

THE CANADIAN MINING JOURNAL

VOL. XXXIII.

TORONTO, October 1, 1912.

No. 19

The Canadian Mining Journal

With which is incorporated the
"CANADIAN MINING REVIEW"

Devoted to Mining, Metallurgy and Allied Industries in Canada.

Published fortnightly by the

MINES PUBLISHING CO., LIMITED

Head Office - Room 36, Canadian Birkbeck Building, 10 Adelaide Street East, Toronto.

Branch Office - - - - - 34B Board of Trade Building

London Office - - - - - Walter R. Skinner, 11-12 Clement's Lane London, E.C.

U. S. A. Office - Ward & Smith, 931 Tribune Building, New York

Editor

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

Contributing Editor

H. MORTIMER-LAMB

SUBSCRIPTIONS—Payable in advance, \$2.00 a year of 24 numbers, including postage in Canada. In all other countries, including postage, \$3.00 a year.

Advertising copy should reach the Toronto Office by the 8th, for issues of the 15th of each month, and by the 23rd for the issues of the first of the following month. If proof is required, the copy should be sent so that the accepted proof will reach the Toronto Office by the above dates.

CIRCULATION.

"Entered as second-class matter April 23rd, 1908, at the post office at Buffalo, N.Y., under the Act of Congress of March 3rd 1879."

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THE EIGHT-HOUR DAY.

The Ontario Government has instructed Mr. Samuel Price, Mining Commissioner, to enquire into the feasibility of establishing by special legislation an eight-hour day in the mines of this Province. To obtain information, Mr. Price is to hold meetings in practically all the mining camps of Ontario. At these meetings all citizens interested will be invited to express their views.

We have before us a copy of a letter sent to Mr. Price by the mine managers of Cobalt. The arguments adduced in this letter are worthy of note. They are all directed against the proposed innovation.

The first point made is to the effect that, at the present rates of wages for a ten-hour day, a reduction of 20 per cent. in the day's pay of all mine workers would result. At present, Cobalt miners are well paid, better, indeed, than in any other mining region of Canada. Unless, then, the rates per hour, which now range from 25 cents to 32½ cents, be correspondingly increased, the miners will lose from 50 cents to 65 cents per day. It would be manifestly unfair, however, for the men to demand the same remuneration for eight hours as they now receive for ten hours.

The second point borne upon by the operators touches the final cost of silver produced. The statement is made that, owing to the cost of prospecting and working unproductive claims, "the final cost of silver is generally above the market value." This is mentioned with a view to offset the fact that many of the mines pay handsome dividends. However, this particular argument is neither exact nor pertinent.

In the third place, the climatic conditions obtaining in Northern Ontario, the heavy marketing expenses incurred in selling silver, the high freight rates charged, and the effect of Mexican competition, are dwelt upon. The marketing cost, per ton of material shipped, is set at \$45. This, of course, is a very serious item. Yet the appositeness of these facts may be fairly questioned. It does not appear to us that they bear upon the problem.

The fourth point, however, is thoroughly germane to the matter in hand. The operators now pay the Supplementary Tax and royalties. They have willingly agreed to bear the cost of workmen's compensation. Cobalt has paid directly into the treasury of the Province, and to the local municipality, a total of \$4,328,000. In other words, the interests of the operators must not be overlooked. If the eight-hour day entails loss upon the mine owners, if the change brings a diminution of output, then the mine owners are amply justified in demanding full consideration of their rights.

The fifth clause of the mine managers' letter refers to the "disastrous effect of the Eight-hour Act in Brit-

ish Columbia." Here we are at a loss to know just what is meant. If the Cobalt managers attribute all the historic ills incident to mining in British Columbia to the Eight-hour Act, they are quite obviously mistaken.

With the sixth point, namely, that a ten-hour shift underground is not injurious to the miners' health, we are in perfect accord. Under normal conditions the miner's lot is not a hard one. He is well paid, well housed, and extremely well fed. His occupation is not as dangerous as is that of the railway employee, nor are his hours as long. The average loss of time through disability last year was 2.2 days per man. This includes accidents and maladies of all kinds, and, in many instances, the causes arose at the homes. "The disability directly chargeable to the mines themselves is . . . probably 1.65 days." We wonder if any other trade or occupation can make as good a showing as this. It proves, beyond a peradventure, that the general working conditions in Cobalt are excellent. The same may be postulated of Copper Cliff, of Porcupine, and of the numerous lesser camps of Ontario.

In the seventh place, the operators urge that where the eight-hour day has been established by law in the Western States, mining is conducted on a large scale, and, underground labour can be so organized as to suffer a minimum loss of time after shot-firing. The Cobalt mines, on the other hand, are too small to permit of the men remaining underground after shot-firing. The average time of actual drilling per shift of ten hours, is 6.45 hours. The remainder of the shift is taken up in getting to and from work, in setting up and taking down the machines, etc. The operators claim that an eight-hour day would reduce the actual drilling time to 4.45 hours, or by 31 per cent., and that, as an inevitable result, outputs and dividends would be similarly reduced.

* * * * *

Cobalt is Ontario's most important mining camp. The mine managers are men of reputation. It is not probable that a threatened loss of dividends would induce the managers to retain the ten-hour day if they knew that a shift of this length to be prejudiced to the health of their employees. And, if one fact stands out clearly, it is that Cobalt miners enjoy excellent health. It is also clear that, were serious loss suffered by the mining companies, the miners themselves would be the first and the greatest sufferers.

In principle, the eight-hour day is sound. It has been applied successfully in several countries. It has also been applied unsuccessfully. Special conditions limit its applicability. If it is demonstrated that the special conditions outlined by the mine managers are sufficient cause for the retention of the ten-hour day, the eight-hour day will be a mistake.

In Great Britain, the eight-hour day has been by no means an unmitigated success. Many colliery owners have lost heavily in the past year.

The lesson is that the most excellent piece of legislation may have the most poisonous sting in its tail.

THE DISTRICT OF PATRICIA.

By an Act of the Canadian Parliament, there was added to the Province of Ontario in 1912 a district larger than the British Isles. The district of Patricia is the name chosen for this region, which covers the enormous extent of 157,400 square miles. It is bounded northwest and west by Manitoba, south and southeast by the English and Albany Rivers, and east and north by James Bay and Hudson Bay. This provides Ontario with a stretch of 600 miles of seashore, extending northwest from Hannah Bay to the mouth of Black Duck River. In addition to this, a strip of land, five miles in width, is being selected now by Mr. J. B. Tyrrell, who acts on behalf of the Ontario Government. This strip will connect the district with the mouth of the Nelson River, and is to be within 50 miles of the coast. In all, 10 miles of water frontage have been secured along the south bank of the Nelson, thus providing amply for harbour facilities and railway terminals.

The Ontario Bureau of Mines has just issued as Part II. of its 1912 Report, a volume of over two hundred pages dealing with the District of Patricia. Dr. W. G. Miller, under whose direction the volume was compiled, contributes an instructive introduction in which are sketched the general character of the country, the geology, soil and climate, forests, fish and game, water powers, and harbours.

The new addition to Ontario's limits is, in Dr. Miller's words, "in general much like that of the older northern districts of the Provinces. . . . In elevation, the presence of numerous watercourses and lakes, character of rocks, and, over a part of the district, the nature of the vegetation, it differs but little from the older districts."

As to geological character, although little work has been done, Patricia is known to present features similar to the region known as Northern Ontario. "The greater part of the district," says Dr. Miller, "is underlain by rocks of pre-Cambrian age. . . . In so far as can be judged, . . . the district should contain important mineral deposits."

Although the agricultural possibilities of the new district may not be of immediate importance, yet it is worthy of note that much cultivatable land is known. At Trout Lake, the Severn River, for instance, "good crops of peas, potatoes, and other roots" are raised yearly. The Hudson Bay officer in charge of this post reports that there is rarely any danger of frost. To the west of the Severn, the country is thought to be even more fertile. On the southern boundary of the district, in the region surrounding Lake St. Joseph, heavy crops of hay are grown, and it is reported that pumpkins and muskmelons have frequently been ripened. Hence it is apparent that the climate is at least as temperate as that of old Northern Ontario.

The timber, both south and north, appears to be of small average growth. Much of the district, however,

is well covered. Banksian pine, poplar, birch, spruce, and white and red pine are abundant. White cedar, various kinds of maple, elm, balsam, tamarac, and ash have been observed. The greater proportion of these woods are probably of insufficient diameter for timber. The forests will, however, become large producers of pulpwood.

Fish and game are plentiful. Whitefish and sturgeon are found in most of the lakes. Dore and pike are also common; brook and lake trout less so. The moose is hunted only to the south, but the caribou ranges through the whole district. Fur-bearing animals are abundant, particularly the rabbit.

Water powers are numerous. According to Mr. W. McInnes, of the Geological Survey, they are for the most part situated far inland.

* * * * *

Even from these brief notes it will be seen that the District of Patricia holds promise of rich natural resources. It is important, of course, that Ontario should have access to tidewater on Hudson Bay. But it is satisfying to believe that the newly acquired territory will in itself amply repay the construction of railways and the establishment of other means of communication.

Dr. Miller's volume is most timely. It should be given a much wider distribution than is usual with other Government reports.

MINERAL WASTES.

The United States Bureau of Mines is making a determined effort to check the constant and costly waste of mineral substances. In a recent pamphlet there are many strong statements.

For all the coal mined in the United States, at least half as much is left in the mine in such condition that

it will be totally lost. The reckless waste of natural gas is another important item, as is also the fact that from 10 to 50 per cent. of many metalliferous and non-metalliferous minerals are wasted or lost.

Particular emphasis is laid upon the wasteful use of coal in all the industries, and the importance of utilizing water powers is accentuated. Dr. Parker's estimate of \$40,000,000 as the value of recoverable products wasted in making coke in beehive ovens, gives point to this phase.

Although the metallurgy of iron is much more highly developed than that of any other metal, yet there is much room for improvement even here. The losses in the smelting of zinc run to many thousands of tons daily. The loss of lead in mining is placed at 10 to 20 per cent.; in concentration, 15 per cent., and in smelting, 15 to 20 per cent. And so on, through a discouragingly long list of minerals, ores, and mineral products.

EDITORIAL NOTES.

Twenty to twenty-five mines have been opened in Cobalt during the past twelve months. Leasing is becoming a vital feature of the camp.

Not only are the Foster-Cobalt and other moribund mines being re-opened, but the Waldman, which was thought to have been dead and buried, is to be galvanized into life.

Mr. A. W. Scott, by his familiarly yept "Lucky," has returned from Baffin's Land to Sydney with spikneard and precious ointments and furs, but with no gold to speak of. Also, he effected a gallant rescue of Captain Munn, who otherwise would have remained in cold storage until the last trump.

PERSONAL AND GENERAL

Dr. J. MacIntosh Bell is in Toronto.

The American Mining Congress will hold its fifteenth annual convention during the week, November 25 to 30. Spokane, Washington, will be the place of meeting this year.

Mr. A. D. Miles has severed his connection with the Canadian Mining and Exploration Company and has accepted a post with the Canadian Copper Company. His headquarters will henceforth be at Copper Cliff and Sudbury.

Mr. B. Browitt has resigned from the position of mine manager for the Diamond Vale Collieries, Ltd., operating a coal mine in Nicola Valley district, B.C. He has since been fined for a breach of the law relating to the regulation of coal mining, the Chief Inspector of Mines having prosecuted him, under instructions from the Government.

Mr. A. J. Becker, superintendent for the Lucky Jim Zinc Mines, Ltd., has resumed shipment of zinc ore from the Lucky Jim mine, Slovan district, B.C., after

an interruption in output of two years, caused by the destruction by forest fire in July, 1910, of several miles of the Kaslo & Slovan railway, which damage was not repaired.

Mr. W. Blakemore, M.E., of Victoria, B.C., has been appointed by the Provincial Government a Commission to enquire into conditions existing in Doukhobor communities in British Columbia where, it is stated, the requirements of the laws of the country are not being observed by the Doukhobors.

Mr. J. W. Bryant returned to British Columbia a few weeks ago after having made but a brief stay in England. He has since paid a hurried visit to Alaska, and is expected to ere long again proceed to England on mining business.

Mr. Jas. Buchanan, superintendent of the big smelting works at Trail, B.C., owned and operated by the Consolidated Mining and Smelting Company, of Canada, Limited, has contributed a paper, on that company's copper smelting department, for reading and

discussion at the forthcoming semi-annual meeting of the Canadian Mining Institute to be held at Victoria, B.C., on 18th and 19th inst. Mr. W. L. Bell, superintendent of the British Columbia Copper Company's smeltery at Greenwood, Boundary district (is also a contributor, his paper similarly giving interesting information, relative to the works of which he is in charge.

Mr. E. E. Chipman, gold commissioner for Ainsworth and Slocan, British Columbia, is spending a three months' holiday in Eastern Canada.

Mr. C. H. Clapp, of the Geological Survey of Canada, has been investigating the geology of Graham Island of the Queen Charlotte group, British Columbia, on which island prospecting for coal and oil is in progress.

Mr. J. H. Cunningham, for about two years resident engineer at the Extension colliery of the Canadian Collieries (Dunsmuir), Limited, has succeeded Mr. Thomas Russell as superintendent of that colliery. Mr. Cunningham graduated from Acadia College, Nova Scotia, in 1904; spent several years in Great Britain studying colliery methods; returned to Canada and was for a time connected with the management of coal mines in Alberta and Saskatchewan, respectively, and went thence to Vancouver Island, B.C., in 1910. Mr. Russell was the recipient of a handsome presentation gift on his retirement from charge of Extension colliery, as also was he some years ago when he resigned the management of the collieries at and near Nanaimo now operated by the Western Fuel Company.

Mr. A. W. Davis, one of the mining engineers on the staff of the Consolidated Mining and Smelting Company of Canada, Limited, has returned to headquarters at Trail, after having spent some time examining mining properties in the Skeena and other districts now being opened by railway and road communication in parts of the province that have not had much development work done in them in past years.

Mr. Geo. Watkin Evans, of Seattle, Washington, formerly on the Geological Survey staff in Washington State, and latterly engaged in investigating the coal resources of certain properties in the Upper Skeena country, British Columbia, has been chosen as one of a large party by Dr. Joseph A. Holmes, director of the United States Bureau of Mines, is taking to Alaska, to examine one of the coal fields in that part of United States territory.

Mr. W. E. Finch, who has had many years' experience in mining in the Coeur d'Aleno district, Idaho, and other parts of the United States, is now engaged in developing several mining properties in the Slocan district of British Columbia, to which he and his associate capitalists are now giving their attention.

Mr. James Gray, who after having been manager of the Nicola Valley Coal and Coke Company's Middlesboro colliery, and later of mines of the Union colliery, Vancouver Island, British Columbia, went to Australia, has been appointed manager of the North Bulli colliery, situated 38 miles south of Sydney, New South Wales, where the output has been about 1,400 tons of coal a day, with preparations being made for an increase to 2,000 tons daily.

Mr. W. H. Trewartha-James, who toward the end of last year resigned as general manager of the Tye Copper Company, Limited, Victoria, and went to England, at the end of July, left the latter country on a professional trip to Nigeria, Africa.

Messrs. R. G. Edwards Leckie, John E. Leckie, and Guy H. Kirkpatrick, returned to Vancouver last month from a trip to mining properties in Portland Canal district, British Columbia.

Col. N. E. Linsley, of Spokane, Washington, has been examining mineral claims in Similkameen district of British Columbia, which an enterprising publicity agency of that city alleges were lately discovered by Spokane men.

Mr. Lockhart, who came from Pittsburgh, Pennsylvania, has succeeded Mr. John Gibson, Jr., as superintendent of the Union colliery of the Canadian Collieries (Dunsmuir) Limited, which colliery is situated in Comox district of Vancouver Island, B.C.

Mr. R. G. McConnell, of the Geological Survey of Canada, recently proceeded to Texada Island, B.C., to continue geological work he did there some time ago.

Mr. J. H. McMillan, at one time mine manager at the Royal colliery, near Lethbridge, Alberta, and afterward employed in one of the coal mines in Nicola Valley, B.C., is now manager of Nos. 5 and 6 mines of the Union Colliery, Cumberland, B.C.

Mr. Richard Marsh, for years engaged in assaying and chemistry work in Rossland and other mining camps in British Columbia and Washington, is now actively connected with gold-silver mines in Republic camp, Washington, distant from Grand Forks, in Boundary district of British Columbia, about 35 miles.

Mr. Edward C. Musgrave, during whose superintendency of the Tye gold-copper mine, at Mt. Sicker, Vancouver Island, the Tye Copper Company made large profits, is spending a month or two visiting friends in Victoria, B.C., having come up from Mexico while mining is interrupted by fighting troubles in that country.

Mr. Thos. G. Proctor, of Victoria, for many years resident at Nelson, West Kootenay, B. C., is now managing director of the Lucky Jim Zinc Mines, Ltd., operating the Lucky Jim zinc mine in Slocan district.

Mr. M. E. Purcell, superintendent of the Centre Star-Le Roi group of mines in Rossland camp, is about again after having been in the local hospital for a week suffering with a bad knee.

Mr. John L. Retallack, mine manager, of Kaslo, B.C., has returned from a trip up the old Cariboo road. He and his associates are operating one of the Whitewater group of mines, and preparing to ship ore when railway transportation facilities shall again be available.

Mr. Wm. Fleet Robertson, provincial mineralogist, is expected to return to Victoria, B.C., toward the end of September, after having spent the summer in the Upper Skeena country making investigations in the Groundhog coal basin and other parts of the district.

Mr. Thos. R. Stockett, manager of the Western Fuel Company, of San Francisco, late in August entertained at Nanaimo the "Flying Legion," which included numerous prominent men from various parts of California, who were on a visit to Vancouver Island.

Prof. Francis A. Thomson, head of the mining engineering department of the Washington State College, Pullman, Washington, has been spending several weeks with his parents in Victoria, B.C.

