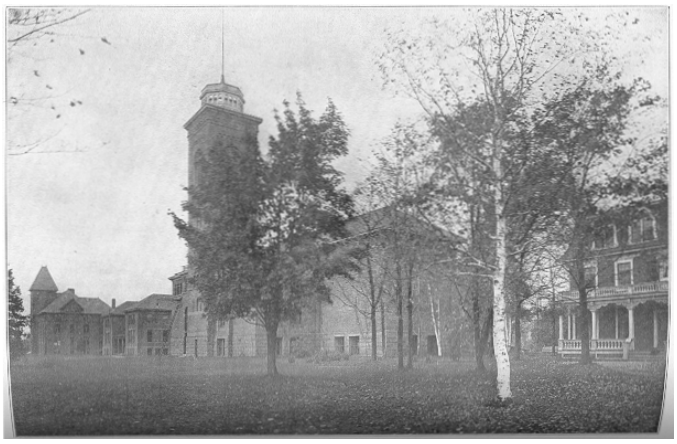

MINES BUILDING—MICHIGAN COLLEGE OF MINES.

STATE OF MICHIGAN

MINES AND MINERAL STATISTICS

By
James L. Nankervis
Commissioner of Mineral Statistics

BY AUTHORITY

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LETTER OF TRANSMITTAL

STATE OF MICHIGAN
Office of
Commissioner of Mineral Statistics

Calumet, April 1, 1909.

HON. FRED M. WARNER,
GOVENOR OF THE STATE OF MICHIGAN:

Sir:—In fulfillment of the duties of my office, I have the honor to submit herewith the following report upon the mines and mineral interests of the State for the year ending March 31, 1909.

Respectfully your obedient servant,
James L. Nankervis,
Commissioner of Mineral Statistics.

Commissioners of Mineral Statistics.

NAME	DATE OF APPOINTMENT	TERM EXPIRED
Charles E. Wright	Feb. 15, 1877	Jan. 12, 1883
A. P. Swineford	Jan. 12, 1883	April 29, 1885
Charles D. Lawton	April 29, 1885	Mar. 19, 1891
James P. Edwards	Mar. 19, 1891	Jan. 10, 1893
James B. Knight	Jan. 10, 1893	Mar. 28, 1895
George A. Newett	Mar. 28, 1895	April 1, 1899
James Russell	April 1, 1899	Mar. 31, 1901
Thomas A. Hanna	April 1, 1901	Mar. 31, 1905
James L. Nankervis	April 1, 1905	Mar. 31, 1909

INTRODUCTORY.

It is extremely gratifying to feel and know that general conditions everywhere are a great deal better than they were a year ago. The year in hand opened up blue enough with sentiment all over the land intensely pessimistic. But a month or two before its opening the nation had passed through a financial panic that shook Wall street and other money centers almost to their foundations. The panic was as sudden as it was severe. For a short time money became practically unobtainable. Trade and commerce fell from unparalleled prosperity to actual paralysis, business became stagnant and industrial enterprises demoralized. Happily the duration of this condition of affairs was short. The thinking people of the nation pulled themselves together, braced up and took a philosophical view of the situation and realized that the cause of the panic was chiefly sentiment.

But the panic was not altogether void of good. It served to illustrate in a magnificent way the wonderful financial and industrial recuperative powers of the American people. Sentiment has completely changed. Business is picking up in all lines of trade and commerce. General conditions are improving everywhere and confidence is again restored in the hearts and minds of the people. Every month of the year closed better than it opened. The country will again soon be in the whirl of another wave of prosperity and it will be bigger and broader and further reaching than any similar occurence experienced in the last twenty years. It is on the way here. It is inevitible and nothing can stop it on the onward course. "Coming events cast their shadows before." The best and furthest seeing people in the land discern and see what is ahead and are planning and preparing to handle a greater volume of business during the next decade than was ever dreamed of a few years ago. The country is full to overflowing with the chief commodities that present civilization must have and can't get along without.

Even today the volume of American products are beyond the comprehension of the human mind. If the products

of the country for a single year could be loaded into 40 ton cars at one time it would take a string of them to hold the stuff that would reach from the earth to the moon. During the next dozen years the amount of wealth that will be recovered from the soil, the forest, the streams and the rock beds of North America will simply be amazing and all will go to swell general business. As an instance according to Secretary Wilson's report the farm yield for the year amounts to $7,778,000,000 equal to $92.00 for every man, woman and child in the United States and $4.00 each for every human being on the globe. "Upon crops of gain and soil products more than anything else hinges the prosperity of the people. With three quarters of the people rolling in wealth, hard times will soon pass away like an unpleasant dream." These last two sentences appeared in my last year's report and I wish to emphasize them here and now. The year 1909 will likely be a much more prosperous year than was 1908 while 1910 promises to be a hummer.

But here in the Upper Peninsula of Michigan what concerns us more than anything else perhaps is the outlook for iron and copper. Iron is the most important metal produced and copper is next. Since the presidential election larger orders, which had been held back, have been placed for iron and steel products and also for copper in bars, ingots and other forms. The outlook for these economic products is full of promise and there is the best kind of reason for believing a heavy demand will spring up for them during the next few months with prices satisfactory.

As to copper the outlook for this metal is very satisfactory indeed.

Orders for electrical supplies are increasing. The world, so to speak, must be electrified and copper is the electrician's metal. Among the next great problems to be solved by electrical forces is the smoke nuisance in big cities and the electrification of railroads.

In operating city power plants and railroad equipments electricity must and will be substituted for steam. Already some of the great railroads have begun the work of electrification and orders for supplies have been placed running into the millions upon millions of dollars. The quantities of copper required for such purposes is something worth considering. The foreign copper business has been uniformly good throughout the year and prospects for a steady continuous active market across the Atlantic is reported very good indeed.

