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# CANADIAN MINING JOURNAL

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In This Issue:

*Sir Thomas White on Taxation of  
Mining Profits.*

*Coal Production and Munitions.*

*Flotation Processes.*

*Production of Non-Metallic Minerals  
in 1915.*

*What Mr. Maclean Believes.*

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# CANADA

## DEPARTMENT OF MINES

HON. P. E. BLONDIN, Minister.

R. G. McCONNELL, Deputy Minister.

### MINES BRANCH

#### Recent Publications

- The Nickel Industry: with special reference to the Sudbury region, Ont. Report on, by Professor A. P. Coleman, Ph.D.
- The Copper Smelting Industry of Canada. Report on, by A. W. G. Wilson, Ph.D.
- Building and Ornamental Stones of Canada (Quebec). Vol. III. Report on, by W. A. Parks, Ph.D.
- The Bituminous Sands of Northern Alberta. Report on, by S. C. Ellis, M.E.
- Peat, Lignite and Coal: their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Report of the Mineral Production of Canada During the Calendar Year 1913, by John McLeish, B.A.
- The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.
- The Salt Industry of Canada. Report on, by L. H. Cole, B.Sc.
- Electro-plating with Cobalt. Report on, by H. T. Kalmus, Ph.D.
- Electro-thermic Smelting of Iron Ores in Sweden. Report on, by A. Stansfield, D.Sc.
- Non-metallic Minerals Used in Canadian Manufacturing Industries. Report on, by H. Frechette, M.Sc.

The Mines Branch maintains the following laboratories in which investigations are made with a view to assisting in the development of the general mining industries of Canada:—

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- Ore-Dressing Laboratory.—Testing of Canadian ores and minerals, to ascertain most economical methods of treatment.
- Chemical Laboratory.—Analysing and assaying of all mineral substances and their manufactured products. Copies of schedules of fees, which are slightly in excess of those charged by private practitioners, may be had on application.
- Ceramic Laboratory.—Equipment is such that complete physical tests on clays and shale of the Dominion can be made, to determine their value from an economic standpoint.
- Structural Materials Laboratory.—Experimental work on sands, cements and limes is also undertaken.
- Applications for reports and particulars relative to having investigations made in the several laboratories should be addressed to **The Director, Mines Branch, Department of Mines, Ottawa.**

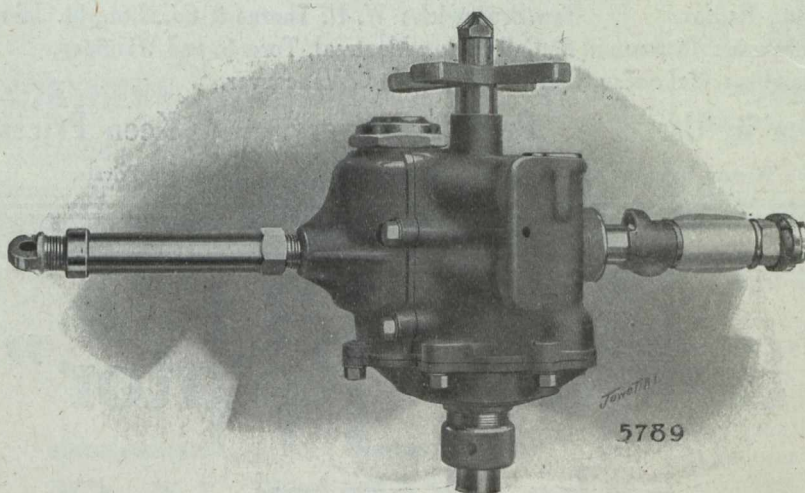
### GEOLOGICAL SURVEY

#### Recent Publications

- Memoir 34. The Devonian of Southwestern Ontario, by Clinton R. Stauffer.
- Memoir 50. Upper White River District, Yukon, by D. D. Cairnes.
- Memoir 56. Geology of Franklin Mining Camp, British Columbia, by C. W. Drysdale.
- Memoir 57. Corundum, its Occurrence, Distribution, Exploitation and Uses, by A. E. Barlow.
- Memoir 60. Arisaig-Antigonish District, Nova Scotia, by M. Y. Williams.
- Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.
- Memoir 65. Clay and Shale Deposits of the Western Provinces (Part 4), by H. Ries.
- Memoir 66. Clay and Shale Deposits of the Western Provinces (Part 5), by J. Keele.
- Memoir 68. A Geological Reconnaissance Between Golden and Kamloops, B.C., along the Canadian Pacific Railway, by R. A. Daly.
- Memoir 69. Coal Fields of British Columbia, by D. B. Dowling.
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- Memoir 76. Geology of the Cranbrook Map-area, British Columbia, by S. J. Schofield.
- Memoir 77. Geology and Ore Deposits of Rossland, British Columbia, by C. W. Drysdale.
- Memoir 78. Wabana Iron Ore of Newfoundland, by A. O. Hayes.
- Memoir 79. Ore Deposits of the Beaverdell Map-area, by L. Reinecke.
- Memoir 81. The Oil and Gas Fields of Ontario and Quebec, by W. Malcolm.
- Memoir 82. Rainy River District of Ontario. Surficial Geology and Soils, by W. A. Johnston.
- Applicants for publications not listed above should mention the precise area concerning which information is desired.
- Maps published within recent years may be had, printed on linen, at the nominal cost of ten cents each.
- The Geological Survey will, under certain limitations, give information and advice upon subjects relating to general and economic geology. Mineral and rock specimens, when accompanied by definite statements of localities, will be examined and their nature reported upon. Letters and samples that are of a Departmental nature, addressed to the Director, may be Mailed O.H.M.S. free of postage.
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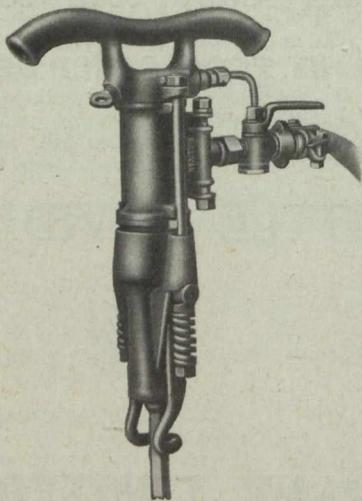
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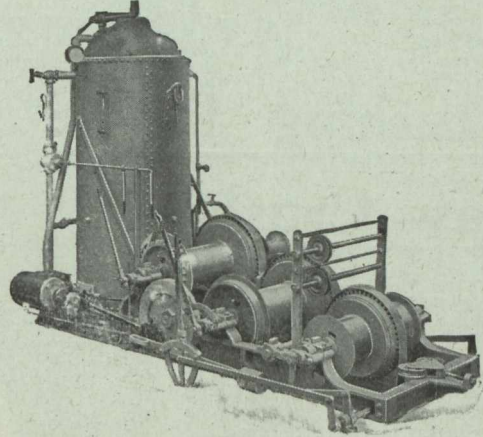
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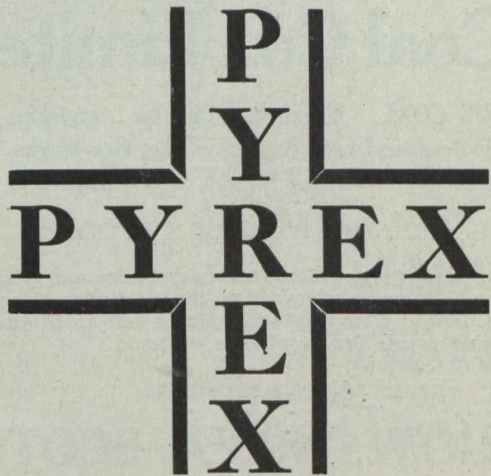
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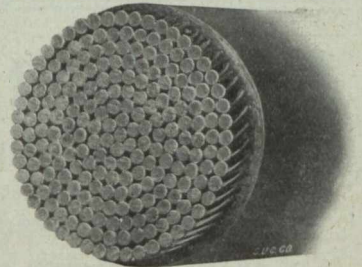
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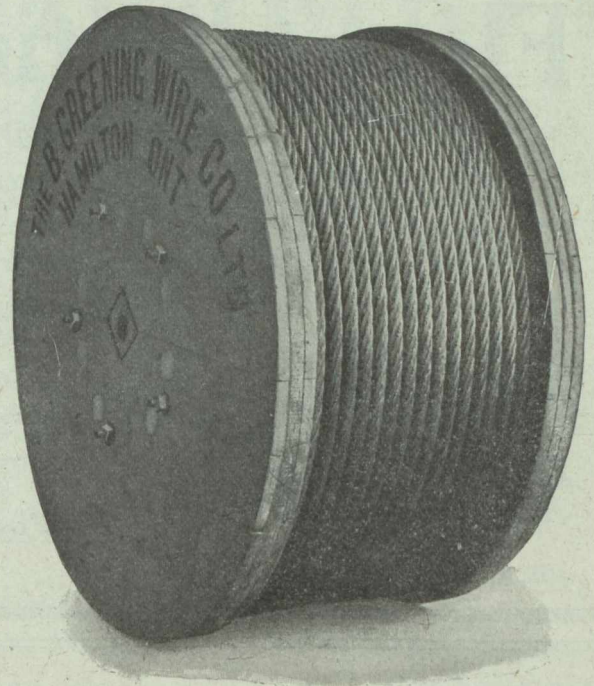
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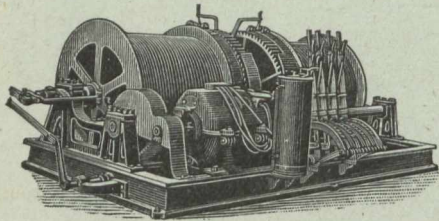
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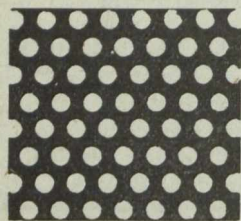
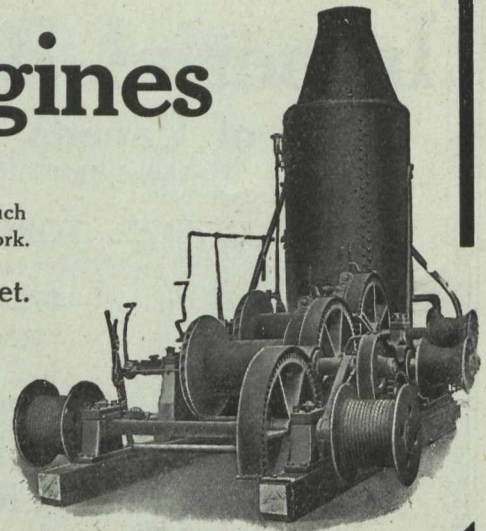
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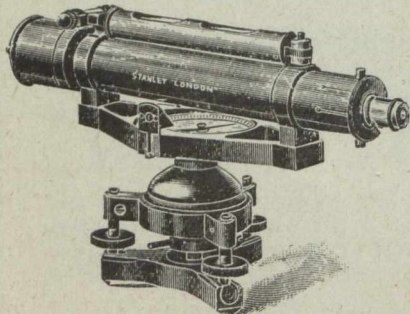
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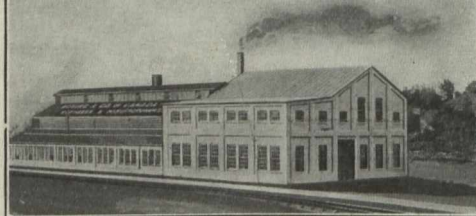
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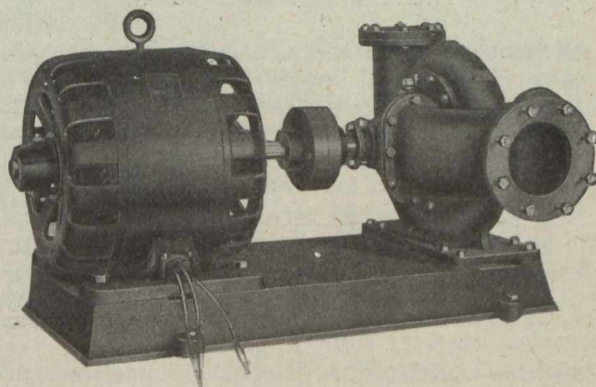
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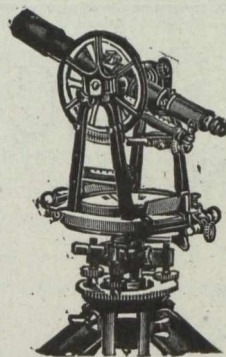
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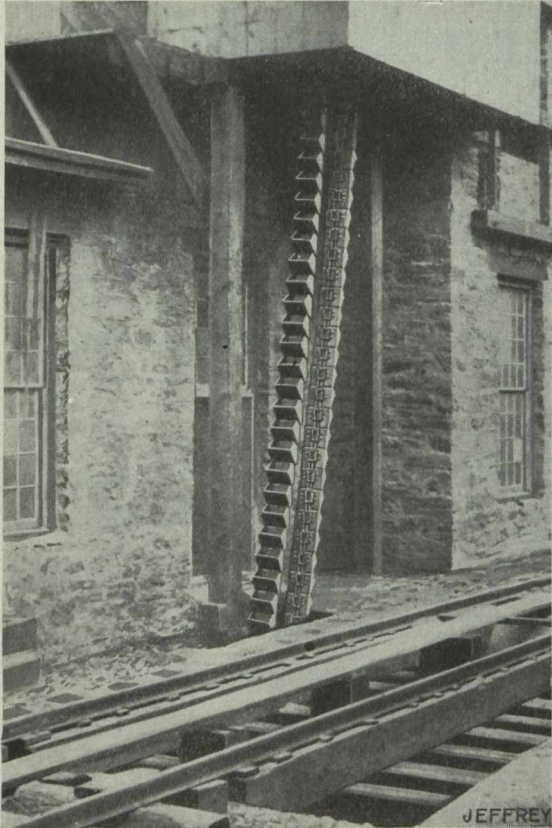
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# THE CANADIAN MINING JOURNAL

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## MISMANAGEMENT OF THE COAL MINING INDUSTRY

The demand for coal is at the present time of the most insistent nature, and all the collieries of the Province of Nova Scotia are producing the greatest amount of coal that is possible with the greatly depleted number of workmen that the call to the colors has left at the mines. In comparison with the production of this time last year, outputs show up very well indeed, but as has been previously pointed out, production in the early part of 1915 was at a low ebb.

The treatment given to the coal producers of Nova Scotia by the authorities would lead to the inference that the importance of the coal industry is but little recognized by those who are directing the policy of the country. The old proverb, "Nothing like leather," is no doubt applicable to coal men, as it was to the ancient cobbler, but surely some consideration should be granted to the industry which produces the basic munition of war, the one article without which modern warfare is impossible, the absence of which immobilizes both the men and the guns.

The mining population of Nova Scotia has given about 24 per cent. of its bread-winners to the colors. No other industry has given anything like this proportion. The loss in coal production, reckoning the productive capacity of the men who have enlisted at the low figure of 2½ tons per man per day, will figure out at about 8,700 tons per day, equivalent to 200,000 tons a month, or close to 2,500,000 tons per year. Canada produces but 15,000,000 tons per annum. The unwisdom of allowing the coal production to fall off in this alarming manner should be apparent to the meanest intelligence. Of course, as was to be expected, the reduction of the coal production is being severely felt in Eastern Canada, but the present stringency is a state of plenty compared to what is coming in a few months from now.

The Canadian Government has announced its intention to raise 500,000 men for overseas service out of a population containing approximately 1,300,000 men of military age. Lord Shaughnessy has had the sanity and the courage to point out that this can only be accomplished by drafting women into the occupations now followed by men. The Canadian woman, in case of need, will doubtless be found as willing to take up men's work as the women of Great Britain and France have been, but it has not yet been suggested that women should go underground to work in the mines. Women work on the pitheads in Great Britain and in Europe, but it cannot be too strongly pointed out that the men who have enlisted from among the colliery workmen of Nova Scotia are overwhelmingly under-

ground men. It is within the mark to say that 95 per cent. of the enlistments from the collieries have been from among the men who work at the coal face, from among the drivers and haulage men, the mine officials and other underground workers, and that the enlistments from surface workers are so small as to be negligible by comparison with the underground workers.

Great Britain does not import a pound of coal, and she is yet the world's greatest coal exporter, although not the greatest producer of coal. This goes a long way towards explaining why "the folks at home" are able to keep up the financial end of this war. But here in Canada, we do import coal, we import more than we mine, and if things go on at the present rate we look like importing very much more than ever before. That is to say, we are going to send Canadian money out of the country to buy American coal, and thereby set up an adverse trade balance against ourselves, and at the same time allow our own coal industry to languish and decline.

One would have supposed that the first care of an intelligent Government would be to increase production of all raw materials in the country, and particularly to aid those two persons who are our chief producers of basic materials, namely, the farmer and the miner.

What is coal chiefly being used for to-day in Eastern Canada? Everybody knows. It is being used in the manufacture of munitions, the operation of railroads carrying and assembling said munitions, and the conveyance of troops from training camps to the battle-front. We make shells in Canada, and are not slow in blowing a trumpet to tell the world how quickly, cheaply and well we make these shells. Reams and reams of Hansard have been filled by protests against the letting of shell-fuse contracts in the United States, and politicians indignantly ask why these delicate little mechanisms cannot be just as well made in Canada. But where is the logic of howling about shell and time-fuse contracts if we allow the coal production of the country to decline by millions of tons annually, and buy this basic and absolutely necessary raw material in the United States? By doing so we strike at the foundation of munitions manufacture and impoverish ourselves.

