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U. S. EXPORTS OF NICKEL

During the past few weeks there has been published in Canadian papers considerable discussion on the export of Canadian nickel from the United States to Germany. For the most part the discussion is based on rumors rather than on facts; but none of those who should know the facts has made a plain statement of the source of the nickel shipped on the "Deutschland," nor satisfactorily denied that several million pounds of nickel have reached Germany since the war began. The officers of the Government have been content to repeat the assertion that not a pound of Canadian nickel has been shipped to Germany since the war began. We hope they are right; but we doubt whether the public believes it. For ourselves we believe the statement to mean that no considerable quantity of Canadian nickel refined since the war began has been shipped to Germany. As for Canadian nickel refined before the war began we must wait for the British Admiralty's report on what happened to cargoes of nickel shipped to neutral countries bordering on Germany.

In a political speech in Toronto two weeks ago, Mr. Hartley Dewart presented figures on exportation of nickel from the United States which he professed to indicate that the Canadian Government's statements concerning exports were not to be relied upon. Political speeches made a few days before election day are of course to be taken at a discount; but in view of the publicity given to Mr. Dewart's comments on the nickel industry it is not unlikely that his figures may be taken by many to prove the truth of what are still unproven rumors.

In this issue we publish a portion of Mr. Dewart's speech as reported by the "World." On another page we publish the report of the U. S. Department of Trade and Navigation on export of nickel during 1915 and during the fiscal years ending June 30, 1913, 1914 and 1915.

From the latter report it will be seen that the amount of nickel exported from the United States to Germany during the year ending June 30, 1915, was 1,036,242 lb., and to Austria-Hungary 67,200 lb. This would be only a normal amount for the five weeks before August 4, 1914. The figures indicate therefore that export must have been discontinued immediately war was declared. This agrees with the statements issued by our Government and not with the contentions of the alarmists.

The U. S. official reports show that there were great increases in exports of nickel during the first year of war to Russia, Italy and Japan, as well as to England

and Scotland, while the amounts going to other countries were, with the exception of Sweden, small. Sweden took 367,696 lb., which seems a large amount for that country. Norway imported 31,158 lb. and Denmark 43,830 lb. Obviously these countries have been able to get no nickel in Germany since the war began and they would have to import from the United States or England for their own needs.

So far as we know the consumption of nickel in these countries before the war was very small. What did Sweden do with that 367,696 lb.? Did Germany get any of it? Did it go to Russia? Such questions are natural and should be answered. They have been answered by the official statement that the British Admiralty is satisfied. That answer we have accepted in the belief that the Admiralty can show, if it wishes to do so, that the nickel has not reached Germany. The answer has not, however, been of such a character as to be considered entirely satisfactory. Sweden is a great steel-making country and may be using nickel in the manufacture of nickel steel. Available records of Sweden's imports in several years previous to the war, however, do not show imports of nickel, and we have no figures for comparison.

We accept the statement of the Admiralty that the arrangements made are satisfactory and we assume that the statement must apply to the nickel shipped from the United States to Sweden. The Admiralty has, however, very much to do and if it should intimate that there is anything questionable about the destination of the nickel imported by Sweden we should not hesitate to take any necessary measures to prevent more such exports. Canadians will not knowingly permit Ontario nickel to reach the enemy. We should be informed more particularly why the arrangements are regarded as satisfactory.

The U. S. exports of nickel to Norway, Denmark and Holland during the first year of the war totalled 97,021 lb. This is surely not an amount to warrant the talk of millions of pounds of nickel reaching Germany. The amount going to Holland during the year ending June 1915, like that going to Germany and Austria-Hungary would be only the normal amount for the five weeks ending August 4, 1914.

Mr. Dewart claims that official records show that millions of pounds of nickel have been shipped during the war to countries which have passed it on to Germany. There is nothing in the records to indicate any such traffic. The only questionable item in the exports for the year ending June 30, 1915, is the 367,696 lb. shipped to Sweden. That may have been used in Sweden.

The following tables show U. S. imports and exports of nickel in the fiscal years ending June 30:—

	1913.	1914.	1915.
Belgium—			
Ore or matte, tons	1,371	1,243	242
Metal contents, lb.	2,498,262	2,037,008	317,971
Canada—			
Ore or matte, tons	35,597	35,174	29,592
Metal contents, lb.	45,010,108	41,507,255	36,607,235
Oceania—			
British, Australia.			
Ore or matte, tons			601
Metal contents, lb.			539,109
Norway—			
Ore or matte, tons			366
Metal contents, lb.			530,704
Total—			
Tons	36,968	36,420	30,801
Lbs.	47,508,370	43,549,303	37,995,019

	1913.	1914.	1915.
Austria-Hungary, lb.	134,400	672,043	67,200
Belgium, lb.	1,719,285	1,230,274	210,612
France, lb.	4,197,110	4,419,663	3,210,980
Germany lb.	2,346,325	11,084,366	1,036,242
Italy, lb.	1,075,303	1,276,905	2,365,177
Netherlands lb.	9,164,012	2,376,216	22,033
Russia in Europe, lb.	7,250	186,626	4,082,280
Sweden, lb.			367,696
Spain, lb.			700
Norway, lb.			31,158
Denmark, lb.			43,830
United Kingdom—			
England, lb.	2,334,845	2,171,511	8,535,418
Scotland, lb.	6,878,264	5,433,081	7,817,384
North America—			
Canada, lb.	16,379	42,529	52,949
Mexico, lb.			1,779
West Indies (Br.), lb.			300
South America—			
Brazil, lb.	1,796		
Columbia, lb.	32		
Asia—			
Japan, lb.	5,447	2,028	308,444
Russia, lb.			1,423,030
Oceania—			
British Australia and Tasmania, lb.	829		22,400
Total	27,881,277	28,895,242	29,599,612

The amount of nickel imported and exported by the United States in the calendar year 1915 was, according to the U. S. Reports on Trade and Navigation as follows:—

	Quantity.	Value.	Per lb.
Imports: Ore and matte—			
Gross tons	45,798		
Nickel, lb.	56,352,582	\$7,615,999	\$13.51
Exports: Nickel—			
To France	3,018,354	1,124,382	37.25
To Netherlands, lb.	129,557	55,954	43.18
To United Kingdom, lb.	14,801,565	5,317,532	35.92
To other countries	8,469,074	3,540,646	41.81
Total	26,418,550	\$10,038,514	\$37.997

THE "TELEGRAM" ON NICKEL

The Toronto "Telegram" in its issue of Aug. 23, under the caption "Ontario's Nickel Insanity," says: "A few boarding houses around two or three holes in the ground, plus Sudbury, represent all that Ontario has to show for a monopoly of 90 per cent. of the world's nickel supply."

The "Telegram" thus exposes its knowledge of the nickel industry. Many other Canadian papers seem to be no better informed on a subject which they venture to comment on at frequent intervals.

Surely the editors of our daily newspapers owe something to their readers. If they want to publish columns about the nickel industry, they should make some effort to learn the facts.

The Sudbury nickel industry is one of Ontario's greatest and most profitable industries. Unfortunately much of the profit goes out of the country to the men who control the industry. Unfortunately some of the work that might be done in Canada is being done in New Jersey. The fact remains, however, that several thousand men are profitably employed in the industry in Ontario; that the wages paid this year will amount to about \$5,000,000; that many of the employees share in the profits; and that the companies spend millions in Ontario for plant, supplies, freight, etc. It is nonsense to contend that such an industry is of no advantage to Ontario. On the contrary, it is because such industries are desirable that we want to see the refining of the nickel-copper matte, as well as the mining and smelting of the ores, done in Canada.

Commenting on the class of labor used in the nickel industry, "Saturday Night" says: "We utilize brawn and not brains on our end of the production, and the consequence is that the wage bill in Canada is all out of proportion to the number of men engaged, as compared with the high class of labor used in the refining process." From this one might judge that "Saturday Night" must have made as little attempt to learn the truth about the nickel industry as has the Toronto "Telegram." It even accepted without criticism Mr. Dewart's clever manipulation of the official reports of the foreign trade of the United States.

GERMAN IMPORTS AND EXPORTS OF NICKEL

A feature of the comments being made on the large amount of nickel imported by Germany before the war is the lack of appreciation of the fact that Germany exported considerable nickel during that time. According to the statistics collected by "Mineral Industry," of New York, German imports and exports of nickel from 1901 to 1913, in metric tons, were as follows (1 metric ton = 1.1023 tons):

Year.	Imports.	Exports.	Difference.
1901	1,947	390	1,557
1902	1,458	689	769
1903	1,507	700	807
1904	1,702	1,203	499
1905	1,955	1,034	921
1906	3,478	954	2,524
1907	2,182	930	1,252
1908	3,058	1,349	1,709
1909	3,745	1,606	1,139
1910	4,606	1,381	2,225
1911	2,598	1,592	1,006
1912	2,027	1,677	450
1913	3,315	1,673	1,642

What significance should be attached to these figures is a question. We have learned to place little reliance on German official statements. We reprint them here

from "Mineral Industry" to call attention to the fact that, according to the Germans, a large part of the nickel imported was exported again.

If we assume the German figures to be correct, it will appear at once that, as compared with the United States, Germany has consumed but a small portion of the nickel production of Ontario. The matte produced in Ontario in the years 1901 to 1913 contained 158,642 tons nickel. Germany's total imports during that time, including nickel from other countries than Canada, were about 37,000 tons, of which a very considerable portion was re-exported.

The electrolytic copper refinery at Trail, B.C., is now in operation. The plant is expected to produce about ten tons of copper daily. Canada is now producing refined copper. How much longer will it be before we can report that Sudbury copper and nickel are being refined in Canada?

From the record of exports of nickel from Germany, it is obvious that metal firms in that country handled much of the nickel used in other European countries. Germany thus had constantly more nickel than she needed for peace purposes. Canada should not permit such traffic being resumed.

MANITOBA'S MINERAL RESOURCES.

Mining men in all parts of Canada have followed with interest the development of the recently discovered mineral deposits in Manitoba. Rice and Gold Lake on the east, and The Pas district on the west have been visited by many mining men during the past year. It is generally believed that Manitoba will from now on figure more largely in the mineral industry of Canada.

In our August 1 issue we published an article by Mr. J. S. DeLury, of the University of Manitoba, on the eastern Manitoba gold area. Mr. DeLury, with Dr. R. C. Wallace, has recently visited The Pas district and for this issue of the Journal has given some account of the mineral deposits of the area. Our readers will be interested in the map which accompanies Mr. DeLury's article. It shows the result of the recent boundary survey.

EXPORTS OF NICKEL TO UNITED KINGDOM.

Exports of nickel, fine contained in ore, matte or speiss from Canada to United Kingdom during the 12 months ended March 31st, 1916, 11,610,100 lb., valued at \$1,779,801. (The weight given is that of the nickel contents, not the gross weight of ore, matte, etc.)

For the three months ended June, 1916, exports under this item were 1,959,000 lb., valued at \$297,015.

The values given are those reported by the Department of Trade and Commerce. The actual value of 11,610,100 lb. nickel in matte would be about \$3,000,000

MR. FERGUSON ON NICKEL

At a meeting in the interests of Mr. James A. Norris, Conservative candidate in the South-west Toronto by-election, the Minister of Lands, Forests and Mines foreshadowed a tax on the nickel industry which would be more favorable to the Province, and which would be made retroactive.

In the course of a speech dealing almost entirely with the nickel question, he said:

"At the present day the Nickel Commission are dealing with that question, and I can say this to you, without disclosing improperly any information as to what the Commission are doing, that we are pretty well satisfied we have got an improved and equitable method to meet the whole mining situation, with a better tax in the future. So far as the nickel situation is concerned, when legislation is brought down making a new tax next winter, that legislation will say that, so far as International Nickel is concerned, it will be retroactive, just as Sir Thomas White's war taxes were retroactive, and we will get a fair share of the profits."

With reference to the statement that twenty-five per cent. of the stock of the International Nickel Company was in the hands of the Krupps of Germany, Mr. Ferguson said he was prepared to show that not only not twenty-five per cent., but not four per cent. of the stock of the International Nickel Company was held by any German or Austrian. The Minister charged that practically every acre of valuable nickel this Province possessed was given away to private corporations by the Liberal Administration, whereas the present Government, since it came into power, had not given one solitary acre of its nickel lands to any other than the private prospector. Hon. Mr. Ferguson referred to the discovery in the Province of a successful commercial process for the refining of Ontario ores, and said that, as a result of the Nickel Commission and the chemists and metallurgists who worked with them, they had today both the large companies coming to the Government and saying, "We are prepared to come into the Province of Ontario and refine our nickel." Mr. Ferguson added, "We are to-day negotiating with them for the development of power for this very purpose."

Regarding the talk about an embargo on nickel, Mr. Ferguson declared the Allies at one time in this war were largely dependent on the munition factories in the United States for supplies. The British Empire undertook to make contracts with firms in the United States, and with reference to nickel the British Government practically took charge of the operations of the International Nickel Company and they are operating that to-day.

"Not one ton of nickel," declared the Minister, "goes out of the refinery the order for which is not submitted to the British Admiralty and approved before it is sent out. Not one ton of nickel matte goes out of this country except by license of the Dominion Government, whereby it can be traced to its ultimate end, where it is turned out in the form of munition supply."

Regarding the supplies on board the Deutschland, the Minister said "the Dominion and Provincial Governments to-day know just how much nickel there was on the Deutschland, just where it came from, what its source was, and we know it never came from the International Nickel Company."

Mr. Ferguson, in vigorous terms, denounced what had been written on the subject by W. F. Maclean,

M.P., "Mr. Maclean has been repeating over and over again that nickel has been getting to the enemy through International channels. I challenge Mr. Maclean or any other man in the Dominion of Canada to put his finger on one tittle of evidence that such is the case. These are merely vaporings and fabrications."

