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### LA ROSE CONSOLIDATED MINES COMPANY.

The first annual report of this corporation has recently come to hand. Because of the prominence and importance of La Rose mine itself, if for no other reason, the report deserves more than passing notice.

By intention or through neglect those responsible for the compilation of the document have not complied with several essential requirements of the Ontario Companies Act. There is no excuse for this. It is bad business, and implies defective vision either in the promoters or in their legal advisers, or in both.

As mentioned below there are four directors whose interests in the company is not defined in the report. Subscribers have a legal right to demand full information regarding the holdings of these directors.

Apart from these serious and needless omissions, the report is apparently a sincere attempt to give the public much necessary information.

The publication of the report sets at rest a number of points that have been discussed by the public without official information.

The Consolidated Company controls the following properties: La Rose, La Rose Extension, Princess, Fisher, Eplett, Silver Hill, University Mines and the Violet. All of these properties, with the exception of the Violet, were formerly controlled by La Rose Mines, Limited, which still remains the operating company.

The Consolidated Company has a Maine charter. The capitalization is \$7,500,000 in \$5 shares. The directors of the company are the five directors of La Rose Mines, Limited, Messrs. John McMartin, L. H. Timmins, N. A. Timmins, D. A. Dunlap and D. McMartin, together with Mr. D. Fasken, of Toronto, and Messrs. E. P. Earle, R. T. Greene, and F. W. Holmes, of New York. Messrs. Earle and Fasken are well known in Canada in connection with the Nipissing mine. The report does not say what interests the four last named directors have in the Consolidated Company, whether they have purchased a part of the La Rose Mines, Limited, or whether they represent the Violet interests, or whether they have been brought into the Consolidated Company owing to their varied experience in connection with the Nipissing mine.

Three reports by mining engineers accompany the general report of the company. The first of these is by Watson & Watson, and is dated June 15, 1908. The senior member of this firm is now resident manager of the Nipissing and is consulting engineer to La Rose Consolidated. The second report is by Mr. T. R. Drummond, recently manager of the Nipissing, and is dated June 1, 1908. The third is by Dr. W. G. Miller, and is dated August 9, 1907. The ore reserves reported

on in all three cases are practically confined to La Rose mine proper, J. S. 14. The most recent report, that by Watson & Watson, shows an estimated profit of \$2,017,878, while the net value given by Mr. Drummond is \$2,638,950. Dr. Miller's report, made for the original owners a year ago, gives a considerably higher number of ounces; but the net value is indicated only in a general way. For the main vein Watson & Watson give 4,045.4 tons; Mr. Drummond gives 4,957, and Dr. Miller gives 5,966, of which 3,728 tons are above the first level and 2,238 tons below it. Dr. Miller states that the ore averages 765 ounces of silver to the ton on the first level, and he is inclined to allow a higher average value than this for the block of ore lying between the first level and the surface. Analyzing the figures in the reports of Watson & Watson and Mr. Drummond, it is seen that the 4,045.4 tons in the former report contains 2,903,310 ounces of silver, or an average of 717 ounces to the ton; while Mr. Drummond's 4,957 tons contain 3,673,000 or 740 ounces to the ton. It is not so stated, but the 717 and 740 ounces respectively apparently represent the average found for the ore on the first level.

Of the three reports the public will naturally lay more stress on the most recent one as showing what the ore in the mine really represents at the present time. According to Messrs. Watson & Watson this shows an estimated profit of \$1,735,712 for practically developed ore and \$282,166 for indicated ore, or a grand total of \$2,017,878.

The mine has been under development for four years and according to the statement of the president in the report it has earned \$1,204,862 net for its owners.

#### DR. HENRY YOULE HIND.

Dr. Henry Youle Hind, explorer, geologist, journalist and educationist, died at Windsor, Nova Scotia, on Sunday, August 9th.

Born at Nottingham, England, on June 1, 1823, he received his early training at a local grammar school. After two years in Leipsic he studied for some time at Cambridge. In 1846 he came to Canada and accepted the appointment of instructor in mathematics and chemistry in the Provincial Normal School, Toronto. Five years later he became professor of chemistry and geology in Trinity University. This chair he occupied for thirteen years.

In 1857 the Canadian Government requested Professor Hind to accompany, in the capacity of geologist, an exploring party sent to the Red River. In the succeeding year he was placed in charge of a similar expedition to the Assiniboine and Saskatchewan regions. The published reports of his travels contained the first map of that great and fertile country.

Again, under the direction of the Canadian authorities, Professor Hind explored the shores of James

and Hudson Bays, and, to a limited extent, the interior of the Labrador peninsula. Much of this was pioneer work of the most difficult and trying nature.

Resigning the chair of geology and chemistry in 1864, Professor Hind undertook a preliminary geological survey of New Brunswick at the request of the Government of that province. After completing this task in 1866, he came to Windsor, Nova Scotia, where he resided until his death.

In the year last mentioned, 1866, the excitement induced by the discovery of gold in Nova Scotia was at its height and Professor Hind was engaged by the Provincial Government to examine and report upon the gold districts of the province. Ten years later he explored northeastern Newfoundland and the Atlantic coast of Labrador, investigating not only the mineral resources of these regions, but also the fisheries and other natural resources.

When, in accordance with the provisions of the Treaty of Washington, the Fisheries Commission met in Halifax in 1876, Professor Hind played an important part in the deliberations. Later, his invaluable work in charting the movements of fish in North American waters won for him a gold medal from the directors of the Paris Exhibition.

In addition to his other activities Dr. Hind was from 1852-1855 editor of the Canada Journal, the official organ of the Canadian Institute. For a time, also, he edited the British American Magazine and the Journal of the Board of Arts and Manufactures of Upper Canada.

Trinity College, in 1853, conferred upon him the degree of M.A., and in 1890 King's College, Windsor, granted him the degree of D.C.L.

During later years much of Dr. Hind's time and energy was devoted to assisting in upbuilding King's College and affiliated institutions.

Dr. Hind was, in one sense, a natural philosopher of the old and most admirable type. He possessed the wide interests, the literary cultivation, the high devotion and the profound faith that marked men like Tyndall, Huxley and Darwin. On the other hand he had all the alertness, directness, and broad commercial sense that are pre-requisites in modern scientific workers.

While he was a voluminous writer, he wrote only from the superabundance of his knowledge and observation. Consequently he wrote little that is not well worth reading.

Those whose privilege it is to have read Dr. Hind's works are forced to marvel at the variety and depth of his attainments. The whole book of nature was open to him as it is to very few of this generation. His whole life is an object lesson. A sound body and a sane mind were his. These, added to high and true ideals, gave to Canada one of the most distinguished scientists of the day.

### THE FERNIE DISASTER.

All Canada was shocked when, on August 3rd, newspaper despatches announced that the town of Fernie was wiped out of existence by fire. Exaggerated reports were rife and it was freely stated that the coal mining industry of the Crow's Nest Pass district had received a blow that would cripple it for a long time to come. The loss of life was also the subject of much misstatement.

Latest reports indicate that not more than eighteen lives were lost. The loss of standing timber cannot be computed, although it is known to run up into the millions of dollars. Both the Crow's Nest Pass Coal Company, the C. P. R. and the G. N. R. suffered losses ranging from two hundred thousand to three hundred thousand dollars. The lumber companies' loss totalled about one million dollars.

So far as the property loss in the town of Fernie can be estimated, it appears to approximate seven million dollars.

Only slight damage was done to the mining and other equipment of the Crow's Nest Pass Coal Company. Neither Coal Creek nor Michel suffered. Production was resumed immediately after the fire had run its course. Temporary scarcity of labor is the only deterrent at present. At Hosmer the tippie and principal buildings of the C. P. R. colliery were unharmed. It had been the intention of the management here to commence shipments of coal and coke in December of this year. This intention will be carried out.

The fire swept resistlessly over an area thirty miles long and from two to ten miles wide. Once started no human agency could grapple with it. The conformation of the Elk River valley gave the fire a free hand and a full sweep. Hence Fernie, standing directly in the path of the flames, was destroyed in an incredibly short time.

Hardly a day elapsed between the destruction of Fernie and the arrival of relief from outside sources. The towns and cities of Southern British Columbia telegraphed funds, collected and despatched clothing and food, with astonishing and gratifying promptitude. Winnipeg, Toronto, Ottawa, Kingston and other eastern cities contributed with corresponding speed. The British Columbia Government gave its agents *carte blanche* so far as money and supplies are concerned. The railways transported passengers and freight free of cost from and to the scene of the disaster. The Crow's Nest Pass Coal Company bent all its energies to relief work and contributed a substantial sum of money in addition. Its buildings were put at the disposal of the shelterless, and its officers were prominent in the arduous work of organization and administration.

But most gratifying of all was the generous action of the city of Spokane on the other side of the international boundary. This city was among the first to telegraph money to the sufferers. In this is displayed

a spirit that is more than merely praiseworthy, a generosity that is not hedged in by restrictions of nationality. The Canadian nation, as a nation, should make fitting acknowledgement of Spokane's timely help.

### THE INTERNATIONAL NICKEL COMPANY.

The sixth annual report of the International Nickel Company is a document of more than passing interest. So complete is this corporation's control of the nickel markets of the world that it has practically no competition. It owns and operates the Sudbury copper-nickel mines. It controls the Nickel Corporation of London and the Societe Miniere Caledonienne of Paris, and through these organizations has been able to make its monopoly almost absolute.

The limited demand for nickel has robbed this monopoly of its sting. The International is constantly striving to find new uses for the metal and thereby to widen the market.

Its efforts have not been unsuccessful. In the last twelve years the United States consumption has grown from 4,000,000 pounds to 20,000,000 pounds per annum.

Unlike other copper smelting companies, the International has not only maintained its earnings but has increased them. Upon its common stock it pays no dividends as yet. Upwards of \$5,000,000 has been spent in new construction and general improvement of plant.

For the last fiscal year, ending March 31st, its net profits are announced to be \$1,324,742. Expenditure upon construction and equipment amounted to \$1,548,481; for depreciation of plant the sum of \$215,975 was allowed; for exhaustion of minerals, \$94,351, and \$168,250 for bond sinking fund. After payment of bond interest and a 6 per cent. dividend on preferred stock, the sum of \$790,000 was added to surplus, and \$300,000 added to the property depreciation allowance.

The International Nickel Company appears to be one of fortune's favorites. It is interesting to speculate as to what its net profits would amount to if present conditions were so altered as to permit and encourage competition in the smelting of copper-nickel ores in Ontario.

### ENTER NEW ZEALAND.

A New Zealand coal mining concern is seriously contemplating the possibility of entering into competition with the Vancouver collieries.

We had occasion lately to allude to the high prices maintained by the collieries operating in Vancouver Island. The fact that competition from New Zealand is even imaginable does not speak well for the spirit that animates the Vancouver Island operators. Our conviction is that the price at which coal is sold in Western British Columbia could be lowered fifty per cent. and still leave a sufficient profit.

# THE GREAT WAIHI MINE.

Written for The Canadian Mining Journal by J. M. Bell, Director of the Geological Survey of New Zealand, and  
Colin Fraser, Mining Geologist.

## INTRODUCTION.

In a graphic article in the Mining and Scientific Press, on "The Great Gold Mines,"\* Mr. T. A. Rickard includes the Waihi Mine of New Zealand in the world's sixteen great gold mines, and mentions that the choice for the premier position among these rests between the Robinson Mine of the Transvaal and the Waihi. In the concluding remarks of the article he places the Waihi second to the Robinson only on the score of the larger, definitely-ascertained ore reserves in the latter.

The Waihi Mine is situated within the limits of the town of Waihi, in the Hauraki Mining Division, Auckland Province, New Zealand. The mine lies in an easily accessible locality, some seventy miles south-east from the city of Auckland, the metropolis of New Zealand, with which it is connected by rail.

The Martha lode, which is the vein of most conspicuous outcrop in the Waihi District, was discovered in 1878. The initial operations on the Martha lode by the original prospectors, and by the Martha Gold Mining Company subsequently floated, were not successful. In 1890 the Waihi Gold and Silver Mining Company, Limited, which had been formed in 1887 to work the Amaranth lodes, bought the Martha Company's property for £3,000. Even this venture can hardly be said to have met with great success till the inauguration, of the cyanide process in 1894. Since that date the rise of the Waihi Mine from the rank of an insignificant prospect to that of one of the foremost gold mines of the world has been rapid and consistent.

The area held by the Waihi Company amounts to 765 acres. This area covers not only the Waihi Mine proper located on the Martha lode and adjoining veins, but also the Silverton, Union and Amaranth veins on the Silverton Hills, which are, however, not being worked at present, and are consequently not considered in this article. Continuous along the line of strike of the Martha lode, in a general northeasterly direction from the Waihi Company's property, are in succession the holdings of the Waihi Grand Junction, the Waihi Extended and the Waihi Consolidated companies, while a separate holding of the first-named company bounds the Waihi Mine to the westward.

## General Physical Geography.

The workings of the Waihi Mine are situated on the slopes of Martha Hill, on the slopes of the Silverton Hills, and beneath the stretch of flat-lying ground half a mile wide between these two physical features. The Martha and the Silverton Hills stand at the northern edge of the gently rolling Waihi Plain. This plain, which is about seven miles from northwest to southeast, and rather more than four miles at its greatest extension in the opposite direction, has an altitude of about 280 feet above sea level, and is surrounded by low hills, showing smooth slopes and few rock ledges. The hills are continued northward from Martha Hill as the mountainous, densely forested country, which forms the backbone of the Hauraki Peninsula. Martha Hill is connected with this elevated country by a ridge, which may be spoken of, as the Martha ridge, rather

lower in altitude than the hill itself. The Silverton Hills are low features forming outliers from the mountains, within the plain. The relatively extensive Waihi Plain, through which meanders the Ohinemuri stream, represents topographically an old lake basin. Formerly the Ohinemuri flowed to the east coast of the Hauraki peninsula, but the damming of its course in that direction by a rhyolite flow resulted in the development of the lake above mentioned. The basin now drains westward through the wild and beautiful Karangahake gorge to the valley of the Thames. The plain is covered only by low manuka scrub, of little commercial value save as firewood, but the more elevated country is forested with larger trees eminently suitable for mine timber.

## General Geology.

The oldest rocks that can be inferred to exist in the Waihi goldfield are argillites and grauwackes of Jurassic and pre-Jurassic age, which form the base-ment series of the whole Hauraki peninsula. Since, however, no outcrop of these sedimentaries has been located within a radius of twenty-five miles of Waihi these rocks may here be regarded as comparatively deep seated.

Tertiary volcanics comprising dacitic, andesitic and rhyolitic lavas and pyroclastics, form the whole of the superimposed rock complex.

The oldest of the volcanics exposed in the Waihi area are dacitic lavas which were ejected upon an old land surface of argillites and grauwackes probably when the land stood at a considerably higher elevation than at present. These dacites, which are the rocks in which the gold-silver bearing veins occur, have but a very limited areal extent at the present surface, since they are in great part covered by the younger volcanics to be later described. In the locality under description outcrops of the vein-bearing dacites are to be seen only in the Martha hill and ridge, and on the Silverton Hills. Wherever encountered, they are highly altered by hydrothermal metamorphism. On the surface they are often weathered to a soft, unctuous clay-like material. The effects of hydrothermal alteration are especially apparent in the neighborhood of the various veins, where the dacites, though hard, are almost completely propylitized and seamed by stringers of calcite, quartz (both chalcidonic and highly crystalline), orthoclase (variety valencianite), in minor amount, and pyrite.\* The vein-bearing rocks have been described as rhyolites,† but careful chemical and petrographical investigation have led the writers of the present paper to classify them as dacites.

Younger andesitic and dacitic lavas and tuffs overlie an irregular surface of the vein-bearing dacites. They form the higher hills in the vicinity of the town of Waihi, and in places occur intercalated between the vein-bearing dacites and the rhyolitic flows of the Waihi plain skirting the Martha and Silverton Hills.

Unconformity between the older vein-bearing dacites

\*See paper by Waldemar Lindgren, Engineering and Mining Journal, New York, Feb. 2, 1905.

†"Rocks of Cape Colville Peninsula," Sollas & McKay, Vol. II., 1906, pp. 67-68.

\*\*"Mining and Scientific Press," San Francisco, 4-5-07, p. 565.

and the younger semi-basic volcanics is shown by an old land surface pierced in the Waihi Grand Junction shaft at a depth of 630 feet below the surface of the plains or 180 feet below sea level, where the occurrence of silicified carbonized tree trunks indicates former sub-serial conditions. The period of vulcanism to which these younger semi-basic rocks are referable was probably followed by a comparatively long period of quiescence, during which the country was deeply dissected by the Ohinemuri and its tributaries.

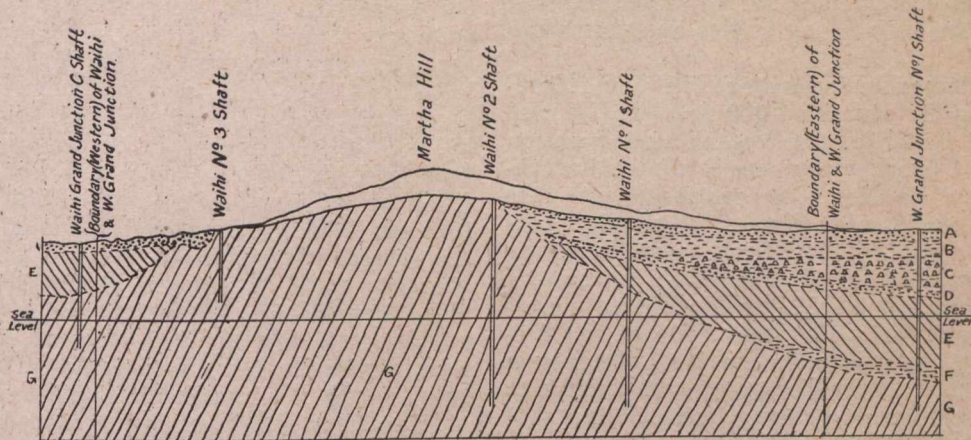
Subsequent to this dissection, volcanic activity preceded or accompanied by a considerable subsidence

Ohinemuri before mentioned, and forms the surface rocks of the Waihi plain.

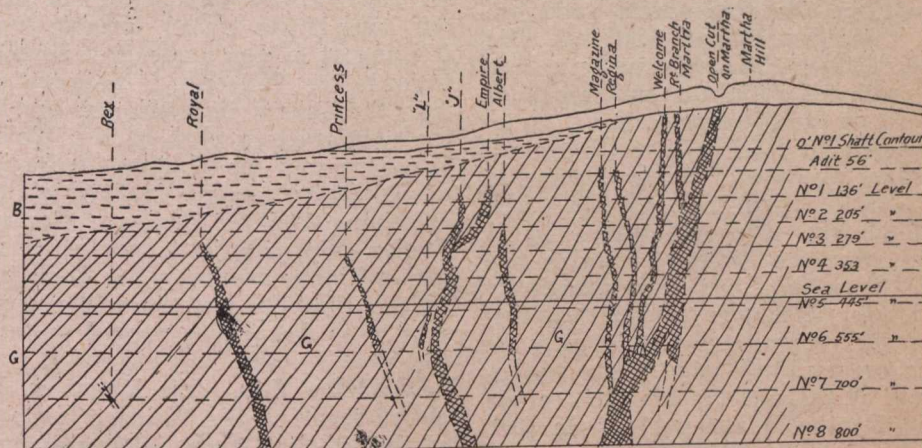
The loosely consolidated sands and gravels along the various streams consist of material derived from both the semi-basic and acidic volcanics.