Exports from American ports since January 1908 will reach fully 200,000,000 pounds more than was shipped over during 1907. Early in the year when copper was a drug on the market, foreign buyers stepped in and secured considerable quantities for about cost or even below cost to certain producers. Taken all in all the situation of copper appears about ideal and all that could be expected at this time, all the underlying conditions that go to make up a steady healthy market are thoroughly sound and of the kind that producing companies like to see.

This is my fourth, and in all probability, last report as commissioner of Mineral Statistics for the State of Michigan.

I have tried to perform the duties of the office in a manner creditable to the State and to myself. Judging by the complimentary things said of my reports and the wide demand there has been for copies of the work I can't help but feel persuaded that I have succeeded in doing so in a general way. To the office I have devoted as much time and spent as much money in preparing the reports as I could afford, perhaps a little more, but since the reports have given general satisfaction, I do not regret having done this.

A great many more applications for copies came to this office than I was able to fill. The unfilled ones were referred to the Secretary of State at Lansing. Many complimentary letters were received, which is gratifying and I am sincerely glad the work is appreciated. I have again endeavored to prepare this report with just as much care with the hope of giving such a work as may prove useful to them and also full value for the amount appropriated for its preparation and publication.

I have visited the mines and properties of the Lake Superior districts and have seen what the properties are like, the methods used for recovering and the mechanical equipments in service. With but one or two exceptions, all figures regarding products, number of men employed, machine drills operated, depths of shafts, extent of ground developed and general data are official, up-to-date and as correct as it is possible to get them. This report is prepared on practically the same lines as my previous ones. Remarks on iron and copper mining and allied interests, together with the condition of labor in the Upper Peninsula of Michigan form the bulk of the work.

Of the iron ore produced in the United States, the mines of the Lake Superior region furnish about 70 per cent while the copper mines of Michigan furnish about 14 per cent of the copper produced and the best brand in the world. These products necessarily exert a powerful influence in the markets of the country and it is but natural that people interested in either of these industries should be anxious to secure any work published on the mineral statistics and resources of Michigan. I wish to express my obligations to all those who have charge of the enterprises referred to in this report. In my visits to the properties and intercourse with managers, I experienced nothing but courteous treatment and was afforded every facility for gathering the necessary information for preparing this report. All have my sincere thanks.

COMMISSIONER.

THE IRON INDUSTRY

During 1908 the Iron and steel industry of the United States was extremely quiet and even dull as compared with the remarkable activity and wonderful prosperity of the three preceding years, 1905, 1906 and 1907. Those three years, however, were record ones with the demand for iron and steel products of practically every make unequaled by any similar period in the history of modern times. So great was the demand for supplies during the first three-quarters of the year, 1907, that stock piles, which had been accumulating for considerable time, had to be drawn upon to meet the requirements. Last year mining operations, all through the iron districts, were conducted with far less vigor than during the three years referred to and the output of ore mined was less than that of 1907 by 15,000,000 or 16,000,000 tons. But the year closed with a better showing than was anticipated. 26,014,987 gross tons of ore were shipped from the Lake Superior region for the season. This was a decrease of 16,251,681 tons as compared with the total shipments of the previous year. A comparison of ore shipments for four years is as follows, in gross tons: 1905, 34,242,065 tons; 1906, 38,522,239; 1907, 42,245,070; 1908, 26,014,987. Shipments by ranges in 1908 were, Marquette, 2,414,632 tons; Menominee 2,679,156; Gogebic, 2,699,856; Vermillion, 841,544; Mesaba, 17,257,350; Miscellaneous, 122,449. As has been the case since 1901 the bulk of the ore came from the Mesaba range.

The history of iron mining in the Lake Superior region begins with the year 1844, when the first discovery of ore was made at the Jackson mine at Negaunee, Marquette County. For more than thirty years thereafter the story of the Marquette district was that of the entire Lake Superior region. Then, in 1877, the first shipments were made from the Menominee range, to be followed in 1884 by opening of both the Gogebic and Vermillion ranges. The Mesaba entered the list in 1892, although the only shipments in that year was 4,245 tons forwarded from the Mountain Iron mine, now and for years one of the giants of the range, and which with 17,198,871 tons to its credit, has produced more ore than any other iron property worked any where on the globe. The growth of the Lake Superior iron ore industry was slow for many years following the original discovery of the first mine, more than sixty-four years ago, but within the past decade the progress made has been remarkable.

Statistics showing the achievements of the different districts are interesting and significant and apportioned appear as follows:

Range.	Year opened	Output
Marquette	1844	87,647,819
Menominee	1877	66,337,670
Gogebic	1884	56,732,446
Mesaba	1892	167,527,143
Miscellaneous		797,868
Grand Total		407,160,116

Prices of iron ore in 1908 were, Bessemer Standard, $5.00 per gross ton; Mesaba Bessemer, $4.75; Old Range Bessemer, $4.30 and Non-Bessemer, $4.00.

THE OUTLOOK FOR 1909.

The present year will likely be a fairly busy one for the mines of the Lake Superior Iron districts but just how many tons of ore will be mined can only be approximated. Indications, at this writing, are that the output will not exceed very much if at all the amount produced last year. Still the iron and steel business has an erratic record and an improvement may set in any time requiring larger supplies than is now anticipated. The country at large is full to overflowing with wealth and the American people are chuck full of energy and business enterprise. A material change for the better in all lines of trade and commerce must and soon will set in and the volume of trade transactions be restored to normal again. Leading interests in the iron and steel markets now claim to see signs of improvement in the outlook for increased activity and a better demand for practically all structural products. The buying of steel rails have been an important feature of the market in the recent past. Some of the great trunk lines are reported to have placed large orders for steel rails while various railroad companies are in the market for amounts ranging from 1,000 to 10,000 tons. Quite an improvement in the demand for structural iron, bar steel, wire and other makes is also noticeable.

