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In This Issue:

*The Sampling and Assaying of
Molybdenum Ores.*

The Kowkash Gold Area.

The Nipissing Report.

Coal Mining in Alberta.

CANADA

DEPARTMENT OF MINES

HON. P. E. BLONDIN, Minister.

R. G. McCONNELL, Deputy Minister.

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- Building and Ornamental Stones of Canada (Quebec). Vol. III. Report on, by W. A. Parks, Ph.D.
- The Bituminous Sands of Northern Alberta. Report on, by S. C. Ellis, M.E.
- Peat, Lignite and Coal: their value as fuels for the production of gas and power in the by-product, recovery producer. Report on, by B. F. Haanel, B.Sc.
- Annual Report of the Mineral Production of Canada During the Calendar Year 1913, by John McLeish, B.A.
- The Petroleum and Natural Gas Resources of Canada: Vols. I. and II., by F. G. Clapp, M.A., and others.
- The Salt Industry of Canada. Report on, by L. H. Cole, B.Sc.
- Electro-plating with Cobalt. Report on, by H. T. Kalmus, Ph.D.
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- Memoir 60. Arisaig-Antigonish District, Nova Scotia, by M. Y. Williams.
- Memoir 64. Preliminary Report on the Clay and Shale Deposits of the Province of Quebec, by J. Keele.
- Memoir 65. Clay and Shale Deposits of the Western Provinces (Part 4), by H. Ries.
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- Memoir 68. A Geological Reconnaissance Between Golden and Kamloops, B.C., along the Canadian Pacific Railway, by R. A. Daly.
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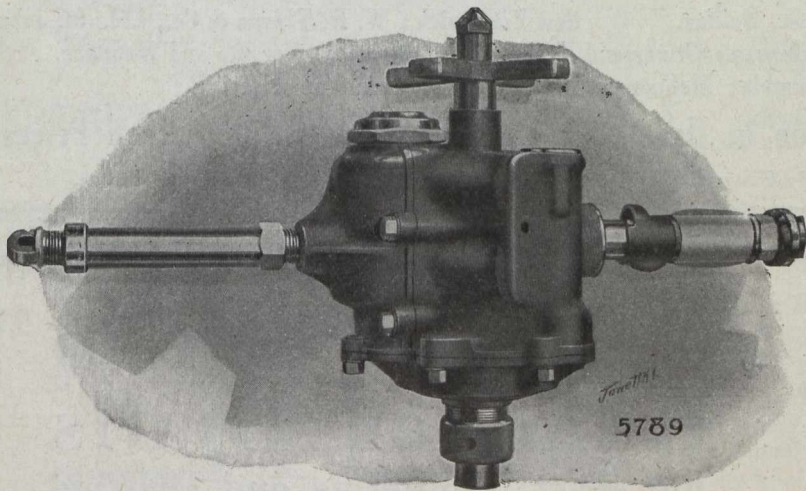
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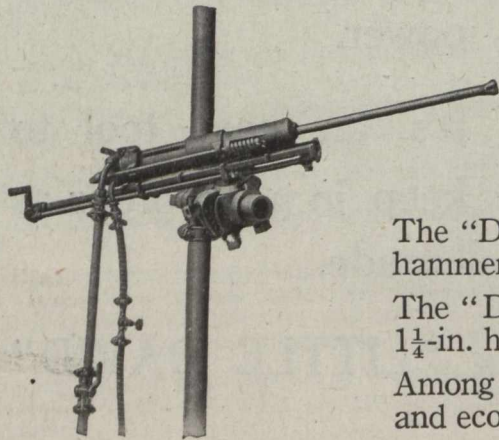
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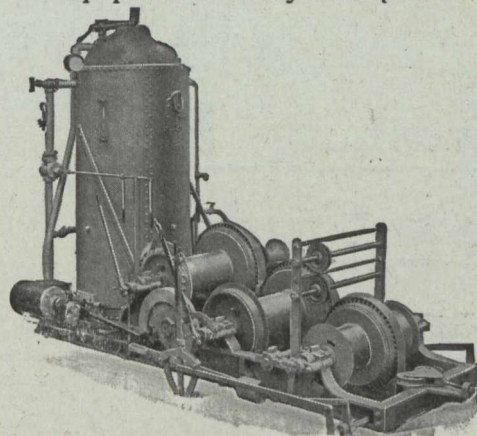
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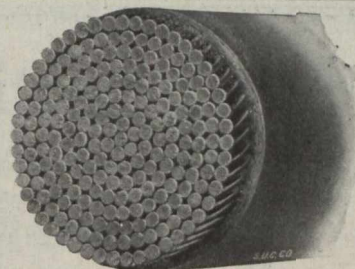
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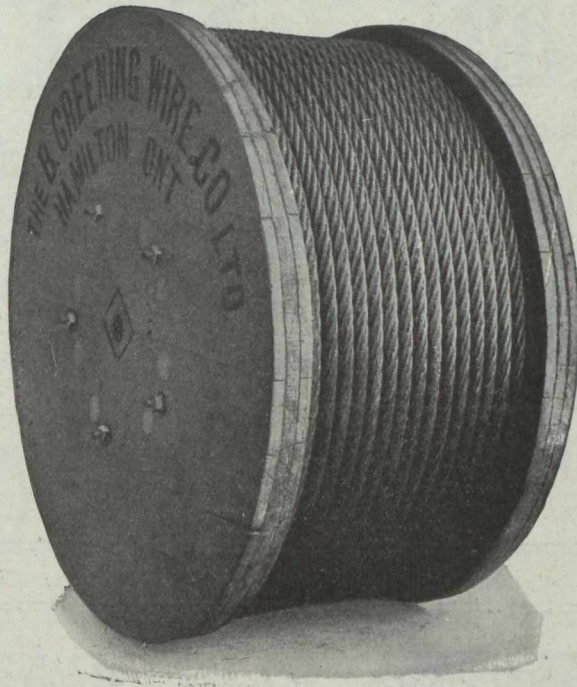
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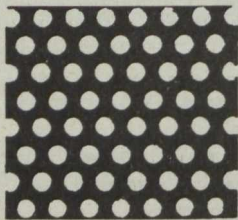
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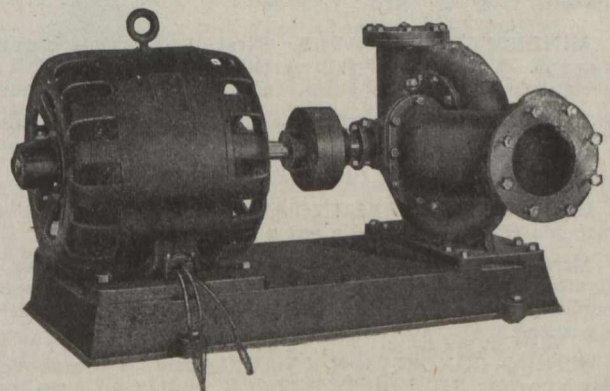
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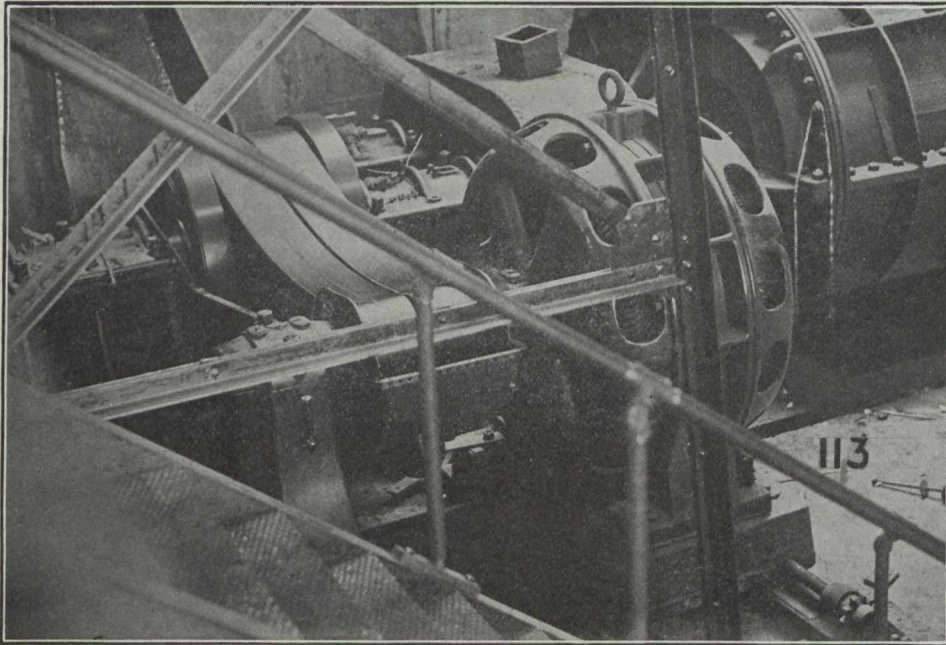
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THE CANADIAN MINING JOURNAL

VOL. XXXVII.

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CIRCULATION

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THE NIPISSING REPORTS

The reports of the Nipissing Mines Company and the Nipissing Mining Company for the year 1915 have been issued and are unusually interesting at this time. They record satisfactory progress during a trying period. They illustrate some desirable and also some questionable features of company reports.

Mr. E. P. Earle, president of the Nipissing Mines Company, the holding company, reports a production during 1915 of 4,097,391 oz. silver valued at \$2,222,256. Net receipts were \$1,441,427. Production cost was 19.06 cents per oz. silver. \$1,200,000 was paid in dividends and \$183,484 added to surplus, the total surplus now being \$1,786,260.93. The ore reserves contain nearly nine million oz. of silver and recent developments indicate the possibility of important additions being made to the reserves. The area of ground still to be prospected has, of course, decreased, but a large production for a few years at least is assured. These statements indicate that large profits are expected from operations during the next few years.

Mr. R. B. Watson, general manager, reporting to Mr. David Fasken, president of the operating company, Nipissing Mining Co., Ltd., gives an interesting summary of operations during the year, and gives instructive figures on the costs of mining and treating the ore.

From the reports of Mr. Earle and Mr. Watson it is evident that the Nipissing is a very valuable mine with large reserves and good prospects. When we turn to the balance sheet of the Nipissing Mining Co., however, we find that the mining property is valued at only \$250,000—an absurd figure.

The Nipissing Company is not alone in carrying such ridiculous figures on its books. One might assume that the accountants were more interested in making two columns of figures that would balance than in giving useful information. Rather than omit listing an asset of which the value is not known, they choose an arbitrary value which is known to be wrong. In this case the auditors evidently had some misgivings about passing such a statement for they say: "The mining property of the company is carried at the par value of the stock of your company which was issued therefor." Such balance sheets are unsatisfactory, for the value of the chief asset is not given correctly.

Most mining men have become accustomed to these unsatisfactory statements, and have learned to make their own estimates from other information contained in the reports. They are not likely to be misled. We submit, however, that it would be better to omit statements of value of property rather than to use arbitrary

figures which are not necessarily related in any way to the actual value.

Another questionable feature of the Nipissing balance sheet, in common with many others, is the valuation given to mining plant, equipment and supplies and of ore and bullion at the mine or in transit. In these cases the balance sheet shows the value worked out to two decimal places, giving thus a suggestion of accuracy which does not exist. The accountant does well enough when he estimates the value in dollars. Compared with the value given to the mining property the figures given are accurate to a high degree, but the decimal figures do not increase the accuracy of such statements. The intelligent shareholder would be more interested in knowing what price per ounce of silver was used in estimating the value of ore and bullion still unsold.

The reports issued by the Nipissing Mining Company are among the best which we receive. General Manager Watson always gives a very good account of the work done and gives important information that we look for in vain in many reports. The balance sheets are, however, not as informing as they might be.

In this issue we publish a description of the Kowkash gold area from the report prepared for the Ontario Bureau of Mines by Mr. P. E. Hopkins. The gold discoveries made in the Kowkash area last year attracted considerable attention. The claims staked must be regarded merely as prospects yet, but the discoveries made will doubtless lead to thorough investigation of the district. The report and maps just published by the Bureau of Mines should prove of great service to those who undertake the work.

In a paper prepared for the annual meeting of the Canadian Mining Institute, Mr. J. B. Tyrrell urged the advisability of seeing to it that the mining industry should be represented in Parliament by mining men. Recent debates in the House of Commons at Ottawa and in the Ontario Legislature emphasize the need of reform. Members who loudly claim, for instance, that the nickel question is one of the most important with which the country has to deal, show by their statements that they have not even taken the trouble to inform themselves about the question and that they are depending on equal ignorance on the part of their opponents when they make absurd statements concerning the mining industry. There should be in Parliament enough men familiar with mining affairs to prevent the time of members being taken up by speakers who do not know what they are talking about. Time and the country's money is wasted in these debates. Mining is one of our greatest industries and should be discussed in Parliament intelligently. At present the subject of refining metals in the Empire, and particularly of refining nickel in Canada, is the subject of

much discussion. It is a question of great importance and under the circumstances it might be expected that those who bring up the matter for debate would make some endeavor to familiarize themselves with the facts.

WM. B. THOMPSON.

"Holland" writes in The Wall Street Journal: Probably the name of no man now active in affairs is more frequently upon the lips of men of large affairs, at least in New York, than that of William B. Thompson. Sometimes the estimate is made that his wealth is now so great that he is entitled to rank with the multimillionaires. He is a director of the Federal Reserve Bank of New York and has other banking interests. But it has been principally through his successful exploitation of copper properties, not the least among them being copper properties in Alaska, and also his share in the building of the original Alaska railroad, that he now takes high rank among men directing great enterprises. Of him, as of many others who in recent years have been very successful in industries of various kinds, the public has had little knowledge.

Mr. Thompson received technical instruction at the Columbia School of Mines. From that institution he went forth to begin a career which is now spoken of by those who know something of it as one of the most successful of all the careers made by men who have been occupied with development of mining property.

A CORRECTION.

In discussing on page 158 of our last issue Mr. Clapp's letter on our criticism of his report on oil and gas, we gave as authority for the statement of production of oil in Ontario in 1912, page 229, Vol. 2, Ontario Bureau of Mines Report, 1912. By a typographical error this was printed page 22 instead of page 229.

KIRKLAND LAKE.

The Tough-Oakes mine is making good progress. The affairs of the company have been the subject of much litigation, Mr. C. A. Foster expects, however, that his faction will come out victorious. He has managed to prevent the closing down of the mine, and good results are being obtained in mine and mill.

TRETHEWEY

The Trethewey Company is dewatering the Lucky Cross mine at Swastika.

CROWN RESERVE.

Good results are being obtained on the McCrea claims in the Boston Creek district by the Crown Reserve Co.

ARSENIC.

The price of arsenic has increased considerably lately. It is now selling at about 6 cents per pound. It has sold at less than 2 cents at times.

OUR GOLD MINING SPECIAL.