**The Martha Vein System.**

As already remarked, the Waihi mine started its splendid course on the outcropping Martha lode. Now, that ore-body is but one of the many which comprise the complicated and branching series forming the Martha vein system. Some of these veins reached the



Vertical Cross Section through Martha Hill showing Geological Formation  
Scale 500' = 1 inch



Vertical Cross Section showing Principal Veins of the Martha System  
(Excepting Edward Vein which is Parallel to Section)  
Scale 330' = 1 inch

resulted in the extravasation of the rhyolitic lavas, which have very considerable development in the Waihi area. Three distinct petrological types are recognizable among these acidic volcanics. These, named in order of succession, are: (a) spherulitic rhyolite, (b) brecciated pumiceous flow-rhyolite, locally called "Wilsonite," and (c) gray lithoidal rhyolite. The spherulitic rhyolite forms the high bare hills not far from the town of Waihi, and the ridges extending therefrom to the eastern coast line. The peculiar, brecciated, pumiceous flow-rhyolite broken through and overlain in places by the gray compact flow-rhyolite, has filled in the old basin or ponded valley of the

surface, but, being covered by the layers of rock waste which is, almost everywhere present, did not actually outcrop, while others were discovered only as the workings of the great mine advanced downward to the present lowermost level—1,000 feet from the surface—and on being worked upwards were found to feather out in the enclosing rock.

**The Principal Veins.**

Altogether, some sixteen veins of the Martha system have in the past contributed or are still contributing to the output of the Waihi mine. The position of all of these veins and their relation to each other may

be seen by referring to the general plan of the Waihi Company's property. The separate plan of the veins being worked at the 700-foot level shows the connection between the several veins at that depth below the surface. The more important producers are the Martha, Welcome, Regina, Magazine, Edward, Empire, Royal, and Albert. Owing to the many remarkable variations exhibited by all of these veins certain somewhat burdening details appear necessary to their description.

**The Martha Vein.**—The Martha lode, the earliest ore-body to be worked, is still a very important producer, and so far shows, in descending, increasing width and no diminution in quality of pay ore. The vein, which has a general north-north-easterly trend, dips to the southeast at varying angles approximating 75°.

The Martha is traceable throughout the Waihi Company's mine for a distance of 3,400 feet, and it also extends into the property of the Waihi Grand Junction Company. From the latter company's mine a branching reef—the Junction No. 2—is continued into the Waihi extended claim, and thus a longitudinal extension of almost a mile of continuous quartz is proven along this remarkable vein. In the Waihi Company's property at the 136-foot level,\* the Martha gave payable ore for a length of 1,100 feet, while in the 850-foot level it has yielded payable ore for 1,200 feet in the northeastern part of the Company's property with very low grade vein material along its west-southwest extension. In the 850-foot level there still remains some 300 feet of an unproven block from the present face of the north-easterly drift on the vein to the boundary of the Grand Junction property. This block is probably payable since the vein shows good ore where it enters the Grand Junction at this level. The pay shoot of the Martha lode has apparently a high pitch towards the northeast from the surface to at least as far downward as the 850-foot level.

At the surface the Martha varied in width from 5 feet to 50 feet with an average of 25 feet, while in the 850-foot level it varied from 20 feet to 120 feet, with an average of 67 feet. This greatest width of vein material occurs after the Welcome, Regina and Magazine have joined it on the dip to form practically one continuous vein. In the newly opened 1,000-foot level excavation has not yet proceeded sufficiently far to prove the Martha or any other vein of the system.

In the upper levels of the mine where the ore was mainly oxidized the Martha was payable from foot-wall to hanging-wall, but lower down the values were chiefly confined to the rich sulphide portion along the foot-wall. Still lower down on the Martha below the junction of the Regina and the Magazine at the 700-foot level, the values occurred mainly on the side on which these veins joined, namely the hanging-wall. Where the Martha is widest, namely, 120 feet, only about 50 feet afforded pay ore. In the 136-foot level a few feet of rich sulphide ore appeared in places on the foot-wall. Thence downward, level by level, the sulphide portion increased in thickness, and from the 445-foot level became the principal ore. In the 555-foot level the oxidized ore ceased to be conspicuous, and in the 850-foot level it has practically disappeared.

The average value of the pay ore from the Martha,

according to the mill returns, has preserved a striking uniformity from the outcrop to the greatest depth yet attained (850 feet), that is, through a vertical height of 1,055 feet. This value is approximately £2 14s. 0d. per ton (2,000 pounds).

**Welcome Vein.**—The Welcome vein is traceable from the surface to and below the 850-foot level. From the 279-foot level downward it meets the Martha in a junction pitching in a south-westerly direction, along the inclination of the Martha. Thus its longitudinal extension diminishes from level to level when followed downward. The Welcome is disposed almost vertically, although in places where it approaches the Martha it dips slightly towards the latter, that is, to the northwest. Its general trend is slightly more northerly than the Martha. In the uppermost level of the mine, the pay-shoot of the Welcome was not less than 1,350 feet long, and the vein was traceable for quite 2,200 feet. The payable ore, however, diminishes in longitudinal extension in descending, and at the 850-foot level extends for only 250 feet in length westward of its junction with the Martha. At the surface the Welcome averaged about 20 feet in width—all payable ore, while at the 850-foot level the vein averages quite 75 feet and varies from 20 feet to 100 feet. Even where 100 feet wide the vein is nearly all payable ore, only about 10 feet of stone occupying a median position being unpayable. This low-grade material forms a convenient pillar between the two payable portions which are being stoped separately.

**Regina Vein.**—The Regina, which is a much less prominent vein than the Martha or the Welcome, did not appear at the surface and was discovered only at the 279-foot level as a branch of the Welcome. From this level it was traced upwards to the 136-foot level. Dipping at a high angle in a north-westerly direction towards the Welcome, it becomes part of this larger vein throughout its course at the 700-foot level. As the north-eastern part of the Welcome at this level junctions with the Martha, the Regina also forms part of the latter, though, in stoping, the ore is reported as coming from the Regina section of the Martha. The Regina vein material is nearly all payable ore and of rather higher average value than that of the Martha. In the 279-foot level the vein varied in width from 1 foot to 15 feet, and averaged quite 7 feet for the 550-foot stope length of the pay-shoot.

**Magazine Vein.**—The Magazine, like the Regina, is an off-shoot of the Welcome from which it branches at the 205-foot level. It dips at an angle of 75° in a north-westerly direction towards the Regina, Welcome and Martha, uniting in dip with all of these at the 700-foot level to form the great mass of vein material in the Martha at and below that level. The length of the Magazine at the 279-foot level is about the same as the Regina. It varies in width from a line to 15 feet, and averages quite 8 feet. The ore in the vein is all low grade, assaying in gold not more than 8 dwts. to the ton at the higher levels and as low as 5 dwts. near its junction with the Regina at lower levels.

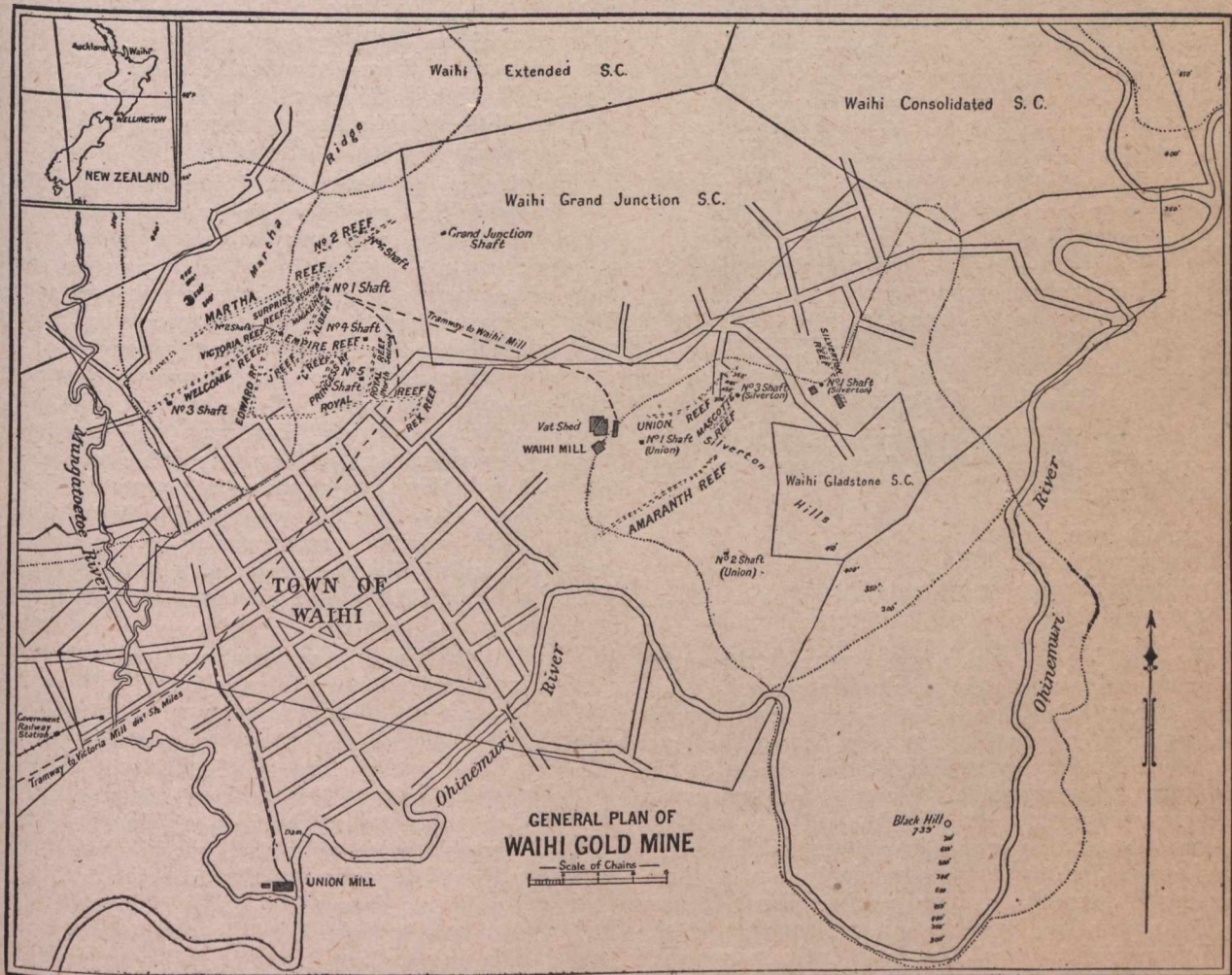
**Edward Vein.**—The Edward vein is in some respects the most remarkable and interesting vein of the whole Waihi system. It was discovered only at the 700-foot level on driving west along the Empire, but was afterwards traced upwards to a point 40 feet above the 445-foot level, at which point it feathers out to zero. The vein, which runs nearly north and south, connects the Welcome with the Royal. In the 700-foot level the pay-shoot has a length of 750 feet and a width

\*All the levels are measured from the collar of No. 1 shaft which is 426 feet above sea level and 205 feet below the original summit of Martha Hill or the highest point of outcrop of the Martha lode.

varying from 3 feet to 18 feet. In the 850-foot level the vein has improved greatly both in dimensions and ore values. It varies in width from 27 feet to 92 feet, and its average is certainly not less than 54 feet. At its point of maximum width—some 250 feet south of its junction with the Welcome—the vein bifurcates, 16 feet of material forming the eastern and 6 feet the western branch. These two branch veins themselves fork, the larger forming two veins, 16 feet and 15 feet wide respectively, the smaller, two veins each 6 feet wide.

In the 700-foot level the Edward dips to the north-west at a high angle, but in the 850-foot level where the vein is widest, the great ore-body appears like an inverted wedge, the two walls dipping respectively to

ward at horizons above and below the 555-foot level respectively. It first appeared in the 136-foot level and was there stoped for a length of 300 feet, while in the 850-foot level the pay-shoot has been already proven for a length of 1,150 feet. The course of the vein from its junction with the Welcome and Edward is a little south of east. The inclination of the vein presents a peculiar warped effect: on its eastern extension its dip is about 72° to the north; near its middle course, where, influenced by junction with the Albert, it is almost vertical; and further westward on approaching its union with the Welcome and Edward, its dip is about 60° to the south. The average width of the vein is 6 feet at the 136-foot level, and increases gradually to about 25 feet at the 850-foot level. The



GENERAL PLAN OF WAIHI GOLD MINE

the east and to the west. Practically all the vein material of the Edward constitutes highly payable ore, and in some places is of bonanza richness. On the 850-foot level at its junction with the Empire, where it is 75 feet in width, the ore values average no less than £10 10s. 10d. to the ton.

Since the Edward is connected with the Martha through the Welcome, and since, as already mentioned, the chief values of the Martha at the 850-foot level are confined to its north-eastern part, together they form a continuous wide band of highly payable stone from a point near the Royal to, and possibly beyond, the Waihi Grand Junction boundary.

**Empire Vein.**—The Empire vein may be considered as an eastern branch of the Welcome and of the Ed-

ward of the vein-stone from wall to wall within the limits of the pay-shoot is milling ore.

**The Royal.**—The Royal vein was discovered at the 353-foot level, and is traceable upwards for 50 feet above the 279-foot level, at which point the drifts and stopes run out against the non-mineralized rhyolite which overlies at this point the vein-bearing dacite. At the 279-foot level the pay-shoot was somewhat over 300 feet in length, while at the 850-foot level this dimension has risen to 1,400 feet. The vein trends almost east and west and dips to the northward at 76°. The average width is about 10 feet at the 279-foot level, and, gradually increasing downward, is not less than 17 feet at the 850-foot level.

**The Albert.**—The Albert vein, discovered in the 205-foot level, extends downwards through all the workings. Its general trend is about north-northeast, and its dip is to the westward at a high angle. The Albert has yielded good ore from the 205-foot to the 555-foot level, but is one of the few veins of the Waihi which has shown, in descending, values inferior to those of the upper levels.

**Output of the Various Veins.**—The following tabulation note showing in what proportion the various veins of the Waihi mine contributed to the total output in the year 1907, is of interest:

Vein.	Tons (2,000 lbs.)
Martha. . . . .	177,800
Royal. . . . .	46,645
Empire. . . . .	45,660
Welcome. . . . .	43,539
Edward. . . . .	13,239
Albert. . . . .	12,231
Regina. . . . .	4,339
Victoria. . . . .	3,871
Princess. . . . .	3,076
Magazine. . . . .	2,252
Reef I. . . . .	1,528
No. 2 Reef. . . . .	1,346
Reef J. . . . .	1,208
Rex. . . . .	240
	356,974

#### The Vein Material.

The vein material of the Waihi mine may be broadly divided into four types, which, for convenience, will be discussed separately:

- (1) Sulphide ore.
- (2) Non-payable vein filling.
- (3) Oxidized surface vein material.
- (4) Surface sinters.

(1) The sulphide ore which is now almost the entire source of the mine's wealth, as already remarked, appeared in the 136-foot level of the mine, and has increased rapidly in quantity in each successive level though there is still a very little oxidized ore at the 850-foot level. The sulphide ore consists of two rather indistinct varieties, namely, the banded ore and the replacement ore. The replacement ore, which seems to have been in greater part the original material formed, consists apparently of highly mineralized country rock. So intense has been the mineralization that the original nature of the rock has been entirely lost save in rare cores in the vein material. The replacement ore is mainly quartz of a general greyish or pale greenish color, and of finely crystalline or of finely saccharoidal texture. Through this is disseminated in individual grains, bunches, or tiny irregular veinlets, sulphide material consisting of pyrite, argentite, spalerite, and rarely of galena and chalcopyrite. The greenish color of the quartz is due mainly to chlorite, or some similar mineral. Druses, showing small hexagonal crystals of quartz, occur but are rare. Calcite is an occasional constituent, and there is evidently some manganic carbonate present as judged by coatings of black oxide in the oxidized ore.

The banded sulphide ore, which is always rich, shows narrow wavy bands consisting almost entirely of sulphides intercalated with others of finely crystalline quartz of milk-white colour, or tinted greyish or faintly

blueish by disseminated sulphides. The banded sulphide ore occurs in narrow veinlets of irregular vertical and lateral dimensions within the replacement ore. The phenomenon of crustification is generally apparent in the veinlets, bands of quartz and sulphides being arranged on either side and not infrequently with drusy quartz in the middle. Visible electrum occurs in connection with the sulphide ore, but is not common. Ruby silver and wire metallic silver have also been found in the sulphide ore, and some selenium mineral occurs, as evidenced by the presence of that element in the bullion.

It is interesting to note that the gold values occur mainly in pyrite, and to a less degree in the rarer minerals in galena and sphalerite, as proved by analyses. An assay made at the office of the metallurgist of the Waihi Company, of one of the dark bands in the sulphide ore from the 850 ft. level, showed gold to the value of 7.25 ozs. to the ton, and silver to the value of 870 ozs. to the ton. The proportion of silver to gold is exceptionally high in this sample, as judged by the average fineness of the total bullion out-turned, in which the proportion of silver to gold is as 100 to 15.

(2) The non-payable vein filling consists partly of altered dacite and partly of quartz and calcite, through all of which more or less pyrite occurs, though the other sulphides are rare or wanting. Calcite is comparatively rare in the upper levels of the mine, though platy or rhombohedral quartz which is pseudomorphous after that mineral, testifies to the former occurrence of calcite in great quantity. The secondary quartz of this nature is often only a framework of the original calcite, and is consequently exceedingly powdery. This characteristic renders the separation of the non-payable material from the rich sulphide ore in places a matter of difficulty, especially on the Martha vein in the Grand Junction Mine. The original quartz of the non-payable ore is generally milk-white in colour and more closely crystalline than that of the sulphide ore. It is very rarely amethystine in character.

(3) The oxidized vein material represents the oxidized equivalents, both of the non-payable vein filling and of the sulphide ore. At and near the surface in the Martha lode all of this oxidized material was payable, and that on the foot-wall highly so. The highly payable oxidized ore of the Martha is the result of oxidation and consequent slight surface enrichment of the pre-existing sulphide ore; while the poorer hanging-wall ore contains its relatively low values, as the result of the concentration by descending oxidizing waters, of the gold and silver contained in the small amount of sulphides disseminated in the original hanging-wall vein material. The hanging-wall material is almost entirely oxidized as far down as the 555 ft. level, while, as already mentioned, sulphide appears on the foot-wall at the 136 ft. level, and, increasing in width at each successive level, has almost completely replaced the rich oxidized ore on this side at the 555 ft. level. Below the 555 ft. level the hanging-wall vein material, exhibiting less and less oxidation, has not been subjected to the enrichment specified and is therefore low-grade, and passes down into the non-payable vein-filling. The latter nearly always contains a little gold and silver, and shows in places oxidation along fractures even to the 850 ft. level. In addition to the Martha, the Empire and the Welcome both showed rich oxidized ore.

The oxidized vein material is generally rusty, and in many places blackish with hydrous oxides of manganese. Free gold is rarely visible, even in the richest material,



though, finely disseminated, it exists in considerable amount. At the surface films of leaf gold were not uncommon in the joint planes. The quartz associated with this oxidized material shows fine crystalline, saccharoidal and platy structures. An assay made of a sample of rich oxidized ore from the Martha lode gave an analysis by Mr. P. G. Morgan, of the N. Z. Geological Survey, the following result\* :—

Moisture at 100° C. ....	.26%
Loss on ignition .....	1.60
Silica .....	89.98
Ferrie oxide .....	5.62
Alumina .....	1.82
Manganese and nickel oxides.....	.39
	99.67

Gold, 2 ozs. 5 dwts. 17 grs. per long ton.  
Silver, 10 ozs. 2 dwts. 12 grs. per long ton.

