9.74d. per ton.

GOLD AND SILVER MINING AND ORE REDUCTION—THEIR RELATION

(Written for THE CANADIAN MINING JOURNAL.)

Gold and silver are known as the noble metals, and since time immemorial have attracted the miner on account of their beauty and their power to resist oxidation. But it is only in recent times that such advances have been made in the treatment of rebellious and low grade ores of these two metals that they are attracting the attention of mining investors throughout the world.

Gold and silver have many features in common in connection with their treatment. The modern hydrometallurgical processes are closely similar. We shall consider these two metals from the standpoint of the miner, and also from that of the metallurgist, and try to show the relation existing between the two principal departments involved in their production. For this purpose it is well to consider the advances made in gold and silver metallurgy, and their relation to investment.

Mining and metallurgy, like all other fields of human endeavour, are constantly and rapidly undergoing change. Perhaps the industrial evolution that we observe on all sides of us is nowhere so well illustrated as in the metallurgy of these two metals.

We have seen in the brief space of a few years hand-feeders discarded for the machine, and we observe the tendency to make not only modern reduction plants automatic in a mechanical sense, but we are now experiencing what may be termed an automatic chemical advance.

In the United States and Mexico, operators are still to some extent unappreciative of the relation existing between milling, concentrating, and subsequent chemical treatment. We have not yet fully developed and moulded into one these three separate manipulations. Australia and Africa have demonstrated this to be necessary to good practice. Before we reach the efficiency of African, Australian and New Zealand methods, we must recognize that metallurgy depends upon all steps and operations from the time the ore leaves the shaft or tunnel, until the tailings are on the dump, and metal marketed. The requirements for this are a sound and wide knowledge of chemicals, mechanics, and physics.

The mill man, the concentrator man, and the cyanide man, as individual units of a mine staff, will gradually disappear. They will be replaced by the real metallurgist. It is by moulding all individual manipulations into a series of operations so well balanced that they become a simple scheme, that we must look for the true advance in the metallurgy of gold and silver from now on.

Great strides have recently taken place in mechanical separation instead of hydraulic classification, and we have reason to congratulate ourselves on the perfection of ore dressing plants, preliminary to, and after rock breaking, and on the sure and steady progress that is made in all departments of crushing and grinding machinery, and their arrangement. We can look, with a good deal of satisfaction, to modern methods of mechanical sampling and automatic weighing. Great perfection has been attained in all kinds of concentrating machines and appliances, and we are now beginning to know something really valuable about slime concentration. We have now the continuous agitator, and the many forms of filter press. Probably we most miss a cheap, simple, and effective slime dewaterer.

While generally there is a splendid effort being made to make new plants continuous of operation in their mechanical and chemical parts, we are still confronted with the problem of imitation. This, however, is gradually disappearing with intelligent investigation. America is unquestionably developing a practice in part distinctly its own, and there is no question that when fully evolved, it will be both efficient and inexpensive. The backward state of wet metallurgy in recent times, in both the United States and Canada, has, no doubt, been due to high efficiency of the many and convenient smelteries throughout the country. Had it not been for this fact, mine owners would have been compelled long ago to have kept fully up with the best wet metallurgical practice of other mining countries. Mines have been operated, and are still being operated to some extent in divisions, and it is only by full acquaintance with all branches of the business that these will gradually be eliminated, and uniformity, a merging of one department with the other, established. This requires that the metallurgist should be familiar with mining operations, and that the mining engineer should have a metallurgical training, as the mining and treatment of ores are interdependent upon incidental mine equipment. But as the metallurgist is forced to have a knowledge of this equipment, so also is the mining engineer compelled to have a similar knowledge, and thus we find no line of real separation.

A well-established relation between mining and metallurgy is as essential for a proper ore mixture in the dressing process, as it is in smelting operations. Subsequent treatment in its later details is affected by the character of this mixture. There is clearly a close relation between the ore reserves in a mine, and the capacity of the reduction plant. It is essential that the knowledge of the constructing metallurgist should be such that he may be in a position to check and verify these reserves. A far more important relation between mining and metallurgy is that of the life of the plant to the mine. This is clearly of vital importance, and demands that a plant should be erected with a full consideration and sense of the prospective possibilities of the unblocked ore possibilities of the mine. A determining factor is found in the interfering minerals encountered in the different parts of the mine workings. A good miner will watch this matter carefully in order that their influence on the treatment does not embarrass those who are responsible for ore reduction.

Metallurgy may be defined as the art of extracting metals from their ores, and preparing them for the use of the manufacturer. It will therefore be seen that there is no plant or part of the equipment upon the surface, that is not directly or indirectly concerned with the reduction of the ore. It should also be understood that this surface equipment is undoubtedly connected in many respects with the mine equipment. Therefore the cost relationship between mining and metallurgy is the most important relationship of all, because it is upon the proper method of cost keeping and distribution of charges that we are enabled to effect improvements and guide the whole operation of a mining proposition. It will thus be seen that it is impossible at any stage to separate entirely the question of costs in one depart-

ment from its bearing on the cost of some other department.

Again, there is a close relationship between mining and metallurgy on the operating sheets that are used to direct and control the dynamics of the hydro-metallurgical department. While we can benefit by the experience and experiments of other countries, we can only use them as a basis of our own work. Both mining and metallurgy are exact operations, and within the limits of our knowledge few mistakes are made by competent men. But we must realize that a sound knowledge and a thorough training are necessary to the solution of any problem. If an individual undertook to make shoes, it is hardly likely that he would begin the process of manufacture until he had obtained men competent to make shoes. Why, therefore, should those incompetent to mine and treat ores undertake the extraction and reduction of these metals? This matter is clearly one for experts. Imitation has never wholly solved any problem, and never will. We must eliminate imitation from our practice and our business methods, and only take what, in the judgment of men trained thoroughly the business of mining, is thought to be suitable for the problem in hand. It must be realized that every mine, no matter where situated, has its local conditions, and its local requirements, and therefore it is only by skill that these requirements can successfully be met. Every metallurgical problem is distinct and depends on the individual ore, and its particular chemical and physical constituents. While the general design and mode of operation of any one reduction works may be to all appearances similar to the mill adjoining, the operating metallurgist will have to use his brains to solve the little local requirements inside the mill in his daily manipulation.

We have arrived at a stage in the history of gold and silver mining where no failures should be recorded on a given payable ore body through operation. We have machinery together with our knowledge and control of the forces of mechanics and physics to assist the miner. We have arrived at a state of mine equipment that would astound the forty-niner, and we are triumphantly marching to a metallurgical goal that even five years ago was not contemplated. We are at present evolving the continuous treatment process, and few at the present time realize what this means for the future. An ideal process would be that which could treat ore without men, and without supplies. We have not eliminated all the men yet, but they have been reduced over 50 per cent. in this last seven years, and supplies have been correspondingly diminished. There is no doubt that the metallurgical chemist will succeed in wonderfully reducing the present consumption of material.

In a brief review of this kind it is impossible to allude specifically to the splendid work that has been done in the various modifications of the cyanide process, and to enumerate and describe the different machines and appliances that have been brought together to effect this evolution. But the time is not far distant when we shall begin to realize that this evolution of the mining and metallurgical industry of our time as applied to gold and silver will in itself become revolutionary.

It is estimated that 40,000,000 tons of iron were carried through the Soo Canal during the past season.

The Newfoundland Oilfields, Limited, has contracted for the sale of its total output. Two new complete drilling outfits have recently been delivered on the ground.

Fire Protection at the Plants of the Amalgamated Asbestos Corporation

One would naturally expect the plants of the largest asbestos concern in the world to be well guarded against fire risks. This is certainly true of the Amalgamated plants at Black Lake and Thetford Mines. From Fire Inspectors' reports the following notes are compiled. It will be seen that the buildings at all the mines are in excellent condition. Every reasonable precaution has been taken to provide against their destruction by fire.

Dominion Mines, Black Lake.—This plant consists of one main mill building with adjacent warehouse and dryers, the latter buildings separated from the mill by about 100 feet of space. The dryers are well installed in a separate building, are of modern design, and have good overhead clearance, with flues thimbled through roof. The electric heaters are installed in the main building with safe surroundings. There are individual motors on all machines, supplied with current derived from high-tension circuit and step-down to 2,200 volts. Wiring and appurtenances are all of standard design and carefully arranged and installed. Premises are clean. The dust collectors all vent into monitor on roof.

For active fire-fighting, there is one double hydrant on the town main. It is of 6-inch size and is situated near office. Nine hundred feet of good cotton jacketted hose is kept on hand. Numerous 3-gallon chemical extinguishers, water casks, and pails are distributed throughout all buildings. The plant depends on the fire brigade of the Standard Mines for fighting fires.

The one-storey dryer building is provided with a metal roof. The walls are asbestos sheathed. The floor is of cement.

Standard Mines, Black Lake.—The plant consists of one main building, which includes the mill, machine shop, dryers, and crushers; and one detached building containing the boilers. No serious defects exist in the installation of electrical plant. The crushers, dryers, heaters, and lights are well arranged as regards hazards. Premises are clean and well cared for

For fire protection there is one hydrant near the Dominion Mill. A fire department of ten men is always ready for duty. There are numerous 3-gallon chemical extinguishers, water barrels, and pails.

The protection here has lately been improved by the installation of two new hydrants that command both mills. The few changes recommended by the Inspector have been carried out.

British Canadian Plant, Black Lake.—The large mill here consists of nine connected main buildings, one of which is four storeys high. All have metal roofs and are of open finished frame joisted construction. Fire protection is described as being ample.

Electric power is used. The equipment is of the highest grade and is well installed. The main power rooms are enclosed in asbestos-sheathed partitions and are practically dust-proof. The switches and starting boxes have excellent surroundings. Risks are carefully guarded. One stove in Shed No. 21 was complained of, as also was a pile of cordwood near the dryers. Both these items were attended to promptly.

The fire protection consists of a new pump driven by electricity. It has a capacity of 500 gallons per minute, supplying a 3½-inch line. The line is supported on the dump trestle. There are take-offs at the machine

shop and dryer buildings. The latter connection is provided with 200 feet of 2½-inch hose. There also are two yard hydrants on the town main, one near the office and one adjoining the machine shop, each provided with 500 feet of good 2½-inch cotton-jacketted hose. All buildings are equipped with numerous water casks, pails, and Badger Chemical Extinguishers of 3-gallon size. The latter are all new and recently charged.

The plant is patrolled hourly by a watchman who punches a ten-station portable watch clock. There are no external exposures except railroad running west of the plant.