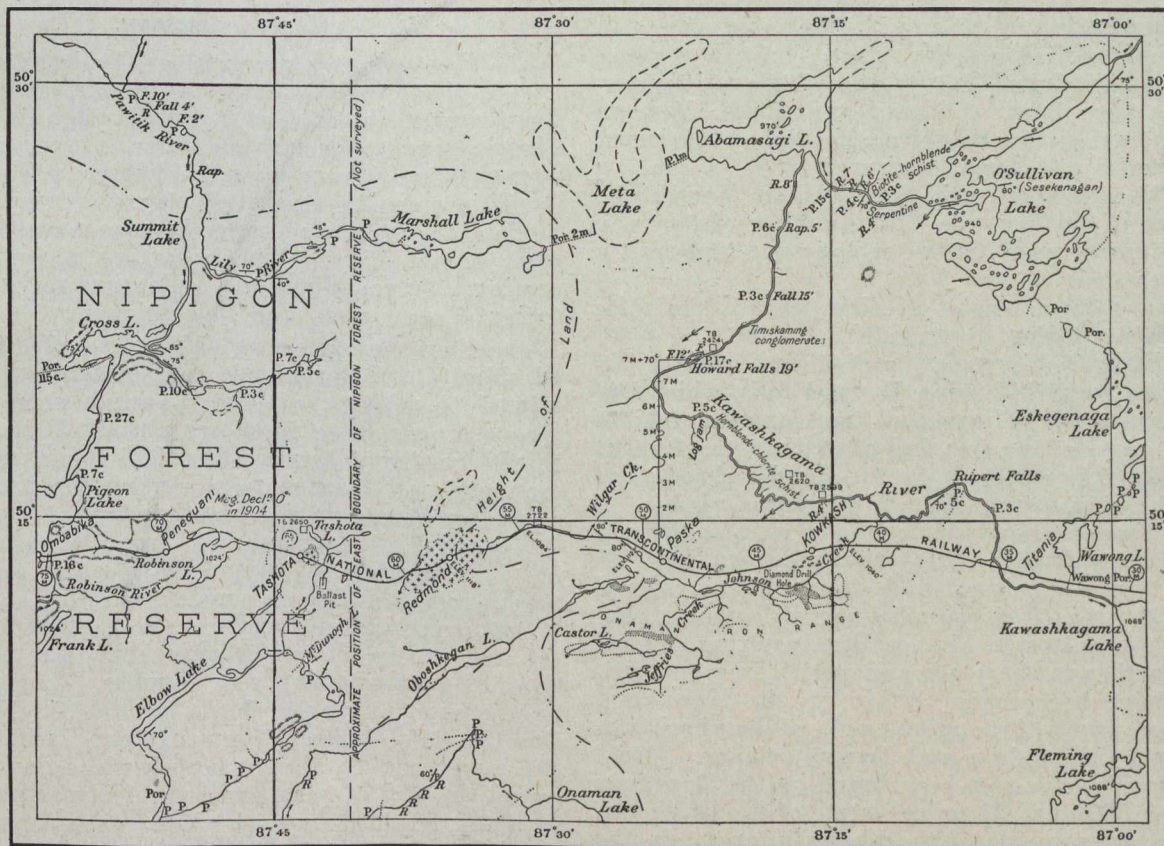
The Canadian Mining Journal will publish next month a special well illustrated issue on the gold mining in Northern Ontario. A large number of copies will be printed, but to ensure getting copies orders should be placed early. All regular subscribers will receive the special issue.

THE KOWKASH GOLD AREA*

By P. E. Hopkins.

In accordance with instructions received from Thos. W. Gibson, Deputy Minister of Mines, the writer left Toronto on September 6th, 1915, and spent six days in making a preliminary investigation of the recent gold discovery near Kowkash, a station 297 miles west of Cochrane on the National Transcontinental railway. A preliminary report was published in the Canadian Mining Journal, Toronto, Oct. 1st, 1915, and a map (No. 24C) of part of Thunder Bay district showing

miles northwest of Kowkash, near Howard falls, on the river Kawa-kash-kagama, which signifies "sparkling water." This name has been shortened to Kawashkagama by the Geographic Board. The railway station called "Kowkash"—an abbreviation or corruption of Kawashkagama—has given its name to the area. The region has so recently been opened up by the National Transcontinental railway that the geological reports have been for the most part of a pre-



THE KOWKASH-TASHOTA DISTRICT, ONTARIO.

A geologically colored map of this area has just been published by the Ontario Bureau of Mines.

the Kowkash gold area accompanied Part I, Volume 24, Report of the Ontario Bureau of Mines, 1915. The writer revisited the area in the latter part of October, 1915, and spent another six days in examining the geology and all the known discoveries. The Kawashkagama river below Johnson creek, part of O'Sullivan lake and the greater part of the route along the railway between Johnson creek and Robinson lake, 25 miles west, were examined. Accompanying this report is a map of the area on a scale of four miles to the inch showing the topography, geology and location of the prospects.

The Kowkash gold area is situated in the central part of the district of Thunder Bay, Ontario, northeast of Lake Nipigon, and is traversed by the National Transcontinental railway. Kowkash station is 297 miles west of Cochrane at about latitude 50° 15' north and longitude 87° 15' west.

Early Exploration and History.

A spectacular gold find was made by E. W. King Dodds on August 21, 1915, on claim T.B. 2424, nine

liminary character and confined to the more important canoe routes.

That part of the Kawashkagama river near the gold find is described by Robert Bell, in the annual report of the Geological Survey of Canada for 1870-1, p. 342; also, by party number 5 in the report on the Exploration of Northern Ontario, issued by the Ontario Department of Crown Lands, in the year 1900, p. 156. In the latter report, E. V. Neelands, geologist, blazed the way for the prospector when he stated "Huronian (Keewatin) rocks, mainly chlorite and other soft green schists, occur in the Kawa-kash-kagama river for about four miles below the Wawong portage to the northern limit of exploration (Howard falls). . . . The most promising district is the country on the Kawa-kash-kagama river below the Wawong portage. Here Huronian (Keewatin) exposures are numerous, mostly chlorite and other soft green schists. Several samples from small quartz veins in this district showed traces of gold, and it might be that careful prospecting in this district would be rewarded."

*Extracts from a report just published by the Ontario Bureau of Mines, Toronto.

W. J. Wilson, of the Geological Survey of Canada, also made a geological reconnaissance survey of part of this area in 1903-4, and his map accompanying the report, which shows the water routes and geology, was very useful to the early prospectors. Robert Bell, W. A. Parks, A. H. A. Robinson and others have described the canoe routes and geology on the western part of the accompanying map.

Up to the present time little attention has been given the Kowkash area by gold seekers, but part of the region was well known to some who prospected for iron on the Onaman iron range along Johnson creek. The iron first attracted the attention of the prospector in 1904, when engineers began the survey of the National Transcontinental railway through this area. R. Flaherty prospected on the range for two seasons, 1906-7, for the United States Steel Corporation, during which time much stripping and three diamond drill holes were sunk. However, the banded red jasper and magnetite and hematite proved to be of too low grade to be workable at that time. E. S. Moore, who spent part of two seasons in examining the range, gives a detailed report on the geology and topography of this area.

From an economic point of view, gold is the chief interest in the region, at present.

E. W. King Dodds made his discovery while walking over the rocky hill below Howard falls, which had been burned clean of moss and trees on the previous day. The news of the rich find caused a rush of about four hundred prospectors to the neighborhood, and 75 or 100 claims were staked within three weeks.

At the time of the writer's second visit at the end of October, no further discoveries had been made in the vicinity of the original find, around which centred the early staking. This was the magnet, however, that drew the prospectors to the locality, resulting in newer finds farther to the south and west. Two gold discoveries have been made farther up the Kawashkagama river, about three miles north of Kowkash station, on the Richardson and Dawson claims. Gold and a telluride have also been found on the Devanney claim near Tashota, 22 miles west of Kowkash, towards the western side of the Keewatin area. In the latter region as much staking has gone on as around the Dodds property. Gold values were obtained near Redmond station at mileage 54.3, from a quartz vein on O'Sullivan lake and other places. Mile posts are marked on telegraph poles along the line of railway west from Grant, a divisional point.

Over 1,000 claims have been staked mainly around Tashota, adjacent to the Dodds discovery, and in the vicinity of the railway between Kowkash and Tashota stations. Nearly 500 claims were recorded at the Port Arthur office up to November 11th, 1915. At the end of October there were about 100 prospectors still in the area.

Topography.

The country has an average elevation of about 1,000 feet above sea level with no great variations in level. There is not a difference of more than about 150 feet between the highest hills and lowest valleys. The most prominent hill seen lies about four miles southwest of O'Sullivan lake.

The continental divide, separating the waters of the great lakes from those of Hudson bay, runs in a tortuous course through the region; but nowhere is it conspicuous as a ridge. A large swamp with streams emerging from either side often forms the watershed.

A boss of red granite, three miles wide, occurs at the divide, altitude 1,118 feet, at Redmond. Towards the northwest of the sheet is Summit lake, a shallow, muddy lake, three miles long by one mile wide, which discharges water both ways, the stream flowing northward towards the Albany being nearly as large as the southern outlet. The country northeast of the height of land is drained largely by the Kawashkagama river, a branch of the Albany.

The average magnetic declination for the area embraced by Map 25a is about one degree west of north.

Following is a brief resume of the geology and a description of the several gold prospects.

General Geology.

The Kowkash area presents pre-Cambrian rocks similar to those found elsewhere in northern Ontario. They are dominantly of Keewatin age, with some Timiskaming sediments and later intrusions of feldspar porphyry, granite and diabase. The younger formations can be separated when the area is mapped in detail. The above rocks cover an area of 600 or more square miles, which is worthy of further prospecting. Surrounding this region are rocks of Laurentian, Keweenawan and Paleozoic age.

The Keewatin consists chiefly of **massive fine-grained chlorite and hornblende rocks which are in places altered to schists**, and which have a nearly vertical dip. Among these rocks are altered diabase, altered basalt showing pillow or ellipsoidal structure, agglomerate and rusty carbonate, so much altered that microscopic examinations are unsatisfactory.

A considerable amount of iron formation occurs on the Onaman iron range, the location of which is taken from E. S. Moore's map.

Cutting the greenstones and closely associated with the iron formation are **narrow dike-like masses and flows of quartz-porphyry or rhyolite**. Exposures may be seen at many places, chiefly around O'Sullivan lake, Howard falls, Onaman iron range and Tashota station. The porphyry contains numerous white quartz phenocrysts, the size of peas, and some feldspar phenocrysts in a fine grained, greyish-white groundmass. The porphyry also contains some quartz stringers, is schistose in places and resembles the quartz porphyry at Porcupine, Goodfish lake and Big Duck lake (north of Schreiber). A sample from the Dodds' claim which was examined microscopically showed large, rounded, angular and broken quartz grains, and albite phenocrysts, partly altered to sericite. The crystalline groundmass consists of quartz, feldspar, sericite and a little chlorite. E. S. Moore noted tourmaline in the rhyolite-porphyry from near Castor lake.

On the Kawashkagama river at the last portage into O'Sullivan lake is an actinolite rock, below which are numerous serpentine exposures.

Granite and gneiss, possibly of Laurentian age, are shown on the map, but these may include some granites of later age. Much of the gneiss is similar to the Laurentian gneiss in other parts of the pre-Cambrian shield. A. W. G. Wilson notes that the acidic schistose rocks in the Summit-Marshall lake region occupy a very doubtful position between undoubtedly Keewatin and undoubtedly Laurentian.

Conglomerate and slates apparently similar to the Timiskaming sediments in Porcupine and Kirkland lake are found about two miles below Howard falls and one chain from the west bank of the Kawashkagama river. They strike north 65 degrees east and dip

vertically. The pebbles of the conglomerate are rounded and drawn out, and consist of chert, quartz-porphry, amygdaloidal basalt and granite-gneiss. The conglomerate is separated on the north by a few feet of drift from a large volume of pillow lava. Slates standing vertically can be seen at mileages 50.7, 51.7, 53.6 and elsewhere in the area. E. S. Moore has mapped a few exposures of tuff and conglomerate with the Keewatin.

Cutting these older rocks are **fresh-looking, massive granite areas**, probably of Algonian age. A grey granite can be seen at the water tank at Tashota station, which under the microscope shows quartz, albite, microcline and biotite. A large boss of red granite three miles wide forms the height of land, altitude 1,118 feet, at Redmond. It contains microcline showing the gridiron structure, albite with zonal structure, quartz and biotite partly altered to chlorite. Some of the quartz porphyries may be of Algonian age, apophyses from the larger granite masses. The feldspar porphyries are rare. A narrow dike was noticed cutting the iron formation at mileage 56.3 along the railway.

Quartz diabase dikes occur in many parts of the area. Exposures may be seen at mileages 50.3, 50.5, and 56.7 west of Grant station. Large exposures of diabase and gabbro occur south of Tashota, and also about 300 yards north of the Dodds gold find. The only reason for placing these rocks in the Keweenawan is that they are similar in every respect to the Keweenawan diabase at Cobalt and in the Nipigon region. W. J. Wilson notes that the diabase is common in both the granites and schists and does not contain olivine.

Large areas of diabase occur around Lake Nipigon. The occurrence of silver associated with the diabase at Silver islet and Silver mountain, 150 miles to the southwest, suggests the advisability of prospecting these diabase areas for silver.

The region has been heavily glaciated, the ice movement having been from the northeast over the height of land in a general south-55°-west direction.

The area lies near the western edge of the northern Ontario clay belt, which has an extent of about 25 million acres, and is covered in places with stratified clays, sands, gravels and coarse boulders. South of Kowkash station near the railway are numerous terminal morainic hills which contain many kettle lakes. Kowkash station is built on an outwash plain formed from an ice sheet.

Economic Geology.

At present gold is the chief mineral sought for in the area, but there was considerable prospecting for iron in earlier years.

Iron.—The iron occurs on the Onaman iron range, which was examined in detail by E. S. Moore in 1907 and 1908. He found the iron formation to occur in two bands, called the northern and southern ranges, the former extending for nine miles and the latter three miles in an east and west direction. The formation is composed largely of red jasper, often well banded, and magnetite. There are considerable deposits of these minerals, but they are interbanded with much slate and some greywacke.

Gold.—Quartz veins carrying gold values in parts of the area have been known for some time, particularly from the Cross-Summit lake area. A. H. A. Robinson, in 1900, obtained an assay return of 80 cents per ton from a vein on the west shore of Summit lake. Another sample on the Lily river, two miles from Sum-

mit lake yielded \$2.80 of gold per ton. W. A. Parks reports an assay value of \$1 per ton in gold from a sample from Cross lake. In 1900 E. V. Neelands obtained traces of gold from several samples collected along the Kawashkagama river above Howard falls.

Dodds' find in 1915 led to others, particulars of which are given below. The prospectors are still busily engaged in the region, but enough prospecting has not yet been done to prove the prospects.

Other Minerals.

A boulder of pyrite, about three feet across, was reported from a point about two miles northwest of Paska station.

A few specks of native copper were seen in quartz veins near the Tashota gravel pit.

No silver was present in the several samples which were assayed.

Other Resources.

The trees are mostly second growth and consist of small spruce, poplar, balsam of gilead, pine, birch and cedar, along the rivers occasionally attaining a diameter of two feet. On the whole, these are suitable for pulpwood and locally for ties, posts and small timber. Large areas have been recently burned. The east boundary of the Nipigon forest reserve, which is not surveyed, is approximately shown on the map.

Small tracts of the country are suitable for agricultural purposes.

Whitefish, pickerel, pike, suckers and brook trout are plentiful in these waters. The rapids on the Kawashkagama river and the numerous brooks entering the river are famed for their speckled trout, some of which are two feet in length.

Many small undeveloped water powers occur on the rivers. Howard falls on the Kawashkagama river would make an excellent water power. The 19 foot fall here is caused by a hornblende-chlorite ridge through which the river cuts, making a narrow canyon-like gorge fourteen chains long. W. J. Wilson notes that the gorge is from twenty to thirty feet deep, and the water descends in steps and slides varying from one to five feet.

THE MAIN PROPERTIES VISITED.

Dodds..

The original gold find which caused the rush to the area was made on the Dodds' claim, T.B. 2424 about three-quarters of a mile east of Howard falls, on the Kawashkagama river. The quartz vein strikes 10 degrees south of east and dips 75 degrees to the north, thus conforming in strike and dip with the country rock. On the surface, the vein which is one to five inches wide, averages three inches in width. The quartz is somewhat glassy in appearance and largely free from sulphides. An abundance of free gold occurred for four or five feet along the hanging wall part of the vein. On the north side of the vein is a rusty schist band, six inches wide, which is heavily impregnated with iron pyrites. The wall rock is pillow lava (meta-basalt) altered in places to schist. Numerous quartz porphyry dikes up to thirty feet wide occur on the claim.