The oxidized surface material on the Martha cannot be considered in the light of what is ordinarily called a gossan or cap of concentrated metallic minerals. The quartz was merely stained with iron and manganese oxides. There were no deposits of these minerals, and the values in gold and silver, even in the richest oxidized foot-wall ore, were little, if at all, higher than obtained in depth in the sulphide ore. Merely an oxidized surface capping of limited extent occurred, indicating that there has been time for little oxidation since the outcrop of the lode was laid bare.

\*Transactions Australasian Institute of Mining Engineers. Volume VIII., page 182.

(4) The surface sinters, which frequently exhibit a banded structure, consist of a very finely crystalline or crypto-crystalline quartz, either whitish and opaque with rusty stains along the joint planes, or of a general pale rusty or pinkish colour.

The walls of the Waihi veins are in general fairly well defined. Owing to the fact, however, that much of the vein material of the Waihi Mine is merely metasomatically replaced country rock, there is in places no decided demarcation between wall-rock and vein material, but rather a gradual transition from payable vein material to propylite containing little or no values. Indeed, in such cases, what is to be classed as ore is often determined only by assay.

In many parts of the mine all of the several vein fillings show brecciation, and even fissuring, but faults of any magnitude giving serious displacements do not occur.

It is noteworthy that the vein material in general of the Waihi Mine bears a striking resemblance to that of the Redjang Lebong Mine in Sumatra, where the geological conditions are, it is understood, closely similar. A resemblance to the vein filling of the de Lamar Mine, Idaho, has also been cited by Waldemar Lindgren, while J. E. Spurr refers to P. G. Morgan's mention of the resemblance between geological conditions at Waihi and Tonopah, Nevada.\*

\*Geology of the Tonopah Mining District, Nevada. Professional paper, U. S. Geological Survey, No. 42, 1905, page 285.

\*See also Engineering and Mining Journal, May 4, 1905, page 862.

(To be continued.)

## Summary Report of the Mines Branch of the Department of Mines for the Year Ending March 31st, 1908.

The Summary Report outlines the work performed by the Mines Branch of the Department of Mines for the fiscal year ended March 31, 1908.

Dr. Haanel received his appointment as Director of the Mines Branch in May, 1907. By an Order in Council, dated June 19, 1907, Mr. John McLeish was transferred from the statistical office of the Geological Survey Branch to the Mines Branch. Later, a part of the chemistry section was similarly transferred. Messrs. T. Denis, F. G. Wait, M. F. Connor and W. W. Leach, officers of the Geological Survey, were also moved to the Mines Branch.

### Iron Ore Deposits.

The most important field work performed during the year was the investigation of iron ore deposits in various parts of the Dominion.

Mr. Einar Lindeman was instructed to examine such of the iron ore deposits of Vancouver and Texada Islands as are favorably situated in regard to transportation, and to devote especial attention to the more promising of these.

With the exception of the bog ore deposits at Quatsino Sound, and a small deposit of hematite on Salt Spring Island, all the properties visited showed magnetite, all in the immediate vicinity of or in contact with crystalline limestone where the latter is in close

proximity to igneous rocks. These magnetites are high in iron, do not exceed 0.05 per cent. phosphorus, but are also, as a rule, high in sulphur.

**Vancouver Island.**—In the Gordon River District, sixty miles from Victoria on the west coast of Vancouver Island, some promising prospects were noticed. The country rocks are chiefly crystalline limestone and igneous rocks, granite and diorites. About seven miles from salt water an outcrop of magnetite has been traced for 350 feet. In several places the ore is in sharply defined contact with granite. Ninety feet below this contact a tunnel, 114 feet long, has been run directly into the hill. It is in ore throughout its length, excepting where a diorite dike, eight feet wide, intrudes. The character of the ore is shown by the following analysis of an average sample taken along the tunnel:

	Per Cent.
Silica .....	8.88
Iron.....	58.30
Sulphur. . . . .	2.75
Phosphorus. . . . .	0.013

A sample from another claim, farther up the valley, gave this result:

	Per Cent.
Silica. . . . .	4.51
Iron. . . . .	67.09
Sulphur. . . . .	1.60
Phosphorus. . . . .	0.009

At Head Bay, on Nootka Sound, four outcrops of magnetite occur along a contact of crystalline limestone and diorite about a mile from the bay. At one place the ore body is fifty-five feet wide. The following analysis shows it to be of excellent character:

	Per Cent.
Silica. . . . .	6.10
Iron. . . . .	66.17
Sulphur. . . . .	0.017
Phosphorus. . . . .	0.016

Mr. Lindeman has serious doubts as to the extent of the Quatsino Sound bog ores. However, he recommends systematic drilling.

Seven miles up the Klaanch River an exposure of magnetite extends along the river bank for 180 feet and is from 25 to 30 feet high. No work has been done. This and other outcrops gave good analyses. Magneto-metric survey indicated other large bodies. Other considerable bodies were found on the Quinsam River.

**Texada Island.**—The principal ore deposits of this island are in the Prescott, Paxton and Lake properties. The Prescott has been worked more extensively than any other. During several years magnetic ore has been shipped from this property to Irondale, Washington. The ore outcrops about 850 feet from the shore, in a bluff on the brow of a steep hill, at the contact between granite and crystalline limestone. The deposit has been opened at three levels. An open cut shows a face of magnetite forty feet wide and one hundred feet high. Here the ore shows patches of calcite and fragments of brecciated volcanic rocks. Small amounts of iron and copper sulphides are also present. The ore dump gave the following analysis:

	Per Cent.
Insoluble. . . . .	6.46
Iron. . . . .	62.57
Sulphur. . . . .	0.403
Phosphorus. . . . .	0.024

The ore bodies of the Prescott are of great magnitude.

At the Paxton mine, 3,500 feet east of the Prescott, an outcrop of magnetite occurs directly in contact with granite. The ore is rich, but, like the Prescott ore, shows traces of copper, and is somewhat high in sulphur, though by no means prohibitively high.

The Lake mine, east of the Paxton, shipped 1,000 tons of ore last summer. The ore bluff is 80 feet high and 100 feet wide on the surface. Crystalline limestone forms the footwall, and diorite overlies the ore in places. An open cut shows good clear magnetite.

Coke carrying 15 to 20 per cent. ash is obtainable on Vancouver Island. This ash could be very much reduced by washing the coal. The ash is low in phosphorus.

Exceptionally pure limestone is obtainable at many localities.

Cheap transportation of raw materials is assured by the proximity to tide-water of all the more important deposits of iron ore, fluxes and fuels.

In addition to Mr. Lindeman's report, the following monographs are in preparation: "On Chrome Iron Ore Deposits of Eastern Townships," by Fritz Cirkel, M.E., and "Report on the Iron Ore Deposits of Western Ontario," by F. Hille, M.E.

Part I. of Dr. J., E. Woodman's report on the iron ore deposits of Nova Scotia is in the press, and reports on the iron ore deposits along the Ottawa and Gatineau rivers.

#### Electric Smelting.

Progress in electric smelting is confined at present to the production of high class steels. Both the Heroult and the Kjellen furnaces are being enlarged. The electric process is gradually displacing the crucible process in the manufacture of high grade and alloy steels.

**The Lash Steel Process.**—The Lash Steel Process, in which finely divided ore is intimately mixed with carbon, a certain quantity of finely divided carboniferous iron, sawdust and suitable fluxes, and the whole treated in an open-hearth furnace in a bath of molten metal, is one of the most recent inventions. It is claimed that in using the Lash mixture in an electric furnace no bath of pig iron is necessary, and a yield of 98 per cent. of the metallic content of the mixture is recorded.

A typical mixture, all of which is finely divided, is as follows:

Iron ore. . . . .	54
Cast iron borings. . . . .	27
Sawdust. . . . .	4
Limestone. . . . .	4
Coal tar. . . . .	3
Coke. . . . .	8
	100

If the average cost of producing one ton of ingots in the regular open hearth be taken as \$20.79, the corresponding cost for the electric furnace, using the wash mixture is \$16.22.

#### Other Work.

The results of Mr. Erik Nystrom's investigation of the utilization of peat have already appeared in a recent special pamphlet.

The hand-book dealing with the mining and metallurgical industry of Canada is soon to be issued. It will appear annually with necessary revisions. Only producing mines and metallurgical plants in actual operation have been reported upon.

For more than a year Dr. J. B. Porter, Mr. H. F. Strangways and Mr. C. Landry, all of McGill University, have been conducting for the Mines Branch a systematic investigation of the coals of the Dominion. A complete report is expected before the end of next year.

Mr. John McLeish's report on the work of the statistical division makes interesting reading. Mr. McLeish urges the standardization of statistical methods throughout the Dominion.

Other features of the Summary Report we are not now able to take up. The report indicates a decided activity and progress on the part of the Mines Branch. But as an official document it does not show evidence of sufficiently careful editing. In arrangement it is loose. Certain sections are carelessly worded. For these faults there is the excuse of haste. But it would, we think, be in keeping with the dignity of the Mines Branch to see that these failings are remedied.

## THE LARDER LAKE DISTRICT.

H. E. T. HAULTAIN.

"It is always an unexplained wonder how the public tolerates these wild-cat promoters. Many hard-headed business and professional men who have all their life been building up and caring for their reputations, have allowed them to be prostituted in these wild-cat prospectuses."\*

An investigation into the psychology of the enterprises connected with this district would be of more value to the public than anything that can be said concerning its geology. It was an ideal field for the wild-catter, and this was taken advantage of most skillfully. Only the general slump saved us from an extensive and disastrous boom in gold shares.

Ontario's appreciation of the relations of otherwise honest men to wild-catters is sadly in need of adjustment. The public's understanding of the mining engineer's philosophy (which indeed ranks with the doctor's and far above the lawyer's) is misled by these wild-cat prospectuses and their prostituted supporters. Some day, some man, altruistic and clean-minded, will explain clearly and persistently to the Ontario public, in a way that it will understand, that mining is not only founded on science, but is a difficult art based on experience, and that the main ingredient of the mining engineer must be honesty. Until this is done, until this is absorbed, or, rather, assimilated, Ontario will continue to look for booms and continue to put a premium on wild-cattling.

Larder's early days were characterized by wild-cat promotions of a very clever kind. Some of the prospectuses were the cleverest issued in Ontario. One in particular stands out for the completeness of its non-essentials and the subtle evasiveness of its misrepresentations. Its title page contained the names of some of our best-known professional and business men as directors. It was complete with its bankers and solicitors and its "consulting engineers." But it contained no vestige of reliable information in regard to its ore bodies. Such reference as was made to these was purposely misleading. To anybody with even a slight acquaintance with mining, it was a most palpable fake. The company had territory and nothing else. One cannot blame the public for buying shares in companies supported by the names of good men, but most unhesitatingly must we condemn the action of men who lend their names to such wild-cat promotions, and it is high time that reputable engineers took steps to condemn publicly as wholly unprofessional (and consequently unreliable) engineers (alleged?) who allowed their names to stand on such prospectuses.

This wild-cattling was so prominent a feature of Larder Lake that the whole district received a black eye, and it was hard to make anybody appreciate the fact that any good could exist up there. The arresting of Law and the letting him out on thirty thousand dollars bail had a wholesome effect towards educating the public, but did not help the district. Now, however, some of the men who helped the wild-catters find themselves with unprospected claims on their hands, and are rising to their responsibilities with honest intention in their efforts.

Besides the wild-catters, there have been a few individuals and at least one company that have been working more or less steadily, and the whole district has now a much healthier tone.

The Ontario Bureau of Mines has issued an excellent report by R. W. Brock on the district, much of which has been published in the Canadian Mining Journal (January 1st and 15th, 1908). There is really but little to be added to this report, except to emphasize some of the matters that Mr. Brock hints at. The main feature of the district is the belt of serpentized dolomite (?) extending in an east and west direction for at least 12 miles, and probably further. This belt contains a fractured zone in which the network of fissures has been filled with quartz. The zone varies in width up to several hundred feet, and the quartz stringers themselves range in thickness from a knife-edge up to six inches or so, and occasionally a mass of quartz up to twelve or fifteen feet in width is met with. There are also well defined veins of quartz, but the network is the main characteristic of the district. At various points along the whole 12 miles of this zone visible gold has been found in the quartz, and in at least two claims very rich specimens have been taken out. The combination of wide ore bodies and occasional rich specimens was the ideal condition for the wild-catter, and even now the sight of these specimens never fails to stimulate even the most disappointed of the wild-catter's victims. Today the general mental attitude of most of those associated with the district is a gloating over these specimens, coupled with an unconscious (though really wilful) ignorance of the true values of the ore bodies outside of the specimen areas. It is true that several tons of rock have been sent outside to be tested, and I believe it to be also true that specimens were rigorously excluded from these test samples. Also there have been several "mill runs" made on the properties themselves, but personally I believe that every test so made prior to my visit in June was made on special ore and was not representative of the ore as it would be mined under commercial conditions. These mill tests have given results all the way from \$8 to \$50 in gold per ton, and they are of value in so far as they show that there is some pay rock in the district; but to connect these mill runs with the large ore bodies is misleading.

Though much money has been spent in the district, very little is really known about the extent or value of the pay zones. Four stamp mills have been erected. Two of these, a full-sized 10-stamp mill and a small 3-stamp mill, have been in operation. The other two mills have not yet been completed to the operating stage. Much money has been spent on shafts, tunnels, mine buildings and even gasoline launches, but very little has been expended on surface work on the alleged ore bodies. At one of the properties a responsible official informed me that in one of the shafts on his property, at a depth of two feet from the surface the ore assayed only two dollars, at a depth of ten or twelve feet it assayed \$7, while at a depth of 35 feet it assayed \$50. If the ore from this shaft would show an average value of \$7 per ton, his property would very probably be one of the big mines of the world. If it averaged even \$2 a ton, I should consider that the property had a great future. I asked the responsible official of another property why

\*From a letter by the writer in the Canadian Mining Journal, Sept. 1st, 1907.

they did not make more effort to determine the value of the ore bodies. He replied that it was little use sampling on the surface; when his shaft was down 100 feet he would cross-cut and sample the ore body then. Now, these were two of the most important properties in the district, and these statements of the officials show the remaining influence of the wild-cat period.

That fiction about the increase of values with depth is one of the most important properties of the wild-catter and boomster. There is absolutely no reason, either from theory or practice, why the ore in the Larder Lake district should carry more gold at 100 feet depth than it does at the surface. As a matter of fact, the richest specimens yet discovered up there have come from the surface, but this is purely accidental. The surface is easily and cheaply prospected; that so little work has been done on it is due either to ignorance or else to the fear of exposing much barren or low-grade ore. The sinking of shafts before the surface has been properly prospected can only be of value for the purposes of selling stock. The same is of course true in an even greater degree in regard to the erection of mills. There is not a property in the district upon which sufficient work has been done to justify the presence of a mill, not even of the small three-stamp, so-called, prospecting mill.

The engineer who makes such statements is locally called a "knocker," and local inhabitants seek to discredit him. In reality the worst knocks the district has had lie in the work that has been done there. Not five per cent. of the money expended has been rationally used for the purpose of finding or exposing pay-ore bodies. The first function of the mills that are being completed at the present time will be to open the eyes of the shareholders to the limitations of the present ore bodies. Their function will be simply to disappoint, so that directors may take a new view of things and begin over again, begin to do what they should have done in the first place, viz., explore.

There are three stages in the proper growth of a mine: exploration, development, production. The present managers at Larder Lake are seeking to attain the last stage without either of the others. And Larder Lake is particularly a district requiring exploration. A large part of the fractured zone with its quartz stringers contains insufficient gold to pay; only here and there in occasional and irregular areas will pay-ore be found. These pay zones must be explored for, and this requires experienced men. It is still a matter of conjecture whether there are any pay zones of sufficient extent to pay for a mill, but probably such zones will ultimately be found. All the local conditions point to the possibility of the existence of some very large bodies of pay ore in this zone of serpentinized dolomite.

To the south and west of the lake discoveries have been made of an entirely different kind of ore. There are some well-defined veins containing massive pyrites, with appreciable quantities of copper. They are reported to contain good gold values. Some systematic exploration work has been done in this neighborhood. Cobalt bloom has been discovered on more than one claim.

Altogether, the district is not without promise, but it is a great pity that it has been so seriously handicapped by wild-cat and ignorant methods of work.

The statement and opinions I have expressed in regard to wild-cats do not apply to the Harris-Maxwell Company. The work done on their property is open to criticism, but their directors have shown a remarkable honesty of purpose.

*Editor's Note.*—We feel justified in appending a note of explanation to Mr. Haultain's article. Mr. Haultain's purpose is to waken a sense of responsibility in the owners and operators of Larder Lake properties. He and other competent judges recognize the fact that, in at least one case, honest work has been done and is being done. The property referred to is being sampled systematically and has a ten-stamp mill ready for operation.

## THE MINING OPERATIONS OF THE DOMINION COAL COMPANY.

BY F. W. GRAY.

(Continued from last issue.)

**No. 4 Colliery (Caledonia Mines).**—Operations were first commenced at Caledonia on the present site in 1866, and shipments date from 1868. The original lessees built a railway along Big Glace Bay Beach, and shipped their product at what was formerly known as Port Caledonia, where they erected an extensive shipping dock, the remains of which are to be seen today half buried in the sand.

Since 1866 Caledonia has produced a little over 8,000,000 tons of coal, of which quantity 6,500,000 tons, or over 80 per cent., has been produced since the Dominion Coal Company took over the mine in 1893. At the present time the output of Caledonia is about 45,000 tons per month on single shift.

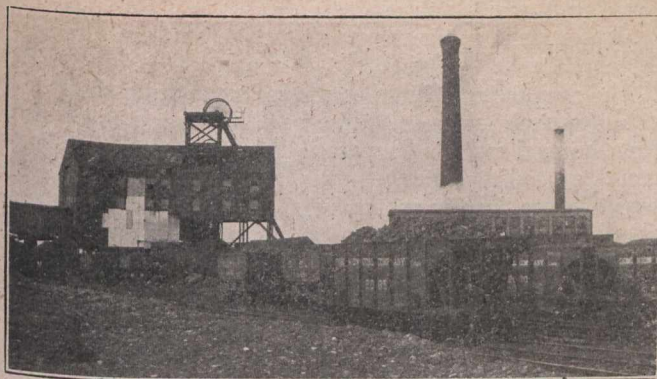
The most serious underground accident that has ever occurred in the Glace Bay Basin took place in this colliery. A fire originated in a pump house situated about 1,400 feet to the deep of the pit bottom, in what was known as the Old West deep. A party of

men in charge of the underground manager were endeavoring to locate the fire when an explosion took place. From all accounts the explosion was a very slight one, and the 11 men who died were in all probability the victims of carbon monoxide poisoning.

The workings of Caledonia are very extensive, as may be judged from the length of time that the mine has been working. They are divided into two distinct sections by the coal pillar left for the support of Glace Bay Harbor and the creek that flows into it. The west side of the mine is an entirely land area. The east side workings are partly submarine, the most easterly levels being extended at the present time some 2,000 feet from the shore in the direction of No. 6 workings, up to the barrier against which the Caledonia workings will ultimately proceed. The territory between Caledonia east side and the workings of No. 6 Colliery is practically virgin, with the exception of the small area that was extracted from the workings of the Old Clyde pit.

The Old Clyde coal mine had the reputation of being of excellent quality.

It will be noticed that in the sketch plan of the Glace Bay Basin, that accompanied the first part of Article II of this series, the outcrop of the Phalen seam is shown as a continuous black line across Big Glace Bay Beach, while those of the other seams are dotted. The Phalen outcrop has been proved by boreholes which



DOMINION No. 3—BANKHEAD APPROACH.

were sunk in 1906, and there is absolutely no dislocation or alteration of the measures between the workings of Caledonia and those of No. 6 mine.