King's Plant, Thetford Mines.—There are here two separate mills. They are both open finished frame of very heavy construction where necessary. The sub-station is of brick. Buildings vary from one to five storeys in height, have composition roofs, and are fairly clean and in good condition, though No. 1 Mill is crowded.

Hazards are few. The electrical installation is excellent. The only boilers in use are for the hoisting engines. Heating is effected by means of steam coils. Premises on the whole are well cared for.

For fire protection a large electrical pump having a capacity of 3,000,000 gallons per 24 hours, is situated in a pump house near the river. This supplies all yard hydrants and vertical pipes in the mills. There are two vertical pipes in No. 1 Mill and one in No. 2 Mill. To each is attached 50 feet of 2½-inch cotton-jacketted hose at every floor. There are also two completely fitted hose wagons, each provided with 500 feet of 2 1-2 inch jacketted hose with full equipment of lanterns, spanners, nozzles, etc. There is also one truck with five ladders.

All the apparatus is manned by volunteers who are paid for time consumed in drilling. The department is under a chief and one assistant. It numbers 35 men. Weekly drills are held.

The full quota of water casks, pails, and chemical extinguishers is kept on hand.

Two watchmen make hourly rounds, controlled by two Eco 6-station clocks.

The town depends upon the equipments of the mills for its own protection from fire.

Beaver Plant, Thetford Mines.—This fair-sized mill occupies one large main building and several small adjacent and outlying buildings. Except the dryer house, the buildings are all one to four storeys high. They are of heavy mill construction with factory floors. All have open-finished frame walls and composition and shingle roofs.

The plant is roomy, clean, and in good condition. The new dryer building is fireproof. Hazards are few. Steam heat is used when necessary. Electrical equipment is thoroughly well installed. Sweepings, shavings, refuse, etc., are well taken care of throughout the plant.

A Snow fire pump, size 10 by 16 by 12, draws from a 15,000-gallon cistern, which is fed by two electrical pit pumps and by city mains. The pump is housed in a separate building. There are two stand pipes in the mill and one in the boiler house. Each has connection on every floor, provided with 50 feet of 2½-inch hose. There are three yard hydrants supplied with town water. These hydrants are 3-way, having 2½-inch and 4-inch outlets. The plant is supplied with hose reel carrying 300 feet of hose. Many chemical extinguishers, water pails, and sand pails are distributed throughout the buildings. The town fire department responds to fire signal.

One watchman makes hourly rounds, controlled by a 12-Station Eco portable clock.

The Inspector found no defects in this plant from a fire protection point of view.

The annual saving in insurance rates effected by this careful control of risks must be considerable. Apart, however, from this positive saving, the care exercised points to the fact that the spirit of efficiency marks the plants of the Amalgamated.

Mine Rescue Work in Britain

(Written for the CANADIAN MINING JOURNAL.)

Rescue work in mines in England and Scotland is now long past the experimental stage, and properly equipped rescue stations have become a part of the normal equipment of the British coal-fields. There are now nine such stations either in operation or nearing completion. In Yorkshire, which was the pioneer county in rescue work, there are three stations; namely, Altofts Colliery near Normanton, Tankersley and Wath. The Altofts station was the first erected in Europe; the Tankersley station was the first erected in Great Britain. In Lancashire the Howe Bridge station has been in operation since October, 1908. In the Midlands a rescue station has been erected near Mansfield, but is not yet in full working order. In Wales there are two stations, namely that at Aberaman, which serves the Cardiff district, and one at Crumlin in Monmouthshire. A large and modern station is almost completed at Elswick, Newcastle-on-Tyne. This station is supported by the coal owners of Northumberland and Durham in conjunction with the firm of Armstrong, Whitworth & Company. There is only one station in Scotland, namely, that at Cowdenbeath, which serves the counties of Fife and Clackmannan. Although, as will be seen from the foregoing, great progress has been made in the provision of rescue stations, there yet remain a number of counties unprovided for. There are no stations in the coal fields of Staffordshire and Warwickshire, in the Swansea coal field in South Wales, nor in the West of Scotland or North Wales. Meetings of the coal owners have been held in most of these unprovided districts and committees appointed to take up the question of rescue stations, but so far no definite progress has been made.

All the British stations are provided with smoke galleries for the training of men in the use of the apparatus. A typical gallery is that at the new station at Wath in Yorkshire. This gallery forms three sides of a square surrounding the paved yard of the station; the walls are of brick provided with doors having spring catches easily opened from the inside, and with observation windows through which the men under training can be watched. The floor of the gallery is filled up with shale and stone from the mine and supplied with all the necessary material for building stoppings and the ordinary mine timbering, together with pit tubs and rails. Contracted and tortuous passageways are provided to imitate the conditions of travelling which might be expected to exist in a mine after an explosion. The gallery can be filled with a dense smoke, which can be made as malodorous as the superintendent of the station wishes. The temperature of the air and its humidity can both be varied, an important feature, as it has been found in actual rescue work that the humidity of the mine air tells very quickly upon the endurance of men wearing breathing apparatus. It will be remembered that one of the rescue corps at the Hamstead fire

succumbed to heat apoplexy. The men under training work in this smoke, wearing the apparatus and doing, as far as possible, the same arduous work that would be expected of them if they were actually occupied at rescue work in the mine.

The instructor at the British stations is generally a retired non-commissioned officer from the army, not necessarily acquainted with coal mines. His work is to keep the register of attendance and proficiency, and see that everything is in readiness and in good order as far as the pit mouth,—beyond that his duties do not extend, as the trained corps naturally place themselves under the direction of the mine manager wherever and whenever their services are required. These ex-non-commissioned officers have proved themselves very suitable and efficient, as it is necessary for the proper working of these stations that a certain amount of military discipline be observed.

The stations are usually situated near a railway station—that at Wath, for instance, being within five minutes' walk of three stations all serving colliery districts. At the Elswick station, a motor is to be provided for the brigade and the apparatus, but at most stations it is not necessary to keep a motor specially for the use of the station as this mode of conveyance is now so common that no difficulty is experienced in getting a car quickly.

Following upon the Mines Accident (Rescue and Aid) Act, 1910, the Home Secretary has appointed a committee to consider the organization of rescue and aid in cases of accidents in mines. The personnel of this committee has been well received by the mining profession in Britain, and it may be expected that satisfactory regulations will shortly be framed by them.

The combination of rescue work with instruction in first aid and ambulance classes is gradually becoming more and more pronounced. In reference to this the "Colliery Guardian" remarks: "There has been too great a disposition to give prominence to the breathing appliances at the expense of other factors which enter into this question. What is necessary is so to organize the staff at every colliery that they may be able to render the most effective aid in the event of an accident occurring, whether it be an explosion or a fall of roof. It is probable that the appliances will be of service only on special occasions—the fewer the better—but hardly a week passes in which there is no work for what may be called the 'Medical Service Corps' of the Colliery." This is a point of view which cannot be too strongly urged. The usefulness of even the slightest knowledge of first-aid work in the case of accident underground can only be estimated by those whose daily work brings them in contact with such things. A great deal of unnecessary suffering, and many lives also, could be saved if more interest were taken by underground workers in ambulance instruction. It seems more than probable that the rescue station as it is known to-day will eventually evolve into an institution that will be a combination of a fire station, having provision both for underground and overground fires, an emergency hospital, and a place for the training of men, who, to use the happy phrase of the "Colliery Guardian", may be called the "Medical Service Corps" of the colliery.

Comparing Canadian conditions with those in Britain, it may also be said that, while considerable progress has been made in mine rescue work in Canada, a great deal still remains to be done. It is pleasing to note that the British Columbia Government has taken up the matter and that several stations are being fitted up in that province. In Nova Scotia there are the stations of the Nova Scotia Steel & Coal Company and the Dominion Coal Company. At least one of the mainland coal companies of Nova Scotia, it is understood, has in contemplation the provision of a station. A joint station for the counties of Cumberland and Pictou was mooted some two or three years ago, but, so far, nothing has been done.

Up to the present time there has been no great enthusiasm shown in Canada in connection with first-aid or ambulance instruction. A branch of the Order of St. John of Jerusalem has been in existence in Montreal for several years, but nothing like the interest that is shown in this work in the coal fields of Durham and Yorkshire, and which is, also, at the present time, being taken up enthusiastically in Pennsylvania—has as yet been manifested in Canadian mines. During the last two winters, ambulance instruction has been given in the Cape Breton coal fields by the colliery doctors. The success of this enterprise was hindered by the disturbed labour conditions that existed for some time, but it is hoped that the ensuing winter will see a revival of such an extremely necessary and laudable work.

The Jersey Falls Gold Mining Property—Beauce County Quebec

Abstract of an Old Report.

Had the facilities for creating a mining boom been as complete half a century ago as they are now, I have reasonable belief that the roar of stamp-mills would be heard in eastern Quebec. There are many old inhabitants, indeed, who can remember the time stamps did drop in the Chaudiere Valley. Within the last thirty years, two or three small mills were in commission. But it is only during the past twelve months that active interest has been aroused. It is a curious fact that capital created and put in circulation by the new fields of Northern Ontario, is now being directed eastward towards the almost forgotten goldfields of old Quebec.