The man who would discourage recruiting in this time of great national peril is a fool and a traitor, but he is neither who recognizes that this war is as much an economic fight as a fight between armies. If the Russians could have overrun Silesia when they were hammering at the gates of Cracow many months ago, the German collapse would have come before this, because Silesia is the great coal field of Germany. It is only because of the British Navy and the fact that France can draw upon Great Britain for coal and iron that our gallant Ally has been able to wage such vigorous warfare against the invader of her northern coal and iron fields. To those who direct recruiting in Canada several significant facts might be pointed

out, namely—no coal miner can enlist in Great Britain or be sent to the front in France if his labor is required to produce coal. Men have been sent home from the trenches to dig coal, and most ironical of all, miners from British Columbia were sent to England to help the coal production there. It is reported that in Germany, prisoners of war, among them British and Canadian prisoners, are being compelled to mine coal in German collieries. Our enemies are under no misapprehension as to the value of coal. Every foot-pound of energy liberated in the terrific artillery onslaught on the Germans upon Verdun was derived in some way from coal.

It is not a coincidence that the much discussed industrial renaissance of Eastern Canada is concentrated in and largely confined to the territory served by the soft coal mines of Nova Scotia. Not only has the supply of soft coal been imperilled by the disproportionate recruiting among the underground workers, but requisitioning of coal carrying steamers has taken place upon a drastic scale, with such serious consequences to Halifax and St. John, N.B., that the representatives of these cities have protested in the House at Ottawa. The reply given to these protests was that Great Britain had to supply transportation, not only for the Empire, but for our Allies also. No one will deny the urgency of the transportation question, because as it was expressed in the House of Commons in London, it is a case of trying to put a quart into a pint bottle. But if the requisitioning of Canadian coal carriers hampers the Canadian railways in the transportation of munitions, delays troopships and transports, and restricts the output of munitions factories, what are we advantaged as an Empire?

It is difficult when discussing this matter to avoid becoming querulous, but surely it should soon commence to dawn upon our leaders that there is nothing more important in connection with the war at the present time than the maintenance of the coal production of Canada. Men are a negligible consideration by comparison, for without coal men can neither be supplied with arms and clothing, nor transported to the front.

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It has been stated in the House of Commons in the debate on the war tax that excluding the nickel companies only 24 mining companies paid dividends in 1915. This statement is hardly correct as there are some companies paying or capable of paying dividends that are not included in the lists which we have published.

---

The incorporation of the Hudson Bay Zinc Co., with a nominal capital of \$5,000,000 in 1,000,000 shares of par value of \$5 each, has been gazetted at Victoria, B.C. The chief object of the company is to acquire from Messrs. Maurice W. Bacon and W. E. Cullin, Jr., of Spokane, options to purchase 14 mineral claims near Salmo, B.C., including the H.B., Leadville, Zincton and other mining properties.

## THE TAX ON PROFITS

The debate in the House of Commons on March 17th was of unusual importance to mining men. We reprint elsewhere in this issue several extracts from the official record of the debate and we suggest that anyone who feared, as from our editorial of March 1 it can be seen we did, that the mining companies were to be burdened with far more than a just share of the war tax, should read Sir Thomas White's explanation.

It appears to us now that the Minister of Finance is making provision for fair treatment of the mining companies and that the industry will not have to bear more than a reasonable share of the war tax. If a profit of seven per cent. of the actual value of each company's assets is exempted from taxation and allowance is made for mineral exhaustion, the balance of profits taxable under the Act will be comparatively small. A tax of 25 per cent. of that balance of profits will not seriously affect the industry.

As we interpret Sir Thomas White's statement, shareholders of mining companies operating in Canada have good reason to believe that the war tax has not very seriously affected the value of their investments. The depreciation on the exchanges which followed the first report of the Budget speech was a natural one which would be warranted if the Minister's satisfactory explanation had not been forthcoming. Much lower values would doubtless have been registered if early assurances had not been given that the tax was not to be as heavy as the Budget speech indicated.

In our last issue we urged that while assurances given were satisfactory to us, announcement of a definite limit should be made by the Government. With the speech of March 17th now before our readers, we feel now that such an announcement is unnecessary.

While the war tax to be levied will yield from the mining companies a total that will be no mean contribution from the industry, we can agree with Sir Thomas in concluding that it will not be so large as to cripple the industry or drive away capital seeking investment in Canadian mining properties. Investors were warranted in hesitating until a satisfactory explanation was forthcoming, and mining company directors had apparently good cause for uneasiness as to the effect of the Minister's proposals; but the manner in which Sir Thomas has met the criticisms of mining men should restore confidence.

It is noteworthy that of the 24 dividend paying mining companies mentioned by Sir Thomas White, 20 are gold or silver producers and consequently can by no means be classed as companies making profits on account of increase in prices of products owing to the war.

Teck-Hughes Gold Mines Limited is creating a \$500,000 five-year seven per cent. first mortgage bond issue, of which \$100,000 par value is now offered to the shareholders at \$2, and accrued interest.

## THAT REPORT ON OIL AND GAS

Mr. Clapp's reply to our criticism of Volume II. of the Petroleum and Natural Gas Resources of Canada, does not appear to us to be satisfactory or convincing. Probably it would be better to consider the different points urged by him in order.

In the second paragraph of his letter, the ample margin is defended on the grounds of improved appearance. We criticized it as one of the evidences of a desire to unduly expand the size of the volume. We might have mentioned others, such as some of the photographs of doubtful value given on page 274 and following ones, including two dry holes and a pile of pipe at a railway siding. As a number of these are  $2\frac{1}{2} \times 4$  inches and the page is  $9\frac{3}{4} \times 6\frac{1}{4}$ , two pictures could easily be printed on one page, and there is no reason why both sides should not be utilized. If this were a volume of spring poems printed as an edition de luxe, the ample margin and the prodigal use of paper would be pleasing. We objected to these devices as unnecessarily increasing the volume of the work. If, as stated in the following paragraph, the appropriation for the Department is too small, there is all the more need to avoid this useless expense.

We think that it can be shown that the deficiencies complained of were not inevitable and that no great effort was necessary to secure a far greater degree of accuracy.

In our criticism we dealt with the oval shape of both gas and oil pools found in the map of Ontario. It is no answer to say that this is generally the shape elsewhere, even if that were true. It is nonsense to say that it was necessary to generalize the boundaries to the extent to which this has been done. These are in many cases old fields which are nearly exhausted and there are plenty of data to outline the gas or oil areas with much greater accuracy than has been done in the volume under discussion, as will appear later on.

Mr. Clapp seems to assume in the next paragraph that the author of a volume such as this has a right to expect that he will find most or all of the material available in existing reports. There are other sources of information, however, such as the plans of the fields kept by nearly all the important producing companies. There is also the simple plan of taking some kind of a vehicle and an intelligent driver who has a local knowledge of the territory, and noting the position of the wells drilled. Moreover, even when there is a map in existence it has not been correctly copied in the volume under discussion. Thus, in the map of the Kent Gas Field published in Vol. XIX. (1910) referred to in Mr. Clapp's letter, the boundaries of the gas field are shown extending out into the lake, and it was pointed out in the text of that report (p. 150) that the gas area probably extended under the lake some distance. No wells existed in the lake at that time in this place, contrary to Mr. Clapp's statement. These were not drilled before 1912 (p. 43, Vol. XXII. Ont. Bur. of Mines, Rep.).

On the following page of the same Report it will be noticed that 62 per cent. of the entire production of gas from Ontario in that year was derived from the Kent field, and it will later on be shown that over 80 per cent. of the total gas for Canada was produced in Ontario in that year. Consequently, half of the total production from Canada was derived from this small area. It is worth while, therefore, to make some effort

to accurately define this field. In the 23rd Report of the Ontario Bureau of Mines, this gas area is shown in two maps, both on large and small scale, extending out into Lake Erie. On p. 241 it is made clear how important the extension under the lake is. This report was issued more than a year before Mr. Clapp's, and yet on the map criticized the gas field stops at the lake shore.

The explanation which is given in the next paragraph, about the omission of certain pools as they were unimportant, does not meet the criticism that the important area extending along and out into the lake in the Townships of Walpole and Rainham is shown as a blank.

The statement in Mr. Clapp's letter that there were only four small producers in Wentworth County does not agree with the information given on p. 222 of the volume under discussion, which is that no well (in Wentworth) has ever produced gas or oil in paying quantities. Allusions to finding of gas in Wentworth County can be found in the following Reports of the Ontario Bureau of Mines, viz.: Vol. 21, p. 37, where it is stated that out of 254 producing wells drilled in the eastern part of the Province in 1911, 9 were in Wentworth County. Again, on p. 46, Vol. 22, which deals with the operations of 1912, the development of a field in Binbrook Township is referred to (incorrectly put in Welland County). In Vol. 23, dealing with operations of 1913, on p. 37, in the list of Natural Gas Producers, Wentworth County is given as one of the localities in which wells are situated in connection with two companies. On p. 36 of the same report this appears: "The old Welland-Haldimand field was extended by drilling a number of wells in Binbrook Township, Wentworth County. This was the most interesting feature in connection with gas in the eastern part."

If our authors will not utilize the data obtainable we have a right to expect that they will at least read their own work. This shows that there were wells in Wentworth County, and absolutely contradicts the information given on p. 222, Vol. II. Thus, in Vol. I., Table V., opp. p. 40, Wentworth County is mentioned in the column entitled "Location of Wells," in connection with the Dominion Natural Gas Co. Many of us as children have played a game where a number undertake to write part of a story, each one writing his or her portion without seeing what the others have written. This is then put together as a continuous story. Perhaps this volume was written in that way.

Mr. Clapp makes the suggestion that we should read Westcott's Handbook of Natural Gas to settle a question of the composition of gas. C'est a rire, as the French would say. His use of this book for this purpose reminds us of the text "And if the blind lead the blind both shall fall into the ditch," Matt. 15:14. This handbook of Westcott's is concerned almost entirely with the mechanical details of field work in connection with natural gas and cannot in any way be regarded as an authority on the composition. The very first paragraph of the preface is as follows: "The need for a Hand Book containing authoritative information on High and Low Pressure Construction in the Use of Natural Gas, and providing information and suggestions of a practical nature for those engaged in field work is responsible wholly for the publication of this Volume." The author of this work had a little touch of voluminosis, too, and a number of analyses of natural gas are given, just as in Mr. Clapp's Volume, without any particular knowledge or discrimination, and also, just as in the work under criticism in some cases not even correctly copied. Thus, on p. 42 (1913 edition) an analysis is given as follows:

Carbon dioxide.....	.1
Carbon monoxide ....	.4
Oxygen .....	.3
Heavy hydrocarbons .....	.1
Ethane .....	.1
Methane .....	14.35
Nitrogen .....	3.95
Total paraffins .....	95.05

Any one who has given any thought to the composition of natural gas would know at a glance that this is an absurd analysis. The original of this analysis is No. 5 on p. 556, West Virginia, Geol. Sur. Vol. Ia., and is given as:

Carbon dioxide .....	0.1
Carbon monoxide .....	0.4
Oxygen .....	0.3
Hydrogen .....	0.1
Heavy hydrocarbons .....	0.1
Ethane.....	14.35
Methane .....	80.70
Nitrogen .....	3.95
Ammonia, etc.....	none
Total paraffins .....	95.05

A similar blunder is made in copying five consecutive analyses, in Westcott's book.

Plenty of analyses can be found showing hydrogen. The point is that the appearance of hydrogen and the other things mentioned is due to a faulty mode of analysis. This should be known to those who write works treating of natural gas. It is fully dealt with in Bulletin 42, U. S. Bureau of Mines, which is the work of two chemists with long experience in this line. Moreover, as we are concerned with gas in Canada and about 40 analyses of natural gas from Ontario are given in the 23rd Report of the Bureau above referred to, and the absence of hydrogen, etc., is demonstrated, it might have put our authors on their guard. It is rubbish to say, as Mr. Clapp does, that numerous analyses are important, unless it can be shown they are correct. Such material is only important to one who is seeking volume and cares nothing for accuracy.

We have already referred to the fact that most of the gas and oil fields in Ontario are fairly old, with limits defined and easily and quickly capable of a much more accurate representation than is given on the map we criticized. From the remarks in the last paragraph one would have the right to infer again that the authors have not read their own work. We sympathize with their evident aversion in this matter. Thus on p. 41, Vol 1, the production of natural gas for 1912 (the last year for which statistics are given) for Canada as a whole and Ontario separately, is put at approximately 15¼ and 12½ billion cu. ft., respectively. The Ontario production is accordingly over 80 per cent. of the total. For the same year 243,614 barrels is given as the yield of oil for the whole of Canada (p. 40, Vol. 1). The Ontario production was 240,935 barrels (p. 22, Vol. 2). This is nearly 99 per cent. of the total.

It will be noticed that we have taken the liberty of making a correction in Mr. Clapp's work. As acknowledged, the table on p. 229, referred to, is taken from the Vol. XXII., Ont. Bur. of Mines Rep. (p. 42). In some way the barrels of oil that appeared in the Ontario Report have been changed into an equal number of dollars, although the value of the barrel in that year according to the Ontario Report, was \$1.43. This is only another instance of the inability of our coterie of authors to even copy existing information correctly. If it can be shown that the territory which is responsible for over 80 per cent. of the production is inaccurately treated, it is a very poor defence to say that the rest might be right. In fact, no one would have the patience to look at the rest.



## CORRESPONDENCE

Editor, The Canadian Mining Journal:

Sir,—In The Canadian Mining Journal of February 15, 1916, you make certain criticisms with reference to Volume II. of The Petroleum and Natural Gas Resources of Canada. Since the undersigned is mainly responsible for that report, he feels it only fair to himself, his associates, the Director of Mines, and to the public, to correct the misleading impressions given by your editorial.

Nothing can be gained by more than mentioning your denunciation of the ample margin, since this is merely an opinion, and does not affect the value of the volume, except to improve its appearance. In considering the size, however, please bear in mind that Canada is a large country, having petroleum and natural gas resources in many districts, so that a complete discussion of them would occupy many volumes. The undersigned and his associates, at the request of the Director of Mines, and at financial sacrifice to themselves, cheerfully compiled Volume II. as a summary of conditions affecting oil and gas development in the Dominion; and while no summary can at this time be made absolutely accurate, it is the only one published on the subject.

So far as accuracy is concerned, the title of your editorial is inaccurate itself, since it refers only to a very small portion of the Petroleum and Natural Gas Report, omitting discussions of the rest, evidently failing to realize that a few deficiencies are inevitable and do not relegate an entire report to the term "inaccurate." All Government appropriations for scientific work are too small; consequently if the Department of Mines had waited authority to pay the full value of a complete oil report, the one under discussion would doubtless never have been made. Data for it were widely scattered and fragmentary, being compiled finally by perseverance and with the assistance of various authorities.

While the oval shape of oil pools is severely criticized in your editorial, such a shape is characteristic of the majority of those throughout the world. Moreover in small scale maps it is necessary to generalize the boundaries considerably, since the collection of full data would require great expense and time. Boundaries are generalized in most preliminary reports on oil fields leaving the details for later reports when the full data become available.

The Ontario map which you condemn so severely is the first map covering all the oil and gas fields of the province, and with the exception of a limited amount of fieldwork, practically the only data available from which to prepare the map was contained in local maps accompanying previous reports, viz.: (1) a map of the Kent gas field, by G. R. Mickle, published on page 150 of the report of the Ontario Bureau of Mines for 1910; (2) the Report of the Geological Survey of Canada for 1898, Vol. XI., Part S, pages 119, 121, and 138; and (3) the map on page 93 of the report for the Ontario Bureau of Mines for 1907. The first-mentioned of these maps, by the way, does not show any of the wells which existed in Lake Erie at that time. The last does not attempt to outline the details of the fields, but the fact does not relegate that report to the category of the worthless. Since you appear to have detailed

knowledge of unpublished information on the fields, it is to be regretted that you do not publish it and correct the alleged errors. You may be sure that any corrections or additions will be cheerfully received by the undersigned or by the Director of Mines, and the data will be incorporated in future reports on the subject.

As to the omissions of gas pools in Haldimand, Welland, Norfolk, and Wentworth Counties, it is important to note that certain ones were intentional omissions, since the amount of gas in certain districts is so limited as to be unworthy of representation on a map of fields having commercial value. The undersigned would like to ask you, in reference to your claim that there are "quite a number of good gas wells in Binbrook Township" of Wentworth County, when they were drilled and the amount and duration of their production. The most authentic information received here is that in December, 1914, only four small producers existed in Wentworth County. If your information is more complete than this, kindly supply the details.

Your statement that hydrogen cannot occur in natural gas is interesting. Perhaps you are right, but I would suggest that you read Westcott's "Handbook of Natural Gas," the latest edition of which contains a number of analyses made by reputable chemists which show substantial percentages of hydrogen. If further enlightenment is necessary, please note in the Petroleum and Natural Gas Report, on the same page with the analyses which you criticize, the statement that they were "reported by" certain parties, being quoted merely as contributions, since numerous analyses are important, and no appropriation was available for making them specially for the report.

Your main criticism is evidently directed to the map of the Ontario gas fields. Kindly remember that this is the first general map ever published of these fields, and that a first map of any group of oil fields is never perfectly accurate. If you will carefully read the preface by the Director of Mines, at the beginning of Volume 1, you will find, in the first paragraph, a statement that "It was proposed that the monograph should contain a general summary of all the information that was available," by which you will understand that a complete report was not expected on all fields, an impossible undertaking with the time and appropriation available. Turning over two pages, you will next find a letter of transmittal, in which a statement is definitely made that "The report is not intended to enter into exhaustive discussions of individual fields, or to solve all the complicated problems regarding petroleum and natural gas in various parts of the Dominion, since such an undertaking would require years of study and work, but as much detail is included as has been possible in the time allotted, and I trust that the publication may be of some value in the development of the Dominion's resources."

After your scathing denunciation you will certainly pardon the remark that any criticism is narrow and one-sided which devotes itself mainly to details of unpublished information, evidently known to the critic, and relating to a single province, while leaving out of consideration the general character, scope and purpose of the report. Perhaps, by bearing these paragraphs in mind, you will better understand the aims of the authors.

Yours, etc.,

F. G. CLAPP.

New York, March 18, 1916.

## ANOTHER PROMISED REVOLUTION

When we read the literature disseminated by some promoters we seldom fail to find strange and wonderful accounts of properties or processes which are to revolutionize the mining industry, and to bring great wealth to those who are invited to subscribe.