The coal shaft is 185 feet deep, rectangular, and un-timbered except for the buntons and spears. It is 18 feet 10 inches by 11 feet, divided into two compartments, one for hoisting coal and the other for the man cage. The cages are of the standard dumping type used by the Dominion Coal Company, and were installed in place of the former platform cages when the plant was taken over. The guides are wooden.

The air shaft is 10 feet in diameter, circular in shape and is divided by a pillar of strata only five feet wide from another shaft of the same dimensions that was sunk side by side and originally intended to be used

bottom of the air shaft, one split ventilating the west side, and the other going to the east side where it is again subdivided into two splits. A new air shaft 15 feet by 10 feet finished dimensions inside the timbering and 160 feet deep has just been completed at a point on the shore line distant about one mile to the eastward of the fan shaft. This shaft will act as the upcast for the easterly split of the east side, and will eventually become the main return for the submarine workings of Caledonia.

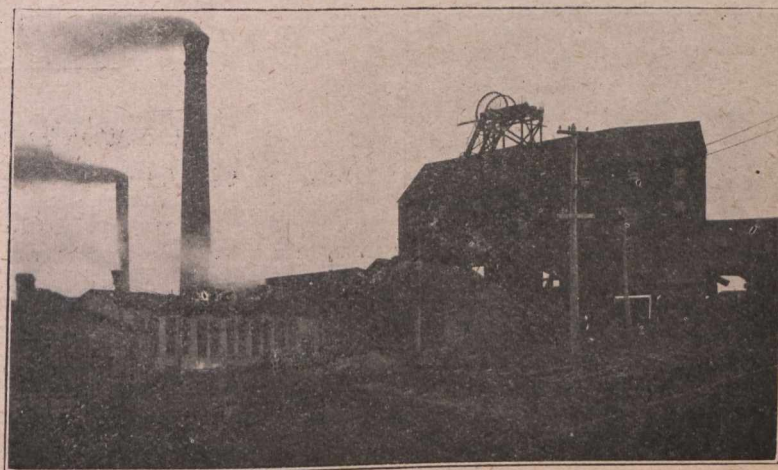
The surface power equipment consists of seven Babcock & Wilcox boilers rated at 1,380 h.p., fitted with Parsons' burners. There is a brick smokestack 125 feet high, and one steel stack 80 feet high.

The coal hoist is the same engine as was originally used at the Gardiner Mines in 1870, and was made by an English firm (Coupe). It is a horizontal engine with 20-inch by 48-inch cylinders, and an 8-foot drum using a hoisting rope  $1\frac{3}{8}$ -inch diameter.

The man hoist was made by Matheson of New Glasgow. It has cylinders 18 inches by 24 inches and a 7-foot drum.

The haulage engine was made by the same people as the coal hoist, being part of the original equipment. It is a horizontal engine, cylinders 22 by 42 and a 15-foot fly wheel. It operates three endless haulages by clutch pulleys on a common shafting, namely the West Level rope, the West Deep rope and the East Deep rope, the length of the hauls being respectively, 6,200 feet, 5,900 feet and 3,500 feet, all using  $1\frac{1}{8}$ -inch wire rope. The usual speed of the haulage is 1.75 miles per hour.

The compressor house is a concrete building and contains one American Rand compressor installed in 1897, steam cylinders 40 inches by 32 inches, air cylinders 36 inches by 22 inches, 48-inch stroke, 60 revolutions with a capacity of 3,200 cubic feet per minute; one Rand compressor steam 36 inches by 20 inches, air 32 inches by 20 inches, 48-inch stroke, 60 revolutions capacity 2,500 cubic feet per minute. There is also a small Ingersoll straight line compressor of 900 cubic



DOMINION No. 4 (CALEDONIA)—LOOKING SOUTH.

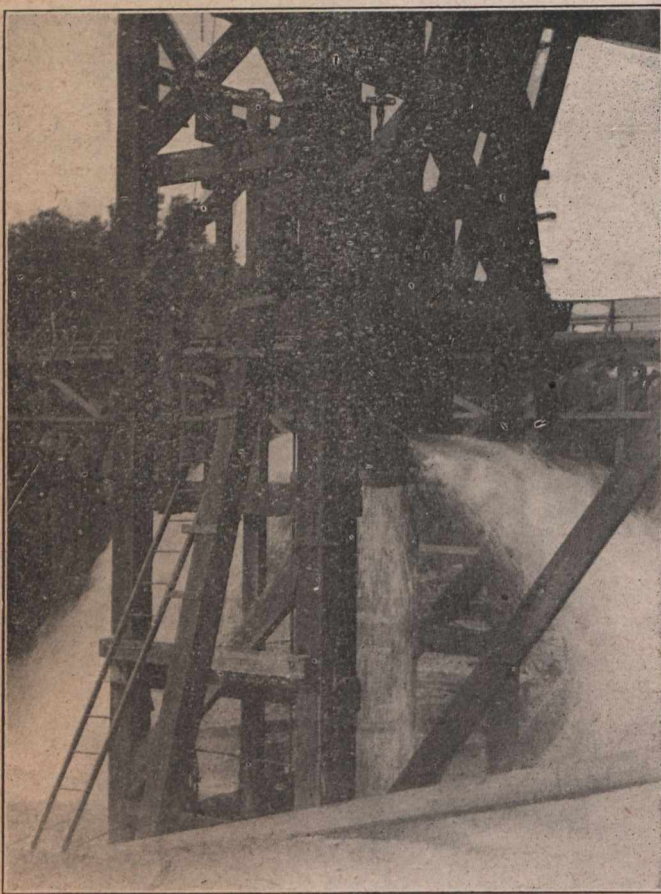
as a water shaft. At the present time the two shafts are connected at the surface and form in reality one air shaft. The main compressed air column is suspended in the last named shaft. The fan is a Dixon fan of the Guibal type, 14 feet in diameter by 6 feet 4 inches wide, and there is also a spare Murphy fan 12 feet diameter. The ventilating column is depressive, the coal shaft forming the upcast. The air is split at the

feet capacity. An automatic lubricating system is to be installed, but is not yet in place.

The colliery surface and pit bottom are lighted by current obtained from the Central Electric Plant and transformed at the colliery.

The amount of mine water that has to be dealt with at Caledonia is greater than at any other collieries on the Phalen seam, as it deals not only with its own

water but with that of No. 3 Colliery to the westward. The water shaft, situated on the side of Caledonia Brook a short distance below the colliery, is capable of dealing with large quantities of water. The shaft, which was sunk in 1900 for the purpose of unwatering the mine after the fire, is 266 feet deep and is fitted with tanks having a capacity of 800 gallons each. These tanks are of the usual type with side outlets for the water. Side discharge tanks were formerly used here, but they have been discarded in favor of the present design as they are less wearing on the guides and generally more suitable. The hoist is a horizontal engine, cylinders 20 inches by 42 inches (Whiting & Shaw). The greatest capacity of the hoist is three tanks per minute, and it has lifted as much as 67,000,000 gallons of water in one month.



CALEDONIA WATER SHAFT.

The underground pumps have up to the present time been driven by compressed air, but is unnecessary to describe these as they are being replaced by an entirely new set of electrically operated pumps. On the west side there is a five plunger Aldrich pump with a capacity of 600 gallons per minute, and a twelve stage Gwynne centrifugal pump, driven by 150 h.p. Westinghouse motors. The pump house is built of brick with walls one foot thick, having projecting buttresses every six feet. The roof is supported by 20-inch steel girders. The floor is concrete and the whole construction is as nearly fireproof as can be made. The transmission lines are carried down a borehole situated on Chapel Hill at Glace Bay, and the discharge will be made through a contiguous borehole 590 feet deep.

The East Side boreholes are situated at Quarry Point and are about 440 feet deep. The pump house underground is of similar construction to that on the west side. The pumps are two 3-stage McDougall turbines driven by two 100 h.p. Westinghouse motors, and rated at 420 gallons per minute against a 450-foot head.

The discharge boreholes are 10 inches finished diameter inside the cast iron casing which is filled in with concrete. The transmission boreholes are not cased and are 6-inch diameter.

The current is transformed on the surface, the transformers house being situated near to the boreholes.

The surface erections comprise a machine shop, lamp cabin, warehouse, etc. The bankhead is a steel structure housed with corrugated iron and fitted with the usual screening arrangements and picking belts. The wash house has recently been fitted with a sprinkler shower bath, an innovation which is being readily taken advantage of. Shower baths are the accepted and best method of cleansing for the use of miners after their work, as they are clean and sanitary, are economical in the use of water, and cleanse very effectively by reason of the mechanical effect of the falling water. They are much preferable to slipper baths which speedily foul unless kept with the most scrupulous care.

The firemen's hall, which Caledonia has, in common with the other mines, is shortly to have a shower bath and its compliment of Draeger apparatus.

The mine is fully equipped with A. & B. safety lamps, and fire fighting appliances. About 650 men are usually employed. The mine has in the neighborhood of 80 horses.

The population of Caledonia is composed mostly of life long residents, largely of Scotch Highland descent. The community boasts of a band of pipers who wear the garb of Old Gaul, and the "boys" of Caledonia have a Gaelic yell, which they use on befitting occasions, that would do honor to any McDonald that ever struck terror to the heart of the Sassenach with his slogan.

(to be continued.)

### ACT ACCOMPLISHES GOOD.

#### Disputes Legislation Prevents Twenty-Eight Strikes.

Washington, July 18.—That the Canadian industrial disputes investigation act for the prevention of strikes affecting public utilities has accomplished the main purpose for which it was enacted is the conclusion drawn after a special investigation of the workings of the law by Dr. Victor S. Clark for the Bureau of Labor in a report made public to-day. From March 22, 1907, when the act went into effect, to January 15th, 1908, thirty disputes became subject to investigation and in twenty-eight cases strikes were averted or ended. The law prohibits a cessation of industry, under penalties, until by the investigation of an official board the public is officially informed of the grounds of the controversy, reliance being placed upon public opinion to prevent or shorten such disturbances.

The law provides for boards of conciliation and investigation. Dr. Clark reports that no employer was found who was not favorable to the law, as better than no legislation, as far as it applied to railroads, and that there is some sentiment in its favor among the rank

and file of the workers, though some representative labor leaders are opposed to it.

Among the public most of those who are practically familiar with labor matters approve the act. Its effect has been to cause the public to take an interest in many industrial disputes quite as immediate and important as that of the conflicting parties. Apparently the law has not affected adversely the condition of workingmen or of industries where applied.

**DEISTER SLIMER AND SUSPENDED TYPE VANNER TESTS AT COMBINATION MILL OF GOLDFIELD CONSOLIDATED MINES COMPANY.**

	Average of All Tests.	
	Deister.	Suspended Type.
Total solids in feed per run in tons....	33.75	39.4
Total solids in 24 hours, in tons... ..	8.90	10.006
Value of feed per ton in ounces .....	.97	.97
Total value of feed in ounces... ..	32.736	39.40
Value of concentrates per ton in ounces	14.27	17.20
Per cent. of extraction by product....	41.89	32.51
Per cent. of extraction by assay of heads and tails... ..	40.10	35.85
Flow to callow tank in pounds per min.	137.7	
Dry solids in pounds per min. ....	16.36	
Water in pounds per min. ....	115.5	
Overflow of clear water in per cent...	48.15	
Per cent. of solids in discharge... ..	22.62	

The above table gives a record of the performance of the Deister, in competition with a suspended vanner. The tests were conducted during May and June of this year, at the Combination Mill of the Goldfield Consolidated Mines Company. As a direct result of the competition seventy No. 3 slime tables were ordered at once.

The new miners' lamp of Santa and Spelmans, of Brussels, is designed to give warning of danger, and is based on the principle that a flame like that of benzine remains constant in size and brightness under constant conditions, but is increased by such a gas as fire-damp and reduced by carbonic acid. The lamp has a protective casing of wire-gauze provided with external cooling ribs. It is surmounted by a refractory chimney, through the opposite sides of which pass the elements of a thermopile, and any variation of current is shown by a galvanometer in connection with these elements. If the flame is made larger and hotter by the presence of fire-damp, the thermo elements are affected, an increase of current intensity being indicated by the galvanometer needle. Carbonic acid gas, reducing the flame, is similarly signaled by a reduction on the galvanometer scale, and a recording apparatus connected with the galvanometer may be made to keep a record of the varying conditions in different parts of the mine's workings.

The idea of using house refuse for fuel, as is being so successfully attempted in the refuse-burning plants of large cities, is supplied on a small scale in the new fuel—called "coalescine"—of an English borough engineer.

Garbage, bits of unburned coal from the ashes, and other waste, are pulverized, mixed with tar, and made into briquettes. This fuel is claimed to be not only perfectly hygienic, but to show high efficiency under boilers. The cost is so moderate that small towns are enabled to dispose of their waste by a practically self-supporting method.

A redistribution of the chemical elements—especially of the metals—has been going on through the agency of man for some thousands of years, and Mr. H. M. Atkinson, a British chemist, points out that the total effect must be considerable. The gold and other metals concentrated in small spots near the surface of the older rocks are being rapidly mined and put to use, the fine particles from their weir being carried down streams and eventually diffused through the deposits at the mouths of the rivers. Tin oxide, for example, is mined at a few places, spread out pretty uniformly over the earth, and in the refuse of towns the waste tin is oxidized, carried away by water, and on the sea bottom the fine particles are so scattered as to be beyond future recovery by any process known. The effect may be modified to some extent by the concentration of metals in solution and other causes. As the common receptacle of all waste, the sea must be slowly changing its composition from industrial processes—notably from soluble chlorides and other factory waste and from the salts of potash and lime that are taken from mines, and used on the soil by farmers.

Selenium, discovered by Berzelius in 1818, is a non-metallic element closely related to sulphur and tellurium. In darkness it is practically a non-conductor of electricity, but when lighted it passes current readily, and it is this unique variability that gives to the substance great possibilities of future importance. The curious property has been applied experimentally in various ways. It has given a means of transmitting speech along a ray of light, a method of guiding and exploding torpedoes by light, and it is employed for sending pictures by wire. It has been used also for measuring the Roentgen rays applied in medicine. Selenium, now selling at 50 cents to \$2.00 per ounce, is a rare substance in little demand, but in the United States it has been produced experimentally from the anode slimes of the electrolytic refining of copper, and it is probable that a moderate supply can be obtained in this way.

In his new iron-making process, Dr. G. P. Loyal, of Stockholm, finely pulverizes the ore, coal and other materials, and causes them to be drawn by a current of air or carbonic oxide in a continuous stream from the hopper through a delivery pipe into the furnace. The furnace is a vertical cylinder, with a tap hole for the iron and an escape hole for the gas near the base. The coal is burned to carbonic oxide in the upper part of the furnace, and the slag and reduced iron collect on the furnace wall and flow down to the lower end.

In a new French Welsbach mantle, the rare oxides are consolidated in an electric furnace, greatly increasing resistance to shocks, tremors and draughts.

# THE TREATMENT OF STAMP MILL TAILINGS AT THE RICHARDSON MINE, GOLDBORO, N.S.

By E. Percy Brown, S. B.

The treatment of the tailings from the mine of the Boston Richardson Mining Company having been attempted in various ways, it may be interesting and instructive to outline the various steps and note the results obtained by the different methods.

For a general description of the mine and the characteristics of the ore, the reader is referred to an article in the "Canadian Mining Journal," June 15, 1907.

The first treatment of the tailings, outside of laboratory work, so far as the writer is aware, was at the Chlorination Plant of the Brookfield Mining Company, Queens County, N. S., carried out by the writer in July, 1897.

About one ton of concentrates, worth \$18 per ton, was treated by roasting and chlorination, giving an actual extraction of 89 per cent. of the value in the roasted ore. The loss of gold in roasting was high and was probably due chiefly to the fact that it was impossible to avoid a loss of ore in handling so small a lot through the large furnace.

In consequence of the success of the treatment a shipment of one hundred tons or more of concentrates was made to the chlorination plant at Brookfield two or three years later.

It is understood that this treatment was not successful, probably due to the fact that the concentrates were old and had become oxidized and caked, so that thorough roasting was impossible.

The cost of roasting and chlorinating such ore in Nova Scotia was from \$5 to \$6 per ton with an expensive plant.

The next step was the erection of a very large cyanide plant at the Richardson mine to treat the mill tailings direct without concentration. While the percentage of recovery was satisfactory and no difficulty

was met in treating the tailings in this way, the values were too low to admit of profitable recovery, being about one dollar per ton.

Early in 1905 Mr. H. S. Badger, assisted by the writer, superintended the installation of a Wilfley concentrator and made a trial treatment of the arsenopyrite concentrates by bromo-cyanide. These tests were so successful that five more Wilfleys were installed and the small cyanide plant, shown in the accompanying sketch was erected.

This process has been successfully used ever since and beyond a few difficulties easily overcome by experimental work has given no trouble.

The method of treatment used is based on the regular Sulman-Teed process with the exception that ordinary zinc box precipitation is used, giving entire satisfaction. In the clean-up the zinc box residues are treated with sulphuric acid, washed by decantation, dried on filter paper in large funnels and carefully roasted. The roasted slimes are then melted in a large graphite crucible with borax glass as a flux, giving a clean brick of gold. The sketch of the plant is self-explanatory. The shaking sluice (K) runs along the ends of the Wilfley tables and conveys the concentrates into the sump (H).

As no fall is available the concentrates must be lifted to the level of the treatment tanks.

A carrier (F) is used and is of such a pattern that the ore must be shovelled into the vats. This ensures an even distribution over the tank.

The method of handling may seem awkward, but the one man necessarily employed at this portion of the work has ample time to attend to his duties.