MR. DEWART ON NICKEL

A speech made by Mr. Hartley Dewart, in Toronto, on August 17, is reported by the "Toronto World" as follows:—

"A big meeting at the Orange Hall cheered Hartley Dewart, the Liberal candidate, to the echo, last night when he flayed Howard Ferguson and declared that his days at Queen's Park were numbered, and followed with breathless interest the sinister trail that links Hon. Frank Cochrane to the International Nickel Co., together with his understudy, Mr. Hearst, his candidate Mr. Norris, and his newspaper, The Toronto News. Every statement so far made in this campaign by the Minister of Mines in the defence of the Government nickel policy was taken up, carefully analyzed and torn to shreds by the Liberal candidate. Mr. Dewart showed from the official returns of the U. S. Department of Commerce, that Canadian nickel had been steadily passing through the United States to Germany ever since the war commenced. The official figures he gave include the fiscal year ending June 30, 1916, and they leave no reason to doubt that the Sudbury nickel refined in New Jersey by the International Nickel Company is going every day to Germany to manufacture munitions.

"Mr. Dewart reminded his hearers that the Department of Mines for ten years past had been under the personal control of Hon. Frank Cochrane. Mr. Cochrane held the office himself for years, then passed it on to Mr. Hearst, and when he promoted Mr. Hearst to the Premiership, he put Howard Ferguson as his understaffer in charge of the department. During all these years the Canadian Copper Company of Sudbury, was a large and constant customer of the Cochrane Hardware Company. A. P. Turner, the president of the Canadian Copper Company, was one of the directors of the Cochrane Hardware Company. Another director of that company was a Mr. Hillery, who holds in his own name 472 shares of stock in The Toronto News of the par value of \$100 a share, and also 300 shares in trust. Mr. Cochrane, Mr. Dewart declared, was interested not only as a stockholder, but also a bondholder of The News Company, and his representative on the board of directors was Mr. James A. Norris, the Conservative candidate in Southwest Toronto. Mr. Norris, he said, held one share of stock and was evidently on the board as a mere stool-pigeon.

"We did not have access to the books of the International Nickel Company, Mr. Dewart declared, but they would no doubt show the intimate relations existing between Mr. Cochrane and the nickel company. Mr. Cochrane was a creature of that concern. It put him in the Whitney Cabinet, and it made him a power in politics. To serve the interests of that company he kept an iron grip on the Ontario Department of Mines. The man who happened to be Minister of Mines to-day looked up to Frank Cochrane as his master. Mr. Cochrane to-day was putting in another of his hired men as a representative of the Legislature for Southwest Toronto, and public opinion was being chloroformed and poisoned on the subject of nickel by his newspaper. The Toronto News

"Coming to the question of Canadian nickel going to Germany, Mr. Dewart said that practically all the nickel ore imported by the United States since 1910, had come from the Sudbury district and had been brought into the country for refining purposes by the International Nickel Company and these imports amounted to 17,000 tons in 1909, 22,000 in 1910, 24,000 in 1911, 26,000 in 1912, 35,000 in 1913, 36,000 in 1914, 30,000 in 1915 and so forth. All this tremendous quantity from Canada was refined by the International Nickel Company in New Jersey, which exported a large proportion of it in the shape of refined nickel. If we took the United States export figures for refined nickel we could be sure that they represented nickel mined in Ontario by the Canadian Copper Co., and refined in New Jersey by the International Nickel Trust. The export figures showed immense shipments to the central powers while they were preparing for the great war. Thus in 1909 the United States exported to Great Britain and France only 762 pounds of refined nickel, while she sent to Germany and Austria no less than 6,640,000 pounds. The figures were then given for the following years up to the outbreak of the war. In 1913, for example, 9,000,000 pounds had been shipped to Germany, all of it refined from Canadian ore.

"But more startling figures were to follow. Mr. Ferguson had stated in a substance that any one was 'a dirty low-down cur,' who said that any Canadian nickel had been exported except to the Allies during the war, and yet the United States Department of Commerce reported that in 1914, 14,500,000 pounds had been exported to other countries, notably Sweden, Denmark and the Netherlands, all contiguous to Germany, and all more or less subject to German influence and control. In 1915, the export of refined nickel from the United States to Great Britain and her Allies amounted to 19,500,000 pounds, but in the same year 10,000,000 pounds went to other countries. For the first six months of the current year—1916—1,800,000 pounds of refined nickel had been exported by the United States to other countries. All this nickel must have been refined from Canadian ore by the International Nickel Co. From this conclusion no escape was possible."

Discussing the figures gleaned from the American blue books, Mr. Dewart said:

"Take the American returns and what do you find—that the exports of the refined nickel from the United States to Belgium, France and Great Britain amounted in 1909 to 762,000 pounds, while the export to our enemies, Germany, Austria and through the Netherlands by canal boat to Germany, amounted to 6,640,000 pounds—nearly ten times what our allies received, for in that year there was no export to Great Britain at all.

"In 1910 there was a considerable exportation to Great Britain, and she, with her allies, received 5,300,000 lbs., but our present enemies received in that year 7,700,000 lbs.

"What is the significance of these figures? It was the time of Germany's preparation. It was the time when the Krupps were busy with the munitions of war that were being prepared both for rifle and for artillery. It was the time when Hon. Frank Cochrane was the responsible Minister administering this department, in which his friends of the International Nickel Company were so vitally interested.

"But that there may be no mistake let us take the last four years and what do we find? The imports of nickel or of nickel matte to the United States were practically all from Ontario. What were the exports?

"In 1913 to Great Britain and France 13,600,000 lbs. To the Netherlands (meaning Germany), 9,000,000.

"To other countries, including Sweden, Norway, Denmark, Italy and Russia, 5,000,000 lbs.

"In 1914 the whole 56,000 tons of matte that the United States received came from Canada. France and Great Britain received 13,000,000 lbs. of the refined nickel.

"The Netherlands, 2,300,000, and the other countries, including Sweden, Norway and Denmark, which we now know to have been the avenues of trade through which supplies of every character reached Germany, 14,500,000 lbs.

"In 1915 the United States received its nickel matte solely from Canada. From the United States there was exported to Great Britain and France, 19,500,000 lbs.

"To the Netherlands 22,000 lbs., and to other countries still, including Sweden and Norway and Denmark, Italy and Russia and South America, 10,000,000 lbs.

"In 1916 during the nine months ending March, 1916, for the United States year to which I have referred runs from July to June 30th, and the figures must be therefore taken as of June in any completed year, there was exported to France and Great Britain 10,300,000 lbs., while the Netherlands still received 132,000 lbs., and the other countries, exclusive of our allies, Italy and Russia, 1,800,000 lbs.

"Mr. Ferguson said on Tuesday night that not one pound of nickel goes out of the International Nickel Company's refinery that has not been approved by the British Admiralty. His statement is unverified and unreliable. Will he account for the exports to our enemies in 1914-1915-1916, amounting in these three years to 29,000,000 pounds of nickel to countries other than Great Britain and France? Will he account even for the 2,000,000 pounds exported in nine months up to March, 1916, to other countries than the allied nations of Great Britain and France and Russia and Italy?

"The people of the Province of Ontario want something more than the random statement of a minister who is hard pressed and who does not submit one solitary figure, give the name of an individual or any record or authentic statement from any source to substantiate his general theory, or show where the 29,000,000 pounds of refined nickel went in the last three years that did not find its way to Great Britain and France."

BRITISH-AMERICAN NICKEL.

Sudbury, August 19.—The British America Nickel Corporation, owners of the Murray Mine and other nickel properties in the district, has acquired the water power on the Wahnapiatae River at Twin Chute, about four miles above Wahnapiatae village, and a force of men is already at the preliminary work towards developing the power. It is expected that from the plant to be erected about 6,000 horse power can be developed, and it is figured that by the time the work is completed and the power transmitted at the Murray Mine, the cost will reach in the neighborhood of \$1,500,000. It is understood that about 300 men will be employed in the development of the power plant alone and that the job will be pretty well completed within a year.—Sudbury Mining News.

THE MINERAL BELT NORTH OF THE PAS, MANITOBA

By J. S. DeLury.

The area described under the above heading includes a wide belt of mineral-bearing pre-Cambrian rocks extending from Amisk or Beaver Lake in Saskatchewan easterly to and beyond Wekusko or Herb Lake in Central Manitoba and showing at many points throughout its length, deposits of mineral, some of which should in the future prove of economic importance.

To the south this belt passes under the almost undisturbed palaeozoic limestones. To the north there is a continuation of pre-Cambrian rocks, the possibilities of which as sources of ore have yet to be demonstrated.

As would be expected, the country as a whole gives evidence of extensive glacial erosion. Doubtless the whole of the mineral belt was at one time covered by palaeozoic limestones and to the protection by these from glacial and pre-glacial erosion we owe the abundance, throughout this belt of residual Keewatin-Huronian outcrops.

In company with Dr. Wallace of the University of Manitoba, the writer recently made a three weeks' trip through the belt, and while little that was new could be learned from so extensive an area in such a short time, a few items of interest may be added to what has already been published on this field, and the accompanying sketch map may be useful in showing the readers of the Journal the locations of the different deposits. There is one feature of special interest in the map, namely, that it shows fairly accurately the positions of the sulphide ore bodies of Flin-Flon and Schist Lakes with respect to the new provisional Manitoba-Saskatchewan boundary line as determined recently by Mr. F. H. Kitto of the Surveyor-General's Department. Any merit this paper and map may have is largely due to the hearty co-operation of Dr. Wallace.

Reports* have been issued by the Canadian Geological Survey embracing the whole and various parts of this area, but being the results of reconnaissance surveys, the information they give is valuable to the prospector only as indicating the possible mineral-bearing formations and the travel routes. Dr. Bruce of the Dominion Survey has been working in this field for the past three field seasons and it is certain that his report and map will be of great value to those working in the district, and they are being anxiously awaited.

The important prospects on the Manitoba side of the boundary were all visited, leaving little time for noting other than the most general geological features of the area. A rough outline of the geology of the country, compiled from survey reports and from the writer's observations, follows: As in similar areas in Northern Canada, there are isolated patches of Keewatin-Huronian rocks, surrounded and underlain by Laurentian and other granitic intrusions. They are commonly spoken of as inclusions, but in most cases are best regarded as residual parts of extensive formations which have

been largely removed by erosion. As pointed out above the large residual areas in this area are best explained as resulting from the protective influence of palaeozoic limestones.

There are without doubt both Keewatin and post-Laurentian rocks in the field and there are evidences of several periods of igneous intrusion, but the rocks are not easily differentiated except in places where contacts are seen. A great variety of rock types is presented, and while locally their relative ages may be determined, it is almost impossible from the information obtainable to give a comprehensive idea of rock correlation over the whole area, on account of the wide variety of types, the similarity of different types, the great variations in short distances and the intense metamorphism which nearly all have suffered. Bruce has listed the pre-Cambrian formation as follows:

Granite, Porphyry, Granite, Granite Gneiss.

Intrusive Contact—Jasper Conglomerate, Argillite, Arkose, Recrystallized Arkose, Conglomerate.

Unconformity—Granite (occurs as pebbles in the Conglomerate), Diorite, Greenstone, Pyroclastics, Auto-clastics, and derived Schists.

This list will give a general idea of the nature and variety of the rocks of the area and the map accompanying McInnes' report will furnish the reader with the locations of the more extensive non-granitic formations. Beyond this bald statement, the geology of the belt will not be considered except briefly in its relation to the ores.

All the rocks of the area, except some of the latest intrusions, show a schistose or gneissoid structure with a strike of schistosity nearly north and south. This and the facts that there are many igneous intrusions with contacts parallel to the schistosity and that the dips are very high, being near the vertical in most cases, indicates that intense folding, probably accompanied by igneous intrusion took place over the whole area. The structure suggests isoclinal folding and hence that the schistose formations are apt to be repeated in belts parallel to the strike of the rocks. Though there are several types of deposit throughout the district, generally speaking the ores of the area are sulphide replacements or quartz veins in schistose rocks, the ores and veins being generally parallel to the schistosity of the rocks. Many of the rocks of the area even when not close to known ore bodies, show considerable sulphide mineralization. Some of the schists are of sedimentary origin, including sericitic, staurolitic and garnetiferous varieties. Others are of igneous origin, felsitic and porphyritic, and to others it is difficult to ascribe a definite origin.