We are hardly prepared, however, for such statements when we open the official report of a debate in the House of Commons. Yet Mr. W. F. Maclean, a member of the House, in discussing the refining of nickel, contributes some startling statements. We do not infer from his statements that he wilfully intends to mislead the public. We do not believe that he does. His remarks are, however, likely to prove misleading, and so we direct attention of mining men to them.

The report, in part, of Mr. Maclean's speech is as follows:

"I cannot pass judgment on certain information which has come before me in the last few months, and which has reached its culmination here in Ottawa in the last few days, but I believe that a process of refining not only nickel, but every other metal, has been developed in this country, and most of the work has been done in this city. A wonderful revolution in the process of reducing ores has been worked out, and demonstrated in the city of Ottawa, and with this result: whereas, heretofore, the International Nickel Company had to collect its ore in great heaps at Sudbury and roast it for a period of ninety days, the matte having then to be sent over to New Jersey, by this new method the process can be carried out within forty-eight hours. Instead of the International Company taking 100 pounds of their ore, and roasting it into matte which produces less than five pounds of nickel, by this new method they will be able to get 70 pounds of alloy, in a powder, from the 100 pounds of ore. That powder is then put in a crucible, and gives 50 pounds of metal, which, for convenience's sake, is called after the name of the inventor, Professor Burrows; and that 50 pounds of metal is the equivalent of 50 pounds of nickel in making nickel steel. There is the revolution. It has been effected in our own country, and I believe that it is a fact that out of 100 pounds of our nickel ore we shall get 50 pounds of nickel, which is the equivalent pound for pound of the nickel that is used in making nickel steel. And not only will this process apply to nickel, but to every other ore. The process is largely based on the making of hydrogen gas in a very cheap way out of steam. Any kind of ore can be treated in this hydrogen furnace. I have been following this process now for some months, and I know others who have followed it and who are more competent to pass judgment on it than I am, and the impression that has been made upon me is that this invention will revolutionize the industry."

Mr. Maclean then goes on to discuss what should be done by the Government in order to control the

nickel industry and says, "if there is a new invention in this connection, I would advise the Government to try to get control of it."

We assume that in arousing interest in the nickel question that Mr. Maclean is doing his utmost to further the interests of the Empire and that he really believes that he is showing the Government and the people how to take advantage of an opportunity of adding to Canada's industries and controlling the export of nickel. We have no good reason to doubt his sincerity, but we cannot agree with many of his statements.

Mr. Maclean says, according to the official report of the debate, that "out of 100 pounds of nickel ore we shall get 50 pounds of nickel." That statement is, of course, absurd. It can be put down to an error in reporting or in printing. From his previous remarks we imagine that Mr. Maclean said, or meant to say, "metal"—not "nickel." Otherwise Mr. Maclean would be claiming that the process would result in recovering 50 pounds of nickel from 100 pounds of ore which contained only 5 pounds of nickel.

We have then Mr. Maclean's statement that 50 pounds of "metal" derived from 100 pounds of nickel ore "is the equivalent of 50 pounds of nickel in making nickel steel." As this "metal" would contain only 5 pounds of nickel it would necessarily be chiefly composed of iron, which is the chief metallic constituent of the ores. It would probably contain also about 2 pounds of copper. We may be pardoned for hesitating to accept the inventor's claims so readily as has Mr. Maclean.

When Mr. Maclean goes on to say that "not only will this process apply to nickel, but to every other ore" we regret that we must conclude that only those who know very little about the treatment of ores will have a great deal of confidence in the process or in Mr. Maclean's remarks concerning it.

It may be that the process has some merit and that it will prove of importance in the nickel industry. Mr. Maclean's remarks concerning it, however, do not impress us very favorably.

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Seneca-Superior Silver Mines, Ltd., was very successful in 1915, making a profit of \$568,501. The production for the year was 2,047,150 ounces silver. A large profit during 1916 is assured, as the remaining ore is being mined very cheaply. The mine is, however, nearly worked out and unless a new orebody is discovered, and the management holds out little hope for this, Seneca's profitable life will terminate early this year, the mine having lasted less than four years but having produced already over 5,000,000 ounces of silver at an operating cost of 10.6 cents per ounce. The cost per ounce for 1915 was 6.86 cents, a record for the Cobalt camp.

## THE TAXATION OF MINING COMPANIES

The debate in the House of Commons on Friday, March 17th, was of unusual interest to mining men. We reprint below extracts from the official report.

Mr. Macdonald: I should like to point out the effect of the imposition of this tax upon every person connected with mining or kindred industries, where the enterprise involves the development of natural resources, and where the development cannot take place except by the employment of capital. The situation has been this.

During the past autumn, throughout Canada generally, there were a great many propositions promoted and on the verge of being capitalized through the assistance of foreign capital, and this legislation will seriously interfere with the consummation of any such capitalization. Indeed, the announcement which my hon. friend the minister made in his Budget speech about a month ago has had the effect of absolutely discouraging any attempt to promote industries of that kind. When a person with a proposition, no matter how good, goes abroad with the idea of obtaining the capital necessary for development, the possible investor inquires whether or not this is one of the companies which would be affected by the Budget of the Government. The person interested would be bound to tell the possible investor that it was one of those companies. It is well that persons should invest with the view of developing coal, silver, nickel, gold or other minerals. The person who invests in an enterprise of that kind, particularly at this stage of the world's history, does so with the hope of making some special profit. He takes bigger chances than are taken in the ordinary financial or industrial company. These deal with settled conditions. Business may vary or fluctuate; dividends may be small or great, but there is always a certain basis on which to proceed. It is the same with an industrial enterprise formed for the purpose of producing some special article used in the country. The production of the article is necessary to meet the needs of the people, and the person who invests in that industry knows that the question of receiving dividends depends upon his being able to produce the article as a saleable commodity, and that the price of the article will furnish him with a reasonable profit. But when a man goes into the mining industry, the conditions are entirely different. There may, or may not, be a large quantity of ore; all that has to be taken into consideration by the person who invests. To a very large degree the investment of capital in the mining industry is a gamble. If my hon. friend is going to throw into the melting pot these propositions, he will create a further menace which will intimate to the outside capitalist that the utmost he can get from his investment, after taking all chances, is 7 per cent., before the Government intervenes to take part of the profit. The minister will see that he is menacing the development of that industry everywhere. In addition to that, the party who is looking for capital is not in a position to assure the possible investor that the Government may not, at a subsequent session, proceed to levy upon that class of industry to a greater degree.\* \* \* Mining is a natural industry in this country, quite as much so as agriculture. We all hope and believe that, particularly in the far northern country, there is an illimitable store of minerals, the development of which will mean a tremendous expenditure for supplies and the increased prosperity of the country at large. This

industry stands apart, as I have said, from the ordinary industrial and financial industries. It requires special consideration. I submit that the minister's proposal menaces the future of this industry, and that the slight amendment which he has made in no wise does away with the possibility of injury.

Sir Thomas White: I am really obliged to my hon. friend from Pictou for bringing up this matter for discussion. I need not say that I appreciate the benefit of his views upon any subject that may be under debate in this House. He has put forward his representations very temperately, and I propose to answer them as fully and frankly as I may be able. I think that my hon. friend and those connected with the mining industry, or I should rather say some of them, are unduly apprehensive as to the effect of this measure upon their industry. The Government is fully aware of the extreme importance of that industry in the national economy of Canada. It is one of the great natural industries, as my hon. friend has observed, and, certainly, the Government would be the last to take any step, unless indispensably necessary in the national interest, which might have the effect of in any way injuring the mining industry, or retarding the flow of capital into this country. I think I shall be able to show before I take my seat that there is no ground for apprehension on the part of the mining community. \* \* \* This particular measure is for a period only. The principle of the resolutions, it would appear to me, indicates that. The principle of the resolutions is in effect that those individuals, firms and companies, which since the outbreak of the war have been able to maintain a rate of profit beyond what we have fixed upon as a fair and normal pre-war standard, shall contribute a fraction of that excess for the purposes of the war. It is a fact with regard to many businesses in Canada that the largest profits resulting from the war, either directly or indirectly, have been made, during the 18 months since the outbreak of the war, by reason of the increase in the price of commodities, due to the demand which arose by reason of the outbreak of hostilities, and in supplying of munitions and other requirements in connection with the war itself. I do not mean to say that if the war goes on there will be a less demand for commodities and munitions, but I do not think that, as the country becomes better organized to meet the new conditions, the prices which obtained during the past 18 months will obtain in the future. Therefore, it would seem to me that I am perfectly justified in stating, as I do, on behalf of the Government, that this is a temporary tax. In making that statement, I largely meet the argument of my hon. friend that capital might be discouraged from embarking upon Canadian enterprise. It is hardly conceivable that an enterprise could be established within the next few months, and before the termination of this legislation, earn such large net profits that the moderate tax which we are taking from them would be a serious matter to the individual, firm, or company in question. Therefore, I do not believe, for myself, that when it is realized, as I believe it is now realized, that this is a temporary measure, the effect which my hon. friend anticipates will be produced, or will continue, if such an effect has already been produced. \* \* \* I want those who can afford to pay, to pay. There is no one who will be taxed that cannot afford to pay, and I know of one who is not willing to pay. In fact, I know the people are anxious to pay the tax imposed by this budget.

This measure, therefore, being a temporary measure, it is not conceivable to me, when it is understood, that it will have any effect in retarding the flow of capital towards this country. Let us assume for a moment, however, that it would; let us assume that my hon. friend is right, and that it would have some effect in retarding the flow of capital to this country. I ask this House, would that be a good reason for a Government refraining from taking any taxation action that it might deem indispensable towards the winning of this war. Suppose that at the time of the war between the North and the South, when the United States was torn in twain, it had been suggested for a moment that the proposals of the Secretary of the Treasury designed, and necessary, for the prosecution of the war by the North, would have the effect of retarding the flow of capital into the United States; would such a suggestion have been listened to seriously? In Canada today, does anyone consider seriously whether general business is going to be impaired or not? General business is of extreme importance. I yield to no man in my desire that the Government should carry on this war with a minimum of inconvenience to the business of the community. I desire that the war should be carried on, in so far as we can carry it on, with our full power, in such a way as to interfere in the least possible degree with the business activities of this country. I desire that on the grounds of business itself, but I desire it more strongly on the ground that, the more we can promote business, the greater the industrial and commercial activities of the country, the better will we be able to sustain the economic burden of the war. Therefore, in answer to my hon. friend I may say that while I do not believe that the effect of this legislation will be to retard the flow of capital to this country, I am bound to say that the first duty of this country is the conduct of the war, and that business considerations, while of great importance, are really secondary; and I believe the public in this country take that view. \* \* \* The first business of the United Kingdom, of Canada, of Australia, of the Empire, is the war, and when I say that I take second place to no one in stating at the same time that we desire to do everything we can, that we shall omit nothing to promote the prosperity of business in this country, and that we appreciate to the full the desirability of taking no measures, not absolutely necessary in the nation's interest, that will have the effect of retarding the flow of capital into this country during and after the war. \* \* \* We are fighting to protect Canada, to protect the industries of Canada, including among others the mining industry. I have talked with many mining men during the last few weeks and I desire to pay them the tribute of saying that they are willing, they are desirous, they are anxious to pay, and to pay large amounts towards the conduct of this war. Nothing has impressed me more than the attitude of two or three American gentlemen engaged in the mining business in this country. They said: You are asking for one-quarter of one per cent. [Ed.—Should probably read "our profits."] over 7 per cent.; if you want more ask for it and we will give it to you.

Mr. Macdonald: What company was that?

Sir Thomas White: I will give my hon. friend the names privately. These gentlemen would not like to have their names mentioned in the House. My hon. friend is apprehensive about the mining industry. I think he has totally miscalculated the effect of the Bill upon that industry. The principle of the taxation is this: If net profits have been made, in the case of companies, including mining companies, in excess of 7 per

cent., we take one-quarter of the excess and one-quarter only. Does my hon. friend know that, excluding nickel companies, only twenty-four mining companies in the whole Dominion paid dividends last year? My authority is the Canadian Mining Journal.

Sir Wilfrid Laurier: They are not very prosperous, then.

Sir Thomas White: The extraordinary thing is that some were exceedingly prosperous.

Sir Wilfrid Laurier: Only the twenty-four are prosperous.

Sir Thomas White: Others are engaged in the business, but they are not affected by this tax, and many of these are not affected by the tax. The point I am making is that the mining industry has nothing serious to apprehend from this tax. We are fighting for this country, we are fighting for every business in it, including mining. On what principle can I, or can the Government, leave out mining industries from the operation of this tax? On what principle can I tax a manufacturing company, a transportation company, a trading company and pass by the Hollinger mines worth \$10,000,000, or \$15,000,000 or \$20,000,000 and earning up to \$2,000,000 net profits? On what principle can I pass by the Nipissing mine earning \$1,200,000 a year and worth probably \$5,000,000 or \$20,000,000. How can I pass by copper companies in view of the fact that copper has doubled in price since the outbreak of the war? On what principle can I pass by the nickel companies which are making enormous sums out of the natural resources of the country? I appreciate to the full what the mining industry at Cobalt and Porcupine means to the Province of Ontario and I appreciate the importance of the mining industry to British Columbia, but the point I make is that the mining industry is not going to be injured materially by this legislation and I shall show my hon. friend from Pictou that he has misjudged the effect of the legislation upon these mining companies.

I do not believe there is a country in the world in which less revenue is derived from mining than Canada. Take the highly mineralized area in Northern Ontario, Cobalt and Porcupine and other mineralized areas; I was surprised to find the other day that the entire amount of revenue derived by the Province of Ontario from its mineral areas was about \$300,000. It cannot be said that in so far as Canada is concerned there is anything in the situation that would retard the flow of capital towards this country for the purpose of embarking in the mining industry. The Minister of Mines of British Columbia was here the other day and I inquired of him how much revenue they derived from the mines of British Columbia. He informed me that they got \$150,000. I do not know of any country in the world in which such small amounts are taken from the mining industry by way of royalty and taxation as in Canada. I do not believe that the imposition of this moderate tax is going to have the effect, amongst a community as intelligent as the mining community of causing them to slacken their efforts in the development of that great natural resource. We go to the legislation of the United States; the United States is a great mineral country and yet there has been an income tax imposed not only upon the subsidiary mining companies, but upon the holding companies. The maximum allowance made by the United States for exhaustion of capital is only five per cent. I think that is too small, and I shall deal with that phase a little later on. Take the nickel companies of Canada. The International Nickel Company, which has its refining plant in the United States and operates, I believe, through a

subsidiary company at Sudbury, had earnings of nearly \$10,000,000 for the nine months ended December 31st, 1915. Now I do not believe that public opinion would sustain the Government in taxing all other industries in Canada and passing by these mining companies. Mr. Turriff: Was it the International Nickel Company or the Canadian Copper Company that earned the \$10,000,000?

Sir Thomas White: The International Nickel Company. I mentioned the subsidiary company at Sudbury, which is called, I believe, the Canadian Copper Company. I give that as an illustration of the large earnings of these mining companies, and I am going to show later that **the amount we shall take from these mining companies is so small that it will have no appreciable effect on the mining industry at all.** Only comparatively few mining companies in Canada are subject to the tax, and they will contribute very much less than my hon. friend has in view. The mining companies desire to contribute. Some of them would rather that the tax was on a basis so that they would not have to contribute so much; that is no doubt very natural. I hear there are also a few, but very few, who would rather not pay anything at all. But we should not be justified in acceding to their request and exempting them from the operation of this tax, provided of course that they made large profits. I can say this that those in the mining industry who do not desire to pay are decidedly in the minority; the great majority do want to pay; they recognize it as just that they should pay, and among these I am happy to say are the Americans.

Let us for a moment **consider the principle of the application of this measure to the mining industry.** I admit that it is more difficult to apply a measure of this kind to mining companies than to manufacturing, industrial or commercial business. The reason is that mining, as my hon. friend from Pictou has pointed out, is a calling in which there are many disappointments, and in which abnormal profits must be looked for. I think that is generally admitted. A man who might be quite content with seven per cent. in a manufacturing business would not invest in a mining company upon the basis of a seven per cent. return on his investment. It must be borne in mind that a man who speaks of getting say twenty per cent. in a mining company, especially a company that is operating metalliferous mines, knows that in that twenty per cent. there is a large return of his capital each year. That is among the reasons why, in mining, a larger return is required than in the case of an ordinary commercial or industrial enterprise. The same remark would apply to other businesses—I do not say that twenty per cent. would apply—in which the capital invested is depleted from year to year. The resolution I have brought down relates net profits to capital. I would call the attention of my hon. friend from Pictou to the fact that in the resolution originally brought down we used the term "net profits." I may say that mining had not escaped our attention, and for this reason, among others: We had examined carefully the American income tax legislation, in which provision is made for an allowance for exhaustion or depletion of capital not to exceed five per cent. of the gross output in any one year. It did not appear to us that we should place a limit of that kind upon the amount that we should allow for exhaustion of capital. There are some mines whose average life is eight or ten years. I am speaking of metalliferous mines. Then other mines, such as coal mines, last for generations, and the same considerations, except in a general way, do not apply; that is to say, the percentage of exhaustion in a coal mine in a particular year is not so great as the amount of exhaustion in connec-

tion with metalliferous mines such as gold, silver and copper mines. We therefore deemed it improper to place any limit on the percentage which we should allow for exhaustion of the capital of a mine. **In the administration of this Act it may be necessary for us in some cases to say we shall allow (for exhaustion) ten, twelve or thirteen per cent.; and in other cases five, or two per cent. It all depends upon the character of the mine with which we are dealing.** The hon. member for Pictou will, I am sure, concede that if we tax what are known as profits and distributed to shareholders, say under the mining laws of the Province of Ontario, but which are really not net profits, and deduct from those profits a proper amount, as we should be entitled to do under the provisions of this Act, for depreciation of plant and machinery, and for exhaustion, in the case of some mines, to the extent of ten, twelve or more per cent. of the value of the mine, they take on a very different complexion from what are ordinarily understood as profits in the payment of dividends to shareholders in mining companies. The result of dealing with the profits of mining companies in that way—and it is a proper way to deal with them—will be to make the net profits appear to be much smaller than the apparent profits which are published from time to time. So much for that phase.