The following table gives in concise form the results for the year 1907:

MONTH	NO. TONS	AVERAGE VALUE STOCK PER TON	TOTAL VALUE OF STOCK	AVERAGE VALUE TAILINGS PER TON	TOTAL VALUE TAILINGS	ESTIMATED			ACTUAL				LABOR		CYANIDE @ 17¢ PER LB		
						AVERAGE EXTRACTION PER TON	TOTAL EXTRACTION	PER CENT.	WEIGHT OF BULLION	VALUE PER OUNCE	TOTAL VALUE	PER CENT.	TOTAL	PER TON	TOTAL	PER TON	
																	PER TON
1907																	
JANUARY	134.03	\$ 17.00	\$ 2268.51	3.23	432.91	13.77	1835.60	81	113.72	17.00	1933.24	85	110.50	0.81	94.30	0.70	
FEBRUARY	143.03	21.74	3110.55	4.62	661.37	17.12	2449.18	78	147.00	17.76	2610.72	83	97.43	0.68	96.25	0.67	
MARCH	150.57	16.13	2420.35	4.26	639.10	11.94	1781.25	74	125.75	18.21	2287.90	94	110.00	0.78	84.00	0.56	
APRIL	185.12	13.57	2512.51	3.25	608.07	10.32	1904.44	75	120.75	17.51	2114.33	84	113.36	0.61	94.50	0.51	
MAY	127.88	16.50	2105.46	5.07	649.24	11.33	1456.22	69	87.50	17.38	1520.75	72	111.07	0.87	101.50	0.78	
JUNE	123.15	17.02	2096.23	4.43	545.63	12.57	1550.60	74	90.46	17.00	1536.80	73	112.87	0.98	105.00	0.85	
JULY	101.25	17.15	1737.02	4.87	493.64	12.28	1243.38	70	78.50	16.82	1320.37	76	103.28	1.02	87.50	0.86	
AUGUST	58.35	15.24	889.76	4.51	263.28	10.73	626.98	70	35.75	16.78	599.88	67	102.50	1.75	48.12	0.82	
SEPTEMBER	96.20	15.48	1488.89	5.06	486.40	10.42	1002.09	67	61.75	16.35	1009.61	67	101.00	1.05	78.75	0.81	
OCTOBER	113.70	13.00	1478.33	3.95	449.94	9.05	1028.39	69	65.75	16.82	1104.23	74	102.50	0.90	87.50	0.77	
NOVEMBER	107.40	13.07	1403.85	3.37	362.29	9.70	1041.56	74	69.60	17.13	1192.24	84	101.00	0.94	78.75	0.73	
DECEMBER	102.68	15.67	1609.70	4.47	459.41	11.20	1150.29	71	57.00	17.44	994.08	61	102.50	1.00	70.00	0.69	
TOTAL	1443.36		\$ 23121.16		\$ 6067.68		\$ 17069.48		1053.37		\$ 18226.15		1268.01		1093.66		



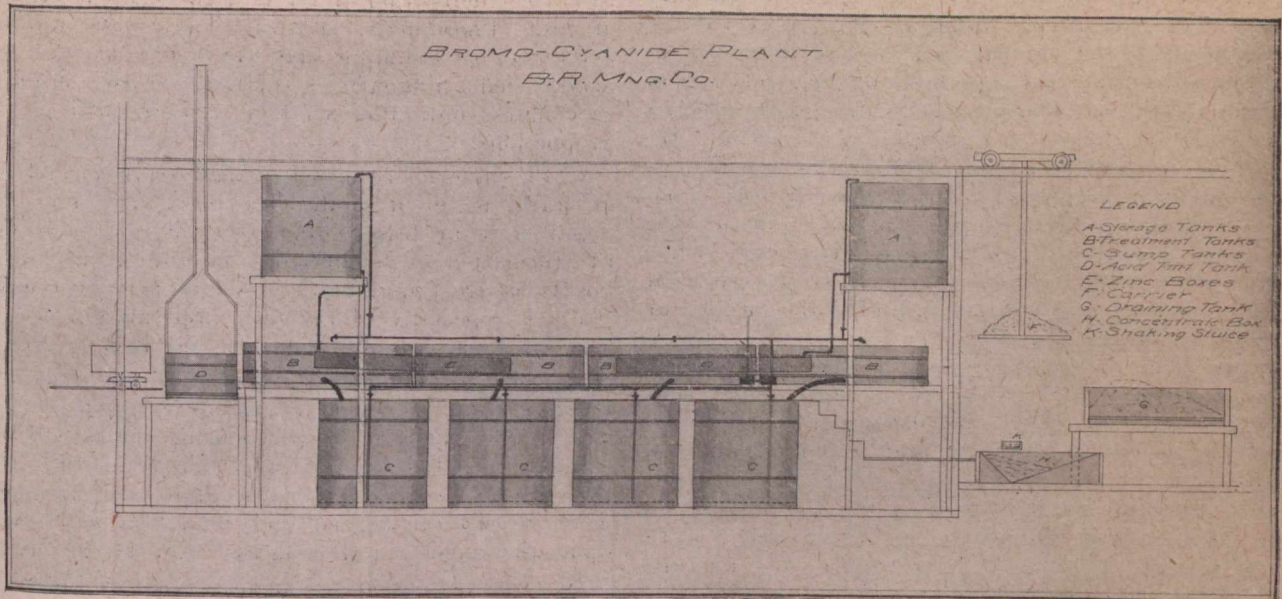
The percentage of recovery, as given above may seem low, but it must be noted that the costs are also low, and while the percentage of recovery might be increased by further treatment, it has been considered that this would not cover the increased cost.

The tailings from the cyanide treatment, which contain 40 to 50 per cent. of gangue (necessary for successful percolation) are now being reconcentrated and

the arsenic and bromo-cyanide for the extraction of the gold. Probably this work will be somewhat along the lines of the method used with such good results at Deloro, Ont.

It can be seen by a glance at the sketch of this plant that the construction is simple in the extreme.

The total cost of erecting such a plant would be about \$1,000, exclusive of grading or boiler power.



shipped to Germany. After this reconcentration they contain 39 to 40 per cent. arsenic and command a good price for this arsenic, and gold contents.

Experimental work, particularly some carried out by students of the Massachusetts Institute of Technology, indicate that the future method of treatment will be a combination of roasting for the recovery of

The four tanks are capable of treating all the concentrates in the tailings from the 60 stamps, this ore carrying from two to three per cent of concentrates.

It is hoped that other gold mining companies in Nova Scotia may be induced to adopt some similar measures to save the gold now being lost in the tailings from their stamp mills.

COST										ROYALTY	PROFIT	REMARKS
BR. SALTS @ 28¢ PER LB		LIME		SUL. ACID		ZINC @ 8½¢ PER LB		TOTAL COST	COST PER TON			
TOTAL	PER TON	TOTAL	PER TON	TOTAL	PER TON	TOTAL	PER TON					
\$ 84 00	0 62			\$ 4 97	\$ 0 03			2 93 97	2 19	9 666	15 42 61	Extras included in A = \$ 67.29 B = 147.84 C = 215.13
63 20	0 44			4 74	0 03			2 61 62	1 82	130.54	2218.56	
84 40	0 56			7 60	0 05	4 62	0 03	2 90 62	1 93	114 49	1874 79	
100 80	0 54			6 87	0 04	4 63	0 02	3 20 16	1 72	105 71	1688.46	
67 20	0 52			5 42	0 04	4 62	0 03	2 89 81	2 26	76 03	1154 91	
62 40	0 50			6 80	0 05	4 63	0 03	2 91 70	2 36	76 84	1168 26	
72 00	0 71			5 40	0 05	4 62	0 04	2 72 80	2 69	66 01	981 56	
28 80	0 49			1 53	0 02	4 63	0 08	1 85 60	3 18	29 98	384 30	
43 20	0 44			3 98	0 04	4 62	0 05	2 31 55	2 40	50 48	727 58	
57 60	0 50			6 40	0 05	4 63	0 04	2 58 63	2 27	55 21	790 39	
52 82	0 49			3 15	0 03	4 62	0 04	2 40 32	2 24	59 61	892 39	
48 00	0 47			5 27	0 05	4 63	0 04	2 30 40	2 24	49 70	713 98	
912 25				62 15		46 25		3382 31	2 53	911.26	15932 68	Total Average Cost, including Royalty = 2 90 per ton

# THE ORIGIN OF BOMBSHELL ORE.

BY H. M. CHANCE.

The term "bombshell" ore is applied by miners and iron-masters to hollow masses of limonite—brown hematite—which sometimes are round or oval, but more commonly are of any irregular shape. The "bombs" may contain water, clay, sand, quartz, flint, pyrite, siderite, sandstone or decomposed slate, or may be entirely empty. Geologists usually speak of such ore as nodular or concretionary. A careful examination of the literature of ore deposits, and especially of that relating to the genesis of limonite ores, fails to disclose a satisfactory explanation of its origin or mode of formation. By many it is assumed to be similar in origin to silicious geodes, which are supposed to be formed by the deposition of silica or silicates upon the walls of cavities, while others describe it as of "concretionary" origin without attempting to explain the process of formation or the manner in which it has occluded the variety of materials which are found in the interior of different specimens from the same locality. That it is not of concretionary origin is evident upon even cursory consideration, for concretions are masses of material arranged in concentric layers around a central nucleus. The latter may be a grain of sand, a pebble, fossil, or any substance around which (as a core) the concretion forms, growing from the center by the successive addition of concentric rings. Concretions are perhaps merely symmetrical segregations.

The peculiarities of this ore are well described by Professor T. C. Hopkins, *Bull. Geol. Soc. Am.*, 1890, Vol. II., p. 477, etc., as follows:

"Nodular ore consists of irregularly rounded masses, varying in size from a fraction of a pound to several hundred pounds in weight. The masses are frequently hollow, but some enclose a rounded or sub-angular rock fragment, which is sometimes sandstone, . . . sometimes chert, sometimes slate, and sometimes clay. Some shells are filled with clay and sand, and workmen report finding many of them filled with water. Some are filled with clay, which still retains the laminated structure and appearance of the original slate from which the clay was derived; furthermore, the slaty structure was found to extend through the ore shell, which showed, besides the plain lamination of slate, a faint concentric structure as well. . . . While only one shell was found still retaining the laminations of the clay, there were many others containing clay and sand. Some of the shells were but thin crusts, while others were quite thick, almost solid; some have a smooth, velvety or bright mammillated inner surface, frequently coated with manganese oxide. In some instances the lining of the shell is covered with many small stalactites of ore. . . . Many of the shells are lined with a dense fibrous layer, often an inch or more in thickness. . . . The thinner shells have all been broken, and we see only the fragments of them in the clay-ore masses. This shell form of ore . . . forms an appreciable part of the ore body in many cases. The small, irregular, nodular-like pieces of ore, commonly known as shot ore, are presumably closely related in origin to the shells. . . ."

The inner wall of many bombs consists of a hard, bright brown or jet-black glazed surface, carved, rounded or botryoidal. This is frequently described as a manganese coating, but is doubtless a film of iron or manganese silicate. Occasionally the interior or a part of the interior is lined with a layer of extremely hard, flinty, liver-colored iron silicate, or with quartz crystals or chalcidony, and the same silicate frequently forms a considerable portion of the body of the shell or of its outer layers, but generally the shell is composed of high-

grade limonite, of a fibrous structure, especially in those layers forming the inner lining of the shell.

These peculiarities are satisfactorily accounted for neither by the theory that these ore masses owe their origin to concretionary action, nor by that which assumes the direct deposition of ferric hydrate upon the interior of rock (limestone?) cavities. They may, however, be explained by assuming that the bombs are the residual masses, remaining after oxidation, of iron sulphides or carbonates containing sand or clay or both in varying proportions.

If the material from which this ore is formed consists of sandstone, or of sandy slate, or of clay slate, impregnated more or less completely with pyrite or siderite, the formation of bombshells, containing just such materials as are found in these shells, may be readily explained, especially if the iron impregnation be in the form of pyrite or marcasite, that is,  $\text{FeS}_2$ .

If such sandstone or slate is broken and fissured by faulting and crushing, and by the development of cleavage planes, oxidation by percolating waters will proceed along the joints or planes which form the channels through which these waters circulate, and in each fragment of the mineralized rock oxidation will commence upon the outside and progress towards the center.

In this way an outer skin or shell of limonite first forms on the outside of the fragment, for if the iron be present as pyrite or marcasite, while some of it may be removed as ferrous sulphate, this salt, if formed, may immediately be oxidized and precipitated *in situ* as ferric hydrate. The sulphuric acid formed by the oxidation of the remaining molecule of sulphur will attack and decompose the clay of the gangue, removing the bases as sulphates in solution; the silicic acid also escaping in solution, or combining with iron oxides to form iron silicates, remains as an integral part of the ore.

If clay be present in large quantity a portion will remain undecomposed in the center of the bomb, together with all of the sand originally present in the gangue.

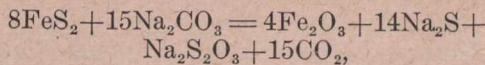
Hence, if the original pyritic material has a clayey (slate) gangue, bombs may form containing no residual matter, or containing more or less clay; if the gangue be sand and clay (arenaceous slate), the sand only, or sand and clay may remain; if the gangue be sand only, some of this will remain as an impurity in the limonite forming the body of the shell, and some as a partial filling of the interior of the bomb.

It is now well known that pyrite (or marcasite) oxidizing underground, whether by waters carrying free oxygen, or by waters containing no uncombined oxygen, or by reactions involving hydrolysis, does not behave in the same way as when oxidized by exposure to the air above ground. One of the most common reactions above ground is that in which sulphur is set free, often written:

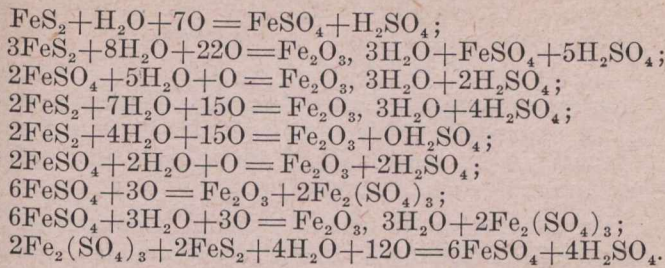


but this rarely occurs beneath the surface, for the gossans of pyritic veins seldom carry free sulphur, although there are a few noted examples in which large deposits of sulphur are found between the surface and the unoxidized portions of such veins.

In the absence of oxygen, carbonates in solution may, as shown by Dr. N. H. Stokes, completely oxidize the iron of pyrite or marcasite thus:



and under proper conditions of temperature and pressure the ferric oxide thus formed may be deposited as hydrate; but these reactions do not satisfy the observed conditions, and it seems more probable that oxidation near the surface has proceeded as indicated by some of the following reactions:



The sulphuric acid having been formed in direct contact with the gangue, it is reasonable to suppose that it must at once attack any clay or other decomposable material, and the removal of the soluble silicates and silicic acid by transfusion through the walls of the bomb is readily pictured. It is, however, possible that the colloidal silicic acid may be retained, and further, that it may perhaps often be set free in a gelatinous condition. This latter hypothesis may account for the frequent presence in such ores of a skeleton of amorphous silica which appears to completely ramify some parts of the limonite.

If the oxidation proceed according to these equations, the successive additions of layers of limonite to the interior of the shells is doubtless due to the further oxida-

tion of the ferrous sulphate as above shown, the oxidation of the solution occurring at or in the wall of the shell where the solutions, in escaping by transfusion through the walls of the shell, are met by oxidizing waters transfusing towards the center of the shell. Under such conditions the ferric hydrate would be deposited in the pores of the shell or upon its inner surface.

In attempting to picture these reactions and their results, it is important to remember the extremely slow rate at which oxidation proceeds under such conditions. Even at the surface, where decomposition is comparatively rapid, the oxidation of pyrite appears to progress at a very slow rate, perhaps not exceeding an inch or a few inches in depth in several hundred years.

If the iron be present as carbonate, a precisely similar series of reactions may be conceived, in which carbonic acid transposes the silicates, freeing silicic acid and removing the bases as soluble carbonates.

Other observers have noted the occasional presence of a central core of siderite or pyrite in bombshell ore, but have generally attributed the presence of such cores to concretionary action and replacement by sulphates (accompanied by reduction to sulphide) or carbonates in solution.

The foregoing theory, advanced to account for the origin of bombshell ore, is based upon a study of these deposits dating back to 1885—when the writer was personally engaged in mining brown hematite ore—and upon examinations of many specimens which show more or less clearly the character of the original material from which such ore is formed. It will form an integral part of a broader statement, extending the application of this theory to the genesis of limonite ores, and including a discussion of the original sources of the iron, methods of mineralization, and subsequent decomposition and precipitation.

## EXCHANGES.

**The Engineering and Mining Journal, July 25, 1908.**  
—James Ralph Finlay contributes to this number an article on the "Cost of Producing the World's Supply of Copper."

At the Wallaroo and Moonta mines of South Australia the present cost of mining, concentrating and smelting a ton of concentrates is about \$35 per ton. The vein matter of each mine contains from 3 to 4 per cent. copper, the concentrates from 11 to 20 per cent. The veins are fissure veins in metamorphic schist and porphyry.

The only important copper mine in the United States east of Lake Superior is that owned by the Tennessee Copper Company, where large leases of copper-bearing pyrites are worked. Fuel and transportation are cheap, but all the ore has to be smelted. The ore yields only 32½ pounds copper per ton. The current operating costs for 1907 were:

Mining . . . . .	\$1.22
Smelting . . . . .	2.14
Administration . . . . .	0.49
<b>Total . . . . .</b>	<b>\$3.85</b>

To this should be added, according to Mr. Finlay, 21 cents per ton for the use of the mining plant, and 47 cents per ton for the use of the railroad and the smelting plant. These items bring the total up to \$4.53. On this basis anything received above 12 cents per pound for copper in New York is applicable to dividends and anything above 14 cents is net profit after allowing for return with interest of money invested in the plant. These costs are from 5 to 10 per cent. higher than the average.

The Utah Consolidated Company mines and smelts ore averaging by actual recovery, 60 pounds copper, 1.33 ounce silver, and 0.104 ounce gold per ton. The total metallic extraction is equal to 80 pounds copper at 14 cents. The total cost per ton is \$5.88 per ton of ore. Everything above 6.75 cents per pound for copper goes to stockholders as dividends.

At Mount Lyell, Tasmania, the total cost per ton of ore is \$5.52.

At the Granby Consolidated, British Columbia, the corresponding figure is \$5.75.

The article concludes with some valuable general considerations, including comparisons of disseminated

ores, quartz-pyrite ores, and ores that must be smelted in bulk.

**The Mining World, August 1, 1908.**—"Some Striking Features of Rand Gold Production" is the title of an article by Ralph Stokes.

From the year 1887 up to the end of June, 1908, the Transvaal has produced gold to the value of \$1,000,000,000. Despite labor troubles the production of the Transvaal is increasing steadily. Before the war the maximum annual production was \$80,000,000. The yield for the first six months of 1908 exceeds \$68,000,000 for the Rand only. This, Mr. Stokes remarks, is the more striking in the light of the gradual diminution of the ore's grade.

Kaffir labor is replacing Chinese. The exorbitant wages of white miners are being reduced. So also are contract rates. Everywhere "cost sheets" are revealing the results of stringent economy. The Robinson Company, under American management and under the control of Messrs. Wernher, Beit and Eckstein, is quoted as an outstanding example of the benefits of rigid reduction of costs. Here the total working costs have been carried down to \$3 per ton. The attainment of this figure throws an enormous body of ore, formerly unprofitable, into the category of payable ore.

Since January, 1888, the Robinson has paid \$29,939,000 in dividends.

**The Colliery Guardian, July 24, 1908.**—A special contributor discusses in this issue the efforts made by British workmen to obtain compensation under the Workmen's Compensation Acts in respects of injuries caused by the acts of fellow workmen during the employment, but which have no relation to that employment. Several instances are cited where workmen were injured through practical jokes. In one case a workman was hoisted fifty feet in the air by means of the hook of a crane passed through his necktie. The man fell to the ground and was crippled for life. In this and similar cases attempts to establish the liability of employers have failed.

**The Iron and Coal Trades Review, July 24, 1908.**—The increasing use of mechanical coal cutters in British collieries is the subject of editorial notice in this number of the Review. In 1906 only 1,133 machines were at work. During the year 1907 the number added was 360, making a total of 1,493. This is by far the largest number added in any one year.

However, out of Great Britain's total output of 267,828,000 tons of coal, only 12,877,000 tons were cut by machine. Hence the movement has yet far to go.

Compressed air is more largely employed as motive power than is electricity. The average quantity of coal cut per machine in 1907 was 8,625 tons, as compared with 9,004 tons in 1906.

Electrolysis of pipes is now prevented by insulating from the ground. The pipes are covered with a specially-prepared asbestos paper, coated with a waterproof insulating compound, and joints are made tight by strips and insulating cement. The protection is claimed to be permanently durable.

## PERSONAL AND GENERAL.

Mr. John E. Hardman recently reported upon several copper deposits on the north shore of Georgian Bay.

Mr. Fraser Reid, superintendent of the Coniagas concentrator, has returned to Cobalt after a brief honeymoon.

Mr. Hiram W. Hixon, late general manager of the Rand Nickel Company, is spending the summer at Fairbanks Lake, near Sudbury.

Mr. J. B. Tyrrell, the well known Toronto mining engineer, left on August 13th for Saskatchewan. Mr. Tyrrell will return about September 1st.