PIG IRON PRODUCTION.

The production of Pig Iron in the United States during 1908 was 15,936,018 tons as compared with 25,781,361 tons for 1907; 25,207,191 for 1906; 22,992,380 for 1905 and 16,497,033 tons for 1904.

The United States turned out as much Pig Iron in 1907 as the entire world produced only 17 years ago. The world's production of Pig Iron in 1900 was but 27,000,000 tons or 1,218,649 tons more than the United States output for 1907. The progress of the United States as a steel and iron manufacturing center is evident from the fact that in 1885 the country produced not much over 4,000,000 tons of iron, compared with a production of 7,415,469 tons by Great Britain and 3,687,434 tons by Germany. Now the United States is producing considerably more than double Great Britain's and Germany's aggregate production.

ESTIMATE OF IRON ORE RESERVES IN THE UNITED STATES.

KIND OF ORE—LONG TONS

Geographical Districts	Hematite	Brown Ore	Clinton Ore	Carbonate Ore	Magnetite	Titaniferous Magnetite	Total
Northeastern District	2,000,000	40,000,000	1,000,000,000	4,000,000,000	110,000,000	100,000,000	5,252,000,000
Southeastern District	50,000,000	315,000,000	1,840,000,000	400,000,000	30,000,000	5,000,000	2,640,000,000
Lake Superior District....	74,000,000,000	1,000,000	40,000,000	.....	5,500,000,000	25,000,000	79,560,000,000
Mississippi Valley District	12,000,000	1,480,000,000	.....	50,000,000	30,000,000	.....	1,572,000,000
Western District	120,000,000	5,000,000	.....	.....	60,000,000	100,000,000	285,000,000
Grand Total	74,184,000,000	1,841,000,000	2,880,000,000	4,450,000,000	5,730,000,000	230,000,000	89,315,000,000

CLASSIFICATION ACCORDING TO AVERAGE.

IRON CONTENT—LONG TONS.

55%	45%	35%	Present Available Ore
160,000,000	4,132,000,000	960,000,000	170,000,000
10,000,000	805,000,000	1,825,000,000	550,000,000
2,500,000,000	5,066,000,000	72,000,000,000	3,500,000,000
22,000,000	1,550,000,000	.....	80,000,000
100,000,000	105,000,000	80,000,000	85,000,000
2,792,000,000	11,658,000,000	74,865,000,000	4,385,000,000

THE WORLD'S IRON ORE RESERVES.

Professor Tornebohm estimates for the Swedish government the iron ore reserves of the world by countries, based on detailed figures for individual districts, as follows:

	Tons.	Metallic Iron Per Cent
United States	1,100,000,000	45 to 67
Great Britain	1,000,000,000	25 to 34
Germany	2,200,000,000	30 to 45
Spain	500,000,000	40 to 56
Russia and Finland	1,500,000,000	20 to 65
France	1,500,000,000	
Sweden	1,000,000,000	50 to 70
Austria Hungary and Other Countries.....	1,200,000,000	
Total	10,000,000,000	

Many will be surprised at the high figures for the reserves in Great Britain and European countries. So much is heard of our own vast reserves and of the low grades of some of the foreign ores that we have come to think of the supply outside of North America as relatively small. The position of the United States is somewhat better than shown in the table when we take into account the grades of ore. By multiplying the figures by the average percentages of metallic iron given for each of the countries by Professor Tornebohm the result is as follows:

	Tons of Metallic Iron.
United States	603,166,600
Great Britain	295,000,000
Germany	825,000,000
Spain	249,375,000
Russia and Finland	637,500,000
Sweden	611,538,460

It is believed that the reserve for the United States, and hence the total, are higher than indicated in this table, but before taking up this question, we may consider conclusions that may be drawn from figures as they stand.

President Hadfield of the British Iron and Steel Institute has prepared a diagram showing the world's increase of pig-iron consumption since the fifteenth century and the production at this rate for the next century, at the rate of the last 30 years. If the same rate of increase holds for the next century, as has held for the last 30 years, in the year 2000, the world's annual consumption of iron will be three and one-fourth times its present consumption. The total world's supply of iron ore known, given as 10,000,000,000 tons by Tornebohm, will be exhausted in about 50 years. If the total be correct, about the one-quarter of the world's known reserves have been used to the present time.

Recent discoveries of new iron ore deposits made in the United States, in Canada and in Mexico renders it absolutely necessary to modify, quite materially, the above estimates in order to make them approximately correct.

MARQUETTE COUNTY.

Total number of men employed in and about the mines of this County in 1908 was 5,362.

OLIVER IRON MINING COMPANY.

This company has been referred to at some length in my previous reports. It holds the unique position of being the heaviest producer and shipper of iron ore in the world with an annual capacity of between 20,000,000 and 30,000,000 millions of tons.

The mines owned and controlled by the Oliver Iron Mining Company are distributed all over the iron region of the Lake Superior district and embrace some of the richest and finest developed and equipped iron mines on the globe, as well as developmnt proposition of distinct future promise and exploratory prospects. Ores produced are among the most desirable and valuable varieties for general purposes and are always in demand at the highest market prices. The reserve ore bodies opened up in the mines and available for production are very large and sufficient to last for many years to come at the present rate of production. And it is well that this

is so to meet the growing demand for this world-wide indispensible product. Iron and steel products are impossible without iron ore and the demand for structural iron, sheets, iron bars and similar products during the year 1906 and the early part of 1907 was wholly unprecedented and without a parallel in the history of civilization.

In 1908, however, the demand for iron ore supplies as compared with that of 1907 was extremely quiet. Total shipments from the Lake Superior region was but 26,014,987 tons as against 42,245,070 tons for the previous year.