I have not considered it necessary to place any limit in the Act, because I think in its administration the judgment of the officials should be left unfettered, although, of course, they will have to act on some principle which will be fair to all. I do not, however, consider it necessary to fix in the Bill a limit of percentage to be allowed for the exhaustion of mines. I have dealt with the matter of net profits, and it does seem to me that in dealing with them in that way we are placing the mining industry on a parity with all other industries.

Now we come to another question, which I am sure my hon. friend from Pictou has given attention to: the question of capital, of reserve, rest and accumulated profits. My hon. friend will observe, by an amendment I shall make to the resolution, that "may" will become "shall."

Mr. Macdonald: In all companies?

Sir Thomas White: I would call the attention of my hon. friend from Pictou to the fact that, in estimating capital we shall have regard, not only to capital stock, but to rest, reserve, and accumulated profits. These will all be embraced under capital.

My hon. friend from Pictou is a lawyer, and I desire to make this statement to him: If we had proceeded absolutely logically we should have said: We will take the value of all the assets, real and personal, movable and immovable, of every company, firm and individual in Canada, and subtract the liabilities from the assets and the difference will be the capital. I need not, however, tell the House that that would be a Herculean task for the officials charged with the administration of this measure. In the case of most companies the capital, reserve and accumulated profits are accurately stated in their reports, and one would feel perfectly safe in taking their statement where the capital stock has been paid in full: capital, so much; reserve and accumulated profits, so much, representing premium on the price of stock sold to shareholders, or profits which have been taken into reserve, or contingent fund, or allowed to remain in profit and loss account. So in the case of an ordinary company for the sake of taxation, you have your capital, your reserve or rest account, and your accumulated profits, substantially representing the capital of the company invested in that business.

Mr. Macdonald: The gross capital?

Sir Thomas White: No, the net.

Mr. Macdonald: What about the liabilities?

Sir Thomas White: I think I am right. I am speaking of capital, reserve and accumulated profits only; I am not speaking of the total assets. I say that that substantially represents the capital of that company. Just as an individual has invested in a business \$100,000 which would represent the value of its assets less its liabilities, so, in determining what the capital of a company logically is, you would say: What is the value of its assets and what are its liabilities? You would then deduct the liabilities from the assets and in that way get the capital. If the business of a company has been conducted properly, if the stock has been all paid in cash, you will find that that will correspond with capital stock, rest, reserve and accumulated profits.

**Mining companies present difficulties in ascertaining the capital invested in them, because there is no necessary connection between the nominal capital of a mining company and its real capital, which is the value of its mines.** Therefore, you will find these anomalies.

You will find a company incorporated some years ago, say, with a capital of \$250,000 or \$500,000, and you will find that the property to-day may be worth \$5,000,000; that a holding company has probably been created, holding the stock in the original company, now the subsidiary company of the holding company, and that the dividends are being paid, say at the rate of 15 or 20 per cent. upon a capital of \$5,000,000. Now, this taxation will apply, of course, to the underlying company; but it will be necessary, in order to be perfectly fair to the mining industry, that in considering what its capital is, under the provisions of this Bill, you have regard to the amount of its fully paid up capital and to the values of its reserves, rest and accumulated property, the three together, as I have stated, representing substantially the value of the mine. In my opinion, that is absolutely fair and just, and it is the principle that would be applied to financial institutions, private individuals and firms in business. The first question is: What is the true amount of your capital? The second is: What is the true amount of your net profits? Now, relate your net profits to the true amount of your capital and you will easily be able to make the calculations called for in this measure. Therefore, I think, in view of the statement I have made, that the apprehensions of those engaged in the mining industry that this tax is going to be oppressive, will be allayed, if not entirely removed, because, on the one hand, the so-called profits are cut down to a net basis, and on the other hand, the capital, reserve and accumulated profits are deemed to be the value of the property, less the liabilities, of course, that is, the true capital invested in the enterprise.

I do not, at the moment, desire to say anything further than this, that, if these resolutions and the Bill which I shall introduce later should meet, as I believe they will, with the approval of this House, it will be our object to administer this legislation, while strictly, in accordance with the legislation, with good judgment and with scrupulous fairness to all parties concerned. The administration will be under the Department of Finance, the tradition of which I believe has been good, and I certainly desire to pass it on unimpaired. It has been suggested here that political considerations might enter into the administration of this measure. I do not believe that that view is shared in by a majority of the members of this House, nor that it is shared in by hon. gentlemen opposite. We are bringing in an exceptional measure under exceptional conditions, and

the House realizes the fact that this is a Bill that under normal conditions would not be brought down. I am sure hon. members will have confidence that this measure will be administered fairly and justly to all parties concerned, and most certainly without regard to political considerations in order that the end may be accomplished that we have in view in introducing this measure, namely, that we may raise a substantial amount of revenue to cover our expenditures in connection with the war.

Perhaps I have spoken longer than a minister should in committee; but the hon. member for Pictou, I know, is sincerely interested in this matter; he has a wide interest in mines; he is sympathetic to the mining industry; he is well informed; he has put forward his views; he has raised questions; he has made representations, and I have thought that his desire was that I should deal with this matter, so that those engaged in the mining industry may be reassured as to certain matters about which they have been in doubt, namely as to what net profits mean and as to what capital means in connection with their industry.

There is another thing. My hon. friend has touched upon the question of the certainty of a tax. It is a good principle in taxation that those who are liable to pay a tax should be able, within reasonable bounds, to ascertain what the tax will mean, because in many cases, they make their future arrangements accordingly. Now, this Bill should be through this House in the course of the next couple of weeks—at least I am hoping it will—and once it becomes law, there will be no difficulty whatever, because the legislation will begin to operate at once, if any mining company is desirous of ascertaining what its taxation will be, in making their return and having the officials of the department check it over and make an assessment upon it. I think we should be able to begin making our assessment in May. Returns will be called for in May or June, or, if any are unduly apprehensive about the amount they will have to pay, they can easily ascertain substantially what it will amount to.

Mr. Turriff: The Minister of Finance has just spoken about the capitalization of mines. I am not sure that I clearly understood what he said. Suppose that a mining company, organized a few years ago, has a paid-up capital of \$250,000. They bought a property for \$100,000 and spent \$150,000 in plant and in carrying on the business. Between that time and the time when this tax comes into effect they make a fine discovery of ore, so that the mine, instead of being worth \$100,000, is worth \$1,000,000. In that case, is that \$1,000,000 capital, or is it not?

Sir Thomas White: Assuming that \$1,000,000 is a proper valuation in the opinion of experts, then I should say the true position of that company would be this: Its capital is \$250,000, and its reserve, rest, and accumulated profits make up the balance. Its capital, for the purposes of this Act, would be \$1,000,000.

Fraser & Chalmers of Canada, Limited, of Montreal, have recently been awarded the contract by the City of Regina, covering the delivery and erection of a 300 h.p. steam turbine direct connected to two centrifugal pumps having a total capacity of seven million Imperial gallons per twenty-four hours.

The directors of the Consolidated Mining and Smelting Co. of Canada, Ltd., with head office in Toronto, on March 10th declared a quarterly dividend at the rate of ten per cent. per annum, payable April 1st. The amount of this dividend will be \$145,125.

# MINERAL PRODUCTION IN CANADA IN 1915

By John McLeish

(Continued from last issue)

## Asbestos.

The asbestos production in 1915 was obtained from the same field in Quebec as heretofore. The output was less than in 1914, but sales showed an increase of about 17 per cent. Stocks on hand at the end of the year showed a noticeable decrease.

The total output in 1915 was 106,558 tons, as against 107,668 tons in 1914, showing a decrease of 1,110 tons or 1.03 per cent. The sales and shipments during 1915 were 113,115 tons valued at \$3,491,450, or an average of \$30.87 per ton, as against sales in 1914 of 96,542 tons valued at \$2,892,266 or an average of \$29.92 per ton. The 1915 sales were larger in quantity than those of 1914 by about 17 per cent. and in value by about 20 per cent.

Stocks on hand at December 31st, 1915, were 22,052 tons, as compared with stocks on hand of 31,171 at the end of the previous year.

The number of men employed in the mines or quarries and mills were 2,393 and the amount paid in wages was \$1,089,976 as against 2,992 men employed in 1914 to whom was paid in wages \$1,283,977.

The total quantity of asbestos rock milled during the year is reported as 1,795,472 tons, which with a mill production of 102,571 tons shows an average estimated content of about 5.71 per cent. of asbestos fibre in the rock. The estimated content of fibre in rock milled in 1914 was 6.03 per cent.

The output and sales of crude and mill stock are shown in the table following. The classification is based on valuation: Crude No. 1 comprising material valued at \$200 per ton and upwards, and Crude No. 2 material valued at less than \$200 per ton; Mill stock No. 1 including mill fibre valued at \$30 and upwards, Mill stock No. 2, mill fibre valued at \$15 to \$30 per ton,

1914 valued at \$2,298,646 or an average of \$28.35 per ton. There was also an export of asbestos sand amounting to 25,103 tons valued at \$157,410 or an average of \$6.27 per ton and of manufactures of asbestos valued at \$125,003.

Imports of asbestos manufactures for the year amounted to \$168,894.

## Chromite.

From 1910 to 1914 inclusive no chromite was mined in Canada, and only a few small shipments were made from stock; but in 1915, according to returns received, shipments amounted to 11,486 tons, valued at \$162,618.

In the early summer the demand for chromite in the United States led to considerable activity in the chromite-producing area in the vicinity of Black Lake and Coleraine, Quebec. Old dumps were picked over, and old pits re-opened. During the summer months ore averaging probably less than 30 per cent. Cr<sub>2</sub>O<sub>3</sub> found a ready market, but towards the close of the year buyers were insisting on a 35 per cent. ore.

The exports of chromite according to Customs records were 7,290 tons valued at \$81,838 or an average of \$11.23 per ton.

## Coal and Coke.

**Coal.**—The total production of marketable coal for the year 1915, comprising sales and shipments, colliery consumption, and coal used in making coke, or used otherwise by colliery operators, was 13,209,371 short tons valued at \$31,957,757, as against 13,637,529 tons valued at \$33,471,801 in 1914 showing a decrease of 428,158 tons, or 3.14 per cent. in quantity, and of \$1,514,044 or 4.52 per cent. in total value.

In estimating the values of the coals arbitrary values are assumed for the Nova Scotia and British Columbia

Output Sales and Stocks of Asbestos in 1915.

	Output		Sales		Stock on hand Dec. 31		
	Tons	Tons	Value	Per ton	Tons	Value	Per ton
Crude No. 1.....	2,305.6	2,735.4	749,811	274.11	589.8	176,533	299.31
Crude No. 2.....	1,681.6	2,631.3	322,049	122.39	316.6	43,006	135.84
Mill stock, No. 1.....	21,710	24,238	1270,074	52.40	2,176	91,919	42.24
Mill stock, No. 2.....	41,973	42,031	840,132	19.99	12,837	268,197	20.89
Mill stock, No. 3.....	38,888	41,479	309,384	7.46	6,133	55,555	9.06
Asbestos.....	106558.2	113114.7	3491,450	30.87	22,052.4	635,210	28.80
Asbestic.....		25,700	21,819	0.85			

and Mill stock No. 3 mill fibre valued at less than \$15 per ton.

The total sales of crude asbestos in 1915 were 5,366.7 tons valued at \$1,071,860 or an average of \$199.72 per ton as against sales in 1914 of 4,147.9 tons valued at \$773,193 or an average of \$186.42 per ton.

The total sales of Mill stock in 1915 were 107,748 tons valued at \$2,419,590 or an average of \$22.46 per ton, as against sales in 1914 of 92,394 tons valued at \$2,119,073, or an average of \$21.64 per ton.

There was also a production of asbestic of 25,700 tons valued at \$21,819.

Exports of asbestos during the calendar year 1915 were 84,584 tons valued at \$2,734,695 or an average of \$32.45 per ton, as against exports of 81,081 tons in

production, viz.: \$2.50 per long ton for the former and \$3.50 per long ton for the latter. The values used for coal production in the other provinces are those furnished by the operators.

The Nova Scotia production was 7,429,888 tons, an increase of 58,964 tons, or 0.8 per cent. over that of 1914; the Alberta, production 3,320,431 tons, a decrease of 362,584 tons or 9.8 per cent., the British Columbia production 2,089,966 tons, a decrease of 149,833 tons, or 6.7 per cent.; the Saskatchewan production 236,940 tons, an increase of 4,641 tons, or about 2 per cent.; the New Brunswick production 122,422 tons, an increase of 24,373 tons, or 24.85 per cent.; and Yukon Territory, a production of 9,724 tons, a decrease of 3,719, or 28 per cent.

## Production of Coal by Provinces.

Province	1913		1914		1915	
	Tons	Value \$	Tons	Value \$	Tons	Value \$
Nova Scotia.....	7,980,073	17,812,663	7,370,924	16,452,955	7,429,888	16,584,573
British Columbia..	2,714,420	8,482,562	2,239,799	6,999,374	2,089,966	6,531,144
Alberta.....	4,014,755	10,418,941	3,683,015	9,350,392	3,320,431	8,136,527
Saskatchewan....	212,897	358,192	232,299	374,245	236,940	361,787
New Brunswick...	70,311	166,637	998,049	241,075*	122,422	304,830
Yukon.....	19,722	95,945	13,443	53,760	9,724	38,896
Total.....	15,012,178	37,334,940	13,637,529	33,471,801	13,209,371	31,957,757

\* Railway Shipments.

The exports of coal in 1915 were 1,766,543 tons valued at \$5,406,058 as compared with exports of 1,423,126 tons in 1914 valued at \$3,880,175, an increase of 343,417 tons or 2.41 per cent.

The imports of coal in 1915 were made up as follows: bituminous round and run of mine; 6,106,794 tons, valued at \$7,564,369, or an average of \$1.24 per ton, bituminous slack 2,286,916 tons valued at \$2,027,256, or an average of \$0.89 per ton, and anthracite 4,072,192 tons valued at \$18,753,980 or an average of \$4.61 per ton, making a total of 12,465,902 tons valued at \$28,345,605.

Imports during 1914 included bituminous, round and run of mine 7,776,415 tons valued at \$14,954,321 or an average of \$1.92 per ton, bituminous slack 2,509,632 tons valued at \$3,605,253 or an average of \$1.43 per ton, and anthracite 4,435,010 tons valued at \$21,241,924 or an average of \$4.79 per ton, making total imports of 14,721,057 tons valued at \$39,801,498.

The above figures show that in 1915 there was a decrease from imports of the previous year in quantity of 2,255,155 tons, or 15.3 per cent., and in value of \$11,455,893, or 28.78 per cent. The larger decrease in value is due to the average value of bituminous, round, and run of mine dropping from \$1.92 per ton in 1914 to \$1.24 per ton in 1915, and that of bituminous slack from \$1.44 to \$0.89.

The details of the decreases in imports are as follows: in bituminous, round and run of mine 1,669,621 tons or 21.5 per cent.; in bituminous slack of 222,716 tons, or 8.9 per cent.; and in anthracite of 362,818 tons or 8.2 per cent.

The apparent consumption of coal during 1915 was therefore 23,849,040 tons, as against a consumption the previous year of 26,852,323 tons. Canadian mines contributed 48 per cent. of the domestic consumption, and the balance was imported. The total Canadian production was equivalent to about 53.4 per cent. of the consumption.

**Coke.**—The total output of oven coke during 1915 was 1,200,766 short tons made from 1,856,393 tons of coal of which 1,425,172 tons were of domestic origin, and 431,221 tons were imported. The total quantity of coke sold, or used by the producers during the year was 1,168,921 tons valued at \$4,253,536 or an average of \$3.64 per ton.

In 1914 the total output was 1,015,253 tons, and the quantity sold, or used by the producers, was 1,023,860 tons valued at \$3,658,514 or an average of \$3.57 per ton.

Returns for 1915 show a production of 0.647 tons of coke per ton of coal charged, as compared with 0.658 tons of coke per ton of coal charged in 1914.

The output of coke by provinces in 1915 was as follows: Nova Scotia 584,993 tons, an increase of 239,113 tons over 1914 production; Ontario 316,211 tons, a decrease of 61,303 tons; Alberta 24,187 tons, a decrease of 4,354 tons; and British Columbia 275,375 tons, an increase of 12,057 tons. The Ontario production was

entirely from imported coal.

By-products from coke ovens which included 10,448 tons of ammonium sulphate, 7,365,931 gallons of tar, and 4,089,602 thousand cubic feet of gas, made in 1915 were in excess of the production in 1914; there was also for the first time a production of benzol and associated compounds. The production of trinitrotoluene near the close of the year was reported by Col. Carnegie of the Shell Committee, as 100,000 pounds per week.

The ovens operated during the year were those at Sydney, Sydney Mines, and Westville, Nova Scotia; Sault Ste. Marie, Ontario; Coleman, Alberta; and Fernie, Michel, and Union Bay (Comox), B.C. At the close of the year there were about 1,742 ovens in operation, as contrasted with only 797 in operation at the end of 1914. Over 800 ovens at Stellarton and Londonderry in Nova Scotia; Port Arthur, Ontario; Lille and Passburg, Alberta; Carbonado and Hosmer, B.C.; were idle throughout the year.

Imports of coke during 1915 amounted to 637,857 tons valued at \$1,608,464, and exports were 35,869 tons valued at \$160,053.

#### Feldspar.

The 1915 production of feldspar was 15,455 tons, valued at \$59,124 or an average of \$3.18 per ton as compared with a production in 1914 of 18,060 tons valued at \$70,824 or an average of \$3.92 per ton. The year's production is slightly less than the average of the preceding six years. As usual by far the greater proportion of the production came from Frontenac County, Ontario. It is of interest to note, however, that there has been a renewal of feldspar mining in Hull Township, Quebec.