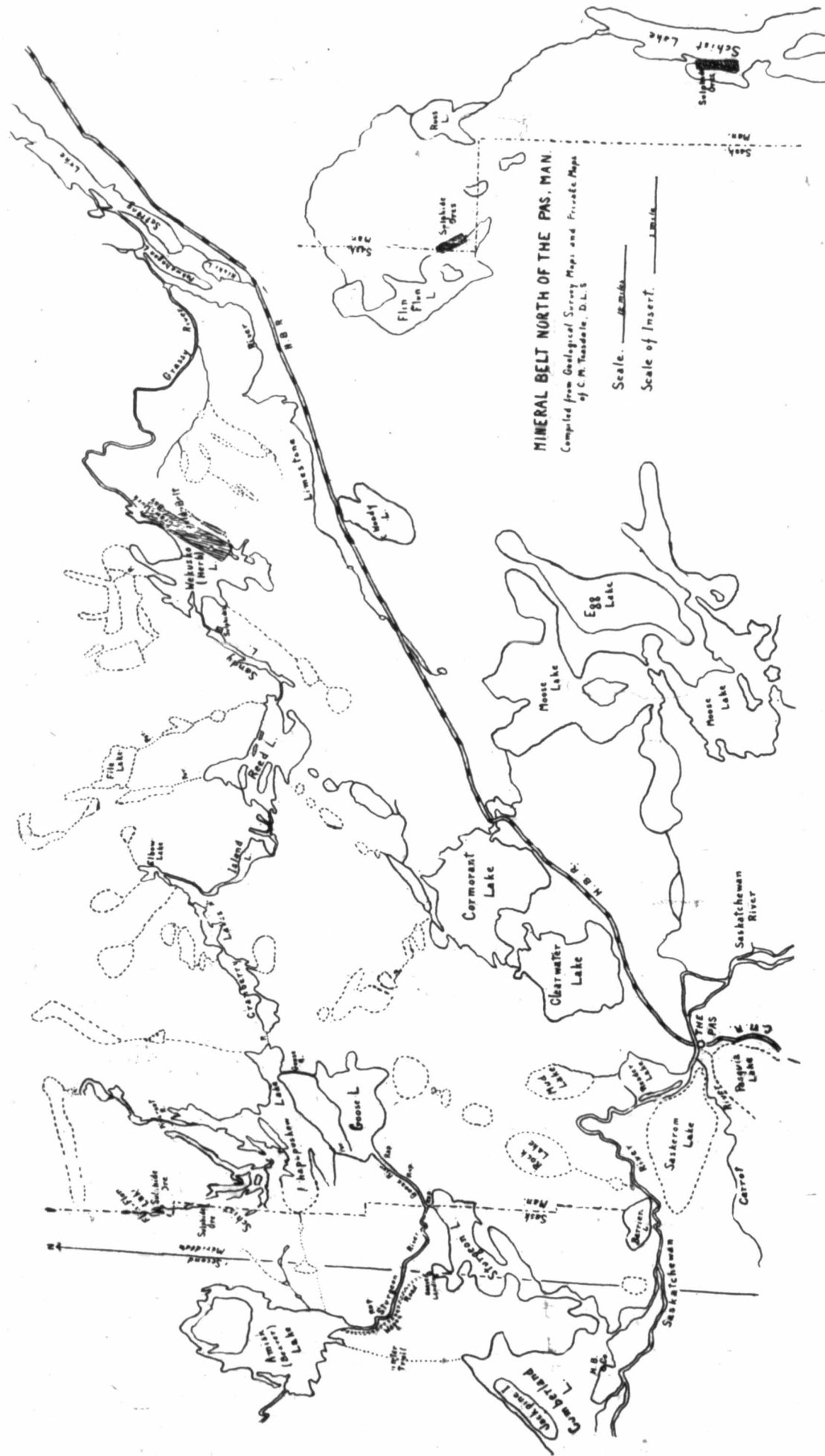
Sulphide Deposits.

Of all the prospects in the area, most interest has centred on the sulphide ore-deposits of Flin-Flon and Schist Lakes. Both of these deposits are on the shore near lake level and the limit of what could be shown by surface work was soon reached. However, during the past season, two American companies have been investigating these properties by means of diamond drills.

Flin-Flon Claims.

On Flin-Flon Lake considerable trenching and diamond-drilling has been done on two claims, the Apex

*Annual Report, C. G. S., Vol XIII.
North-Eastern portion of the District of Sask. and Adjacent Parts of Districts of Keewatin. By J. B. Tyrrell.
Geological Explorations in Athabasca, Sask., and Keewatin Districts. By D. B. Dowling.
Memoir No. 30, C. G. S.—
Basins of Nelson and Churchill Rivers. By W. McInnes.
Summary Report, C. G. S., 1915—
Amisk-Athapapuskow Lake Area, Northern Sask. and Northern Man. By E. L. Bruce.



MINERAL BELT NORTH OF THE PAS, MAN.

Compiled from Geological Survey Maps and Private Maps of C. M. Todd, D. L. S.

Scale. ——— 1 mile.

Scale of Insert. ——— 1 mile.

MAP OF THE AREA NORTH OF THE PAS, MANITOBA.

and Unique. The ore consists of partially replaced schist grading into bands of sulphides of which pyrite, chalcopyrite and sphalerite are the more abundant and galena and arsenopyrite in small quantity. There has been considerable oxidation on the surface, the mixture of rock and sulphides weathering more readily than the massive sulphide bodies. It is said that there are considerable gold values in the sulphides, the free gold has been found in some of the drill cores and that the surface oxidized material will yield gold in the pan. The ore body is obviously a replacement deposit and as in most replacements, the ore is somewhat irregularly distributed throughout a wide mineralized zone.

The banded nature of the ores can be ascribed to changes in the ore-bearing solutions and successive replacements of layers of the fractured rock zone. In places on the weathered surface of the ore-body, the mineralized rock has been entirely leached of its sulphides and there is left a thoroughly bleached pumice-like mass of rock. The irregularity of the ore-body makes it impossible to give tangible dimensions. The replacement zone has in one place a width of close to 200 ft. and indications of ore are found throughout a length close to 2,000 ft.. Wide bands of solid and mixed sulphides are found in most of the trenches and these are always accompanied by rock rich in sulphides. Drills have cut the ore-body at several depths up to 500 ft., but no authentic information could be obtained as to the size or nature of the body at these depths. The schist carrying the ore appears to have been a rather basic felsite. There are several varieties of rock in the vicinity, including schistose gabbro and quartz-porphry and a rather fresh looking granite dyke which grades into quartz-porphry on the edges. No connection of any of these rocks with the origin of the ores were established. The ore-bearing schist strikes a little west of north and is nearly vertical, having a dip of about 80 deg. east. The ore appears to follow the strike and dip of the enclosing rock.

Schist Lake Claims.

On Schist Lake is a sulphide ore-body that is very similar to that on Flin-Flon Lake. Trenching has showed up a very wide mass of pure chalcopyrite with accompanying bands of pyrite and sphalerite and mixtures of these. Surface weathering as at Flin-Flon, has resulted in the formation of iron capping on the upper few feet of the ore and noticeable deposits of covellite and chalcantite were formed. The nature of some of the partly replaced rock indicates that the ore was deposited in a zone which besides being quite schistose was also fractured. The ore-zone is not as large as on Flin-Flon, being, as far as has been determined, confined to a surface area somewhat less than 500 ft. long and 80 ft. wide, but in this are some large bodies of valuable sulphides. Drilling to depths up to 500 ft. shows that there is an extensive ore-body and that it is of the pockety nature of replacement deposits. The ore-body, following the rock, has a dip of about 75 deg. east and strikes a little west of north.

Other Sulphide Deposits.

Both of these sulphide bodies appear to be large enough and rich enough to warrant that at some time they will be important producers. There are excellent chances for finding similar bodies along the same zone of fracture and for that matter, elsewhere in the district. Similar sulphides have been reported from the Pinroot R. country to the north and east of these deposits, and also on Arthapapuskow Lake. On Sandy Lake is a considerable impregnation of pyrite and pos-

sibly other sulphides in a graphitic schist, but the value of this is not known.

Herb Lake Gold Prospects.

The country on the east side of Herb Lake has furnished the bulk of the promising gold prospects. In this area are found gold-bearing quartz veins which occur in a sericitic schist and in a schistose diorite or gabbro. With the quartz are notable amounts of tourmaline and a little carbonate gangue. Besides free gold, the veins carry sulphides which are largely arsenopyrite with some pyrite, chalcopyrite, sphalerite and galena. Mineralization is fairly constant throughout the length of the veins, but apparently less in proportion to the width in the wider parts. Free gold is rather persistent and in places there are quite rich showings. There is considerable arsenopyrite scattered in grains throughout the country rock adjacent to the veins. The veins run between a north-south and a north-east-south-west direction and are nearly vertical, following both the strike and dip of the country rock. They are irregular in width, thinning to a few inches in one place and widening to lenses up to 6 or 8 feet in another, while they seem to be fairly persistent in length wherever they have been stripped or cross-trenched, some of them having been traced in these ways for several hundred feet.

Considering the amount of prospecting that has been done in the area, the number of showings is remarkable and speaks well for the future of this part of the country. The relations of the quartz veins to the folded rock structures suggest that the veins may be followed into the troughs of synclines in which case there may be enlargements as frequently happens in quartz veins following similar structures.

Molybdenite.

On Crow-Duck Bay, across from the gold deposits above described, is a quartz vein which has been opened up and traced for a short distance. It contains a considerable proportion of molybdenite, also orthoclase and tourmaline crystals, and a little pyrite and chalcopyrite. It is said to carry low values in gold. The vein is small and has not been traced for any great distance. The country rock is a quartz-diorite or quartz-monzonite with a gneissoid structure. In the same bay is a pegmatite dyke carrying considerable amounts of muscovite.

Other Gold Deposits.

It has been known for many years that there are many gold prospects on Beaver Lake in Saskatchewan. It is also reported from Island Lake, from Little Herb Lake, north of Herb Lake and from the File Lakes, north of Reed Lake.

Future of the Pas District.

On the whole, the showings made in this wide belt are both remarkable for their number and nature, considering the brief history of prospecting and developing and the writer feels that he is sufficiently conservative in predicting a bright future for further prospecting and future development.

MR. J. E. SPURR ON THE PAS DISTRICT.

"The greatest mining district in Canada," says Mr. J. E. Spurr, advising engineer and first vice-president of the Tonopah Mining Company, on his arrival in The Pas from an extended tour of the mineral area between Schist and Herb Lakes.

"That covers it," said the eminent geologist, as he boarded the train for the south. He avoided saying anything further on the subject, and also declined to

discuss the plans of the Tonopah. This company is diamond drilling a sulphide body at Schist Lake, where satisfactory results have been obtained, and a further exploration is going on. At Herb Lake the company are investigating a molybdenite deposit. Elsewhere in the mineral belt the Tonopah have interests which are being examined and tested with an eye to development. More money is being spent by this company in proving the mineral deposit of New Manitoba than any other concern in the field, and they have earned the good wishes of every man in the hinterland. It is evident from the expenditures already made, and the program outlined, that the Tonopah are here to spend vast sums of money in determining the mineral possibilities of which they seem to have the greatest confidence and faith. Whatever else may be done to promote the mining interests of New Manitoba, it is apparent that the Tonopah will outshine them all in point of bringing to realization the actual fact that here in this district are great deposits of precious minerals in unlimited quantities. That is the attitude of the Tonopah engineers, led by Mr. Spurr, and the people of The Pas are grateful and appreciative of this spirit.—The Pas Herald.

and 25 miles wide, extending from Flin-Flon to Herb Lake, and showing outcroppings of sulphides throughout. He declared to The Pas Herald that the sulphide discoveries already made are more accidental than anything else, and a vigorous campaign of prospecting would reveal larger ore-bodies than those found at Flin-Flon and Schist, though they are, he says, wonderful properties as it is.

Gold, copper and zinc were the chief minerals encountered by the Manitoba University professor of geology, and to these three he looks forward to the bulk of production. Lack of prospectors was lamented by Mr. Wallace, and he will give particular emphasis to this point in writing his report to the Government. These views are similar to expressions given out by Mr. J. E. Spurr, of the Tonopah, and both geologists appear to agree that the entire district is one of great mineral promise that can be only uncovered by diligent prospecting and development.

Professor Wallace was accompanied by Associate Professor De Lury, and Hay Stead, a well known journalist, who will write a series of articles on the district for the Winnipeg Telegram. Mr. Wallace's report will



FLIN-FLON CAMP.



AFTER CROSSING BEAVER LAKE, 53 BELOW.



AT POLICE SHACK, BEAVER LANDING.
Constable Douglas, Mr. Hammell and Mr. Robinson.



FLIN-FLON CAMP.
From Left—Tom Creighton, Dan Mulligan, Leon Dion, Jack Hammell, Isador Dion and Jack Mosher.

PROF. WALLACE ON THE PAS DISTRICT.

"Heavier veins, more lenticular and greater mineralization in the country rock than at Rice Lake," is the opinion of Professor Wallace regarding Herb Lake.

Professor Wallace has spent three weeks in the mineral belt of the north, on behalf of the Provincial Government, and his report will set forth his conclusions, which he says are decidedly favorable in every way. The mineralized area he puts at 125 miles in length

appear in the Winnipeg Free Press as well as other papers, and mining men in The Pas are waiting for it with considerable interest.

The owners of the Kiski and Rex claims at Herb Lake were congratulated by Professor Wallace for the manner in which they had opened up the veins on their respective properties, which was characterized as intelligent work and most advantageous.—The Pas Herald.

A NEW FLOTATION OIL*

By Maxwell Adams.

Considerable interest has recently been developed in sage-brush oil because of its possible utilization as a flotation agent in the mining industry. A list of some of its physical properties, together with the method used in its extraction, may prove of interest at this time.

Something over a year ago, a study of the essential oils in desert plants was begun in the Chemical Laboratory of the University of Nevada. None of the oils so far studied possess properties of special interest to engineers, except the oil of sage, *Artemesia tridentate* which has exceptional power as a flotation agent. This plant, known as common sage brush, also called black sage, is widely distributed over the semiarid West, being found quite generally on most of the dry plains and mountains west of Missouri.

The method of extracting the oil followed in these experiments is very simple. The leaves, twigs and small branches are placed in an air-tight drum, having a capacity of about 27 cu. ft. Steam is admitted through a number of small openings at the bottom of the retort, and the pressure maintained at 20 to 25 lb. per sq. in. for 3 hr. The escape of the steam from the retort is regulated by allowing it to pass through a stop-cock into a condenser. The water in the receiver is drawn off from time to time and the oil, which is insoluble and floats upon the water, is thus collected. At the end of 2 hr. most of the oil has been driven out, though traces continue to come over for a much longer time. By raising the pressure, the time required could probably be shortened and the yield increased, but the lack of laboratory equipment has prevented the carrying out of this experiment.