The claim was optioned by T. B. Caldwell, of Lanark, Ontario, and Messrs. Fraser and Orn. On October 23rd the vein had been stripped for 100 feet, exposing two specks of gold towards the western end, and a 14 foot pit had been sunk. In sinking, the showing of free gold disappeared in a few feet. At the bottom of

the shaft the vein is two inches wide with a foot of pyritous schist on the foot wall, but no gold was visible. A channel sample across twelve inches of the pyritous schist from the bottom of the shaft gave an assay \$2 in gold. Work was suspended early in November. It is reported that arrangements have been made to sink a 150 foot shaft.

Richardson—Loudon—Ogilvie.

During the first week in October, 1915, gold was found on Claim T.B. 2599, near the first rapids on the Kawashkagama river below the junction of Johnson creek. The quartz vein is narrow, averaging about two inches in width over a length of 200 feet. The vein strikes south 85 degrees east and dips about 70 degrees to the south. The rock is Keewatin pillow lava, and near the vein is a biotite granite dike 6 feet wide. Coarse gold could be seen in 6 or 7 places along the vein, and pyrite is also present. Rock outcrops in this vicinity are scarce, but further trenching may reveal larger auriferous quartz veins.

Dawson.

About two miles northwest of the Richardson claim across sand plains and intervening swamps is the Dawson claim, T.B. 2620, where gold was reported to have been found about October 22nd, 1915. The quartz vein strikes north and south for 400 feet and dips about 60 degrees to the east. The vein is lenticular and will average about one foot in width. Chalcopyrite, pyrite and chalcocite are disseminated throughout the rusty quartz. The country rock is a massive, green, altered Keewatin diabase.

Devanney.

On account of obtaining visible gold and high assays from the Devanney claim, near Tashota, 22 miles west of Kowkash station, as much staking has gone on around Tashota as around the Dodds' property.

The Devanney claim, T.B. 2650, lies about one and a quarter miles north of Tashota station on the northwest shore of Tashota lake. The vein strikes south 60 degrees east and dips from 50 to 70 degrees to the southwest. The vein is lenticular varying from a few inches up to four feet in width, and having an average width of a foot or more. It can be traced intermittently for about 600 feet. The quartz is milky, in places rusty, and contains a little fine gold, a telluride in considerable amount, also pyrite and pyrrhotite. A polished surface of the ore shows that there are probably three tellurides present. Three pieces of quartz containing a small amount of the tellurium mineral gave \$27.60 in gold to the ton. The wall rock is a Keewatin greenstone consisting of chlorite, calcite and quartz. Quartz porphyry dikes occur on the claim and in the vicinity. The little trenching that has been done shows the prospect to be an interesting one.

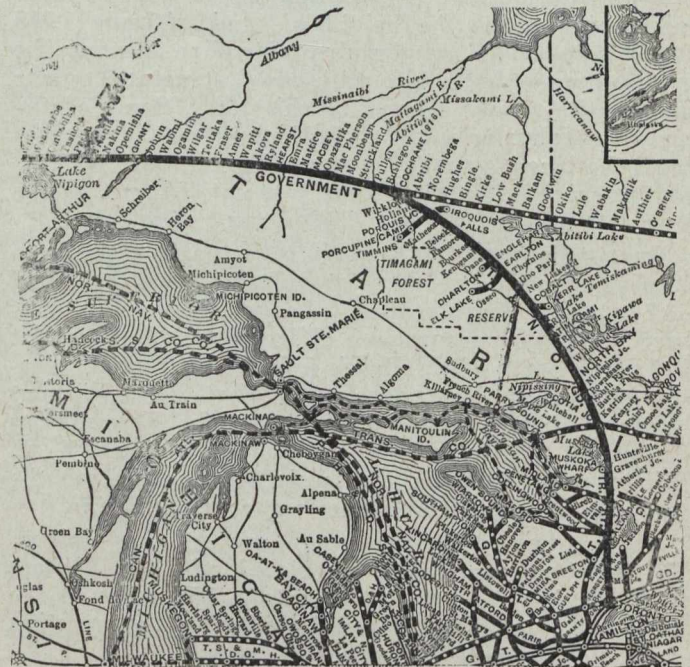
McFarlane—Manion.

At mileage 54.3 west of Grant, or four miles east of Redmond on the north side of the track on claim T.B. 2722, is a quartz-calcite vein, two to ten feet wide in a Keewatin greenstone which is said to extend across several claims in an east-west direction. Mr. McFarlane has sunk a pit 11 feet deep on the vein where it strikes south 70 degrees east and dips 70 degrees to the north. A one-half inch vein of galena occurs near the foot wall. Chipped samples for assay taken in three sections with a moil and hammer across the vein at the bottom of the pit gave as follows:

- No. 1. 1½ ft. hanging wall part of vein, gold none; silver none.
- No. 2. 3½ ft. centre of vein, gold \$1.20; silver none.
- No. 3. 1½ in. foot wall part of vein, containing galena, gold \$6.00; silver none.

Conclusions.

The Kowkash area, comprising 600 or more square miles, is similar geologically to other northern Ontario Keewatin areas, for instance, Porcupine. In these schistose rocks quartz veins are plentiful. Gold, at this early stage, is known to be widely distributed.



The Dodds vein contained a small rich pocket of ore, and the Devanney vein carries a telluride in addition to gold. Enough work has not been done to prove that the gold occurs in paying quantities. Prospecting is somewhat difficult in places on account of the heavy overburden, while other parts are rocky and burned. The transportation facilities are excellent on account of the railway and splendid waterways. The area is worthy of thorough prospecting, which it undoubtedly will receive during the coming summer. Besides gold, the prospector should be on the lookout for iron ore and pyrite.

In concluding the writer wishes to express his thanks to W. R. Rogers, topographer, and P. A. Jackson, for the preparation and production of the map.

The assays were made by W. K. McNeill and T. E. Rothwell of the Provincial Assay Office.

MUNRO.

Croesus Gold Mines, Ltd., operating the property formerly known as the Dobie-Leyson, in Munro township, is putting Munro on the map to stay. The shaft has now reached a depth of 300 ft. Mr. Julius Cohen is superintendent. The chief owners are Messrs. Davis and Steindler. Mr. A. G. Kirby is manager.

The Munro Consolidated Co. was developing adjoining property, but since the death of Mr. P. S. Hairston, who was a victim of the American Club fire, the property has been closed down.

THE SAMPLING AND ASSAYING OF MOLYBDENUM ORES

AS PRACTISED BY THE ORILLIA MOLYBDENUM COMPANY, LTD., ORILLIA, CANADA

By B. C. Lamble.

The methods of sampling and assaying molybdenum ores set forth hereunder were adopted and developed after a considerable amount of experimental work, and have been in use in our laboratory on mill heads and tailings, concentrates and ore samples, for the past six months, during which time the mill and refinery treated over four hundred tons of molybdenite ores. Our results have been satisfactory in every way.

Sampling.—The ores received at our plant carry from 1 to 3 per cent. molybdenum, in the form of the sulphide, molybdenite.

The ore is generally shipped from the mines in bags containing from 80 to 100 lb. each. The ore is sampled in the usual way; the final sample ($-\frac{3}{4}$ "") is cut to 400 lb. This is quartered, put into bags and sealed. The sample to be run in the laboratory represents about 100 lb. of $-\frac{3}{4}$ " material. This is run first for moisture. It is then crushed and rolled to pass a 40 mesh screen until only flakes are retained on screen. These are rolled three or four times until fairly clean. We now have two samples: one of fines and one of metallics. Both are weighed, and weights recorded.

The fines are coned and quartered 5 times, being thoroughly mixed after each quartering, till a final sample of some 3 lb. is obtained. This is then pulverized until whole has passed through 100 mesh screens. It is then thoroughly mixed and is then ready for laboratory.

The metallics are mixed and quartered to about one-half pound sample, placed in large iron mortar and pounded with pestle until the whole passes through 40 mesh screen. This is then thoroughly mixed for laboratory.

Assaying.—In the determination of molybdenum the chief troubles met with are: first, the difficulty in getting a complete solution of all molybdenum; second, in low grade ores, which are the general run, the large amounts of iron contained, when precipitated out of solution, retain large amounts of molybdenum, which is difficult to recover, either by re-dissolving, re-precipitating or by washing. For this reason we have found it expedient in this laboratory to take small samples of the fines for the initial treatment and then unite several of the final filtrates for the determination. I might mention here that the ores received and treated contain molybdenite, pyrrhotite, iron pyrites, very small amounts of copper pyrites, with the usual gangue material, quartz, calcite, mica, etc.

Usually ten one gram samples are weighed out into 250 c.c. beakers, 5 c.c. concentrated hydrochloric acid added, beakers placed on hot plate and solution evaporated to dryness, 10 c.c. concentrated nitric acid added, and mass boiled, addition of nitric acid and boiling continued till all solubles are in solution, 25 c.c. distilled water added, boiled, cooled, ammonia added to precipitate iron, etc., solution again boiled, filtered, precipitate washed with a solution 20 parts water and one of ammonia. The precipitate is dissolved on filter paper with a hot 1 to 1 nitric acid solution, and received in original beaker. Iron is again precipitated with ammonia, solution boiled and filter-

ed, receiving in beaker containing first filtrate. Each filtrate will now measure about 75 c.c. We combine five filtrates, giving two final filtrates of from 350 to 400 c.c. capacity. These solutions are boiled till only a faint smell of ammonia is discernable, small piece of blue litmus paper is dropped into the solution, and acetic acid added till solution is barely acid. This is then titrated while hot with a standard lead acetate solution, using a 1 per cent. solution of tannic acid for an outside indicator. The lead acetate solution contains 15.7 grams lead acetate per litre, and it is standardized against a known ammonium molybdate solution, the lead factor multiplied by 0.464 gives molybdenum factor. Twenty-five c.c. of the ammonia molybdate solution is measured into a flask, diluted with distilled water to 100 c.c. and boiled. The lead acetate solution is run in until a drop of this solution added to a drop of tannic acid in spot plate fails to give a yellow coloration. This is the inverse to the well-known Alexander method for lead.

The flakes are somewhat harder to get into solution. One gram samples are weighed out (in duplicate) into beakers, covered with concentrated hydrochloric acid, and placed on hot plate and solution taken to dryness. Treatment with the acid is continued till no sign of molybdenite is showing. About 20 c.c. of 1:1 ammonia is added and solution boiled. It will be seen that particles of molybdenite will now appear. This is due to the flakes becoming coated with molybdic acid, which is dissolved by the ammonia, exposing the untouched molybdenite. The precipitate and unattached flakes are allowed to settle and solution poured through filter, the residue being washed 3 or 4 times by decantation with small amounts of hot water. The residue is treated with nitric acid, and then ammonia till all the molybdenite is in solution. Solution finally titrated as above.

The percentate of metallics to total sample, multiplied by percentage molybdenum found in metallics equals metallic assay. This plus fines assay equals total assay.

For ores containing appreciable amounts of lead, copper, etc., the treatment is the same until point is reached where the ammonia is added. This is added till solution is just alkaline, a few c.c. ammonia sulphide added to precipitate iron, lead, copper, etc., and then a few c.c. in excess. The beaker containing solution set in warm place till precipitate has settled. The whole is then filtered, and precipitate washed with a weak ammonium sulphide solution. The precipitate is then rinsed into beaker and a hot mixture of equal parts nitric acid and bromine water is passed over filter paper to dissolve any adhering precipitate. The whole is boiled and then re-precipitated with ammonia and ammonium sulphide. Filter and wash precipitate with the weak ammonium sulphide. The combined filtrates will show a deep brown color if much molybdenum is present. The solution is made just acid with hydrochloric; this theoretically will throw all the molybdenum, but it is best to pass a rapid stream of hydrogen sulphide through for 10 to 15 minutes to make sure of this. The sulphide is filtered off and washed with H_2S water. The precipitate is rinsed

into beaker using a hot solution equal parts nitric and bromine water to cleanse filter paper. The solution is boiled with frequent additions of bromine to insure oxidation of sulphur and complete solution. The solution is then diluted somewhat if necessary with distilled water, made faintly alkaline with ammonia, barely acid with acetic, and titrated whilst hot with the lead acetate solution as above.

For the determination of molybdenum oxide and ammonia molybdate dissolve 1 gram molybdic oxide (MoO_3) in as little ammonia as possible. When all is in solution, dilute to 100 c.c. with distilled water, measure off 10 or 15 c.c. with pipette, run into flask, dilute, make barely acid with acetic and titrate as above. Dissolve 1 gram ammonium molybdate in 50 c.c. distilled water, add few c.c. ammonia, dilute to 100 c.c., take aliquot part and titrate as above.

COAL MINING IN ALBERTA IN 1915

By JOHN T. STIRLING, Chief Inspector of Mines.

The output of lignite coal in Alberta during the year 1915 was 1,682,922 tons, the output of bituminous coal 1,626,237 tons, and the output of anthracite coal 125,732 tons; showing a reduction of 14,479 tons of lignite coal below that of the year 1914, 327,130 tons of bituminous coal and 45,170 tons of anthracite coal, making a total reduction of 386,788 tons below the output for the year 1914. The total output from the province during the year 1915 was 3,434,891 tons, while that of the year 1914 was 3,821,739 tons. There was 23,826 tons of coke and 83,190 tons of briquettes produced during the year 1915.

The output from the Crow's Nest Pass district was 919,383 tons, from Calgary 943,897 tons, Lethbridge 719,728 tons, and from the Edmonton district 851,883 tons. This shows a reduction in output below that of the year 1914 in the Crow's Nest Pass, Lethbridge and Edmonton districts, while the Calgary district shows an increase of 82,475 tons over that of the year 1914. This is due to the largely increased development in the lignite district in the Drumheller field and the bituminous district in the Brazeau field. 23,453 tons of bituminous coal were disposed of in British Columbia, 84,489 tons in Saskatchewan, 4,136 tons in Manitoba, 29,788 tons in United States and 1,355,693 tons in Alberta. 15,100 tons of lignite coal was sold in British Columbia, 601,913 tons in Saskatchewan, 60,421 tons in Manitoba, 3,406 tons in United States, and 752,278 tons in Alberta. 26,062 tons of anthracite coal was sold in other provinces, 853 tons to United States and 21,859 tons in Alberta.

There were employed underground during the year 4,493 men, and above ground 1,952. This shows a reduction of 1,625 men employed compared with the year 1914.

The number of tons mined per man for the year 1915 was 532 tons, while that of the year 1914 was 467 tons.

The number of mines in operation during the year was 280, which is an increase of 16 over the previous year. 58 mines were opened during the year, while 72 were abandoned.

During the year an Order-in-Council was passed providing amongst other things that after the first day of July, 1915, all plans required to be kept in accordance with the Mines Act must be of durable material and must be prepared by or under the supervision of a person holding a certificate as Mine Surveyor granted under the Mines Act.

The Canadian Coal & Coke Co., Ltd., operating a mine near Coalhurst introduced during the year the Addison portable electric lamp. There are between 80 and 100 of these lamps being used in this mine with considerable satisfaction.

There were 18 separate accidents causing the loss of 18 lives, 15 of which occurred underground and three above ground; 28 serious accidents occurred underground and five above ground, and 27 slight accidents occurred underground and six above ground.

7.17 tons of coal was mined per pound of explosives used in bituminous and anthracite fields, while 3.91 tons of lignite coal was mined per pound of explosives used. The average number of days worked per month in the province was 16.9.