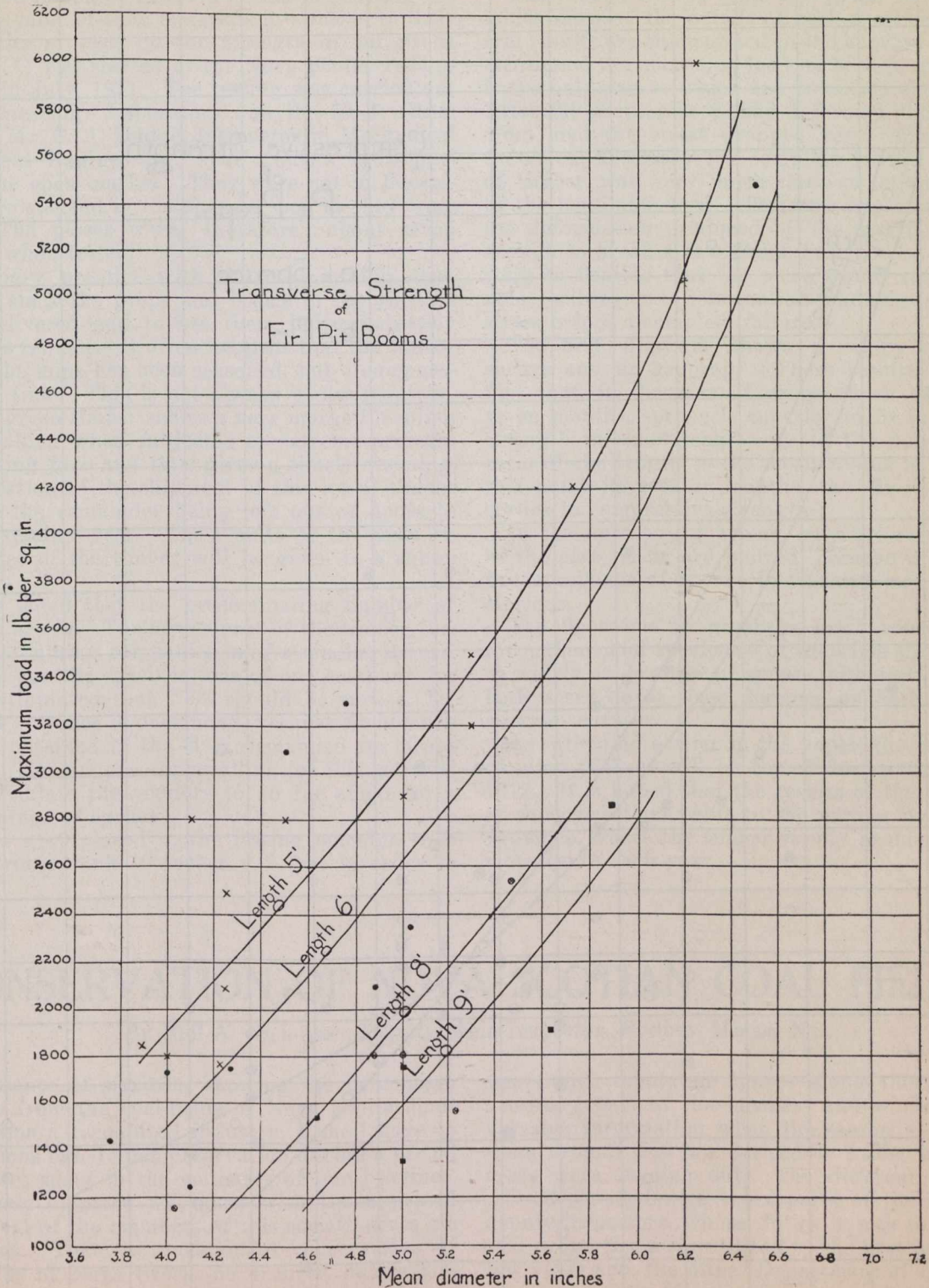
Mr. J. M. Turnbull, of Trail, B.C., mining engineer, on the engineering staff of the Consolidated Mining and Smelting Company of Canada, Limited, is one of the recently chosen fifteen members of the first Senate of the University of British Columbia, steps toward founding which, in the election of a Chancellor and Senate, were taken at Victoria on August 21. John Moncrieff Turnbull, B.A., Sc., graduated with first rank honours in Natural Science at McGill University, Montreal, in 1897. For several years he has been engaged in mining engineering for the Consolidated company, in which connection he is well known in British Columbia, particularly in West Kootenay District.

TESTS ON SOME SPECIES OF N.S. MINE TIMBER.

Written for the Canadian Mining Journal by F. H. Sexton and C. A. Hodge.

It is on extremely rare occasions that the mine manager or superintendent refers to an engineer's handbook to find out the strength of timber. Even when

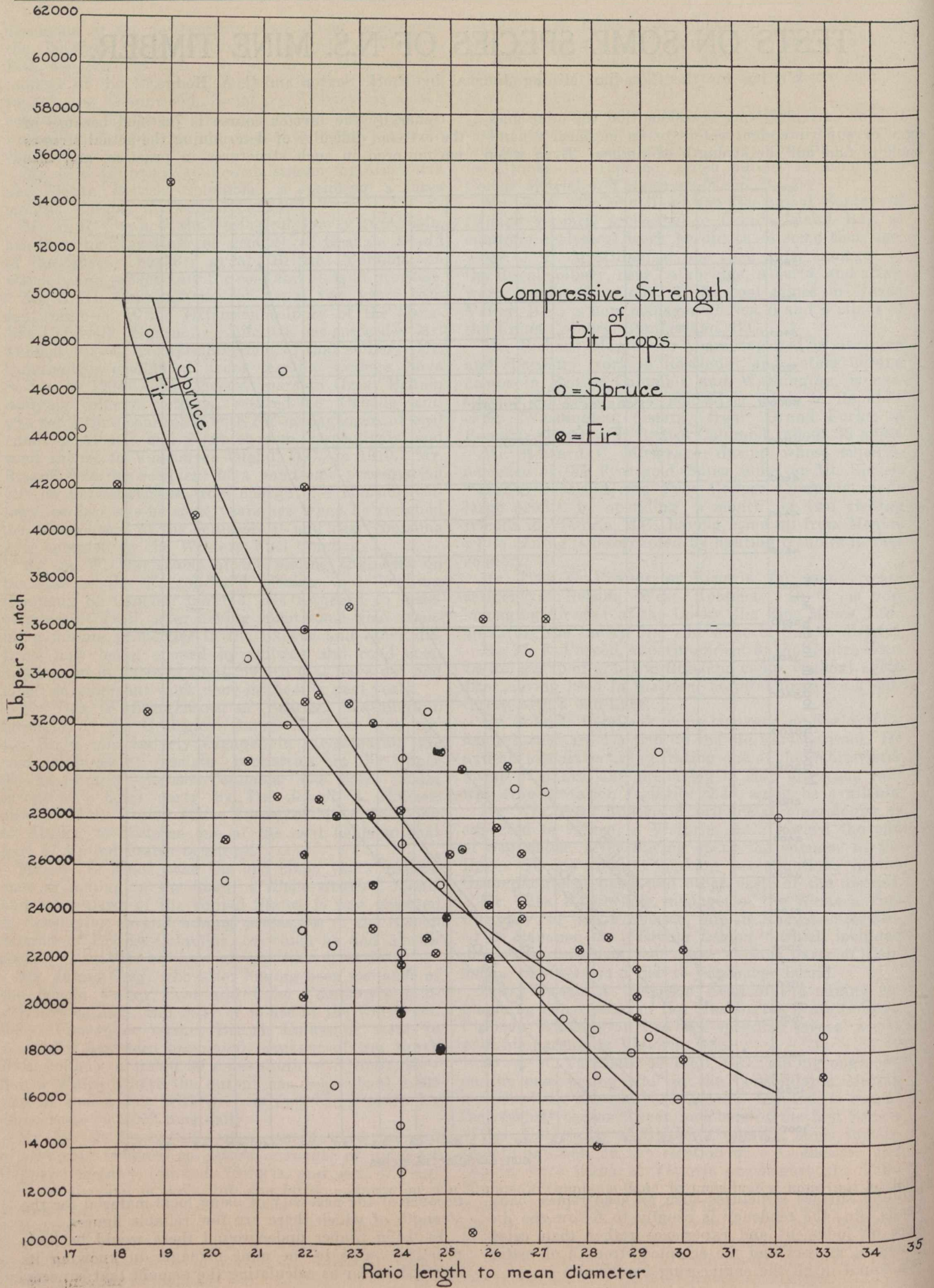
Generally the former course is justified because of the extreme difficulty of determining the actual stresses encountered in such structures in practice, and also



building surface structures such as headframes, bankheads, etc., the tendency is usually to follow the dictates of judgment and experience rather than calculations of stresses and the accepted strength of materials found in all the engineering handbooks.

because of the necessity of using local material for the strength of which there are few reliable figures.

In using timber underground there would be little practical value to the mine manager in knowing its strength as far as calculating the amount that is neces-



sary to keep any excavation supported. The great trouble in such a case is the uncertainty of the exact magnitude of the underground stresses to be resisted. Every miner knows that it takes a much smaller amount of timber to keep a roof from starting than to support it after it has begun to move.

There is a definite practical value, however, in a series of careful tests on mine timbers of the different kinds of wood available in Nova Scotia in showing the comparative value of such materials in relation to their cost. A series of tests on the strength of pit props and booms (*) was started at the Nova Scotia Technical College in July, 1911. The testing was carried out in the Engineering Laboratory on the 50 T. Olsen machine by Mr. C. A. Hodge, Instructor in Mechanical and Electrical Engineering. The timbers were purchased in the open market. They were cut in December and were stacked in the open as soon as they were received. The pieces were, therefore, about seven months old when tested.

The ordinary practice with the coal mining companies is to stack the props and booms in the yard as they are delivered and to use them indiscriminately as exigencies require. It often happens that the timber taken into the mine has been seasoned, but a comparatively short time. This is not always a disadvantage, because the green timber shows a very marked bending without breaking when subjected to extreme pressure at the working face and thus gives a timely warning.

Only a portion of the shipment of this lot of timber was tested; the remainder being left out of doors to season for another year. The results of the tests on the remainder of the timber will be given in a subsequent paper.

It will be noted that the predominating number of props tested are fir. The larger part of the timber furnished to the mining companies is of a similar nature. A few years ago the specifications of one company for pit timber stipulated that 75% should be spruce. Today only 25% spruce is demanded, because fir is much more easily obtained in the sizes demanded for props and booms. The low prices prevailing for this material does not stimulate the vendors to go far afield for a large percentage of spruce.

The props were placed in the testing machine with a cap of spruce plank 10 inches x 2 feet in order to

test it under as nearly the same conditions as they are used underground as possible. The props were also placed in the machine just as they were delivered from the vendor and no steps were taken to be sure that the ends had been sawed across perfectly parallel. It was thought best to put them into the machine and submit them to pressure under conditions as nearly as possible like those existing in a mine.

The results of the tests are given in the form of tables showing the details of each specimen. The general results are summarized in the curves. It should be mentioned the maximum load on both props and booms is the only one to which any attention should be paid. After the prop or boom had deformed under the maximum load the stress dropped very considerably and the stress necessary for complete failure of the piece of timber was very much less—sometimes only 1/10 of the maximum load. This was due to the fact that the deformation produced by the maximum load was enough to break a few fibres, but the rest of the fibres were so flexible that the piece would suffer considerable subsequent deformation under a smaller total stress before a complete failure.

The first diagram shows a comparison between spruce and fir as props. These results point to the fact that, in the case of props which have been cut seven months, spruce is superior to fir in compressive strength in short lengths up to the point where the ratio of the length to the mean radius is 25.5. Beyond this point in greater lengths, the fir is superior to spruce in compressive strength.

In the tests on pit booms, only the results obtained in the case of fir are plotted, because there were too few specimens of spruce to warrant any definite conclusions.

The fir seems to give the more consistent values throughout and specimens of the same size do not vary as widely as do those of spruce, although the values in both cases lie at some distance on both sides of the average curves.

As intimated earlier in the paper, the rest of the lot of mine timbers will be tested during the summer of 1912. It is hoped that the results of the series will be of some practical value to the mining industry of the Province, where the timber supply problem is growing more acute each year.

CONSERVATION OF NOVA SCOTIAN COAL FIELDS.

By Neil A. Nicholson, Deputy Mine Inspector, Sydney Mines, N.S.

In the absence of statistics showing the percentage of coal won from the coal-fields of Nova Scotia since mining became a recognized industry, I shall have to submit opinions based upon observation during a period of forty years spent in the collieries of our province. Whether these opinions will meet with the approval or disapproval of the members of this society gives me little concern. That the question of conservation of the coal-fields of Nova Scotia be brought before you is my chief object, for wrapped up in this question is that of the economic mining of coal on sane and safe methods.

Unfortunately no attempt was made in the early years of mining, in this province to collect information showing the amount of coal won and wasted. It did not then occur to mining men and mine depart-

ments that tabulated figures along this line were a necessary part of the business and would prove very valuable information when the season of stock-taking came around and we desired to know how our coal areas were turning out. The different governments seemed satisfied with the reports of the inspectors or deputy-inspectors, whose duties it was to see that the coal properties were utilized to the best advantage. A few years ago, the Mines Department at Halifax introduced a system of gathering such information, and it is now in a fair position to state how much coal is being extracted and how much is being left in the mine. The period of time over which this date extends is too limited to enable me to give any definite statement in the way of figures and I prefer on this occasion to use the knowledge I have gained during my experience of

*—"Prop" is the term generally used in the Nova Scotia Coal Mines to designate upright timber supports used either singly or in timber sets. "Boom" is used to designate timber supports placed horizontally either by itself with the ends resting in hitches or as the upper horizontal member of a timber set.

some years, both as a miner and inspector of mines, upon which to base my observations and conclusions.

There is no clamour in this province to conserve our coal areas; indeed, at present it is all the other way. The great desire of the people is toward the rapid development of these areas. At times criticism has been made of the extent of the coal properties held by the larger companies, and some seemingly good advice tendered by men wise in their way, who, in their zeal for the common good would multiply collieries until every coal seam was attacked, with the result that a few years would find us despoiled of the basic commodity of all our industries—left at the commercial mercy of an alien and competitive nation. To the warnings of these carping critics, the public has hitherto paid but little attention, as they somehow feel that in the hands of hard-headed Canadian men of business there is no danger, immediate or otherwise, of unnecessary waste of our coal. Nor is it in the best interests of either the public or the mining industry that coal seams beyond those necessary to supply the demand should be opened. For many years it was generally thought that the more collieries there were, the better it would be for the coal industry. The public still holds the same view; but while it may be to the advantage of consumers that coal be abundant and prices low, it works out very badly for the miner in the way of idle time because of over-stocked markets. A concrete illustration of this may be found in the mining conditions of the United States. The coal output of that country last year was 500,000,000 tons, yet the statement is made by American labour leaders that many of the collieries only worked one hundred and sixty-two days out of the year. In other words, the American collieries worked less than half time during the year, yet they supplied the full demand of the market. Look at this another way; if half the collieries were closed up and half of the miners put to some other kind of employment, the remaining collieries and miners working steadily would more than supply the demand for coal. Surely the opening up of unnecessary coal seams, the equipment of collieries and the manning of them with labour is a useless waste of money and men, and has its inevitable result in labour unrest. All ill-balanced industrial conditions seriously affect the peace of a nation. The great danger to the public interest lies in listening to the utterance of untrained, unpractical enthusiasts upon whose vision has suddenly dawned the importance of any industry of which they conceive themselves to be the guiding spirits or the guardians. Such men are more ideal than real, and fail to see that technical skill combined with sound judgment and good practical business methods are incomparably superior to all fine theories in achieving results in any field of labour, especially the coal field. Nova Scotia is not without her quota of these visionaries.

Conservation, as I understand it, is the right use of any commodity for present need, or as another writer has put it, "conservation of any commodity or power is a maximum efficiency with a minimum waste." It conserves what it does not need now for another day; it has thought of the morrow, while to-day it uses to the full for its own necessity. How far the principles of conservation were applied in the early mining days cannot now be fully ascertained. That they are at present being applied with all the aid of well-directed scientific knowledge, there can be but little question. The large coal companies of this province and the government in their desire to intelligently deal with the problems of the coal industry, have diligently sought and

obtained expert advice from the foremost mining engineers of Britain. They recognize the necessity of having trained and practical men with large experience give their opinion on our coal-basins and the strata in which our coal is imbedded. The single purpose for such outside aid is the strong desire to make the most of the mineral wealth of our province for the good of all interested. But before dealing with the work of our large coal companies and their methods of mining, it might be to the benefit of all were we to look for a moment at the causes which brought large coal companies into existence in the country of our neighbour across the border.

The evolutionary period of the coal industry of the United States forms an interesting chapter in the industrial history of that country and is well worth consulting. The baneful waste of coal and the destruction of valuable coal beds, early attracted the attention of American mining engineers and compelled them to study the causes leading up to such waste. Through the writings of these men, a special commission was appointed by the government to investigate the conditions of mining and the amount of coal won and wasted in the American coal-fields. The report of the commission showed that for every ton of anthracite coal shipped, 1.5 ton was wasted, and while the loss in bituminous mining was not so great, yet large waste was found to exist. Several causes led up to this reckless depletion. Principal among these causes were the short-term leases, payment of royalty only on coal shipped and on the larger sizes of coal. It was found that under the short-term leases, the efforts of the lessee were directed to getting to market as much coal as possible of the most saleable sizes within the given time of his lease. It mattered little to him how much coal was wasted so long as he made profits. The system under which he worked became known as the "hogging" system, and it was found ultimately to work against his own best interests and that of the owner and the public. The recommendation of the Commission led to the formation of strong companies that bought up large coal-fields, in the operation of which sixty per cent. of all anthracite coal was obtained. The bituminous coal-fields showed even better results.

The Province of Nova Scotia has been fortunate in that its coal-fields have been held by the province for the people. No wholesale plundering can occur where there is proper government supervision and where mining legislation gives stability and confidence to investors of capital. Under the twenty-years' lease with the right to renew, there is little incentive to fevered haste to rob and ruin valuable coal-seams, and more care is exercised in gaining a thorough knowledge of the condition of coal in its occurrence, before the method best adapted to its extraction is determined. The extension of the leases for a further period contains the very essence of conservation, in that it gives still greater confidence to capital and permits of larger companies which can lay out their plans on a scale calculated to obtain the best results. But before these large companies were formed, many costly mistakes were made by the early mining companies. Some of these companies were of very limited capital, and quick returns had to be extracted from coal mining. For this purpose pillars that should have been left to support the surface and underground workings were drawn, with the result that every drop of rain that has fallen during the last thirty years over the areas of these districts had added to the cost of mining coal. Mistakes of this nature, however, do not lead to waste of coal; they

have the opposite effect and eventually react on the operators themselves in the way of increased cost of production. But it is not good mining and shows a lack of sound judgment on the part of mining men who permit the drawing of pillars that should be left standing. Added to these mistakes were the early accidents that occurred, such as explosions and mine fires, causing the abandonment of sections of the mine and, in more than one case, of the whole mine. With the result of these mistakes and accidents the present companies have to contend; and, added to the difficulties of mining which Nature has thrown in, they form very serious problems indeed.

The coal-fields of Nova Scotia contain many beds of good quality, ranging from one to forty feet in thickness. Mining is yet only in its infancy and hundreds of millions of tons of coal lie awaiting the pick of the miner. Many of the coal-beds are easy of access, and with proper care and skill ought to be economically and profitably mined. Other beds are beset with many difficulties and present many serious problems. These problems vary with the coal-fields and are becoming more complex with the age of the industry. Much of the coal lies at a very heavy spool angle and dips deep into the bowels of the earth; in fact, the deepest coal mine on the American continent is to be found in the Pietou coal-field. Other beds lie under the Atlantic Ocean, in which case the thickness and nature of the intervening strata between the coal and the ocean-bed means much. This is amply illustrated in the recent accident to the Port Hood and Mabou mines. Other beds again are contorted and very irregular in their formation, while some are thick—too thick—and some very thin. Even our most extensive coal areas which lie at easy angles and are of medium thickness and of splendid quality are nearly all found dipping under the sea, and the great bulk of coal mined from these in the Island of Cape Breton will at no distant day be drawn from under the bed of the ocean. Upon the method of working these beds depends largely the amount of coal taken out. It is known to you that the best results are obtained from beds ranging from four to eight or nine feet in thickness. Beds less than four feet thick are costly to mine and do not yield good results in the way of profit, as they come into competition in the market with coal from thicker beds. The government has not lost sight of these beds, however, and care is being exercised in the working of the larger to preserve the thinner ones, which at some time in the future will be of greater commercial value. Two of the largest producing companies are mining coal in their thick and thin beds and in this way are gaining experience which will be useful when a general attack is made on the smaller seams. But it is only the larger companies that in the present state of competition can experiment in this way, and while not wishing to be misunderstood in my attitude towards any coal company operating in the province, I am of the firm belief that it is in the best interests of the public that our largest coal-fields should be in the hands of strong financial concerns, interested and allied with other industries, such as railways, the manufacture of steel and iron products, shipping, etc. In such cases coal is made the basis of a profitable business and coal operators have other aims than the rapid spoliation and the depletion of coal beds. For these and other apparent reasons, a sane and safe policy will always be pursued by the different companies of our province.