Mr. W. F. C. Parsons, mining engineer to the Londonderry Iron and Mining Company, Londonderry, N. S., is examining the Bathurst, N.B., deposits for the Drummond interests. Mr. Parsons will also make a professional visit to Mayo, Ont.

Mr. Alexander H. Smith, general manager of Los Reyes Gold Mining and Milling Company, Oaxaca, Mexico, is in Toronto. Mr. Smith has recently visited the copper mines of the Lake Superior region. He is returning shortly to Mexico.

Dr. Henry Youle Hind, who died at Windsor, Nova Scotia, on August 9th, was the author of the following publications: "Prize Essay on Insects and Diseases Injurious to the Wheat Crops," 1857; "Narrative of the Canadian Red River Exploring Expedition of 1857, and of the Assiniboine and Saskatchewan Exploring Expedition of 1858," 1860; "Explorations into the Interior of Labrador Peninsula," 1863; "Eighty Years' Progress of North America"; "Notes on the Northern Labrador Fishing Ground," 1876; "The Effect of the Fishery Clauses of the Treaty of Washington on the Fisheries and Fishermen of British North America," 1877; "Sketch of the Old Parish Burying Ground, Windsor, N.S.," 1889; "History of the University of King's College, Windsor, N.S.," 1890. The degree of M. A. was conferred on him by Trinity University in 1853; and the degree of D. C. L. was granted to him by King's College, Windsor, of which college he was for many years a Governor, in 1890.

## CORRESPONDENCE.

To the Editor

"Canadian Mining Journal."

Dear Sir.—

The clipping\* which I send you doubtless refers to the special representative's work who was sent to Canada by our president. I will be indebted to you for an outline of your Canadian Act on the subject of compulsory arbitration. Please give same in your Journal.

I have had considerable experience with labor, especially with coal miners, and have had charge of mines in various parts of the United States and Canada. Some of the middle western coal mining States, e. g., Illinois and Indiana, formerly had State Boards of Arbitration. The services of these Boards were merely conciliatory, and neither party to the controversy was required to abide by their decision. Yet these Boards rendered good service. I do not believe compulsory

\* See page 398.

arbitration would be of service in the States, even if it could be made constitutional.

In your columns I note frequently reference to labor troubles among coal miners. Recently I read of a strike at Michel resulting from the refusal of a superintendent to employ an objectional miner. This cause rarely leads to troubles over here as the unions (I refer to the U. M. W. of A. more particularly) generally recognize the superintendent's right to employ or to refuse to employ any man. From my observations in Cobalt I rather doubt the efficiency of your law on compulsory arbitration.

Kindly give an outline of your law and comments on the same in your journal.

Very truly yours,  
American Coal Mine Manager.

[Editor's Note.—This is the clipping referred to by our correspondent. We shall publish some comments on the Industrial Disputes Act in an early number.]

Editor Canadian Mining Journal, Toronto, Ont.:

Dear Sir,—Will you please insert the following correction: In several newspapers last week, and now in the Engineering and Mining Journal, there is a statement concerning placer gold in the Larder Lake district. "Professor Willmott" is quoted as the authority. I wish to state that so far as I am concerned I have never been at Larder Lake and made no report to anyone on placer gold in that region. Yours truly,

A. B. WILLMOTT.

Sault Ste. Marie, Ont., August 11, 1908.

## INDUSTRIAL SECTION.

**Bulletin No. 16, The Jeffery A-5 Electric Rotary Drill.**—This machine is designed on essentially new lines for heavier work than it is usual to attempt with electric rotary drills. For drilling coal, slate, rock salt, clay, gypsum and other soft material it possesses distinctive features. The motor, entirely enclosed in a damp and flame-proof casing, furnishes ample power. Changes in speeds and rates of feed are quickly and easily effected. A friction release checks the forward movement in case excessive resistance is encountered and makes possible the drilling of harder material than is practicable with a positive feed. The drill is easily handled and set in position. Special auger bits are provided.

**Jeffrey Bulletin, No. 25.—Handling Coal and Ores.**—A well illustrated catalogue showing engravings and sections of steel tipples, roller shaking screens and loading chutes.

**Compressed Air Appliances and Uses of Compressed Air.—Canadian Rand Company, Limited, Montreal.**—The Canadian Rand Company has designed air power machinery for the past twenty years. The pamphlet before us embodies in crisp form the results of the company's experience in designing and manufacturing compressed air appliances. In the machine shop, in the foundry, in the boiler shop, in structural steel work, the uses of compressed air are too numerous to mention. The air-lift system of pumping artesian wells by means of compressed air is superseding the old deep well pump. In many industries, such as tanning, stone work, etc., modern conditions demand its use. For house cleaning, car cleaning, etc., compressed air is now considered indispensable.

This recently issued catalogue presents illustrated descriptions of air hoist valves, air hoists, Rand trol-

leys, Rand jib cranes, compressed air elevators, hydro-pneumatic elevators, compressed air jacks, pneumatic rams, broaching hammers, blacksmiths' air hammers, "Imperial" pneumatic tools, "Imperial" motor hoists, jaw riveters, injector sand blast, air compressors and Rand rock drills.

The "New Slugger" rock drill marks a departure in design. The valve is of the piston variety with a movement of only a fraction of an inch. It strikes an uncushioned blow and operates with a variable stroke. By cranking the drill up close to the rock, or back from the rock, the stroke may be varied from one-half inch up to the full stroke of the machine. This variable stroke is of special advantage when spotting a hole in a glancing place, or to enable the drill to free itself in close quarters, or in case the steel is a little too long.

The Rand Class "C" portable self-contained air compressor is worthy of especial note. It is designed for prospecting, mining or general operations on undeveloped or difficultly accessible properties where a large outlay of money is not warranted.

**Bulletin No. 40 "Cleveland" Stope Drills.—The Cleveland Pneumatic Tool Company, Cleveland, Ohio.**—The first inside page of this bulletin is noteworthy. On it is printed a half-tone of a well known mine-manager of Cobalt operating a "Cleveland" No. 40 hammer drill.

The pamphlet, alluding to the small amount of power necessary to run the No. 40 hammer drills, points out that a gasoline engine and small compressor, capable of supplying power to one 2¾-inch reciprocating drill, will run two or three No. 40's.

## SPECIAL CORRESPONDENCE

## NOVA SCOTIA.

## Glace Bay (August 3).

Output of the Dominion Coal Company's mines for July, 1908:

No. 1.....	51,782
No. 2.....	66,845
No. 3.....	39,507
No. 4.....	41,936
No. 5.....	49,827
No. 6.....	24,073
No. 7.....	17,435
No. 8.....	23,646
No. 9.....	29,871
No. 10.....	19,751
	364,673

After a great deal of hard work and patient investigation the arbitrators appointed to act on the Board on Conciliation between the employees of the Nova Scotia Steel Company and that company have arranged a satisfactory settlement between the parties to the dispute. The following statement, which was officially issued to the press, will explain the nature of the settlement:

On Saturday a settlement was reached in the matter of the dispute between the Nova Scotia Steel and Coal Company and its employees in the colliery department.

Much evidence was taken on behalf of the men, and the company, and the matters at issue were discussed in all their bearings. Every opportunity was afforded the parties of reaching a mutually satisfactory agreement. In the end the Board of Conciliation formulated a basis of settlement which involved an adjustment of rates as between the higher and lower scales of remuneration, though a great difference would still remain. This adjustment involved a moderate reduction on some of the higher paid work in No. 3 colliery, and an increase in the wages paid to certain grades of lay labor through the collieries, and also an increase in pay for the less remunerative mining in No. 1 colliery. The increase in wages is considerably more than the decrease and the difference is supplied by the company.

The award of the board was referred to the various lodges on Friday evening, and on Saturday morning the sub-council of the P. W. A. met at the town hall of Sydney Mines to receive the reports of the delegates from the lodges and to take final action on the award of the Board. It is understood that the representatives of No. 3 mine were opposed to the reduction of their scale of rates, but by a large majority, the sub-council voted to accept the award of the Board.

The company having also agreed to the award it was signed by the representatives of both parties. Mr. T. J. Brown signing on behalf of the company, and Messrs. Moffatt, Galagher, McLachlan and Dorsay on behalf of the men, while Prof. Shortt and J. W. Maddin also signed as members of the Board of Conciliation.

By the terms of the agreement the previous rates in No. 3 are reduced as follows: For machine men, one-half cent per ton; for shot-firers, one cent per ton, and for narrow works, five cents per ton. These reductions will amount to \$550 per month, to which the company agree to add \$300 per month. The total of \$850 per month, or \$10,200 per annum, will be devoted first to increasing the wages of day laborers from \$1.38 to \$1.45. Second to increasing the scale of payment for falling stone in No. 1 mine. The new rates take effect from August 1st.

It will be seen that the settlement has been come to along similar lines to that arranged under the same chairmanship

between the workmen and the management of the Dominion Coal Company in March of this year, namely, an increase to the low paid men and a slight reduction in the wages of some admittedly highly paid workmen. This same extraordinary gap between the wages of men working side by side has for many years operated very disadvantageously on the labor situation in the Cape Breton collieries. The Conciliation Boards are doing very good work in Nova Scotia. Where the matters in dispute are of serious moment, affecting large numbers of men and communities the method of conciliation afforded by the working of the Lemieux Act is proving to be a very beneficent one, but where the matters are trivial it can easily be seen that the constant appointment of such boards will prove a vexatious proceeding, if carried to unreasonable limits. If the law is administered with sound judgment, limiting its application strictly to cases where its operation is necessary, we shall have the working basis of arbitrational legislation applied to labor and wages disputes that will make Canada a land of freedom from strikes. If this can be achieved we shall have gained a point in the industrial game which will considerably advantage us against our southern neighbors. We rather think that the submission of the men's case by a native labor union before a tribunal impartially constituted under a Canadian law has resulted in better things than would have resulted from the efforts of a foreign labor organization, deprived of that subtle force of public sympathy whose effect it is hard to estimate. Public opinion is something that no corporation, however arrogant, and no labor union, however aggressive, can afford to ignore, and there can be no doubt that public opinion would be utterly against the workings of any labor organization that were engineered from across the border, should trouble arise as a consequence.

The mines of the Dominion Coal Company produced their record output in July, namely, 368,000 tons, which is 18,000 tons more than the previous record, this being the 350,000 tons obtained in October, 1906. This large output was obtained in spite of the fact that the delays experienced were more than the ordinary ones. The output might easily have been 12,000 tons more than it actually was. Nos. 2 and 9 were considerably delayed by the falling of the coal hoisting cage from the top to the bottom of the shaft in the Harbor side, which delayed No. 2 for two days and No. 9 for four days. Up to the end of July the outputs are about 330,000 tons ahead of last year, and the St. Lawrence shipments are about a quarter of a million tons in advance of those of 1907 at this period. When it is remembered that the output of 368,000 tons has been produced on single shift it will be seen how large the capacity of the coal company's mines has become.

The news of the Fernie conflagration has been received here with regret approaching consternation, as so many natives of Nova Scotia are out in the Crow's Pass district. The Cape Breton miner bears the same relation to the Dominion that the Cornish miner bears to the Empire as a whole. He is as ubiquitous as the Nova Scotia seaman. In the Yukon, the Cobalt and the Kootenay one can find the man from "Cape Breton over," and when the early history of Canadian mining comes to be written there will be a fair sprinkling of those Highland names peculiar to Cape Breton.

## Sydney.

Mr. E. J. Foster, vice-president of the Great Bras D'Or Gold Mining Company of Middle River, Cape Breton, reports that his company is making satisfactory progress with the development of their mines. The stamp mill is giving pleasing results.

Between the Lizard vein and the footwall a 4-inch vein of nickel-copper ore occurs. It carries 22 per cent. copper and 17 per cent. nickel. This occurrence may prove of economic importance.

#### Halifax.

The vein of scheelite (calcium) tungstate, which is being opened up near Moose River, Halifax county, averages 50 per cent. tungsten trioxide as mined. It is being actively developed. Search is being carried on for other veins. The discovery is one the importance of which has scarcely been appreciated.

### ONTARIO.

#### Cobalt.

A celebration for the benefit of the Volunteer Fire Department will be held at Cobalt on August 19th and 20th. The most elaborate programme ever attempted in this part of the country has been arranged.

On Wednesday morning, August 19th, a double hand-drilling contest will be held in Cobalt square. A prize of \$200 will be given the winning team and \$100 to the second. Aquatic sports will be held on Cobalt lake, and in the afternoon a firemans and miners' parade, to be followed by a ball game in Cobalt's new park. Thursday there will be boat, canoe, pointer and swimming races on the lake, and a second ball game in the afternoon. Over \$2,000 will be given in prizes. Arrangements have been made with the railroads for special rates from all points.

### BRITISH COLUMBIA.

#### Fernie.

The total loss of the Crow's Nest Pass Company in the recent fire amounts to about \$200,000. Very little of the mining plant was damaged. Neither Coal Creek nor Michel was touched by the flames. The timber lands destroyed were valued roughly at \$1,000,000. This asset, however, did not appear in the balance sheet of the company and the loss does not affect directly the affairs of the corporation. During the week of the fire the company produced 6,000 tons of coal. Production of both coal and coke will be back at normal figures as soon as sufficient workmen have returned.

A new steel tipple is under construction at Michel and fifty new coke ovens are being built at Fernie and Michel.

The damage done at Hosmer will not delay the commencement of coal and coke shipments in December next. Only ten miners' cottages out of seventy-three were burned. The tipple and trestle are both intact. Two weeks will suffice to clean out the tunnels. The office, bunkhouse and machinery house are undamaged.

#### Rossland (August).

The mines of this camp continue to produce over 5,000 tons of good ore per week with regularity. The ore is showing up as well as could be expected at depth, especially in the workings of the Consolidated Company's mines, where the main shaft is down on the Centre Star claim over 2,200 feet. Some of the ore taken from the War Eagle-Iron Mask section of this

company's property has shown an average value of \$31 per ton, which is \$18 to \$20 higher in value than the average gold-copper ore of this vicinity. The company shipped 2,132 tons of this ore to their smelter at Trail which returned the mine over \$27 per ton. Ore of this character is a valuable asset to a mining company in a low-grade belt and comes as a kind of "find," as under existing conditions it costs no more to handle than \$10 or \$12 ore.

Work is being continued on the small properties around the city and every now and then one of the small mines appears on the shipping list as having sent out a car or two of picked ore. During the week ending July 25th the Sunset was added to the shipping list, the 25-ton car sent out being the first shipment made from the mine for several years.

Things are quite busy about the Trail and Northport smelters and it looks as though business at these places would improve ere long.

The Le Roi 2, Ltd., continues to work ahead and lay up money for another dividend in the impending last few months of the year. The Le Roi 2, Ltd., is certainly making a good showing. A considerable quantity of prospecting work is being done on the ground of this company with an eye to the ore supply of the future. The Vancouver group of claims in the Slocan district, on which the Le Roi 2, Ltd., have expended nearly \$100,000, will in future be in the hands of a London flotation known as the Van-Roi Mining Company, the capital stock of which is £34,500. The Le Roi 2, Ltd., will still hold a share in the enterprise in the form of stock.

#### Boundary.

The latest advice is that the Snowshoe-War Eagle group in Phoenix camp is to resume operations in a few days. This property, controlled by the Consolidated M. & S. Co. of Canada, Ltd., is a valuable copper producer and when once work is going on there then all of the large Boundary copper mines will be in working condition and this district will bear much the appearance of what it has in busy days gone by. The Consolidated Company has expended a considerable sum of money on the Snowshoe group for up-to-date machinery, development work and the acquiring of nearby claims. While the company was only able to operate about nine months of last year, owing to the shortage of coke, etc., yet they managed to mine and ship over 135,000 tons of copper-gold ore. Part of the Snowshoe ore was treated at the Greenwood smelter last year owing to the fact that this smelter was nearer at hand than the company's own smelter at Trail, where but a portion of the output was treated, but it is understood that a majority of this ore will go to Trail when work is commenced, where the ore is desirable as a flux for the "wet" ore received at that point.

The Granby Company has been mining and treating from 20,000 to 22,000 tons of ore per week right along. At this writing four of the furnaces at the Grand Forks smelter of the company are out of commission as they are being connected up to the new blower apparatus. This will, no doubt, cut down the treatment record while the improvements are going on. Owing to the fact that a disastrous fire has ravaged the Fernie district where most of the coke used by the Granby Company is made, it is likely that the supply of that commodity will fall short of the needs of the company and the supply they have on hand at Grand Forks will be used up before things can be got in good running order at the Fernie mines again. If a situation of this character should arise it would probably mean a curtailed output from the Granby mines for a short period.

The B. C. Copper Co. is making several improvements about their mines and smelters, including a new 20,000-volt sub-station to facilitate the transmission of electric power about the works, self-dumping cars, etc. The new Rand compressor is now running without a hitch and as a consequence they have an ample supply of compressed air power about the place for all requirements. An officer of the B. C. Copper Co. has stated that during June the company produced copper and laid it down in New York for 9¼c. per pound, and that during the month of July they would beat this low cost, in consequence of a larger tonnage treated at the same fixed costs. They are shipping a car of blister copper per day.

A strike of marked importance was made on the Dominion Copper Company's Brooklyn mine, Phoenix, a couple of weeks ago. The ore of the Brooklyn mine has been known to carry higher gold values than any of the other Phoenix mines and in the case of the new find the values are up to the standard for this locality. Recent assays give \$4.50 in gold, 50c. silver and 2.2 per cent. copper. This ore body has been blocked out on several levels and development work is being executed further to ascertain its exact extent.

The Dominion Copper Company is not shipping what one would call heavily at the present time, but arrangements are being made to equip the two smaller furnaces at Boundary Falls with an up-to-date feed arrangement, when shipments and treatment can be raised to about 1,000 tons per day. They are shipping a quantity of \$8 ore from the Athelstan and also a quantity of the Mountain Rose ore, which runs high in iron, for fluxing purposes. Regular shipments are being maintained to the smelter from the Brooklyn, Rawhide and Sunset. The big furnace is treating 650 tons per day.

The ore shipments from the Boundary district for the week ending July 25th were the heaviest that have been recorded for this district so far; 38,113 tons were sent out during the week, running the total for the year to date up to 706,185 tons.

Interest is again being revived in many of the smaller properties in this district and work has been commenced, or will shortly be resumed, on many of them, including the Skylark, Prince Henry, Tip Top, Silver Reef, etc.

#### Nelson.

Inquires have been made in this vicinity lately in regard to several mining companies that have been organized in this district but which have not achieved very much in the way of definite results. The Maple Leaf Mining Company which was organized here several years ago never did very much in the way of legitimate mining. The promoter, who got a number of business men and some of the clergy interested, was more interested in selling stock than in doing any work on the claim of the company and nearly got himself into trouble with San Francisco shareholders, who sent an engineer to report on the property. The report, we are informed, was not favorable.

Considerable of the stock of the erstwhile Referendum Company, now the Forty-Nine Creek Company, is knocking about the country. Now, the showing on the Referendum as a prospect was quite a promising one. The property is a free milling gold mine and some good looking ore has been taken out of the workings, but there is some doubt as to whether the work has been done in a systematic manner and whether the enterprise will prove to be a mine in the future. There is a 3-stamp mill on the ground and some likely looking gold bricks have been turned out, but taking the thing all in all we would not care to invest our money in a mine of this kind when there are far more promising propositions to be had.

The Fisher Maiden Company were to have resumed operations before this and no doubt will get down to work before long. There is said to be a good showing on this property but in the prospective stage.