In every department connected with the company's mines, order and system prevail in a high degree and the affairs of the corporation are transacted with exacting knowledge and marked ability. The policy outlined and followed by the management has been broad and liberal; fair and considerate and the cohesion of prices maintained for the products of the district has been worked with distinct success and for the general good of all companies alike and workmen as well. Men are paid good wages and have been given the opportunity to invest their savings profitably through the purchase of preferred stock of the U. S. Steel Corporation at a price materially below the market quotation and pay for it in easy monthly payments.

The mines are in the hands of experts who know the business thoroughly and do it right. They are opened up and developed on practical modern methods for the general results and equipped with permanent machinery plants designed for the work; are ably and efficiently managed and progress has been substantial and continuous.

Mr. Thomas F. Cole is president of the Oliver Iron Mining Company; Mr. Pentecost Mitchell is manager with Mr. John McLean assistant manager. P. O. address, Duluth, Minn.

The following mines located on the Marquette range are operated by the Oliver Iron Mining Company: Lake Superior Hard Ore, Lake Superior Hematite, Section 16, and Section 21 Mines, comprising the Lake Superior Iron Company's group: Hartford Mine; Champion; Prince of Wales and Blue Mines, comprising the Queen Group, General Superintendent, William H. Johnson; Assistant General Supt., D. J. Sliney; Superintendent, F. E. Keese; Chief Clerk, J. C. W. Chipman; Mining Engineer, H. F. Hulst; Assistant Engineer, W. R. Bauder.

LAKE SUPERIOR IRON COMPANY.

This group of mines forming this organization consist of the Hard Ore, Hematite, Section 16 and Section 21. The company ranks among the best known and most successful iron ore producing concerns operating in the Lake Superior Iron region. It was first organized in March, 1853 and stand credited with having produced 14,617,737 tons of iron ore. Quite a substantial output and represents big values. The mines have been operated with distinct skill and the success achieved practically tells the whole story. From time to time an army of men have been employed at good average wages, which are invariably paid as soon as due.

During 1908 the average number of men employed was 676 and the amount of ore produced 383,261 tons as compared with 527,775 tons for the previous year. For holding up the ground and making the underground department safe for working in 404,312 feet, board measure, of stull timber was used and 605,923 lineal feet of lagging. No reasonable expense is spared to make the mines as safe and comfortable as possible for working in.

HARD ORE MINE.

This mine is located in the N. ½ and the S. E. ¼ Section 9 and the N. ½ of the S. W. ¼ Section 10, Town 47, Range 27, just south of the town of Ishpeming on a line of the C. & N. W. Railway. Ishpeming is a pretty town with about 12,000 inhabitants. Hard Ore mine is opened and developed through three working shafts. Dimensions; No. 6 shaft, 8x10 feet and 840 feet deep; No. 2 shaft, 7x9 feet and 720 feet deep; No. 7 shaft, 15½x6¼ feet and 920 feet deep. Skips operate singly and lift 2.5 tons of ore to a trip. All told, 19 levels are extended from shafts and the product of ore is recovered from No. 2 shaft, 6th level; No. 6 shaft, 7th and 9th levels and No. 7 shaft, 8th, 9th, 10th, 18th and 19th levels.

170 men are employed.

The ore body mined is substantial and continuous and so far as appearances go, good for years ahead at the present rate of production. The "stoping" method is used for taking out the product. The work is readily and economically performed. Compressed air for operating machine drills, etc., is supplied from Section 16 mine.

Mechanical equipment is modern, highly efficient and generally adequate for requirements. Machinery buildings are substantial and well located. Equipment includes one 24x48 inch simple duplex Brown hoisting engine, geared motion, operating 4x12 foot drums 6-foot face grooved for ¼ inch rope, built by Webster, Camp & Lane. Hoists from No. 2 Hematite shaft skip and Hard Ore No. 6 shaft and Hard Ore No. 7 shaft, one 22x36-inch reversible simple slide valve Hoisting Engine geared to two 8-foot drums, 4-foot face, grooved for 1¼ inch rope. Engine built by Iron Bay Mfg. Co., drums by Webster, Camp & Lane, hoists from Hard Ore, No. 2 shaft and No. 2 Hematite Cage. One 72-inch by 28-foot return tubular boiler. Three 72-inch by 15-foot return tubular boilers. A complete main and auxiliary pumping plant underground. The plant is practically complete, in good running order and economically operated.

Mining Captain, John McEncore.

HEMATITE MINE.

The Hematite is located in Section 10, Town 47, Range 27 with 80 acres of land and directly south of Ishpeming. Mine is opened and developed through two working shafts substantially constructed and in first-class running order. No. 2 shaft is 7x14 feet in dimensions and 570 feet deep. No. 3 shaft is 5x7 feet 6 inches in dimensions and 190 feet deep. Two compartments are used for hoisting ore, etc., the third for ladder-way and pumping outfit. Men are lowered in and lifted out of the mine workings with cage operated with Hard Ore hoist. 216 men are employed and compressed air for operating machine drills are supplied from Section 16 compressor. There is considerable development work going ahead on this property and three levels are being extended from shaft to ore body. Work is conducted vigorously and in up-to-date methods. Ore body is substantial and contains some fine blocks of ground opened up in systematic order. Underground openings are connected in different places and air circulates freely through them. This is a comfortable mine and men like to work in it. The product is taken out by means of the "caving" system, which answers admirably for the ore deposit mined. The product is taken from the 570-foot level and also the 190-foot level; and developing work and opening up fresh reserves of ore is conducted on the 190-foot level of No. 3 shaft. Mining Captain, Joseph Hodgson.

SECTION 16.

Lake Superior Section 16 adjoins Pittsburg and Lake Angeline on the east and lies in the S. E. ¼ of the S. E. ¼ Section 9, N. E. ¼ of N. E. ¼ Section 16 in Town 47, Range 27 and consist of 80 acres of land. Mine location is just south of Ishpeming. 241 men are employed.