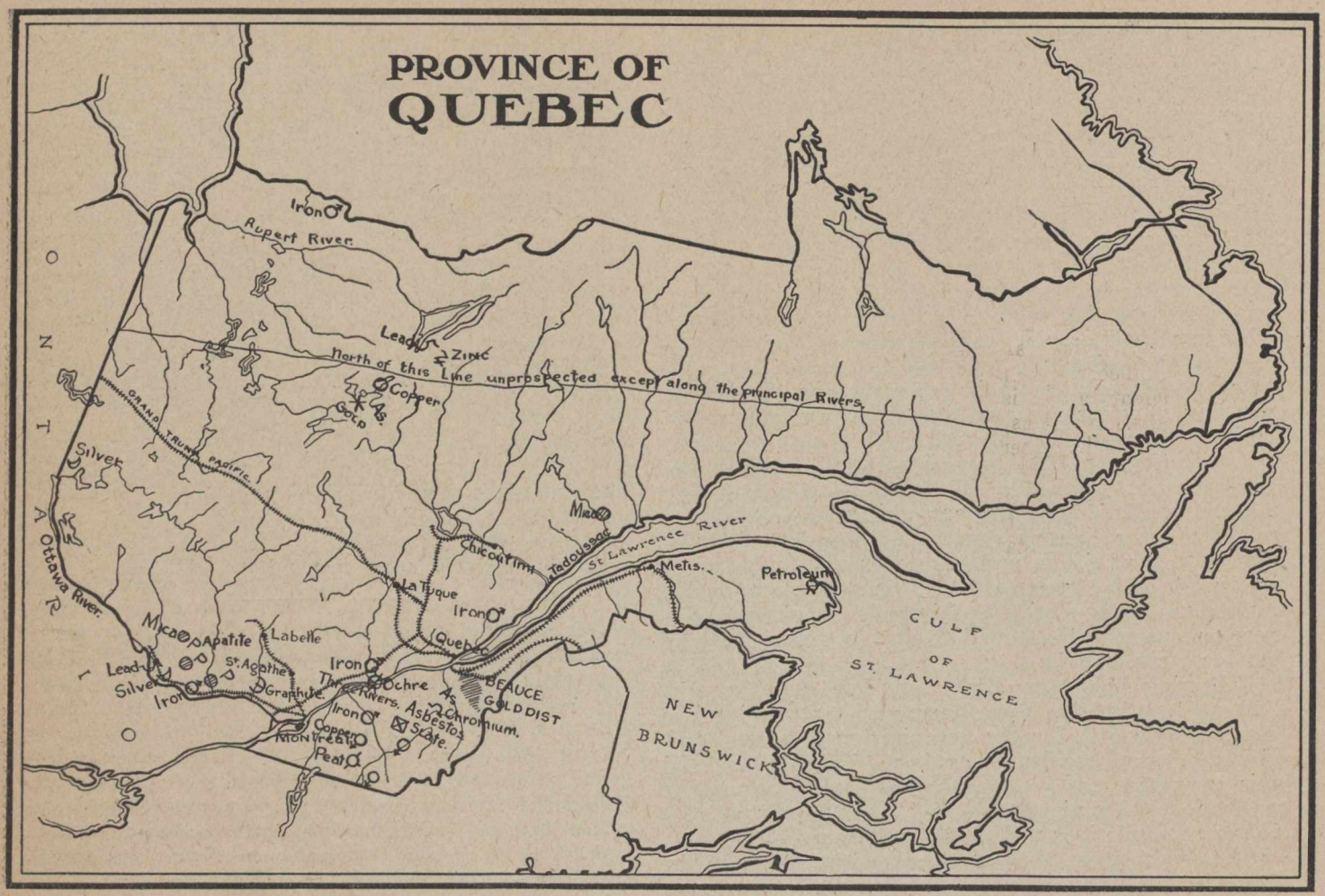
In view of this latter fact, I have put together a few notes from a report written in 1867 by Professor Henry Y. Hind. This report, printed in Boston, comprises Professor Hind's opinion of the Jersey Falls Gold Mining Property, several maps, and a list of assays made by Dr. A. A. Hayes, state assayer for Massachusetts.

The report is addressed to Mr. J. N. Maynard, and covers a tract of 2,300 acres on the Chaudiere River, in the Townships of Jersey and Shenley, County of Beauce. Within the boundaries of this tract are the Grand and Lower Falls and a series of rapids above the Grand Falls. Thus there was, in Professor Hind's opinion, ample power for all future purposes.

The Stafford stream, only about fifteen feet wide, with a total fall of 215 feet, within a mile from its mouth, joins the Chaudiere on the Jersey side, after intersecting several hundred acres of the property. The Chaudiere, at summer level, is 120 feet wide, and has an average depth of 18 inches.

The rocks, belonging to the upper members of the Upper Silurian series, are clay slates interstratified with sandstones. The prevailing dip is S. 20 degrees E, at angles varying from 65 to 85 degrees.

The interbedded strata are folded in a series of great curves, with a general northwesterly inclination. The



prevailing strike is N. 70 degrees E. As the tops of these folds have been denuded, the dips are almost always to the southeast. A belt of disturbed strata, about 780 feet wide, runs with the stratification. This belt was thrown into a series of folds before the general folding referred to above.

A series of faults or dislocations, having a general course, nearly at right angles to the stratification, show sometimes considerable downfall, and contain quartz veins.

The Veins.

The veins are of two kinds. Dr. Hind describes them as the Strike Veins (interbedded), and the True Veins (fissure) in the faults.

The Strike Veins run with the stratification, are of varying thickness, and are continuous. They range from a few inches to several feet in thickness. Their depth does not exceed 1,200 feet. In cases they are shallower. They occur in groups, and there are more than ninety on the property. They resemble in structure the gold-bearing veins of Nova Scotia. Essentially segregated, they have derived their minerals from the surrounding rocks by aqueous action. Among the minerals are galena, pyrrhotite, pyrite, zinc blende, and occasional traces of copper. With the quartz are small quantities of calcite, gypsum, and chlorite. Visible gold was not detected, but the existence of angular particles of the metal in nearby alluvions points to the veins as having been the original source.

Outside of the disturbed belt, the strike veins are perfectly regular between the dislocations.

The Faults.

Six faults, in each of which is a quartz vein, have been discovered. These may be of great depth. Where considerable downfall has occurred, the vein sometimes expands to many feet in thickness. The fault veins contain much more calcite than do the strike veins, and at intersection points of the two systems important metalliferous deposits may be looked for.

The Alluvions.

The order in which the alluvions occur is as follows:

1. Surface drift, with boulders of northern origin.

2. Stratified marine estuary deposits upwards of 100 feet thick, containing 25 to 35 feet of gold-bearing gravels below a belt of stratified blue clay 40 feet thick, and overlying,

3. Glacial drifts, consisting of very compact unstratified blue clay, holding boulders of northern origin, reposing on the country rock.

4. Modern river alluvions derived from Nos. 1, 2 and 3, and from the country rock.

Nos. 1 and 4 are gold-bearing, and require special notice.

The Modern River Alluvions.

These occupy the beds and banks of the River Chaudiere. Dr. Hind asserts that they are important and will amply repay working. He instances a case where, in 1851, a property within 3 miles of the Jersey Falls estate, yielded $4,323 from one acre. The "Long Tom" washing process was used. The working profit was $1,-366. Thus the gold won was $1.33 per cubic yard, at a cost of 90 cents.

In the light of modern conditions the figures next quoted by Dr. Hind are interesting. Taking Californian practice, he estimates a miner's wages at $4.00 per day. Then the comparative cost of handling a cubic yard of gravel is as follows:

I.—With the Pan	$20.00
II.—With the Rocker	5.00
III.—With the Long Tom	1.00
IV.—With the Hydraulic Process	0.20

Adapting these figures to Quebec (then, of course, Canada East), he notes that current wages are $1.00 a day, whilst, parenthetically, he informs us that 80 cents was the current wage in August, 1867. Thus the Californian figures become:

I.—With the Pan	$5.00
II.—With the Rocker	1.25
III.—With the Long Tom	.25
IV.—With the Hydraulic Process	.05

From these figures, Dr. Hind feels encouraged to conclude that modern methods would recover $400,000 from the river alluvions on the Jersey Falls estate, at a cost of $62,200. His estimate is based upon the assumption that the Jersey alluvions are as rich as those in the Du Loup.

The Marine Estuary Alluvions.

These alluvions assume the form of cliffs on the Shenley side about 100 feet in height. They consist of eleven feet of barren gravels, underlaid by forty feet of sterile stratified blue clay, which rests on about thirty feet of gold-bearing gravels. These in turn overlie a rich auriferous bed of blue clay, or a rich surface of glacial drift.

The greater part of the gold, so Dr. Hind believed, has accumulated on the surface of the blue clay. Where the blue clay is absent the gold has accumulated on the glacial drift.

An average gold content of ten to twelve cents per cubic yard would pay, according to Dr. Hind's contemporary estimate. Ample water was available. He, therefore recommended strongly the exploitation of the gravels.

Samples of quartz assayed by Dr. A. A. Hayes and by S. Dana Hayes gave results ranging from $11.79 of gold per ton up to $19.79. In one case a sample showed 16 ounces of silver per ton, along with $13.47 in gold. These samples were taken from five veins.

ONTARIO BUREAU OF MINES REPORT.

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

	Quantity.	Value.
Gold, ounces	1,390	$ 28,729
Silver, ounces	19,791,033	9,792,669
Cobalt (paid for) tons of 2,000 pounds	275	44,884
Copper, tons of 2,000 pounds	7,168	1,022,436
Nickel, "	13,905	2,989,651
Iron Ore "	120,358	273,906
Iron Pyrites "	16,454	44,690
Pig Iron "	319,698	5,039,626
Steel "	245,566	5,830,896
Zinc Ore "	700	5,760

Shipments from silver mines aggregated 23,824 tons, of which 19,191 tons were of ore and 4,633 tons of concentrates. The former averaged 768 ounces of silver to the ton and the latter 990 ounces. Gowganda, with six shippers, contributed 402 tons of ore, containing 334,210 ounces of silver. Elk Lake contributed 17 tons of ore, South Lorrain 9, and the Lake Superior district a small production, the remainder being from Cobalt proper. The output of metallic silver from the mines of the Cobalt camp is increasing, being 468,887 ounces for the nine months. During the period 7,069 tons of ore (containing nearly 50 per cent. of the total silver yield) were treated by the silver reduction works at Thorold, Trout Mills, Copper Cliff and Deloro.

The production for the corresponding period of 1909 was 18,751,549 ounces of silver, valued at $9,385,600.

The gold production shows a considerable increase, the greater portion being from the new Porcupine camp. For the corresponding period in 1909 the production was 1,125 ounces valued at $18,926, while this year the return shows 1,390 ounces, valued at $28,729.

The nickel-copper mines of Sudbury turned out 13,905 tons of nickel, and 7,168 tons of copper, as compared with 8,912 tons of the former and 5,587 tons of the latter for the same period in 1909, showing an increase of 56 per cent. and 28 per cent., respectively.

The production of pig iron as compared with the first nine months of 1909, shows a considerable increase, the figures being 319,698 tons, having a value of $5,039,626, as against 294,698 tons valued at $4,095,735 last year.

TORONTO BRANCH, C.M.I.

The second meeting of the Toronto Branch of the Canadian Mining Institute was held at McConkey's Restaurant, at 1 p.m., Saturday, Nov. 19th. Twenty-five members were present. Mr. H. E. T. Haultain occupied the chair. Professor W. Nicol, of Kingston School of Mining, was the guest of the day. After luncheon had been attended to, Professor Nicol spoke briefly and appropriately. He glanced over the progress of mining in Ontario, referring particularly to Cobalt, Porcupine, and Hastings County; and alluded to the present healthy condition of the mining industry.

The meeting then became informal. A discussion on the bearing of reciprocity on mining was led by Mr. J. J. Harpell. It was decided to make this a subject of debate at the regular meeting on December 17th, when Mr. Harpell will read a short paper.