The stock wood, bark and branches contain no oil, the distribution of the oil being limited to the leaves and young shoots. There is a seasonal variation in the amount of oil contained. Samples collected on different dates gave the following amount of oil: May 1, 0.42 per cent.; May 27, 0.6 per cent.; June 30, 0.72 per cent.; Aug. 1, 0.9 per cent.; Sept. 10, 1.0 per cent. The increase appears fairly constant from early spring, when the leaves first appear, until light frosts occur in the autumn. When the plant is air-dried there is some loss of oil, as the following data will show: Two 100-lb. samples were collected at the same time. One was distilled when green; the other was air dried for 10 days before distillation. The green sample yielded 275 grams, and the dried sample 248 grams of oil, showing a loss of about 10 per cent.

A laboratory experiment can furnish little data useful in forming an estimate of the commercial cost of production. A man working for 6 hr., and using a pair of common pruning shears, collected twigs which yielded 1 lb. of oil. Since only a small percentage of the oil is lost if the brush is dried, the most economical method of production would perhaps be to collect it in large quantities, by using a tractor engine and a drag, in some such way as land is cleared for farming. When the brush is dry, the leaves and young shoots are easily shaken from the limbs. Thus the amount of material to be distilled would be greatly diminished and the oil perhaps obtained at a cost and in quantity sufficient to make it available as a flotation oil, if not alone, pos-

sibly as an ingredient, to increase the flotative power of other oils.

The crude oil is dark in color. When redistilled with steam it is water-white at first, changing gradually to a straw-yellow color upon standing. It has the following physical properties: Density at 15 deg. C., 0.9206. Refractive index at 20 deg. C., 1.4732. Rotation at 20 deg. C., -4.69. At 98 deg. C., a light oil, with a very sharp and pungent odor, begins to distill, but only after the temperature is above 165 deg. C. does rapid distillation take place. At 180 deg. C., the oil turns dark and decomposition begins. At a pressure of 12 mm., and below 125 deg. C., almost all the oil can be distilled.

The chemical properties of the oil are as yet undetermined. There are small quantities of alpha and beta pinene. The main part of the oil has a camphor-like odor and taste, but has failed to give the ordinary tests for ketones. The fraction boiling at 175 deg. to 180 deg. C. has some of the properties of ordinary cineol, but is acted upon by metallic sodium, which indicates that the chief ingredient is not cineol. The chemical composition, which has little interest in this connection, will be worked out later. The important question for the engineer is: Can the oil be produced in quantity and at a cost that will make it available for ore flotation?

COAL MINE DISASTER AT MICHEL, B.C.

A series of explosions took place in No. 3 mine of The Crow's Nest Pass Coal Co.'s Michel colliery, in the Crow's Nest district of South-east Kootenay, B.C., on the night of August 9, and as a result twelve men lost their lives and the mine was badly wrecked. Mine-rescue crews from both Michel and Coal Creek entered the mine, but they found the workings blocked by great falls of rock, so were unable to reach the parts where some of the unfortunate miners had been working. By the 16th of the month seven bodies had been found and removed from the mine. The cause of the disaster has not yet been ascertained, but it is believed that during an electrical storm that was raging in the neighborhood at the time, the lightning being severe and coming low down, a heavy current of electricity must have followed the steel rails of the track into the mine. The Chief Inspector of Mines for the Province hurried from Victoria to Michel, to make investigations, and to take preliminary steps to hold an inquiry into the circumstances attending the explosions.

Last year the Coniagas put in a cyanide plant to treat decomposed ore in the form of slime. From three to four tons was washed out every 24 hours of material that will run about 150 oz of silver. This plant gives an additional profit of from two thousand to twenty-five hundred dollars a month. Previously the concentrates were shipped to smelters. In all probability this practice will be continued after the flotation plant is installed. Slime tailings last year ran an average of 6.3 oz., but this has been reduced to below 4.5. It is thought that flotation will make an additional recovery of from three to four oz. per ton.—Northern Miner.

*A paper to be presented at the Arizona Meeting, September, 1916, American Institute of Mining Engineers.

A FEW NOTES ON CALLOW FLOTATION

By A. G. Morrison.

In the hope that other persons will write of their experiences in connection with the practical operation of Callow Flotation Cells the writer has prepared a few notes on his experience in the flotation of chalcopyrite.

Volumes have been written concerning the theory of flotation, but after wading through many articles on the colloidal chemistry of flotation, and reading one article by an eminent writer stating that most minerals are negatively charged, and another article stating that the pulp should not be emulsified, and finding both of these statements refuted by J. M. Callow (see Canadian Mining Journal, December 1st, 1915), one loses hope of learning anything from the prophets.

Two solid facts stand out very clearly, however. The first is that no one can as yet explain the why of flotation and that all attempted explanations can be reduced to the electrolysis theory and the contact angle theory. The second is that no predetermined kind or quantity of oil can advantageously be used on any given ore. This gives the novice a certain amount of encouragement, for all can at least start even. The writer has been connected with the use of the Callow cell on chalcopyrite ores and writes from that standpoint only.

The first trial of oil was with 55 per cent. of coal tar, 35 per cent. wood creosote and 10 per cent. pine oil. This gave a fairly satisfactory froth of a dirty grey color. After considerable experimenting it was found that pine oil could be dispensed with, providing the air pressure was sufficient. The oil finally used was 55 per cent. coal tar and 45 per cent. mineral creosote instead of wood creosote. The air supply was obtained from a Root blower of an old type which hardly gave enough pressure, the result being bubbles from $\frac{1}{8}$ inch to 2 inches diameter. These were too large since the smaller the bubbles the more surfaces there are to carry the ore. The blower being run from the main drive necessarily stopped when the engine stopped.

To supplement this, air was carried from the compressor (100 lbs. at the compressor end) a couple of hundred feet through a $\frac{1}{2}$ -inch pipe to the cell, the only protection against a blowout being a valve at the cell end of the line. This valve was opened just sufficient to give the right pressure at the cell. This gave a stronger pressure, allowing the cell to start much more quickly, if for any reason it was stopped, and also decreased the size of the bubbles, thus offering more surface for the ore to cling to. It was not a very economical process for it took a high pressure to drive the air through the $\frac{1}{2}$ -inch pipe.

The ore was ground so that 90 per cent. would pass 100 mesh. Under the microscope the chalcopyrite showed as somewhat rounded angular particles clean from rock and gave every indication of separating cleanly from the rock even when not ground so finely. The ore was mixed with water in the ratio of 1 to 4.

There are four fundamental conditions necessary for good results. First, the ore and water feed must be in exact proportions, i.e., in the same ratio, otherwise the oil feed must be changed to meet the changed conditions. Secondly, the feed of the pulp into the cell

must be constant, for although the float more or less compensates for a changing feed, its action is somewhat slow, and this prevents the even slopping over of the concentrates, and if a cell goes out of action for any reason, it often takes considerable time to get it going again. Thirdly, the oil feed must be regular. Fourthly, the air pressure must be steady.

Given these conditions, cells will work steadily with little or no attention. Under a heavy feed the cells muck up about twice a week when they must be emptied and the mud scraped off the blankets. Some authorities advise blowing air through the blanket till it is dry, and then beating it with a piece of belting till all the dust is out of it. This is very effective, but just at present when it takes so long to replace the blankets, owing to the slowness of the manufacturers, it is not to be recommended unless one has a good supply on hand.

The first oil feeder used was merely a barrel having a steam coil for heating and an ordinary valve to allow the oil to drip into the pulp. This caused endless trouble as a constant feed could not be maintained. This was replaced by a wheel, the rim running in the oil at about 10 feet a minute velocity. A square piece of tin pressing against the rim scraped off the oil. The tin was slid along the face of the wheel until there was sufficient contact between the two surfaces to collect the required amount of oil. The tin was attached to a wooden block run in grooves.

The oil container was a shallow tin pan and gave some trouble at first because the oil stratified and only the light frothing oils came off. This difficulty was overcome by changing the oil occasionally.

A good point to bear in mind is that the cells should be located so that the man in charge can readily see into them, to be sure that they are overflowing properly. This necessitated a climb down a ladder to get at the air valves underneath the cell. This is a handicap, as the idea must be to have one man attend as many cells as possible. Since human beings are frail, if there are many ladders to climb in a day some of the cells will be neglected. A worm or bevel gear attachment which would allow the valves to be operated from the top of the cell so that the man can at once see the result, would be an improvement.

Observations of the flow of the froth indicate that it is from top to bottom end of the cell with a tendency to go to both sides. This indicates the necessity of having the lower end of the cell overflowing at all times otherwise there will be a considerable loss in the tailings.

A fact not generally known is that a single cell can be used both as a rougher and a cleaner cell, by throttling down the upper air valves and allowing the lower end of the cell to overflow. The froth (in the case of chalcopyrite) will then change from a dirty grey to a beautiful copper yellow. The production will be cut down about one-half and the grade of the concentrates doubled without making any appreciable difference in the tailings. This is, however, far from fool proof and must be given closest attention.

MANUFACTURE OF DRILL STEEL IN CANADA.

Armstrong, Whitworth of Canada, Ltd., has now in operation a "Heroult" electric furnace for the manufacture of high grade carbon steels. The company is now in a position to make all grades of carbon and alloy steels of a quality that have not heretofore been manufactured in Canada. This includes "Aweo" mining drill steel, which is giving very excellent results in rock drill work, etc. The electric furnace has come into prominence in the last few years, and manufactures a very pure steel owing to its refining qualities.

A I. M. E. MEETING IN ARIZONA.

For the first time in its history of forty-five years the American Institute of Mining Engineers will this month meet in the State of Arizona. Sessions of the meeting will extend over the entire week of September 18th and will be held in the principal mining centres of the State, the members travelling between the various points by special train and automobile. Principles of mining and metallurgy of the greatest interest will be presented at the technical sessions.



ELECTRIC FURNACE AT ARMSTRONG, WHITWORTH PLANT.

Armstrong, Whitworth manufacture high speed steel in crucibles, as it is well known that this class of steel made in crucibles is of the highest quality and gives the best results.

The company is installing two additional electric furnaces of 6 ton capacity each in connection with a new plant for the manufacture of locomotive and car wheel tires, rolled steel wheels, special heavy forgings, etc. They expect to have this new plant in operation next spring.

Some indications of the importance of this meeting to mining engineers is shown by the fact that a special train has been arranged for to carry Eastern members from New York city on September 14th. Other members and their guests will join the party at various points en route and at El Paso, Tex., the western section of the convening members, starting from Los Angeles, Cal., will meet the train and continue to Arizona.

The principal towns in which the Institute sessions or visits of inspection will be held are Santa Rita and

Hurley, N. Mex., and Douglas, Bisbee, Globe and Phoenix, Arizona. The inspections will include the Roosevelt Dam and the mines and works of practically all the leading metal-producing companies of the State. At Douglas, in the technical sessions, the Institute will discuss the special subject of "Smelting." At Bisbee papers will be read on "Mining and Geology," and at Globe the first day will be given over to "Mining and Smelting" and "Leaching." During the second day at Globe time has been set aside for what is regarded as an important discussion of "Concentration and Flotation."

The Institute now comprises more than 5,600 members and this meeting is designed to develop subjects of interest to all of these. In announcing the Arizona meeting an official of the Institute says: "A few years ago Arizona stood third in the copper-producing districts of the United States. Since that time, with the development of porphyry mines, the output has gone up with great rapidity until it not only is the leading district, but its output at the present time is at the rate of nearly double the Montana output, which now stands second in the list."

An elaborate entertainment program is being plan-



ELECTRIC FURNACE AT ARMSTRONG, WHITWORTH PLANT.

The company plants that will be visited are as follows: At Hurley, the mines and works of the Chino Copper Co.; at Bisbee and Douglas, the mines and works of Copper Queen Consolidated Mining Co., Calumet and Arizona Copper Co., and Shattuck Copper Co.; at the Globe district, mines and works of Inspiration Consolidated Copper Co., Miami Copper Co., Old Dominion Copper Mining and Smelting Co., together with the new works of the International Smelting Co.

ned by the Arizona Committee comprising Gerald F. G. Sherman, chairman; Arthur Notman, secretary; Norman Carmichael, W. G. McBride, John C. Greenway, W. L. Clark, B. Britton Gottsberger, and Forest Rutherford. The Committee on Transportation is composed of Walter Douglas, chairman Cleveland E. Dodge, secretary, Arthur S. Dwight, John C. Greenway and Julius Kruttschnitt, Jr.

BOOK REVIEWS

Economic Geology, by Heinrich Ries. Fourth Edition, revised and enlarged. Published by John Wiley & Sons, New York. Price, \$4.00. For sale by Book Department, Canadian Mining Journal.

Professor Ries' textbook on economic geology is well known. It is particularly useful on account of prominence given to the non-metallic minerals, on some of which Mr. Ries is an acknowledged authority. The section devoted to metallic minerals is comparatively weak.

In this new edition the author has included descriptions of some Canadian mineral deposits. The descriptions are not remarkably good and the classification of the deposits is not designed to convey correct impressions. It may be well to point out some features of the descriptions which appear to us as objectionable.

First, let us take the case of the Cobalt silver deposits. Cobalt is the world's richest silver mining camp. We naturally look for a description of these native silver deposits in the chapter headed "Gold and Silver." Instead, the description is given in a chapter headed "Minor Metals," under the subheading "Nickel and Cobalt," thus conveying a false impression as to the character of the chief product of the Cobalt silver mines.

In describing the Cobalt silver deposits Mr. Ries says: "The important ores are native silver, smaltite and cobaltite. As a matter of fact, cobaltite is not one of the important minerals, and is only occasionally seen. The important mineral is native silver.

The greatest gold deposits discovered in recent years are those of the Porcupine district, Ontario. In the chapter on gold and silver one paragraph of four sentences is devoted to a description of the Porcupine gold deposits.

In this same chapter the gold deposits of Rossland are mentioned as follows: "The deposits at Rossland, B.C., referred to under copper, also yield an appreciable quantity of gold." The gold production of the Rossland district during 1915 was \$2,947,439, while the copper production was 4,651,681 pounds. The relative importance would hardly be deduced from Mr. Ries' textbook.