The property is opened up and operated through one fine shaft, 3 compartment, 7x16 feet in dimensions and 1,080 feet deep. In all, 15 levels are extended from shaft and the product is recovered from levels 350, 530, 680, 830 and 955. Skips operate in balance, carry 3 tons to a trip and dump automatically. Ore mined is hard and soft Hematite running about 61.50 iron and less. Bessemer and non-Bessemer.

Ore body is opened up well ahead and apparently good for years to come, Drifts are going forward and the usual amount of ground is being opened up in accordance with the policy of the management. Underground openings are connected at various points and well ventilated. The “stoping” method is used for taking out the product and it seems just the thing for the ore deposit mined. Men are distributed to the best advantage for general results. No money or effort is spared to make the mine safe and comfortable and every department seems to be running to perfection. Opening work is conducted with a view to getting the best results and the progress has been substantial. Compressed air for Hard Ore and Hematite are supplied from compressor located on this property. The product is trammed by hand labor and mules. Mechanical equipment is of the best, powerful, practical, highly efficient and economical. Machinery buildings are substantial and arranged for the best service. Equipment includes one 24x48-inch single Corliss Hoisting Engine geared to one drum 10 feet in diameter, 8 ft. 9 in. face, grooved for 1⅜ in. rope. Engine built by E. P. Allis Co., Drums built by Webster, Camp & Lane. Hoist in balance. One Duplex compressor, 26 in., and 42-48 in. cross compound Corliss Engine 25½ in. and 40x48 in. two stage air cylinders. Engine built by Rand Drill Co., air cylinders by Nordberg Mfg. Co. furnishes air for Section 16, Hard Ore and Hematite Mines.

Joseph Hodgson, Mining Captain.

SECTION 21 MINE.

This mine is operated by the Oliver Iron Mining Company.

Wm. H. Johnson, general superintendent; F. E. Keese, superintendent; D. J. Sliney, assistant to general superintendent; John Trebilcock, mining captain; E. T. Hulst, engineer; W. R. Bauder, assistant engineer; J. C. W. Chipman, clerk.

P. O. address of mine, National Mine Post Office, Mich.

The ore body mined is a soft and medium hard Hematite running 58 per cent Iron and less, Non-Bessemer. Two shafts are in operation. East shaft, 8x18 and West shaft, 7x12 feet in dimensions. Four tons are hoisted to a trip and skips operate in balance at the East shaft, and singly at the West shaft. East shaft is 760 feet deep and West shaft 700 feet deep. Six levels are extended and the product is being taken from the 700 feet and 760 feet levels in the East shaft and 580 feet and 640 feet levels in the West shafts. Tram-cars are operated by hand labor and mule power, and the method in vogue for taking out the product is “caving and stoping.”

HARTFORD MINE.

This mine is situated about one-half mile northwest of the town of Negaunee in the East half of Lot 5, Lots 6 and 7, Section 36, Town 48, Range 27, making about 65 acres of land. Mine location is conveniently located and contributes material support to Negaunee. Its ore deposits are substantial, consisting of soft Hematite running about 58 per cent iron and less. Both Bessemer and Non-Bessemer ores are produced.

In 1908 the company employed 248 men, operated 20 power drills and produced 272,441 tons of ore.

Mine is opened and operated through two shafts, No. 1 and No. 2. No. 1 is 8x10 feet in dimensions and 650 feet deep. No. 2 is 5x15 feet in dimensions and 975 feet deep. Underground openings are developed on up-to-date methods. Future requirements are anticipated and

planned well in advance of actual necessities. Ore bodies are opened up and blocked out in the best way for bringing the best results and form some fine stopes of ground. Levels are conducted at various points and producing places well ventilated. The mine is well managed and seems to be in a prosperous condition. The "stoping" system is in use for taking out the product. Product now comes from the 650, 750 and 825 foot levels. In all, 5 drifts are extended from shafts. Every effort is made to keep the mine in safe condition and comfortable for working in. About 300 men are employed on the average and a 25-drill capacity air compressor operated. Operations are conducted economically and order prevails everywhere. Mechanical equipment is in good running order, well adapted for the work and adequate for requirements. Skips counter-balance in shaft and dump automatically carrying 5½ tons to a trip.

Mining Captain, Elijah Toms.

REGENT GROUP OF MINES.

The property of the Regent Iron Company commonly known as the “Blue” and sometimes as the “Queen” group and consists of 64 acres of land in the Southwest quarter of the Southwest quarter of Section 5, Town 47, Range 26, Marquette County, and is situated southeast of the town of Negaunee.

The ore mined in this property is Soft Hematite, Non-Bessemer and running 60 per cent iron or less.

In 1908 the management employed 212 men, operated 25 power drills and produced 120,627 tons of ore.

The mine is operated and developed one fine shaft 6x15 feet in dimensions, 3 compartment and 895 feet deep. Skips are operated in balance and lift 5 tons to a trip. Ore is dumped automatically and trammed to stockpile. Underground department is in fine physical condition and looks well. A 25-drill capacity Rand Compressor furnishes power for drills and all tram-cars are operated by electricity. Three 30-horsepower 24 in. gauge Electric Mine Locomotives are used for the work. Method in vogue for taking out the product is “caving system” and it answers admirably. The amount of timber used in the mine work was 310,000 B. M. Stull timber, and 320,000 lineal feet last year. Mine ventilation is good connecting with Prince of Wales shaft by new raise for ventilation and additional outlet to surface.

Equipment embraces one E. P. Allis Duplex 16x36 in., engine, operating one drum 7 ft., 6 in. diameter, 7 ft., 7 in. face, grooved for 1¼ inch rope. One Duplex Compressor, 18x30x30 in. Cross Compound Condensing Simple Slide Valve Engine, 18x30 in. air. Four 72x30 in. Return Tubular Boilers. Complete main and auxiliary pumping plants underground.