Mr. Eugene Coste and Col. A. M. Hay emphasized the importance of a Dominion Mineral Act. Col. Hay urged strongly the need of a Royal Commission to study the mining legislation of all important countries with a view to consolidating the Dominion Acts and all the provincial Acts on the best possible basis.

Mr. Coste urged immediate action to be followed later by the appointment of a Royal Commission. A definite Act is needed now.

Dr. W. G. Miller advised action on the part of the Canadian Mining Institute. The subject is to be taken up more fully at the next meeting, December 3rd.

PEBBLES FOR TUBE MILLS.

Flint pebbles for tube mills, cement grinding and granite polishing come from the Orkneys, Greenland, Denmark, and largely from France. In the granite polishing trade the use of pebbles has been superseded by toughened shot and saws, and on the Rand by the use of the pebbles in the banket. The French deposits cover a distance of over a hundred miles on the beaches between Havre and St. Valery-sur-Somme. These pebbles are extremely hard, and occur in the cretaceous chalk formations. They are shipped in large quantities to Australia, New Zealand and America.

Gold pannings can be collected with a small globule of clean mercury, which can be transferred to a small bottle. Foreign matter can be removed by passing the globule from one cup to another. It can then be dissolved in nitric acid and the gold residue left as powder. The residue is then ignited and weighed.

Ore Receipts at British Columbia Smelteries

The total quantity of ore received at the several smelteries operating in the Kootenay and Boundary districts of British Columbia during nine months to October 1st, 1910, compares favourably with that for the corresponding periods of 1909 and 1908, respectively. The tonnage figures for the different smelteries and periods are as under:

Smeltery.	For nine months ending Sept. 30,		
	1908.	1909.	1910.
Consolidated, Trail	227,997	302,353	351,413
Granby, Grand Forks ...	786,852	728,447	871,255
B. C. Copper, Greenwood	224,203	203,065	279,785
Le Roi, Northport	59,631	9,301	.....
Total	1,298,683	1,243,166	1,502,451

These figures, which have been taken from the statements of ore receipts printed in the Nelson Daily News, show that the total for the nine months lately expired is approximately 260,000 tons higher than that for the corresponding period of 1909, and 204,000 tons higher than for 1908. Whether or not a proportionate rate of increase will be maintained to the end of the current year, is uncertain, but it is probable it will be, notwithstanding that the output of two or three mines that in other years were important producers is likely to be less for the closing three months of this year than in the two other years under notice. The suggestion that proportionate tonnage figures will be maintained is based on the fact that several mines not shippers in other years are among this year's producers.

It should be kept in mind that the foregoing figures do not exhibit the total production of ore for the whole province, but only the tonnage of ore sent to the smelteries mentioned. In addition, there is the ore that has been put through stamp mills or concentrators in East and West Kootenay—roughly 170,000 to 180,000 tons—and that from mines in the Similkameen and Coast districts. It would, therefore, appear to be quite reasonable to place the total tonnage of ore produced by the metalliferous mines of the province during the nine expired months of 1910 at between 1,700,000 and 1,750,000 tons.

It is on official record that the gross tonnage of ore mined in British Columbia in 1908 was 2,083,000 tons, and in 1909, 2,057,000 tons. Should nothing happen to interfere with production at present rate, the total for 1910 should be about 2,300,000 tons.

Personal and General

Mr. R. B. Lamb visited Cobalt recently.

Mr. A. H. Smith has returned from Porcupine.

Mr. O. E. LeRoy was in Toronto on Saturday, November 19th.

Mr. H. Kilburn Scott has left for Brazil on professional business.

Mr. John Shaw has been appointed superintendent of the Casey Cobalt.

Mr. J. H. Plummer has been elected a director of the Bank of Nova Scotia.

Mr. W. Stanley Lecky has moved from Montreal to Toronto. Mr. Lecky has been engaged by a Toronto syndicate to inspect mining properties.

Mr. Charles Watson, formerly manager of the Cobalt Townsite, has been appointed manager of the Armstrong-McGibbon property in North Tisdale, Porcupine. He is succeeded in the Townsite by Mr. A. C. Bailey.

Mr. Osmond E. LeRoy, of the Geological Survey, having completed his field-work in British Columbia for 1910, left the West about the middle of November on his return to Ottawa.

Mr. G. A. Guess, late of the Tennessee Copper Company, was entertained at luncheon at the National Club, Toronto, by Mr. H. E. T. Haultain on Thursday, Nov. 24th. Dr. W. G. Miller, Mr. R. W. Leonard, and Mr. J. C. Murray were also present.

Mr. J. A. Reid, who spent the summer in Portland Canal, was in Toronto on November 15th completing arrangements to take up mining property in Mexico. Mr. Reid is a graduate of Kingston School of Mining, 1902, and has spent some years in Mexico and in Western Canada.

Mr. Wm. Yolen Williams, of Spokane, Washington, formerly superintendent of the Granby Company's mines at Phoenix, B.C., recently went to Observatory Inlet, near Portland Canal, B.C., to determine what development work shall be done by the Granby Company on the Hidden Creek Copper Company's mine, now under option to the Granby Company. Mr. O. B. Smith, jun., present mine superintendent for the Granby Company, afterwards joined Mr. Williams at the mine.

Mr. James Gray, formerly manager of the Nicola Valley Coal and Coke Company's Middlesboro colliery, in Nicola Valley, B.C., is now manager of one of the Canadian Collieries (Dunsmuir) Limited's coal mines at Cumberland, Vancouver Island.

Mr. Howard W. Du Bois, of Philadelphia, Pa., U.S.A., who is general manager and engineer for the Quesnelle Hydraulic Gold Mining Company, was in Victoria, B.C., recently.

Mr. H. K. Rodgers, of Seattle, Washington, who owns a one-fifth interest in the Hidden Creek Copper Company, lately proceeded to the company's mine on Observatory Inlet, to give charge of the property to the Granby Company's officials, who will further develop it.

Mr. F. N. Sylvester, hydraulic and electrical engineer, has been appointed assistant to Mr. Jay P. Graves, general manager of the Granby Consolidated Mining, Smelting and Power Company, Limited. Mr. Sylvester will have charge of the commercial business of the company, leaving the superintendence of the company's mines and smeltery as at present.

Among recent visitors to Sheep Creek mining camp, in Nelson division, B.C., were Messrs. W. M. Brewer, of Victoria; Robert R. Hedley, of Vancouver, and S. S. Raymond, of Los Angeles, California. For several years Mr. Raymond was manager of the Britannia Smelting Company, with works at Crofton, Vancouver Island.

Mr. A. J. McMillan, liquidator of the Le Roi Mining Company, left British Columbia early in November on a business visit to Chicago, Illinois.

Mr. Norman McKenzie, superintendent of No. 2 district for the Dominion Coal Company, has been granted an extended leave of absence. He will visit the principal coal mines of the United States, with a view to studying provisions for safety of life in mines.

In our "Personal and General" column in our last issue reference was made to the suit of Smith vs. Hersey et al. In this paragraph the case was summed up inaccurately. A friendly settlement was effected at the suggestion of Chancellor Sir John Boyd. After the settlement had been arranged the charges preferred by Mr. Smith were withdrawn.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Dominion Coal Company Employees' Benefit Society.—The regular quarterly meeting of this society was held at Glace Bay on the 14th November. The treasurer reported that all the collieries and departments were organized into branches of the society, with the exception of a few scattered departments which will be gathered into a general branch. It is now four months since the old societies were amalgamated, and the result of the quarter's work is very satisfactory. The net excess of income over expenditure, after allowing for liabilities contingent or contracted on claims during the quarter, amounted to $7,448. The total funds to the credit of the society at the end of October amounted to $83,204. It was decided to create a reserve fund, and $50,000 was set aside for this purpose. For the purpose of forming the nucleus of a fund to provide for old age pensions and disability, the sum of $25,000 was further set aside. The number of members of the Benefit Society is now 6,700, and by the beginning of 1911 it is expected that this number will be increased to 7,500 members.

The Dominion Coal Company is adding to the equipment of its rescue station a motor-driven oxygen refill-pump. The station is at present equipped with a hand pump, with which the one-hour flasks which form part of the apparatus are charged from the main storage bottles. The work of pressing up the oxygen charge is necessarily slow and somewhat laborious, and it is not considered wise to have the station dependent on one pump. The new pump will be of a greater capacity, and will form part of the permanent equipment of the main station, thus allowing the smaller hand-pump to be available for transportation to any place required.

A new set of Draeger apparatus, "1910 Model," has also been ordered. This model is fitted with one large oxygen flask instead of the two which form part of the older type of apparatus. The potash cylinders in the older type were also two in number, but in the latest model their place is taken by one large cylinder. Both the potash cartridge and the oxygen flask can be changed in half a minute in smoke without the necessity of removing the apparatus from the shoulders. The helmet is also improved. Part of the metal in the old type of helmet is replaced by soft leather, and the whole pneumatic lining which is the distinctive feature of the Draeger apparatus is made so that it can easily be removed and replaced again.

Reciprocity in Coal.—The people of Cape Breton who are vitally interested in the prosperity of the coal trade and the allied steel industry, upon which the continued welfare of Cape Breton almost entirely depends, have taken decided measures to present their case before the Government at Ottawa. A meeting was held in Sydney on the 10th of November, at which were present the mayors of Sydney, Glace Bay, North Sydney, Sydney Mines and Louisburg, the warden of the county, Mr. M. J. Butler, the general manager of the Dominion Iron & Steel Company and the Dominion Coal Company, and representative deputations from the lodges of the Provincial Workmen's Association. The following resolution was unanimously adopted:

"Whereas, the question of reciprocity between Canada and the United States is now under consideration, and

"Whereas, the prosperity of Cape Breton is dependent on the coal industry, and the revenue of the province of Nova Scotia is in a large measure derived from the industry; and

"Whereas, the capacity of this section of the Dominion to purchase provisions and manufactures, the products of the western provinces, thereby developing interprovincial trade, is dependent on the coal industry; and

"Whereas, reciprocity in coal between the United States and Canada, or reduction of Canadian duties on coal, would be disastrous to the Nova Scotia coal trade;

"Resolved, that this meeting is opposed to any change in the existing coal tariff, and to any reciprocal arrangement which would include coal;

"Resolved, that copies of this resolution be forwarded to the Honourable the Minister of Finance, Ottawa, and to the Provincial Secretary of Nova Scotia."