It seems almost useless to advise people not to put money into mines that they know nothing about for the fact that they do it is evidenced by the great number of companies throughout this district who are selling stock and doing little or no work other than thinking up brilliant ideas for prospectuses. It would seem that the only way to protect these small investors from themselves would be for the government to adopt some plan limiting the capitalization of mining companies and providing means for seeing that the proceeds of treasury stock were spent on the property and controlling to some extent the selling of promoters' stock, then the investor would know that the money he had paid for treasury stock held by him had all been expended on development and that an effort had at least been made to make his stock more valuable, and the prospect into which he had bought, a mine.

#### Rossland (July).

The Rossland mines made good headway during the last six weeks and all of the large mines made a good profit on their operations for the month of June. The ore bodies in the lower levels of the Le Roi are developing in good shape and the erstwhile premier mine of the camp is steadily making money. At the Centre Star mines, now the heaviest shipper in Rossland camp, a large amount of \$40 ore is still being taken out besides 3,500 to 4,000 tons of average grade ore per week. These mines are now making more money for the Consolidated Company than any of their other holdings. The Consolidated Company has done much for the development of the ore bodies of the southwest side of Red Mountain and at that they have only begun to work. There are large areas in their holdings which have not been explored at all yet and which will not be, even though they are steadily extending their operations, for many years to come. Mining men here expect to see a good annual report from the Consolidated Company for the past fiscal year's work.

Diamond drill exploration still continues on the property of the Le Roi Two, Limited, and the lower levels of this mine look better now than they have ever before; that is, as far as future prospects go. In order to maintain their reputation as Rossland's steady dividend paying mine this company has declared another interim dividend of two shillings per share, paid July 8th. This totals four shillings per share already paid by the Le Roi Two this year, two shillings having been paid to the stockholders in March last. The Le Roi Two, Ltd., is a valuable asset to Rossland camp and it looks as though they would soon be in a position to pay these regular dividends for a good many years yet, the way the ore is coming in at the lower levels.

The work of the lessees hereabouts continues and some good results have been achieved. During the last couple of weeks the Curlew sent out a 30-ton car of good grade ore and the lessees of the Blue Bird shipped a 35-ton car of partly oxidized ore, which is expected to carry exceptionally high values for this district.

The Trail smelter is receiving 6,500 tons of ore per week from Rossland and Slocan districts, about 150 tons per week from the First Thought in Washington and 1,000 tons from the Snowstorm in Idaho.



The mining outlook here for this fall is very bright, and as everyone expects copper to go a little higher in the next few months the Rossland mines will no doubt make good profits for the balance of the calendar year.

**Boundary.**

Things are beginning to look like the good old busy days in the Boundary district. The Granby Company is working away steadily and every day making some improvement in its working plant that will cut down the operating expense. The same may be said of the B. C. Copper Company.

At the Dominion Copper Company mines they have got down to shipping, but the shipments are not as heavy as they will be a little later on, when several important improvements have been made. The big furnace at the Boundary Falls smelter is treating about 650 tons of ore per day, but it is planned to put the two smaller ones in commission as soon as they can be equipped with electric feed, the same as the big one and most of the furnaces now used in this district.

Good news is heard from the Brooklyn property of the Dominion Copper Company, where they have opened up a big new ore body. The values and full extent of this find have not been ascertained at the time of this writing, but it is stated that this lode will have an important bearing on future work at the Brooklyn.

The ore shipments from this district for the week ending July 18th and for the year to date were as follows :

	Week, Tons.	Year, Tons.
Granby Mines. ....	21,744	582,488
Mother Lode (B. C. C. Co.).....	8,901	58,015
Oro Denoro (B. C. C. Co.).....	2,912	18,558
Brooklyn (D. C. Co.).....	1,050	2,220
Rawhide (D. C. Co.).....	1,710	4,570
Sunset (D. C. Co.).....	576	1,608
Mountain Rose. ....	50	110
Sally. ....	..	80
Crescent.....	..	50
Snowshoe.....	..	367

The week's shipments mentioned above were a record lot for this district. The Granby smelter at Grand Forks treated 21,820 tons of ore during the week; the B. C. copper smelter at Greenwood, 13,143 tons, and the Dominion copper smelter at Boundary Falls, 3,625 tons.

As stated above the Dominion Copper Company are fitting up their two small furnaces with electric feed and are to build a 1,200-foot tramway from the Idaho to the Stemwinder to facilitate the handling of ore and reduce the cost of production.

Distinguished visitors to the Boundary from the business centers of the country all express the opinion that conditions will so shape themselves within the next few months that copper will rise to a point near a normal figure. It looks as though the gradually increasing consumption and other factors would bring about this result in the next few months. When the red metal does advance a few cents the copper mines of the Boundary are going to make big profits as they are to-day working on a rock bottom economical basis and many little forms of

extravagance that are often overlooked when times are prosperous have been cut off and the little leaks stopped. It is stated that the Granby Company are making copper for between eight and nine cents per pound and at the rate of 30,000,000 pounds per annum.

The work of making a geological survey of Phoenix camp is now under way; the work has begun at the Gold Drop-Snowshoe claims. No doubt this work will prove as valuable to the miners of Phoenix as it has done to those of other districts where surveys have been made.

The stamp mill on the Golden Zone has been completed and will soon be in operation. As is the case in Rossland, Nelson and Ymir districts, in the Similkameen, more development work is being done this year than has been the case for some time past. No extensive development is going on in the Ollala section with the exception of at the Bullion where seven men are at work on active development.

**Nelson.**

Mr. James Cronin, formerly managing director of the St. Eugene and associates, have disposed of the Canadian Girl and the Yankee Girl claims in the Ymir district to H. L. Rogers, of Spokane, representing eastern capital. The consideration is \$40,000. Work has been commenced on the property, which is a silver-lead prospect of merit and appears to have a promising future.

The Ymir Mining Company is going to spend \$30,000 in development work and improvements about the Premier mine of Ymir district. Having recovered the main ore body the outlook for the Ymir is better than it has been for four or five years.

A visitor to Nelson this week says that a record quantity of gold is now passing through the Assay Office at Vancouver. The staff is working overtime and on holidays, and a recent shipment of gold received from the north was valued at over a quarter of a million dollars. It is presumed that the recent trouble at the assay office in Seattle has diverted some of the trade that used to go to that institution to the Vancouver office.

At the Vancouver mine, Slocan, operated by the Le Roi 2, Limited, they are installing the first half of a twenty-drill Rand compressor.

The Blue Bell mill is making concentrates at the rate of a barge load per week. The handling of the concentrates is made an economical process by dumping them directly from the cars to the barge in bulk. Just now the zinc in the Blue Bell ore is not being saved, but negotiations are under way for the installation of a magnetic plant to accomplish this. The Hewitt Mining Company have organized. Their head office is Wilmington, Del., and they will have a branch at Nelson. The Hewitt Company are successfully operating the Hewitt and other properties at Silverton.

The International Coal and Coke Company will deduct three-quarters of 1 per cent. from their regular quarterly dividend of 2 per cent., payable August 1st, which is to be applied to their outstanding bonded indebtedness of \$200,000, so the shareholders will only receive a dividend of 1¼ per cent. this time. The company is steadily producing 2,000 tons of coal per day.

## GENERAL MINING NEWS.

### NOVA SCOTIA.

[**Editor's Note.**—The following is a press despatch. It will come as exceedingly bad news to those interested in Nova Scotia gold mines. Until further particulars appear it is impossible to size up the situation. It may be stated, however, that the financial difficulty that has crippled the company, does not indicate that the mine is exhausted. In our next issue we intend to demonstrate that this is an excellent opportunity for the Government of Nova Scotia to step in and put the mine once again in operation.]

**Halifax.**—The Boston Richardson mine at Goldboro, the largest gold mine in Nova Scotia, has gone into liquidation and is now in the hands of a receiver. An application was made to the Supreme Court to-day for an order appointing a receiver, and after hearing counsel, the judge to whom the application was made granted an order appointing the Eastern Trust Company. An expert, representing the receiver, will leave to-day for the mine, where he will make a thorough and complete investigation of the mine and its potentialities. His report will be submitted to the court in order that further instructions may be given to the receiver.

The collapse of the Richardson mine means heavy financial loss to many in Halifax, but the greater part of the mortgage bonds were held in Boston. At the present time there is about \$52,000 owing by the company on current account. Besides this there is \$59,000 owing on first mortgage bonds.

Of a total capitalization of over half a million, about \$350,000 of consolidated mortgage bonds have been issued and sold, and those will rank after the mortgage bonds. Practically the whole of the first mortgage bonds are held in Halifax. The consolidated mortgage bonds are almost entirely held in Boston. Probably the largest holder is Franklyn Playter, the president of the company, who has lost his private fortune backing running operations at Goldboro. Another large loser is Mr. Wallace, a prominent banker and shoe manufacturer in New Hampshire. He is a close personal friend of President Playter and invested very largely in the mine, and his loss will be heavy. Playter is president of the United Zinc Company of America.

**Glace Bay.**—The Dominion Coal Company's output for July was 368,000, which breaks all previous records. The next largest, 350,000, was raised during October, 1906. But for some accidents the July output would have been good for many thousand tons larger.

**Glace Bay.**—Through the fall of a cage at No. 9 colliery of the Dominion Coal Company's mines, work was delayed for a few days.

**Springhill.**—In No. 3 slope of the Cumberland Coal Company's collieries, Percy Jordan, a young negro, was crushed between the boxes and fatally injured.

### ONTARIO.

**Belleville.**—Substantial gold discoveries are reported from the township of Elzevir, Hastings county.

**Madoc.**—The talc grinding mill, recently put in operation here, has sufficient orders to keep it moving for some time to come.

**Cobalt.**—Three miners, natives of Cape Breton, Foley, McDonald and Gillies, were suffocated by gas in French's mine at Elk Lake, on August 1st.

**Cobalt.**—Manager McNaughton has installed a crusher at the Tretheway. Additional machinery is to be installed. During July the Tretheway shipped 400,070 pounds of ore, seven carloads. The rumors of a coming dividend still persevere.

La Rose mine shipped more ore during July than did any other Cobalt mine. Its record was 18 cars, or 1,028,880 pounds. Nipissing came next with 13 cars, or 727,707 pounds, and O'Brien 11 cars, or 725,697 pounds.

The shipments of the camp for the month were heavier than ever before. A total of 2,584 tons was reached. This is a large increase over any previous monthly output.

**Larder Lake.**—While the limits of the pay zone of the Harris-Maxwell mine have not yet been determined, rich ore has been encountered in the drift, which is being driven in just above water level. A quantity of specimen gold ore has been obtained, some of which has got into dishonest hands and has been used to sell stock in other properties.

**Port Arthur.**—New machinery is en route to the Beaver mine. A carload of silver ore has just been shipped.

**Halleybury.**—The new townsite, "Sixty-Six," in South Lorrain, is being cleared and laid out. From its situation it forms an advantageous base of supplies for the new mines of the district.

**Wabigoon.**—Near the junction of the Lake Superior branch with the main line of the Grand Trunk Pacific, on the north shore of Vermilion Lake, is situated the mine of the Northern Pyrites Company. The shaft is down 220 feet, and a considerable amount of cross-cutting and drifting has been done.

**Sudbury.**—The Mond Nickel Company is developing the Garson mine rapidly. Ore is being purchased from outside producers.

**Port Arthur.**—Existence of a large and valuable deposit of nickel north of the Transcontinental Railway, and 100 miles west of here, is reported by T. H. Crowley, of Peterboro, a prospector, who has a long experience in all parts of Ontario. Crowley arrived in the city recently, en route home, after spending several weeks in that country, and showed a number of excellent samples. One contained both silver and free gold and he said lots of it was to be found north of Wabigoon and Sturgeon lakes. He also claimed to have uncovered at a point some distance northeast, a vein of almost pure nickel, and expressed the opinion that a large ring of it would be found to exist there.

### BRITISH COLUMBIA.

**Fernie.**—A few days before the fire the Crow's Nest Pass Coal Company commenced the construction of fifty additional coke ovens, twenty-eight at Fernie, twenty-two at Michel.

**Fernie.**—Twenty-four miners were entombed in the C. N. P. Coal Company's No. 2 mine, Coal Creek on July 31st at 8 a.m. Prompt measures were taken and all of the miners were rescued.

**Fernie, Aug. 5.**—The work of rebuilding the town of Fernie has already commenced. The new C. P. R. station is almost ready for occupation. At date of writing every man, woman and child has been provided with shelter.

**Phoenix.**—Work is to be resumed at the Snowshoe mine. Shipments amounting to 125,000 tons of ore were made up to the middle of last November, when the mine was closed. The reopening of the Snowshoe will mean the blowing in of another copper furnace at Trail.

**Rossland.**—The Sunset mine has joined the list of shippers.

**Phoenix.**—The Granby Consolidated has purchased the Golden Eagle claim. The reported price was \$12,000.

**Nelson.**—The first shipment of zinc ore has been sent to the new zinc smelter.

**Kaslo.**—A carload of zinc ore from the Hewitt mine is being put through the plant of the Kootenay Ore Company here.

Mr. Louis Pratt is arranging to open up the Last Chance mine at Sandon.

The Silver Cup mine at Ferguson is shipping steadily. Sixty men are employed. Four stopes are being worked.

#### YUKON.

**Dawson.**—A ledge of copper ore has been discovered on Williams' Creek, 230 miles above Dawson. The vein matter is quartz and the copper-bearing minerals bornite, malachite and chalcopyrite.

## MINING NEWS OF THE WORLD.

### GREAT BRITAIN.

The statement submitted to the shareholders of the Glamorgan Colliery Company at a recent meeting showed 40 per cent. profits on the year's transactions, in addition to paying arrears of dividends on preference stock. Another striking record of a South Wales coal company is that of the International which, during a period of ten years, has realized profits amounting to 20 per cent. per annum.

Of the total output of collieries in Great Britain last year, amounting to 267,828,000 tons, only 12,877,000 tons, or less than 5 per cent. were hewn by machinery. The use of coal-cutting machines, however, is rapidly increasing, the quantity cut in this manner showing an increase of 26 per cent. over the like output in 1906.

### FRANCE.

The quantity of bauxite exported from France in 1907 was 110,915 tons, of the value of £94,000. The chief sources of supply are a few miles east of Marseilles, the deposits being the most important in the world.

### RUSSIA.

The gold discovery on the lower Amascov, Siberia, from preliminary investigations is estimated to contain 230 poods, or 121,151 ounces of gold. Pits are being dug and working will be begun immediately.

### NORWAY.

A shipping duty of 25 öre per ton has been placed upon all ore exported from Norway.

### GERMANY.

The Bavarian Government is acquiring the Stockheim collieries, paying therefor 2,500,000 marks, and an annual rental based on a sliding scale, increasing with the output.

An investigation is being carried out by a special committee of the German Gas and Water Association on the subject of gas coals. So far twenty-eight different kinds of coal have been tested.

### AUSTRALASIA.

Two seams of good coal, respectively 7 feet and 4 feet 6 inches thick, having been found on the property of the Mount Morgan Gold Mining Company, Queensland, a mine will be opened.

The Northern Federation of Miners, New South Wales, have repudiated the New Industrial Disputes Act, and declared their intention of reverting to the strike system. As strikes are illegal under the act serious complications may result.

The Queensland Government has devoted £50,000 to the encouragement of the mining industry. The Government geologist is visiting the principal mining fields of the State to ascertain how the money can best be applied.

### SOUTH AFRICA.

The De Beers diamond mine at Kimberley, the largest in the group, was closed down July 31st in pursuance with the policy of the company to restrict the output and reduce expenditures until the market revives. The syndicate which markets the De Beers output have on hand a stock of uncut stones worth nearly \$10,000,000.

The report of the Secretary of Mines for Rhodesia for 1907 notes steady progress in the gold mining industry, the output being 612,052 ounces valued at £2,178,886. The total crushing power in operation was equivalent to 1,488 stamps and five tube mills. The diamond yield was 4,363 carats, value £20,193.

### UNITED STATES.

On July 24th the new smelter of the Tintic Smelting Company, built at a cost of about \$300,000, in the Tintic mining district, Utah, was blown in.

High grading, which is said to prevail to a greater extent at Goldfield, Nev., than in any other mining camp, resulted in the fatal wounding of one of the offenders at the Mohawk

mine, who refused to surrender when caught in the act. Another was arrested.

Gold dredging is being extensively undertaken in Calaveras county, Cal., to secure the tailings of the old-time miners, which contain much gold.

Plans are practically complete for the construction of a railroad into the Yerington copper district, Nevada, in connection with the Harriman railroad system.

The first cargo of 12,000 tons of iron ore arrived at the new plant of the United States Steel Corporation, at Gary, Ind., on July 23rd.

**MEXICO.**

By a Mexican law recently promulgated machinery imported into Mexico by mining syndicates and metallurgical establishments for refining the precious metals will continue exempt from import duty until June 30, 1909.

The proposed anti-foreign mining legislation has been referred by the Cabinet to President Diaz, who is given authority to accept and enforce or to reject the measure.

**CHILI.**

The consumption of coal has increased very rapidly in the last five years, the gain in that period amounting to nearly 300 per cent. An effort is being made to develop the very extensive coal fields of the Province of Aranco, south of Coronel.

**COMPANY NOTES.**

The Trethewey Silver-Cobalt Mine, Limited, has declared a 5 per cent. interim dividend, payable on September 1, 1908.

The Mond Nickel Company has made remarkable progress recently and further evidence of its prosperity is given by the dividend declared last month. The distribution on the ordinary shares, which a year ago was 12½ per cent. is increased this time to 15 per cent., while the deferred shareholders will receive 48, as against 33 per cent. At the same time £25,000 is

placed to reserve, as compared with £20,000, and the balance carried forward is £11,600 larger than last year, amounting to £29,900. Considering that the first dividend on the ordinary shares were declared only three years ago, and that two years before then the preference interest was not fully earned, the progress made since the initial difficulties were overcome has been astonishingly rapid.

The high price of copper has been of great help during the past financial year, but the low price now ruling must reduce the profits. The Mond process converts all of the copper into sulphate of copper, which is largely used for the manufacture of paris green by mixing with arsenic. It is claimed for the Mond nickel that it is the purest of any offered to consumers.

The directors of the Crow's Nest Pass Coal Company have authorized the rebuilding of the parts of the plant destroyed by fire at Fernie. Although no fixed appropriation was made, it is estimated that the net cost to the company of the rebuilding and refitting will be in the neighborhood of \$50,000. The fire destroyed the hospital, and did considerable damage to the coke oven plant and other equipment, the total loss being placed at about \$200,000. There was about \$150,000 insurance held on the plant. The work of rebuilding will be started immediately.