In nearly all parts of the province, the initial work of mining requires a large expenditure of money if

results are to be obtained. Shafts have to be sunk and slopes driven to great depths. Costly machinery must be installed and surface buildings of many kinds constructed. Plans for opening up the mine must be made and the method of mining determined as soon as the underground conditions are known. This work can only be done by a competent and practical mining man, for mining is an expert question upon which competent men only can advise. The larger the expenditure, the greater the need there is for the best talent. Herein probably lies the greatest safeguard against ruinous mining methods and the surest road to the highest economy in mining, "with a maximum efficiency and a minimum waste." Large interests must be in the hands of large and capable men, and the concerns which are always ready to pay the highest prices for costly colliery equipment are equally ready and able to secure the services of the person best qualified to look after those interests.

Every mining man now knows that a certain amount of coal must be left in the mine to protect the workings. Some of this coal must necessarily be sacrificed, while a portion of it may be recovered in the last stages of mining. Given the true conditions of the coal bed, it is simply a matter of calculation as to the amount to be taken out and to be left, and it is one of the best evidences of engineering skill when this coal that must be sacrificed is determined and deliberately set apart for that purpose at the time when the colliery is opened or very soon after. When a large territory is to be worked, a much larger percentage of coal can be won, if the conditions in which the coal occurs are carefully studied and a general system of working decided upon and carried out from the beginning.

This is generally understood and observed in the mining practice of our province and no departure from the method once adopted is permitted, except in cases where a reasonable cause is given or by way of experiment, in which case the change of method is limited to a certain section or part of a section of the mine. In most of the collieries now working, large sections of coal have been taken out with but very little loss. This is due to following out the method once adopted, with military precision, as no deviation other than for the causes mentioned are permitted, and it is no uncommon thing among miners to hear them state that the section of the mine in which they worked was swept as clean as with a broom. This is a commonplace mining expression and applies to the successful extraction of pillars. It is uttered with more or less pride, both by the miner who digs the coal and the official whose duty it is to see that all coal that can be reached with safety is mined and sent out. The mine may be left empty, full of nothing but fallen rock and debris, but this in its essence is, we should say, true conservation of coal. But the greater the quantity of coal taken out of a given area, the longer the supply will last.

Just a word in closing in reference to the character and ability of the men in whose care are our collieries, the great majority of whom are native-born. With an intelligence and application worthy of a province that has sent men of education and genius into all parts of the world, they have applied themselves to the mining problems of their own coal-fields with a degree of success unequalled and unattained by others working under more favourable conditions. Mining men of skill have been brought in from other countries to add their quota of experience, but all without exception have been outspoken in their praise of the Nova Scotian mine official. These men have come and gone, and have ad-

mitted that from the men engaged in the Nova Scotian mining industry they learned more than they, in turn, were able to impart. This is a tribute of no mean worth and one which enables us to see ourselves as others see us. But we are not satisfied to rest on success attained, there is much to be done and more to be learned and he only is a true citizen who nobly stands by the men who go down deep into the bowels of the earth and with true courage risk all dangers to bring up the treasures of ages, long stored up for the use of mankind.

* * * *

Discussion.

C. Archibald.—The conservation of minerals is a most necessary subject for study; but so far, speaking of Cape Breton more particularly, with one or two exceptions, there has not been very much loss through bad mining. In the first place it is the object of the owner and operator to conserve the mines. It should be their object to have around them men with sufficient ability to look after that part of the work. If the mine is worked badly near the sea and proper precautions not taken to have sufficient timbers, or if the pillars are

taken away, the sea water gets in; and many mines are lost in that way. It is possible to get out about 70 or 75 per cent. at first, but anyone familiar with mines knows it is more than an ordinary average. It depends largely upon conditions. Some leave more pillars in, and others risk having falls.

Hon. R. Drummond.—I am sorry I had not seen the paper before. I take exception to certain things. The day of the one-man operator is gone. The time was when the one-man operator did very well, and Mr. Archibald retired with heavy profits. A great deal depends on conditions and a great deal on management. In Cape Breton they are not so unfortunate, but in Cumberland they lost millions of tons owing to mistakes in management. The contractors call on the manager for cheap coal, and in order to get it he draws the pillars; there is a crack, and all coal is lost for the time being, and we thought at one time it was lost for ever. The time is coming when only strong companies should operate. As a rule, with the exception, perhaps, of an isolated company, small collieries will fail.

A vote of thanks was presented to the writer of the paper.

OIL SHALES OF PICTOU COUNTY, N.S.

The oil shale industry of Scotland has attracted wide attention because of its considerable extent and also on account of the large dividends paid by most of the companies engaged in the business. In 1909, there were at least 10,000 workmen employed in the oil shale industry, to whom were paid nearly \$5,000,000 in wages. Four out of the five largest corporations engaged in this line of business paid dividends from 15 to 50 per cent. It is no wonder that the large deposits of oil shales in Nova Scotia and New Brunswick have excited a good deal of interest by people acquainted with the possibilities of this industry. The deposits in Nova Scotia which have been most frequently mentioned have been those of Pictou County, Antigonish County, Lake Ainslie, Cape Breton County, and near Cheverie, Hants County. The present paper deals with those of Pictou County.

Oil shales were first discovered in Nova Scotia in Pictou County in 1859. The discovery consisted of a seam of stellar or oil coal with bituminous coal and shale lying under the McGregor seam of coal in the Pictou basin. This bed containing the oil coal was five feet thick and made up as follows:—

Bituminous coal	1 ft. 4 in.
Stellar or oil coal	1 ft. 10 in.
Bituminous shale	1 ft. 10 in.

The oil coal when pure was called stellarite because of the fact that when a splinter piece was lighted with a match, it gave off scintillating flame and little star-like sparks.

Sir J. W. Dawson, in his "Acadian Geology," gives his opinion of this coal as follows:—

"The material known as stellar coal is, as I have maintained in previous publications, of the nature of an earthy bitumen, and, geologically, is to be regarded as an underclay or fossil soil, extremely rich in bituminous matter derived from decayed and comminuted vegetable substances. It is, in short, a fossil swamp muck or mud, which, as I have elsewhere pointed out,

is a character of the earthy bitumens and highly bituminous shales of the coal formation generally. Its value depends on the high percentage of illuminating gas and of mineral oil, which it yields on distillation, and it is likely on this account to form an important portion of the products of this coal area. According to the results of different trials it is stated to yield from 50 to 126 gallons of crude oil per ton, the larger amount being apparently the yield of the pure stellar coal."

Professor How of King's College analyzed this coal and gave the following results:—

	Pct.
Volatile matter	66.33
Fixed carbon	25.23
Ash	8.21
Moisture	0.23

This sample gave 126 gallons of crude oil per ton.

In the Geological Survey report for 1869, Sir W. E. Logan and Edward Hartley report that stellar coal occurs at several places in the Pictou coal field, notably at Marsh Brook, McLellan Brook and Coal Brook, near No. 3 slope.

The stellar coal was worked to some extent and sold principally to oil distillers for making petroleum and to gas works for enriching illuminating gas. The discovery and exploitation of oil resources in the United States shortly after 1860 made the working of the stellar coal and oil shales unprofitable, and the mining of the latter in Nova Scotia has been practically nil up to the present time.

The deposits of stellar coal and oil shales in Pictou County have been often examined by members of the Geological Survey, scientists and engineers. The results of numerous investigations and analyses have been published so that the nature of the oil coals and shales may be fairly ascertained.

Mr. E. Hartley of the Canadian Geological Survey reports of the oil coal found on Marsh Brook and McLellan Brook, is both of the shaly and the curly variety,

the latter kind appearing to be the better quality. The oil coal with a curly appearance resembles stellarite in appearance, but is much heavier and has a lighter brown color. It weathers a dark grey. Some large samples were taken from this locality by Sir W. E. Logan in 1868 and gave the following results on analysis:—

	Per Cent.
Volatile below 200 C. water and some oil..	0.67
Volatile at 200 C. (oil).....	14.73
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Total vol. matter	33.91
Fixed carbon	6.11
Ash (greyish-brown)	59.88
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	99.90
Coke	66.09
Sp. gr.	1.747

On close examination of these shales, Sir William Logan reports as follows:—

“This substance appears to be an argillaceous shale of a greyish black color, having a brownish streak; the bedding is not well marked except on surfaces of fracture, where the lamination can be traced by numerous small brilliant points, apparently bituminous, which are included between the laminae. A thin section of this oil shale under the microscope presents the appearance of a dark-brown or black-ground, nearly opaque, with numerous spots of yellow which are translucent; the black ground being the shale, and the yellow spots the included hydrocarbonaceous matter.”

The deposit of stellarite or stellar coal that was previously mentioned in this paper was worked to some extent by Mr. J. D. B. Fraser, and later passed with other holdings to the Acadia Coal Company. Mr. E. Hartley of the Geological Survey describes the three constituents of the bed containing the seam of stellarite as follows:—

“**Coal.**—The coal appears to be merely an ordinary fat coking coal, with an unusually small percentage of ash for this region, but the bench being thin, the value of the seam depends principally on the two lower divisions, stellarite and oil shale.

“**Stellarite.**—This peculiar substance was first known and worked at these mines by the former owner, the late Mr. J. D. B. Frazer, of Pictou. It appears to be an earthy bitumen, or to quote Dr. Dawson, a fossil swamp muck or mud, which has the character of the earthy bitumens and highly bituminous shales of the coal formation generally.

“**Bituminous Shale or Oil Shale.**—This is a rather heavy, brownish-black shale. The following remarks thereon include both this bench and the stellarite. The first series is taken from Mr. Hoyt’s report to the Acadia Coal Company for 1866, and the analyses under the head of No. 1 refer to the stellarite, while No. 2 refers to the oil shale.”

Analysis by Professor Wallace of Glasgow.

	No. 1.	No. 2.
Vol. matters	68.38	38.69
Fixed carbon	22.32	8.26
Ash	8.90	52.20
Sulphur	0.05	0.25
Moisture	0.32	0.60
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	No. 1.	No. 2.
Gravity of oil	0.844	0.850
Crude oil per ton	126 gals.	63 gals.

Sp. gr.	1.079	1.568
Weight per cubic foot.....	67½ lbs.	97 lbs.
	100.00	100.00

Ash in coke of stellarite—28.48%.

Analysis by Prof. Penny, Andersonian University, Glasgow.

	No. 1.	No. 2.
Vol matters	67.26	34.16
Fixed carbon	24.03	12.30
Ash	8.40	52.00
Water	0.20	0.80
Sulphur.	0.20	0.80
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	100.00	100.00
	No. 1.	No. 2.
Sp. gr.	1.069	1.612
Weight per cubic foot	66¾ lbs.	100 lbs.
Crude oil per ton	123 gals.	60¾ gals.
Gravity of oil	0.844	0.850

Several actual tests were carried out on large samples of the same character of material as samples No. 1 and No. 2, and the results are as follows:—

Trials by Mr. J. DeW. Spurr, of St. John,s N.B., of No. 2 crude oil per ton	74 gals.
Trials by J. Haworth, Boston, Mass., by steam process.	65 gals.
Trials by F. McDonald, Portland, Me., No. 2 crude oil	50 gals.

The practical results of the material extracted by Mr. Frazer in working the mine on the bed containing stellarite bed was 60 gallons of crude and from 30 to 35 gallons of fine clarified oil per ton. The size of the seam of stellarite varied from 4 inches to 2 feet in thickness. As a rule the seam appeared to improve toward the eastward of the Frazer slope.

The general appearance of the Stellar coal is peculiar; it is irregularly bedded, the different layers seemingly interlaced, giving it a sort of entangled appearance, or a structure like felt. Sometimes the layers are much curved and have smooth surfaces like slickensides, which appear to have been produced by lateral movements, corresponding very nearly with the plane of the bed, rather than by vertical motion, the better layers generally possessing this peculiarity, whence the statement in many notices of this substance that the curly oil-coal is the best. The surfaces of these curved faces have a bright resinous lustre, and a brown-black colour, while a block sawn across shows a uniform dead-brown surface. It breaks with a splintery fracture, very irregularly, but approximately with the surface of deposition; the streak has a brown colour and a dull resinous lustre.

The stellarite and oil-shale from this bed were used at the gas works in the town of Pictou for enriching the illuminating gas. The general results were as follows:

“The yield of gas from the stellar coal of the Frazer mine was 11,000 cubic feet per ton of 2,240 lbs. of illuminating power of 36 candles; coke worthless. From the oil-shale, 8,000 cubic feet of 36 candle power.”

Several attempts have been made to find oil by boring in this part of Pictou County, without any gratifying results. The amount of oil-shale mined and sold from the Frazer slope in Stellarton and Patrick’s shaft near McLellan Brook was about 4,000 tons. The average value of this shale was about \$8 a ton. A greater part of this product was sent to oil works in the United

States and part of it was used in Nova Scotia for the enrichment of the gas manufactured from bituminous coal.

The most complete map of this district was compiled by Mr. H. S. Poole and published in 1904 by the Canadian Geological Survey. On this map, oil coal is noted at a number of widely divergent points and indicating the existence of very large deposits.

The deposits of oil-shades on McLellan Brook, near Patrick's shaft, have been recently (1911) investigated and some boreholes put down by one of the Government drills. The deepest of these boreholes pierced a thickness of 670 feet of the sales, slates, and sand-

stones of the locality, the first mentioned rock being greatly predominating.

At a depth of 214 feet a bed of brown oil shale, 2 ft. 4 in. in thickness was encountered; at a depth of 366 ft. another bed, 4 ft. thick, was met with; and a thickness of 70 feet of brown oil shales was pierced by the drill at a depth from 600 to 670 feet.

Some of the oil shales in the cores were analyzed and gave 32.5 gallons oil per ton and one sample gave 30.5 gallons oil and 35.5 lbs. of ammonia per ton.

It is to be hoped that these promising oil shale deposits may be the seat of an important industry in the near future.

THE MINERALS OF NOVA SCOTIA.

(Written for the Canadian Mining Journal.)

EDITOR'S NOTE:—This article was crowded out of our last issue. It is valuable as a succinct review of Nova Scotia's mineral wealth.

The mineral resources of Nova Scotia, as shown by the symbols on the map,* are of a highly varied character. The shore line is irregular and is provided by nature with many safe harbours. Nova Scotia is almost an island, so that many of the workable deposits are in close proximity to shipping facilities. This Province possesses the only coal deposits at tide-water on the Atlantic coast; and in this part of Canada only are coal, iron and fluxes found in juxtaposition.

The Province is most favourably situated geographically in regard to distribution to world markets; it is 581 miles nearer London than New York, has water navigation to Montreal, and is much better situated to supply markets of New England than many of the States in the United States.

The Coal Fields of Nova Scotia.

The Sydney Coal Field, on the northeastern shore of Nova Scotia and in the County of Cape Breton, is the first to be noticed. Its area of available coal is estimated at 300 square miles. It contains ten coal seams, each of which is from 12 to 3 feet in thickness, besides numerous smaller beds. The coals are highly bituminous and coking; many of the seams yield coal well adapted for gas making. Numerous certificates show a quality almost equal to the Welsh steam coal. Several of the seams enjoy an enviable reputation as good domestic coal for grate and range purposes.

The Inverness Coal Field is situated on the north-western shore of Nova Scotia in Inverness County. There are three collieries at Inverness, Port Hood and Mabou. Important deposits are known to exist and have been worked at the surface in a desultory manner at Chimney Corner.

The Pictou Coal Field covers an area of about 25 square miles and is noted for the unusual thickness of some of the beds. There are 16 known seams, from 42 to 3 feet in thickness. The coal is not as bituminous as that from the Sydney district, but is still a coking coal, except in the case of a few seams. The coal has its chief reputation as a good strong steam coal adapted for use under all forms of boilers.

The Cumberland Coal Field is not yet explored over its whole extent, but its area has been estimated at 300 square miles. The known seams are from 10 to 3 feet in thickness.

The coal is similar in character to that of the Pictou district, and is largely used for steam and domestic purposes.

Miscellaneous Coal Fields. In Richmond County extensive prospecting work has been carried out on the coal basin at River Inhabitants, at Kempton and Debert in Colchester County, work of an exploratory nature has been carried on intermittently for a number of years. Coal has also been found at Big Marsh, Antigonish County, River John, Pictou County, and at various other places in the Province.

The Gold Fields of Nova Scotia.

The Atlantic shore from Canso to Yarmouth is occupied by the auriferous strata. The width of the district varies from 10 to 40 miles and the area of gold-bearing sedimentary rocks in this portion of the Province is estimated at 3,000 square miles.

The Nova Scotian gold is derived entirely from vein-workings. The auriferous quartz veins occur in groups, running parallel to one another in a system of anticlinal domes. They have, in some cases, been traced superficially for a distance of over two miles, and pay-shoots in the vein have been followed to a vertical depth of 1,100 feet.

The worked veins vary in thickness from 30 feet to 1 inch, and are found interbedded in quartzite and slates. The gold occurs in these veins principally in the shape known to miners as coarse gold, and in pockets and strings of various shapes and sizes—it is usually associated with arsenopyrite, pyrite, galena, chalcopyrite, sphalerite, etc.

The gold ores of Nova Scotia may be classed as free-milling, and most of the value may be extracted from the ore by the stamp mill alone.

The natural conditions for the legitimate prosecution of the gold mining industry are favourable. There is a very small amount of overburden; timber for supporting excavations and for fuel is plentiful. The rocks in which the gold veins occur are of a nature that require little artificial support; native labour is cheap and efficient; there are abundant water powers in the vicinity of many of the gold mines; and transportation facilities are good.

*See last issue.

The Iron Ores of Nova Scotia.

Iron ore occurs in very many places throughout the Province, as is easily seen by reference to the map.

Beginning at the western end of the Province we have first, the red hematites and magnetites of Clementsport and Torbrook, Annapolis County, representing a range of ferriferous strata, extending from Digby to Windsor, with one interruption in the shape of the Paradise granite. Extensive mining operations are being carried on at the present time at Torbrook on deposits of the interbedded type.

Between Windsor and Truro there are numerous deposits of brown hematite, often highly manganiferous. Among the localities may be mentioned Selma, Clifton and Brookfield.

At Londonderry there is an immense vein ofankerite 30 to 150 feet wide, holding limonite and specular hematite, and extending for many miles, which has been worked for a number of years.

In Pictou County workable deposits of hematite, limonite, specular hematite and spathic and clay ironstone ores are found in the district extending from Glengarry on the Intercolonial railroad to Arisaig on the Gulf Shore. An important deposit exists at Arisaig.

In Guysboro County several valuable deposits of specular ore have been opened and worked. The ore from one of these mines at Boylston has been satisfactorily used in the blast furnace at Londonderry.

In Cape Breton valuable deposits of brown hematite and magnetite are found near Lake Ainslie and near Whyecomagh.—Epathic ore occurs on Boularderies Island. Near East Bay a valuable bed of red hematite, 12 to 6 feet wide, has been traced for some distance. Numerous other deposits of hematite are met at Boisdale, Big Pond, Loch Lomond, Grand Mira and other points on the island.

Deposits of bog iron are known to exist at various places throughout the Province, but as yet have received little attention.

There are many other localities yielding iron ores, which as yet have not been thoroughly prospected.

Limestone suitable for flux is everywhere met in the vicinity of the coal and iron districts.

Copper.

Ores containing this metal are found in the Province in rocks of every age.

The trap associated with the Trias of the Bay of Fundy yields native copper at many points, among which may be mentioned Cape d'Or, Spencer Briar and Five Islands.

Chalcocite and carbonates of copper are frequently met in the Upper and Lower Coal Measures of Cumberland, Colchester and Pictou Counties.

In the vicinity of Lochaber, in Antigonish County, some valuable deposits of chalcopyrite have been proven.

At Coxheath, in Cape Breton County, extensive development has been carried on, on a chalcopyrite deposit.