Mr. Butler stated that the Dominion Coal Company had made most determined efforts to place its coal in New England, urged thereto by the necessity of providing work for the men during the winter and, to some extent, equalizing the winter and summer shipments. The result had been most absolute failure, and the only thing the company had accomplished was to enable the Boston & Maine Railway Company to use its quotation as a club to beat down American coal companies to cheaper prices. Mr. Butler expressed the opinion that the agitation for reciprocity in coal emanated from the two great railway systems of Canada. He did not believe that there was any real wish in the Province of Ontario for reciprocity in coal, and he felt that the business men of Ontario realized that anything which acted to the detriment of the prosperity of the Maritime Provinces would, at the same time, react most adversely upon the business done by Ontario manufacturers in the Maritime Provinces.

Mr. Butler made the striking point that reciprocity in coal with the United States would mean a readjustment of the east to west transportation between the Canadian provinces. A north to south exchange of commodities would completely destroy the great systems of railway transportation which have been built up by the efforts of the people of Canada.

The meeting was entirely unpolitical—every shade of party being represented—and there was complete unanimity of opinion that any interference with the coal duties would be no less than calamitous in its result upon the Maritime Provinces.

QUEBEC.

Sherbrooke.—The East Canada Smelting Company is pushing the development of the McDonald mine, at Weedon. It is stated that there are some hundreds of thousands of tons of ore in sight, in addition to ore indicated by diamond drilling.

A contract has been let for digging a canal seven miles in length, so reports go, for working gold-bearing gravels in the Chaudiere district. Several transactions are pending in this region. The favourable report of a Montreal engineer has again come to the fore, and will probably be acted upon.

ONTARIO.

Cobalt.—The Casey Cobalt, the only property mining silver in the clay belt, has already shipped this year nearly 50 tons. It has gone out in O'Brien and Cobalt Townsite cars so that until investigation was made nothing was known of the little mine's productiveness. As all of the ore was of high grade it should net the company a comfortable sum. Mining operations are being conducted at the 200-foot level and the ore appears to go down. Shipments were made in January, April, July and October.

At a meeting of the Wyandoh Mining Company the following directorate was elected: Messrs. Alex. Pringle, John P. Black, Dr. Milton Hersey, O. H. Ward, B. Neilly and Shirley Ogilvie. The report showed ore on hand $820, in treasury $11,000 and 500,000 shares of stock, and the company owed between $18,000 and $20,000. The shipment made netted the company $11,800.

In the thirty miles of trenching upon the Nipissing last year eleven veins all showing high grade were uncovered. One of these, in the keewatin, in the southwest corner of the territory had an ore body 25 feet long by three inches wide of very rich ore. It has been sunk on, and at the 100-foot level a cross-cut has been started to catch the vein which dipped out of the shaft. Four parallel veins near Peterson Lake are being mined from tunnel 28. The ground covered included some hitherto unexplored keewatin territory, some partly explored conglomerate, and 3,500 feet in the diabase only. The average depth of the trenching was 2.8 feet. Next year all the surface prospecting will be done by means of hydraulicking.

In drifting on the Lavalle vein on the 150 foot level of the T. & H. B., near the Trethewey line and heading for it a five-inch vein of 3,000 ounce ore has been cut. It has been opened up now for 430 feet right to the Trethewey line. The mill building at this mine has been completed and half the machinery is on the ground, while the remainder is ordered. For the concentrator there is 12,000 tons on the dump and a large tonnage of low grade has been stoped in the mine itself. This is the fourteenth concentrator to be erected in camp and there are plans being made for two more, one at the Crown Reserve and the other at the Nipissing.

Quite a number of changes have been made in the management of Cobalt properties. Mr. Charles Watson, formerly of the Cobalt Townsite, goes to take charge of the Armstrong McGibbon at Porcupine at the beginning of the month; Mr. A. C. Bailey leaves the Casey Cobalt to take his place at the Townsite, and Mr. John Shaw will be manager of the Casey.

As the Cobalt Provincial now has a continuous ore body of over 200 feet at the 175-foot level, Mr. Reddington has thought developments warrant the erection of a good camp and a small sorting house to look after 40 tons a day. The vein is of high grade ore from three to six inches wide and outside its values extend for sixteen feet in several spots in the drift. Twenty tons of high grade have been taken out of a stope on the upper level and two cars of seconds are on the dump. The camp is being built to accommodate sixty men.

The Little Nipissing has cut its vein again at the 285-foot level and report it to be as rich as ever and six inches wide. The company has on hand three cars of ore of which one-third of a car is high grade.

The Cobalt Provincial Mining Company has secured an option from Messrs. Fraser and Ogilvie on lot A53. There is opened up on it 25 feet of a one-inch vein. The showing was supposed to be the best of any of the lots offered for sale at the last sale of property by the Government and brought $35,100.

On the fifth or lowest level of the Kerr Lake, No. 3 shaft near the Hargrave boundary, a new vein of high grade ore has been cut. Under Kerr Lake, where previously nothing had been done, a cross-cut has revealed the existence of several very rich veins, in all probability, the extension of some of the Crown Reserve's veins.

The largest shipment of bullion made from any one mine at one consignment was that from the Crown Reserve when they shipped 65 bars, containing 45,000 ounces, to England. It came from their coarse metallics from their small sorting plant.

Buffalo interests have leased the Green-Meehan on terms that appear to be favourable to the discovery of more ore if there is any left at all. In the five years of their lease the syndicate has to do 120 feet development in the first year and gradually increase the extent of the exploration each year until the fifth year when 275 feet at least must be done. Unless there is again a hitch, active work will be commenced at once.

The Beaver Consolidated has issued a statement showing that there was on hand at the end of October $30,000 in cash, $30,000 due from the smelter and another $30,000 car ready to ship.

During the month of September the Nipissing produced 351,849 ounces, having a value of $185,219. Development during the month has mainly been on the Meyer, which now shows a 212-foot ore body.

Surface conditions on the Nipissing are:—

	Partially Prospected.	Unprospected.
Conglomerate	306	123
Keewatin	176	10
Diabase	16	225

The Ophir Cobalt Company has been fined $100 for not providing a guard rail at its 200-foot level. A man named T. J. Kinsey fell down into a winze and was killed. The Beaver Consolidated was also reprimanded by a jury for not seeing that the guard rail at the shaft was kept down and in place. A man was killed there.

The McKinley-Darragh-Savage has already mined this year two million ounces of silver in the first ten months of the year. From the Savage mine a regular output of between 50,000 and 60,000 ounces is being maintained per month.

Two gold prospects outside the Porcupine area report continued good showings. These are the Swastika mine near Dane, on the T. & N. O., and the Thelma mine, in Bryce Township. At the Swastiki the manager has gone to Nova Scotia to buy a second-hand mill of five stamps in order that they may extend operations. At the Thelma Gold Mining Company, midway betweent Cobalt and Elk Lake, assays continue good as test pits are put down on a two-foot vein.

A contract has been let to sink a shaft on the Valentine Mines at the southwest end of Cross Lake. The shaft will be put down a hundred feet to crosscut several good sized veins found on the surface.

Pennsylvania detectives are looking into the affairs of the Delaware Cobalt Mining Company with properties somewhere near Gillies depot. The properties were bought for a few hundred dollars by the promoters and resold to the company, capitalized at $2,000,000, for $21,000. Much stock in the company, on extravagant representations, was sold to Easton, Pa., people, who are now beginning to make enquiries.

The O'Brien mill is now treating 120 tons a day and getting an extraction of 93.4 per cent. from 30 ounce ore.

Fourteen shipments of bullion have been made from the mill, consisting of 288,405.78 ounces, worth $153,028.49.

Porcupine.—Until the trail is better and supplies are cheaper and more easily obtainable, the Dome has got rid of most of the men employed. Probably this winter work will be confined to the erecting of a mill and big plant. A twelve-drill compressor has been ordered from the Canadian Rand Company.

By the time this appears in print the trail to Porcupine for sleighs and passenger traffic should be excellent. A new winter trail is being cut from Crawfords on the Frederickhouse to Hills on the Porcupine, and should be completed by the end of the month.

Two men were drowned in the Frederickhouse River, one in trying to break through ice with a canoe, the other in endeavouring to cross the river on thin ice.

Work on the Miller Middleton properties of the Timmins shows that the gold showings go down for at least thirty feet on those properties. Below the 100-foot level of the main shaft a winze is being sunk. It has been put down 30 feet and is still in excellent ore.

An English company represented here by the firm of Rose Van Cutsen & Company, has staked Pearl Lake near the Timmins holdings and Simpson Lake near the Foster. The intention is to prospect under them in a few days.

The demand for claims in the Porcupine area in Tisdale, Whitney, Shaw, the Reserve, and even in Carman and other townships, has never been so keen. Many important sales have been

made and many more are reported. Before the snow flew it was remarkable the number of gold showings discovered. But now the snow hides all the reports have increased tenfold.

There is still much discussion as to the route the electric road being built into Porcupine by the British Canadian Power Company will take. But the cutting of the right of way from Iroquois Falls to the Frederickhouse Lake has commenced and sixty teams have been purchased to commence grading.

The T. & H. B. Mining Company has purchased the six Foster-Ellis claims in Porcupine in Shaw Township, it is reported, for $30,000. The T. & H. B., in addition to the main mine at Cobalt, have properties at Hangingstone and Porcupine now.

Many Porcupine companies are being incorporated. Some of them are: Ontario Northern Mines, Sault Ste. Marie, $100,000; Porcupine Three Nations Gold Mining Company, Ottawa, capital $1,500,000; King Porcupine Mines, Toronto, $500,000; Pearl Lake Gold Mines, Toronto, $2,500,000.

The Porcupine Gold Mines has acquired the McDonald claims and will develop them in connection with the Vipond holdings.

The Porcupine Power Company, in which the Timmins syndicate is largely interested, states that it will be able to deliver power by June 15 next year. Contracts have been let for the plant to be installed at Sandy Falls, on the Mattagami. Two units will be installed, which will furnish about three thousand horse-power.

South Lorrain.—After a summer of reticence from the Wettlaufer mine, being worked by the Lewisohn interests, it is now learned that developments have been most satisfactory. Below the 250-foot level in a winze now sunk 30 feet, a vein of bonanza ore shows from a foot to a foot and a half wide. For a week the mine was producing 30,000 ounces per day. The Wettlaufer has been shipping much ore recently, but here again official reticence steps in the way of definite statements.

Owing to a disagreement among the directors of the company, the Haileybury Frontier mine has shut down. The Frontier will probably start up again as soon as power arrives, as it is one of the best prospects in South Lorrain.

Elk Lake.—The Lucky Godfrey and Mackenzie Syndicate has shut down, and the chief operating companies are now the Devlin and the Moosehorn. The latter has made a small trial shipment of ore. Some good finds are reported in Willett Township.