**COBALT DIVIDENDS.**

July dividend payers are as follows:

Nipissing (regular 3 per cent. quarterly) ..	\$180,000.00
McKinley-Darragh (interim 3 per cent. and 2 per cent. bonus) ..	112,346.85
Kerr Lake (regular 2 per cent. and regular 1 per cent. bonus) ..	90,000.00
Crown Reserve (half-yearly 4 per cent)....	80,000.00
Temiskaming (regular 3 per cent. quarterly)	75,000.00
Temiskaming & Hudson Bay (\$6 per share on 7,700 shares) ..	46,200.00
Buffalo (regular 3 per cent. quarterly).....	27,000.00
City of Cobalt (interim 3 per cent. and 2 per cent. bonus) ..	25,000.00
Grand total from July 1st to 20th.....	\$635,346.85

**STATISTICS AND RETURNS.**

**NOVA SCOTIA COAL MINES.**

Nova Scotia Steel and Coal Company—

Shipments July, 1908.....	72,740
Shipments, July, 1907.....	82,605
Decrease July, 1908.....	9,865
Shipments 7 months, 1908.....	360,335
Shipments 7 months, 1907.....	323,287
Increase 7 months, 1908.....	37,048

Intercolonial Coal Company—

Shipments July, 1908.....	19,246
Shipments July, 1907.....	23,919
Decrease July, 1908.....	4,673
Shipments 7 months, 1908.....	153,769
Shipments 7 months, 1907.....	155,816
Decrease 7 months, 1908.....	2,047

Inverness Railway and Coal Company—

Shipments July, 1908.....	24,375
Shipments July, 1907.....	27,960
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Decrease July, 1908.....	3,585
Shipments 7 months, 1908.....	152,666
Shipments 7 months, 1907.....	130,997
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Increase 7 months, 1908.....	21,669

Acadia Coal Company—

Shipments July, 1908.....	24,907
Shipments July, 1907.....	30,080
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Decrease July, 1908.....	6,046
Shipments 7 months, 1908.....	187,555
Shipments 7 months, 1907.....	172,974
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Increase 7 months, 1908.....	14,581

Cumberland Railway and Coal Company—

Shipments July, 1908.....	1,590
Shipments July, 1907.....	37,063
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Decrease July, 1908.....	12,473
Shipments 7 months, 1908.....	222,865
Shipments 7 months, 1907.....	213,413
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Increase 7 months, 1908.....	9,452

DOMINION COAL COMPANY'S OUTPUT.

The July output of the Dominion Coal Company is in the vicinity of 368,000 tons. The company, for the seven months of the year, shows an output of 2,292,000 tons, or 317,000 tons ahead of a year ago. The output in detail follows:

	Tons, 1908.	Tons, 1907.
January. . . . .	314,108	252,248
February. . . . .	285,649	225,988
March. . . . .	346,529	212,831
April. . . . .	298,745	316,384
May. . . . .	332,588	327,269
June. . . . .	347,000	319,000
July. . . . .	368,000	321,000
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Total tons. . . . .	2,292,619	1,974,720

CROW'S NEST PASS OUTPUT.

The output of the Crow's Nest Pass Coal Company for the week ended August 1st was 24,711 tons, a daily average of 4,118 tons. For the corresponding week of last year the output was 21,677 tons, a daily average of 3,613 tons.

Sydney, August 4.—July was another record breaker for output from the collieries of the Nova Scotia Steel and Coal Company, being over three thousand tons greater than the previous month. The figures follow:

No. 1.....	21,153
No. 2.....	3,097
No. 3.....	24,495
No. 3.....	1,337
No. 4.....	9,236
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Total. . . . .	59,318

THE DOMINION STEEL OUTPUT FOR JULY.

The furnaces were idle the first five days of July for holiday and other causes. The balance of the month produced 22,080 tons of steel, from which was rolled 16,405 tons of rails, 2,503 tons of rods, besides considerable tonnage of steel blooms and billets for the market. Shipments aggregated 23,332 tons.

Toronto.—Shipment returns from the Cobalt camp for the week ending Saturday, August 1st, were a little belated this week. They totalled 1,021,331 pounds of ore or 510 tons, considerably less than the previous week, which amounted to 743 tons and was a record. Ten mines shipped for the year to date 22,569,053 pounds, or 11,234 tons. Shipments for the week and year to date are:

	Week end Aug. 1, Pounds.	Since Jan. 1, Pounds.
Buffalo. . . . .	759,950	.....
Coniagas. . . . .	714,480	.....
Cobalt Lake. . . . .	341,683	.....
Crown Reserve. . . . .	.....	128,000
Cobalt Central. . . . .	.....	247,515
City of Cobalt. . . . .	42,210	781,240
Drummond. . . . .	62,300	300,700
Foster. . . . .	.....	238,400
Kerr Lake. . . . .	.....	522,974
King Edward. . . . .	.....	127,240
La Rose. . . . .	285,040	3,577,442
McKinley. . . . .	.....	2,019,260
Nipissing. . . . .	120,600	2,285,960
Nova Scotia. . . . .	311,775	.....
Little Nipissing. . . . .	40,110	.....
Nancy Helen. . . . .	40,000	367,110
O'Brien. . . . .	63,790	3,734,437
Peterson Lake. . . . .	.....	41,237
Right of Way. . . . .	121,100	612,100
Provincial. . . . .	.....	143,210
Silver Leaf. . . . .	61,410	258,030
Silver Cliff. . . . .	52,000	.....
Silver Queen. . . . .	.....	879,310
Townsite. . . . .	.....	130,700
Temiskaming. . . . .	.....	445,000
T. & H. B. . . . .	724,000	.....
Tretheway. . . . .	170,250	1,664,296
Watt. . . . .	54,630	420,990

**COBALT ORE STATEMENT FOR THE WEEK ENDING  
AUGUST 8, 1908.**

O'Brien Mine—  
 Aug. 1—Am. Smelting & Refg. Co., Denver, Col. 64,160  
 Aug 4—Deloro M. & R. Co., Deloro, Ont.... 64,220  
 Aug. 7—Am. Smltg. & Refg. Co., Denver, Col.. 63,380

La Rose Mines—  
 Aug. 3—Am. Smltg. ¼ Refg. Co., Denver, Col.. 60,000  
 Aug. 6—Am. Smltg. & Refg. Co., Denver, Col.. 62,000  
 Aug. 7—Am. Smltg. & Refg. Co., Denver, Col.. 62,000

Townsite—  
 Aug. 4—Can. Copper Co., Copper Cliff, Ont.... 66,800

Nipissing Mines—

Aug. 5—U. S. M. & R. Co., Chrome, N.J..... 64,540  
 Aug. 5—U. S. M. & R. Co., Chrome, N.J..... 61,290  
 Aug. 7—Can. Cop. Co., Copper Cliff, Ont..... 64,400

Temiskaming—

Aug. 4—Deloro M. & R. Co., Deloro, Ont..... 40,600  
 Aug. 6—Am. S. & R. Co., Denver, Col..... 60,000

Drummond—

Can. Cop. Co., Copper Cliff, Ont..... 66,800

Grand total . . . . . 774,390

**SHIPMENTS FROM THE COBALT DISTRICT FOR THE HALF YEAR OF 1908 (TONS).**

Mine.	January.	February.	March.	April.	May.	June.	Total.
Buffalo Mine. . . . .	89.83	63.20	53.35	51.94	46.22	41.57	346.11
City of Cobalt. . . . .		50.00	60.97	55.26	.....	112.23	287.46
Cobalt Lake. . . . .	25.44	32.45	30.76	1.96	33.25	.....	123.86
Coniagas. . . . .	67.86	32.45	93.30	.....	62.13	62.65	318.39
Cobalt Central. . . . .	20.00	.....	24.85	28.74	23.72	26.27	123.58
Crown Reserve. . . . .		6.84	.....	19.27	.....	22.56	48.67
Casey Cobalt. . . . .		.....	10.00	.....	.....	.....	10.00
Cobalt Silver Queen. . . . .	125.40	.....	119.59	21.95	59.25	.....	326.19
Drummond. . . . .		46.17	.....	.....	28.13	19.80	94.10
Foster. . . . .	54.30	.....	.....	.....	34.90	.....	89.20
Kerr Lake. . . . .	20.64	21.05	92.73	30.57	31.30	79.50	275.79
King Edward (Watts) . . . . .	32.00	61.45	25.90	.....	65.22	30.08	214.65
La Rose. . . . .	459.97	71.06	388.37	431.90	161.90	180.94	1694.14
McKinley-Darragh. . . . .	64.70	193.52	121.33	181.66	126.24	125.05	812.50
Nipissing. . . . .	188.97	127.32	125.93	105.79	293.12	234.98	1076.11
Nova Scotia. . . . .	20.39	.....	20.00	13.80	52.47	21.50	129.16
Nancy Helen. . . . .		.....	69.52	.....	.....	.....	69.52
O'Brien. . . . .	202.89	264.27	258.78	125.53	392.00	286.96	1530.43
Peterson Lake. . . . .		.....	.....	.....	.....	20.05	20.05
Provincial. . . . .		.....	24.60	51.24	.....	.....	75.84
Right of Way. . . . .		.....	29.35	.....	90.04	60.37	179.76
Silver Bar. . . . .	.58	.....	.....	.....	.....	.....	.58
Silver Cliff. . . . .	26.80	.....	.....	.....	.....	.....	26.80
Silver Leaf. . . . .	31.00	.....	.....	35.40	32.26	.....	98.66
Temiskaming. . . . .	29.70	26.90	56.12	60.50	46.30	92.88	312.40
Temiskaming & Hudson Bay.....		99.05	36.15	.....	29.76	31.85	196.81
Townsite. . . . .	20.80	.....	20.56	.....	.....	.....	41.36
Trethewey. . . . .		88.80	153.11	96.49	159.14	33.85	631.39
Totals. . . . .	1481.27	1184.53	1815.27	1312.00	1768.35	1583.09	9144.51

This was shipped as follows:

Country.	January.		February.		March.		April.		May.		June.		Totals.	
	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.	Tons.	P.C.
Canada. . . . .	292.40	19.74	310.32	26.20	713.56	39.31	306.27	23.34	505.81	28.60	435.76	27.53	2583.88	27.45
U. S. . . . .	1188.87	80.26	841.76	71.06	1029.70	56.72	975.63	74.36	1262.54	71.40	1117.48	70.58	6415.99	70.73
Gt. Britain . . . . .	.....	.....	32.45	2.74	40.56	2.24	30.10	2.30	.....	.....	29.85	1.88	102.96	1.53
Germany . . . . .	.....	.....	.....	.....	31.45	1.73	.....	.....	.....	.....	.....	.....	31.45	.29
Totals	1481.27	100.00	1184.53	100.00	1815.27	100.00	1312.00	100.00	1768.35	100.00	1583.09	100.00	9144.51	100.00

**BRITISH COLUMBIA ORE SHIPMENTS—WEEK ENDING  
AUGUST, 1908.**

Following are the shipments from the mines and receipts at the smelters for the past week and year to date:

**Ore Shipments.**

Boundary—	Week.	Year.
Granby. . . . .	20,261	624,566
Mother Lode. . . . .	10,492	78,628
Oro Denoro. . . . .	3,440	25,368
Rawhide. . . . .	2,260	8,300
Brooklyn. . . . .	2,260	5,400
Sunset. . . . .	515	2,818
Mountain Rose. . . . .	80	270
Athelstan. . . . .	120	120
<b>Total. . . . .</b>	<b>39,308</b>	<b>746,011</b>
<b>Rossland—</b>		
Centre Star. . . . .	3,219	97,622
Le Roi. . . . .	1,406	45,000
Le Roi No. 2. . . . .	344	17,350
Evening Star. . . . .	36	624
Other mines. . . . .		63
<b>Total. . . . .</b>	<b>5,005</b>	<b>160,719</b>
<b>Slocan-Kootenay—</b>		
St. Eugene. . . . .	584	12,303
Whitewater, milled. . . . .	280	8,540
Poorman, milled. . . . .	250	6,850
Queen, milled. . . . .	185	5,540
North Star. . . . .	45	2,139
Richmond. . . . .	23	1,113
Arlington, Erie. . . . .	26	903
Blue Bell. . . . .	165	506
Ruth. . . . .	40	478
Sunset. . . . .	19	206
Reco. . . . .	21	185
Keystone. . . . .	8	50
Little Robert. . . . .	1	1
Other mines. . . . .		17,990
<b>Total. . . . .</b>	<b>1,647</b>	<b>56,807</b>

The total shipments for the past week were 45,960 tons, and for the year to date 963,537 tons.

**Smelter Receipts.**

Grand Forks. . . . .	20,261	624,566
Greenwood. . . . .	14,052	106,036
Boundary Falls. . . . .	5,115	16,788
Trail. . . . .	6,545	164,430
Northport (Le Roi) . . . . .	1,576	48,665

The total smelter receipts for the past week were 47,549 tons, and for the year to date 966,205 tons.

Following is the report of the manager of the Le Roi mine for the month of June, as cabled to the London office of the company:

“Shipped from the mine to Northport during the past month 5,100 tons, containing 2,429 ounces gold, 2,450 ounces silver and 101,000 pounds copper. Expenditure on development work during the month, \$9,000.”

Following is the report of the manager of the Le Roi Two for the month of June, as cabled to the London office of the company:

“Shipped 2,390 tons. The net receipts are \$48,626 (£10,026), being payment for 2,352 tons shipped, and \$1,067 (£220), being payment for 76 tons concentrates shipped; in all \$49,693 (£10,246).”

Following are the figures of German consumption of foreign copper for the months January-May, 1908:

	Tons.
Imports of copper. . . . .	72,247
Exports of copper. . . . .	3,354
<b>Consumption of copper. . . . .</b>	<b>68,893</b>

As compared with consumption during the same period in 1907 of 47,979 tons.

Of the above quantity 67,155 tons were imported from the United States.—Figures from L. Vogelstein & Co.

The following were the figures of German consumption of foreign copper for the months January-June, 1908:

	Tons.
Imports of copper. . . . .	82,968
Exports of copper. . . . .	3,878
<b>Consumption of copper. . . . .</b>	<b>79,090</b>

As against consumption during the same period in 1907 of 55,507 tons.

Of this quantity 75,759 tons were imported from the United States.—L. Volegstein & Co.

**MARKET REPORTS.**

**Coke.**

August 11.—Connellsville coke, f.o.b. ovens—

- Furnace coke, prompt, \$1.60.
- Foundry coke, prompt, \$2.00.

**Other Metals.**

August 11—

- Tin, Straits, 30.75 cents.
- Copper, prime lake, 13.875 to 14 cents.
- Lake, arsenical brands, 13.85 to 13.95 cents.
- Electrolytic copper, 13.875 cents.
- Sheet copper, 18 cents.
- Copper wire, 15.25 cents.
- Lead, 4.60 cents.
- Spelter, 4.75 cents.
- Sheet zinc, 7.50 cents.
- Antimony, Cookson's, 8.25 to 8.375 cents.
- Aluminium, 32 cents.

Nickel, 45 to 47 cents.  
 Platinum, \$23.50 per ounce.  
 Bismuth, \$1.75 per pound.  
 Quicksilver, \$42.50 per 75-pound flask.

**Silver Prices.**

	New York, cents.	London, pence.
July 8.....	.53¼	24 9-16
July 9.....	.53½	24 11-16
July 10.....	.53¼	24 9-16
July 11.....	.53¼	24 9-16
July 13.....	.53¾	24¾
July 14.....	.53¾	24½
July 15.....	.53¾	24½
July 16.....	.53¼	24 9-16
July 17.....	.53	24 7-16
July 18.....	.53¼	24 9-16
July 20.....	.53¼	24½
July 21.....	.52¾	24 5-16
July 22.....	.52¾	24¾
July 23.....	.52½	24 3-16
July 24.....	.52¾	24 3-16
July 25.....	.52½	24¼

	New York, cents.	London, pence.
July 27.....	.52¾	24 3-16
July 28.....	.52½	24¼
July 29.....	.52¾	24¾
July 30.....	.52¾	24 5-16
July 31.....	.52½	24 3-16
Aug. 1.....	.52¼	24 3-16
Aug. 3.....	.52½	..
Aug. 4.....	.52¾	24¾
Aug. 5.....	.52½	24¼
Aug. 6.....	.52¾	24 3-16
Aug. 7.....	.52¼	24 1-16
Aug. 8.....	.52¼	24 1-16
Aug. 10.....	.52	24
Aug. 11.....	.51¾	23 13-16

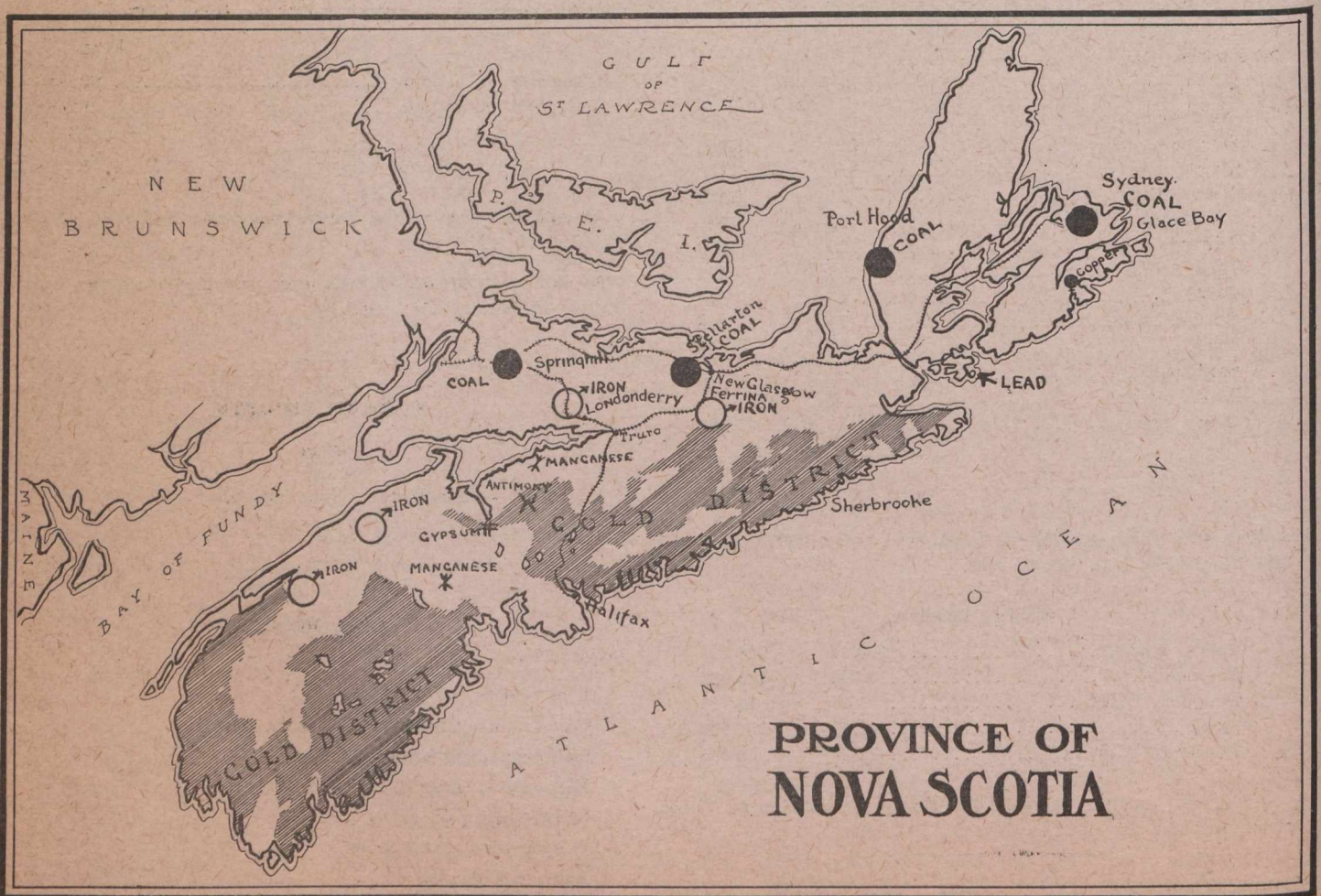
**MARKET NOTES.**

Immediate advances in the price of tin and slow gains in copper prices are predicted by market authorities. The general improvement in the metals market is likely to continue.

Antimony firm and shows signs of strengthening.

Pig iron is low but firm.

Coke production is increasing rapidly.



**MAP OF NOVA SCOTIA.**

The Boston-Richardson Mine, temporarily closed owing to financial difficulties, is situated on the Atlantic Coast of Nova Scotia. (See General Mining News.)