There are other deposits of copper in the vicinity of Gabarus, Cape Breton County; St. Ann's, Victoria County; Cheticamp, Inverness County; and other points in the Province.

Lead and Silver.

The ore of lead most frequently met here is galena, generally carrying silver, and occurs in the rocks of all ages, but most abundantly in the Lower Carboniferous limestones, which are met with in almost every county. At Gay's River and Pembroke, Colchester County, the

ore is met disseminated in limestone, in quantities which have warranted a large amount of exploration. At Smithfield, in this same county, in the same district, a still larger deposit is met. Indications of valuable deposits have also been discovered at Cheticamp, Inverness County; North Bay, Ingonish, Victoria County; East Bay, Cape Breton County; and Musquodoboit, Halifax County.

Manganese.

This ore is frequently found as pyrolusite, psilomelane and manganite in the Lower Carboniferous strata.

Deposits of pyrolusite have been extensively worked at Walton and Tennycape, Hants County; Loch Lomond, Cape Breton County; and in the vicinity of Truro, Colchester County. New deposits have recently been explored in New Ross, Lunenburg County.

Gypsum.

This mineral is found in Nova Scotia in immense quantities associated with anhydrite. It occurs associated with Lower Carboniferous strata in beds frequently 100 feet in thickness.

There are many enormous deposits of gypsum in various parts of Nova Scotia, which exist on tide-water, among the most valuable of which are the ones near Windsor, Hants County; Amherst, Cumberland County; Antigonish, Antigonish County; McKinnon's Harbour, Baddeck and St. Ann's, Victoria County, and Cheticamp, Inverness County. Gypsum occurs in large quantities along the shore line of Cape Breton Island, in the interior, and along the shores of the Bras d'Or Lakes.

The conditions are most favourable for the development of an immense industry in the production of gypsum. A small amount of this material is manufactured in the Province into plaster of Paris, wall plaster, fertilizer, etc., but most of the gypsum mined in the Province at the present time is shipped to the United States in the crude form.

Antimony.

Antimony is found at West Gore and Rawdon in Hants County. The principal deposit is in a vein of the fissure type where antimony comes as stibnite and native antimony, associated with pyrite and pyrrotite and often carrying high values in gold. This deposit has been extensively worked and large shipments of ore have been made extending over a number of years, to Swansea, Wales and New York, U.S.A.

Tungsten.

Tungsten minerals have been found at Moose River and Waverley, Halifax County (in the form of scheelite); at Emerald, Inverness County (in the form of hubnerite); New Ross, Lunenburg County (in the form of scheelite and tungstite), and at Molega, Fifteen-Mile Brook, Queens County (as scheelite). Extensive exploration work is being carried on at Moose River, Halifax County, with promising results.

Molybdenite.

Molybdenite occurs at New Ross, Hants County; Gabarus, Cape Breton County; and Ohio Road, Shelburne County.

Tin.

Tin has been discovered as cassiterite and stannite in situ near New Ross, Lunenburg County.

Oxides—Mineral Pigments.

Various beds of ochre and umber have been worked to a small extent at Londonderry, Chester, Onslow, Kentville, Polson's Lake and numerous places in Cape Breton.

Barytes.

This mineral is found at numerous points in the Province and is confined to no particular geological horizon. Little attention has yet been paid to it, and it has been worked to a small extent only.

At Lake Ainslie, Inverness County; Five Islands and Stewiacke, Colchester County; and River John, Pictou County.

Salt.

The Lower Carboniferous rocks and gypsum of Nova Scotia frequently yield brine springs, adapted for the manufacture of salt, but as yet few attempts have been made to utilize it. Among these springs may be mentioned the ones near Antigonish, Antigonish County; Whycomagh, Inverness County; Springhill, Cumberland County; and Walton, Hants County. Strong brine was encountered in a bore-hole at a depth of . . . feet at Cheverie, Hants County.

Mineral Springs.

These are numerous. Among the most notable are those near Wilmot, Annapolis County; Windsor, Hants County; Chester, Lunenburg County; Garloch and Sutherland's River, Pictou County; and East Bay, Cape Breton County.

Building Stones.

The building stones of Nova Scotia are chiefly sandstone and granite. The various grades of the former are supplied almost entirely from the Upper Carboniferous, and we therefore find the principal quarries in Cumberland County at Wallace, Amherst, Joggins, Minudie, River Philip, etc.; in Pictou County, at River John, the Pictou Rivers and Merigomish.

On the Basin of Minas various localities in Kings and Hants County yield materials adapted for building purposes. Granite occurs along the Atlantic shore in every variety and texture, etc. Shelburne, Queens, Annapolis and Halifax Counties have yielded handsome varieties.

The Lower Carboniferous limestones have hitherto been used for little beyond lime burning, but they merit more attention for building purposes than they have received. They occur in great abundance and present every variety of texture and composition. At some points in Cape Breton limestones are metamorphosed into marble, as at West and East Bays, George's River,

etc., and may prove of commercial value. Flags, slates and clays are abundant and worked for local use.

Grindstones, Etc.

At Joggins and Pugwash, Cumberland County; Merigomish, Pictou County; and various points in Cape Breton County, grindstones and whetstones of good quality are largely cut for local and foreign use.

Diatomaceous Earth.

Deposits of this mineral are met in many of our lakes and swamps. A large deposit has been extensively worked at Bass River, Colchester County.

Oil Shales.

Beds of oil shales, of late Devonian or Carboniferous age, are found in Nova Scotia in the vicinity of many of the coal fields, and at other points in the Province, extending from east of the Avon River, in Hants County, to the eastern part of Cape Breton Island. Among the most important known beds are those in the vicinity of Cheverie, Hants County; New Glasgow and Pictou, Pictou County; Big Marsh, Antigonish County; Lake Ainslie, Inverness County; and McAdam's Lake, East Bay, Cape Breton County. Analyses show many of these deposits to be of a superior character, but little has yet been done in the way of developing them.

Clays.

Clays suitable for the manufacture of bricks, tiles, sewer pipe, etc., are abundant in Nova Scotia, large beds existing in almost every county in the Province. At the present time ordinary stock and pressed red bricks, tile and sewer pipe of different sizes, are manufactured at various points, principally for domestic use.

The industry is capable of large expansion, both as regards material manufactured and export trade.

Fire-Clays.

Large beds of fire-clay occur in connection with the various coal seams throughout the Province. Fire bricks are manufactured at Westville, Pictou County; but not in quantities large enough to supply the home consumption.

Cement.

Slag cement is now being made at Sydney, from slag procured from the Dominion Iron and Steel Company.

LEAD MINING AND SMELTING IN SCOTLAND.

From our own Correspondent. London, September 3rd, 1912.

One of the most ancient industries in Scotland is lead mining, although it perhaps never in its palmy days reached a large size. There are signs now of a distinct revival of the old industry. The ore was chiefly galena occurring in limestone, and if it was somewhat sparsely distributed it was usually rich and pure when found, so that in view of the small silver content it commanded a good price. When, however, the highly argentiferous lead ores of America were developed the price of pig lead fell from the neighbourhood of 150s per ton (2,240 pounds) to little more than 50s and this, together with the increasing amount of "Black Jack" (zinc blende) got in the native ores, led to the abandonment of all the mines, except in one district.

A band of Silurian rocks traverses the counties of Wigtown, Dumfries, and Lanark, and in the limestone deposits of this series among the Lowther or lead hills work is still carried on in several veins, and quite recently operations have received a new lease of life.

The two adjoining villages of Wanlockhead and Leadhills are the centre of activity, and the inhabitants are mostly engaged in the mines and smelters. The annual output of the mines aggregates close upon 8,960,000 pounds of ore, but of late the greater proportion has been coming from Wanlockhead, where most interesting developments have been carried out. The richest lode has been entered in the valley just below the village, and followed to the dip in a north-easterly

direction by means of an inclined shaft some of the levels from which have penetrated over a mile and a half into the hills. Much of the ore now raised from the deeper levels, about 200 feet down, contains in addition to the associated vein stuff (calcite) a deleterious proportion of blende, which interferes with the smelting operations unless it is removed. To accomplish this the Wanlockhead Lead Mining Company installed little more than a year ago what is, according to a leading Scottish daily paper, perhaps the most up-to-date and perfect dressing plant to be found in the United Kingdom.

The new concentrating mill is capable of handling 22,400 pounds of ore per hour continuously, and can deal with 26,880 pounds when pushed to its utmost capacity. The ore is automatically tipped into trolleys which discharge it over grizzlies on to the conveyor belt, from which gangue is picked out by hand and washed by water jets. The large pieces of ore are reduced by crushing in two stages, first by rock breakers and then by rolls, the separate products from which are elevated to a long series of graded trommels delivering uniformly sized particles to duplicate sets of water jigs arranged on each side of the floor. These effect a good separation of the first four sizes of ore particles down to 4 mm. giving clean galena in the first compartment and almost pure blende in the third and fourth, whilst the middlings from the second compartment contain both minerals and have to be recrushed and jigged after another classification to size.

The very finest ore particles are carried as slime through an elaborate series of pointed box settlers of the Luhrig type, and the separation is completed by means of oscillating Buss tables and Luhrig slime vanes, which can be supplemented if need be by two circular buddles and a mechanically operated dolly tub. The products are (1) tailings which run into a large tank, from which clean water overflows to the stream, and the clean sediment is elevated to the dump; (2) a high grade of zinc glende, containing very little pyrite, which is carted away for export; and (3) very pure galena containing over 80 per cent. of lead, which is trammed in 11,200 pound lots about half a mile down the valley to the smelter. The larger grades are ready for use, but the fine particles of ore are sintered into lumps by a partial roasting in a small reverberatory furnace.

The type of furnace still used was originated in the district, and has been only slightly altered, although modifications of the Scotch ore hearth were for a time

used in the North of England, and a Jumbo water-cooled hearth was tried in America. The furnace base is set in masonry and consists of a cast-iron sump 30 inches long by 22 inches wide, and about 6 inches deep, which is kept full of lead, any excess flowing over the workplate into the lead pot. The front is open, but the sides and back are made up of a height of 18 inches by means of two hollow iron blocks called "stones" which retain the charge, comprising a mixture of ore, coal and a little limestone. Air is blown through the charge from a tuyere at the back, thus burning the fuel and accomplishing the roasting and reduction of the ore at the same time. Two workmen are required to attend each hearth, and every five minutes it must be rabbled to pick out slag or infusible lumps, and fresh ore and fuel is added. The campaign runs from Monday morning until Friday evening, three sets of men taking eight-hour shifts and producing about 2,240 pounds of pig lead each shift. The labour is not excessively hard, but is almost continuous, and there is very little danger from the fume produced as this is drawn away by the stack over the hearth, and a ventilating hood over the workplate sucks away any poisonous fume rising off the rabbled charge.

The process is very economical in fuel consumption, only taking about 560 pounds of coal per 2,240 pounds of lead produced, and this is due to a considerable amount of heat which is generated by the oxidation of the sulphur in the ore. The first yield of lead is only about 60 per cent., and this would not be profitable if it were not for a very perfect system of waste recovery which sets the slag aside for retreatment in a slag hearth similar to the ore furnace, but larger, and, further, the fume is practically all condensed in water scrubbers before the gases are passed into a horizontal settler and a flue or duct leading half a mile uphill to the chimney. Two hearths are usually at work on ore, and other two on recovered fume, which contains about 60 per cent. of lead and yields, about half the quantity of lead that the ore produces. The method of work is admirably suited to the local conditions of scarce fuel and cheap labour, which is not highly skilled. The hearths are best adapted for small outputs from a highly concentrated or pure ore, where this is not very abundant, thus necessitating intermittent working. That such an old method should be able to hold its own against the competition of large producers testifies to the high efficiency to which the various operations have been brought and maintained.

THE SCHEELITE DEPOSITS OF NOVA SCOTIA.*

By Victor G. Hills.

Scheelite camp is situated five miles northeast of Ship Harbour, Long Lake, and 34 miles by waggon road from Stewiacke, the nearest railway station, in Halifax County. The scheelite deposits occur in veins of the same formation and character as the gold-bearing veins of the region. The Nova Scotia peninsula is occupied by granite and Lower Cambrian quartzites and slates. The striking characteristic of the veins is their similarity to the saddle reefs of Bendigo, Australia. Thus in both cases the formation is quartzites and slates, much crumpled and folded; there is the

same development of parallel anticlines in series; in both fields, the movements causing the folding appear to have a common origin with neighbouring intrusive-granite; while other points of similarity are: the metamorphism of the sedimentary rocks is dynamic; the metalliferous deposits are in quartz veins paralleling the original sediments and were folded with them; other lodes are found crossing or connecting the regular interbedded veins; the most common ore deposit is gold associated with arsenopyrite; and the ore-shoots usually parallel the folds. The points of dissimilarity

*Abstract of a paper presented at the Annual Meeting of the Canadian Mining Institute, Toronto, March 1912.

between the two regions are that the anticlines in Nova Scotia are from three to five miles apart, while in Bendigo they are from a few hundred feet to a quarter of a mile apart; and in Bendigo there is some evidence of igneous activity. In Nova Scotia the metamorphism seems to be entirely dynamic.

The scheelite deposits, in the Moose River Gold Mining district, occur on the same anticline two miles to the west of the old gold mines. The peculiar crumpled or corrugated form of the veins is unique and interesting. Two explanations have been advanced to account for their exceptional sinuosity. Woodman holds "that the sinuous courses shown represent the outlines of the fissures formed by the folding pressure which were afterwards filled with quartz; and that "the evidence is of continual accretion inward, on both sides, as in other fissure veins and not from a central primary layer outward." Fairbault, on the other hand, maintains that the quartz veins were formed with the slate beds, being gradually deposited during the earlier period of metamorphism and deformed into these wrinkles by differential pressure causing the slate to crush and buckle between sliding bands of harder quartzite. This view is shared by the author.

The main anticline strikes S. 67 degrees W. and has a pitch of about 7 degrees to the west. The veins are interbedded or intercalated and are usually in the slate rather than in the quartzite. At Scheelite camp three faults, the throws of which are from 10 to 70 feet, cross the folds. The 70-foot horizontal throw appears to have but slight vertical displacement; the second fault displaces 5 feet horizontal and 11 feet vertical. No scheelite or mispickel has been found in the faults. The veins are numerous and small, usually from one to six inches, but sometimes widening to several feet near the anticlines and synclines. The scheelite ore-shoots are rather more regular and continuous than is the case in most of the tungsten deposits of the world, but are not so closely confined to the anticlines and synclines as are the gold deposits. The vein matter is quartz, ankerite, scheelite, and arsenopyrite, while there is also a little pyrite and calcite, and a few slender tourmaline crystals present in the quartz, in the calcite and in the scheelite. No gold, beyond a trace, has been found here; but a little scheelite in the old gold mines at Moose River.

The natural conclusion that the scheelite was formed by alteration from ankerite, does not appear to be borne out by the obtaining conditions.

SLOCAN DISTRICT, BRITISH COLUMBIA.

By E. Jacobs.

Continuing my notes on my visit to Slocan mines, made in August, brief mention will be made of the Rambler-Cariboo Extension, and the Rio, also some others that were passed when going from the Rambler-Cariboo up by the Washington and R. E. Lee, thence to the Surprise and Noble Five.

RAMBLER-CARIBOO EXTENSION.—The short account of this property included in the official report for last year is as follows: "In running the main Rambler-Cariboo tunnel, a vein was cut at 2,100 ft. from the portal, in ground which did not belong to the Rambler-Cariboo Company, although it was held by allied interests. The vein was apparently not known on the surface, although exhibiting considerable strength at the adit-tunnel level."

From Mr. W. E. Zwicky, manager of the Rambler-Cariboo, who also directs the development of the Rambler-Cariboo Extension and Rio properties, it was ascertained that the drift on the Extension vein from the Rambler-Cariboo adit, was in, at the time of the visit, about 350 feet, and that it was expected ore would be met with very soon; it might be encountered any day. I have not heard whether this expectation has since been realized.

RIO.—The Rio property is described as being situated in the same basis (McGuigan) as the Rambler-Cariboo, but at an altitude of about 7,000 feet, which is approximately 1,000 feet higher than the Rambler-Cariboo mine. The Provincial Mineralogist states that the original owners had driven, on this property, an adit about 200 feet, which cut near the surface a shoot of dry ore which was not sufficiently rich to be shipped from that place at a profit. Farther in a shoot of galena about 6 inches wide and continuing 20 feet in the level, was cut. Since its present owners acquired the Rio there was shipped from this upper tunnel 15

tons of ore from which a net return of about \$3,500 was received.

The development work done by Mr. Zwicky includes a lower adit, at a depth of 180 feet below the tunnel above mentioned, which cross-cut reached the vein at about 500 feet from the portal. Nearly 250 feet of drifting was done before the downward extension of the oreshoot occurring in the upper tunnel was entered; this shoot was found to be something like 50 feet in length, and the ore contained more galena than in the higher working. Drifting was continued beyond this oreshoot until at about 180 feet farther along the vein a second oreshoot was entered.

The position last August was that one car of ore had been shipped to Trail, and ore was being taken out for another carload. Pack horses take the ore from the mine down to the old millsite, where it is loaded on wagons and hauled thence by road to the railway at Three Forks. It was stated that should the development work, being done some time since, continue satisfactory, a cross-cut would be driven from No. 3 level (upper workings) of the Rambler-Cariboo to the Rio vein, and thus open the latter property at considerable depth.

SOHO GROUP.—Along the wagon road, between the Rambler-Cariboo camp and the angle of the road below the site of the old Washington concentrator, there was seen a notice of intention to apply for a certificate of improvements for the Laughing Waters claim, "located in McGuigan Creek basin, across the nose of the mountain spur between the Best and Washington basins." It was understood that this is one of the Soho group, on which Mr. W. H. Sherzer, of Ypsilanti, Michigan, has been engaged in survey work in July and August.

WASHINGTON.—No work was being done on the Washington group, which includes the Slocan Boy, situated high up the mountain, across from the Payne. The latest published information available concerning the Washington is that communicated by Mr. J. L. Retallack, manager for the mining partnership known as Retallack & Co., owners of the Whitewater and other properties, and chief shareholders in The Washington Mine, Limited. No work has been done on the Washington group this year, but during the immediately preceding two or three years something like 3,000 feet of development has been carried out. It is estimated that about 40,000 tons of concentrating ore has been developed, this ore containing from 5 to 6 per cent. lead, 20 to 25 per cent. zinc, and silver to the amount of about 2 oz. to the unit of lead and 0.25 oz. to the unit of zinc. The provision of milling and transportation facilities is requisite however, before this ore can be utilized.

R. E. LEE.—There are other mining properties in the vicinity of the Washington, but it did not appear that any of them were being worked. Passing thence up to the summit of the divide, the R. E. Lee upper workings were seen, but these, also were not then being worked. After a look in at the R. E. Lee cabin, the trail was followed down the Cody Creek slope of the mountain, past the entrance to the low-level adit of the R. E. Lee, and the Ajax, and thence up to the Last Chance camp, where the men working at the Surprise have their bunk and boarding house accommodation.

SURPRISE.—The development of the Surprise property during the last few years has been one of the most striking demonstrations of dogged persistence, in the face of very great difficulties, known in Slocan district. First, the Last Chance No. 3 adit was extended more than a thousand feet into Surprise ground, and the long and tedious work of raising about 800 feet was undertaken. Connection had been made with the old Surprise workings only a few weeks before the mine was visited in August. Much exploratory work had been done in addition to the actual rise itself, before the winze from the Surprise No. 3 cross-cut was connected with. There was much water in the old workings of the Surprise, but this had been drained away, although the lower workings, from the Last Chance No. 3 up, were still far from dry when visited. It was found that drifting on the vein was in progress at 120 and 220 feet, respectively, above the Last Chance No. 3, and that ore was showing in both drifts, that in the higher drift being the more promising at that time. No information has been obtained relative to the progress made during the last month, but the indications were favourable to production of ore whenever stopping should be undertaken.