The whole plant is of the best, in first class condition and everything in and about runs smoothly and is doing full duty.

Improvements completed during 1907 includes one modern change house, with metal lockers, shower baths, etc.

Richard Roberts, Mining Captain.

PRINCE OF WALES.

This is a development proposition located in the N. E. ¼ of S. W. ¼, Section 5, Town 47, Range 26, with about 64 acres of land. Average number of men employed during 1907 was 24. Property is being developed through one shaft 6x16 feet in dimensions, 3 compartment and 610 feet deep. Output of ore is included in the shipments made by the Blue or Queen Group of mines.

The work is well in hand and conducted on up to-date methods and on lines that promise to bring the best results. People behind the proposition know the business and are doing it right. Progress has been substantial and of the kind that counts.

Additions made and improvements completed during 1907 include erecting combined Office and Warehouse; combined Machine, Carpenter and Blacksmith shop; Captain’s office; Change house; Steel Head Frame; Engine House, Boiler House, coal and Ore Trestles. Also Underground Pumping Plant and Electric Haulage system. Tile Chimney.

Equipment is adequate for requirements, in first-class running order and doing full duty.

CHAMPION MINE.

This property is located near the town of Champion in Section 31, Town 48, Range 29, with realty holdings of 18,000 acres of land. It is among the oldest iron mines in the Lake Superior region, having been in operation off and on since 1868. Ore produced is Bessemer and Non-Bessemer and runs 64 per cent iron and less.

In 1908 the management employed 120 men, operated 12 power drills and produced 53,758 tons of ore.

Ore bodies are opened up and blocked out in the best way for bringing the best results and form some fine stopes of ground. Levels are connected at various points and producing places well ventilated. The mine is well managed and seems to be in a prosperous condition. The “underhand and milling” method is in use for taking out the product and in mine work last year 14,000 feet B. M. timber was used for shaft work. Operations are conducted economically and order and system prevails in every department of the mine. Skips carry four tons to a trip and dump automatically in ore cars.

Champion has fine equipment. Buildings are substantial and conveniently located for service required. Machinery is of the best, powerful and adequate for requirements. Machinery has recently been overhauled and put in thorough order and it now stands ready to have the steam turned on at a minute's notice.

Mining Captain, Chas. Champion.

THE CLEVELAND-CLIFFS IRON MINING CO.

The Cleveland-Cliffs company forms one of the largest and most important iron ore mining producing organizations in the state, with works scattered and varied and its record for up-to-date progressive mining and business methods stand among the highest in the land. Besides working the shipping mines, the company is exploring, opening up and developing new properties of promise and which may form in the years to come substantial, profitable mines. Moreover, the company operates blast furnaces, turning out pig iron and other industries scattered over the Upper Peninsula of Michigan. The combined works employ a little army of men. All employees earn good wages and receives 100 cents on the dollar every 30 days. The mines are ably and vigorously operated and for the best intersts of the company. Order and system is kept in the foreground and the business affairs of the mines are transacted with precision and exactness. The ore bodies developed and available for production are sufficient to last for years to come and the physical condition of the various mines was never better than at the present time, nor did the future outlook for them ever look better.

A noteworthy feature and emphatically a praiseworthy one maintained by the managers of the iron and copper mines alike, in the Lake Superior district, is the special care and attention paid to the general comforts and home life of the company's employees and their families. In most cases, employees are provided with comfortable dwellings having nice patches of ground; the advantages of a mine physician; good water for domestic use; fuel at practically cost to the companies, and many other advantages and in some instances, electric light and sewerage system. In this particular, the Cleveland-Cliffs company affords a splendid example, for the management has gone so far as to pay a special premium for the best cultivated gardens and the most attractive residences. The movement has worked very successfully indeed. The result is that many employees now have cultivated pretty gardens; raise their own vegetables and small fruits, besides adding quite notably to the attractiveness of their residences and to the general appearance of the location.

Officers of the company are: President, W. G. Mather; vice-president, J. H. Wade; auditor, R. C. Mann; secretary, J. H. Sheadle; treasurer, W. G. Mather; main office, Cleveland, Ohio; mine office, Ishpeming, Mich.; mine agent, M. M. Duncan; mine auditor, A. J. Yungbluth; mining captain, J. H. Rowe; engineer, J. E. Jopling.

Cleveland-Cliffs company operates the following mines, located on Marquette and Gogebic ranges; Lakes, Cliffs, Negaunee, Princeton, Austin, Salisbury, Moro, Maas, Stephenson, Lucy, Smith, Ogden, Imperial and Jackson.

Following are the 1908 products of the mines operated in Marquette county by the Cleveland-Cliffs Iron Company:

Lake Shaft mine	341,845	tons ore.
Cliff Shaft mine	218,242	"
Negaunee mine	281,415	"
Maas mine	64,332	"
Princeton mine	120,128	"
Moro mine	86,140	"
Austin mine	197,411	"
Salisbury mine	99,290	"
Stephenson mine	85,051	"
Imperial mine	75,767	"
Ashland mine, Gogebic County	274,008	"
Total—	1,843,629	"

LAKE SHAFT MINE.

This mine is located within the limits of the town of Ishpeming and lies under the bottom of old Lake Angeline in Section 10, Town 47, Range 27. Ore mined is a soft Hematite enclosed between walls of diorite running nearly due east and west. Analysis of ore: Lake Bessemer Iron 62.50 per cent; Phosphorus, .048; Lake Iron 60 per cent. Ore body is substantial and strong and looks well. Its likes of demarkation are clear and distinct.

In 1908 this mine employed 272 men, operated 10 power drills and produced 341,845 tons of ore.