There were 131 prosecutions instituted for contravention of the Mines Act, and convictions obtained in practically every instance.

Two Mine Rescue Stations have been installed during the year, one at Nordegg and one at Pochontas, making a total in the province now of six stations and two cars. The Mine Rescue training has been pushed ahead vigorously during the year, although considerable difficulty is now being experienced in obtaining men to undergo this training owing to the number who have enlisted.

There was 306,461 tons of coal mined in the Crow's Nest Pass district per man killed in the mines, 359,864 tons per man killed in the Lethbridge district, 121,335 tons per man killed in the Edmonton district, and 157,316 tons per man killed in the Calgary district.

GRANBY CONSOLIDATED M. S. AND P. CO.

"The average daily shipments from our Hidden Creek mine, in British Columbia, to our Anyox smelter are 2,500 tons of ore, containing between two and three per cent. copper," said Mr. O. B. Smith, general superintendent of mines for the Granby company.

"As the season advances we are employing more men on construction work, so our mine employees now number about 400 and those at Anyox and the smelter around 600. The wage scale for miners is a minimum of \$3.50 per day, with bonuses of from 25 cents to 75 cents a shift, according to the monthly average settlement price for copper. The bonus begins when copper is above 16 cents and the highest bonus is paid when it passes 22 cents a pound.

"Our mines at Phoenix are shipping an average of 3,000 tons of ore daily to our Grand Forks smelter. The mine employees number 400 and the smelter hands around 200.

"Two minor shippers to our Anyox smelter are the company's lime and quartz quarries. The former is about 90 miles from the smelter and ships 100 tons daily for flux. The latter is about one mile from the smelter and furnishes 100 tons daily for converter linings. The quartz carries more than enough gold values to pay its own way.

"From our Mamie mine at Hadley, on Prince of Wales Island, Alaska, we are also shipping 20 tons daily to the Anyox smelter. Another property we own on the same island is shipping 40 tons of ore daily, which contains enough lime to make it a desirable flux. We shall begin shipments from our mine at Valdez, Alaska, as soon as transportation is available. Steamers are scarce just now. The weather last winter in southwestern Alaska was the worst known for years. High winds, intense cold and heavy snowfall combined to make operations difficult and costly."—Grand Forks Gazette.

ANNUAL REPORTS NIPISSING MINES CO. AND NIPISSING MINING CO., 1915

President E. P. Earle, in his annual report to the shareholders of Nipissing Mines Co., says under date of March 6th, 1916:

The results obtained from the operation of our property during the year 1915 were gratifying, although, owing to conditions caused by the European war, the average price at which our silver was sold was only 50.06 cents per ounce, which is five and three-tenths cents less than was obtained during the previous year.

The fine silver production was 4,097,391.17 ounces, valued at \$2,222,256.29 gross. Net receipts were \$1,441,427.67. The production cost per ounce of silver was 19.06 cents, which is about three-quarters of a cent less than in the previous year. There was added to sur-

plus account \$183,484.73, the total surplus now being \$1,786,260.93. There was paid to shareholders during the year \$1,200,000.

The ore reserves contain nearly nine million ounces of silver and recent developments in the vicinity of shaft 73 and along the Cobalt Lake fault indicate the possibility of important additions to the reserves. The mines and mills are, as usual, in excellent condition and the present market price of silver, viz., about 57 cents per ounce, as well as its future prospects, indicate that the results of the company's future operations may be regarded as promising.

General Manager R. B. Watson reports on the operations of the Nipissing Mining Co. as follows:

Nipissing Shipments in 1915.

	Dry Tons.	Fine Ounces Silver.	Net Value.
Silver bullion.	212.2520	6,164,239.03	\$3,158,720.21
Residue.	326.1845	10,774.12	11,903.30
Concentrates.	34.9865	61,629.59	27,784.54
Total shipments	573.4230	6,236,642.74	\$3,198,408.05
Less custom ore included in above.	381.4890	1,612,684.96	816,944.68
Shipments of Nipissing Product.	191.9340	4,623,957.78	\$2,381,463.37

Nipissing Production in 1915.

	Ounces Silver.	Gross Value.	Net Value.
Shipments in 1915.	4,623,957.78	\$2,422,791.14	\$2,381,463.37
On hand at mine, Dec. 31st, 1915.	583,705.54	332,712.16	325,497.47
	5,207,663.32	\$2,755,503.30	\$2,706,960.84
On hand at mine, Dec. 31st, 1914.	1,110,272.15	538,481.99	523,913.03
	4,097,391.17	\$2,217,021.31	\$2,183,047.81
Difference between estimated shipments in 1914 and actual returns.		5,234.98	5,231.10
Nipissing production	4,097,391.17	\$2,222,256.29	\$2,188,278.91

Cost of Producing Silver.

(Based on production of 4,097,391.47 ounces and 77,904 tons milled.)

		Per Ton Ore.	Per Oz. Silver.
Hydraulicling.	\$ 41,300.81	\$.530	\$.0101
Diamond drilling	1,299.34	.017	.0003
Development and exploration	119,283.00	1.531	.0291
Stoping.	102,346.58	1.314	.0250
Assaying and engineering	8,778.02	.113	.0021
Administration and office	27,505.90	.353	.0067
Boarding house and camp maintenance.	8,517.79	.109	.0021
Insurance and taxes	25,543.71	.328	.0062
General and legal	16,306.36	.209	.0040
High grade mill	50,290.65	.646	.0123
Low grade mill	302,019.01	3.877	.0737
Depreciation.	60,764.14	.780	.0148
Marketing product	38,796.59	.498	.0095
Corporation, New York office and traveling.	12,252.76	.157	.0030
	\$815,004.66	\$10.462	\$.1989
Less rents and interest.	34,176.04	.439	.0083
Total cost of production.	\$780,828.62	\$10.023	\$.1906
Gross value of production.	\$2,222,256.29		

The only change made during the year in the high grade ore treatment is an important improvement in the **retorting of the large amount of amalgam** produced. This amalgam is now retorted and melted to bullion in one heat in large graphite crucibles mounted in tilting furnaces. The mill treated 921 tons of Nipissing ore averaging 2,474 ounces per ton and 553 tons of custom ore with an average assay of 2,917 ounces per ton. The refinery also treated the product from the low grade mill containing over two million ounces. Total shipments of bullion amounted to 6,164,239.03 ounces. The market for cobalt residue was poor on account of the war; the shipments amounted to only 326 tons.

	Dry Tons.	Assay Ozs.	Silver Ozs.
Ore treated	77,071	29.62	2,282,614
By-products treated	112	1322.34	148,036
	<hr/>	<hr/>	<hr/>
	77,183	31.49	2,430,650
Bullion recovered from above.....			2,127,372
Extraction.....			87.52%

In the low grade mill there was treated 77,183 tons ore and by-products as follows:

Forty stamps ran 293.67 days or 80.45 per cent. of possible running time. The stamp mill has a larger capacity than the cyanide plant and is not run full time. Crushed per day 262.82 tons; crushed per stamp per day 6.57 tons. The mill was shut down during part of the months of February, March and April on account of shortage of power. Notwithstanding an increase of 20 cents per ton in the cost of supplies, the

total cost of treatment was reduced 7 cents per ton. The Callow screens in the tube mill circuits collected metallics which contained 176,158 ounces of silver. This removal of the metallic silver from the pulp did not improve the extraction or the cost in the cyanide plant and the practice was therefore discontinued.

The present high war cost of aluminum dust will make it necessary to substitute some other method of precipitation when our present contract for dust expires. Experiments on a large scale are now being carried on with the **use of sodium sulphide as a precipitant**, the resulting silver sulphide being desulphurized by the use of aluminum ingots in a caustic soda solution, before being melted down to bullion. The results

so far are satisfactory and it is likely that this procedure will be adopted.

During the past year a great deal of research work has been done to determine whether the tailings or ore can be treated to advantage by the oil flotation process. From these experiments it appears that a small additional saving can probably be made by using flotation and a small plant of four cells is now being installed to try out the process on a working scale.

Treatment Costs on Low Grade Ore.

Including Transportation, Picking Plant and Low Grade Mill
(Based on 77,183 Tons Milled)

	Total Cost.	Cost per Ton.
Crushing at mine	\$12,045.32	\$.156
Aerial tramway	4,967.85	.064
Surface tramway	4,594.49	.060
Picking plant	14,177.88	.184
Crushing and conveying	3,919.48	.051
Battery.....	22,787.60	.295
Tube mills and classifiers	50,091.80	.649
Desulphurizing and slime collecting.....	14,659.00	.190
Intermediate filtering	6,520.74	.084
Cyanide treatment	99,918.02	1.295
Cyanide filter	9,742.94	.126
Clarifying and precipitation.....	29,159.72	.378
Refining.....	7,959.01	.103
Heating.....	8,477.35	.110
Water supply.....	2,864.24	.037
Construction.....	1,326.89	.017
Residue dam.....	4,806.68	.062
Consulting.....	4,000.00	.052
	<hr/>	<hr/>
	\$302,019.01	\$3.913

Consumption of Supplies at Low Grade Mill.

	Total lbs.	Cost per lb.	Total Cost.	Pounds per Ton.	Cost per Ton.
Sodium cyanide	329,600	\$.2240	\$73,813.22	4,270	\$.9564
Lime.....	378,680	.0040	1,523.41	4.905	.0198
Caustic soda	213,144	.0284	6,060.28	2,760	.0785
Aluminum dust	51,040	.4210	21,489.30	.660	.2784
Aluminum plates	8,140	.2364	1,924.30	.106	.0249
Aluminum ingots	4,257	.2104	905.83	.055	.0117
Pebbles.....	400,675	.0090	3,594.76	5.190	.0466
Coal.....	2,102,000	.0029	6,079.33	27.234	.0788
Borax.....	6,305	.0456	287.78	.086	.0037
Power K. W. H.....	4,922,400	.0117	57,704.41	63.776	.7476
			<hr/>		<hr/>
			\$173,382.62		\$2.2464

Surface Prospecting.—The hydraulic plant began operations on April 23rd and continued until stopped by weather conditions on November 23rd. The main area washed lies to the east of Cart lake and to the south of Peterson lake. Acres washed, 111; cost per acre, \$372.08; cubic yards removed, 445,653; average depth of soil, 2.49 feet; cost per cubic yard, 9.27c., made up of: labor 4.83c., power 3.98c., and supplies .46c.; 184 set-ups were made; 31,053 feet of 16-inch pipe was laid down and 31,942 feet taken up; 12,657 feet of roads built; average pressure at nozzle, 136 pounds; pump ran 71.9 per cent. of possible running time.

The conglomerate flat on the east side of Cart lake was considered a very promising section, but the results were disappointing. A considerable area of diabase was also washed, but this formation is too rough to give good results by this method of prospecting. Pits or open cuts were made on twenty-seven different veins uncovered by the hydraulic operations; veins H.55 and H.63 produced a small tonnage of high grade ore and the work developed some mill ore, but none of the veins proved to be of much importance.

Geological investigation indicated an increased depth of conglomerate along the eastern side of this lot due to a faulting in the formation and subsequent diamond drilling has proved that the conglomerate continues to a depth 150 feet below the fourth level over a considerable territory. This development is of much importance, as it opens up a wide field for exploration under the most favorable conditions.

Vein 490 which occurs within this area was developed on and above the fourth level without success; it was a large vein but consistently low grade. A winze was then sunk on the vein and at a depth of 75 feet came into six inches of high grade ore. This good ore did not persist, however, but the winze was continued to a depth of 150 feet where the new fifth level will be started. The vein is badly broken up by faults, but it is confidently expected that a good ore shoot will be developed between these two levels.

While no new veins of much importance were discovered in the workings from 73 shaft, the old veins turned out well, so that the ore reserves show only a

Summary of Underground Work, 1915.

Shaft No.	Drifting (ft.)	Crosscutting (ft.)	Raising (ft.)	Sinking (ft.)	Stoping (cu. yds.)
14 O'Brien . . . . .	....	499.0	....	....	....
63	316.0	521.5	53.0	....	2,356
64	171.0	673.0	....	37.0	....
73	1,520.0	3,202.0	744.0	136.5	15,154
80	172.0	757.0	86.5	....	106
81 . . . . .	....	....	....	6.0	....
96	248.0	280.0	85.0	28.0	551
150	139.5	676.5	105.5	....	....
H. Veins 55 and 63 . . . . .	....	....	....	39.0	365
Total	2,566.5	6,609.0	1,074.0	246.5	18,532

Diamond drilling (all underground at 80 shaft), 503 feet.

Development.—The total of 10,496 feet of development compares with 12,148 feet done during the previous year. The stoping was also less, but this was largely because the stopes were full of ore; they now contain 72,200 tons ready to hoist.

Shaft 14 O'Brien.—Nipissing lot 402 lying north of the O'Brien mine is now being explored by crosscuts running east and west along the boundary between this lot and the O'Brien, the expense being divided by the two companies. Some 500 feet of crosscuts were driven in conglomerate without any favorable results; the work will be continued.

Shaft 63.—The Little Silver veins were developed through this shaft and proved much better than expected; the stopes are now full of ore and there is some further ore to break down. After a steady production throughout the year the reserves are higher than a year ago and amount to 675,000 ounces.

Shaft 64.—No work was done on the main 64 vein during the year and the reserves remain as before.

A crosscut is being driven north from the second level to explore the large section of conglomerate lying between vein 64 and the Bucke Township line; it has reached a length of 600 feet. A similar crosscut 800 feet to the east is advancing north from the fourth level of shaft 73.

Shaft 73.—The workings from this shaft continue to produce the larger part of the ore sent to the mill. The main stoping was on vein 98 and its numerous branches, which proved fully as good as expected.

small decrease. The high grade ore is estimated to contain 2,743,190 ounces, and the low grade ore 1,827,950 ounces.

Shaft 80.—Considerable crosscutting was done from the second level of 80 shaft without striking any veins of importance. The faulted extension of one of the old veins is being stoped with good results. The broken ore in the stopes on 80 vein was drawn on rather heavily during the year, which reduced the reserves to 525,000 ounces. No ore was taken from 100 vein; the reserves are estimated at 894,000 ounces.

Vein 96.—This vein lies south of the Little Silver and is developed by a tunnel. Another small ore shoot was found on 96 vein and a crosscut to the east cut vein 102. This vein was low grade at the outcrop, but on the tunnel level the ore averaged 4,000 ounces over a width of 1.5-inch for 95 feet in length. A winze is now being sunk on this orebody which is expected to produce well above and below the tunnel level.

Shaft 150.—Further underground exploration was carried on in the conglomerate to the east of Cart lake with continued poor results, so it was decided to shut down work permanently in this shaft.

Cobalt Lake Fault.—The exploration of this fault in Cobalt Lake ground has shown up several bodies of rich ore, the last one being found below the 450-foot level. The fault enters Nipissing ground on the dip and two of these ore shoots have extended to within a few feet of the boundary. Considering the great dis-

tance which this fault can be prospected on our property, it was decided to sink 81 shaft down to the contact and from this to thoroughly explore the fault on our side of the line; the prospects of finding ore are good.

cents per ounce of silver. The gross value of the production was \$2,222,256, and the total cost of production including every expense was \$780,828, leaving a net operating revenue of \$1,441,428. Dividends declared during the year amounted to \$1,220,000.

Nipissing Ore Reserves, December 31st, 1915.

(Developed and Partly Developed Ore.)

Shaft No.	High Grade Ore.		Mill Ore.		
	Tons.	Ounces.	Tons.	Assay.	Ounces.
64.	203.1	200,403	4,049	20	80,980
73.	1,621.2	2,743,190	73,118	25	1,827,950
80.	179.9	385,250	5,570	25	139,250
100.	260.4	609,400	11,391	25	284,800
63.	195.5	469,900	8,425	24.3	204,770
96.	51.9	148,300	2,263	25	56,575
	2,512.0	4,556,443	104,816	24.7	2,594,325
Dumps.			75,420	23.5	1,770,950
			180,236	24.2	4,365,275

Summary.