Reference to the descriptions of some of the American deposits with which the reviewer happens to be familiar does not increase our confidence in the accuracy of Mr. Ries' descriptions. Of the Michigan copper deposits he says: "At the present time most of the production comes from the Calumet conglomerate, while the balance comes from two other copper-bearing conglomerates known as the Albany and the Allonez, and from the ashbeds and amygdaloids, whose gas cavities are filled with a mixture of native copper, calcite and zeolites." This sentence is full of errors. By far the greater part of the Michigan copper is being mined from amygdaloid lodes, the Kearsarge amygdaloid lode itself yielding more than the Calumet conglomerate. Aside from the Calumet conglomerate very little conglomerate ore is being raised. Comparatively little of the copper in the amygdaloidal lodes occurs in the form of filling of gas cavities, being chiefly present as a replacement of rock constituents.

Following the inaccurate statements contained in the sentence quoted above we find the following: "The

Calumet and Hecla ore shoot, which is three miles long, 12-15 ft. thick, has been mined to a depth of 5,000 ft." This description of the Calumet ore shoot is almost as inaccurate as it is brief. Ore is being mined at the Calumet and Hecla property for a length of three miles on the conglomerate lode, but there is no continuous ore shoot of that length.

In the case of the more recently discovered districts it is not surprising to find very poor descriptions in textbooks. We expect, however, to find even in textbooks reasonably accurate descriptions of such long-worked and well known deposits as those of the Calumet conglomerate.

The author of a text book on ore deposits cannot be expected to be familiar with all the deposits mentioned. He has to depend upon written descriptions and is sure to make some mistakes in summarizing. We have here called attention to a number of unfortunate descriptions noted on brief perusal of this new volume. In spite of the fact that the book is in some respects unsatisfactory, it will doubtless find considerable use, especially by those studying the non-metallic minerals.

A ROLL OF HONOR

At noon of Friday, August 4, at the Western Fuel Co.'s machine shop, Nanaimo, Vancouver Island, British Columbia, there was unveiled a Roll of Honor comprising the names of employees of the company who had enlisted for active service in the war. Alderman Ferguson presided, and Mr. A. S. Hamilton, the company's master mechanic, who removed the covering from the roll, said: "Fellow employees: It is fitting that we should, on this the second anniversary of the great war, pay special tribute to those of our staff who responded to the call of the Motherland, and did, or are doing, 'their bit' for the sacred cause of Freedom and Justice. In the journey through life there is only one path by which we travellers may reach happiness and righteousness, and that is by acting on the square one toward another, man to man. Crime and injustice flourish but a short time; righteousness alone prevails. Nations being merely a collection of individuals, must be animated and governed by the same laws, and any violation of this sacred principle must be stamped out of civilization is to advance and prosper. It is this glorious and worthy cause for which our comrades are fighting; for this they have left their homes and gone thousands of leagues from us, ready to sacrifice their vigor and, if need be, their lives. We thank them now; generations to come will bless them, and the world will be the better that such men have lived. The list of names inscribed on this Roll of Honor is but a humble contribution to the hosts engaged, but these names are dear to us, inasmuch as they who bear them were our chums, our fellow-workmen, our friends, and we know what their sacrifice means. May we who remain at home be spurred on to further efforts in the much easier duty allotted to use of caring for those left behind, and may we never cease to be proud of this humble list of names of those who are representing our department in this great war." Mr. Hamilton then unveiled the Roll and read out the ten names inscribed thereon, one of them being that of one of their fellow-workmen who had been killed in action.

DEATH OF HON. EDGAR DEWDNEY

The late Hon. Edgar Dewdney, who on August 8 died suddenly at his residence near Victoria, B. C., was one of a fast-passing band of pioneers who helped considerably to mould the destinies of that province. The Daily Colonist, of Victoria, published a lengthy obituary notice, from which the following has been taken:

"British Columbia was the scene of the late Hon. Edgar Dewdney's earliest exploits and most of his life's work was carried on within the boundaries of the province. In Victoria and throughout the community his loss is being deeply mourned. He died suddenly at his residence, Cadboro Bay Road. His death, which was due to heart failure, came as a great shock to his many friends, for he gave every appearance of being in his usual health until within half an hour of the end. He was seriously ill about a year ago, but while he had been somewhat weak ever since, he suffered no relapse and appeared to be regaining his former strength. He was down town the day before his death.

"Mr. Dewdney was 81 years of age. He was born in Devonshire, England; he received his education not far from his birthplace and qualified as a civil engineer. About the time he gained the certificate to practice his chosen profession, the richness of the Cariboo gold-fields, in British Columbia, was attracting world-wide attention and the surrounding country was slowly but surely being developed in order to provide adequate communication to the mines for the prospectors and settlers attracted there from all parts of the world. It was therefore not unnatural that Mr. Dewdney made British Columbia the choice as the field of his labors.

"In the year 1859 he left England for the Canadian North-west, and upon his arrival here was almost immediately taken into the service of Sir James Douglas, Governor of the colony, and of Colonel Moody, R. E. He was engaged to lead a survey party to lay out the town of New Westminster, and in the undertaking, which was carried out with efficiency and dispatch, he gained the reputation which placed him in the favor of his employers. In 1860 he built the old Hope trail to Similkameen, which trail has stood the test of time and its route has only been slightly changed since Mr. Dewdney made the first survey more than half a century ago. That trail was to afford access to the placer-gold mines of Granite creek and of Tulameen and Similkameen rivers and tributary creeks, and it was at first intended to construct it as far as Rock Creek, in Boundary district, but that extension was not made until some time later. Mr. Dewdney did much work on roads near Princeton, in the heart of the Similkameen country, and where Keremeos was afterward established; he also built a trail to what is now Midway, near the mouth of Boundary creek, and this trail was used by prospectors in the neighborhood of that creek and of Rock creek.

During his term of office as Governor, Sir James Douglas conceived the plan of making a trail through the Similkameen, Boundary and Kootenay districts to the placer-gold field on Wild Horse creek and the regions to the eastward of what is now Fort Steele mining division, with the ultimate purpose of joining up with a wagon road from the eastward through the Rocky mountains. Eventually this work devolved upon Mr. Dewdney, who had shown by his capable performance of less important tasks to be the most reliable engineer obtainable at that time in the province. In 1865 the project was undertaken and before

it was completed Mr. Dewdney had been compelled to undergo the hardest and most trying experiences, although under all conditions he showed himself to be fully equal to the responsibilities placed upon his shoulders. In the early spring of the year he proceeded to Fort Sheppard and thence to Wild Horse creek. With the aid of a few Indians, who acted as guides, he explored the Kootenay river from its source to Kootenay lake with the object of finding a means of utilizing a pass between Crawford bay, an arm of the lake, and St. Mary's river, which flows into the Kootenay near Fort Steele. When he broke his way through that country it was little less than a solid unbroken stretch of dense forest and the surveyors had to suffer many hardships while their task was being performed. Their courage and resource was taxed to the limit, but that they ultimately succeeded is testimony to their dogged determination and to the ability at all times shown by their leader, Mr. Dewdney.

"In a birch-bark canoe Mr. Dewdney and his party traversed Kootenay river to its junction with the Columbia, past Bonnington Falls, running through the rapids where they were found navigable and portaging where too strong a current, rocks, or falls, barred their passage. Before the expedition terminated a large number of Chinese had to be employed, and they were subsequently paid in gold dust. Mr. Dewdney and his party returned to New Westminster in September, 1865, after the trail had been broken. He was heartily complimented by the Governor on the work he had done; also for the satisfactory account rendered by him, the total cost of the vast work having been only \$74,000. Ever since the trail was first declared fit for traffic it has been known as the Dewdney trail, in recognition of the fine record of its builder.

Mr. Dewdney became a member of the Dominion House of Commons in 1872. In the early part of 1879 he was appointed Indian Commissioner for the North-west Territories; in December, 1881, he became Lieutenant-Governor of the North-west, and he held the two positions conjointly. In August, 1888, he was made Minister of the Interior and Superintendent of Indian Affairs in the Cabinet of Sir John A. Macdonald, and he continued in office until October 16, 1892, when he retired. Later he was appointed Lieutenant-Governor of British Columbia, which post he held until November 5, 1897. Since his retirement from public life he has been occupied as a financial agent and has been actively associated with mining enterprises, chief among which was that of the Britannia Mining and Smelting Co., of which organization he has been president for a number of years.

"The late Mr. Dewdney was very popular in both public and private life, and was held in high respect by all who knew him. No country produced a finer type of gentleman. He was a man of incorruptible integrity, and was public-spirited and far-sighted; he was one of the real builders of British Columbia, and his name will ever be closely associated with the history of its development.

In the month of June, the Josie mine, of the Le Roi No. 2, Ltd., shipped to Trail 1,204 tons of ore. The receipts from the smeltery were \$20,205, being payment for 1,893 tons of ore shipped; sundry receipts were \$51. Total of receipts was \$20,256. The estimated working costs for the corresponding period were: Ore production, \$8,000; capital expenditure, \$100; and development costs (including diamond-drilling), \$6,500. Total costs were, therefore, \$14,600.

PYRITE MINING IN ONTARIO

In an article to be presented at the September meeting of the American Institute of Mining Engineers, Mr. P. E. Hopkins, of the Ontario Bureau of Mines, gives brief descriptions of the pyrite deposits in South-eastern Ontario and some general notes on pyrite mining in other parts of Ontario.

The earliest mining of iron pyrites in Ontario was done in 1868 on the Billings property near Brockville. The mines were closed down in 1879 under the assumption that they were exhausted. Many other pyrite deposits have been worked for gold, iron or copper at some time. The steady pyrite industry of the Province began in 1900 when ore from the Bannockburn mine was produced. Mines in Hastings County have been steady producers since that time. An acid-making plant has been in operation at Sulphide since 1907 by the Nicholls Chemical Co. for the treatment of its ore at Sulphide. The company also buys the ore mined from other properties in the neighborhood. Another plant for treating custom ore is operated by the Gravel Chemical Co. at Hamilton. These two plants treat the bulk of Eastern Ontario production, the remainder being shipped to the United States.

Recently a large percentage of the production has been coming from the Vermilion Lake deposits in North-western Ontario, the ore being shipped to United States ports on the Great Lakes. Another property, the Goudreau Lake deposits, has been recently developed and expects to commence at once supplying large tonnages. The Helen mine, operated by the Algoma Steel Corporation, produces some pyrite which is treated in its plant at Sault Ste. Marie.

The iron pyrites resources of Ontario are of considerable extent and value, in the last 15 years 538,755 tons, worth \$1,438,122, having been produced, the greater part coming from South-eastern Ontario. During the coming years there will undoubtedly be a steady increase in production. The war has had a stimulating effect on the demand of the United States for pyrite from Ontario.

The Canadian Sulphur Ore Co.'s Pyrites Mine, No. 12

was discovered in 1906 by Stephen Wellington while prospecting for iron. Under the gossan, merchantable iron pyrites was discovered, from which a car load of iron pyrites was shipped in 1908. Later, the Canadian Pyrites Syndicate bought the property, installed a small plant and shipped a few hundred tons of pyrite. In the spring of 1910 the property was handed over to the present company, which began shipping ore three months later, and has continued to the present. The mine is equipped to produce 100 tons of iron pyrites per day, yielding 40 per cent. of sulphur. Since December 11, 1912, the mine has been run by electricity supplied by the Seymour Power Co. A branch line 2½ miles in length from the Bay of Quinte Railway near Queensboro to the mine was completed in 1913. The ore is shipped to the Nicholls Chemical Co.'s acid plant at Sulphide, 11 miles south-east, and to the chemical companies at Hamilton and Detroit.

The pyrite is mined by underground and open-pit methods. The development work consists of three shafts and two open cuts, with some diamond-drill borings. Nos. 1 and 2 shafts, which are 75 and 100 ft. deep respectively, have been abandoned for some time. The work in late years has been confined to shaft No. 3 and the two open pits. The vertical shaft, No. 3, is 250 ft. deep with about 800 ft. of drifting on the 60-

120-, and 200-ft. levels. The pyrite deposits are marked by gossan outcrops from 2 to 30 ft. in depth. Beneath are the pyrite deposits, which occur as lenses in contact with rusty schist to the south and white quartzite to the north (both Grenville in age) near an irregular post-Hastings intrusion of gray felsite. The strike of the deposits is slightly north of east, while the dip is almost vertical, inclining slightly to the south. Lenses vary in width up to 25 ft., but horses of country rock are frequently inclosed in the pyrites.

The ore is high grade, very little clobbering, if any, having to be done. Ores have been shipped running 40 to 48 per cent. sulphur.

The deposits are free from impurities such as arsenic, zinc, lead, copper and calcium. The pyrite burns satisfactorily, and is in good demand by sulphuric acid makers.

INSPECTION OF WIRE ROPES.

At the mines of the Canadian Copper Co., according to Superintendent J. C. Nicholls, there is required a daily examination of the winding ropes, and of attachments to the drums and to the cages, skips and other means of conveyance, the brakes and depth indicators, and any safety catches attached thereto, and the pulley wheels and all and every external part of the winding arrangements upon which the safety of persons depend. At least once a month an examination is made of the structure of the winding rope, with a view of ascertaining the amount of deterioration thereof. For the purpose of this examination the rope must be cleansed at places selected by the mechanical engineer, who notes any reduction in the circumference of and the proportion of wear in the ropes.

At least once in six months the winding rope is re-capped, a portion thereof, not less than seven (7) ft. in length, being at the same time cut off at the lower end. It is required that the portion of the rope so cut off shall have ends adequately fastened with binding wire to prevent disturbance of the strands. The wire is sent to a reputable testing laboratory and a certificate showing the result of testing is required.