Mine is opened and operated by means of one of the finest shafts in the district 450 feet deep, 10x16 feet in dimensions and four compartment. Daily capacity of the mine is about 1,850 tons ore. In 1907 the timber used underground for holding up the ground and making the workings safe and secure for men while working there and taking out the product and for other mine purposes amounted to 930,846 feet board measure. Skips operate in balance and lift three tons to a trip. All tramming is done by an electric haulage system. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically done. Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most businesslike way. Results accomplished have been substantial and should be satisfactory. Mechanical equipment is of the best, in good running order and includes hoisting plants, a 45-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements. Shaft house is built of steel. Alfred Collick, mining captain; T. H. Bargh, chief clerk; J. R. Reigarh, mining engineer.

CLIFF SHAFT MINE.

This mine lies just west of the town of Ishpeming in Section 9, Town 47, Range 27 and forms a substantial, prosperous mine with a fine record. It is claimed to be a comfortable mine, well ventilated, and men like to work in it.

The 1908 product of ore was 218,242 tons. 229 men were employed. On an average, 39 power drills were operated. Method in use for breaking down product is "breast and underhand stoping" and it answers to perfection. Ore mined, Red Specular running Lump 62 per cent; Crushed 61 per cent. Underground operations and conducted through two shafts known as "A" shaft and "B" shaft each 10x14 feet inside measurement. "A" shaft is 693 feet deep. During 1907 "B" shaft was sunk from the 9th to 10th level and is now 738 feet. Two cages operated in balance are lifted at once, each carrying two tons of ore, making four tons of ore hoisted to a trip. Speed, 800 feet per minute. Underground department is in fine condition and looks well. Operations are practical and up-to-date. Work is dispatched in the best way for bringing the most satisfactory results. Tramming is done by hand labor and mules. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically done. Mechanical equipment is in good running order and includes hoisting plants, a 50-drill Nordberg air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements. Superintendent, W. W. Graff; Captain, James Stephens; Engineer, M. H. Barber; Clerk, J. F. Vanbrocklin.

NEGAUNEE MINE.

The Negaunee is nicely situated just east of the town of Negaunee in Section 5, Town 48, Range 26.

During 1908 the management employed 294 men, operated 10 power drills and produced 281,415 tons of ore.

Ore mined is a Soft Hematite. Analysis: Bessemer 60 per cent Iron; .058 Phosphorus; Negaunee 59 per cent. Underground operations are conducted through two shafts: No. 1 is cage shaft, 8x8 feet in dimensions and 620 feet deep. No. 2 is a hoisting shaft 8x16 feet in dimensions, three compartment and 750 feet deep. Skips operate in balance carrying three tons to a trip. Daily capacity of the mine is 100 tons ore. Ventilation is fine. No. 1 and No. 2 are connected and these are connected with the Maas shaft. The "caving" system is used for taking out the product and it works well. No reasonable expense is spared to make the mine safe and comfortable for working in. 1907 over 500,000 feet of timber, board measure, was used for supporting and holding up ground. Underground tramming is done by an “electric haulage" system, which renders first-class service and is highly appreciated by the trammers. It is a big improvement over the old method of pushing cars. Surface equipment is .ample for requirements and embrace "geared hoists" with two shafts in No. 2 shaft, cage in No. 1 ,12-drill capacity compressor and the usual mine buildings and appliances that go to complete a well-appointed mining plant.

Superintendent, S. R. Elliot; mining captain, Fred Wane; engineer, W. H. Barber; clerk J. N. Whiting.

PRINCETON MINE.

Princeton is located at the town of Princeton and adjoins the Austin mine on the North. It is a substantial mine with solid merit and on the way to bigger and better results, than the management has so far succeeded in obtaining.

The 1908 output of ore was 120,128 tons; 136 men were employed and 10 power drills were operated.

The mine is opened up and developed according to the latest and most approved methods of modern mining. Ore product is a Soft Hematite running 59 per cent Iron for Princeton and 59.70 per cent Iron for Cambridge. Mine is opened and worked through two fine shafts each 6x16 feet in dimensions and three compartment. No. 1 is 380 feet deep. No. 2 is 390 feet deep. Skips operated in balance and tram cars are run by hand labor. Ventilation is good. The “caving” system is in use for taking out the product and the underground department as well as other parts of the mine is in first-rate physical condition. Ore body is substantial and apparently good for the present output for considerable time in the future. Mine equipment is up-to-date, efficient and in good running order. It embraces a Sullivan Straight Line 10-drill capacity air compressor, a two drum hoisting engine, single drum reversible geared hoisting engine and supplementary appliances adequate for requirements.

G. R. Jackson, superintendent; Wm. Jory, mining captain; A. H. Tillson, engineer; John I. Keeton, chief clerk; Geo. J. Sarasin, mine clerk.

AUSTIN MINE.

This property is located at Princeton and adjoins the Princeton. It is practically a young mine of solid merit and forms a fine business enterprise.

The 1908 product of ore was 197,411 tons. 189 men were employed and 5 power drills were in operation. The physical condition of the mine is broadening out and steadily improving. Three power drills are operated and the “caving” system is in use for recovering the product of ore. Underground openings are developed on the latest and most approved methods for working an iron ore mine and substantial progress has been made all

over the property. Nothing seems to be neglected. Future requirements are anticipated. Analysis of ore mined: Bessemer Iron 63 per cent; Phosphorus .60 per cent; Austin Iron 61.50 per cent. Mine is opened and developed through one shaft, 10 feet 8 inches by 11 feet 4 inches in dimensions and 238 feet deep. Skips operate singly and carry two tons to a trip. No ordinary expense is spared to make the underground department safe and comfortable for working in. The mine is in a prosperous condition and good things are predicted for it. Mechanical equipment is in good running order and includes hoisting plant, an air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate fore requirements.

Superintendent, G. R. Jackson; mining captain, J. Ellis; clerk, Arthur Uren; engineer, A. H. Tillson.

SMITH MINE.