	Tons.	Assay.	Ounces.
High grade ore.	2,512	1814.0	4,556,443
Mill ore	180,236	24.2	4,365,275
Total.	182,748	48.8	8,921,718

Summary of Results.—The past year has been one of uncertainty, both as to the price we were likely to receive for our product and as to the cost of supplies necessary to carry on the business. Under these conditions no effort was made to push the production of the mine beyond the tonnage necessary to yield the regular dividends. The price of silver was steady during the first part of the year between 48 and 50 cents; but in August it went down to the low price of 46 $\frac{5}{8}$ cents per ounce in New York. In November and December there was a decided improvement in the market, the closing quotation for the year being 55 cents per ounce; since then it has ruled even higher. The average price received in London for Nipissing silver sold during the year was 50.06 cents.

The production for the year was 4,097,391 ounces of silver, compared with 4,689,333 ounces produced during the previous year. Costs were reduced from \$11.60 to \$10.02 per ton of ore and from 19.80 cents to 19.06

Some further development was carried out on the Teck-Hughes mine in the Kirkland Lake district, but the results obtained did not warrant the company in going any further under the terms of the option. The company had several engineers in the field who examined numerous properties, and some development work was done on a prospect in California, but no permanent interests were acquired.

The Nipissing mine has never shown ore reserves commensurate with its annual output, but the history of the company during the past twelve years has shown that the development of new ore has kept pace with the current production. As the property becomes better explored year after year, this result cannot be expected to continue indefinitely. However, with the possibilities at greater depth in the vicinity of shaft 73 and along the Cobalt Lake fault and with known ore reserves of nearly nine million ounces, satisfactory results are assured for a considerable period of time to come.

The report of the treasurer of the Nipissing Mining Co. is as follows:

Statement of Operations—Year Ended December 31st, 1915.

Gross settlements 1914 ore (paid for in 1915)	\$ 596,292.57
Gross settlements 1915 ore	2,639,894.96
Gross settlements for year	\$3,236,187.53
Gross value of ore and bullion at mines and in transit, December 31st, 1911.	944,931.51
	\$4,181,119.04
Less:	
Gross value of custom ore purchased.	\$ 829,323.17
Gross value of inventory, December 31st, 1914.	1,129,539.58
	1,958,862.75
Gross value of 1915 ore.	\$2,222,256.29

Other Receipts:	
Ground rents	\$19,937.00
Interest, discount, etc.....	14,239.04
	<u>34,176.04</u>
	\$2,256,432.33
Cost of mining and all other expenses (including smelter deduc- tions, treatment, etc., on settlements 1915 ore and accrued charges on ore and bullion at mine and in transit).....	815,004.66
	<u>\$1,441,427.67</u>
Net receipts for 1915 production.....	\$1,441,427.67
Cost of special investigations and work on outside properties...	37,942.94
	<u>\$1,403,484.73</u>
Surplus, January 1st, 1915.....	1,602,776.20
	<u>\$3,006,260.93</u>
Less:	
Dividends declared and paid during 1915.....	\$920,000.00
Dividend payable January, 1916.....	300,000.00
	<u>1,220,000.00</u>
	\$1,786,260.93
Net surplus to Balance Sheet.....	\$1,786,260.93

This net surplus is made up as follows:

Cash in various banks.....	\$776,854.17
Ore and bullion at mine and in transit.....	944,931.51
Accounts receivable	2,038.21
Investments.....	33,430.00
Deferred charges	6,000.00
Mining plant, equipment and supplies.....	439,974.49
	<u>\$2,203,228.38</u>
Less:	
Accrued expenses on ore and bullion not settled for.....	\$ 13,057.83
Accounts payable (including estimat- ed taxes)	103,909.62
Dividend payable, January, 1916....	300,000.00
	<u>416,967.45</u>
Net surplus.....	\$1,786,260.93

Balance Sheet, December 31st, 1915.

Assets.

Mining property	\$250,000.00
Mining plant, equipment and supplies	439,974.49
Investments.....	33,430.00
Deferred charges	6,000.00
Ore and bullion at mine and in transit.....	944,931.51
Accounts receivable	2,038.21
Cash in banks, New York, Toronto and Cobalt.....	776,854.17
	<u>\$2,453,228.38</u>

Liabilities.

Capital stock	\$250,000.00
Accounts payable, including estimated taxes.....	103,909.62
Accrued expenses on ore and bullion.....	13,057.83
Dividend payable January, 1916.....	300,000.00
Surplus (see Statement of Operations).....	1,786,260.93
	<u>\$2,453,228.38</u>

The Nipissing Mines Co. is incorporated under the laws of the State of Maine, with authorized and issued capital, \$6,000,000 in 1,200,000 shares of the par value of \$5.00.

The officers are: E. P. Earle, president, Richard T. Greene, secretary, and P. C. Pfeiffer, treasurer.

The directors are: W. H. Brouse, Toronto; E. P. Earle, New York; David Fasken, Toronto; John L. Feeny, New York; Richard T. Greene, New York; Denis Murphy, Ottawa; August Heckscher, New York, and R. B. Watson, New York. The late Mr. Duncan Coulson was a director.

PERSONAL AND GENERAL

Mr. T. F. Sutherland, chief inspector of mines for Ontario, will go to New Caledonia with Dr. W. G. Miller to examine nickel deposits there.

Mr. S. W. Cohen has gone to California.

Mr. C. L. Campbell is developing a molybdenite property near Amos, about 200 miles east of Cochrane.

Mr. Chas. O'Connell, manager of the Tough-Oakes mines, has returned to the property after spending some months in California. His health is much improved.

Mr. Clifford E. Smith is at Porcupine in charge of development work at the Ankerite claims, which are under option to Coniagas.

Mr. J. H. Stovel, recently appointed inspector of mines for the Sudbury district, has moved from Bruce Mines to Sudbury.

Mr. A. H. Brown, manager of the Hudson Bay and Dome Lake mines, has resigned.

Mr. T. W. Gibson, now in England, is expected to return to Toronto in a few weeks.

Dr. W. G. Miller, now in England, will go to New Caledonia to examine nickel deposits there.

Capt. H. H. Yuill is "Assistant Controller of Mines" with the first army in France.

Capt. G. C. Riley's brigade is now in France.

Capt. Angus W. Davis is in command of a tunnelling company in France.

Lieut. Eric Billington and Lieut. G. G. Gibbins were wounded while taking to pieces an unexploded German shell for the purpose of learning the construction of the detonator. Lieut. Billington's injuries were serious. Both are recovering.

Mr. John P. Keane, of Rosebery, Sloean Lake, B.C., where he runs a concentrating plant treating custom lead-zinc ores, was in Spokane, Washington, attending the Northwest Mining Men's Convention, held in that city during the latter part of March.

Mr. E. J. Montgomery, of Rossland, B.C., assistant superintendent of the Consolidated Mining and Smelting Co.'s Centre Star group of mines, was a recent visitor at Spokane, Washington.

Mr. O. B. Smith, of Vancouver, B.C., superintendent of mines for the Granby Consolidated Mining, Smelting & Power Co., lately paid one of his periodical visits to the company's big copper mines at Phoenix, Boundary district.

Mr. George T. Coffey, superintendent of hydraulic operations, Yukon Gold Co., has returned to Dawson from Oakland, California. Mr. E. E. McCarthy, the company's dredge superintendent, was in San Francisco during the latter part of March, on his return journey from New York to the Yukon.

Mr. Frank A. Ross, consulting engineer, Spokane, Washington, who prior to the sale of the property to the

organizers of the Hedley Gold Mining Co., was general manager for the Marcus Daly Estate, of the Nickel Plate group of gold mines and 40 stamp mill in Camp Hedley, Similkameen, B.C., has been appointed the Washington State representative on the United States Naval Consulting Board.

Mr. Charles Hayden, of the house of Hayden, Stone & Co., is to be the guest of D. C. Jackling in an excursion upon the latter's yacht, whose itinerary will take in both the Atlantic and Pacific sides of South America as well as a visit to the Republic of Bolivia. An excursion of that distance is unusual, although Commodore E. C. Benedict has made several voyages to South America and up the Amazon, having in view the possibilities of the rubber market.

GRANBY.

Granby Consolidated should treat approximately 1,000,000 tons of ore at its Anyox smelter during the coming year. Assuming a recovery of not better than 35 pounds of copper per ton of ore, the yield from that plant should approximate 35,000,000 pounds in addition to which the Grand Forks smelter should turn out 15,000,000 pounds, making a total of 50,000,000.

During the coming summer the Midas mine in Alaska, owned by Granby, is expected to start shipments. This ore will be treated in the Hidden Creek smelter at Anyox.

The usual winter interference with operations has about ceased. The agglomerator will start permanent operations just as soon as normal water power can be secured. This will also permit the entire four furnaces of the Hidden Creek smelter to run full blast. With the agglomerator the management expects four pounds of copper per ton of flue dust to be secured at a very low cost.

Although paying but \$6 dividends, Granby has been earning very much more. Assuming a cost of 10 1-2 cents a pound the company on 20-cent copper can show profits of \$4,750,000 per annum, on an output of 50,000,000 pounds. On a production of but 40,000,000 pounds profits would approximate \$3,800,000. The latter figure is equal to \$25 per share.—Boston News Bureau.

SULLIVAN MACHINERY CO.

A New England industrial which has profited measurably from the extraordinary activity in the American mining industry is the Sullivan Machinery Co. The company manufactures mining and quarrying machinery. Net earnings for the 1915 year were not far from \$540,000, or about 14 per cent. on the \$3,846,800 stock. The significant fact about these figures is that the bulk of the earnings accrued in the last four months of the year; in the first half profits were very small.

Sullivan Machinery has advanced to about \$130 a share from a price in the low nineties last year. Before the war it was an 8 per cent. stock. In the fall of 1914 the rate was cut to 4 per cent., and recently again elevated to 6 per cent. A satisfactory amount of unfilled orders was carried over to the new year, and it is believed to be only a question of a few months when the 8 per cent. dividend will have been restored.

The Western Dominion Collieries, Ltd., of Taylorton, Sask., have awarded a contract to the Roberts and Schaefer Co., engineers and contractors, Chicago, for the installation at Taylorton of a coal mining tippie using a horizontal screen.

A MOUNTED HAMMER DRILL FOR DRIFTING WITH PNEUMATIC FEED

By Frederick W. Copeland.

A tantalizing ambition of modern drill designers has been to develop a practical drifting machine, operated by air feed. The elimination of the shell and feed screw form of mounting in the modern stoping drill and the substitution for these parts of the air feed cylinder and piston, resulted in a great increase in drilling speed in all upper hole work. Air feed stopers, in spite of the fact that a striking plug or anvil is employed, secure high speed, because of the fact that the air feed holds the bit constantly against the rock, so that any break in its character is instantaneously followed up by the steady push of the air. In the case of the screw feed, the operator, if using a hammer type of drill, must catch the sound of the hammer as it strikes the front head; and take up the slack with the crank before the drill can work again at full load.

Effort has been made by means of what is known as the "Reverse Feed" cylinder to adapt the stoping drill to drifting work. This has been only partially successful; as a temporary expedient in work of short duration or in certain kinds of development, the reverse feed stoper has proven valuable. One difficulty encountered by it is the fact that the rate of feed cannot be varied, as it can with the feed screw machine. If the cutting is soft or uneven, a heavy feed stoper will drive forward as the resistance decreases and bind the bit. This means freeing the steel by hand, with great loss of time and effort on the part of the runner. If the reverse feed stoper is fitted with a light feed, to handle soft cutting in ore, no impression will be made when rock is encountered. Another objection is that the length of the stoper, when arranged for drifting, makes it clumsy to operate in cramped quarters and impossible to dip for cut holes, as the long feed cylinder strikes the roof.

The problem of eliminating the feed screw and crank with its attendant reduction in drilling speed, loss of time in moving about the drill, changing steel, etc., has at last been solved, however, and the solution is embodied by the Sullivan Machinery Co. in a new type of mounting for its automatically-rotating, hand-feed hammer drill. The idea for this mounting came from the southeast Missouri lead district, where a home-made affair, used for mounting hammer drills for drifting work, in the disseminated lead ore formation, showed great promise.

The perfected mounting, which has now been on the market for a number of months, consists of a feed cylinder and piston, similar to the reverse feed type employed for mounting stopers. Instead of one port leading to the back end of the cylinder, to drive the feed piston, and with it, the drill, forward against the work, two ports in the piston rod are employed, one conducting the air to the rear end of the feed cylinder and one to a point just forward of the feed piston. By this means, the first great advantage of this feed mounting is secured, namely, the drill is not only advanced to its work by air power, but is withdrawn from it by the same means.

At the will of the operator, air can be admitted to the rear of the feed cylinder only, to carry the drill

forward against its work; to the front end of the cylinder only, to carry the drill and steel back from its work; or to both sides of the feed piston at once, in which case a forward feed of modified strength is secured. The drill may be operated so that the steel continues cutting and rotating with the air feed acting in any one of these three positions. The feed may thus be regulated to suit the character of the ground being



Sullivan "DP-33" Water Tube Rotator in use on pneumatic feed and "U-20" Column for drifting

drilled, and when spotting a hole, crossing a slip, or cutting through a bug hole or mud pocket, the operator can so manipulate the action of the drill as to prevent its becoming stuck and to use just the right kind of blow in order to get the best and most rapid results. These changes of operation are all controlled by a common throttle valve, which admits air to both ports of the feed, and to the drill, as well, as required. This throttle can be operated from in front of the drill, if desired, or at either side. The runner does not have to stand behind his machine in order to operate it, but, if he wishes, can stand in front, with both hands directing the steel after the throttle has been set in the desired position. A supplementary throttle or hand wheel just inside the main throttle controls the rate of feed, as described above. When in one position, the full feed is effective for forward work against hard

rock or on holes pointing upward. In the second position, the differential feed is employed, securing a retarded rate of feeding, for down holes or soft rock.

A second scheme of controlling the feed is provided in a mechanical brake or retarder, controlled by a hand wheel, and placed at the forward end of the feed cylinder. This consists of a brake band surrounded by a coiled spring, which is tightened or released, as desired, by a hand wheel controlling a worm and gear. This retarder enables the runner to lock the feed piston in any desired position and to vary the strength of the feed still more than is possible by means of the supplementary throttle.

The writer has operated this machine in mines in northern New York, New Jersey, Wisconsin and Colorado, and has seen the pneumatic feed in operation in a great variety of conditions—in hard and soft drilling, in even ground and in ground full of seams and bug holes. By manipulating the supplementary throttle valve and the hand brake, the runner can adapt the feed to any kind of cutting, and with a little care and practice, can drill through any slips or pockets by working his brake and reverse to keep the bit free. With a light brake and reverse feed, he can cut his way out of any difficult ground, in which a feed screw would wedge the bit solid.