At the periodical recapping of the winding rope, the connection between the rope and the cage, skips or other means of conveyance is annealed.

All new ropes purchased must be accompanied by a certificate from the manufacturer showing the amount of breaking load, as ascertained by actual test.

It is required that a winding rope newly put on and the connecting attachments between the rope and the cage, skips or other means of conveyance must be carefully examined by a mechanical engineer, and must not be used for the ordinary transport of persons in any shaft or winze until after two complete trips up and down the working portion of such shaft or winze, the cage, skip or other means of conveyance attached thereto bearing its authorized load.

In case of an overwind or skip or cage derailed, the ropes and all attachments are examined, and must not be used for raising or lowering persons until conveyance has been run at least two complete trips up and down the working portion of the shaft.

No winding rope for raising and lowering persons is used after examination has shown that the breaking load at any point therein has become reduced to less than six times the maximum working load. The maximum working load includes the weight of the rope in the shaft when the cage, skip or other means of conveyance is at the correct working point and the weight of such conveyance with its contained load.

CANADIAN MINING INSTITUTE, WESTERN BRANCH

The adjourned meeting of the Western Branch of the Canadian Mining Institute was held at Sandon, Slocan, B.C., on Thursday evening, July 20. It was attended by leading mining men of Sandon and neighborhood and a number of visitors from other parts.

The branch secretary, Mr. E. Jacobs, before calling upon the newly elected chairman of the branch, Mr. Bruce White, manager for the Noonday Mines, Ltd., to preside, quoted from an address by Dr. Willet G. Miller, geologist for the Province of Ontario, a former president of the Institute as follows: The Canadian Mining Institute has covered a wide field. Its most important work, probably, has been that of the publication of papers. Few of these papers would have been written had the Institute not existed. Mining men are proverbially reluctant to appear in print, and their valuable experience is frequently lost. Local branches have much to do with getting papers. Men will prepare papers under local encouragement when they would pay little attention to written communications from the secretary of the Institute. . . . The mining men of Canada and their society, the Canadian Mining Institute, have a great mineral field before them—half a continent. We are scarcely at the beginning. Let us make the best use of our opportunities. Let us avail ourselves of the experience of older mining countries, have faith in Canada and a firm belief in the future of our industry."

Speaking of the difficulty usually experienced in inducing mining men to take an active part in meetings such as that then being held, the secretary mentioned that only last month he had read in a New York technical journal an editorial in which the following occurred: "No wonder the mining institutes do not build up and educate as they should. The operator too often thinks they should be abolished. There are too many such affairs, in his estimation, and they take up much time. The same might be said about the little red schoolhouse. It also takes both time and money. The institutes will be just what we make them. If we give them the cold shoulder, they will have only cold shoulder to feast on. If we give them hearty support and carefully control them so that none but speakers with a real story can take up the time of the institute, the associations will do worthy work.

Referring to their new chairman, Mr. Bruce White, the secretary said he was one of the older members of the Institute, having joined it in 1899, which was the year following its incorporation. Further, he was, as far as was known to the speaker, the only life member now resident in British Columbia. It was about a quarter of a century ago that Mr. White came to Slocan district, with the progress of which he had long been actively identified. He was too well known to residents in West Kootenay to need commendation or introduction to them. He well merited the honor recently done him in unanimously electing him chairman of the Western Branch of the Institute for the ensuing year. He had pleasure in now asking Mr. White to commence his duties as chairman.

Chairman's Address.

The chairman, in the course of a comprehensive address, first expressed the opinion that there is now being taken a greater general interest in the progress of the mining and metallurgical industries than was the case a few years ago. It is to be deplored, he

said, that the largely increased demand for metals in the last two years has been the direct result of the destructive activities of war rather than of the constructive advances of a time of prosperous peace; on the other hand, it is a matter for congratulation that those engaged in the mining of ores and the extraction of useful metals, both throughout Canada and the republic to the south of us, have been equal to the emergency that has arisen and have to so large an extent met the enormous and urgent demand that was both unforeseen and unexpected. While we do not find cause for pleasure in the fact that the big nations of Europe are at war, he remarked, it is permissible, I think I am justified in saying, to feel satisfaction in our having been in a position to do our part toward supplying the great need for metals that arose, and without the meeting of which Great Britain and her allies would have doubtless been under a tremendous disadvantage.

Quoting from a published report of a recent speech by the Hon. the Minister of Mines for British Columbia (Hon. Lorne A. Campbell), who had been a member of the Institute for nine years, as follows: "The old order has passed away and the mining centres of the Province are now coming into their own—this time under sure and safe auspices. There is no boom, but there is a great awakening of the industry which is bound to be permanent," Mr. White said that it is gratifying and encouraging to find our energetic Minister of Mines convinced that the present condition of the mining industry warrants him in coming to such a conclusion, and he felt sure that all about him would share with him a sense of satisfaction that the prospects for the permanence of mining in British Columbia are believed to be good.

After quoting some editorial comment from the Nelson Daily News, to the effect that the mining industry of Kootenay and Boundary districts does not have to depend on abnormally high prices for its prosperity, it having been established on the basis of normal and not abnormal prices, and that it will continue to pay dividends after prices of metals shall have again become normal. Mr. White proceeded to review the progress of mining, taking in order the several minerals produced in the Province, and showing that the general situation at the end of the first half of the current year was satisfactory. He also made a brief survey of the advances made in metallurgical matters, and directed attention to the fact that after having for years produced much electrolytically refined lead at its works at Trail, the Consolidated Mining and Smelting Co. is now producing electrolytic zinc and is preparing to shortly add the electrolytic refining of copper to its operations. He concluded by expressing the hope that they will witness even greater progress as modern knowledge and practice shall be brought within their reach and that as a result of their efforts they will obtain a more adequate return for their labors than they had done in past years.

Other Speakers.

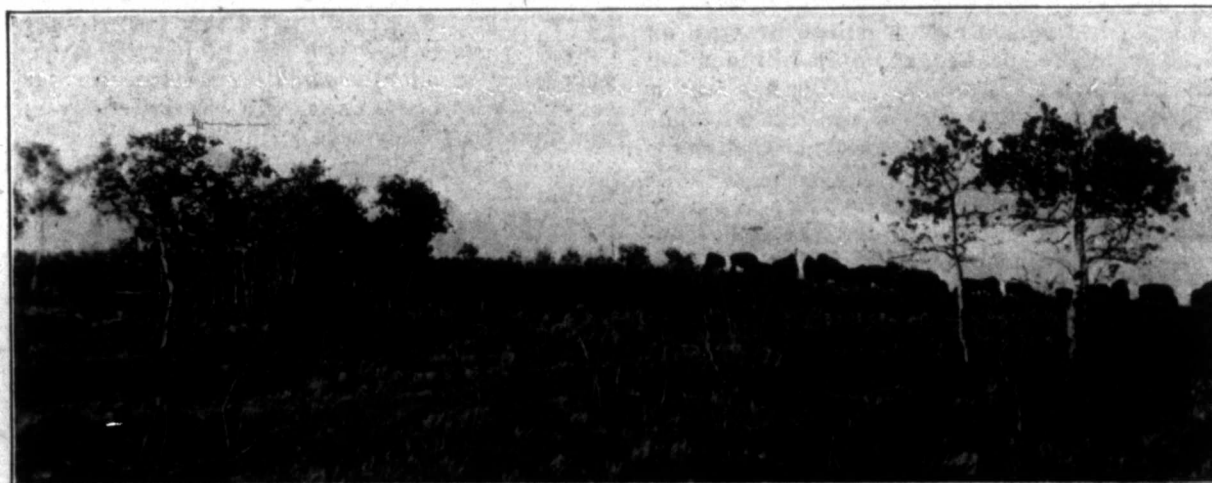
Other addresses were delivered by Mr. Wm. Hunter, of Silvertown, Slocan lake, who for years had represented Slocan district in the Provincial Legislature; Mr. John F. Sweeting, of the Canadian Pacific Railway Co.'s Natural Resources Department, Calgary, Alberta; Mr. E. L. Dewdney, manager of the Bank of Montreal, New Denver, B.C.; Mr. A. W. McCune, of Salt Lake City, Utah; and several others.

Professor Arthur Lakes, formerly of Denver, Colorado, but now resident in Nelson, B.C., read a paper on "The Relation of Igneous Rocks to Orebodies in British Columbia," and afterward replied to a number of questions that were put to him. A talk on "First-Aid and Mine-Rescue Training at Metal Mines" was made by Mr. H. H. Johnstone, of Rossland, district acting inspector of mines, and he also gave an interesting demonstration of the use of the triangular bandage in first-aid work.

The second night's session was largely devoted to reminiscences of early days in the Ainsworth and Slo-can districts, after the day had been spent by some

of the visitors at mines and concentrating mills in the neighborhood of Sandon. The proceedings were enlivened by instrumental and vocal music.

On July 29 a meeting was held at Silverton, in the vicinity of which are the Standard, Hewitt-Lorna Doone, Van-Roi and Galena Farm mines and concentrating mills, some of which were visited. The programme was largely a repetition of that submitted to the Sandon meeting, and it well maintained the interest of about fifty men from neighboring mines and towns who attended. A new feature was a talk by Mr. J. P. Keane, of the Rosebery concentrating mill, who took for his subject the oft-heard remark that "one man



On the western prairies. A reminder of the geologists' excursions, 1913.

can see as far into the ground as another," a view he did not agree with, and he showed that to be successful mining men must carefully acquire knowledge to fit them for their work.

CALUMET AND HECLA.

Calumet and Hecla, the world's premier producer of native copper, has just celebrated its 50th anniversary with fitting ceremonies. The romance of its discovery and early struggles has been printed many times, but probably few people, not excepting the stockholders, have any conception of the amount of native pure copper which this spectacular producer has dug from the bowels of the earth during this eventful period.

The Boston News Bureau asked President Agassiz for figures summarizing in brief what Calumet and Hecla had produced during the past half century, what it had paid in dividends and what it had paid out in wages. The totals are quite beyond popular conception.

During the period in question it produced over two and a half billion pounds of copper, or to be exact, 2,686,896,000 pounds, or 26.868 pounds for every share of the company's present 100,000 shares outstanding.

The amount paid in dividends was \$132,250,000, or \$1.322 per share, assuming that the present capital was outstanding since the company's inception, which of course was not the case.

A striking fact is that notwithstanding the mine's bonanza profits, a sum almost equal to the dividend payments has been paid in wages to its miners. The wage item alone was \$129,230,938, and this does not include eastern office and clerk hire costs, nor the indirect wage payments involved in huge purchases of materials, machinery and supplies.

The following summarizes the major items above referred to:

The amount paid in wages from December, 1867, to June 30, 1916, was..... \$129,230,938
(This does not include eastern expenses)
The amount paid in dividends to June 30, 1916, is 132,250,000
There was produced from the starting of the mine to June 30, 1916, in pounds of copper 2,686,986,000

Production of C. & H. and subsidiary mines for the first half of 1916 was as follows:—

	Production pounds.	Lbs. copper per ton ore.	Cost per pound.
			Cents.
Ahmeek	11,461,195	21.24	9.59
Allouez	5,137,907	18.54	10.37
Centennial	1,269,697	16.42	12.89
Isle Royale	6,035,766	13.48	13.09
Calumet & Hecla	35,693,436	22.17	11.45
Osceola	9,791,439	15.72	10.12
Superior	1,758,465	17.22	12.89
Tamarack	3,446,425	18.48	14.67
White Pine	2,190,472	23.20	10.57
Total	76,784,802		

INTERNATIONAL NICKEL CO.

The International Nickel Co. will spend about \$2,000,000 on the proposed new refinery which it will erect in Canada to produce all the nickel needed by

Great Britain and her possessions. This expenditure will be met from treasury cash which approximates \$8,500,000.

A subsidiary concern has been formed in Canada to own and operate the new plant and its \$5,000,000 capital stock will be owned by the International Nickel Co.

Nickel prices have shown comparatively little advance beyond the normal level except where desired in the fine arts. On nickel sold for such requirements a premium has been demanded. At the present time the company's quotation range from 24 to 42 cents a pound according to specifications; where higher than normal prices, they do not exceed 5 per cent.

As the International Nickel management sizes up the situation, there will probably develop after the war a greater demand than now exists for its product. Shipyards all over the world have been straining every effort to get out new vessels. The construction of marine equipment promises to continue at a record breaking pace after peace has been established and this alone augurs well for the world's largest producer of nickel.

At the Copper Cliff mines there has been installed hoisting equipment capable of raising 4,000 tons of ore in eight hours. This, operated one shift a day, will more than care for the present milling and smelting requirements of about 3,500 tons daily and enable the company to build up a reserve in bins against the day when a greater tonnage will be needed.

The company's operations now result in an output of approximately 5,000,000 pounds of nickel and 3,000,000 lbs. of copper monthly or a total of 60,000,000 lbs. and 36,000,000 lbs. respectively per annum.

Some little misunderstanding having arisen in regard to the recent dividend declared it is officially stated that International Nickel may now be considered on a 24 per cent. dividend basis with possibilities of extras as earnings warrant.—Boston News Bureau.

METAL PRICES.

Mr. Harry A. Guess, of New York, consulting-engineer of the American Smelting and Refining Co., was reported to have said, when in Spokane, Washington, on August 16: "Copper appears to occupy a strong position in the metal market now that the allies have come forward with good buying orders, and there does not seem to be any likelihood of a serious decline in its price for a long time. The outlook for lead is generally felt to be more indefinite. While by no means weak, at present it is the least strong of all the metals, as it is the general belief that the Allied demand for copper for the manufacture of munitions will be accompanied in some degree by a demand for spelter, with the result that the price of zinc should be materially increased. My personal opinion is that with the return of peace and ordinary business conditions, spelter will experience a sharp decline to prices more nearly normal."