It is reported that the Otisse, Currie, and the Gavin Hamilton will pay their creditors. The good news from Porcupine has drained off many men from the Elk Lake and Gowganda fields.

Gowganda.—The principal news from Gowganda is in regard to the favourable developments at the Gates or Miller Lake-O'Brien. There is a high grade vein six inches wide at the 150-foot level of this property, and it will probably be a shipper this winter.

BRITISH COLUMBIA.

Nearly all the Geological Survey officials who have been working in the West this year have left to report to the director at Ottawa. Much useful work has been accomplished, both topographical and geological, and British Columbia in particular will derive benefit from the various investigations of topographers and geologists. The publication of the several reports and maps will be awaited with much interest.

Cariboo.—The Quesnelle Hydraulic Gold Mining Company is making good progress towards the completion of its works to bring in water from Swift River for hydraulicking purposes on its placer mining leases near Quesnel River, about 20 miles below Bullion. Of the 17½ miles of ditch, flume and pipe line, from the intake on Swift River to the pooling lake four or five miles above the ground to be hydraulicked, about 13 miles have been completed, and it is expected the remaining four to five miles will be finished in time for gravel-washing to be commenced next summer.

Slocan.—The agitation carried on for some time, with the object of inducing the Great Northern Railway Company to rebuild the destroyed parts of the Kaslo & Slocan Railway, which formerly connected Kaslo, on Kootenay Lake, with the town of Sandon, in the heart of the Slocan country, a distance of nearly 31 miles, has been resultless thus far. Strong representations have been made to both the railway company direct and the Provincial Government, and there have been communications passing between the Government and the railway company. It is too late now for anything to be expected this winter, but it is earnestly hoped the requisite work will be done next spring, at any rate as far as McGuigan, so that mines between Kaslo and the summit of the divide at Bear Lake may again be provided with railway transportation facilities to Kootenay Lake at Kaslo. Meanwhile horses and heavy sleighs have been procured by the Rambler-Cariboo Mines, Limited, for hauling ore over the newly-constructed wagon road from McGuigan to Three Forks, the latter being a station on the Canadian Pacific Railway Company's line from Sandon to Nakusp, on Arrow Lake. Much ore has been made accessible for shipment by the opening of new levels and the extension of old ones in the Rambler-Cariboo mine, so that production will be on a larger scale than for several years. Work is also being continued in the Washington mine, situated within a mile of the Rambler-Cariboo.

Around Sandon, the Richmond-Eureka and Ruth-Hope groups are the chief producers of ore this year, the Slocan Star not having shipped much of late. At Cody, the raise from the deep-level workings of the Surprise is still being made, and about half the distance to the old workings, 800 feet above, has been passed. Development of the Noble Five group is still in progress, and a report is current that a vein of ore several feet in width has been encountered.

The smaller mines about Sandon and New Denver, respectively, are nearly all closed for the winter, communication being difficult when the snow becomes deep. The Mollie Hughes is an exception, for it is only a little above Slocan Lake level, so can be kept open and worked with comparatively little trouble. In Four-Mile Creek camp, near Silverton, operations are being continued on three properties, namely, the Standard, Hewitt, and Van Roi. The last mentioned mine is not now taking out ore, for the term of the company's lease of the Wakefield concentrator has expired and construction of its own mill is not yet completed. However, the development of the mine is being carried on, so as to have plenty of ore available after completion of the new concentrator. The Wakefield mill is controlled by men largely interested in the Silverton Mines, Limited, which company is operating the Hewitt mine. During recent months ore has been shipped from the Hewitt to the Consolidated Company's smeltery at Trail, but not in considerable quantity, although there are large quantities of ore blocked out. The intention is to put much of the ore through the Wakefield concentrating plant and ship the resulting concentrates, which will be both silver-lead and silver-zinc. An interesting feature in the Hewitt mine is the occurrence of much ruby silver in the ore, the value of which is considerably increased by the presence of this rich mineral.

Lower down Slocan Lake there are only two mines attracting attention at present, those being the Eastmont group, owned by the Ellis Silver Mining Company, of Toronto, and Enterprise, which has been leased by Mr. S. S. Fowler, M.E., from the British company that owns it. Both these mines are in the vicinity of Ten-Mile Creek.

Nelson—A consolidation of a number of mining properties situated on Toad Mountain, near Nelson, has been effected, and a sale of them made to a strong syndicate. Several weeks ago, Mr. R. S. Lennie, for years a prominent citizen of Nelson, but now resident in Vancouver, was quoted by the Nelson Daily News as follows: "It is an absolute purchase which will positively be carried out, and the payment of the remaining 40 per cent. of the total price is guaranteed. The people I represent will absolutely own the properties. Work will be commenced just as soon as our engineers have completed their examinations,

and a method of treating the ore of the respective properties mine. thoroughly determined."

Other mines in the neighbourhood of Nelson worthy of mention are the Athabasca, Granite-Poorman, Eureka, and Ferrier group. The last of these is a property not yet much developed, having ore of high grade, and on which a small compressor has lately been placed.

Ymir and Sheep Creek.—These two camps, both in Nelson mining division, are more active now than for years, and both are adding substantially to the mineral production of the district, with much promise of their output being steadily enlarged. The shipping mines of Ymir camp are at present the Yankee Girl and Wilcox; among others that are being worked, though not shipping ore, is the Dundee, on which it is intended to install a compressor.

The Emerald, near Salmo, has sent about 1,700 tons of lead ore to Trail this year; it is the only mine in the southern part of Nelson division shipping lead ore. Below Salmo, in Erie camp, there are several properties, including the Second Relief, Arlington, and others that, unlike these two, have not made a continuous output of ore.

Sheep Creek camp is coming into more prominence as development work is proceeded with, but production is not general, the Queen and Nugget being the two chief shippers. The final payment on the purchase price of the Queen mine, which was $175,000, was made early in November, the amount paid then having been $71,428. The Queen-Yellowstone group and 20-stamp mill thereupon passed to the possession, absolutely, of the Wisconsin company, which has for more than two years been working the property. The Nelson Daily News quoted the president of the company as having said, in part: "The policy of the company will be to push development at an accelerated rate, not only in connection with the Queen vein proper, but on the numerous promising prospects which are included in our property. In past years shipments of ore have been made from the Alexandra, Hideaway, and Yellowstone veins. Our compressed air system will be at once enlarged, so that with air from our two compressors we may be able to operate hoist, pump and ten machine drills. It is well known that about 60 per cent. of the ore from the Queen mine is free-milling, that percentage of gold being caught on the plates and, except for the small quantity lost in the tailing, the remainder is recovered by the smeltery. If an addition to the stamp mill shall later be required, or a new mill of larger capacity become necessary, it will doubtless be provided. The provision of a cyanide plant to recover the gold from the tailing, will probably be made in the future."

It has been announced that the owners of the **Mother Lode**, which has been developed extensively during the last two years, are arranging to erect and equip a stamp-mill for this property, reports concerning which have been decidedly favourable. The provision of this treatment plant is expected to result in a substantial increase being made to the output of gold from this camp.

Rossland.—There is little to note of this camp, in which production of ore is being well maintained, and progress is being made. The total output of ore for the year to the middle of November was about 220,000 tons, of which approximately 165,000 tons came from the Consolidated Mining and Smelting Company's Centre Star group of mines, and 40,000 tons from the mines of Le Roi No. 2, Limited. Most of the remainder came from Le Roi, the production of several other mines having been small. Le Roi No. 2, Limited, paid another dividend on November 8th, amounting to about $60,000. Total paid to date is $1,065,000.

Boundary.—The aggregate output of Boundary district mines in 1910 will probably have reached 1,500,000 tons by the end of November. Fully two-thirds of this large quantity will have come from the Granby Company's mines, while nearly 370,000 tons will have been the share of the British Columbia Copper Company's several mines, and well on for 130,000 tons that of the Consolidated Mining and Smelting Company's Snowshoe

Similkameen.—The Hedley Gold Mining Company's Nickel Plate group is still the only ore-producing mine in this district. There are several other properties in Hedley camp that are regarded as promising to make profitable mines if money shall be available for their development, but at present this is lacking. The development of the coal resources of the district about Princeton and Granite Creek is being proceeded with. Mr. Arthur Hickling, managing director of the company owning the coal mine at Princeton, who lately came from England on one of his periodical visits to British Columbia, has been quoted as authority for the statement that his company has contracted to supply the Hedley Gold Mining Company with 10,000 tons of coal, and that next year the output from the Princeton colliery will be about 500 tons a day. Railway building in the upper part of the district, from the direction of Nicola Valley, is expected to considerably increase the importance of mining throughout that part. The coal mining industry in Nicola Valley is flourishing, with a steadily enlarging production.

Yale.—The new mining field, known as Steamboat Mountain, is not expected to make much progress until after the snow shall have melted next spring. Many mineral locations have been made, and several claims and groups of claims have been sold to men who can provide money to develop them. The occurrence of gold in quartz veins in the country lying between Hope, on the Fraser River, and the International Boundary line has been known for years, but its presence in the many porphyry dikes that exist was not recognized. Now, however, there is reason to think that some of these dikes will pay to work, and an effort will be made next year to prove whether or not they can be turned to profitable account. The quartz veins as yet discovered are not wide as a rule, though the ore contains good value in gold. There seems to be a reasonable prospect of the new field proving productive, but pending development of some of its properties this is necessarily as yet uncertain.

Coast.—There is nothing of especial importance to chronicle in connection with metalliferous mining in the Coast district. Work is being proceeded with at the Britannia mine, Howe Sound, and it is reported that late developments have been satisfactory. On Vancouver Island little, if any, mining is being done, so there is practically no ore production at present. The Tyee Copper Company's smeltery, however, is receiving supplies of ore from various sources, chiefly from southern Yukon and Alaska. In Portland Canal district, the most encouraging development is the continued successful operation of the Portland Canal Mining Company's concentrating plant, which is reported to be abundantly realizing expectations, in regard to suitability for recovering the valuable metals from the ore occurring in the company's mine. Some particulars of other properties in this camp, and in the neighbouring Observatory Inlet, are given in an article on mining in the Coast district sent by same mail.