NOBLE FIVE GROUP.—It was found that twenty men were being employed on the Noble Five group—a few in cross-cutting and raising on the Noble Five vein to make connection with the Last Chance vein, which latter dips into the upper claims of the Noble Five group, and the others in the Deadman mine of the group.

In addition to the two above-mentioned veins, there is on the property another vein known as the Deadman vein. All three veins are, approximately, parallel. The Deadman vein is east of the others, and on this considerable development work has been done, with generally very encouraging results. Levels Nos. 1 to 4 with several intermediates, have been opened.

In the old workings on No. 4 the present superintendent, Mr. McAllister, found the drift stopped at a

strong fault cutting almost squarely across the course of the vein. Work was re-started here, and after the fault had been followed about 25 feet to the right, the vein was found. As the fault is normal and not extensive, work was undertaken on several lower levels down to No. 1, inclusive, and, so far in each instance where the drift has been carried forward, the same fault has been encountered and the vein afterward picked up beyond it under almost identical conditions as on No. 4 (the highest) level.

An interesting feature of this work is that on each level which has been driven beyond the fault, a shoot of galena-zinc blende ore has been found, and this orebody appears to be continuous vertically from No. 4 down to No. 1 level. The ore shoot is, apparently, 35 to 60 feet in length, and from one foot to four feet in thickness. Much of the ore is either silver-bearing galena or zinc blende of remarkably good grade for this camp. A considerable proportion of the blende is estimated to contain 55 to 60 per cent. zinc. Beyond the ore shoot on each level now carried forward the vein pinches for a short distance, afterward becoming freer again, with indications favourable for another shoot of ore ahead. No. 1 level is in 230 to 240 feet; there is now available an abundance of ore suitable for mill feed, so the desirability of again running the concentrator, situated down on Cody Creek, is being recommended. A car of lead ore was shipped in July, while in August one of ore running high in zinc was sent out.

ZINC ORE IN NOBLE FIVE MINE.—Although it is about seven years since the field work was done for the "Report of the Commission Appointed to Investigate the Zinc Resources of British Columbia," the information then obtained relative to the Noble Five group may be regarded as still applicable, since not a great deal of development work has since been done, and but little ore has been shipped.

The Noble Five was one of the properties reported on by Mr. A. C. Garde, who assisted Mr. Philip Argall in the field-work of the Zinc Commission. Mr. Garde reported, in part, as follows:

"This group is owned by the Hon. James Dunsmuir, of Victoria; it adjoins the American Bay on the east. On account of litigation the property has not been operated for several years, but at one time produced a considerable tonnage of high-grade silver-lead ore, which in some cases changed into zinc blende. On one of the claims, called the Deadman, three levels have been driven on a 2 to 3 ft. vein. The strike of the vein is 55 deg. east of north, dipping at an angle of 70 degrees to the southeast and flattening somewhat in a winze sunk from the second level. This level, being the only one of interest from the zinc point of view, was examined. It was found that the level was first driven 25 feet along a slip in the slate formation. At this point a cross-cut was made into the hanging wall toward the east for a distance of 20 feet, where the main vein was encountered, and explored in a north-easterly direction for a distance of 120 feet. Next to the hanging wall and along the floor of this drift a lens of zinc blende averaging 12 inches in thickness has been exposed for nearly the whole distance. About 20 feet from where the vein was first encountered a winze has been sunk to a depth of 100 feet, proving the existence of the orebody all the way down, but decreasing somewhat in size at depth. About half way down the vein flattens out to an angle of 55 deg.

"In this winze I took a three-cut sample averaging 12 inches in width. It assayed 55.6 per cent. in zinc and 15.1 oz. in silver, and represented the best part of the lens. The vein itself is from 2 to 3 feet wide, and a little galena is occasionally mixed with the vein matter. The zinc occurs, however, essentially as a clean blende. From present developments no considerable tonnage of ore can be estimated, but I believe that the showings warrant the owner in developing the property and blocking out the ground between Nos. 2 and 3. Present work on the property was done some time ago by lessees who extracted all the galena in sight. They discontinued working as soon as the ore changed into zinc. . . .

"Exposures of zinc ore were reported on other claims of the Noble Five group, but as the workings had caved in, these were not examined.

"Besides having good accommodations for men working at the mine, the property is equipped with a 100-ton concentrator at Cody, which is connected with the mine by an aerial tramway. The concentrator is not arranged for saving zinc ore, so would require remodeling, but it is conveniently situated for handling concentrating ores from various adjacent properties, and the machinery is being kept in good repair."

(It will be observed that Mr. Garde's account of the mine varies in some details from that first given above, but to later developments may be attributed the chief differences between the two descriptions.—E. J.).

RECO AND GOODENOUGH.—Owing to heavy rain necessitating a much longer stay at the Noble Five than was intended, there was not time to visit the Reco and Goodenough mines and then walk to Sandon before dark. However, present operations in the Reco are only on a small scale, and nothing is being done at the Goodenough, so that little would have been ascertained of these properties had a call been made at them. It was stated in the neighbourhood that another strike of good ore had lately been made in the lower workings of the Reco, but production from the property has been comparatively small in quite recent years. Mr. A. C. Garde's description of the mine follows:

"This property, which adjoins the Noble Five on the east, is one of the oldest and best known local mines. It consists of five Crown-granted claims, with a total of 150 acres. No attempt was being made to hand-sort any of the zinc ore associated with the high-grade galena. On account of the blende containing high silver value, it has been found more profitable to leave it with the galena even if it be at times necessary to incur a penalty on the excess of zinc. Past experience with zinc ore shipments to Swansea, Wales, was very discouraging. For a 67-ton lot of blende, containing 50 per cent. zinc and 99.5 oz. of silver to the ton, the Hafod smelter in 1898 refused to pay anything for the silver content.

"One of the Reco veins (No.3), which is narrow but of very high grade, was worked in connection with the adjoining property (the Goodenough) for some time, on account of the vein running into the latter. The Reco has produced a considerably larger quantity of ore from it than the Goodenough, and is being operated extensively at the present time. There are in the Reco property three veins, which strike parallel to each other. The property is one of the constant dividend-payers of the Slocan, and so far has distributed, approximately, \$300,000.

"Ore shipments are handled over the Reco trail to the railway siding—a distance of four miles—in a

unique and cheap manner, during the winter season, this being 'sliding' or 'rawhiding' on the snow. A one-ton parcel of ore, consisting of about one dozen sacks, is wrapped and laced into a raw cowhide, this is dragged by one horse down the mountain trail, which has a down grade of about 17 per cent. Beside the rawhides, the same horses, on their return trip, pack provisions and supplies to the mine. Two men are able ordinarily to attend to twelve horses; occasionally a few more. Rough-locking is done with common log chains. A hide usually lasts one season, but if well taken care of and provided with wooden runners, it will last longer than that. This method of transporting ore is also employed by other mines around Sandon, located similarly to the Reco. In a ruggedly mountainous country, such as this, where the snowfall attains a depth of several feet each season, a more economical way of handling galena ores in small quantity could not be introduced. Trimming, by means of gravitation, is certainly cheaper, but it involves a considerable outlay, which is seldom warranted when the tonnage is small."

"GREY COPPER CLAIM.—The Goodenough property is situated east of the Noble Five group and adjoins the Reco mine to the south. It consists of the Grey Copper claim and two fractions, having a total area of 50 acres. It has two parallel veins, of which the upper one of the Goodenough fraction is known as the continuation of the Reco vein No. 3, in conjunction with which it was worked from 1894 to 1902. During that period there was shipped 450 tons of hand-sorted galena, averaging 45 per cent. lead, two per cent. zinc, and 300 oz. of silver to the ton. The greatest thickness of this vein is 30 inches, and its average thickness only 8 inches. Four levels, respectively 66, 225, 600, and 775 feet long, have exposed the vein to a vertical depth of 450 feet, with a total stoping area of 3,300 square feet. . . . The Grey Copper vein, while so far not productive of a similar high grade of ore as the upper vein, has the advantage of being considerably wider and more regular. It promises to become of importance as a zinc producer.

"There are two levels in the Grey Copper workings—the upper is 50 and the lower 120 feet long. Those levels have been driven on the vein, which is from 5 to 6 feet wide, and outcrops plainly at the surface. The strike of the vein is north 55 deg. east; the dip is to the southeast at about 70 deg. The vein cuts through a large porphyry dike at nearly right angles, and has in every respect the appearance of a well-defined and true fissure. The porphyry dike can be followed across the Grey Copper, Texas, and Deadman claims, and has a width of nearly 1,000 feet. Above the dike the usual slates and shales make their appearance. They have a bedding strike of about northwest and southeast, and can be seen on the surface as well as in the workings of the upper Reco-Goodenough vein. The same grade and character of ore is found on both levels, but the paystreak in the lower one is twice the size of that in the upper one. In the latter it averages 12 inches, and in the former 24 inches in width. Approximately 1,000 tons of ore has been blocked out on three sides between the two levels, which are 85 feet apart, measured on the dip of the vein. A five-cut sample was taken in the lower tunnel. It represented an average of 24 inches of ore in width; it assayed 42.6 per cent. zinc, 18.8 lead, and 33.2 oz. silver to the ton. As will be seen from this analysis, the ore is of a heavily mineralized character, and requires to be

separated more than to be concentrated. Hand-sorting would be of little use, unless it were followed by concentrating of the 'sortings.'

"By trail, the Grey Copper camp is four miles from the nearest railway shipping point (Reco Siding). The present cost of transporting ore by means of pack-horses is \$3 per ton, but with a large output the raw-hiding method would no doubt be introduced during

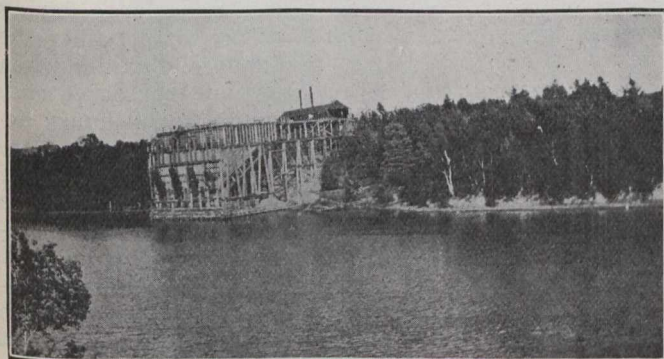
the winter season, thereby materially lowering the cost of transportation.

"From its upper vein, the Goodenough Mines, Ltd., extracted at one time \$80,000 worth of galena and paid in dividends \$45,000. While the second vein on the Grey Copper claim is still only in a prospecting stage, it is very promising, and is one of the most interesting prospects in that locality."

THE COLONIAL COAL CO., LTD.

The Colonial Coal Co., Ltd., with head offices in North Sydney, was organized a little over a year ago to take over the old Colonial Company and the Mackay Mining Co. Mr. W. A. Mackay, of North Sydney, is president and general manager.

The company control the coal leases over an area one-half mile wide by 4½ miles in length extending



Colonial Coal Co.—View of Loading Pocket.

from Sydney Harbour to the Little Bras d'Or Lake. This property lies to the south of the Nova Scotia Steel & Coal Co.'s areas. Four seams of coal of workable thickness are known to outcrop on the property. The average thickness of these is 4 ft. 6 in., 4 ft., 5 ft. 6 in. and 5 ft. 8 in., respectively. So far only the 2nd and 3rd seams have been worked. Other seams ranging in thickness up to 2 ft. have also been found.

The company are at present operating two collieries, the Mackay mines on seam N. 2, near the centre of the property and the Colonial mine on seam No. 3 on the shore of the Little Bras d'Or. About one hundred men are employed mostly on construction work and development. Both mines have railway connections with the Intercolonial Railway. In addition to this the company have a coaling dock on the Little Bras d'Or at the Colonial mine where vessels drawing 20 ft. can take cargo.

The difficulty of disposing of the slack from the Mackay mine lead Mr. Mackay to go to Europe and make a study of the briquette plants in operation there. As a result he has installed at the Mackay mine the first briquette plant in America to operate on soft coal.

The binding material used is coal pitch obtained from the by-product coke ovens of the Dominion Iron & Steel Co. at Sydney. This is ground and elevated to a five-ton hopper. Slack coal from the bankhead or the stock piles is feed to a similar hopper. From these hoppers rotary distributing plates feed the ground pitch and slack coal in the proper proportions to a screw conveyor. From 5 to 6 per cent. of pitch is used. The conveyor passes the material to a squirrel-cage disintegrator where it is thoroughly pulverized. It is then

elevated to the mixer where it meets with superheated steam at a temperature of 600 degrees F. This liquifies the pitch and mechanical agitators mix the material until every particle of coal becomes coated with the liquid pitch. A screw conveyor takes the material from it is pressed into ovoid briquettes by machine where it is pressed into ovoid b briquettes by passing between heavy indented rollers. After leaving the press the briquettes are screened to remove any fines or broken briquettes and are then elevated to storage bins over the railway tracks. The fines are returned to the disintegrator. The capacity of the plant is 10 tons per hour.

Recent tests made on the Intercolonial Railway go to show that the briquettes from the Mackay mill are super-



Colonial Coal Co.—Briquette Machine and Mixer.

ior to lump coal for steaming purposes. The briquettes entailed less labour in stoking, gave an even, clean fire, and burned entirely free from clinker. Another advantage is that on coming in contact with the fire the briquettes do not decrepitate and so form no fines or cinders to be carried up through the stack, thereby lowering the efficiency of the fuel and endangering the surrounding country.

The success of the plant at the Mackay mine has encouraged the company to go more extensively into the business. They are at present installing a similar plant with a capacity of 20 tons per hour at their Colonial mine. Here they have a seam of coal 5 ft. 6 in. in thickness, perfectly clean and free from slate, and of a high calorific value. The roof is a strong sandstone requiring little timbering, making mining cheap and easy. The only difficulty with this seam in the past has been that the coal is exceedingly friable and will not stand shipping. The company now propose to turn all this coal into briquettes.

MANUFACTURE OF SEWER PIPE IN N.S.

Written for The Canadian Mining Journal.

There are a number of clay-working industries in and about the town of New Glasgow. The principal one of these is the plant of the Standard Drain Pipe Company. The main works of this company are situated in St. John, P.Q., but the Nova Scotia branch is expanding every year. The New Glasgow plant was started in 1903, but was totally destroyed by fire in 1907. It was rebuilt in 1908 with three burning kilns, which number has been added to year by year until there are nine kilns at present. Most of the pipe manufactured is shipped to Montreal by railway and the output at present is about 1,000 car loads a year. Recently the company has commenced to make hollow tile for building purposes and the demand for these is constantly growing.

The company owns 25 acres of land in the town limits of New Glasgow. Two clay quarries are operated, one of which is right near the works. This is a deposit of soft red clay about nine feet thick and has only four inches to fifteen inches of alluvial material to be stripped. This clay is loaded into cars at the quarry face, trammed out to the mouth of the working and then drawn up on a small machine to a stock house 300x50 feet. All the excavation is done by contract.

The other quarry is situated about 1,000 feet away. The clay at this point consists of a soft gray shale which has a high fusing point. This shale contains some graphite and if used alone the pipes have to be fired very slowly in order to prevent bloating. This clay also shows a rather high percentage of soluble salts, and this was at first believed to prevent the formation of a good salt glaze. This difficulty was subsequently found to be due to the ware not being fired hard enough. There are also a few siderite concretions which some times cause fused specks in the pipes. The shale is mined and sent to the same stockhouse as the red clay in cars of one-half ton capacity by means of an aerial tramway. This endless rope tramway is driven by a rope sheave on the main shaft of the mill.

The two clays are mixed in the proper proportions and taken from the clay shed to two nine-foot dry pans where it is ground to the required fineness. It is then conveyed to a revolving screen and the undersize discharged into a storage bin. The fine clay is drawn

from the bin into four seven-foot wet pans where the proper amount of water is added to convert it into a highly plastic mass.

From the wet pans a bucket elevator conveys the tempered clay to the press feeders. There are two presses, one made by the Taplin Rice Company, of Akron, Ohio, the other type being that manufactured by the Stevenson Company, of Wellsville, Ohio. Both the presses are operated by steam pressure supplied from the battery of three 100 h.p. return tubular boilers made by I. Matheson & Company, of New Glasgow. All sizes of drain pipes 2 feet in diameter, are squirted in these presses. Different sizes are obtained by changing the die on the lower end of the press. The squirted sections of pipe are removed singly from the presses on hand trucks, and placed on a large drying floor on the spigot end, while a workman paints the other end with a wash of manganese dioxide, when they are invested and left to dry on the socket end. The drying process requires from 30 to 60 hours according to the size of the pipe. When the pieces are thoroughly dry they are taken down on trucks to the ground level by means of a gravity elevator and placed on end three tiers high. The kilns are of the down-draft type of bee hive form. After the kilns are full the doors are bricked up and sealed, and the heat increased slowly from day to day until the temperature reaches 2300° F. The glaze is secured by placing salt on the fire in the fireholes whereby the atmosphere in the kiln is charged with salt vapor. The temperature is judged by the eye and also controlled by Seger cones in front of the peep holes. After glazing, the fireholes are closed and the kiln allowed to cool off gradually. The whole process occupies 10 days from the time the pipes are charged until they are ready to remove for shipment. They are loaded into railway box cars on a track which runs close to the kilns.

The plant employs 120 men and works for eleven months per year. The main building is 225 x 87 feet, and is three storeys high. Power is supplied by a 350 h.p. Laurie Corliss engine. Electric light and power is supplied by a small 15 h.p. horizontal slide valve high speed engine belted to a D. C. generator.

A LARGE ELECTRIC HOISTING ENGINE.

Written for The Canadian Mining Journal.

It is only very recently that the question of employing electricity for the operation of large main shaft hoisting engines has come to the front in Canada, we refer to hoisting engines with peak loads of 1,000 h.p. or more, a description therefore of a recent installation in Nova Scotia, and which is by far the largest electric hoisting engine running in this country will no doubt be of interest.

The engine in question has lately been installed and is now in operation at the No. 14 Colliery of the Dominion Coal Co., the following being the principal technical particulars: Output, 150 tons per hour; length of

shaft, 5,000 feet; gradient, 25 per cent.; hoisting speed, 30 feet per second.

Owing to the conditions of working and there being but a single track down the slope, the hoist is of the single drum type and operates under unbalanced conditions.

Perhaps the most interesting feature is the method of electrical control used and which is the Ward Leonard System, a brief description of which is as follows:—

The hoisting motor is a direct current shunt wound motor, but excited at a constant value from a separate source of supply. Under this condition the speed of the

motor is practically proportional to the voltage across the armature and quite independent of the load on the motor.

The winding motor receives current from a direct current shunt wound generator, usually termed "control dynamo," which is also excited from an independent source, but by means of a suitable regulator the current passing through the field can be regulated from zero to its full value and in either direction.

This control dynamo is driven by a three-phase motor to suit the source of supply available, and a small exciter is also coupled to this set for exciting the shunt fields of the hoisting motor and control dynamo mentioned above.