Articles of incorporation of the Jackson Basin Zinc Co. with an authorized capital of \$2,000,000, were filed on July 6 at the office of the county auditor, Spokane, Washington, by Messrs. A. L. White, Chas. F. Caldwell, W. Yolen Williams, F. L. Kilner and Volney D. Williamson. The mining property to be acquired and operated by the company is situated in Jackson basin, about seven miles from Retallack (long known as Whitewater), on the Kaslo and Slocan railway west from Kootenay lake, British Columbia.

PERSONAL AND GENERAL

Mr. J. B. Tyrrell has returned to Toronto from British Columbia. He spent some time at the Granby plants at Anyox.

Dr. W. G. Miller and Mr. T. F. Sutherland, who have been visiting the New Caledonia nickel mines for the Ontario Nickel Commission, reached Sydney on August 18 on their return from Noumea. They are expected to reach Toronto early in October.

Dr. A. P. Coleman, of the University of Toronto, is in Labrador, continuing investigations along the coast.

Dr. R. C. Wallace and Mr. Justin S. DeLury, of the University of Manitoba, have recently visited The Pas district and are now engaged in making reconnaissance surveys east of Lake Winnipeg for the Geological Survey of Canada.

Dr. A. Ledoux has been collecting mineral specimens in Ontario for the Bureau of Mines for exhibition purposes.

Mr. T. A. Rickard is visiting mining districts in British Columbia.

Geo. Watkin Evans, consulting mining engineer of Seattle, is East on a professional visit. He will shortly leave for Alaska on a two months' examination trip.

Mr. F. J. Longworth, of Greenwood, B.C., superintendent of the British Columbia Copper Co.'s smelting works there, paid a business visit to Colville, Washington, about the middle of August.

Mr. J. Cleveland Haas, of Spokane, Wash., consulting engineer to the Kootenay Development Co., was at the company's mining property near Ainsworth, B.C., for several days in August, investigating results of development work done.

Mr. James White, of Ottawa, assistant to the Chairman, and Deputy Head of the Commission of Conservation, was in Victoria, B.C., early in August. He was reported to have stated, in the course of an interview, that Mr. W. J. Dick, mining engineer to the Conservation Commission, is investigating the possibilities of the metal industries of Canada, with a view of substituting Canadian products in certain lines for those which have been formerly obtained in Germany, and for the manufacture of which Canada has an abundance of raw material.

Mr. Geo. A. Guess, professor of metallurgy at the University of Toronto, has been engaged to start the copper smelter of the Vermont Copper Co., at South Trafford, Vermont.

Mr. C. W. Harper, of Hackensack, N.J., went to Slocan City, B.C., last month to arrange for doing more development work on the Alice S. and Paterson mineral claims, situated about six miles from Slocan City.

Mr. W. S. Grether, of the mining staff of the Butte & Superior Mining Co., Butte, Montana, is superintending mining operations at the Hudson Bay zinc mine, near Salmo, Nelson mining division of British Columbia.

Mr. A. H. Gracey, formerly operating the Venus gold mine, near Nelson, B.C., is now at Kingman, Arizona.

Mr. R. D. Fetherstonhaugh, of Edmonton, Alberta, is stated to have bonded a group of mineral claims near Camborne, Fish Creek, Lardeau, B.C., after having visited the property about the end of July.

Mr. W. Yolen Williams, of Spokane, Washington, who in the nineties opened the Granby Consolidated Co.'s big copper mines in Boundary district of British Columbia, was examining mining properties in the western part of Ainsworth mining division and about Sandon in Slocan division about the end of July.

Mr. Bruce White, manager for the Noonday Mining Co., operating near Sandon, Slocan, B.C., was in the northern part of Washington State early in August, looking over a group of mineral claims there.

Mr. Anthony J. McMillan, liquidator of the Le Roi Mining Co., has returned to England after having spent several months in Eastern Canada and the United States.

Mr. A. J. Waddie, president and general manager of the Canadian Drawn Steel Co., Hamilton, was struck by a street car on August 22 and received severe injuries.

Mr. J. L. Bruce, of Butte, Montana, general manager for the Butte & Superior Mining Co., and for the Hudson Bay Mining Co., which is operating in Nelson mining division of British Columbia, is reported to have been operated on recently for appendicitis.

Mr. Harry A. Guess, of New York, consulting engineer for the American Smelting and Refining Co., and managing director of the Federal Mining and Smelting Co., arrived in Spokane, Washington, about the middle of August. The latter company operates mines and concentrating plant in the Coeur d'Alene district of Idaho, distant from Spokane only a few hours' journey.

Mr. Thomas Graham, of Victoria, B.C., chief inspector of mines for that Province, has been at Michel, Crow's Nest district, inquiring into the circumstances attending a fatal disaster that occurred there lately.

Mr. Joseph Hunter, of Victoria, B.C., chief engineer for the Canadian Collieries (Dunsmuir) Limited, operating the Comox and Extension collieries on Vancouver Island, has been taking a vacation at Banff, Alberta. The Victoria Daily Times on August 12 published a lengthy notice of Mr. Hunter's many activities and important engineering work during his residence of more than forty years in British Columbia, noting that he had given the greater part of his life to the development of that province.

Mr. Van H. Manning, of Washington, D.C., who has recently been visiting North-eastern Washington and the Coeur d'Alene district of the adjoining State of Idaho, has been banquetted in the City of Spokane, Washington, by prominent residents in and about the city, including many well-known mining men. Accompanying Mr. Manning were Messrs. F. G. Cottrell, G. A. Hulett, and Dorsey A. Lyon, all of the Bureau of Mines staff. Among those who accompanied the party to see mines and concentrating mills in the Coeur d'Alene district were Mr. Robert N. Bell, inspector of mines for the State of Idaho, and Mr. E. K. Soper, of Moscow, Idaho, one of the professors in the mining engineering department of the University of Idaho.

The next annual convention of the American Mining Congress will be held in Chicago in November of the current year. The secretary, Mr. James F. Callbreath, has already been attending to the preliminary arrangements, with the object of ensuring another large and successful gathering.

Anaconda Copper Co.'s production of copper in July of this year, according to the Butte correspondent of The Engineering and Mining Journal, was 28,200,000 lbs., this representing the output of the company's Washoe and Great Falls smelteries. This compares with 22,100,000 lbs. for July, 1915. The total of the company's production for the seven expired months of 1916 is 192,700,000 lbs., an average of 27,528,000 lbs. a month.

SPECIAL CORRESPONDENCE

BRITISH COLUMBIA

Generally, the mining industry of British Columbia is in a progressive condition, with difficulties that restricted production for a short time overcome for the most part, and a prospect of mining and metallurgical operations being continued on a scale equal to that of the corresponding part of last year. Two recent dividend announcements were those of the Standard Silver-Lead Mining Co., of two and one-half cents a share on 2,000,000 shares, payable on September 9, and of the Rambler-Cariboo Mines, Ltd., of one cent a share, paid on August 15. The Standard Co.'s monthly profit disbursement of \$50,000 brings the total for the current year up to \$450,000; that of the Rambler-Cariboo, of \$17,500, makes the total of that company for the expired part of 1916, \$70,000.

It was reported before the middle of August that the coal-mine operators of the Crow's Nest district and their employees had agreed upon a basis of settlement of the war bonus payment question that had been the subject of negotiation for several weeks, and that the operators have made concessions that have found acceptance with the majority of the workers, who have returned to work.

East Kootenay.

Production of ore at the Consolidated Co.'s Sullivan mine, near Kimberley, is again on a comparatively large scale, the larger compressor having been made safe for operating following renewal of foundations damaged by high water last June. The quantity of Sullivan ore received at Trail during the first week in August was 3,006 tons. The Trail News reported early in August that Mr. S. G. Blaylock, assistant general manager of the Consolidated Mining and Smelting Co., had returned to Trail from the Sullivan after having spent five weeks there looking after extensive repairs necessitated by recent floods.

The output of coal and coke from Crow's Nest collieries has been smaller lately owing to stoppage of work at some of the mines and coke ovens pending settlement of a wages question that was under consideration. Except that one mine at Michel, at which there was an explosion early in August, is not being worked, production is again nearly normal, so that the latter half of August will see the output back to normal quantity.

West Kootenay.

Ainsworth—Silver-lead ore of good grade is being mined in a stope opened from a low-level adit driven in the Highland mine, but owing to inadequate hoisting facilities production is smaller than it might be under favorable conditions in this respect. It is stated that the galena coming from this part of the mine is the best known to occur on the property, which years ago was a comparatively large producer of lead ore. Development of the Krao-Crow Fledgling property, by Mr. A. W. McCune, of Salt Lake City, Utah, is in progress, the work of driving an adit to gain depth being well forward. This development is regarded as one of the more important undertakings in Ainsworth camp, its object being to open in the deep an ore-body that near the surface contained much native silver. As machine drills are being used, driving is rapid as compared with hand-drilling. Work is also being done

on the Crescent group, on Coffee creek, where a vein of good lead-zinc ore has been opened to a depth of 35 ft., and an adit is being driven to develop this ore-shoot deeper than it has yet been worked. Air from the Florence Mining Co.'s new compressor, on Woodbury creek, was used on August 7 in the company's Hope mine, on Princess creek, for the first time. The compressor is a Canadian Ingersoll-Rand engine of 15-drill capacity; it is 20 by 18 on the low and 12 by 18 on the high side. The Kootenay Development Co. has commenced to drive a long adit from a level sufficiently high above the lake shore to allow room for the erection of a concentrating mill later should its provision be warranted by underground developments. This work is being done on the Early Bird claim of the company's group.

On several groups of claims on Woodbury creek small numbers of men are doing development work. Numerous mineral claims along one or other of the forks of this creek were located years ago, but owing to there not being a wagon road to give better access to the country, development has been slow in recent years. As long ago as 1896, Mr. W. A. Carlyle, then Provincial Mineralogist, reported on a group of claims situated near where the creek flows into Kootenay Lake, two or three miles above Ainsworth, and gave brief particulars of a concentrating plant then being put in for the Canadian Pacific Mining and Milling Co. of Minneapolis, but neither mining property nor mill has been worked in late years.

Nelson—Shipment of ore has been resumed by the Iron Mountain Co. from its Emerald lead mine, distant about eight miles from Salmo. No ore had been shipped prior to the first week in August since the snow went off the ground last spring; up to March 31 the total of this year's receipts of Emerald ore at the Trail smelting works was 436 tons. During several recent months the company's property was under bond to prospective purchasers, but as the bond was not taken up, Mr. John Waldbeser, manager of the Iron Mountain Co., arranged for ore production to again be undertaken, and now teams are hauling the ore to the railway at Salmo for shipment thence to Trail.

There has been an interruption to continued production of ore from the Queen gold mine, situated at the junction of Wolf and Sheep creeks, owing to the necessity having arisen for retimbering the main shaft throughout, which work has taken about six weeks. However, it is expected that before the end of August miners will again be stoping ore, of which a large body of a good average grade was opened on the 700-ft. level several months ago. Advantage has been taken of this opportunity to do some overhauling of the plant and machinery in the Queen 20-stamp mill.

Ore is being hauled down to the wagon road at the Queen mill from the Vancouver gold mine, situated between the Queen and Kootenay Belle properties. Dempster Bros., who are in charge of mining operations at the Vancouver, are opening the mine down to a lower level than that from which ore had been taken in the past, the intention being to block out a considerable quantity of ore before attempting to make provision for milling in the neighborhood of the mine.

Laib Bros., owners of the Spokane group, in the Bayonne country, situated eight to twelve miles east of Sheep Creek camp, are having ore packed out to the Mother Lode mill, on Sheep creek, for wagon-hauling

thence to Salmo and shipment to Trail by railway. Last autumn a test shipment of 10.75 tons to Trail gave a return of \$2.40 gold and 48.5 oz. silver a ton and 71.2 per cent. lead. Assays of average samples have since given a higher return in gold, so it is hoped the ore now being sent out will prove to be of higher average value than that shipped in 1915. Costs are high, the charge from mine to the railway at Salmo being \$35 a ton; however, the Messrs. Laib are determined to demonstrate that ore from the Bayonne country is of sufficiently high value to warrant the expenditure of money by the Provincial Government on road construction and they hope their enterprise will induce the Government to make an appropriation sufficient to pay the cost of constructing a snow road, if not an ordinary wagon road, to Kootenay Lake, distant about 25 miles, so as to provide an outlet for ore at a considerably lower freight charge than has to be paid under existing conditions.

Further development of the Molly molybdenite property, on Lost Creek, some 15 miles by wagon-road from Salmo, in the southern part of Nelson mining division, is being arranged for. Mr. J. R. Rutherford, formerly manager for the Sheep Creek Motherlode Mining Co., is to direct this work, in doing which he will employ about 15 men. It is stated that a short option of purchase has been taken on the property, from which ore was shipped to Denver, Colorado, two or three years ago for bulk tests, and which gave satisfactory results, but the breaking out of war in Europe prevented the successful conclusion of prior negotiations for the purchase of the property by New York men understood to be acting for German principals.

Rossland—July ore production totalled 28,235 tons, of which 16,259 tons was from the Consolidated Co.'s Centre Star-War Eagle group of mines, 10,543 tons from the same company's Le Roi mine, and 1,433 tons from the Le Roi No. 2 Company's Josre group. The Consolidated Company is prospecting the Deer Park property, in the South Belt region, doing both surface work and diamond drilling.