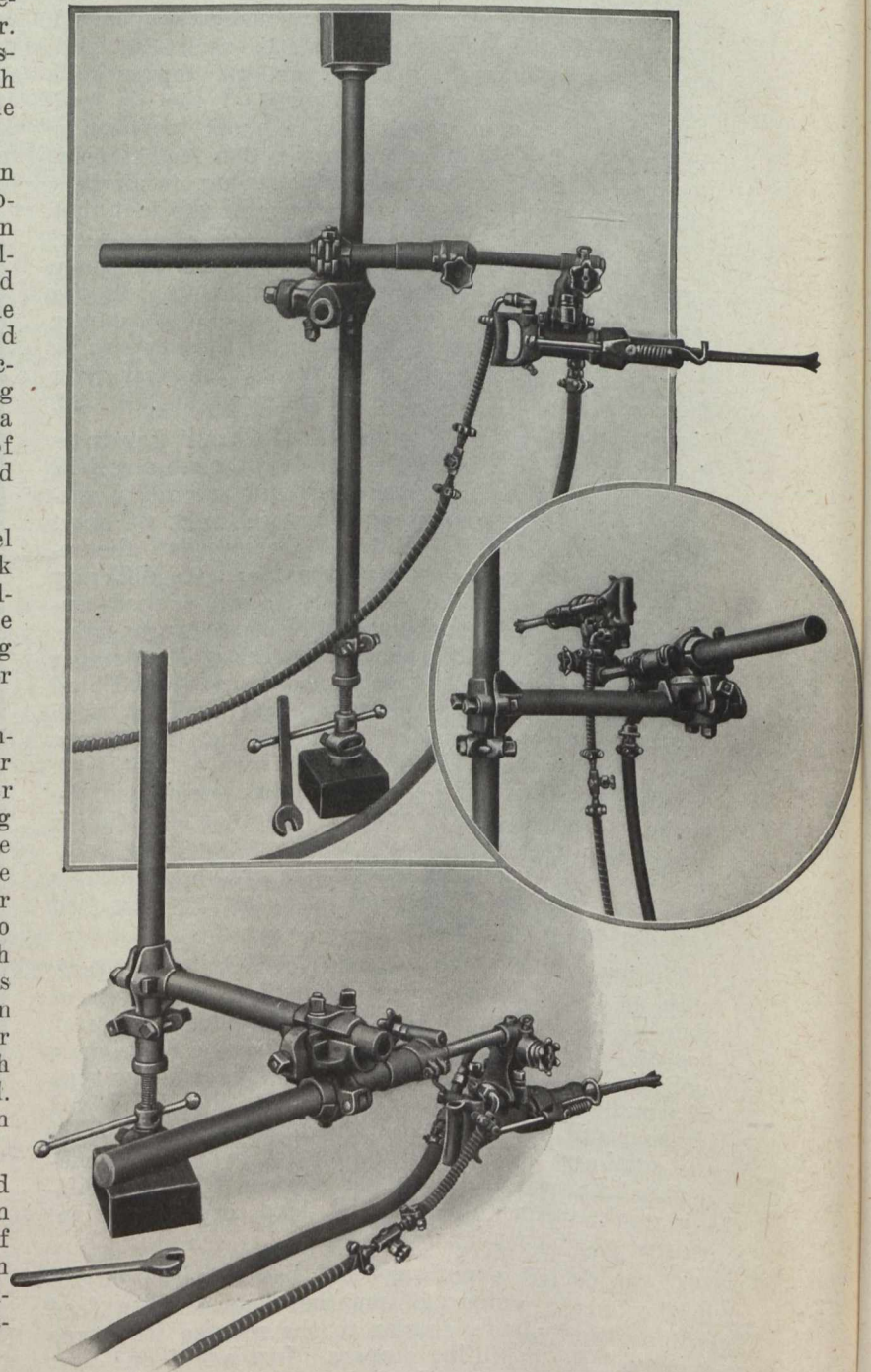
The reverse feed pulls the drill back with the steel instantaneously, saving the time lost in cranking back a feed screw machine and the labor expended in pulling back a stopping drill used as a drifter. The complete operation of pulling back, changing steels and running up to the face with a fresh steel, should not take over thirty seconds.

The drill feed cylinder is supported in a cradle trunnion which fits a standard saddle for a column arm or tripod. By shifting the position of the feed cylinder in the trunnion, back or forward, steels of varying lengths can be employed; in combination with the two-foot run of the feed piston, this makes it possible to accommodate a variation in lengths of steels of four feet; for instance, to change from a two-foot starter to a six-foot second, the starter should be run in with the feed cylinder pulled forward until only its end is clamped in the cradle. With the starter withdrawn from the hole and the feed piston in its extreme rear position, the feed cylinder may be slid back through the cradle until it is clamped close to the forward end. The six-foot steel can now be inserted and run down to its full depth, by reversing this operation.

By the above method, the runner can handle a round in an irregular heading without changing the position of the column. The most interesting use, however, of this change of position of the feed cylinder occurs in slicing, when the reach of the machine may be extended to take in a greater number of rounds, without sacrificing any of the length of the previous steel.

Method of Mounting.—If the air feed, with its practically automatic forward and reverse action, constitutes a remarkable improvement, the method of mounting the drill is no less remarkable. The drill is attached to a saddle, which forms the end of an offset arm, about 9 inches in length. The common air inlet and throttle valve for both the drill and the pneumatic feed is situated in this arm. To mount the drill on the feed, it is merely necessary to remove the throttle valve that goes with the machine when used for hand drilling, and place the valve chest of the drill in the saddle.

By tightening three clamp bolts, the rotator is converted from a sinking or block-holing tool, into a mounted drifter. This offset arm, swinging slightly as it does on the feed piston and cylinder, enables the drill to follow the steel, keeping always in line with it, so that the steel may work itself free without bind-



Sullivan Water Tube Rotator on "D-62" Pneumatic Feed and "U-20" Column. Various positions of the drill and mounting for work of different kinds.

ing, as is so frequently the case on a rigid feed screw mounting. To change steel with this rig, it is merely necessary to stop the machine by turning off the air, loosen the steel retainer with one hand, pull the drill chuck back off the steel, swing it to one side on the offset arm and pull out the used bit. By tightening up

the hand brake, the offset arm may be held in any desired position while changing steels.

A handy feature of the pneumatic mounting, provided by this offset arm, consists in the fact that holes may be drilled with the arm above the feed piston, and then, by swinging the arm and drill under the piston, other holes may be drilled without touching a nut or bolt of the mounting. By this swinging action, two holes 18 inches apart may be put in very rapidly. The use of reasonable judgment and forethought on the part of the drill runner will enable him to space out his round in such a way as to take one hole with the drill over the feed piston and the next with the feed below, so that he can get the round in in half the number of moves that were necessary with the feed screw mounting. A drift 8 x 7 feet in size can be handled from one set-up of the column, by employing an arm of suitable length.

Another advantage in the offset arm, not mentioned above, is the fact that, by its use, holes may be put in at practically any point in the face, including close to the wall, roof or floor of the working. By shifting the position of the drill in the saddle and cradle, holes can be put in at any desired angle. The drilling of cut holes in small drifts is easily accomplished by setting the column a proper distance from the face and shifting the feed cylinder in the cradle, as the angle of the holes may require. The action of the air feed drifter is so rapid as to surprise those that have not seen it, and the variety of work which it can accomplish is equally remarkable.

The low vibration which falls on the drill and on the mounting, due to the air cushion provided by the air feed cylinder and piston, permits the use of a light column and arm, which are a great assistance in confined work and one-man drilling. The standard mounting used with this rig is a 2½-inch column, on which arms up to 36 inches in length can be used without undue vibration.

The absence of a crank and feed screw to operate, the absence of chuck bolts to tighten and loosen, and the reduction in the number of stuck steels, are items which reduce the amount of labor required and make the work of the drill runner lighter and more congenial. Once the drill is started, with the brake set for the proper feed, the operator is free to leave the drill until the run is completed. In the meantime, if he knows his work, he can pick out the next steels, measure them for length and gauge, blow them out and put them in position for a quick change; or, he can be squaring up a place for the next set-up of the column, or cutting his fuse and preparing his powder for shooting.

As suggested above, the pneumatic feed, in combination with the Sullivan rotator, makes a machine that is practically an all-around drilling tool. The drill itself weighs forty pounds, the pneumatic feed cylinder and piston, with offset arm, sixty-five pounds; so that the outfit can be handled readily by one man and carried by him into any part of the mine and there set up. When the round of holes in the drift is completed, if there is sinking or block-holing to be done, the loosening of three clamp bolts frees the drilling tool proper, and by substituting the regular throttle valve, the machine is ready for any kind of hand feed drilling work. A minute or two is sufficient to make this change. Should raising be required, or upper holes, the drill on its mounting can be removed from the

column arm, and the rear end of the feed piston, set against a rock or abutment. The drill then becomes an automatically rotating, water jet stopper, of the most efficient kind.

These features render the pneumatic feed mounted rotator a popular machine with leasers and mining companies beginning operations on a small scale. The same drill can be used for shaft sinking, cross-cutting and stoping, with minimum expense and delay.



Putting in a "lifter" with the drill under the feed piston.

The air feed, with offset arm; the light, improved hammer drill, with automatic rotation of steel; the steel retainer and water attachment combine in one drilling tool all of the improvements considered most valuable and advanced in rock drilling mechanism. In short, the pneumatic feed mounting, with the water tube rotator, forms a combination that is the last word in drill design. The mine operator welcomes it for its unexcelled daily footage and low repair and power cost per foot drilled; and the runner boosts for it as the easiest one-man drill to operate that is on the market.

STANDARD CHEMICAL IRON.

The Standard Chemical Iron and Lumber Company, Limited, is out with its 1915 report. This shows a complete reversal of form, as compared with 1914, in which latter year the business depression had a marked effect on the affairs of the company. Judging from the whole tenor of the present report, and taking into consideration the fact that prices of commodities have scored a distinct advance operations for the current fiscal year should net the largest returns in the company's history. For the year ended December 31st last, gross profits, including those of the subsidiary companies, amounted to \$301,859, as compared with \$21,509 the previous year.

TEN YEARS' MINING PROGRESS IN BRITISH COLUMBIA

The total value of the mineral production of British Columbia for all years to the end of 1915 has been \$516,122,000. More than one-half of this large value, about \$267,459,000, was the production of the last ten years. That is to say, the value of the production of the ten-year period, 1906-1915, was somewhat greater than that of the 54 previous years included in the official records.

A few weeks ago it was stated at a public meeting in Victoria that the production of the metalliferous mines of the province was \$15,000,000 in 1905 and \$15,000,000 in 1914, and that in the intervening ten years there had not been one dollar increase. That was a misstatement. As a matter of fact, the value of the metalliferous minerals produced during five years, 1906-1910, was \$70,133,000, or nearly \$16,000,000 a year, and during the last five years, 1911-1915, \$84,485,000, or nearly \$17,000,000 a year. The accompanying comparative table shows the quantities and value of the various minerals produced in British Columbia during the two five-year periods just mentioned, and exhibits the actual position, which is that during the last five-year period, as compared with the first similar period, there was an increase in quantities of gold, silver, lead, copper, zinc, coal, and miscellaneous products, and a decrease only in coke, while the increase in value of metalliferous minerals was \$1,070,298 a year, and of coal and coke together \$495,978 a year. And it should be remembered, as affecting the production of coal and coke that during the last five years there were labor strikes of longer duration in both of the big coal-producing areas of the province than in any other period in its history, leaving out of account the unfavorable effect of both the use of fuel oil and of the war.

Very briefly reviewing the position to-day of the mining industry, the following facts are evident. The outlook for increased production of placer-gold is more favorable than for several years, both for Cariboo district, now that railways are more accessible, and for Atlin, with its productive area being enlarged. More lode-gold will be produced in the near future from mines in Rossland, Boundary, and Similkameen districts, while in the Coast district (Surf Inlet, Anyox, and Omineca) there is also promise of an increase. Activity at Slocan and Ainsworth district mines, warrants the expectation of more silver being produced, while in less degree this metal will come more freely than in recent years from mines in districts where it occurs in association with other metals. Slocan and Ainsworth will also produce more lead, and East Kootenay will doubtless do the same, for with the bigger output of lead-zinc ore from the Sullivan mine, already arranged for, this is assured. The production of zinc will make substantial progress in the immediate future, for not only will there be a considerable quantity of this metal produced at the new zinc works at Trail, but, as well, several mining companies have made arrangements to ship much zinc ore and concentrate to the United States. As to copper—never before was the situation so favorable, for two or three large mines in the Coast district are now in a position to produce freely, while interior mines are maintaining their output. And the coal-mining companies, too, have prepared for a greatly enlarged production, new mines having been opened during the last year or two on Vancouver Island, while in the Crowsnest district immense coal areas, not heretofore worked, have been opened, ready for operation whenever the market for

coal shall make demands upon them. The greater activity at smelting works that is assured will involve the manufacture of more coke. It is of interest to note, in this connection, that one big company has obtained from its shareholders sanction to raise a large sum of money for saving by-products from coke-making.

The advances made and being made in metallurgy are significant. The electrolytic refining of lead has long been an established industry at Trail. Now preparations for producing refined zinc there are well forward, and it will not be long before copper will also be refined electrolytically there. A notable feature in economy at the Trail works is the successful adoption of a process for the electrical precipitation of metals contained in the fumes from the copper, lead, and zinc furnaces and roasters. The modern flotation process to increase the saving of metals in concentration of ores is in profitable use in Slocan district on lead-zinc ores and at Britannia Beach, on the Coast, on copper ores.

Transportation facilities have been, and are being improved, in various parts of the mining districts. The extension of railways, the construction of wagon-roads, and the installation of aerial and other tramways, all tend to reduce costs and thereby to make mining profitable.

Half a dozen or more of the companies operating metalliferous mines in British Columbia are now on a dividend-paying basis, making periodical distributions of profits among their shareholders, and quite recently the Crow's Nest Pass Coal Co. declared a dividend after an interval of four years, during which comparatively large liabilities were entirely discharged.

On the whole, then, it would appear that the Provincial Mineralogist is well warranted in using these words with which he concluded the recently-issued "Preliminary Review" for 1915: "Generally, it may be said that the outlook for the larger operating mining companies of British Columbia is more promising than at the beginning of several successive late years. There is a good demand for the metals they produce, prices subject to fluctuations are higher than at this time last year, operating conditions are favorable to a comparatively large production, and there is no present prospect of any set-back to interfere with the progress that it is now confidently expected will be made in 1916."

Comparative Table for Two Five-Year Periods.

Mineral.	Five Years, 1906-10.		Five Years, 1911-15.	
	Quantity.	Value.	Quantity.	Value.
Placer gold	*172,020	\$3,440,400	*140,075	\$2,801,500
Lode gold ..	*1,181,713	24,426,009	*1,249,915	25,835,742
Total gold.	*1,353,733	\$27,866,409	*1,389,990	\$28,637,242
Silver.	*13,350,082	7,406,914	*15,526,901	8,234,242
Lead	†222,397,745	9,687,444	†223,723,948	8,740,656
Copper	†214,939,001	33,485,392	†237,759,685	36,202,033
Zinc	†15,699,192	687,273	†36,435,867	2,670,280
Total value, metalliferous		\$79,133,432		\$84,484,924
Coal (after deduction of that made into coke)	‡9,801,741	33,547,443	‡10,316,980	36,109,430
Coke	‡1,146,271	6,678,399	‡1,099,384	6,596,304
Miscellaneous products..		6,175,200		14,734,001
Total value of production.		\$125,534,474		\$141,924,659

*Oz. †Lb. ‡Long tons.

SPECIAL CORRESPONDENCE

PORCUPINE, KIRKLAND LAKE, SWASTIKA

Dome.