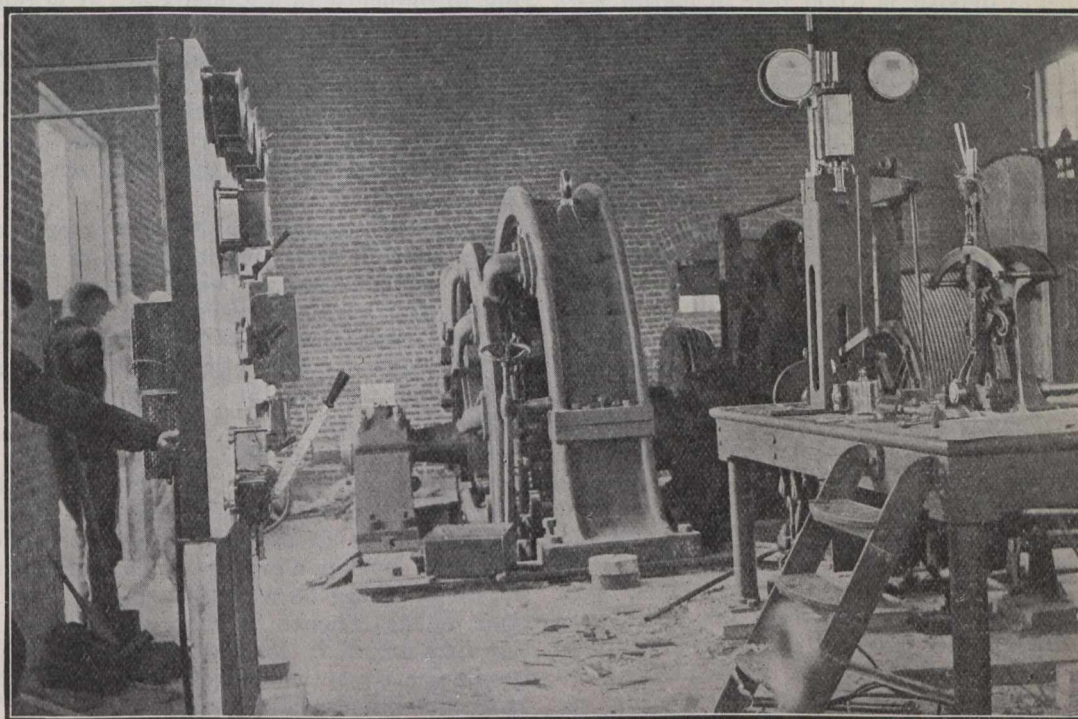
The speed of the control dynamo being constant, the voltage at its armature terminals is proportional to the field current passing, and as the armature is connected electrically to the armature of the hoisting motor, the

practically instantaneous, so that whether starting or stopping the speed of the widening motor exactly corresponds to the position of the driver's handle, and is under complete control.

The hoisting motor works up to a peak load of 1,360 h.p. when starting, and has a full load speed of 72 r.p.m. The maximum voltage is 600 volts and excitation pressure 220 volts. The control dynamo has an output and voltage corresponding to the hoisting motor, the speed however being 735 r.p.m.

The three phase motor driving the control dynamo and exciter has a mean output of 800 h.p., capable of working up to 1,600 h.p. on the peak load, and is designed for 2,200 volts, 25 cycles and 735 r.p.m. full load speed.

The exciter has an output of 18 k.w. at 220 volts. A depth indicator is provided arranged by means of cams to prevent the driver from accelerating too



Siemens Bros. Electric Coal Hoist, No. 14 Colliery.

voltage at the terminals of the hoisting motor and thus the speed, is proportional to the field current of the control dynamo.

It can easily be seen that if the direction of this field current be reversed, the polarity of the control dynamo and thus the polarity and direction of rotation of the hoisting motor is also reversed.

The field regulator is connected directly with the driver's control handle, so that the speed of the winding motor corresponds exactly to the position of this handle, and is quite independent of the load.

It will further be seen that when the winding motor is running at full speed, if the field current of the control dynamo be reduced, the momentum of the load and the revolving parts tends to keep the hoisting motor running at full speed. The voltage of the control dynamo having fallen, however, the voltage of the hoisting motor will overcome this, the hoisting motor then acting as a generator, and the control dynamo as a motor. This of course gives a powerful braking action until the system is once more balanced and the hoisting speed has altered itself to correspond to the new conditions. Being an electrical action it is of course

quickly, and also to stop the motor at the end of the wind, by returning the control handle to the off position if the driver fails to do so.

A Karlick Recording Tachograph is also provided which gives a complete record of the time and speed of each trip.

Coming to the mechanical features it will be noticed from the illustration that the hoisting motor is direct coupled to the drum, doing away with any intermediate gearing which thus ensures steady running and absence of vibration.

The winding drum is of the cylindrical type with cast iron cheeks. On the rim of each cheek is cast a brake path accurately turned. The shell is also of cast steel made in sections and bolted to a flange cast on the cheek. There are two sets of massive post brakes with compressed air engine for 60 lbs. pressure, including the Whitmore patent self-adjusting and variable load appliances, by means of which the load on the brakes corresponds to the position of the brake lever.

The equipment further includes an electrically driven air compressor and receiver for the brakes and all necessary switch gear, both three phase 2,200 volts and direct current.

THE BATHURST IRON DEPOSIT, N.B.

The development of the Bathurst Iron Deposit by the Canada Iron Corporation, Limited, by W. F. C. Parsons, chief engineer, and E. M. Archibald, mechanical engineer.

The Bathurst iron deposit is located on the Nipisiquit River in the County of Gloucester, N.B., about 24 miles south-west from Bathurst town. The mines are connected with the Intercolonial railway by a branch line owned by the company. The length of this line is 17 miles. The iron deposit consists of several large lenticular deposits of which numbers 1 and 3 are the largest. Number 1 lense is 2,300 feet long averaging about 130 feet in width and has been drilled to a depth of 527 feet, proving the continuity of the ore to that depth. Number 3 deposit is 6,000 feet in length with an average width of 75 feet. Drillings to the depth of 347 feet also show that this lense has a good depth. It is figured that in Nos. 1 and 3 deposits alone there is over 20,000,000 tons of ore available.

The present mining operations of the Canada Iron Corporation, Limited, is confined to No. 1 deposit which is on the west side of Austin Brook near the junction of this stream with the Nipisiquit River. This deposit rises about 70 feet above the bed of the Austin Brook and is being worked as an open quarry with a face of 60 feet. Large blasts are set off and the material is loaded into small 2 $\frac{1}{4}$ -ton cars by steam shovel. It is then trammed a short distance to the foot of an inclined trestle running to a bankhead. On this trestle an up and down car haul is operated, consisting of two endless chains with hooks spaced 12 feet apart to engage the axles of the ore cars. The up-haul conveys the loaded cars to the brow of the trestle where the cars run by gravity to a revolving tippie, which delivers the ore into the hopper of a No. 8K Gates crusher. The empty car gravitates to a kick back where it is automatically switched to the down haul track. The down haul catches the empty car and returns it to the foot of the slope ready for re-loading. From the hopper into which the loading car discharges, the ore passes directly to a No. 8K crusher where it is crushed to pass a 3 $\frac{1}{2}$ -inch ring and then is delivered on to a conveyor belt to be passed into the crushing department of the concentrating mill.

Plant.—1 Inglis Corliss Tandem Compound 16x32x36 inch, which operates the bankhead apparatus and crushing machinery.

Boiler Plant.—There are three McDougall Return Tubular boilers 72 in. by 16 ft., rated at 125 h.p. each, with 34 in. by 60 ft. steel stacks, and two Robb tubular boilers of the same size.

Compressor Plant.—The air compressor is an Allis Chalmers 2 stage cross compound 16x26x16 $\frac{1}{4}$ and 26 $\frac{1}{2}$ by 18 capacity 1290 cubic feet per minute of free air at 120 r.p.m. The central condensing plant consists of a 500 h.p. Worthington Barometric condenser to which all engines but the mill engine is piped.

The branch line between the mines and the Intercolonial Railway is the Northern New Brunswick and Seaboard Railway. It is laid with 85 lb. C.P.R. standard section rail and class A Dominion Government specification steel bridges. The rolling stock consists of 60-50 ton steel hopper cars, one I.R.C. standard consolidation locomotive and combination baggage and passenger car. The concentrates are then shipped to the company's ore pocket at Newcastle on the Miramichi

River. The mine is equipped to handle about 1,000 tons per day. The loading plant at Newcastle consists of 13,000 tons ore pocket. The ore is delivered from this pocket through a series of chutes into a continuous horizontal bucket conveyor operated on a track. This conveyor delivers the ore into an outer 150-ton pocket situated on a dock. From this pocket the ore is loaded into the vessel by means of a self-trimming chute. This plant is capable of loading at the rate of 3,000 tons per hour, and is operated by five men.

The run of mine ore after receiving its primary crushing in the No. 8K Gates gyratory crusher to pass a 3 $\frac{1}{2}$ -inch ring then passes through a secondary crushing to reduce it to a 2-inch size. It is then discharged into a storage bin of 700 tons capacity, the sole object of which is to act as a balance between the mine and the concentrating mill, providing for short stoppages and irregularity in operation. Should the mill be out of commission for a short time, the mine remains in regular operation filling up the storage pocket, and vice versa.

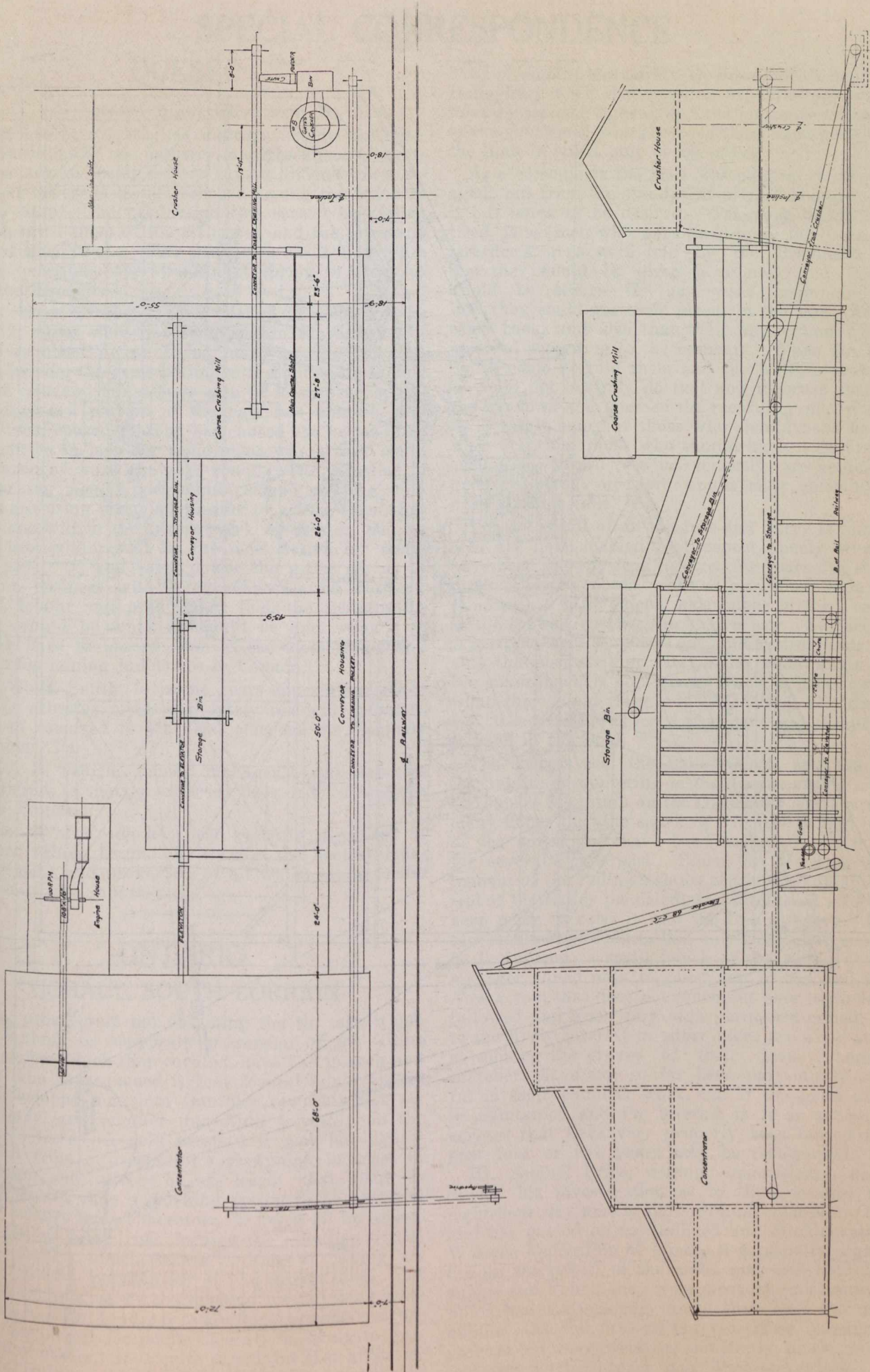
From the storage pocket the ore passes through the concentrating mill, and concentrates discharged either into a 500-ton loading pocket whence it may be loaded direct into cars or passes on to a stock pile. Tailings are conveyed about 150 feet from the mill to a point suitable for a dump pile. Provision is also made to load these tailings into cars for ballast for the railroad.

Coarse Crushing Mill.—The crude ore is conveyed from the hopper under the primary crusher on a 24-inch conveyor belt set at an angle of 15 degrees thence discharged at right angles into the boot of a continuous steel bucket elevator which discharges at the top of the building on a small grizzly set to remove fines and muck. Thence through a revolving bull screen 4 ft. diameter, 6 ft. long, with 2-inch round holes. The undersize from this passes directly to a conveyor belt discharging into the storage pocket. The oversize of this screen delivers into a set of Traylor rolls 54-inch diameter, 24-inch face. These are set at 1-inch opening. The product of the rolls is re-elevated in a steel bucket elevator to a second revolving screen 4 ft. diameter, 6 ft. long, with 2-in. round holes, from which any oversize is returned directly to the rolls. In this manner all oversize of a 2-inch round hole is kept in continual circulation until crushed. This is very necessary with this ore on account of its physical tendency to break into large thin slabs, impossible to properly stratify in a jiggling concentration process. This crushed ore is now ready for concentration, and delivers to an 18-inch conveyor belt set at an angle of 15 degrees and discharging into the top of the storage pocket.

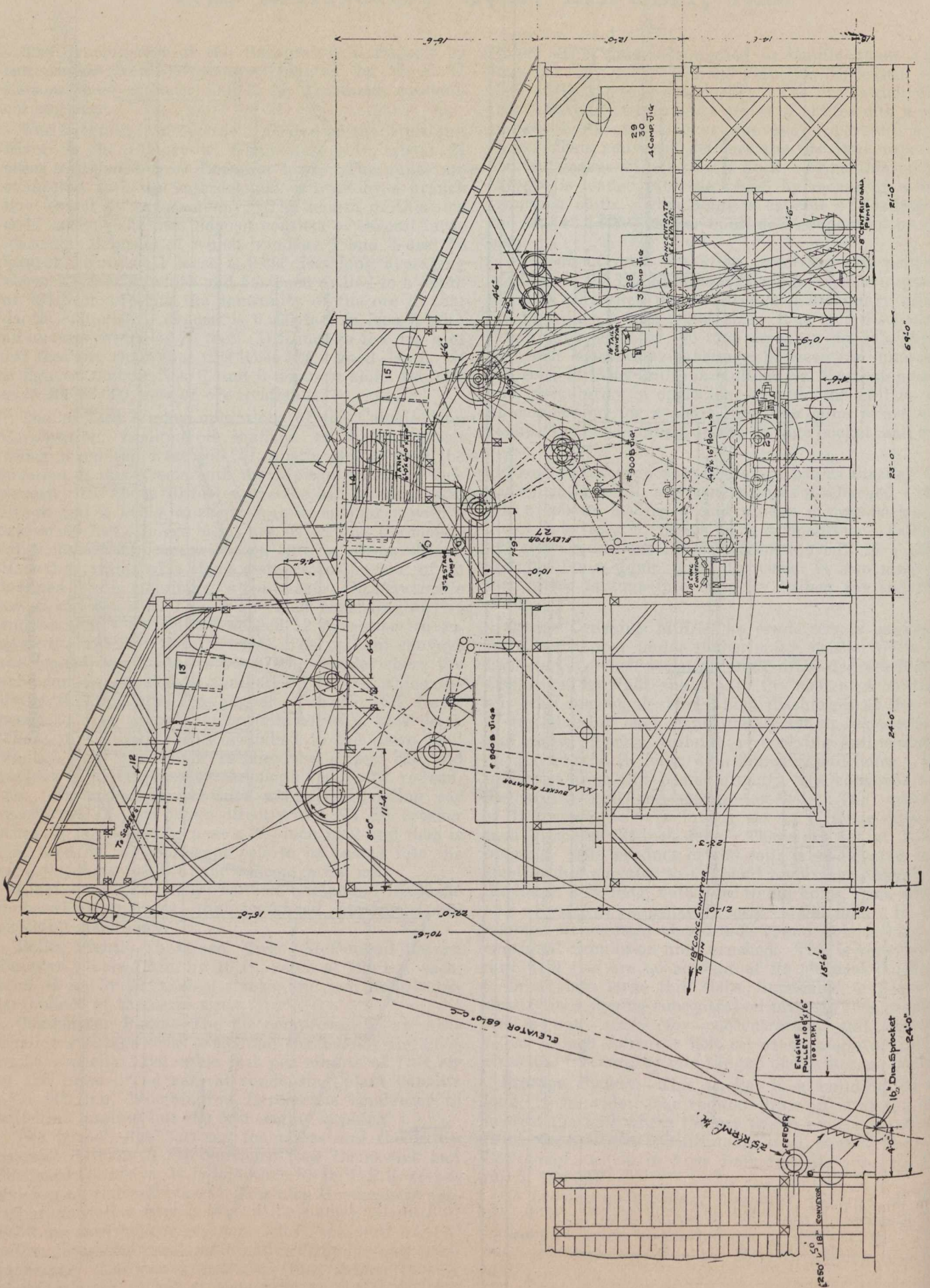
Storage Pocket.—This pocket is a building 50 ft. long, 15 ft. wide. The regular draw-off is at the end nearest the mill where the ore passes over a revolving drum feeder into a continuous steel bucket elevator 70 ft. high, which in turn discharges the ore into the top of the mill.

To provide an auxiliary discharge to draw off the pocket, an 18-inch conveyor belt runs underneath fed by several gates in the bottom of the pocket. This belt also discharges into the elevator feeding into the mill.

(To be continued.)



Bathurst General Layout



Bathurst Concentrator Elevation.

SPECIAL CORRESPONDENCE

QUEBEC

Thetford Mines, Que., Sept. 21, 1912.

There has been a marked improvement in the business conditions of the industry, and the almost forgotten spectacle of seeing buyers having difficulty in placing their orders is being recorded among the wonders of the camp. The production this season has fallen about a third short of the estimates, and the prospects are that some of the "fibre producers" will be given a chance to resume operations next spring in order to meet the demands.

The reason of the sudden change in conditions is that the mines were unable to obtain the amount of labour required owing to so many of the working classes leaving the camp owing to the uncertain labour market. Several mines have seen fit to suspend operations during a portion of the past two winters, and the distress caused thereby has caused the better class of labourers to look for some place where they could be assured of work the year round. The injustice to the working men is now acknowledged and the companies are using strenuous means to assure them that operations will in the future work all winter, and no doubt this winter will be the most active for many years past. O, wad some power the giftie gie us to run our business with some sane relation between capital, labour and production; then the asbestos industry would be what it should be and what it is striving hard to become, one of the most stable and prosperous mining industries in Canada.

Mr. W. H. Smith, for some years superintendent of the Bell asbestos mines and lately resident manager, has been removed to the head office of the company at Ambler, Pa.

Mr. J. D. Sharpe, general manager of the Asbestos Corporation, is shortly expected back from a business trip to England.

A Board of Trade has been recently instituted in Thetford Mines, having for its aim the healthful encouragement and promotion of all which tends to the progress of the industry.