#### Fluorspar.

Fluorspar is obtained at Madoc, Ontario. There have been no shipments for three years, but the operators report having contracted for delivery of 1,000 tons in 1916.

Imports of fluorspar are not shown separately in the Customs records; imports of hydro-fluo-silicic acid in 1915 were 1,117,874 pounds valued at \$36,085.

#### Graphite.

Shipments of milled and refined graphite amounted to 2,610 tons valued at \$121,023 or an average of \$46.37 per ton. This includes 76 tons from mills at Buckingham, Que. The major portion of the production came from Calabogie, Renfrew county, Ont., with a small tonnage from Mumfords, Hastings county. The production includes material varying in value from less than \$40 to over \$150 per ton. The 1914 production was 1,647 tons valued at \$107,203. Operators report a greatly increased demand with higher prices owing to the shortage in supplies in the United States from sources outside of America.

Exports of plumbago and of manufactures of plumbago were valued at \$96,325 according to Customs records.



### Gypsum.

The production of gypsum of all grades in 1915 is reported as 470,335 tons valued at \$849,928. This is lower than for several years, previous production having been 516,880 tons in 1914; 636,370 tons in 1913; and 578,454 tons in 1912. The Ontario production was practically the same as in 1914, while New Brunswick production showed a slight increase. In both Manitoba and Nova Scotia 1915 production showed a conspicuous decrease from that of the previous year.

Gypsum sold in 1915 was classified as follows: lump 342,467 tons; crushed 48,735 tons; fine ground 6,455 tons; and calcined 72,678 tons. In 1914 the tonnages of the various grades were: lump 351,729 tons; crushed 49,441 tons; fine ground 6,097 tons; and calcined 109,613 tons.

Exports of crude gypsum were 292,234 tons valued at \$336,380 being the smallest reported since 1908. Exports of ground gypsum which were valued at less than \$10,000 yearly for many years rose to a value of \$35,490 in 1914 and to a value of \$80,933 in 1915.

### Magnesite.

The production of magnesite in 1915, chiefly crude but including some calcined, was 14,779 tons valued at \$126,535 in contrast with a yearly average production from 1908 to 1914 inclusive of 621 1-2 tons. The increased production was due largely to the urgent demands of steel companies and manufacturers of refractory brick.

All the production came from Grenville Township, Argenteuil County, Quebec. From the Atlin district, in British Columbia, several hundred tons were shipped to Vancouver, but not marketed.

### Manganese Ores.

In 1915 there was according to returns received to date, a production of 47 tons of manganese ore (90 per cent.  $MnO_2$ ) valued at \$5,460 or an average of \$116.17 per ton, as compared with a production in 1914 of 28 tons, valued at \$1,120 or an average of \$40.00 per ton.

The records of the Customs Department show exports of manganese ores amounting to 255 tons, valued at \$6,855, which would seem to indicate shipments additional to those reported.

The property at New Ross, Nova Scotia, formerly operated by the Nova Scotia Manganese Company, was taken over in September and reopened by the Metals Development Company of Halifax.

### Natural Gas.

Complete returns have not yet been received from some of the largest operators in Ontario. The 1915 production of natural gas therefore (subject to the corrections of the estimates used) was approximately 18,319,710 thousand cubic feet valued at \$3,300,825 contributed by provinces as follows: Ontario 13,510,071 thousand cubic feet valued at \$2,202,523; New Brunswick 430,692 thousand cubic feet valued at \$60,383, and Alberta 4,378,947 thousand cubic feet valued at \$1,037,919.

The production the previous year was reported as 21,692,504 thousand cubic feet valued at \$3,484,727 of which amount Ontario produced 14,094,521 thousand cubic feet valued at \$2,215,808; New Brunswick 425,826 thousand cubic feet valued at \$54,249, and Alberta 7,172,157 thousand cubic feet valued at \$1,214,670.

Ontario's production in 1915 showed a decrease of 584,450 thousand cubic feet, Alberta production a de-

crease of 2,793,210 thousand cubic feet, and New Brunswick production an increase of 4,866 thousand cubic feet.

The Ontario gas production came from the same fields in the southern portion of the province between Niagara Falls and Windsor, as heretofore. In 1914 and 1915 gas from the Kent fields was distributed as far east as Hamilton, a distance of 153 miles.

The New Brunswick production is obtained in Albert County and supplies chiefly Hillsborough and Moncton, while in Alberta, Medicine Hat and Bow Island are still the principal gas fields, being utilized, supplying the district between Medicine Hat and Calgary.

### Petroleum.

The annual production of crude petroleum which had been showing a steady decrease from 1907 to 1914 showed in 1915 a slight increase in quantity over the 1914 production. The value, though, was the lowest recorded in the records of the Division which date back to 1885 for the average price per barrel in Western Ontario (from which nearly the entire Canadian production comes) was the lowest in several years.

A bounty of 1½ cent per gallon is paid on the marketed production of crude oil from Canadian oil-fields through the Department of Trade and Commerce. From the bounty statistics it appears that the 1915 production in Ontario and New Brunswick was 215,464 barrels on which bounties amounting to \$113,118.45 were paid. The market value of this crude oil at \$1.39½ per barrel amounted to \$300,572. In Alberta there was a small production of crude oil, but no bounty was paid on this as the specific gravity was below the standard set by the Petroleum Bounty Act, and complete records have not been furnished by the producers.

The total production of crude oil (exclusive of Alberta) in 1915 is therefore, 215,464 barrels, valued at \$300,572 as compared with a production in 1914 of 214,805 barrels valued at \$343,124.

The average monthly price of crude oil per barrel at Petrolia for the year was \$1.39½ as compared with \$1.59 in 1914, and \$1.782 in 1913. For the first seven months of the year the average price was almost constant at \$1.30½ per barrel, but during the last five months it showed an increase month by month reaching a maximum of \$1.70 in December.

The Ontario production in 1915 was, according to the records of the Department of Trade and Commerce at Ottawa, 214,444 barrels. The production in barrels of the various fields, as furnished by the Supervisor of Petroleum Bounties at Petrolia, was as follows: Lambton, 161,368; Tilbury, 12,742; Bothwell, 33,395; Dutton, 5,401; Onondaga, 1,490, and Belle River 46; giving a total of 214,442 barrels. In 1914 the production by fields was as follows: Lambton, 154,186; Tilbury, 18,530; Bothwell, 33,961; Dutton, 2,190; Onondaga, 2,437; and Belle River, 1,191; giving a total of 212,495 barrels.

The production in New Brunswick was 1,020 barrels as against 1,725 in 1914 and 2,111 in 1913.

Exports of petroleum entered as crude mineral oil in 1915 were 35,977 gals., valued at \$1,789, and of refined oil 103,488 gals., valued at \$14,107. There was also an export of naphtha and gasoline of 16,644 gals., valued at \$4,540.

The total value of the imports of petroleum and petroleum products in 1915 was \$8,047,781 as against a value of \$11,174,763 in 1914.

The total imports of petroleum oils, crude and refined, in 1915 were 236,923,765 gals., valued at \$7,979,-

264. The oil imports included, crude oil 192,588,487 gals. valued at \$3,678,021; refined and illuminating oils, 6,792,873 gals. valued at \$405,019; gasoline 28,030,972 gals. valued at \$2,693,717; lubricating oils 4,557,179 gals. valued at \$755,535; and other oils, products of petroleum, 4,954,254 gals. valued at \$446,972. The oil imports in 1914 were: crude oil, 195,207,210 gals. valued at \$5,750,971; refined and illuminating oils 12,833,065 gals. valued at \$970,481; gasoline 24,396,401 gals. valued at \$2,747,360; lubricating oils 5,767,676 gals. valued at \$940,143 and other oils, products of petroleum, 6,283,621 gals. valued at \$663,407, making a total of 244,487,973 gals. valued at \$11,072,362.

The imports of petroleum products in 1915 included 980,662 pounds of paraffin and paraffin wax candles valued at \$68,517, as compared with imports in 1914 of 1,594,236 pounds valued at \$102,401.

### Pyrites.

The production of pyrites in 1915 was 296,910 tons valued at \$1,028,678, of which 153,607 tons valued at \$614,428 was mined in Quebec, and 143,303 tons valued at \$414,250 was mined in Ontario. The 1914 production was 228,314 tons valued at \$744,508 of which 117,698 tons valued at \$470,792 came from Quebec and 110,616 tons valued at \$273,716 came from Ontario.

Exports of pyrites in 1915 were 137,598 tons valued at \$527,318, or an average of \$3.83 per ton, as compared with exports in 1914 of 89,888 tons valued at \$377,985, or an average of \$4.21 per ton.

Exports of sulphuric acid in 1915 amounted to 19,270,572 pounds valued at \$243,457, as against exports in 1914 of 7,485,509 pounds valued at \$45,612.

### Salt.

The total sales of salt in 1915 were 119,900 tons, valued at \$600,226 (exclusive of the cost of packages) as compared with sales in 1914 of 107,038 tons, valued at \$493,648. The entire Canadian production of recent years has come from Southwestern Ontario.

The Canadian Salt Co. in addition to selling salt, uses a portion of its production in its chemical works at Sandwich, Ontario, where caustic soda and bleaching powder are manufactured.

The exports of salt were 889,300 pounds, valued at \$5,836, as compared with exports in 1914 of 952,700 pounds valued at \$5,229.

The total imports of salt in 1914 were 137,486 tons valued at \$517,526 and included 27,613 tons of fine salt in bulk, valued at \$84,449; 6,867 tons of salt in packages, valued at \$50,997, and 103,006 tons of salt imported for the use of fisheries, valued at \$382,080. The imports in 1914 were 142,646 tons, valued at \$540,881, including 26,065 tons of fine salt in bulk valued at \$82,149; 7,828 tons of salt in packages, valued at \$68,959; and 108,753 tons of salt for the use of sea or gulf fisheries, valued at \$389,773.

### Talc.

The production of talc was about the same as in the two preceding years, the 1915 shipments being 11,885 tons, valued at \$40,554.

The output of talc, all of which comes from the vicinity of Madoc, Ontario, is marketed in both crude and ground form in the United States and Canada.

### Cement.

The general decrease in production of structural materials and clay products which was a feature in 1914 was repeated in 1915, the production in the latter year

being valued at \$18,712,074, as against a production in 1914 valued at \$26,009,227.

The total quantity of Portland cement, including natural Portland, made in 1915 was 5,153,763 barrels of 350 pounds each, as compared with 8,727,269 barrels in 1914, a decrease of 3,563,506 barrels, or about 40 per cent.

The total quantity of Canadian Portland cement sold or used during 1915 was 5,681,032 barrels, valued at \$6,977,024 or an average of \$1.228 per barrel, as compared with 7,172,480 barrels, sold or used in 1914, valued at \$9,187,924, or an average of \$1.28, showing a decrease in quantity of 1,491,448 barrels, or about 20 per cent.

The total imports of cement in 1915 were 98,664 cwt. equivalent to 28,190 barrels of 350 pounds each, valued at \$40,426, or an average of \$1.434 per barrel, as compared with imports of 98,022 barrels, valued at \$147,158, or an average of \$1.50 per barrel in 1914.

The total consumption of cement, therefore, neglecting a small export, was 5,709,222 barrels, as compared with a consumption of 7,270,502 barrels in 1914, showing a decrease of \$1,561,280 barrels, or about 21 per cent.

The average price per barrel at the works in 1915 was \$1.228 as compared with \$1.28 in 1914, \$1.27 in 1913, \$1.28 in 1912, and \$1.34 during 1911 and 1910.

The imports of cement in 1915 included 1,065 barrels, valued at \$1,480, from Great Britain, and 27,125 barrels, valued at \$38,946, from the United States.

### Production and Sales of Portland Cement.

	1914.	1915.
	Brls.	Brls.
Portland cement sold or used.....	7,172,480	5,681,032
Portland cement manufactured.....	8,727,269	5,153,763
Stock on hand Jan. 1st.....	1,073,328	2,620,022
Stock on hand Dec. 31st.....	2,628,117	2,062,961
Value of cement sold or used.....	\$9,187,924	\$6,977,024
Wages paid.....	2,271,006	1,180,882
Men employed.....	2,977	1,679

### Exports of Products of the Mine and Manufactures of Mine Products, Calendar Year 1915.

(Compiled from Trade and Navigation Statements).

Products	Quantity	Value
Arsenic, cwt.....	46,364	\$ 174,190
Asbestos, tons.....	84,584	2,734,695
Asbestos sand, tons.....	25,103	157,410
Coal, tons.....	1,766,543	5,406,058
Chromite, oz.....	7,290	81,838
Feldspar, Magnesite, Talc, etc.....		148,915
Gold.....		16,528,143
Gypsum, crude, tons.....	292,234	336,380
Copper, fine, in ore, etc, lb.....	81,437,063	8,671,641
Copper, black, or coarse, and in pigs, lb.....	21,292,516	3,788,715
Lead, in ore, etc, lb.....	1,845,100	40,273
Lead, pig, etc., lb.....	2,066,929	79,067
Nickel, in ore, etc, lb.....	66,410,442	7,394,446
Platinum, oz.....	236	11,052
Silver, oz.....	27,672,481	13,812,018
Mica, lb.....	879,631	236,124
Mineral Pigments, cwt.....	23,916	17,263
Mineral water, gal.....	198	53
Oil, mineral, crude, gal.....	35,977	1,789
Oil, mineral, refined, gal.....	103,488	14,107
Ores:—		
Antimony, tons.....	1,149	82,990
Corundum, tons.....	339	37,798
Iron, tons.....	79,770	206,823
Manganese, tons.....	255	6,855
Other ores, tons.....	23,816	798,214

Phosphate, tons.....	179	1,860
Plumbago, crude ore, etc., cwt.....	5,254	12,009
Pyrites, tons.....	137,598	527,318
Salt, cwt.....	8,893	5,836
Sand and Gravel, tons.....	808,022	380,549
Stone, ornamental, tons.....	29,976	12,764
Stone, building, tons.....	35,804	28,910
Stone, crushed, tons.....	42,716	24,453
Stone, for manufacture of grindstones, tons.....	180	900
Other products of the mine, tons.....		53,106
<b>Total mine products.....</b>		<b>61,814,582</b>

**MANUFACTURES.**

<b>Agricultural implements:—</b>		
Mowing machines, No.....	5,031	175,912
Cultivators, No.....	5,957	166,602
Reapers, No.....	471	21,105
Drills, No.....	6,400	422,772
Harvesters and Binders, No.....	7,668	809,141
Ploughs, No.....	14,923	309,286
Harrows, No.....	4,459	81,731
Hay Rakes, No.....	1,758	40,289
Seeders, No.....	2	87
Threshing machines, No.....	1,001	568,401
All other.....		302,355
Parts of.....		519,379
<b>Asbestos, manufactures of.....</b>		<b>125,003</b>
Bricks, M.....	1,155	9,089
Cement.....		5,161
Clay, manufactures of.....		25,202
Coke, tons.....	35,869	160,053
<b>Drugs:—</b>		
Acetate of lime, lb.....	10,001,830	205,748
Acid sulphuric, lb.....	19,270,572	243,457
Calcium carbide, lb.....	102,017,471	3,160,950
Phosphorus, lb.....	545,050	77,476
<b>Earthenware and all manufactures of.....</b>		<b>11,281</b>
Fertilizers.....		2,335,297
Grindstones, manufactured.....		35,334
Gypsum or Plaster, ground.....		80,933
<b>Iron and Steel, and manufactures of:—</b>		
Stoves, No.....	1,271	18,563
Gas buoys and parts of.....		2,017
Castings, N.O.P.....		143,714
Pig iron, tons.....	17,307	231,551
Ferro-silicon and ferro-compounds, tons.....	9,238	537,081
Wire and wire nails, cwt.....	1,439,950	3,224,740
<b>Machinery:—</b>		
Linotype machines and parts of.....		6,946
Sewing machines, No.....	2,557	30,479
Washing machines, No.....		20,334
Typewriters, No.....	3,175	206,811
Machinery, N.O.P.....		536,162
Scrap iron and steel, cwt.....	1,787,155	883,134
Hardware, viz.: tools, hand or machine.....		321,021
Hardware, N.O.P.....		401,053
All other, N.O.P.....		31,147,770
<b>Lime.....</b>		<b>15,617</b>
<b>Metals:—</b>		
Aluminum in bars, etc., cwt.....	186,808	3,333,726
Aluminum manufactures of.....		620,562
Brass, old and scrap, cwt.....	120,685	1,468,165
Copper, old and scrap, cwt.....	41,616	616,553
Metallic shingles, etc.....		66,655
Metals, N.O.P.....		878,258
<b>Mineral and aerated waters (in bottles).....</b>		<b>3,525</b>
Oil, gasoline and naphtha, gal.....	16,644	4,540
Oil, N.O.P., gal.....	1,247,376	290,943
Plumbago, manufactures of.....		84,316
Stone, ornamental.....		5,990
Stone, building.....		660
Tar.....		37,331
Tin, manufactures of.....		173,206
<b>Vehicles:—</b>		
Automobiles, No.....	13,475	6,756,395
Automobiles, parts of.....		363,178
Bicycles, No.....	116	4,692
Bicycles, parts of.....		15,547
		62,343,279
<b>Grand Total.....</b>		<b>124,157,861</b>

**“SULPHUR SMOKE” CASES AT SUDBURY.**

Sudbury, March 22.—In a special sitting of the Supreme Court, before Hon. Mr. Justice Middleton, the hearing of the “sulphur smoke cases” which have been entered against the two nickel smelting companies in this district, was commenced at Sudbury on Monday. Four cases are being heard against the Canadian Copper Company and two against the Mond Nickel Co. Damages are sought for loss of crops, stock, buildings, machinery, fences, pollution of water supply and injury to lands, as the case may be, from the sulphur smoke and gases alleged to have been emitted by the companies from their smelters, roast yards and other works during the past year. In each case an injunction is sought to restrain the defendant companies from further injury or damage to the plaintiffs.

The court room has been crowded to overflowing at every session, largely by the farming section of the community, and great interest is being evidenced in the progress of the cases.