Trail—Ore receipts for the month of July totalled 40,268 tons, of which quantity 32,720 tons was from mines operated by the Consolidated Mining and Smelting Co. and 7,548 tons was of custom ores. The larger shippers were the company's Centre-Star-War Eagle and Le Roi mines at Rossland, together 26,802 tons, and its Sullivan mine, near Kimberley, East Kootenay, with 5,532 tons. Enlargement of the electrolytic zinc refinery, which the Consolidated Co. has been operating for several months, is being made; other advances are the construction and equipment of an electrolytic copper refinery, and the completion of provision for resuming the manufacture of fluosilicic acid for use in the electrolytic refining process.

Trout Lake Division—Among the ore receipts at Trail during the first week in August was that of 63 tons from the Silver Cup mine, near Ferguson. This was the first ore from that part of the district shipped to Trail this year. Efforts are being made to resume production at the Triune mine, and development work is being done on several other properties in the division, after a period of inactivity which had for some time been general in this region.

General Notes.

Efforts are being made to induce the Provincial Government to construct a wagon road into what is known as the Burnt Basin district, between the Columbia

river and Christina lake, starting from near Paulson on the railway from Nelson to Boundary district, the object being to give wagon-hauling communication to a number of mineral claims on which there are good showings of ore. One group, known as the Molly Gibson group, shipped ore to a smelting works some years ago, but the cost of getting it out to the railway was too great to allow of production being continued.

Ore is being hauled from the Aberdeen, near Mamette lake, in Nicola district, to the railway for transportation thence to the British Columbia Copper Co.'s smelting works at Greenwood, Boundary district.

It is stated that the Granby Consolidated M. S. and P. Co. is arranging to develop a group of copper claims near Kamloops, in Yale district. There has only been one shipper of copper ore in considerable quantity from a mine in that neighborhood in recent years, namely the Iron Mask, on Coal Hill.

DRILLING AT FLIN-FLON STOPPED.

The Pas, Man., Aug. 18.—The deal for the copper sulphide mines at Flin-Flon is temporarily held up pending a re-arrangement of the terms of payment, it is reported. The diamond drill operations have been suspended, and the engineers called to New York. That the ore is present in sufficient body to make one of the largest mines of its kind in Canada is not disputed by anyone connected with the property. The ore values blocked out by the drills is variously estimated at between thirty and sixty millions of dollars. The deal for the sale of the twelve claims in the group involved a sum of three millions of dollars, with a first payment of half a million on January 12th next. It is this large first payment and subsequent large instalments that is objected to by the buyers, and they want better terms. About \$50,000 has been spent already on the properties, and a small initial payment was made at the outset on the total purchase price, and it is believed that the Boston interests are jockeying for the advantage. Mr. John Hammell represents the prospectors interested. The hitch is expected to be adjusted this month, and work will be resumed.

Of the deal the Winnipeg Telegram says:

"On the best authority it is definitely announced that the big American mining interests which have for the past six months been engaged in diamond drill at Flin-Flon lake, in The Pas mining district, have abandoned the project.

"An immense sulphide deposit, said to be extremely rich in copper, zinc and gold, situated at Flin-Flon lake, was the subject of their investigations. Some \$50,000 is said to have been spent on the work, under an agreement with the prospectors who own the twelve claims in which the ore-body is situated. This agreement is said to have been in the form of an option, which, in the event of the option being taken up, would involve a purchase price of \$3,000,000, with a payment on the first of January next of \$500,000.

"About a month ago orders were received by the engineers in charge of the work at Flin-Flon to cease operations and come in. Drilling was promptly stopped, and the whole outfit pulled up stakes and returned to civilization. Since then rumor has been busy as to the reasons for this sudden cessation, the favorite solution being that operations would be resumed on the modification of the agreement. It is now learned that this is not to be the case, and that the operating interests are out of the deal for good.

"On the same authority it is stated that the withdrawal of the mining companies is not necessarily any reflection on the district itself, which is believed to have great promise as a mining camp of big calibre. Nor does it necessarily mean that the property under investigation has fallen short of the expectations of either of the parties to the deal. No reason whatever is offered for the irrevocable decision of withdrawal."

The Telegram's authority for saying the deal is off altogether is not clear. A letter was received in The Pas this week indicating that the parties had got together, and a satisfactory re-arrangement of the terms would be arrived at shortly. In fact, a local engineer has gone to Flin-Flon to make preparations for resumption of drilling at an early date.—The Pas Herald.

THE FLIN-FLON DEAL.

The Pas, Man., Aug. 18.—A satisfactory solution of the differences between the financial interests back of the deal at Flin-Flon and the owners of the properties involved may be arrived at within a fortnight. Deals the size of this one are not common in mining, and it might be expected that some obstacle would arise between the parties interested to subject the deal to a re-arrangement. Three millions of dollars is a lot of money to pay for a surface-showing mine, and when it is considered that this sum was the least of the bargain, which covers water powers, railroad and milling machinery, it is not to be wondered that the buyers sought better terms of payment, which were harsh in view of the hugeness of the undertaking and the expenditures for equipment to be incurred. Hammell drove the bargain, and it is now evident he is a good little bargainer of undoubted merit. He recognized only the prospectors' interests and the men associated with him in the property, and he harnessed the buyers into as good a bargain as he thought possible to get. The buyers desire the product of the mine to pay the cost of purchase, but they want this consideration to be the basis of the agreement under re-arrangement. This seems a reasonable proposition, and it is the usual method employed in buying mines of this size and promise. However, it is now assured that the hitch will be adjusted and work resumed shortly.—The Pas Herald.

GENESEE.

At the annual meeting of the Genesee Mining Company, held in the executive offices of the company in Rochester this week, the following were elected to the board: President, R. H. Gorsline, president of the New York State Pipe Co.; Vice-President, C. F. Crandall, director Union Trust Co.; Secretary-Treasurer, Alexander Russell, secretary Rochester and Lake Ontario Water Company; managing director, L. F. Steenman, Cobalt; director, C. D. Van Zandt. With the exception of Mr. Steenman, the directorate consists entirely of Rochester men.

The shaft at the property is now down 194 feet.

ROAD TO FLIN-FLON.

The contract for building a waggon portage to Flin-Flon will be given out within a short time. The road begins near the mouth of the Sturgeon river and runs into Athapapuskow lake, a total distance of between 12 and 15 miles. Considerable corduroying will be

done on the Athapapuskow side of the portage. The contract price is made on a basis of progress estimate. Commissioner J. A. Campbell arranged the matter.

BOSTON CREEK.

Niagara Falls, Ont., Aug. 21.—The Boston Creek Gold Mining Co., Ltd., with headquarters at Niagara Falls, Ont., who hold a large block of gold claims, at their first annual meeting appointed the following officers: Eugene M. Richardson, New York, president; William B. Albright, New York, vice-president; Henry D. Symmes, Niagara Falls, Ont., managing director; John P. Bickell, Toronto, and John K. Papassimakos, Boston Creek, Ont., directors.

BOUNDARY, B.C., MINERAL CLAIMS BONDED.

A press despatch from Grand Forks, in Boundary district of British Columbia, dated August 16, gave the following information:

After negotiations extending over some weeks, an important mining deal has just been put through here whereby the Seattle and Loyal Canadian groups of mineral claims, situated eight miles north of Grand Forks, have been bonded by Robert (Seattle) Clark and associates to interests backed by E. E. Martin, a prominent financier of San Francisco. In the negotiations, W. P. Hofstetter, of St. Maries, Idaho, represented the purchasers.

The consideration is \$125,000, of which \$5,000 is to be paid in six months, \$10,000 in twelve months, and the balance within two years. The agreement stipulates for shipment from the property of 50 tons of ore daily, upon which ore there will be payable to the owners of the claims a royalty of 50 cents a ton, though this will apply on the purchase price.

The property is one of which little has been heard for more than a decade, though considerable money was expended on it in development work some fifteen years ago, and a small quantity of ore was shipped. It is situated near the railway up the valley of the north fork of Kettle river.

Men are already at work on the property, and John McKay, of Republic, Washington, is in charge. Shipments of ore are being made three times a week to the Granby Co.'s smelting works at Grand Forks, and arrangements are under way for installing a compressor plant in October, after which installation the output of ore will be greatly increased.

Another deal is now pending for the acquisition by the same interests of other mining properties in the district.

SILVER PRICES.

		New York, cents.	London, pence.
August	11.....	66¼	31½
"	12.....	66¼	31½
"	14.....	66¾	31¾
"	15.....	66¾	31¾
"	16.....	66½	31½
"	17.....	66¼	31½
"	18.....	65¾	31½
"	19.....	65¾	31
"	21.....	66	31½

MARKETS

STOCK QUOTATIONS.

(Courtesy of J. P. Bickell & Co., Toronto.)

As. of close August 23, 1916.

New York Curb.

	Bid.	Asked.
Atlantic Steel	55.00	62.25
Atla. Cons.	15.00	25.00
Butte	5.25	5.75
Can. Car	45.00	55.00
Curtiss Aeroplane	20.00	30.00
Can. Copper	1.62	1.75
Cambria Steel	82.00	Bid.
Canada Cement	60.12	60.50
Con. Ariz.	1.50	1.62
Emma Copper	52.12	57.00
Howe Sound	4.75	5.00
International Petroleum	10.50	10.63
Inter. Nickel (new)	245.00	250.00
Kennecott Copper	50.37	50.50
Maxim Munitions	6.25	6.50
Midvale Steel	64.37	64.63
Marconi	3.37	3.63
Magma	14.25	15.25
Mother Lode	31.50	32.00
Steel of Canada	58.00	60.00
Tonopah Extension	5.75	5.87

Porcupine Stocks.

	Bid.	Asked.
Apex	.07%	.08
Dome Consolidated	.08	.12
Dome Extension	.34%	.35%
Dome Lake	.43%	.44%
Dome Mines	25.50	...
Eldorado	...	.00%
Foley O'Brien	.55	...
Gold Reef	...	.01%
Hollinger	...	.30
Homestakes	.60	.80
Jupiter	.27%	.28
McIntyre	1.35	1.37
McIntyre Extension	.40	.46
Moneta	.15%	.16
Plenaurum	.50	.70
Porcupine Crown	.62	.65
Porcupine Imperial	.02%	.03%
Porcupine Tisdale	.01%	.02
Porcupine Vipond	.35	.40
Preston East Dome	.04%	.04%
New Ray	.52	.53
Teck Hughes	.38%	.39
West Dome	.38%	.39

Cobalt Stocks.

	Bid.	Asked.
Bailey	.07%	.08
Beaver	.39	...
Buffalo	.85	1.10
Chambers Ferland	.18	.19
Coniagas	4.75	5.00
Crown Reserve	.41	.42
Foster	...	.07%
Gifford	.06%	.07
Gould	.00%	.00%
Great Northern	.05	.05%
Hargreaves	.03	.03%
Hudson Bay	55.00	70.00
Kerr Lake	4.85	4.95
La Rose	.61	.65

McKinley	.59%	.60%
Nipissing	7.00	7.09
Ophir	.07%	.08%
Peterson Lake	.22%	.23
Right of Way	.05%	.06
Seneca Superior	.26	.30
Shamrock Cons.	...	.09
Silver Leaf	.01%	.02
Temiskaming	.59%	.60
Trethewey	.17	.19
York Ontario	.01%	.01%
Wetlaufer	.11	.15

NEW YORK MARKETS.

August 21, 1916—Connellsville Coke—

Furnace, spot, \$2.75 to \$2.85.

Furnace, contract, \$2.50.

Foundry, prompt, \$3.25 to \$3.50.

Foundry, contract, \$3.25 to \$3.50.

August 21, 1916—Straits tin, f.o.b., 38.50 cents.

Copper—

Prime Lake, nominal, 27.00 to 27.50 cents.

Electrolytic, nominal, 27.75 to 28.00 cents.

Casting, nominal, 24.87½ to 25.12½ cents.

Lead, Trust price, 6.50 cents.

Lead, outside, 6.75 cents.

Spelter, prompt western shipments, 9.67½ to 9.92½ cents.

Antimony—

Chinese and Japanese, 13.50 to 14.50 cents.

American, not offered.

Aluminum—nominal—

No. 1 Virgin 98.99 per cent., 58.00 to 60.00 cents.

Pure 98.00 per cent. remelt, 56.00 to 58.00 cents.

No. 12 alloy remelt, 45.00 to 47.00 cents.

Powdered aluminum, \$1.00 to \$1.15.

Metallic magnesium, 99 per cent. plus, \$3.50 to \$3.75.

Nickel, 45.00 to 50.00 cents.

Cadmium, nominal, \$1.25 to \$1.50.

Quicksilver, nominal, \$72.00.

Platinum, nominal, \$60.00.

Cobalt (metallic), \$1.25.

Silver (official), 66 cents.

Metal Products.—Following base prices are all f.o.b. mill, but prices are purely nominal:

Sheet copper, hot rolled, 37.50 cents.

Sheet copper, cold rolled, 38.50 cents.

Copper wire, nominal, 32.00 cents.

Copper wire, nominal, October, 30.75 cents.

High sheet brass, 38.00 to 39.00 cents.

Seamless brass tubing, 44.00 to 45.00 cents.

Seamless copper tubing, 44.50 to 45.50 cents.

Brazen brass tubing, 45.50 to 46.50 cents.

Brass wire, 38.00 to 39.00 cents.

Brass rods, 38.00 to 39.00 cents.

Sheet zinc, f.o.b. smelter, 15.00 cents.

TORONTO MARKETS.

Aug. 23—(Quotations from Canada Metal Co., Toronto)—

Spelter, 12½ cents per lb.

Lead, 8¾ cents per lb.

Tinn, 44 cents per lb.

Antimony, 18 cents per lb.

Copper, casting, 28½ cents per lb.

Electrolytic, 30 cents per lb.

Ingot brass, yellow, 17 cents; red, 20 cents per lb.

Aug. 23—(Quotations from Elias Rogers Co., Toronto)—

Coal, anthracite, \$8.00 per ton.

Coal, bituminous, \$5.50 per ton.