ONTARIO.

COBALT, SOUTH LORRAIN

Those prospectors not obtaining the tin tags which entitled them to temporary possession of the Gillies Limit claims which they coveted, have had to seek new fields. The consequence is that several minor rushes have developed, one into Gauthier township not far from Dane, and another into Auld township on the Montreal River. A gold prospect is now but lightly regarded from a prospector's viewpoint, at least in comparison with silver; he has learnt that there is nothing better than a working option to be obtained and on meagre terms; therefore the cry is all for silver.

The Gillies Limit rush focused the attention of the general public, which knows nothing of mining, on the speculative possibilities of the silver camp, and there is again a very keen demand for anything with a chance to make good. Already the stampede has furnished one arrest for perjury, and it is likely to provide many others. It is quite significant that although a special train was hired it did not land its enterprising

band of stampeders on Mr. George Smith's doorstep at Haileybury until that position of advantage was well filled by waiting figures, and the inference is that some of the gentlemen who preceded them must have been in the limit in spirit only or by proxy.

As a comedietta the rush was admirably stage managed; but from the standpoint of justice and fair play it left much to be desired. Take one instance. The tired, jaded men who were lined up in the dawn on the recorder's steps were told by the Provincial police that they would be given a number and that they would be secure if they went home and slept that they could get their places in the line when they came back, and also that their application would be received according to the numbers. When Mr. George Smith came he told them and the waiting crowd that he could not lawfully do that and the rush that broke the windows and jammed the recording office followed. As a result many of those who should have been last were first, and those who should have been first were last. The crowd was marvellously law-abiding and good tempered, or there would most certainly have been much trouble.

The net result of all the fuss and flurry is that many men are now enabled to prospect openly what they have been secretly looking over for years. No startling discoveries have been made as yet; some wide calcite veins with a little galena and copper in them comprise at the time of writing the known bag. But according to location there should be some interesting finds. Probably the most striking fact in the whole affair is that the government is now giving away in small packages what they could have got \$20,000,000 for six years ago, when faith was more abundant and the promoter reigned in the land.

The success that the Bailey-Cobalt and the Cobalt Central are encountering in their resuscitation exercises at Diabase Mountain on the Glen Lake shore is waking many hopes that the spark of life still lingers in some of the mines that have been regarded as "floaters" for several years past. Since Mr. Benson, superintendent of the Pullman shops at Chicago, obtained control of the Bailey persistent and intelligent efforts have been made to raise it into the line category. Until a few months ago results had only been good enough to be tantalizing; a small bunch of ore would decoy the manager ahead only to pinch out in a round or two. Now a vein that does not pinch out over night is being followed and some very high grade ore mined. Owing to the lively interest in silver there are some attempts at robbing the graves of their dead. These body-snatchers have not so far been particularly successful in their ghoulish work, but if the price of silver is maintained and the interest in it as active, many corpses that have very properly been buried for the past four or five years may be resurrected.

Mr. Samuel Price, mining commissioner, has conducted his investigation as to the necessity for an eight-hour day among underground miners in Ontario, and has passed on to Sudbury and Michipocote. The Western Federation of Miners is personally urging the bill on the behalf of the union men and both in Porcupine and Cobalt they were strongly represented. The union had matters very much their own way in Porcupine. At the first sitting two mine managers appeared, but they were so manifestly in the minority that for the most part they were spectators. There

was no organized opposition in Porcupine at all, the majority of the mine managers ignoring the investigation altogether.

In Cobalt the case was quite otherwise. The Cobalt Mine Managers' Association presented a closely reasoned argument against the bill signed by agents of twenty-seven mining companies. It is stated that an eight-hour shift would reduce production and dividends by 31 per cent., and would necessitate a 31 per cent. cut in wages. A tabulated statement was presented from the mines hospital of Cobalt that sickness among the men only amounted to 2.2 days per year per man, so that underground mining could hardly be called an unhealthy employment. The mine managers stated that they were in active competition with Mexico and South America where silver could be produced cheaper and that any interference with the existing scale of operations would tend to make capital shy of the country. The statement was read by the commissioner at the opening of the night session at Cobalt and the Western Federation speakers following attacked some of its conclusions. An unusual interest was taken in the investigation both in Porcupine and Cobalt and the meetings were invariably crowded with those who wished to urge the passing of the measure. At both camps there was a unanimous vote for the passing of the measure and enthusiasm was undoubted, but whether the crowd present represented the opinion of the underground miner in the camp is another matter. Mr. Samuel Price made an ideal investigator. He heard all men and urged the fullest discussion. He was patient as long as patience was a virtue, but at Cobalt reproved a pert speaker with such force that he never had any more trouble.

Very interesting is the discovery that the Beaver vein at the 530-foot level holds just as high grade values where it is in the diabase as in the Keewatin. The pay streak is just as high grade and there is far more silver in the wall rock. While it is yet far too early to make any deductions for the future the discovery does tend to break down the uncomfortable theory that in the South Coleman area when the diabase contact was reached the values would disappear or be so patchy that mining would yield relatively poor returns. This theory had gained much strength from the development at the Temiskaming where ore was very much poorer in the diabase than in the Keewatin. If the development is not a freak, the discovery will rank as one of the most important in the Cobalt camp during the year 1912.

The Beaver Consolidated has taken possession of the Elk Lake property it has recently purchased, and the Donaldson is to be equipped at once with a compressor plant and development prosecuted with vigour.

The production of the Cobalt Lake mine is being maintained at a good level. In July it produced 100,000 ounces, and in August 120,000 ounces. The new mill is working satisfactorily. Previously the Cobalt Lake made dissatisfied shareholders and deficits its principal output.

Some conception of the richness of the short shoots of ore in the veins at the Temiskaming mine may be obtained from the car of ore that went out last month. It contained thirty tons and was worth at least \$75,000, or sufficient to provide one quarterly dividend.

PORCUPINE AND SWASTIKA

In the absence of any returns from the producing companies in Porcupine the shipments of copper from Dane and nickel from Iroquois Falls is interesting. The

Alexo property is maintaining a steady stream of ore from their siding near Iroquois Falls on the T. & N. O. Railway to Victoria Mines, near Sudbury. The ore is being mined most economically and a fair profit can be made. But what is perhaps more important, development is revealing an ore body much larger than could be demonstrated existed before.

The first high grade copper that has perhaps ever been shipped in marketable quantity from Northern Ontario left Dane station last month. The sixty tons of ore was shipped to the United States Metal and Refining Company at Chrome, New Jersey. The Dane Mining Company, formerly known as the McKinnon Syndicate, owns 1,200 acres near Dane and are proceeding deliberately to discover what they have got. The shipment of ore was made more for testing purposes than with the idea of continued production for at the present time the long haul to the station and the bad roads run up costs rather high. The company has let a contract for several thousand feet of diamond drilling on the property and is endeavouring in every way to make a mine of importance. They have as their engineer Mr. G. O. McMurtry, who came direct to Northern Ontario from the copper country at Bisbee, Arizona, where he had been working at the Copper Queen.

The unsubstantial character of the claims of the diamond seekers in Ungava is made more evident by the return of several prospectors from James Bay. James Muir, of Haileybury, has brought back blue clay which he found up there, but no diamonds. He states that the Indians he met told him that there had been no white men in the country for many years. The trip was an arduous one.

While there is silence absolute as to the production of the Porcupine camp, it is known that the Dome, Hollinger and McIntyre are making clean-ups which satisfy the management that their mill practise is correct. The Dome is producing steadily now, treating nearly 400 tons per day, and the Hollinger can see the end of their troubles. The design of the mill at the Hollinger has been a subject to the same severe criticism which assails all matters relating to this company, but the proof of the milling is in the extraction, and there now appears ground to hope that no bad errors have been made in the construction of the plant. In the light of practise at the McIntyre and the Vipond it appears that the mill might have been built at a considerably smaller cost than it actually was, but it is very probable that the features it now contains would have had to be added at a later date when their ore became more refractory. There is a very natural impatience among shareholders to have some figures as to production and it is this lack of knowledge that has probably inspired most of the adverse criticism. It is understood in camp that the Dome and the Hollinger have come to an agreement to publish figures as to production on or about the fifteenth of this month, and from every point of view this course would be very desirable.

Quite a little flurry was caused in the northern section of the Porcupine field by the discovery of native gold in ore at the 150-foot level of the Hughes Porcupine mine. The upper levels had not presented any great encouragement for the future.

The Porcupine Lake is also proceeding with vigour to erect buildings and house plant on the Hunter claims in Golden City and Whitney and Northern Tisdale for the past month very quiet indeed, have become much more active.

It is to be feared that the Schumacher syndicate has lost its mine and rendered useless the work that has so far been completed. The company was cross-cutting from a shaft to the south of the town towards Pearl Lake at the hundred foot level. The day before the accident happened the ground seemed very soft and it was determined to shoot one more round in the morning and abandon the cross-cut. The morning's shots let in the water and the sand and caused a hole in the highway fifteen feet deep by sixty feet wide. Several buildings were undermined.

While work on the second level of the Vipond is revealing an unexpected width of ore in the Davidson vein, developments at the third level have not been so satisfactory. So far no shoots of ore of the grade found at the upper levels have been cut in the development work at the 300 foot level, though as yet little work has been done.

Cobalt, Gowganda and South Lorrain

It is now evident that while the Cobalt mines will make more out of their silver in 1911 or ever before, the production of metal will be less. This conclusion was foreshadowed in the bulletin of the Department of Mines for the first three months of the year, and is confirmed by the record for six months. The production table as it affects the Cobalt camp reads:

Silver, 14,258,403 ounces, value \$7,936,600.

Cobalt, cobalt and nickel oxides, 854,324 lbs., value \$192,073.

The reduction in the production of the silver district of Northern Ontario for the first six months of 1912 amounted to 973,566 ounces, but owing to the higher prices of silver \$292,400 more was received for it. It is very interesting to notice that after years in which the by-products of Cobalt's ores have been a drug on the market, there has been a little quickening of interest and cobalt, and cobalt oxides realized \$192,073 for the first six months of this year, or three times the amount obtained last year.

The revised shipments for the month of August, prepared for the T & N. O. Ry., by Mr. A. A. Cole reads:

Last month the Trethewey produced 62,200 ounces of silver, or a little higher than the average run about 60,000 ounces per month. According to Col. A. M. Hay, for the first seven months of the year the net profits were \$101,294, or nearly twenty per cent. on the capitalization. The floating assets of the company including cash and ore at the end of July amounted to \$127,500. The flow sheet at the mill has been changed so that the production can be raised by 25 per cent. If the company desired this year it could probably wipe out its capitalization as it has already disbursed 84 per cent. in dividends. While the Trethewey has never gone on a quarterly basis it has usually paid 20 per cent. per year. It has already paid ten per cent., and will probably make another disbursement of the same size in the fall.

All the expeditions to Ungava, Baffin's Bay, and the East Coast of Hudson's Bay have failed. The two most ambitious undertakings have just returned. "Lucky" Scott and his crew which include two members of the Holland family, have just reported from Newfoundland. They found no trace of gold and believe that it is a myth. But they did bring back with them some fur and other "trade." The other expedition was even more unfortunate. The ship commissioned by Captain Munn for some English interests

and sailed by Captain Bartlett was crushed in an ice jam and the members of the party were very lucky to be saved by "Lucky" Scott's party. As the New York party took with them a moving picture operator it is probable that the films may prove a little salvage from the venture.

Most of the prospectors who adventured to the east coast of Hudson's Bay in search of the diamonds which a man named Grant is reported to have found have returned with no intention of going back next year. They report that the distances are so vast that even if they believed there was anything there it would take years to locate it. One Haileybury man got within 400 miles of the spot where some Indians said Grant had said he had found some diamonds, and another man exhibited clay which might have contained diamonds if it had been in the Transvaal. But that is all. It will be very interesting to learn how Mr. Robert Flaherty fared when he returns this winter. For Sir William Mackenzie and his associates Mr. Flaherty has been on the shores of Hudson's Bay for eighteen months, and he will certainly have covered a great deal of ground. He is returning to Canada via England, and will probably not be seen here much before Christmas. He was well and properly equipped for the expedition and knew his ground well, so that he has a much better chance of success than many of the expeditions that left late in the spring from Northern Ontario.

The Ontario Government has given notice that no more work must be done on disputed claims in the Gillies Limit, or rather that no more work must be done on the discoveries which the contestants believe will establish their right to the claim. They can if they like prospect on another part of the claim and endeavour to make another part of the claim and twenty-five claims still under dispute. Many of the stakers have agreed among themselves believing it is better to compromise with your opponent than to subject the matter to law's delays and lawyers fees. There have been no startling discoveries in the Limit and most of the prospectors who took part in the stampede have sought fresh fields. One of these is in Auld Township half way between Elk Lake and Latchford on the Montreal River. Here a narrow vein of calcite showing native silver has been uncovered, and there has been some staking. There was also a mild stampede into Gauthier Township in the Larder Lake mining division. Three Haileybury Frenchmen have discovered some native gold in a quartz vein there.

The Tongue claims near Hubert Lake in the Elk Lake section have been sold to a Toronto syndicate who have already begun to develop them. The owners of the claims were Dr. C. W. Haentschel, of Haileybury, and Sam Tongue, of Mattawa. Mr. A. P. Seymour, formerly manager of the Cobalt Lake mine, is superintendent for the purchasers.

The excellent results that have lately been obtained on the Bailey and old Cobalt Central, at Cobalt, has determined the Alexandra Mining Company, which holds the next property, to re-open their mine.

Work on the Foster has as yet been confined to the surface. Mr. T. J. Flynn, who is in charge for the leasing syndicate, is making a study of the conditions in the Kerr Lake section before he does any underground work.

Porcupine, Swastika and Larder Lake

The returns furnished by the department of mines for the first six months of 1912 give some very reassuring statistics as to the manner in which the Porcupine

camp is making good. During that time the Province of Ontario produced 11,854 ounces of gold worth \$235,198, a very puny sum no doubt in comparison with the millions of Cobalt, but nevertheless \$192,878 more than last year. For this increase the Dome mine of Porcupine is responsible to a very large degree. The Dome mine first dropped stamps at the end of March, but the accident to the tube mills prevented any steady practise till the end of May. It will be seen, therefore, that Porcupine was but just getting into its stride at the end of June. The Hollinger mill did not crush ore until the end of June, and for several months the troubles that invariably await the trying out a new plant cut off production. Now it is learned on definite, but not official information that during the month of August, the Hollinger produced \$200,000 with but thirty stamps dropping. The mill is now running quite smoothly, and there is little doubt but that that rate of production can be maintained and when the ten other stamps are added, accelerated. It is also understood that in the first week in September the Dome produced almost \$50,000.

The Dane Mining Company has made its first shipment of high grade ore. This first shipment of ore went to a New Jersey smelter. The Montreal syndicate controlling the company have purchased a large acreage round the mine, and evidently intends to build up a property if the ore is there. For the first time in the history of the camp a Cobalt company was paid for copper as a by-product. The ore came from the bottom levels of the Temiskaming mine. To-day Northern Ontario is shipping and producing gold, silver, copper and nickel.

The Schumacher syndicate sustained a severe loss when the drift caved in and the waters of Pearl Lake followed. A cross cut was being driven from a shaft south of the town to Pearl Lake at the 100 foot level. The night shift had found the ground soft and it was determined to put off one more shot. That round of holes was fatal for it broke through the rock into the sand and the drift being below water level Pearl Lake followed, and the mine was lost. Traffic along the highway between South Porcupine, Schumacher and Timmins was held up until the hole had been filled in.

At the third level of the McIntyre mine the ore has undergone a decided change. In the face for a width of 26 feet there is little visible gold, but the rock is heavy with fine sulphides. The management claims that at this point the ore averages \$16 per ton right across the face.

BRITISH COLUMBIA.

Another dividend of 2½ cents a share on its 2,000,000 shares—total amount of this distribution, \$50,000—was paid by the Standard Silver-Lead Mining Company on August 9. This brings the aggregate of dividends paid in five consecutive months up to \$225,000.

The gross value of metals produced at the smelter of the Consolidated Mining and Smelting Company of Canada, Limited, at Trail, West Kootenay, during the fiscal year ended June 30, last, was approximately \$5,083,000, and of this the proportion in gold was 52.3 per cent. This total compares with that of \$4,437,901 for the year ended June 30, 1911. Earlier corresponding periods showed totals as follows: June 30, 1910, \$5,911,767; June 30, 1909, \$5,505,526.

The discovery of placer-gold, stated to be in paying quantities, was reported from Kamloops late in August. The locality is given as Louis Creek, about 30 miles

north of Kamloops. The creek is described as being a tributary of the North Thompson River, coming in from the east. Bed rock is said to be only six feet from the surface in one claim bottomed. The entire creek has been staked, so outsiders are likely to have a fruitless journey if they go there with the expectation of finding unstaked ground.

Mining Near Nelson.

Kootenay Gold Mines, Ltd.—The Kootenay Gold Mines, Ltd., continues to mine and mill gold ore from its Granite-Poorman group of mines, situated a few miles west of Nelson. This property has been worked for years, mining from 10,000 to 12,000 tons of ore each year. The brief particulars of its operations in 1911, as printed in the recently published "Annual Reports of the Minister of Mines" for that year, are as under:

"The Granite-Poorman, on Eagle Creek, operated its 20-stamp mill continuously. An addition to the mill, 36 by 70 ft., was built, and in this is a plant for the treatment of iridium and palladium—stated by Mr. A. Gordon French to be contained in the ore—and which is just ready to be put in operation. A new sorting house was built at the No. 4 Poorman tunnel to facilitate sorting the waste from the ore. The development work during the year has greatly added to the reserves of the property. In the No. 4 Poorman tunnel a vein called the 'Hardscrabble,' that had been crossed when the tunnel was driven, was drifted on for 432 feet, and a raise put up 90 feet. This opened an oreshoot for 300 ft., showing from 6 in. to 3 ft. of ore, 8 ft. being the width of the vein at present, which is at a depth of 200 feet below the surface. As this is a parallel vein to the old Poorman vein, it adds greatly to the life and value of the property. There was also done during the year 197 ft. of cross-cutting in the White, 145 ft. of cross-cutting and 375 ft. of raising in the Greenhorn, and 315 ft. of drifting and 354 ft. of raising in the No. 5 level of the Poorman."

Last month it was ascertained from the manager that during 1912 there has been driven some 600 ft. on the Hardscrabble vein, and ore has been stoped from this vein. The average width of good ore has been about 2 ft., there is approximately 550 ft. of backs above, so much more ore should be obtained from this vein. The ore ranges in gold content up to a value of \$20 a ton, but as much barren rock has to be broken down with the ore, the average value is reduced, and consequently the mill feed runs but \$7 to \$8 a ton. Dikes cutting the vein cause much trouble, but usually ore containing a higher value in gold is found near the dikes.

Perrier Group.—Work is being continued on the Perrier group, distant from Nelson about three miles, along the Great Northern railway southward to Spokane. The main lead has been opened in several places on the surface. Further sinking has been done, and now a cross-cut is being driven to intersect another lead.

The plant is being added to—a small crusher is being put in, also a Triumph vanner. That previously installed includes a small compressor and a Huntington mill. The ore contains gold; it is intended to shortly begin concentrating it. A trial run was made lately with the Huntington mill, and from 700 lbs. of ore gold to the value of nearly \$40 was obtained. Ordinarily, though, the value of the gold content is about \$20 a ton. Not much ore has yet been shipped; some time ago 19 tons was sent out to ascertain its value in bulk. This property is owned by Nelson men.

Granby Co. Prospecting Bonanza Group.