Probably no session of the Supreme Court in the North Country has seen so many eminent members of the legal profession arrayed on both sides as are engaged in the conduct of the cases. Conducting the defence of the Canadian Copper Co. are D. L. McCarthy, K.C., and Britton Osler, of McCarthy, Osler, Hoskin and Harcourt (Toronto), and G. E. Buchanan (Sudbury). For the Mond Nickel Co., Ltd., are J. M. Clark, K.C., and R. U. Macpherson, of Macpherson, Clark, Campbell and Jarvis (Toronto). Mr. Hartley Dewart, K.C. (Toronto), appears as general counsel for all the plaintiffs, and has associated with him A. W. Fraser, K.C. (Ottawa) and J. A. Mulligan, J. H. Clary and J. S. McKessock (Sudbury).

At the opening of the session it was agreed between counsel and concurred in by the Court to permit evidence of a general nature from the various witnesses to be called as to alleged damages and injury of sulphur smoke on vegetation, etc., in addition to the actual knowledge of the damage alleged by the claimants. While nominally proceeding with the case of the Sudbury & Copper Cliff Dairy, witnesses were interrogated as to their general knowledge of alleged injury and damage from sulphur smoke and gases, as they were called. This roving commission, so to speak, extended to McKim, Garson, Rayside, Blezard and Broder townships in the evidence so far presented.

With the exception of the case of Belanger vs. the Canadian Copper Company, all the cases are independent actions. The Belanger case, it is understood, is in the nature of a test case, there being a large number of claimants for alleged damages awaiting the result of the action before proceeding in their case, the nature of their claims being identical to those in the Belanger case.

A great number of witnesses are in attendance, including some fifteen experts to deal with all phases of the sulphur smoke question, while possibly one hundred other witnesses will be called upon to testify.

**NIPISSING.**

Nipissing Mines Company reports cash in bank on March 20, \$898,527; bullion in transit, \$311,977; ore on hand and in process, and bullion ready for shipment, \$553,597; total, \$1,764,101. The company declared a dividend of 5 per cent., payable April 20 to stock of record March 31.

## FLOTATION PROCESSES\*

By C. Terry Durell.

(Continued from p. 123, March 1.)

### Essential Elements.

Cold solutions were seen to be used with some processes. Therefore heat is not an essential element to flotation. Vacuum is used in the one type to produce the gas so it is not essential to flotation. Oil is not always used in froth flotation so it is not an essential element to any except bulk oil flotation. This fact is also shown by the new process of Louis A. Wood. An alkali is used in one case to neutralize the excess acid and in others in place of an acid. Either an acid or an alkaline solution will do and, from the amounts used in mill solutions, it is seen that extremely dilute solutions are effective. That is, complete ionization exists and the effect is that of an electrolyte. By this process of elimination there are left the essential elements as follows: air for surface tension flotation; oil for bulk oil flotation; and gas and an electrolyte for froth flotation.

It is seen that the gas, to form bubbles in froth flotation, can be generated chemically or electrolytically within the pulp mass or it can be (1) beaten in with stirrers, (2) forced in by pressure (that of the atmosphere or greater), or (3) carried in by jets.

### Attachment of Mineral Particles to Bubbles.

Something more than mere bubbles of gas within the pulp mass is necessary to make froth flotation effective. The mineral particles must either be attached to the bubbles or the bubbles must be attached to the mineral particles.

Since a bubble carries with it a surface film of liquid the mineral particle must be caught by this surface film in froth flotation or caught by the free surface of the liquid in surface tension flotation. The necessary conclusion then is that some inherent property of the mineral particle itself is the cause of its resting on the surface of the liquid in the one case or on the surface of the bubble in the other. If it were possible to attach a mineral particle to a bubble already formed by some physical, chemical or electrical force, then it might be possible that surface tension flotation and froth flotation are in no way related, and that bubble attachment is in no way dependent upon some property of the particle itself. It is a well known fact, however, that no such attachment can take place to bubbles that are already formed.

A stream of compressed air turned into a pulp mass in a perfect float condition can not effect flotation, as is well known by every one who has tried it. The bubbles not only rebound from one another but the mineral particles show no tendency to adhere and the bubbles come to the surface without the mineral particles. This is due to the surface film, which phenomena will be taken up later, when it will be shown that there can be no adhesion between this liquid film and the mineral particle, be it either wetted with oil or water. There is no reason for any chemical affinity.

In an electrical field, it is possible for bubbles to be electro-negatively or electro-positively charged. There is no reason why these charges might not be reversed at will by varying the field. Also it is a well known fact that mineral particles can be electrically charged and this is taken advantage of in electrostatic concentration. Cottrell dust precipitation, clay separation, etc. It is also shown in colloidal work that, under the same

condition, some minerals are negatively charged, while others have an opposite charge. It is upon these facts that electrical theories of flotation are based. Assume that the particles of metals, sulphides, tellurides, arsenides and the like "have charges of one polarity (positive), and that non-floatable particles have charges of the opposite polarity (negative)," and also that the bubbles are negatively charged. Witness then the metallic particles jumping for and clinging to the bubbles. A beautiful theory if it were true and would explain all connected with flotation.

In the first place, flotation is not dependent upon an electrical field as is electrostatic concentration, dust precipitation, Boethe Schwerin's Electro-Osmotic Process, and others. It would also be possible to attach mineral particles to bubbles already formed by the assumption of an electrical theory. So far, these electrical theories have considered oil as an essential element to flotation, which, as shown above, is not the fact. If a slight change in the strength of the electrolyte will change the polarity of quartz, calcite and the like so as to cause them to sink, when before they were floating, why will it not also change the polarity of some metallic particles so as to create a preferential flotation? No. It is far better to make a theory conformable to the facts than to try to ignore and twist facts to conform to some of the present electrical theories. Since there is no known way to attach mineral particles to bubbles already formed, bubble attachment depends directly upon some property of the particle itself. This property must then be the same for particles floating in either a surface tension or a frothing machine. As shown by Mickle's experiments, this must be due to gas occlusion.

Why is it then that no solid can be floated unless it contains occluded gas? A particle once wetted with the flotation liquid tends to sink as there is no surface tension effect tending to float it. Water is always used as the flotation liquid as it is the cheapest and has the greatest surface tension of all liquids except mercury. If all gases be driven from a solid, water will enter the pores and adhere to its surface. No surface tension effect can be then exhibited towards it for the reason that it is then as part of the water. Thus a force of adhesion predominating, flotation can not take place. This truth is not so readily seen when the particle is below the surface of the water and an attempt is made to float it by means of a bubble. The surface tension of the liquid film surrounding a gas bubble is much greater than the adhesive force of the gas for a solid. The gas is, in this way, firmly held within the enclosing liquid film and attachment between it and a solid cannot take place. As has been shown above, **it is only the gas that is formed within the pulp mass that is of any value in flotation.** In other words, this nascent gas is attracted by the gas at the surface of the solid. A cohesive force exists between the molecules of the gas at the surface of the solid and those in the immediately surrounding liquid so that the solid becomes a nucleus for the formation of a bubble from the nascent gas of the liquid.

As shown above, there are three mechanical ways of forcing air or a gas into solution. There are three methods of expelling it: (1) supersaturation so that the

\*Extract from an article published in the Colorado School of Mines Magazine, Feb., 1916.

excess gas is driven out; (2) heating to increase the volume and drive some out; and (3) reduction of pressure.

The same cause that tends to supersaturate a liquid with gas, will evidently tend to supersaturate a solid with this same gas if this solid be within the liquid. The dissolved gas will evidently be expelled from both the liquid and a solid within it by the same force—one of the above. Due to adhesion, the gas, as it is expelled, tends to condense on the solid or increase the amount of adsorbed gas. Lest confusion arise, it may be stated that adsorb is here used in the sense of being one of the three ways that solids hold gases. With sufficient condensation, a bubble will form on the surface of the solid from these molecules as they collect.

As a logical sequence from the above reasoning, **solids with high occlusive power for gases should have a greater tendency to float.** Hezekiah Bradford was the first to recognize this fact.<sup>3</sup> "The floating particles appear to possess some peculiar qualities which repel water from their surfaces, especially when the particles are exposed, even momentarily, to atmospheric air." It is only necessary to look into the subject of ore deposition to learn the reason why metallic particles occlude gas more readily than other minerals. Chemical affinity assists in this occlusion of air and carbon dioxide, which eventually change the sulphides and like ores into sulphates, carbonates, oxides, etc. This greater power of occlusion is a cause of selective flotation.

Selective flotation is here used as a general term in contradistinction to preferential flotation, an accepted term to designate the separation of minerals that ordinarily float together. Horwood accomplishes this by a roast that oxidizes some sulphides and not others. The same effect is accomplished by others by coating the sulphides not desired in the concentrate. Leslie Bradford uses a reducing gas to accomplish this result.

By the aid of the microscope, Hebron, an associate of Carrie J. Everson, discovered that the desirable minerals, to be saved by concentration, have larger pores and surfaces than equal sized gangue particles. This gives greater chance for gas occlusion. Oil and like substances are usually but slightly soluble in water. The reverse is also true.

There is little adhesion between water and a surface wetted with oil, or oil and a surface wetted with water. Oil, due to its property of capillary attraction can readily enter the pores of solids not filled with water. Therefore, most metals, sulphides and the like containing occluded air are capable of absorbing more oil due to their larger pores and surfaces. With sufficient oil thus attached, agglomeration or bulk oil flotation takes place.

By this process of elimination, the same conclusion is reached as that demonstrated by Mickle's experiments. **Gas is the necessary substance** for Surface Tension, Bulk Oil and Froth Flotation methods and this must be occluded gas. Nascent gas and an electrolyte are also essential elements for Froth Flotation.

**What is the function of the electrolyte?** As has been shown, an acid or an alkali creates the selective action in froth flotation. How? By its ability to vary the contact angle between the surface of the mineral particle and the liquid film on either a bubble of measurable radius or a horizontal liquid surface of infinite

radius. Dr. Young showed the constancy of contact angles. H. Livingston Sulman, investigating figures for contact angles found "discrepant readings" due to "existence of a variable range of the contact angle." C. G. Lamb termed this angular difference "the angle of hysteresis." Speaking of this, Mr. Sulman says:<sup>4</sup> "Whereas the angular hysteresis of silica in plain water may exceed 30 degrees, thus indicating the substance to have a definite power to occlude gas and to float, it drops from 4 degrees to nil in water acidulated with sulphuric acid."

The occluded gas can be driven out from a solid in the same way that it can be driven from a liquid. This gas of the solid particles will cause them to become nuclei for the formation of bubbles from the gas "coming into being" from the liquid and, as the bubbles grow, the particles are lifted or floated. Since there is more occluded gas in the metallic particles, all that is necessary to create the selective action of flotation is to drive out a considerable portion of the occluded gas from all particles. There then will be insufficient gas remaining with the gangue particles to cause them to act as nuclei upon which to grow bubbles. The metallic particles still having occluded gas are then floated while the gangue particles sink.

As shown above, this selective effect is produced in extremely dilute solutions. An electrolyte produces it, but how? It was also shown that some force is required to expel occluded gas. No outside force such as pressure or heat is the cause. Therefore it is an internal one that drives this occluded gas from the mineral particles. The ions of the electrolyte displace the equilibrium and the force that causes the gas occlusion is, at least partially, neutralized so that the tendency of the gas is then to diffuse throughout the liquid instead of remaining in the solid.

A parallel case in physics is osmosis. **The function of the electrolyte, therefore, is to create osmotic pressure.** The septum is the surface of the mineral particle. Ions of the electrolyte enter the solid while those of the gas leave. This action continues to the eutectic point and bubbles form on the metallic particles, as described above. Greater delicacy of manipulation is obtained with an alkali. Further advancement along this line means that selective action can be created between sulphates, carbonates, etc., and gangue minerals. Also that, by means of a variation of the electrolyte, preferential flotation can be effected and different metals can be separated.

Increased strength of the electrolyte will sometimes "kill" the float; or, in other words, increased osmotic pressure drives the air from the metallic particles, leaving them in the same condition as those of the gangue. This effect is not to be confused with an entirely different phenomenon which produces the same effect. Colloidal impurities like tannin, saponin, etc., or volatile oils and the like destroy bubbles by reducing the surface tension to the extent that the gas pressure from within bursts them. This weakening of the surface tension by a colloid is thus seen to be entirely different from the strengthening of osmotic pressure by a crystalloid, although the result is practically the same—no froth.

In studying this selective action, it is difficult to explain the motive power of osmosis, as present authorities do not agree. According to the Van't Hoff school it is the kinetic energy of the dissolved molecules obey-

<sup>3</sup>U. S. Pat. No. 345,951. 1885.

<sup>4</sup>Presidential address of H. Livingston Sulman. Institution of Mining and Metallurgy Transactions, 1912.

ing the laws governing gas pressure. It is the impact of these molecules against the walls of the semipermeable membrane. On the other hand, Kahlenberg shows it to be the force of chemical affinity, while Professor Traube proves it is an "interfacial pressure obtained by subtracting the surface tension of one fluid from the tension of the fluid into which it diffuses." Since surface tension is a cohesive force, osmosis may depend upon electromotive force because, according to both Sir Oliver Lodge<sup>5</sup> and Fernando Sanford,<sup>6</sup> the forces of chemical affinity and cohesion are electrical. This is a much mooted question for, by assuming Dr. Lupke's<sup>7</sup> "Osmotic Theory of the Current of Galvanic Cells," the starting point is again reached. Fortunately the question as to the motive power of osmosis has no bearing on the result of the selective action in flotation caused by osmosis. As shown, this selective action in all three methods of flotation depends primarily upon gas occlusion by the mineral to be floated. Mickle showed that no mineral will float on the surface of hot acid solution, even if dilute. Thus an electrolyte creates a greater selective action in surface tension flotation.

This selective tendency exists in neutral solutions due to the fact that metallic particles occlude more gas than others. In bulk oil flotation, the metallic particles have occluded more air and, hence, are more easily wetted with oil than with water. The osmotic force set up by the electrolyte in froth flotation expels occluded gas from the mineral particles. There is still left with the metallic particles sufficient gas for them to act as nuclei so that the nascent gas of the liquid may form bubbles to float them.

Just as vapor must have a nucleus upon which to form a rain drop, so the nascent gas in flotation pulp must have a nucleus upon which to form a bubble. Duhem<sup>8</sup> shows that a bubble will never form where the liquid is continuous, due to the fact that its infinitely small radius would be less than the limiting radius of collapsibility. Note how the vapor bubbles of boiling water form on the bottom or sides of the vessel.

**Not only are bubbles necessary for froth, but they must be more or less persistent.** The surface film that encloses the bubble as it is formed in the interior of the liquid becomes a part of that bubble and, due to surface tension, remains with it throughout its passage to the surface of the liquid, in the same way that the surface film of a soap bubble remains with it throughout its passage in the air. This is easily proved by slowly blowing a colored bubble at the bottom of a large beaker of which the upper portion at least is filled with clear liquid. Due to this fact, the bubbles may have their films strengthened or toughened so they will endure for a longer time. Therefore, if the bubble be coated with some such substance as oil, the total force of surface tension is increased, due to the surface tension of the water film plus that of the oil film. Surface tension tends to decrease the size of the bubble as is well illustrated by Boys,<sup>9</sup> while the expansive force of the gas enclosed tends to enlarge it. The hydrostatic head aids surface tension in maintaining the bubble in the interior of the liquid.

Arriving at the surface, the bubble may burst due to: (1) interior gas expansion; (2) adhesive force of

the contained gas for the atmosphere; (3) evaporation of the enclosing film. Therefore an immiscible substance aids in two ways in making the bubble more persistent: (1) adding to the force of surface tension; (2) forming a film less easily evaporated. Since molecular forces are dealt with, these films approach one molecule in thickness and hence little oil is required. The colors of the bubbles also show this.

In addition to the oil film, the bubbles may be still further strengthened by an armor of metallic particles. These metallic particles containing occluded gas are, as shown above, more easily oil-coated than gangue particles. Due to cohesion, an electrical force, these particles are firmly held together and to the bubble film, which is then enclosed in a network of them just as a balloon is enclosed in a netting of rope. Bubbles thus made will endure for days and have been spoken of as "oil froth."

Oils that are good "collectors" are practically insoluble in water and form a film not easily evaporated, so make persistent bubbles. Good "frothers" are oils more or less soluble and, while they make quantities of bubbles and much froth, evaporate quickly, so that the bubbles burst more readily. Mineral particles are very easily coated with volatile oils and the bubbles are readily armored, but they burst readily, sometimes with violence. Being soluble, these oils decrease the surface tension since their surface tension is less than that of water.

**Most oils aid flotation in three ways:** by (1) increasing surface tension of the oil film with the additional force of surface tension of the water film; (2) decreasing adhesive force of the water for metallic particles by forming films around them; and (3) increasing cohesive force of metallic particles for each other by means of the oil film. Thus it is seen that although oil is a great aid, there can be no universal theory for flotation which considers oil necessary. By this method of elimination, it is shown that all processes and kinds of flotation can be satisfactorily explained by gas occlusion and that the bubbles for froth formation are from nascent gas.

#### BETHLEHEM STEEL CO.

Bethlehem Steel Corporation has issued its full pamphlet report for the year 1915. It shows that on December 31, 1915, cash on hand totaled \$15,380,350, against \$5,220,910 on December 31, 1914. Miscellaneous investments aggregate \$27,617,495, against \$437,664 on corresponding date of preceding year. Cash on hand and investments totaled \$42,997,845. A large percentage of these investments consist of Anglo-French bonds which Bethlehem Steel subscribed for last year.

The statement shows total provision for repairs and depreciation of \$9,106,671 last year, compared with \$4,716,273 in preceding year. Bonded debt of Bethlehem Steel Corporation on December 31, 1915, stood at \$31,099,000, a reduction of \$5,108,700 from December 31, 1914. There was appropriated for and invested in additions to property and working capital \$12,500,000. Actual amount of bonds purchased for sinking fund or cancelled was \$6,193,300.