The construction work at the Dome Mines has now reached a stage where the activity is at its height. The central shaft is almost completed and the foundation for the head frame and the hoist house are already in. Within a very short period it will be necessary to sink this shaft to the 800-ft. level as from that point the cross-cut is to be run towards the Dome Extension line, at the 800-ft. level. This cross-cut must be run into Dome Extension ground and it is from it that all work will be undertaken on the Dome Extension. The taking over of this option on the Dome Extension will entail a good deal more work on the Dome management. Excavations are also well under way for the secondary crushing plant. The first crushing of the ore will occur at the 600-ft. level in the big steel-jaw crusher. The second crushing will occur at the rock house which is being built half way between the new central shaft and the mill. Here a big and a small jaw crusher will be installed to break rock so that it will pass through a two and a half-inch trommel. A big gyratory crusher will be installed as an auxiliary. The ore will then go direct to the Hardinge mills and the stamps. One of these eight-foot Hardinge mills is now treating about 350 tons a day. When it was first installed the feed was crushed to 1½ inches, but in order to raise the tonnage it was raised to 2½ inches. Ten stamps have been removed to make room for the second Hardinge mill which should be back from Toronto any day. It was sent from the factory some weeks ago but was found to be out of line and was sent back at the owner's expense to be put into shape. There is no doubt that the management of the Dome intends to supersede stamps with Hardinge mills as occasion offers. The two tube mills are now installed and are now ready to run and the mill at the Dome should be crushing forty thousand tons a month by July. The production during the month of March was a record both in respect to production and of tonnage crushed. The grade of the ore was a little lower, but it can be regulated to suit the requirement of the management. The bulk of the ore is still coming from the big glory hole on the surface but the grade of the mill feed is raised from ore from development. Before satisfactory extraction can be made from the ore coming from the lower levels of the mine the present mill will have to be very radically altered. It is possible a new one will be built when the low grade ore from the upper levels is exhausted. The record for the first three months of the year at the Dome was as follows:

	Ore Milled.	Bullion Recovered.	Value Per ton.
January	31,600	\$176,990.00	\$5.58
February	32,040	163,500.00	5.10
March	34,300	173,380.00	5.05

The Dome is now seriously considering the comforts of its employees. The growth of the mine has greatly outdistanced the growth of the accommodations for the men and plans are now being drawn for a dormitory for the single men and blocks of double houses for the married. The dormitory will be one of the most comfortable and hygienic ever erected in the north country. There will be on the first floor a large rotunda, around which will be reading and writing

tables. Around this hall will be bed rooms, each man having his own bed and only two men in a room. The building will be of three stories and on each story a lavatory and a bath. For the married men a series of double houses are to be erected. Ten will be put up in the first block, but it is anticipated that forty will be set up in a very short time. To-day most of the men working at the Dome live in South Porcupine, a distance of a mile and a half. The accommodations in the dormitory will be for ninety-two men.

Mr. J. C. Houston has settled down as general superintendent of the Dome and is now attending to most of the details of the work of what is now becoming such a large organization. Mr. C. D. Kaeding is making good progress with the annual report.

Dome Extension.

The arrangement whereby the Dome agrees to take up the option on the Dome Extension has aroused a great deal of controversy. It appears to be a clear cut agreement upon which there should be little argument, and it should be for the benefit of both companies. The Dome takes an option on the total assets of the Dome Extension Mines for the sum of \$1,150,000 to be paid for by the issue of \$46,000 Dome shares. The option is open until October 15th, 1917. Under this option the Dome Mines must sink their shaft to a depth of 850 ft. and carry a drift at 80 ft. into the territory of the Dome Extension. It is provided that not less than an average of 100 ft. of drifting should be done on the Dome Extension every month and that not less than \$5,000 should be so spent. At the same time the Dome Extension may proceed with any work they may see fit as long as they do not interfere with the Dome development. The Dome Extension have full right to see and inspect all work carried on by the Dome and they will have access to the assay sheets of the Dome work at all times. The option will provide for the development of the Dome Extension for the next year and a half. It is believed by everyone in the camp that the orebody found on the big Dome dips into the Dome Extension at a depth of 1,200 ft. or thereabouts, and in this case the development of this part of the property should show some very valuable ore.

McIntyre.

Construction both underground and on the surface at the McIntyre group is very active. After considerable figuring it was finally decided to build a surface tramway between the No. 5 shaft of the McIntyre and the Jupiter shaft. This will entail a line of rails for three thousand feet around Pearl Lake. From No. 5 shaft the aerial tramway will be doubled to the McIntyre mill in order to carry the extra ore. At any time when the connection is made between the No. 5 shaft and the Jupiter ore can be taken out. Ore is broken in the stopes at the Jupiter at the 50, 100, 150 and 200 ft. levels and it can be broken at the 300 ft. level on a very short notice. The head frame and rock house on the Jupiter were long delayed by the non-delivery of material, but are now nearing completion. A careful sampling of the Jupiter ore is provided for in the rock house at the Jupiter before it leaves the mine. It will be broken to 2½ inches before it is loaded on the surface cars. Notice has been received by the McIntyre Company that the two vertical compressors ordered by the Jupiter Company a year

ago have at last been shipped. In the meantime the old compressor at the Jupiter will be used until the big machines arrive.

The new unit at the McIntyre mill is in full running order. Advantage was taken of the fact that Jupiter ore could not be delivered for some time, to shut down one of the existing units and clean it up. The enlarged mill is now treating about 370 tons a day of McIntyre ore, and last month about 10,000 tons were handled.

Copper and Molybdenite.

Copper and molybdenite are being mined by a Montreal syndicate along the Transcontinental Railway about 200 miles east of Cochrane. The copper prospect is to the north of the track near Spirit Lake. The molybdenite is coming from the orebody known to exist on Keewagama Lake which is a little south of the track.

The headquarters for these operations is at Amos. It is understood that a quantity of both copper and molybdenite has been assembled and may be shipped at any time. The demand for copper ore has caused a very keen search for that metal all over the north country. The Rand Syndicate have taken an option on two deposits in on Temagami Lake, one of them on Cedar Lake, and the other on Temagami Lake itself. One car has already been shipped, another has been assembled and another will soon be taken out. Previously not more than one or two cars of copper ore have ever left the north country.

Deloro.

The activity in Deloro continues to increase as the spring advances. The Porcupine Premier Mines, formerly the Old Standard, is now pumped out and two drills are running east and west on the 100 ft. level. Good results have been obtained in at least one drill hole by the La Rose on the Maidens-Macdonald property.

Mr. Clifford E. Smith is in Porcupine personally superintending the work on the Ankerite claims upon which the Coniagas Mines have taken an option. As soon as supplies can be taken in work will commence here and it is probable that diamond drilling will be undertaken. The most strenuous campaign is on the Chisholm Vet, where Mr. Thomas is running five diamond drills for the Chisholm Corporation Limited. With these drills an attempt is being made to fairly thoroughly gauge the possibilities of this property. Each drill is put down at an angle of 45 degrees to 1,000 ft.

Dome Lake.

Mr. A. H. Brown has resigned his position as manager for the Hudson Bay Mining Company. Since the old mine shut down at Cobalt, the Hudson Bay Mining Company have been largely interested in the Dome Lake and it is at this point that Mr. Brown has been located. The foundation for the new cyanide plant at the Dome Lake has been completed for some time and it is believed that the first ore will be treated about the end of this month. It is an entirely new process and the results will be watched with keen interest all through the district.

West Dome.

Mr. Trethewey has taken up his residence on the West Dome Consolidated. The old shaft has been dewatered and sampling is now in full progress. As soon as possible a diamond drill will be set up in the low-lying land between the West Dome Consolidated and the Dome Lake and several holes put down. There

is every indication that the company intends to carry on a vigorous campaign of development this summer.

Porcupine Crown.

The Porcupine Crown have let contracts for a system of exploration with the diamond drill on the 500-ft. level. Flat holes will be run at regular intervals in order to endeavor to give further ore bodies. The last month has been satisfactory at the Porcupine Crown inasmuch as production has been a good deal higher than it was.

COBALT, SOUTH LORRAIN, GOWGANDA Flotation Processes at Cobalt.

More and more attention is being paid to flotation in the camp. The representatives of the General Engineering Company who hold the patent of the Cal-low Pneumatic Process believe that most of the old dumps in the camp will be well worth treating and there is a project to form a company to erect a plant to treat all these old dumps. Most of the existing companies in the camp are considering the advisability of putting in flotation to raise the extraction on the slimes. McKinley-Darragh and Buffalo already have these plants under construction.

The McKinley-Darragh is putting in two double-length roughing cells and two cleaner cells. They are also leaving room for two more cells if necessary. The present equipment will provide for treatment of 150 tons a day. The Buffalo is putting in a plant which will be capable of treating 600 tons a day of their tailings and also low grade ore they may take out of the mine. This plant will consist of eight 9-ft cleaner cells. Research so far leads to the conclusion that the higher extraction from flotation will lead to the treatment of lower grade mill ore than has heretofore been possible.

The fact that the experiment with the flotation plant is not at all expensive and the operating costs light, makes the experiment a very desirable one for the Cobalt camp. Concentration mills in the camp are still not making a much higher extraction than 80 per cent. and flotation will quite materially increase this. In existing mills the treatment will be over the sand tables as at present, but the slime tables will be taken out and flotation plant installed in their place.

Prospecting.

The advance in the price of silver is bringing to life many old prospects and some new ones. In Cane Township, near Elk Lake, several companies are working on veins in the diabase. These veins show considerable native silver and several mining companies are working on them. The Royal Mines, a newly formed Montreal Company, has installed a plant and is doing considerable work. On the McCrea claims work is also in progress. The Genessee Mining Company working a prospect in the conglomerate north of the Hudson Bay Mining Company is making good progress with the shaft. The barren calcite vein is growing wider and its silver content is increasing. At about 70 ft. it runs from 30 to 40 oz. in silver.

South Lorrain.

The Comfort Leasing and Mining Company on the Wettlaufer in South Lorrain is now in full operation. Drills are running and some high-grade has already been taken out.

The Belle Ellen Mining Company in South Lorrain is also making fairly good progress and obtaining satisfactory results.

Nipissing.

The Nipissing report for the month of March gives some interesting information as to progress north of the town. After some disappointment another shoot of ore has been struck on vein 490. This was discovered 112 ft. below the fourth level of the Meyer. The ore is not high grade, but there is every indication that good ore will be cut. Another level is to be sunk at shaft 80 from which the ground near the City of Cobalt boundary will be prospected. On their ground the City has had such remarkable success that it is believed most likely the Nipissing will find a good body of ore on their property. The shaft from which the Cobalt Lake fault will be developed on Nipissing, is now down to the 400-ft. level. The first drift will be run at 325 ft. and the second at 525 ft. As good ore has been found on the Cobalt Lake Fault at 450 ft. the Nipissing should soon reach a very interesting stage of development at this point. The production from the Nipissing for March was \$2,000 less than in February, but \$19,856 more was shipped in Nipissing and Customs bullion.

NOVA SCOTIA

Dominion Coal Production.

For the first quarter of the year the production of the Dominion Coal Company shows an increase of 253,000 tons compared with the first quarter of 1915. For probably the first time in the company's history, the coal mines have worked through the winter months as steadily as is the custom in the summer months, and although in many parts of Eastern Canada the winter was an unusually severe one, yet in Cape Breton the interruptions from snowstorms were very minor. That with an output capacity so seriously diminished by enlistments the Dominion Coal Company should have been able to show an increased production of over a quarter of a million tons of coal in the first quarter, is explainable by two conditions, namely that the first quarter of 1915 showed very much below the normal production, even of the winter period, and the quarter just elapsed has been one of continuous operation, although with a reduced number of workmen.

The outputs actually obtained compare with 1915 as follows:

First quarter:	1916.	1915.
Glace Bay Mines...	1,126,000	864,871 tons.
Springshill Mines...	100,000	98,791 tons.
	<u>1,226,000</u>	<u>963,000 tons.</u>
Increase		253,000 tons.

From the first of April onwards, however, the monthly outputs will not show anything like this rate of increase, but will probably show a decrease when compared with 1915, so that by the end of the summer of 1916 the production for the year to date will, from present indications, have fallen below the figures of last year. That is to say, the increased production at the end of March will have been replaced by a decreased tonnage figure, say by the end of September.

The financial year of the Dominion Coal Company ends at the 31st of March in each year. The revival of trade commenced to be felt about the month of April, 1915, so that the financial year 1915 of the Dominion Coal Company should compare very favorably with its predecessor, and will indeed be not only the best year for production since the merger of the Steel and Coal Companies in the Dominion Steel Corporation, but the best year in the Coal Company's history.

The demand for coal for railway use at the present time is quite striking, and it is, of course, a natural outcome of the general activity that all railroads in the United States and Canada are now experiencing. Some of this activity, probably more than is suspected, is the result of the greatly increased cost of water transportation, the effects of which are quickly felt in a country like Nova Scotia, where, because of the shape and geographical features of the country, rail freights have always been largely controlled by water freights. The Intercolonial Railway is particularly busy, and is being taxed beyond the capacity of the present rolling stock and engine power by the demands that are being made upon it for the conveyance of freight, plus the movement of military stores and troops. The great waterway of the St. Lawrence and the Great Lakes has always provided Canada with healthful competition between rail and water transportation, but the increase in shipping freights to-day affects equally the Great Lakes routes and ocean-borne trade. There seems no reason to anticipate any reduction in freight rates in the near future, and there are a good many reasons to anticipate a still further increase in the cost of water transportation. Shipping freights are absurdly high to-day, showing increases of over one thousand per cent. on the rates of normal times, but the tendency is upwards, and it may be that even the extraordinary rates of the present time will seem cheap in a year from now. Therefore it seems reasonable to expect a heavier demand for coal from the railways, coupled with large orders for locomotives and rolling stock. It may be that the net result when normal days come again will have been the general improvement of the railroads, and that the financially improved conditions of the roads will have enabled some elimination of bad grades and the necessary amount of double-tracking to enable full advantage to be taken of the present roads. Surely not for much longer will a single-track railroad from Montreal to Sydney suffice for the needs of the Province of Nova Scotia. However that may be, the present activity of the Intercolonial Railway means quite an appreciable increase to the demand for coal in Nova Scotia.

"In last year's report reference was made to the depressed condition of the iron and steel trade as experienced for the great part of that year, and which reached a crisis with the outbreak of the great war at the beginning of August and for two months following largely paralyzed the ordinary activities of the Company. It was only during the last few weeks of the calendar year 1914 that any improvement was manifested when certain munition work was undertaken and some two hundred thousand shrapnel shell bodies were produced at the New Glasgow plant. That report pointed out that when the year closed the Company had been entrusted with ordnance material orders sufficient to keep the plant fully occupied for the first six months of the present year.

"The additional forging presses and other plant requisites for the execution of the very considerable order then entrusted to the Company were installed as rapidly as possible. Equipment for the finishing and assembling of shrapnel shells was also then installed. This was followed in May by building and equipping of a second finishing department for machining and assembling 4.5 and sixty-pounders high explosive shells. For the calendar year 1915 there was manufactured in the Company's forges nearly three million of shell bodies, comprising four different sizes of shrapnel and high explosive shells. During the closing months of 1915 we contracted for a further large ton-

nage of shell forgings including larger sizes than have hitherto been made in the Dominion. To enable us to undertake this munition work it was decided to instal a further unit of larger and more powerful presses, for forging shells up to 19-inch diameter. Orders for the necessary presses, accumulators, pumps, boilers and other plant have been placed and the foundation for this machinery is now all in place. The buildings erected are practically completed, some other plant is already on the ground and the balance will be installed so soon as we can get a delivery, and it is expected that within a few weeks we will be turning out a considerable tonnage of large shells. To aid in providing the large additional quantity of steel required to fill the contracts referred to, your directors in November last decided on an additional sixty-ton open hearth furnace at Sydney Mines and this furnace was actually producing steel within four months from the date of that decision which, under existing conditions, we considered work. The iron and steel operations were considerably greater than in 1914, and were as follows: Coke made, 90,277 tons; limestone and dolomite quarried, 79,211 tons; pig iron made, 73,110 tons; steel ingots made at Sydney Mines, 97,072 tons; steel billets rolled at New Glasgow, 76,082 tons; total shipments of finished steel forgings from New Glasgow plants being 60,283 tons.