On August 1 there was printed in The Canadian Mining Journal the report of Mr. Donald G. Forbes, made for the Provincial Department of Mines, on the Granby Company's Hidden Creek mines near Granby Bay (formerly known as Goose Bay), which account of that important property was reprinted from the "Annual Report of the Minister of Mines for British Columbia, 1911." The following information concerning another group of mineral claims situated in the vicinity of the Hidden Creek group, to which the Granby Company is giving attention, was obtained recently from Mr. Jay P. Graves, vice-president and general manager of the company, when the writer was in Spokane, Washington:

In addition to the large amount of development work the Granby Company is doing in its Hidden Creek mines, and the extensive surface improvements it is making in connection with those mines and the copper smeltery it is intended to establish at Granby Bay, the Bonanza group of mineral claims is being prospected by the company.

The Bonanza group consists of twelve full and fractional claims. Part of this property is within one mile of the Granby Company's smeltery site, and the group extends clear down to tidewater. The company holds these claims under option of purchase from H. Doyle and associate owners. The purchase price is \$70,000, and under the terms of the option, the company has one year within which to explore the property and decide whether or not it will purchase it. The agreement also stipulates that not less than \$1,000 a month shall be spent in development work while the option shall hold good. The ore showings are stated to be strong, and similar in appearance at the surface to some of those on the Hidden Creek group. As the character of the ore deposits appears to be like that of those in adjacent mines, it is expected the formation and conditions generally will also be found to be similar. Diamond drilling has been commenced, and the first 20 feet of core gave assay returns of from two to three and one-half per cent. copper. Ore from open cuts ranges from three to five per cent., and even up to as high as nine per cent. copper. It may be added that it is understood present indications are favourable for the property proving under development good enough for the company to purchase, in which case its holdings in the vicinity of Granby Bay will be considerably increased in area.

British Columbia Copper Co.'s Operations.

When at Greenwood in July the writer was informed that during the expired six month sof 1912 the British Columbia Copper Company had treated at its smeltery there 302,747 tons of ore from its own mines in the district tributary to Greenwood, and had produced 5,362,226 lbs. of blister copper. This compares with a tonnage for the whole of the fiscal year ended November 30, 1911—twelve months as against six in the current year—of 598,758 tons of ore smelted and 10,044,093 lbs. of blister copper produced, so that the proportionate production for this year shows a satisfactory increase, both in quantity of ore smelted and blister copper made.

This company is also operating in Vogt's camp, near Princeton, Similkameen, where it is exploring several mineral claims of a large group held under option of purchase. The energy with which the work of exploitation is being conducted will be indicated by mention of the fact that five diamond drills are being used in prospecting these claims, in addition

to much ordinary development work being done in endeavours to determine the approximate quantity and metal contents of the ore in the ground being explored.

In Boundary district, the company's largest mining operations are being conducted at its Mother Lode mine, near Greenwood, and the Rawhide mine in Phoenix camp. The latter is owned by the New Dominion Copper Company, a controlling interest in the shares of which is owned by the British Columbia Copper Company. Officials of the latter company also direct the work being done at the Rawhide mine. The Lone Star and Napoleon mines, in the neighbouring State of Washington are both owned and operated by the British Columbia Copper Company; ore from these mines is being received at the company's smeltery at Greenwood. In the company's last fiscal year the Napoleon shipped more than 14,000 tons of sulphide ore for use as a sulphur flux, while the Lone Star shipped only a little more than 3,000 tons, its ore being of a refractory nature and so less suitable for low-cost smelting. The current year's smeltery receipts to date from these mines show totals of approximately 6,000 tons from the Napoleon, and 3,000 tons from the Lone Star.

Other mines being worked by this company are the L. H.—a gold ore property situated a few miles from Silverton, Slocan Lake—and the Eureka copper mine, in Nelson mining division. It was reported recently at Silverton that the L. H. is developing encouragingly, so that it is hoped the company will take up its option on the group, but no information had been received that can be regarded as reliable. As to the Eureka group—it is stated that the purchase price named in the bond on this property is \$50,000, and that in the past approximately 2,000 tons of ore has been shipped from the mine. The average metal contents of the ore shipped have been reported in newspapers, as follows: Copper 5.5 per cent., and silver 2.1 oz., and gold 0.21 oz. per ton. Machinery and plant from the company's Wellington group mine, recently closed, has been shipped to Nelson for use at the Eureka.

It is noteworthy that some weeks ago announcement was made in New York that the company was making profits at the estimated rate of about \$750,000 a year. On August 24 the Boston Commercial printed the following news item: "The British Columbia Copper Company's metal production for the first ten days in August was the largest in the history of the company. Earnings as published for July do not include the income from its New Dominion Copper Company investment. Including these, the total is more than double its dividend requirements."

Mr. Chas. Camsell in Similkameen.

The Hedley Gazette of August 29, includes the following in its mining news: "Mr. Chas. Camsell, of the Geological Survey of Canada, came to Hedley on the 26th inst. from Tulameen and Princeton, and expects to put in about a fortnight in this vicinity, looking over the camp and keeping his data thereon strictly up to date, as well as making further investigations. He has spent a busy summer going over the route mapped out for the excursion next summer of the visiting geologists from other lands, and the members of the International Geological Congress who will be shown over the route by him will be fortunate in the guide whose services will be at their disposal. He has finished most of his maps and guide books and sent them in to the department, Ottawa.

“Mr. Camsell has been on Copper Mountain, near Princeton, where development is in progress. Before going there he spent a couple of days in the platinum belt on the Tulameen with the representatives of two large concerns. These were Mr. J. E. Colby, of the firm of Baker & Co., platinum dealers, of New York; and Mr. A. B. Coussmaker, representing Johnson Matthey & Co., of Hatton Gardens, London, England, the largest platinum dealers in the world. The world’s supply of platinum in sight is diminishing year by year, while the demand is constantly increasing, so it is now up to mining men to discover new platinum fields. This situation may lead to an extensive exploration of the platinum-bearing gravels on the Tulameen River.

“Messrs. Selby and Coussmaker were fortunate in having Mr. Camsell go over the field with them and explain the geology of the district, which he has so carefully worked out.”

COMPANY REPORTS.

NEW DOMINION COPPER COMPANY, LIMITED.

The report of the New Dominion Copper Company, Limited, for the fiscal year ended March 31, last, shows total shipments of ore during the year amounting to 179,605 tons. Four series of shipments were made to the British Columbia Copper Company’s smeltery at Greenwood under various rates for smelting. The existing rate on April 1, 1911, was upon the basis of the New Dominion Copper Company paying the actual smelting cost of the British Columbia Copper Company, plus 50 cents a ton.

Owing to the strike of the coal miners in the Crow’s Nest Pass coal district and the importation of Connelville, Pennsylvania, coke by the British Columbia Copper Company, the smelting costs of that company

were increased and a new arrangement for the smelting of the New Dominion Copper Company’s ore was accordingly made. This arrangement was put into effect on June 1, 1911, and was, in substance, a minimum royalty of 20 cents a ton to be paid to the New Dominion Copper Company by the British Columbia Copper Company, after calculating ore returns on the basis of the previous arrangement.

The grade of ore, combined with the increase in smelting costs due to use of Pennsylvania coke, and the decreasing price of copper, did not allow of any royalty being paid beyond this. Subsequent to July 1 the ore has been smelted on a new basis, arrived at by a committee of impartial engineers representing the respective interests concerned, these engineers having fixed a definite smelting rate and slag deductions. Apart from this the British Columbia Copper Company guarantees to the New Dominion Copper Company a fixed profit of 15 cents a ton, regardless of whether or not such amount is realized from the ores.

The balance sheet as of March 31, 1912, follows:

Assets.	
Mines, smeltery and other properties . . .	\$1,311,891
Inventories and ore in transit	26,059
Unexpired insurance	701
Accounts receivable	91,125
Cash in banks	114,579
Profit and loss account	149,102
Total	1,693,457
Liabilities.	
Capital stock	\$1,178,320
Income bonds	491,725
Accounts payable	15,778
Reserve	7,634
Total	1,693,457

STATISTICS AND RETURNS

COBALT ORE SHIPMENTS.

While this week’s ore shipments show a slight falling off from the average, the bullion shipments are much greater than usual. The Nipissing sent a large consignment of 102 bars of silver to England, and the Drummond appeared again in the list of bullion shippers after a lengthy absence. Practically all of the bullion shipped by the Dominion Reduction Company came from Kerr Lake ore. Following are the ore shipments in pounds for week ending September 21, graded:

Trethewey, 1h.	55,300
Buffalo, 2h.	121,651
Cobalt Townsite, 1h.	93,300
Cobalt Lake, 2h.	153,480
O’Brien, 1h.	65,973
La Rose, 1h.	89,477
Nipissing, 1l.	64,110
Chambers-Ferland, 1l.	64,000
Temiskaming, 1h.	56,063

Total 765,354

The shipments for the week and for the year to date in tons are as follows:

	Week Ending	Year
	Sept. 21.	to date.
Beaver	244.26

Buffalo	60.82	864.57
Casey Cobalt . . . . .	. . . . .	212.15
City of Cobalt . . . . .	. . . . .	887.99
Cobalt Lake	76.74	663.65
Cobalt Townsite	47.74	1,254.68
Chambers-Ferland	32.00	321.05
Coniagas . . . . .	. . . . .	1,515.41
Crown Reserve . . . . .	. . . . .	351.10
Drummond . . . . .	. . . . .	330.30
Hudson Bay . . . . .	. . . . .	538.47
Kerr Lake . . . . .	. . . . .	529.92
La Rose	44.73	2,537.23
Lost and Found . . . . .	. . . . .	15.00
McKinley-Darragh . . . . .	. . . . .	1,919.88
Nipissing	32.05	1,630.72
O’Brien	32.98	453.31
Penn-Canadian . . . . .	. . . . .	29.70
Provincial . . . . .	. . . . .	22.22
Right of Way . . . . .	. . . . .	242.82
Temiskaming	28.03	797.01
Trethewey	27.65	381.54
Wettlaufer . . . . .	. . . . .	265.74
Colonial . . . . .	. . . . .	63.14
Totals	382.65	16,111.90

The week's shipments of bullion were:

	Ounces.	Value.
Crown Reserve	8,529.00	\$5,200.00
Dom. Red. Co.	11,902.08	7,435.76
Buffalo	14,077.00	8,500.00
Nipissing	114,131.01	72,336.29
Trethewey	10,943.00	6,784.00
Drummond	1,066.08	672.00
Totals	160,648.17	\$100,928.05

The bullion shipments from the camp to date for the present year are:

	Ounces.	Value.
Nipissing	2,715,460.69	\$1,618,230.62
Crown Reserve	298,801.26	163,271.94
Temiskaming	38,782.00	23,165.10
O'Brien	146,049.33	86,055.39
Nova Scotia	49,010.00	31,800.00
Buffalo	82,157.00	48,914.54
McKin.-Darr.	80,327.00	6,069.37
Kerr Lake	19,223.70	11,678.95
Trethewey	20,637.08	12,416.16
City of Cobalt	4,285.94	2,267.20
Colonial	1,698.00	1,018.00
La Rose	41,189.00	22,975.00
Wettlaufer	3,280.62	2,003.14
Cobalt Lake	5,256.88	2,989.75
Right of Way	505.50	273.00
Cobalt Townsite	2,984.50	1,790.00
Drummond	2,542.90	1,558.00
Casey Cobalt	940.00	574.00
Dom. Ded. Co.	64,306.06	40,296.03
Miscellaneous	16,672.56	11,050.14
Totals	3,594,201.49	\$2,145,662.39

BRITISH COLUMBIA ORE SHIPMENTS.

Ore production in the Kootenay and Boundary districts for week ending September 14 totalled 47,062 tons. For the year to date the figure is 1,711,474 tons. Smelter receipts for the week were 41,847 tons, and for the year to date, 1,557,731 tons. Ore production in detail:

Boundary.

	Week.	Year.
Granby	24,049	879,090
Mother Lode	6,241	265,065
Napoleon	342	6,878
Rawhide	6,012	164,557
Unnamed	340	9,156
Nickle Plate, milled	1,500	54,000
Knob Hill	62	1,610
Other mines	.....	22,152
Total	38,546	1,402,508

East Kootenay.

Monarch, milled	425	7,300
Sullivan	497	21,927
Other mines	.....	740
Total	922	29,967

Slocan and Ainsworth.

Standard, milled	400	12,400
Van-Roi, milled	1,100	42,600
Bluebell, milled	200	1,700
Bluebell	210	908

Standard	148	1,142
Richmond-Eureka	72	1,019
No. 1	24	554
Other mines	.....	9,581
Total	2,154	74,904

Rossland.

Centre Star	2,902	111,488
Le Roi No. 2	563	17,981
Le Roi	115	32,220
Inland Empire, milled	90	990
Le Roi No. 2, milled	300	5,900
Other mines	.....	237
Total	3,970	168,816

Nelson.

Granite-Poorman, milled	250	10,100
Mother Lode, milled	350	5,200
Queen, milled	300	9,000
Molly Gibson, milled	300	4,800
Molly Gibson	162	806
Hudson Bay	74	337
Granite-Poorman	34	253
Other mines	.....	4,783
Total	1,470	35,279

Granby Smelter Receipts.

Grand Forks, B.C.		
Granby	24,049	879,090

B. C. Copper Co.'s Receipts.

Greenwood, B.C.		
Mother Lode	6,241	265,065
Napoleon	342	6,878
Rawhide	6,012	164,557
Unnamed	340	9,156
Other mines	.....	17,003
Total	12,935	462,659

Consolidated Co.'s Receipts.

Trail, B.C.		
Centre Star	2,902	111,488
Le Roi No. 2	563	17,981
Sullivan	497	21,927
Molly Gibson	162	1,806
Bluebell	210	908
Standard	148	6,144
Le Roi	115	32,220
Hudson Bay	74	337
Richmond-Eureka	72	1,019
Knob Hill	62	1,610
Granite-Poorman	34	253
No. 1	24	554
Other mines	.....	19,726
Total	4,863	215,973

COBALT BULLION.

The bullion shipments total nearly 98,000 ounces for the week ending September 14, with four shipments made, the Nipissing leading. They are:

	Ounces.	Value.
Nipissing	72,739.00	\$46,094.96
Dom. Red. Co.	15,169.46	9,253.37
Temiskaming	4,700.00	2,989.50
Miscellaneous	350.00	213.50
Totals	92,958.46	\$58,501.33

SHARE MARKET.

(Courtesy of J. P. Bickell & Co.)
New York Curb.

	Sept. 24.	
	Bid.	Ask.
Braden	\$7.12½	\$7.25
B. C. Copper	5.00	5.12½
Giroux	5.12½	5.37½
Greene Cananea	9.62½	9.87½
Inspiration	19.00	19.50
Yukon Gold	3.37½	3.62½
Goldfield Con.	2.87½	3.00
Nevada Hills	1.62½	1.87½
Miami	29.87½	30.00
Tonopah Mining	6.62½	6.75
Ray Con.	23.87½	24.12½
Chino	44.00	44.50
United Copper	1.00	2.00

Cobalt Stocks.

Bailey . . . . .	.5	.5½
Beaver Con. . . . .	.36½	.37½
Buffalo	1.50	1.52
Chambers-Ferland . . . . .	.18½	.20
City of Cobalt . . . . .	.26	.27
Cobalt Lake . . . . .	.35	.36½
Coniagas	7.40	7.60
Crown Reserve	3.35	3.50
Great Northern . . . . .	.5	.7
Gifford . . . . .	.5	.5¾
Green-Meehan. . . . .	..	.1 ...
Hargraves . . . . .	.4½	.5
Kerr Lake	2.85	3.00 ex div
La Rose	2.55	2.65
McKinley Darragh	1.94	1.95
Nipissing	8.40	8.60
Ophir . . . . .	.6	.8
Otisse . . . . .	.2	.3
Peterson Lake . . . . .	.7¾	.8
Rochester . . . . .	.2½	.3
Right of Way . . . . .	.6	.6½
Silver Leaf . . . . .	.3½	.4
Silver Queen . . . . .	.7	.7½
Temiskaming . . . . .	.39	.40
Wettlaufer . . . . .	.42	.44

Porcupine Stocks

Apex . . . . .	.1	.2
Dobie . . . . .	..	.25
Crown Charter . . . . .	.4¼	.4¾
Dome Ext. . . . .	.9½	.10
Eldorado . . . . .	..	.1
Foley-O'Brien . . . . .	.14	.19
Hollinger	12.45	12.60
Jupiter . . . . .	.24¾	.25¼
N. Ont. Exp.	1.50	2.00
Pearl Lake . . . . .	.19	.21
Porcupine Imperial . . . . .	.2½	.3
Porcupine Tisdale . . . . .	.1	.2
Preston East Dome . . . . .	.2½	.3
Rea Mines . . . . .	.25	.27
Standard . . . . .	.½	.1
Swastika . . . . .	.7½	.8¼
Vipond . . . . .	.24¼	.25
United Porcupine . . . . .	..	.1
West Dome . . . . .	.8	.15

Sundry.

Canadian Marconi	5.25	5.50
American Marconi	8.25	8.50
Island Smelters . . . . .	.1½	.2

TORONTO MARKETS.

Sept. 24 (Quotations from Canada Metal Co., Toronto):

- Spelter, 6.50 cents per lb.
- Lead, 6¼ cents per lb.
- Antimony, 9 cents per lb.
- Tin, 52 cents per lb.
- Copper, casting, 18½ cents per lb.
- Electrolytic, 18½ cents per lb.
- Ingot brass, 11 to 15 cents per lb.

Sept. 24.—Pig iron (Quotations from Drummond, McColl & Co., Toronto):

- Summerlee No. 2, \$23.50 (f.o.b. Toronto).
- Midland No. 1, \$20.50 to \$21.50 (f.o.b. Toronto).
- Midland No. 2, \$20.50 to \$21.50 (f.o.b. Toronto).

GENERAL MARKETS.

- Coal, anthracite, \$5.50 to \$6.75.
- Coal, bituminous, \$3.50 to \$4.50 for 1¼-inch lump.

Coke.

- Sept. 20.—Connellsville Coke (f.o.b. ovens).
- Furnace Coke, prompt, \$2.50 per ton.
- Foundry Coke, prompt, \$2.75 to \$2.90 per ton.

Sept. 20.—Tin, Straits, 50.10 cents.

- Copper, Prime Lake, 17.65 to 17.75 cents.
- Electrolytic, Copper, 17.65 to 17.75 cents.
- Copper Wire, 19.00 cents.

Lead, 5.10 cents.

Spelter, 7.65 cents.

Sheet zinc (f.o.b. smelter), 8.90 cents.

Antimony, Cookson's, 8.75 cents.

Aluminium, 24.50 to 25.00 cents.

Nickel, 45.00 cents.

Platinum, ordinary, \$45.50 per ounce.

Platinum, hard, \$48.00 per ounce.

Bismuth, \$2.00 to \$2.25 per lb.

Quicksilver, \$42.00 per 75-lb. flask.

SILVER PRICES.

		New York cents.	London pence.
Aug. 24	62¼	28½	
" 26	62	28½	
" 27	61⅝	28½	
" 28	61¾	28⅞	
" 29	62⅜	28⅞	
" 30	62⅝	28⅞	
" 31	62⅝	29⅞	
Sept. 2 . . . . .	..	28⅞
" 3	62¾	28⅞	
" 4	62¾	28⅞	
" 5	62¾	28⅞	
" 6	62⅝	28⅞	
" 7	62⅝	28⅞	
" 9	62½	28⅞	
" 10	62½	28⅞	
" 11	62½	28⅞	
" 12	62¾	28⅞	
" 13	62½	28⅞	
" 14	63	29⅞	
" 16	63	29⅞	
" 17	63¼	29⅞	
" 18	63¼	29⅞	
" 19	63⅝	29⅞	
" 20	63¼	29⅞	