<sup>5</sup>Electrons by Sir Oliver Lodge, Principal the University of Birmingham; Chap. 16, Nature of Cohesion, Page 153, July, 1906.

<sup>6</sup>A Physical Theory of Electrofication (1911), by Fernando Sanford, Prof. of Physics, Stanford University. Page 43.

<sup>7</sup>Elements of Electro Chemistry, by Dr. Robert Lupke. Part 3.

<sup>8</sup>Thermodynamics and Chemistry, by P. Duhem, 1903. Page 366

<sup>9</sup>Soap Bubbles, by C. V. Boys.

## LE ROI NO. 2, LIMITED

The report of the directors of Le Roi No. 2, Ltd., for the company's fiscal year ended September 30, 1915, prepared for submission to the annual meeting of shareholders called for March 1, in London, England, is as follows:

"Accounts.—The accounts show a balance of £12,471 4s. 11d. in favor of Profit and Loss, after writing off £10,717 10s. 6d. as depreciation in respect of development, machinery, buildings, etc., which added to the balance brought forward from 1914, namely, £34,715 18s. 10d., makes a total of £47,187 3s. 9d. From this amount must be deducted the dividend of one shilling per share paid May 1, 1915, absorbing the sum of £6,000, and leaving a balance of £41,187 3s. 9d. to be carried forward.

"Production.—The Mine Managers' report shows that 24,289 tons of ore was mined, of which 15,681 tons was shipped to the smeltery, the average value per ton having been \$20.02 as against 17,014 tons of an average value of \$20.19 shipped during the previous year. There was produced 828 tons of concentrate, averaging \$17.48 per ton, from 9,467 tons of low-grade ore. Mining costs worked out at \$3.65 per ton, and smelting charges at \$6.46 per ton, making a total, after allowing for development and depreciation, of \$12.22 per ton, as against \$13.05 per ton for 1914.

"General.—The chief point of interest during the past twelve months has continued to be the deep-level exploration in the South Rodney vein. The results obtained here have been on the whole quite up to expectation. Difficulties at one time arose as to the simultaneous development of the vein and the extraction of ore, but these difficulties have now been overcome, and it is hoped that in the near future this part of the mine will contribute materially to the company's profits.

"During the year under review a dividend of one shilling a share was paid, and since the closing of the accounts a further interim dividend of one shilling a share has been paid in respect of the fiscal year 1915-1916.

"The company's interest in the Cloncurry Syndicate is now secured by the allotment of 13,380 shares in the Dobbin and Cloncurry Mines, Limited, which shares it is expected will prove to be of actual value to the company."

### Mine Managers' Report.

The report of the mine managers, Messrs. Alexander Hill and Stewart, gave particulars of work done at different levels on various veins in the Josie group of mines, and on the adjoining Giant-California property held under option of purchase.

A summary of the development work on the Josie group shows a total of 1,293.5 ft. of driving, crosscutting, and raising, at a cost of \$23,642.78, equivalent to an average of \$18.28 per ft., and on the Giant-California of 895 ft. of driving and crosscutting (machine work) at a cost of \$15,819.61, or an average of \$17.67 per ft., and of 53.5 ft. of hand-driving at \$22.35 a foot.

Diamond drilling totalled 3,825.5 ft., of this 2,132 ft. was in the Josie and 667.5 ft. in the No. 1 mine, together 2,799.5 ft., at a cost in labor and material of \$5,021.06, or \$1.79 per ft., and 1,026 ft. was in the Giant-California, at a cost of \$1,926.36, or \$1.88 a foot.

The managers report, further: "We have taken advantage of the ruling high prices of copper to give every preference to the shipping of the more cupriferous ore. During the ensuing year we propose to con-

tinue the exploration of the Deep, California and Josie territory, and to restart work in the No. 1 mine which will lead to our return to exploration of the northern part of our ground."

Stoping cost for the year totalled \$81,081.34, or \$3.44 per ton of ore; diamond drilling cost in all \$5,021.06, or 21 cents per ton of ore; together \$3.65 per ton of ore.

The average metal contents of the 9,467 tons of ore concentrated were: Gold, 0.094 oz., and copper 10.4 lb. a ton, and of the 828 tons of concentrate produced, gold 0.5978 oz., silver 0.829 oz., and copper 30.44 lb. to the ton, having a total value of \$17.48 per ton. Concentration cost was \$0.819 a ton of ore treated.

The gross value of ore shipped was \$313,922.22, or \$20.02 a ton. The proportions of the several metals contained in the ore were as follows: Gold 0.5077 oz. a ton at \$20 an oz., \$10.16; silver, 1.517 oz. a ton at 53.6 cents an oz., \$0.81; copper, 55.5 lb. a ton at 16.31 cents a pound, \$9.05; total, \$20.02.

As a result of mining operations the sum of \$110,400 was remitted to the head office in London.

### Josie Mine Report for January.

The Josie mine report for January, 1916, of the company's managers at Rossland, just received from the London office, is as follows: There was shipped during January 1,188 tons of ore and 50 tons of concentrate. Shipments were low owing to inability, through snow and bad weather conditions, of the Canadian Pacific Railway to provide transportation facilities. The receipts from the smeltery were \$12,081 in payment for 970 tons of ore, and 2,194 for 54 tons of concentrate; sundry receipts were \$806; total receipts, \$15,101.

Estimated working costs for the month were for ore production \$5,320 and concentrating \$400; together \$5,720. Other expenditure was: On capital account (concreting shaft), \$400, and on development, including diamond drilling, \$8,896; together \$9,296. Total of all expenditures during month was \$15,016.

### DRILLING AT FLIN FLON LAKE.

Sudbury, March 23.—The Tonopah Mining Company of Nevada has placed a large contract for diamond drilling with the Smith & Durkee Diamond Drilling Company. The first drill on this contract was shipped from Sudbury on Tuesday.

The Tonopah Mining Company have secured thirty sulphide claims in the Schist and Flin Flon lakes district. H. C. Carlisle is in charge of the development work which was begun early in last week. Seven tons of supplies were sent up about ten days ago. Camps are being built and a clearing made for the erection of additional buildings. A large gang of men will be taken on with the coming of warm weather.

The diamond drills at Flin Flon are shooting down through the ice at a small lake near the Apex claim. It is proposed to drill on the ice as long as possible before the break up, when the work of drilling will be shifted to the shore. A thorough test of the orebody will be made, and it is stated a dozen holes and more will be driven through the sulphides to reasonable depths. Mr. Durkee says the drills will make 750 feet a month under normal conditions.—Sudbury Journal.

### GRANBY.

Directors of the Granby Consolidated Mining Company have declared a dividend of \$1.50 a share. The previous dividend—\$1.50—was paid February 1.

## PERSONAL AND GENERAL

Mr. Rex Taylor is at the Wettlaufer mine in South Lorrain, having accepted the position of manager of Dr. C. V. Comfort's company.

Mr. T. W. Gibson and Prof. Young of Toronto, members of the Ontario Nickel Commission, have arrived in England.

Mr. G. G. S. Lindsey of Toronto, past president of the Canadian Mining Institute, has completed the work which took him to China a year ago. He has been asked by the Chinese Government to draft new mining laws for China.

Mr. W. E. Segsworth and Mr. R. F. Segsworth have returned to Toronto after visiting the Seneca and Mercer mines. The Seneca is nearly worked out. The Mercer has shipped its first car of ore and development will be carried on energetically.

Mr. E. V. Buckley, manager of the Queen gold mine and stamp mill at Sheep creek, Nelson mining division, British Columbia, returned a few weeks ago to the mine from Wisconsin, whence he had been called following the death of his son-in-law in that state.

Mr. J. Cleveland Haas, of Spokane, was in Ainsworth camp, British Columbia, last month, looking into the progress made in development work on the Nicollet group of claims, under bond to the Kootenay Development Co., for which he is consulting mining engineer.

Mr. Frederic Keffer, of Keffer & Johns, mining engineers, Spokane, Washington, was in Vancouver lately, in connection with the purchase of machinery for use on a mining property in Yale district, B.C.

Mr. C. H. McDougall, formerly superintendent of the Sullivan lead mine, in East Kootenay, B.C., but for some time past very busily occupied as engineer of construction at the Consolidated Mining and Smelting Co.'s smelting works at Trail, has resigned his position there and gone to Nova Scotia to train for active service in Europe in the British Army.

Major J. Richardson Roaf, who prior to the outbreak of the war was manager for the Pacific Coast Coal Mines, Ltd., with collieries at South Wellington, Morden and Suquash, Vancouver Island, B.C., now of the 143rd Battalion, British Columbia Bantams, is to have command of a new tunnel company to be formed and trained at Nanaimo, B.C. It is stated that a tunnel company usually consists of about 300 men to be engaged in driving tunnels and other underground work at the front.

Mr. D. H. Browne, of New York, was in Toronto and Copper Cliff last week.

Mr. Geo. Guess was at Sudbury last week in connection with the smelter smoke cases being heard there.

Mr. Percy Hopkins, of the Bureau of Mines, who reported last summer on the Kowkash district, expects to make further examinations there this summer.

Mr. Frank Loring has examined the Jamieson claims in Robb township. The property is being developed by a company in which Mr. Duncan Chisholm, of Toronto, is interested.

Mr. Thos. McGuckie, for several years general superintendent for the Western Fuel Co., operating coal mines near Nanaimo, Vancouver Island, B.C., is now at Drumheller, Alberta.

Mr. J. J. Spry, who after retiring from the position of superintendent of the Eureka copper mine, near Nelson, B.C., when the British Columbia Copper Co.

relinquished its option of purchase on that property, removed to the Cobalt district of Ontario, was married in Toronto recently.

Mr. E. E. Ward, at one time superintendent of the Silver Hoard silver-lead mine, in Ainsworth camp, B.C., has for some time past been with the Granby Consolidated Co. at Anyox, Observatory Inlet, B.C.

Dr. C. V. Comfort of the Comfort Mining and Leasing Company has returned to Rochester from Cobalt. His company is reopening the Wettlaufer mine.

Mr. Robert Livermore has returned to Cobalt after visiting the St. Anthony gold mine which the Kerr Lake Company is now interested in.

Mr. C. A. Foster has been in Toronto recently in connection with litigation over control of the Tough-Oakes.

### BOSTON CREEK

A preliminary report and geological map of the Boston Creek district is being prepared by the Ontario Bureau of Mines. It is probable that Mr. A. G. Burrows and Mr. P. E. Hopkins will do some further geological work in the district early this summer.

### KOWKASH.

There will probably be considerable prospecting in the Kowkash district this summer. In anticipation of this the Ontario Bureau of Mines is publishing a report and geological map prepared by Mr. P. E. Hopkins. The map is ready for distribution and the report should be printed by the time this copy of the Journal reaches our readers. Those wishing copies should apply to the Department of Lands and Mines, Toronto.

### CHAMBERS-FERLAND.

Alladin Cobalt appeared in the list of shippers from Cobalt last week, sending out a car load of high grade ore from the Chambers-Ferland mine. Chambers-Ferland is controlled by Alladin.

### MR. LINDSEY TO DRAFT MINING LAWS FOR CHINA.

A despatch from Peking says that G. G. S. Lindsey, the well-known lawyer and mining man, having concluded the negotiations connected with mining concessions which have occupied him during the past year, has been engaged by the Chinese Government to draft new mining laws for China.

### FLOTATION PLANTS FOR COBALT MINES.

Cobalt.—Good progress is being made in the installation of the new flotation plant at the Buffalo. The entire plant is being changed over and the work of taking out the old machinery to give room for flotation cells is being rushed.

It is estimated that the new 150-ton flotation plant being installed at the McKinley-Darragh will save an additional 500 oz. a day by high extraction. The ore reserves at McKinley-Darragh are estimated at 1,875,000 oz. On what is known as the blind vein, there is good milling ore for a width of 30 ft., at the 250-ft. level, and extending for several hundred feet.—Cobalt Nugget.

### LALLY GOLD MINES, LTD.

Mr. J. Craig Watson is arranging for resumption of operations on the Lally claims in Turnbull Township. Tenders are being asked for the deepening of the shaft to 200 ft. and for timbering.



## SPECIAL CORRESPONDENCE

### COBALT, GOWGANDA AND SOUTH LORRAIN

**Oil flotation** is to be tried on a considerable scale in the Cobalt camp. The McKinley-Darragh mill is already installing a 150-ton plant to treat their slime. It is expected that the plant will be running in May. The concentrating tables are being pulled out to make way for the new process. Twenty-five tables are to be taken out to make room for the flotation plant. Six rougher cells are to be installed and two cleaner cells. The slime tailings in a Cobalt reduction plant run from five to seven oz., and Mr. Callow, whose process is being adopted, is sanguine that he can reduce these to two oz. and perhaps one. The installation is inexpensive, and the cost of running the plant not great.

The Buffalo Mines, always the pioneer in flotation in Cobalt, has decided to erect a 600-ton plant in order to treat their tailing pond.

The Nipissing is installing three units at the low-grade mill and several other companies are experimenting with the process.

In the same connection it is very interesting to record the fact that pine oil has been refined with complete success at the Buffalo mill from wood waste in Northern Ontario. The success of these experiments, in which Mr. T. R. Jones of the Buffalo, and Mr. A. A. Cole participated, was so pronounced that the attention of the Department of the Interior was called to the matter and Dr. Bates was sent up. He spent a whole week in the camp and appeared most favorably impressed with the prospects. As to the commercial possibilities, one of the large oil corporations sent up their head chemist to make his own investigations, and he, too, was quite impressed with the possibilities of the situation. The refining would have to be undertaken on a very large scale to make it commercially feasible, but good progress has already been made to accumulate no little data on the matter.

**McKinley.**—There has been a marked improvement in the position of the McKinley-Darragh-Savage in the past two or three months. A very large tonnage has been developed below the 200-ft. level of the mine. Previous to this year it was assumed that there was no ore to speak of below the 200-ft. level, but this has been proved to be a complete fallacy. There is on the Blind vein at the 250-ft. level a very large body of milling ore. Its maximum width is no less than 55 ft., but its average width is 30 ft. and its milling value is about 15 oz. The development on the Cobalt Lake fault, while it has not yet yielded anything tangible in the shape of ore reserves, is perhaps even of greater importance still. Below the 250-ft. level the winze sunk parallel to the fault was in ore for 30 ft. It is now down about 100 ft. vertically, and while the hanging wall is Keewatin, the foot wall is in excellent conglomerate. This makes the possibility of opening up ore shoots on lower levels of the mine quite bright.

Altogether ore reserves at the end of the year are shown to be 1,200 tons more than at the end of 1914 and containing 1,875,000 oz. This is 257,820 oz. less than ore reserves were declared at in 1914 owing to the fact that the grade of mill rock is lower.

A very interesting development has also occurred under the lake at the 75-ft. level. This portion of the property is now quite free from water and is quite safe and a raise is being put through to the surface. The

old Discovery vein—the first vein to be found in Cobalt—was opened up for six to 17 inches wide. While it is cobalt and not high grade, it and the adjacent wall rock can be mined at a good profit. It is instructive to note that this vein had been completely missed by the pioneers of the camp. It was a foot back from the fault in the hanging wall and had been given up.

If the flotation system is successful it will result in the treatment at a profit of much lower grade milling rock than at present. It is reckoned, for instance, at the McKinley-Darragh that it will be possible to save by higher extraction no less than 500 oz. a day.

The McKinley-Darragh has done so well that it has maintained production and dividends and yet increased its ore reserves: the reduction in ore reserves is entirely due to the fact that the Savage mine has not responded to development as well as formerly. There is still quite a little mill rock at the Savage and it is more than paying expenses, but if further ore shoots are not soon found this subsidiary of the McKinley-Darragh will have to be shut down.

**Foster.**—Considerable interest is being taken in the development of the old Foster under the auspices of the leasing company, the Glen Lake Cobalt Mines, Ltd. This company and its predecessor, the Foster Leasing Co., has pegged away at development in this section of the field without much encouragement for about two years. It is true that from time to time short shoots of high grade ore have been found and mined near the Lawson line, but they were soon stoped out. Recently in driving to the west on a series of calcite veins a shoot of very rich ore was encountered. This shoot was not more than 15 ft. long and the vein is two inches wide, but since it is in good conglomerate there is a fair chance that it is but the first of further lenses of rich ore. From the old Foster shaft a long cross-cut has been driven under Glen Lake until now it is about 70 ft. from the Bailey line at the 210-ft. level. A winze is now being put down to the Keewatin contact. On ascertaining the horizon at which it is considered best to prospect, a cross-cut will be driven parallel to the Bailey with the expectation of picking up extensions of the Bailey veins.

No ore has yet been found under Glen Lake, although the Penn-Canadian has conducted some exploration in this direction, too. But the formation is favorable and the recent strike on the Foster will without doubt lead to further energy in the prosecution of the work.

**Prospecting at Cobalt.**—While the keenness with which gold prospects are sought is far more apparent than silver there is nevertheless a desire on the part of capital to discover whether there is not some good in some of the old prospects around Cobalt that has been overlooked in previous exploration. There is little doubt that both the John Black and the Ophir will be working in the spring. It is quite probable that there will be a merger of these two companies. The Adanac Cobalt has some fine ore but the vein is broken and not well defined. The Shamrock is working. The Gifford has been pumped out. The Rochester is working. The Peterson Lake Mining Company is working the Reliance claim.

Wettlaufer has already been dewatered by a company known as the Comfort Mining and Leasing Co. Dr. Comfort is the president of the company and it is well backed. The water has been pumped out to the fourth level and drills will be running before the end

of the month. The Bellellen is being worked under lease by a Haileybury syndicate and some high-grade has already been taken out and sacked. Leads opened up are very promising.

In Gowganda, in addition to the Miller Lake-O'Brien, the Reeves-Dobie is working the Bishop. The Powerful Company is operating near Calcite Lake, and the Barbara has a small gang of men at work on Wigwam Lake.