A different account may be given of coal mining in the Coast district, to that above written relative to mining for metallic minerals. The Western Fuel Company, Canadian Collieries (Dunsmuir), Limited, and Pacific Coast Coal Mines, Limited, are all producing much coal. The first mentioned has had some temporary difficulty arising out of overheading in one part of its No. 1 mine, but this has been overcome and the miners are back again at work in the mine. The usefulness of the oxygen breathing apparatus provided here was demonstrated, for with it the underground troubles just mentioned were disposed of speedily and with much less loss in both time and money than would have been the case under old conditions, when without the advantage of the use of such appliances. The Pacific Coast Coal Company lately made its record daily production, that being an output of 1,000 tons of coal in one day, taken from its South Wellington mine, near Nanaimo. For a colliery that has been producing coal only about two years, this indicates creditable progress. This company is also developing another coalfield, situated at Suquash, in the northern part of Vancouver Island.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

London.—A recent careful estimate figured out that for the nine months ending on September 30th there was a decrease of $800,000 in the world's gold production from the same period in 1909. At the same time it was suggested that this might be made up by increased output at the Rand mines during the last three months of 1910. Returns at hand show that for October, at least, the Rand fulfilled expectations. Output of gold there was $1,078,000 heavier than a year ago, and was the largest on record. Compared with three years ago, the month's output showed an increase of $2,100,000.

London, November 18.—The presence of William D. Haywood, of Idaho, a member of the Western Federation of Miners, in the Welsh coal fields, where extra police and military have been required to check the rioting of strikers, is interesting the authorities who have to cope with the situation. Considerable tension still prevails among the miners. A number of continental labour leaders are in the district, but the authorities are acquainted with their methods of conducting strikes, a knowledge of which is lacking in the case of American labour chiefs.

Cardiff, Wales, November 22.—The disorders in connection with the strike of the Welsh collieries in the Rhonda Valley are becoming serious. The rioters have attacked the houses of the mine officials, held up and searched trains, storming the signal boxes and keeping the signalmen prisoners while this was going on, and have threatened other outrages. There was a fierce conflict last night between rioters and the police at Ton-Y-Pandy, which was not quelled until the troops were summoned. Several policemen were severely injured.

AUSTRALIA.

Sydney.—The October gold yield of New South Wales is 17,423 ounces, valued at £59,641. The yield for the last ten months is 190,837 ounces, valued at £675,944.

Perth.—The Western Australian Government has decided to construct forthwith a temporary water pipe line from Southern Cross to the Bullfinch mine, where the gold discoveries were made recently. This line will provide an ample supply of water for domestic purposes. The Government has also decided to introduce a bill for the immediate construction of a railway to the Bullfinch centre via the Corinthian mine. Arrangements for the work are already being made by the department concerned.

CHINA.

The Pekin Syndicate announces that the output and sales of coal for the month ended 31st October, 1910, were as follows: Output, 33,400 tons; sales, 38,500 tons; boiler consumption, 3,250 tons.

UNITED STATES.

Cripple Creek, Colo., November 18.—Pouring out of the Roosevelt deep drainage tunnel at Cripple Creek is a flow of water estimated at about 2,000 gallons a minute. It is from the well of the El Paso shaft. The tremendous flow started at 3.45 o'clock yesterday morning and was followed by shrieking of whistles, blasts of dynamite and general jollification at the portal. Yesterday marked the real beginning of the draining of the deep levels of the Cripple Creek district and the recovering of $100,000,000 to $300,000,000 worth of ore. The water in the El Paso shaft has fallen about 75 feet from the old tunnel level. Of this distance, 50 feet was lowered yesterday morning and the drop is easily perceptible. There is little water now coming from the old tunnel. All work in the heading is being carried on through the intermediate shaft. At the portal of the tunnel the water is going out knee deep. At least 2,000 gallons a minute is pouring forth.

Houghton, Mich.—Edwin J. Hulburt, discoverer of the Calumet and Hecla mine, one of the most prolific copper producers in the world, is dead in Rome, Italy, according to advices received here. Mr. Hulburt was 81 years old.

Joplin, Mo.—Twenty-one camps were represented in the zinc and lead turn-ins from the Joplin district recently. The area of production extended from Aurora, Mo., to Miami, Okla., from Alba and Neck City on the north to Peoria on the south. The production tells a story of general activity throughout the entire Joplin district. It shows that operations are in progress in camps that are not always active, and when these conditions prevail nothing could tell more forcefully the story of the present prosperous times.

New York City, November 19.—J. Parke Channing, vice-president of the Miami Copper Company and consulting engineer of the General Development Company, has returned from an inspection of the Miami property at Globe, Ariz. He reports that while work on the mill has been delayed, the plant probably will be placed in operation in January. The mill, which is constructed of iron, and has cement foundations, has a capacity of 2,000 tons daily capacity, and the foundations for the 3,000-ton unit already have been laid. It is expected to treat 750,000 tons a year.

MEXICO.

Guadalajara, Mex., November 15.—Some ore is being shipped from the old Mololoa mine in the Hostotipaquilla district, the property of the Mololoa Mining Company, of Toronto, Canada. Work was recently resumed under the direction of W. M. Matthews. The Mololoa, which is a famous antigua, has produced some very rich ore during the last ten years. A fault interfered with profitable development for a time, and the mine was purchased by the Toronto interests from Carlos Romero, of Etzatlan, for $30,000. The mine has been the property of the Toronto company for over three years. Two additional tube mills have been ordered for the new reduction plant of the El Favor Mining Company in the Hostotipaquillo district of this state. They will make a total of four. There are twenty stamps, and with four tube mills for regrinding, coarse crushing will be done, and it is expected to handle up to 120 tons of ore daily. Some improvements are being made in the cyanide annex, with a view to the highest possible efficiency. The plant will go into commission as soon as electric power reaches the Hostotipaquillo district. The big El Favor mine, which has been systematically developed for several years, is in shape to supply any tonnage that may be called for. All levels have been given connection with the main transportation tunnel, and in anticipation of early milling, heavier track is being laid there.*

* Editor's Note.—The Mololoa and the El Favor mines were developed by two Canadian engineers—Mr. F. G. Stevens and Mr. S. N. Graham. Both are now in Canada. Mr. Stevens is in Kingston, Ont., and Mr. Graham is manager of the pyrite mine of the Canadian Sulphur Ore Company, Queensboro, Ont.

Parral, Mex., November 14.—The sale of the Hidalgo properties to a syndicate headed by A. J. McQuatters, of Dallas, Texas, once more brings this city into the limelight of trade and development. The Hidalgo properties are in the immediate neighbourhood of Parral and up to the middle of last month were controlled by Pittsburg men, with James I. Long as general manager. The mines have always been large producers and were worked steadily until July, 1907, when the company decided to close them on account of the large number of estates pending settlement among these stockholders.

KERR LAKE DIVIDEND.

Kerr Lake has issued the statement that the fourth dividend of the year will be made on December 15 at the old rate of 5 per cent. regular and 5 per cent. bonus. They will thus have paid 40 per cent. in 1910, or $1,200,000. Altogether, at the end of the year they will have paid 91 per cent., or $2,730,000.

COMPANY NOTES.

CROW'S NEST PASS.

For the first nine months of the present year profits of the Crow's Nest Pass Coal Company show an excess of over $100,000 over the corresponding period of last year. For the whole of last year profits were $145,000, which would make the profits for the first nine months of last year—if in proportion—$108,000. At this rate the total amount for this year to date is almost double that of last year.

Wyandoh stockholders met on November 15th in Montreal and elected the following directors: Alexander Pringle, John P. Black, Shirley Ogilvie, Dr. Milton Hersey, A. Pierce, F. H. Ward and B. Neilly.

The financial report as read showed 500,000 shares left in the treasury, about $11,000 cash on hand, and a balance of about $18,000.

The property produced one car of ore, netting $11,683 during the year. Ore on hand is estimated at $820.

MCKINLEY-DARRAGH.

The announcement of a 12 per cent. bonus and 3 per cent. regular quarterly dividend on McKinley-Darragh was made on November 22nd.

STATISTICS AND RETURNS

DOMINION COAL SHIPMENTS.

For the present season the Dominion Coal Company has shipped 1,228,000 tons of coal up the St. Lawrence.

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending November 11th, and those from January 1st, 1910, to date:

	Nov. 11. Ore in lbs.	Since Jan. 1. Ore in lbs.
Beaver	.....	226,217
Buffalo	62,530	2,068,878
City of Cobalt	.....	548,875
Chambers-Ferland	64,000	1,591,300
Cobalt Central	.....	293,286
Cobalt Lake	.....	300,900
Cobalt Townsite	.....	601,120
Colonial	64,150	309,730
Coniagas	.....	1,816,436
Crown Reserve	.....	5,314,140
Drummond	440,000	1,504,200
Hargraves	.....	564,070
Hudson Bay	.....	481,215
Kerr Lake	.....	9,059,468
King Edward	.....	263,406
La Rose	87,130	9,342,971
McKinley-Darragh	.....	3,599,449
Nipissing	446,620	11,051,177
O'Brien	.....	1,115,250
Peterson Lake (Little Nip.)	.....	497,420
Provincial	.....	65,000
Right-of-Way	.....	1,545,187
Rochester	.....	60,750
Silver Cliff	.....	268,720
Standard Cobalt	.....	258,951
Temiskaming	.....	1,913,350
Tretheway	103,870	957,490
Waldman	.....	63,992
Wyandoh	.....	48,300

Ore shipments for the week ending November 11th were 1,268,300 pounds, or 634 tons.

Total shipments from January 1st to November 11th were 55,731,248 pounds, or 27,865 tons.

Following are the shipments from the Cobalt camp for the week ending November 18th, and those from January 1st, 1910, to date:

	Nov. 18. Ore in lbs.	Since Jan. 1. Ore in lbs.
Beaver	.....	226,217
Buffalo	55,510	2,124,388
City of Cobalt	60,000	608,875
Chambers-Ferland	.....	1,591,300
Cobalt Central	.....	293,286
Cobalt Lake	.....	300,900
Cobalt Townsite	64,000	665,120
Colonial	.....	309,730
Coniagas	63,800	1,880,236
Crown Reserve	146,700	5,460,840
Drummond	440,000	1,944,200
Hargraves	.....	564,070
Hudson Bay	.....	481,215
Kerr Lake	60,240	9,119,708
King Edward	.....	263,406
La Rose	260,870	9,603,841
McKinley-Darragh	169,060	3,768,509
Nipissing	252,620	11,303,797
O'Brien	64,110	1,179,360
Peterson Lake (Little Nip.)	.....	497,420
Provincial	.....	65,000
Right-of-Way	60,100	1,605,287
Rochester	.....	60,750
Silver Cliff	52,680	321,400
Standard Cobalt	.....	258,951
Temiskaming	.....	1,913,350
Trethewey	.....	957,490
Waldman	.....	63,992
Wyandoh	.....	48,300

Ore shipments for the week ending November 18th were 1,749,690 pounds, or 874 tons.