"Owing to the great shortage of suitable steamers for transportation, the abnormally high cost of shipping and shortage of skilled labor, due to enlistments, mining was not proceeded with as vigorously as in former years, the total coal mined being 618,103 tons, or 134,050 tons less than the previous year. Of this tonnage there was used in the manufacture of iron and steel and other plants of the Company 284,971 tons, or 110,323 tons more than the previous year. We supplied to the collieries' workmen 13,432 tons; sold in Newfoundland and Maritime Provinces slightly over 140,000 tons, while shipments to Montreal and other points on the St. Lawrence River were 125,000 tons, being only about 40 per cent. above the previous year. Our coal consumption has increased by reason of our larger operations and are likely to further increase during the current year. Therefore, the coal sales this year in the open market will be comparatively small. The coal royalty paid to the Nova Scotia Government for the year 1915 amounted to \$69,914. Owing to the depressed conditions of the iron and steel trade during the first half of 1915 and especially the great shortage of suitable shipping and exorbitant cost of freighting, but a comparatively small quantity was sold for delivery in the United Kingdom and no sales were made in the United States.

"The iron ore output was 125,069 tons, being the smallest output for many years and was nearly all used in the company's own operations. The royalty paid the Newfoundland Government during the year was \$14,253.22.

"Shipping freighting conditions during 1915 were abnormal by reason of the interruption of the regular business of the company due to the war and the large amount of new business arising out of the war."

BRITISH COLUMBIA

Several companies operating metalliferous mines in British Columbia recently declared **dividends**. The Consolidated Mining and Smelting Co.'s quarterly dividend, at the rate of ten per cent. per annum, totalled \$145,125. The Granby Consolidated Mining, Smelting

and Power Co.'s quarterly dividend at the rate of six per cent. per annum, amounted to \$224,979; the Hedley Gold Mining Co.'s quarterly dividend and bonus, together 5 per cent., totalled \$60,000; the Standard Silver-Lead Mining Co.'s next monthly dividend of \$50,000 payable on April 10.

From time to time opponents of the Provincial Government have alleged that there are Orientals working in coal mines on Vancouver Island who have not passed the examination for coal-miners prescribed under the Coal Mines Regulation Act, or who are not entitled to hold a coal miner's certificate under that Act. It has been announced that in order to meet such a situation, if the allegations be true, it is the intention of the Provincial Government to bring in a bill during the current session of the Legislative Assembly which will provide for re-examination of all Oriental miners working in the coal mines of the Province.

West Kootenay.

Slocan.—Mr. Bruce White, one of the discoverers of the property near Sandon for years known as the Slocan Star silver-lead mine, now manager of the Noonday Mining Co., was lately reported in the press to have said: "Since I first went to the Slocan country, in the autumn of 1892. I have never seen such severe weather as we have had during the winter now closing. It made both development work and production almost impossible, but despite this fact one result of the winter's work was to demonstrate that in at least two mines the veins and oreshoots persist to considerable depth. After having done much exploration work, the **Slocan Star** has opened a splendid body of ore on a level 1,000 ft. below the outcrop, while the **Noble Five**, in a new lower tunnel, has proved the persistence of its orebodies to a relatively lower horizon. There are indications that in the Pavne mine the results of development work in the deep will also be similar."

Boundary.

From the Greenwood "Ledge" it is learned that Messrs. Houghton & Oliver, lessees of the Jewel-Denero Company's Jewel gold mine, at Long Lake, eight miles from Greenwood, have nine men at work and have 1,500 tons of ore ready for being milled. It was intended before the end of March to increase the number of men to work in the mine and to resume operating the 15-stamp mill there.

Announcement has been made recently that it is expected a **second blast furnace will shortly be blown in at the British Columbia Copper Co.'s** smeltery at Greenwood. On August 23, 1914, smelting operations were suspended at these works, owing to copper-marketing difficulties resulting from the war in Europe. On July 26, 1915, one of the three furnaces was blown in, the available supply of ore having been insufficient for larger operations being then undertaken. As the blowing-in of another furnace appears to be planned, it is to be inferred that more ore is now obtainable for reduction here. Dr. Alfred W. G. Wilson, in The Copper Smelting Industries of Canada (Mines Branch of the Canada Department of Mines, 1913, No. 209) states, on p. 127, that "there are three water-jacketed blast furnaces in the cupola building. Originally these furnaces were 340 by 240 in. at the tuyeres; the capacity was increased in 1910 about one-third by widening the two end furnaces to 51 in. and lengthening them to 360 in." The centre furnace was similarly widened. Mr. Frederic K. Brunton, in a paper pre-

pared for the San Francisco meeting of the American Institute of Mining Engineers held in September, 1915, an abstract of which paper was printed in the Canadian Mining Journal of July 15, 1915, pp. 440-43, stated that those enlargements increased the total smelting capacity of the three furnaces to 2,400 tons a day. In his introductory comments Mr. Brunton said that this smelting plant "is of special interest to metallurgists for several reasons. It was successfully smelting in blast furnaces the lowest grade copper ore of all plants in America. In order to do so, it had to be run at very high efficiency, which necessarily required a large tonnage per square foot of hearth area, together with the minimum amount of labor and other costs. The furnaces smelted daily 2,250 tons of ore (6.62 tons per square foot of hearth area), containing 0.85 per cent. of copper, at a smelting cost of \$1.18 a ton. The entire plant required 130 men to operate it and keep up repairs, showing a labor efficiency of about 17.5 tons per man per day."

General Notes.

The incorporation of the **Wild Horse Creek Placer Gold Mining Co., Ltd.**, with an authorized capital of \$100,000 in 1,000,000 shares, par value 10c each, has been gazetted. It is probable the scene of this company's operations will be on Wild Horse Creek, Fort Steele division of East Kootenay. A mining bulletin, published some time ago by the Provincial Government, gave brief information concerning that placer-gold field, as follows: "The commencement of mining operations in the East Kootenay district dates from 1864, when discoveries of rich alluvial gold deposits were made on Wild Horse creek, which flows into Kootenay river at Fort Steele. It is officially estimated that ordinary claims on two miles of this creek yielded from \$20 to \$30 to the man per day, and that from 1864 to 1866 five thousand persons were engaged in placer mining in East Kootenay. By the close of 1866 the locality was largely abandoned, except by Chinese, although in the early nineties the old workings have been operated by hydraulic methods." Under the heading "Fifty Years Ago To-day" the Daily Colonist, of Victoria, on December 18, 1914, reprinted from its early issue the following: "Kootenay Mines.—Mr. Fred White, the well known Cariboo packer, arrived here yesterday from the Kootenay mines. He states that some of the mines have taken out \$15,000 a month. It is expected that a large rush from California and the Boise, Idaho, mines will come in the spring." There has been more or less placer-mining on Wild Horse Creek ever since, and last year there was more gold reported to have been recovered than for a number of previous years.

The Trail "News" lately published the information that it is reported that requirements of **siliceous ore for its new copper converters** have caused the management of the Consolidated Mining and Smelting Co.'s smeltery at Trail to contract with the West Hill Company, which recently took over the San Poll mine at Republic, Washington, under a lease and bond from the receiver, for 200 tons a month, at a freight and treatment rate of \$4 a ton, which is the lowest rate ever yet accorded Republic ores.

The erection of mine buildings for the accommodation of employees has been undertaken at the property in Ashcroft mining division, of the Highland Valley Mining and Development Company. Mr. Frederic Keffer is president of the company and Mr. Henry Johns secretary. Both were for a number of years with the British Columbia Copper Co. The ore

occurring in the mine assays on an average 3 per cent. copper and about 60 cents in gold and silver to the ton. A concentrating plant is to be put in shortly.

DOMES EXTENSION.

According to Mr. W. S. Edwards, president of Dome Extension, Domes Mines, Ltd., has taken an option on Dome Extension property and assets, lasting until October 15th, 1917. The option has been sanctioned by the directorate of each company, but will have to be ratified by the shareholders of Dome Extension and a meeting of the shareholders will be held in the near future for this purpose.

The basis of the exchange is 46,000 shares of Dome Mines' stock for the 2,300,000 issued shares of Dome Extension, or 50 shares of the latter for 1 of Big Dome.

The Big Dome are permitted to diamond drill or do such work as they deem necessary during the tenure of their option, while the Dome Extension reserve the right to go on developing the property as heretofore, providing it does not interfere with the work of the Dome. The Dome management proposes to drive east from their No. 3 shaft on the 850-ft. level into Dome Extension territory, which will probably enter the latter at the 900-ft. level owing to the difference in elevation.

At the present time Captain Anchor is directing operations for Dome Extension on the 100 and 200-ft. levels. The work is being carried on with the money received from the recent sale of treasury stock.

DRILLING AT FLIN FLON LAKE.

Sudbury, April 1.—The diamond drills on the Great West Sulphide Mines at Flin Flon were put in operation early last week, and the first core of the drilling was brought to The Pas on Sunday. Mr. Hammell brought the core in and he is greatly enthused about it. Mr. Durkee, the drill contractor, returned with him and his enthusiasm knows no limit. He says it is a remarkable looking sight to see an orebody stripped in width for 200 ft. and every foot showing solid ore. He very earnestly recounted the features as they appeared to him, and he declares he will stake his reputation on the favorable outcome of the drilling. Night and day shifts are being worked on the diamond drills and more men will be placed to work as they are secured. It is a rush order and minutes are valuable to the workers.

Mr. Hammell feels satisfied with the way things are moving. He leaves the property in charge of three mining engineers, with instructions to push development along at a rapid pace.—Sudbury Journal.

SILVER PRICES.

		New York, London,	
		cents.	pence.
March	24.....	60¾	28½
"	25.....	60½	28½
"	27.....	59¾	28½
"	28.....	60¼	28½
"	29.....	60½	28½
"	30.....	60¾	28½
"	31.....	60¾	28½
April	1.....	60¾	29
"	3.....	61%	29¾
"	4.....	61¾	29¾
"	5.....	61%	29%
"	6.....	61%	...
"	7.....	61%	29%

MARKETS

NEW YORK MARKETS.

April 7, 1916—Connellsville Coke—
 Furnace, spot, \$2.75 to \$3.00.
 Contract, \$2.50 to \$3.00.
 Foundry, prompt, \$3.75.
 Contract, \$3.50 to \$4.00.

April 7, 1916—Straits Tin, nominal, 53.50 cents.

Copper—
 Prime Lake, nominal, 27.50 to 28.00 cents.
 Electrolytic, nominal, 27.50 to 28.00 cents.
 Casting, nominal, 26.00 to 26.50 cents.

Lead, Trust price, 7.50 cents.
 Lead, outside, nominal, 7.62½ to 7.87½ cents.
 Spelter, prompt western shipment, nominal, 18.55 to 18.80 cents.

Antimony—
 English brands, nominal.
 Chinese and Japanese, 43.00 to 44.00 cents.
 American, 43.00 to 44.00 cents.

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

Nickel, 45.00 to 50.00 cents.
 Cadmium, nominal, \$1.25 to \$1.50.
 Quicksilver, nominal, \$155.00.
 Platinum—nominal, \$88.00.
 Cobalt (metallic), \$1.25.
 Silver (official), 61½ cents.

Metal Products.—All prices are nominal as follows:
 Sheet copper, base, 34.50 cents.
 Copper wire, base, 29.00 to 29.50 cents.
 High sheet brass, base, 36.00 cents.
 Seamless brass tubing, 42.00 to 42.50 cents.
 Seamless copper tubing, 43.50 to 44.00 cents.
 Brazed brass tubing, 42.50 to 44.50 cents.
 Brass wire, 36.00 cents.
 Brass rods, 36.00 cents.
 Sheet zinc, f.o.b. smelter, 25.00 cents.

TORONTO MARKETS.

April 11—(Quotations from Canada Metal Co., Toronto)—
 Spelter, 22 cents per lb.
 Lead, 9¾ cents per lb.
 Tin, 58 cents per lb.
 Antimony, 45 cents per lb.
 Copper casting, 30 cents per lb.
 Electrolytic, 31 cents per lb.
 Ingot brass, yellow, 16 cents; red, 21 cents per lb.

April 11—(Quotations from Elias Rogers Co., Toronto)—
 Coal, anthracite, \$8 per ton.
 Coal, bituminous, \$5.75 per ton.

STANDARD MINING EXCHANGE.

Toronto, April 10, 1916.

Cobalt Stocks.

	Ask.	Bid.
Bailey . . . . .	.06¼	.06
Beaver Consolidated . . . . .	.39	.37½
Buffalo	1.30	.....
Chambers Ferland . . . . .	.23	.22½
Coniagas	4.65	4.00
Crown Reserve . . . . .	.....	.49
Foster . . . . .	.10½	.09½
Gifford . . . . .	.07½	.07
Gould . . . . .	.00¾	.00¾
Great Northern . . . . .	.04¾	.04¼

Hargraves . . . . .	.05	.04½
Hudson Bay	30.00	25.00
Kerr Lake	4.35	4.15
La Rose . . . . .	.63	.58
McKinley Darragh S. . . . .	.46	.43
Nipissing	7.50	7.12½
Ophir . . . . .	.05¼	.04¼
Peterson Lake . . . . .	.26¾	.26½
Right of Way . . . . .	.05¼	.04¾
Seneca Superior . . . . .	.41	.40
Silver Leaf . . . . .	.02¾	.02¼
Silver Queen . . . . .	.....	.01¼
Shamrock Con. . . . .	.15	.14½
Timiskaming . . . . .	.56½	.56
Trethewey . . . . .	.20½	.20
Wetlaufer . . . . .	.08¼	.07
York Ont. . . . .	.02½	.02¼

Porcupine Stocks.

	Ask.	Bid.
Apex . . . . .	.05¼	.04¾
Dome Con. . . . .	.....	.12
Dome Extension . . . . .	.38	.37½
Dome Lake . . . . .	.27	.26
Dome Mines	25.50	.....
Foley O'Brien . . . . .	.59	.50
Gold Reef . . . . .	.02½	.01¾
Homestake . . . . .	.50	.46
Hollinger	27.50	27.00
Jupiter . . . . .	.20¼	.19¾
McIntyre . . . . .	.91½	.91
McIntyre Ex. . . . .	.30	.27
Moneta . . . . .	.....	.10½
Porcupine Crown . . . . .	.74	.73
Porcupine Gold . . . . .	.00¾	.00¾
Porcupine Imperial . . . . .	.03¾	.03¾
Porcupine Tisdale . . . . .	.01¾	.01½
Vipond . . . . .	.54	.53½
Preston E. D. . . . .	.04½	.04
Schumacher G. . . . .	.50	.43
Teck Hughes . . . . .	.18½	.....
West Dome . . . . .	.17	.16¼
West Dome C. . . . .	.24	.23½

NEW YORK STOCKS.

	High.	Low.	Close.
April 10, 1916.			
Allis Chalmers	29½	29	29
Anaconda	87¾	86¾	87¾
Beth. Steel	479½	461	479½
Chino	55¾	54¾	55
Crucible	93½	92	92¼
Dome	25	24¾	25
Goodrich	80	78¾	79¾
Gt. Nor. Ore	43¾	43½	43½
Int. Nickel	50½	49¾	50
Kennecott	57¾	57¼	57½
Lead	67¼	67	67¼
Miami	38¾	38½	38¾
Lack. Steel	77¼	77	77
Nev. Cons.	18	17½	17¾
Ray Cons.	24¾	23¾	24¾
Smelting	102½	102	102¾
Tenn. Cop.	52¾	52¾	52½
U. S. Steel	85¾	84¾	85
do., pref.	117¾	117¼	117¾
Utah Cop.	82¾	82½	82¾
Anaconda	87¾	86¾	87¾

PROFESSIONAL DIRECTORY.

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