### PORCUPINE, KIRKLAND LAKE AND BOSTON CREEK

At the 100-ft. level of the **R. A. P. Syndicate** enough drifting has been done to prove that the prospect is doing very well indeed. One hundred feet of drifting has been done both east and west. To the west there is now seven feet of ore which will undoubtedly give a very high grade of mill rock. The sulphides are very fine and there is plenty of free gold. To the east there is a smaller width of ore, but as this drift is heading towards the rich shoot found on the surface of the Kenzie vein there cannot be a very long stretch of it without good values. Both these claims are controlled by the R. A. P. Syndicate, although in varying proportions, Messrs. A. M. Scott and J. P. Bickell having recently purchased an interest in the Kenzie claim. The development seems very important indeed.

The **Crown Reserve** has also been very fortunate in striking good ore on their optioned claims in Picaud Township, near the Boston Township line. They had got down no more than ten feet when the vein widened out to ten inches, and the ore became very rich. The ore is full of sulphides and there is much free gold. The strike was made on the McCrea claims, three of which the Crown Reserve has under option. This early success will encourage other companies to venture into Boston Creek.

At the **Miller Independence** the plant is now running and much quicker progress will be made with the opening up of the prospect.

There are no lack of purchasers for prospects at reasonable working option prices.

At Swastika the Trethewey has pumped out the **Lucky Cross** mine and is now busy sampling the underground workings. The Swastika mine has been closed down.

It is understood that arrangements are now being made for the opening up of the **Wright-Hargraves**, a prospect which has lain idle much longer than could have been anticipated considering the excellent prospects it has of making a mine. It lies directly on the fault plane between the Tough-Oakes and the Teck-Hughes, and has a very spectacular showing on the surface. But it has never been possible to harmonize the veins of the men owning the property. Now there is every probability that it will soon be worked. Beyond some stripping and open-cutting no work has ever been done on it.

In the Porcupine camp there has been a very general desire to open up old prospects, but the snow is so deep that save in special instances development has been postponed until there is less snow to shovel.

In **Deloro** the old Standard is being worked by the Porcupine Premier, the Ankerite claims are under option to Mr. C. E. Smith of Toronto, the Kilroy and McCrea claims are being worked by a Toronto syndicate, the Dominion Rand has ordered a plant and is now installing it, five thousand feet has been contracted for

on the Chisholm veteran claim and other options will be taken up as soon as the spring thaw comes.

Mr. Trethewey is proceeding to put the **West Dome** in shape for operations this summer. While the cyanide plant is being installed the Dome Lake mill has been closed down, although mining is proceeding on the same basis as ever.

The **Porphyry Hill** is under option to the Gold Bullion Company, but will not be worked until the spring is farther advanced.

The **Dome** mine is now running through the mill ore taken in sinking the new central shaft. The location of the new shaft was selected with the view of its being in barren ground. To the 600-ft. level it was, but below that level an unsuspected ore shoot was struck and values are of good milling quality for the whole width of the shaft. Production was slightly less in March, amounting only to \$169,000. Tonnage was slightly higher but grade was lower. The two tube mills have arrived and the remodelling of the mill is proceeding very rapidly.

It is satisfactory to note that values in the ore found in the basalt at the 1,275-ft. level of the **Hollinger** approximate much closer to the upper levels than those obtained from the winze below the thousand-foot. The winze has been sunk on the main vein in the quartz porphyry and the values have been quite low. This quartz porphyry at the 1,275-ft. level has given place to basalt, as the management expected it would, and it is reassuring to note that there is no diminution in values. The winze was not selected because of the character of the ore at this particular spot—on the contrary, this is the one lean spot on the main vein—but it was located because of its advantage in the working of the mine.

The ore shoot on the Vipond at the 400-ft. level continues to hold out very well. In the middle of the month it was developed for over 160 feet and had an average gold content of \$13 over the width of the stope. This is the best ore shoot yet developed on this property. At the 500-ft. level the vein has not yet been definitely picked up. The fatality at the mine when a Finn was killed by a fall of rock is the first serious accident that has happened, although the mine has been working since the very early days of the camp.

### BRITISH COLUMBIA

A recent noteworthy event in connection with mining in Kootenay district of British Columbia is the fact that the total of ore receipts at the Consolidated Mining and Smelting Co.'s smelting works at Trail for the week ended March 2 was the largest weekly total on record. The quantity was 11,126 tons; previously, the highest total was 10,994 tons, for the week ended March 11, 1915. Mines owned and operated by the company contributed by far the greater part of the recent record quantity; these were the Centre Star and Le Roi, at Rossland, 6,873 tons; the Sullivan and St. Eugene, in East Kootenay (the latter only 94 tons), 2,361 tons; and the No. 1, in Ainsworth camp, 362 tons. The total from the company's mines was 9,594 tons, and of custom ores, chiefly from Rossland and the State of Washington, 1,532 tons. The increased quantity from the Sullivan mine is understood to have included zinc as well as lead ore, for the company is expected to soon be operating its newly-installed electrolytic zinc plant. Ore receipts from Slocan mines were small during three weeks from February 10 to March 3, but that was probably due to the heavy snowfall that im-

peded mining and railway transportation work temporarily, for there was a return to normal quantity for the first week in March.

**East Kootenay.**

The Monarch mine, in Golden division, North-east Kootenay; the Lead Queen, in Windermere division; Central East Kootenay; and the St. Eugene, in the southern part of Fort Steele division, are three small shippers of ore to Trail on this year's list. From each there has been received at the smelting works two shipments. While the total quantity received this year from all three mines is only 261 tons, it is pleasing to note even this much production being made in widely separated parts of this big district. Of course, the comparatively big production of the Sullivan mine, also in Fort Steele division, of 11,600 tons in 67 days of this year to March 7, inclusive, an average of 173 tons a day, is in strong contrast to the small output mentioned above, but since small producers are sometimes developed in due time into big ones, the more there are being operated in a mining district, the better the outlook for its future.

There is not much news coming from the coal fields just now. The following statement, reported to have been made by Mr. Elias Rogers, of Toronto, president of the Crow's Nest Pass Coal Co., operating coal mines at Coal Creek and Michel, and coke ovens at Fernie and Michel, in South-east Kootenay, is of interest:

"January was rather a trying month for us, climatic conditions having been the most severe for many years. The heavy snowfall prevented movement of trains, with the result that we could not get more than two or three trains a week. Moreover, it was impossible for our men to work during the most severe weather. Conditions were decidedly abnormal, but, despite this, our net earnings for the month of January were much better than we expected.

"On March 31st we will pay a dividend of 1 1-2 per cent. We are not announcing this as a quarterly dividend, just at this time. We are buying from the Canadian Pacific Railway Co. a seven-mile branch from its Crow's Nest main line, and will be making large capital expenditure on this account. Our financial year which closed last December 31 was a much better one than the previous year and there was improvement all along the line. All our debts have been liquidated, and we now have more than \$300,000 cash in bank. The outlook for present year is of the best."

**West Kootenay.**

**Ainsworth.**—This year's ore-shippers from Ainsworth division so far have been the Bluebell, Cork-Providence, Florence, Highland, Martin, No. 1, and Utica mines. The total of receipts at Trail from these mines to March 7, inclusive, was 3,545, of which the Consolidated Mining and Smelting Co.'s No. 1 mine shipped 1,901 tons and the Bluebell 1,203 tons.

**Slocan.**—Shipments of silver and silver-lead ores from this district to Trail have not been large this year, the total from the two Slocan divisions to March 7 having been only 2,119 tons, of which three small high-grade mines in Slocan City division together sent 72 tons, while a dozen mines in Slocan division shipped 2,047 tons. These figures do not include shipments of zinc ore and concentrate, nor the output of the Surprise mine, which is sent to the United States. Shipments of silver-lead ore and concentrate from the Standard totalled 928 tons, Slocan-Star 268 tons, Rambler-Cariboo 236 tons, Galena Farm 163 tons, and Ruth 134

tons; the remaining 318 tons was the total of shipments from the Howitt-Lorna Doone, Lucky Thought, Noonday, Reco, Apex, Yakima, and Comstock.

**Rossland.**—This year's output of ore from Rossland mines to March 7 has averaged about 900 tons a day, the total for that period received at Trail having been 60,355 tons. Most of this ore was from the Consolidated Co.'s Centre Star and Le Roi mines, with the Le Roi No. 2 Co.'s Josie group also a shipper. One carload was from the Velvet mine, but that was the only shipment made from other parts of Rossland camp.

**Revelstoke.**—The Lanark mine, in Revelstoke mining division, has shipped two cars of ore to Trail this year, together 60 tons.

**Yale.**

**Kamloops.**—The Iron Mask mine, in Kamloops division, continues to ship ore to Trail. Seven lots have been received this year at the smelting works, a total of 403 tons.

**Nicola.**—A little ore is being sent from the Nicola division to the British Columbia Copper Co.'s smeltery at Greenwood. Now that the Kettle Valley railway gives direct connection with Boundary district smelting works, there is a probability of occasional small shipments being made from claims in this division now being developed.

**Omineca.**

The discovery of what is described as "a new mineral belt in the vicinity of White Sale and Emerald Lakes, south-west of Ootsa Lake," has been reported by the Omineca Herald, a newspaper published in the heart of the Skeena country, Omineca mining division. Zinc ore is stated to occur on the White Sale Lake property, while from the Lead Mountain mineral claims, consisting of five groups with a total of 27 claims, samples of ore assayed have given value in gold, silver, lead, and copper. Up to the present access to the new camp has been from Houston, on the Grand Trunk Pacific Railway, but there seems to be little likelihood of that route being used eventually for sending out ore, so it is suggested that an outlet by way of the head of Dean Channel may be found. In the 1914 official report of Mr. Stephen H. Hoskins, of Hazelton, gold commissioner for Omineca mining division, there was made mention of this part of the big area under the jurisdiction of that official: "During the summer of 1914 ledges of free-milling gold ore were discovered in the vicinity (of Sibolia creek), which resulted in 42 mineral claims being recorded. From reports it would appear that the country is difficult to get into; all travel so far has been from Houston, but it is suggested that an easier way may be found from Gardner canal by proceeding up the Kemano river."

**SILVER PRICES.**

	New York.	London.
March—	cents.	pence.
11. . . . .	56¼	27
13. . . . .	56⅝	27
14. . . . .	56⅝	27
15. . . . .	56¾	27⅛
16. . . . .	56⅞	27⅜
17. . . . .	57	27⅝
18. . . . .	57	27⅝
20. . . . .	57⅝	27⅝
21. . . . .	57⅞	27½
22. . . . .	58½	27⅞
23. . . . .	59¾	28¾

# MARKETS

## NEW YORK MARKETS.

March 23, 1916—Connellsville Coke—  
 Furnace, spot, \$3.25 to \$3.75.  
 Contract, \$2.50 to \$3.00.  
 Foundry, prompt, \$3.75 to \$4.00.  
 Contract, \$3.25 to \$3.75.

March 23, 1916—Straits Tin, f.o.b., nominal, 49.50 cents.

Copper—  
 Prime Lake, nominal, 27.25 to 27.50 cents.  
 Electrolytic, nominal, 27.25 to 27.50 cents.  
 Casting, nominal, 25.75 to 26.00 cents

Lead, Trust price, 7.00 cents.  
 Lead, outside, nominal, 7.87½ to 8.00 cents.  
 Spelter, prompt western shipment, nominal, 17.55 to 17.80 cents.

Antimony—  
 English brands, nominal.  
 Chinese and Jap., 45.00 cents.  
 American, 45.00 cents.

Aluminum—nominal.  
 No. 1 Virgin, 98-99 p.c., 59.00 to 61.00 cents.  
 Pure, 98-99 p.c., remelt, 57.00 to 59.00 cents.  
 No. 12, alloy remelt, 48.00 to 50.00 cents.

Nickel, 45.00 to 50.00 cents.  
 Cadmium, nominal, \$1.25 to \$1.50.  
 Quicksilver, nominal, \$200.00.  
 Platinum—Nominal, \$88.00.  
 Cobalt (metallic), \$1.25.  
 Silver (official), 59.75 cents.

Metal Products—Owing to the withdrawal of all price lists by the leading manufacturers of brass and copper products, quotations appearing below are based on the outside market and are likely to change at any moment. All prices are nominal as follows:  
 Sheet copper, base, 34.00 cents.  
 Copper wire, base, 29.00 to 29.50 cents.  
 High Sheets, brass, base, 38.50 to 40.50 cents.  
 Seamless brass tubing, 42.50 to 44.50.  
 Seamless copper tubing, 43.50 to 45.50 cents.  
 Brazed tubing, 47.50 to 49.50 cents.  
 Brass wire, 38.50 to 40.50 cents.  
 Brass rods, 38.50 to 40.50 cents.  
 Sheet, zinc, f.o.b. smelter, 25.00 cents.

McIntyre. . . . .	.94	.93½
Pearl Lake . . . . .	.00¼	....
Porcupine Crown . . . . .	.75	.65
Porcupine Gold . . . . .	....	.00¾
Porcupine Imperial . . . . .	.03¼	.03
Porcupine Tisdale . . . . .	.02	.01½
Porcupine Vipond . . . . .	.69	.66½
Preston. . . . .	.04½	.04¼
Teck-Hughes. . . . .	.20	.19½
West Dome . . . . .	.17½	.16¾
Gold Reef . . . . .	.02	.01½
Moneta. . . . .	.13	.11
McIntyre Extension . . . . .	.30	.27
Dome Con. . . . .	.20	.15
Imperial Reserve . . . . .	.08¼	.08
West Dome Con. . . . .	.25½	.25¼
Schumacher. . . . .	.45	.40
Adanac. . . . .	....	.60
Bailey. . . . .	.05¾	.05½
Beaver. . . . .	.42	.41½
Buffalo. . . . .	1.00	.75
Chambers Ferland . . . . .	.24¾	.23
Coniagas. . . . .	4.85	4.75
Crown Reserve . . . . .	.50	.48
Foster. . . . .	.12	.10
Gifford. . . . .	.06¼	.06
Gould Con. . . . .	.00½	.00¼
Great Northern . . . . .	.05	.04⅝
Hargraves. . . . .	.05	.04½
Hudson Bay . . . . .	....	26.00
Kerr Lake . . . . .	4.50	4.35
La Rose . . . . .	....	.63
McKinley-Darragh. . . . .	.48	.44½
Nipissing. . . . .	.07⅝	.07¼
Peterson Lake . . . . .	.27¾	.27½
Right of Way . . . . .	.05	.04½
Shamrock Con. . . . .	.17	.15
Seneca Superior . . . . .	.60	.55½
Temiskaming. . . . .	.58	.57½
Trethewey. . . . .	.17	.14½
Wettlaufer. . . . .	.08	.07½
York Ont. . . . .	.01¾	.01½

## TORONTO MARKETS.

March 24—(Quotations from Canada Metal Co., Toronto)—  
 Spelter, 22 cents per lb.  
 Lead, 10 cents per lb.  
 Tin, 53 cents per lb.  
 Antimony, 45 cents per lb.  
 Copper casting, 30 cents per lb.  
 Electrolytic, 30 cents per lb.  
 Ingot brass, yellow, 13c.; red, 19 cents per lb.

March 24—(Quotations from Elias Rogers Co., Toronto)—  
 Coal, anthracite, \$8 per ton.  
 Coal, bituminous, \$5.75 per ton.

## STANDARD STOCK EXCHANGE.

Mines—	March 24, 1916.	
	Ask.	Bid.
Apex. . . . .	.05½	.05¼
Dome Extension . . . . .	.38¼	.38
Dome Lake . . . . .	.29	.28
Dome Mines . . . . .	.26	.25
Foley. . . . .	.56	.50
Hollinger. . . . .	.27½	.27
Homestake. . . . .	.50	.45
Jupiter. . . . .	.22½	.22¾

## NEW YORK STOCKS.

	March 24, 1916.			
	Open.	High.	Low.	Close.
Allis Chalmers . . . . .	30¾	....	....	....
Crucible Steel . . . . .	89¾	90¼	86¾	88½
Am. Smelter . . . . .	101½	101⅝	100½	101¼
Anaconda. . . . .	86½	86¾	86¼	86¼
Beth. Steel . . . . .	495	....	....	....
Chino. . . . .	54⅝	54¾	53⅞	53⅞
Col. F. & I. . . . .	46½	46½	46	46
Con. Gas . . . . .	136¼	136¼	136⅞	136⅞
Cal. Petrol . . . . .	23¾	23¾	22¼	22½
Dome. . . . .	25½	25½	25	25
Gen. Electric . . . . .	167⅞	167⅞	167	167½
G. N. Ore Cer. . . . .	44¾	44⅞	44⅝	44⅝
Goodrich. . . . .	73	....	....	....
Int. Nickel . . . . .	46¼	46¼	46½	46½
Mex. Petrol . . . . .	107¼	108¾	106	107⅞
Nevada Copper . . . . .	15½	17	15½	16⅝
Ray. . . . .	23¾	23⅞	23⅞	23¾
Tenn. Copper . . . . .	53⅝	53⅝	52½	53
Texas Oil . . . . .	197	197¼	195	196
U. S. Steel . . . . .	85⅞	85½	84⅞	85
do. pref. . . . .	116⅞	....	....	....
do. fives . . . . .	104¾	....	....	....
Utah Copper . . . . .	82	82	81	81⅞

# PROFESSIONAL DIRECTORY.

The very best advice that the publishers of the Canadian Mining Journal can give to intending purchasers of mining stock is to consult a responsible Mining Engineer BEFORE accepting the prospectus of the mining company that is offered them. We would also strongly advise those who possess properties that show signs of minerals not to hesitate to send samples and to consult a chemist or assayer. Those who have claims and who require the services of a lawyer, with a thorough knowledge of Mining Law, should be very careful with whom they place their business.

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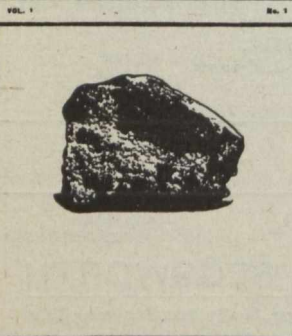
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