Total shipments from January 1st to November 18th were 57,480,938 pounds, or 28,740 tons.

In addition to the ore tonnage 106 bars of bullion were shipped from Cobalt last week, this being probably the record for any one week since bullion has been shipped from the camp: Buffalo mine, 9 bars, 12,912 ounces, value $5,750; Crown Reserve, 65 bars, 45,000 ounces, $24,268.67; O'Brien, 19 bars, 15,888 ounces, $10,230.55; Nova Scotia, 11 bars, 9,156 ounces, $5,579.96.

BRITISH COLUMBIA ORE SHIPMENTS.

The Aurora mine, at Moyie, made its initial shipment of the year the past week, to the Consolidated smelter at Trail, as disclosed by the returns.

The following are the returns of the ore production and movement for the week ending November 11th, and for the year to date:

Boundary Shipments.

	Week.	Year.
Granby	19,370	966,307
Mother Lode	7,160	306,139
Snowshoe	2,989	129,039
Jack Pot	350	13,251
Rawhide	3,200	19,100
No. 7	75	517
Other mines	.....	9,523
Total	33,144	1,443,876

Rossland Shipments.

Centre Star	3,739	166,566
Le Roi No. 2	597	27,453
Le Roi No. 2, milled	300	13,500
Le Roi	58	11,454
Nickle Plate	69	711
Other mines	.....	852
Total	4,763	220,536

Slocan-Kootenay Shipments.

St. Eugene, milled	2,775	124,875
Van Roi, milled	800	36,000
Queen, milled	420	18,900
Granite-Poorman, milled	250	11,250
Nugget, milled	110	4,950
Highland, milled	250	8,600
Wilcox	75	900
Richmond-Eureka	91	3,586
Standard	96	1,470
Emerald	21	1,661
Yankee Girl	192	4,663
Eastmont	30	649
Sullivan	428	18,373
Hope	28	205
Panama	37	55
Idaho-Alamo	32	103
Aurora	19	19
Other mines	.....	33,754
Total	5,654	270,013

The total shipments for the week, including the estimated milling, were 43,561 tons, and for the year to date, 1,934,425 tons.

British Columbia Copper Company's Receipts.
Greenwood, B.C.

Mother Lode	7,160	306,139
Jack Pot	350	13,251
Rawhide	3,200	19,100
Other mines	.....	9,339
Total	10,710	347,829

Granby Smelter Receipts.
Greenwood, B.C.

Granby	19,370	966,307
Other mines	.....	120
Total	19,370	966,427

Consolidated Company's Receipts.
Trail, B.C.

St. Eugene, concentrates	185	12,390
Le Roi No. 2, part concentrates.	597	27,453
Queen, concentrates	42	738
Centre Star	3,739	166,566
Le Roi	58	11,454
Snowshoe	2,989	129,039
Richmond-Eureka	91	3,586
Standard	96	1,470
Emerald	21	1,661
Yankee Girl	192	4,663
Eastmont	30	649
Sullivan	428	18,373
Hope	28	205
Nickle Plate	69	711
Panama	37	55
Idaho-Alamo	32	103
No. 7	54	496
Aurora	19	19
Other mines	.....	20,326
Total	8,707	399,957

The total receipts at the smelters, including concentrates, were, for the week, 38,787 tons, and for the year to date 1,714,213 tons.

BOUNTIES.

The following were the concerns participating in the bounties paid by the Dominion Government on iron and steel during the fiscal year ended March 31st last:

Algoma Steel Company	$ 318,814
Dominion Iron and Steel	1,029,503
Nova Scotia Steel	97,345
Hamilton Steel and Iron	238,408
Lake Superior Iron and Steel	54,628
Ontario Iron and Steel	4,463
Canada Iron Corporation	41,146
Atikokan Iron Company	15,099
Standard Chemical Company	10,120
Total bounties paid	$1,808,533

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

Miscellaneous—November 23, 1910.

	Bid.	Ask.
Amalgamated Asbestos	12	13
Black Lake	15	17
Dominion Coal	63	..
Dominion Steel	63	..
Dominion Steel Corporation	61¾	..
Granby	44	45
Consolidated Mining	40	50
Nova Scotia Steel	..	86¼
Crow's Nest	..	80

Cobalt Stocks—November 23, 1910.

Amalgamated	.01	.03
Bailey	.08⅛	.08¼
Beaver Consolidated	.26¾	.27
Buffalo	2.02	2.15
Chambers-Ferland	.16¾	.17½
City of Cobalt	.21	.22
Cobalt Central	.07¾	.08⅜
Cobalt Lake	.14⅜	.14½
Coniagas	4.70	4.90
Crown Reserve	2.74	2.76
Foster	.05	.08
Gifford	.04¼	.05
Great Northern	.08¾	.09
Green Meehan	.02½	.02¾
Hargraves	.31⅜	.32
Hudson Bay	97.00	110.00
John Black	.01	.04
Kerr Lake	7.45	7.55
La Rose	4.60	4.68
Little Nipissing	.20⅝	.20⅞
McKinley	1.30	1.31
Nancy Helen	.03	.05
Nipissing	10.95	11.12½

Nova Scotia	.22	.24½
Ophir	.16	.25
Otisse	.02	.02¼
Peterson Lake	.19½	.19⅞
Right of Way	.26	.28
Rochester	.08⅜	.08½
Sivlre Leaf	.05¾	.06
Silver Bar	.02	.05
Silver Queen	.05	.05¾
Temiskaming	.86¾	.87¼
Trethewey	1.22	1.25
Watts	3 sellers	
Wettlaufer	.84	.89

New York Curb—November 23, 1910.

Boston Copper	17	19
British Columbia Copper	6⅜	6½
Butte Coalition	19½	20½
Canadian Mines	..	..
Chino Copper	24⅜	24½
Davis-Daly Copper	1½	1⅝
Ely Consolidated	.39	.41
Giroux Mining	7 7/16	7 9/16
Goldfield Consolidated	8	8⅛
Greene-Canadian	7⅜	7⅝
Harcuvar Copper	10	15
Inspiration Copper	9 11/16	9 13/16
Miami Copper	20	20¼
New Baltic Copper	7	8
Nevada Con. Copper	20¼	20⅝
Ohio Copper	1½	1⅝
Rawhide Coalition	.03	.03½
Ray Central	2 7/16	2½
Ray Consolidated	20½	20¾
Union Mines	13/16	⅞
Yukon Gold	3 9/16	3⅝

SILVER PRICES.

	New York. cents.	London. pence.
November 8	Holiday.	25⅞
" 9	55⅞	25 13/16
" 10	55⅞	25 13/16
" 11	55¾	25 13/16
" 12	56	25⅞
" 14	55⅞	25 13/16
" 15	56	25⅞
" 16	55⅞	25 13/16
" 17	55½	25⅝
" 18	55⅜	25 9/16
" 19	55½	25⅝
" 21	55¼	25½
" 22	55⅜	25 9/16

TORONTO MARKETS.

November 23.—(Quotations from Canada Metal Co., Toronto).
Spelter, 5.25 cents per lb.
Lead, 3.70 per lb.
Antimony, 8 to 8½ cents per lb.
Tin, 39 cents per lb.
Copper, casting, 13.50 cents per lb.
Electrolytic ,13.50 cents per lb.
Ingot brass, 8 to 12½ cents per lb.

November 23.—Pig Iron (Quotations from Drummond, McCall Co., Toronto).
Summerlee No. 1, $23.00 (f.o.b. Toronto).
Summerlee No. 2, $22.50 (f.o.b. Toronto).
Midland No. 1, $20.50 (f.o.b. Toronto).
Hamilton No. 1, $20.00 (f.o.b. Hamilton).
Hamilton No. 2, $19.50 (f.o.b. Hamilton).
Clarence, $20.00 (f.o.b. Toronto).
Cleveland, $20.00 (f.o.b. Toronto).
Coal, anthracite, $5.50 to $6.75.
Coal, bituminous, $3.50 to $4.50 for 1¼-inch lump.

Coke.

November 21.—Connellsville Coke (f.o.b. ovens).
Furnace coke, prompt, $1.40 to $1.50 per ton.
Foundry coke, prompt, $2.00 to $2.15 per ton.

November 21.—Tin (Straits), 36.95 cents.
Copper, Prime Lake, 13.00 cents.
Electrolytic Copper, 12.90 cents.
Copper Wire, 14.25 cents.
Lead, 4.50 cents.
Spelter, 6.00 cents.
Sheet zinc (f.o.b. smelter), 7.75 cents.
Antimony, Cookson's, 7.87½ cents.
Aluminium, 22.75 to 23.00 cents.
Nickel, 40.00 to 45.00 cents.
Platinum, ordinary, $39.50 per ounce.
Platinum, hard, $41.50 per ounce.
Bismuth, $1.95 per lb.
Quicksilver, $43.50 per 75-lb. flask.

TEMISKAMING AND HUDSON BAY.

The directors of the Temiskaming & Hudson Bay Mining Company, of Cobalt, have declared another dividend of 300 per cent. on the capital stock to be paid on Saturday, November 12, 1910.

This is the 28th dividend declared by this company, and the seventh this year as follows:—

	P.C.	
January 11	300	$23,263
February 17	300	23,263
April 12	300	23,263
May 25	300	23,263
July 29	300	23,263
August 29	300	23,263
November 12	300	23,263
	2,100	$162,841

Thus making 2,100 per cent. paid this year, and a total of 17,200 per cent. since the company started paying dividends.

The capital stock of the company issued is $7,746, so that a 300 per cent. dividend means a distribution of $23,263 amongst the shareholders.

With its dividend just declared the company will have paid $1,319,335, or $172 on every $1 share.

TEMISKAMING STATEMENT.

The following financial statement, covering the operations of the Temiskaming Mine for the nine months ending October 31, 1910, will accompany the dividend cheques, which will be mailed to shareholders in the course of a day or two:

Assets.

Capital assets	$2,640,624.51
Cash in Union Bank	171,811.26
Ore at smelters	241,340.77
Ore on hand	56,049.00
Petty cash	18.23
Open accounts due company	6,956.00
Supplies on hand	8,901.44
Treasury stock	829.00
	$3,126,530.30

Liabilities.

Ottawa Bank	$ 3,707.40
Open accounts payable	18,544.87
Wages payable October	10,610.05
Capital stock	2,500,000.00
Revenue account (surplus):	
Balance brought down	14,303.68
Profit for nine months	579,364.30
	$3,126,530.30

For the last quarter the profits of the Temiskaming Company were $284,762.93, or at the rate of $94,920.98 per month.