This is a development proposition located at Princeton and has attracted a good deal of attention all over the Iron region. Up to the present time the work at the property is confined to sinking one fine shaft through the overburden of water, quicksand and gravel, which is most difficult to pass through successfully. The shaft is 14 ft., 4 in. by 18 ft. 4 in at surface and 10 ft. 10 in. inside at junction with the ledge. Shaft is 550 feet deep and solidly connected with the ledge. From surface to ledge, it is concreted throughout. Concrete is 3 feet thick, reinforced by steel bars set horizontally and perpendicularly six inches apart. Shaft is perfectly dry, as no water entered it while work was going on. Smith mine is an interesting property, believed to contain important values and to form the making of a fine mine. Despite the fact that water is reached within a few feet of surface at the Smith shaft will not be wet, as the concrete walls are so thick and well constructed that it will be impossible for water to work through.

August Fogerberg, Mining Captain.

The Lucy, Odgen, North and South Jacken mines were idle during 1908.

MORO MINE.

This mine lies in section 10, Town 47, Range 27 and is situated east of the town of Ishpeming.

In 1908 the management employed 119 men, operated 14 machine drills and produced 86,140 tons of ore.

It is opened and developed through one large shaft substantial in construction and 812 feet deep. Shaft is 10x15 feet in dimensions and double compartment. Ore produced is a Red Specular. Analysis, Scotch, 61 70 per cent Iron. Ore bodies are large and apparently good for a considerable time ahead. The product is recovered on the “breast, back and underhand stoping" systems.

The mine is developed on practical lines and its physical condition is first-rate. The amount of ore hoisted to a trip is 1¾ tons and skips operate singly. The property is ably and skillfully managed and for the best interests of the company and its future well-being. Tramming is done by hand labor. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically operated. Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most business-like way. Mechanical equipment is in good running order, and includes hoisting plants, a Nordberg 50-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements.

Superintendent, W. W. Graff; mining captain, Duncan Campbell; engineer, J. R. Riegarh; chief clerk, James Murphy.

SALISBURY MINE.

This mine is located about a mile and one-half south of Ishpeming in Section 15, Town 47, Range 27, and forms one of the best known iron properties in the Marquette range.

Tons of ore produced in 1908, 99,290. Number of men employed 147 and five machine drills were in operation.

The ore mined is a soft Hematite running 60 per cent Iron for Salisbury and 61 per cent Iron for Clifton. Product is recovered through one shaft, 7x20 feet inside measurement and 1,170 feet deep. Skips operate singly and dump automatically in cars, which carry two tons to a trip.

The property is opened up and mined in the most practical way for bringing the best results. Progress has been continuous, substantial and of the right kind. Underground workings are in fine condition and no reasonable expense is spared in making them comparatively safe for men to work in. For holding up the ground and other mining purposes 255,281 feet of timber, board measure, were consumed in this mine in 1907. Opening work for the purpose of developing fresh reserves of ore for future needs are constantly going on and the physical condition of the mine maintained up to the standard of a well managed mine. Mine contains some fine stopes of ore and look first-rate. The daily capacity of the mine is about 550 tons. Tram-cars are operated by hand labor and the method in vogue for taking out the product is the “caving” system. Mine is ventilated through working shaft and air shaft, which keeps the workings cool and fairly comfortable for men.

Mining Captain, J. H. Dunstan.

MAAS MINE.

While this mine has now reached the distinction of being a producer of ore, it is still a development proposition. It has a fine future outlook and promises to form a fine substantial mine and a first-class business enterprise.

In 1908 the mine employed 137 men, operated 9 machine drills and produced 64,332 tons of ore.

Underground work is conducted through one fine shaft, 8x12 feet in dimensions and 1,150 feet deep. Ore mined is a soft Hematite. Skips operate in balance and lift 3 tons to a trip. Tram cars are run by an electric haulage system.

The work of developing the property is conducted on practical, systematic lines. Everything is modern and up-to-date. The property will be developed in the best manner for bringing the best results. Progress has been substantial and of the kind that counts. Mine equipment is new, up-to-date and includes Thompson & Green 1st Motion Hoist 8 ft. Drum; Cage Hoist; Allis & Chalmers 2nd Motion Hoist 8 ft. Drum; Ideal High Speed Engine and General Electrical Generator; three Stirling Boilers-forced draft and Murphy Stokers. Superintendent, S. R. Elliot; mining captain, Jos. Thomas; engineer, R. Reigarh; chief clerk, E. A. Doty. Postoffice address, Negaunee, Michigan.

STEPHENSON MINE.

This mine is located at Princeton about one and one-half miles from the town of Gwinn.

In 1908 the company employed 129 men operated 7 machine drills and produced 85,051 tons of ore. Mining operations are conducted through one fine shaft 10 feet ten inches by 14 feet ten inches and 459 feet deep. Ore mined is a soft hematite running 58.70 per cent iron.

Property has a very promising outlook and the management is developing the mine on practical lines and putting it in condition for a substantial produce in the future. Ore reserves are being opened up and blocked out in the most practical way for getting out a product of ore economically and successfully. Progress has been continuous, substantial and of the kind that counts. Skips operate singly so far, and lift two tons to a trip. The caving system is used for taking out the product.

Mine equipment will be new, of the best and includes a Rand Straight Line compressor, a Sullivan Corliss hoist for skips, an Allis-Chalmers Co., 14x26 in. geared hoist for cage and other necessary appliances consisting of up-to-date workshops and substantial mine buildings, etc.

Stephenson is located at Princeton in Town 47 and Range 27. Superintendent, G. R. Jackson; mining captain, John Ellis; clerk, Arthur Uren.

IMPERIAL MINE.

This mine is situated near Michigamme, Mich., and although a producer of ore for years, it is an irregular shipper. The ore body mined is a brown Hematite running 54.00 per cent Iron.

The 1908 product of ore was 75,767 tons. 76 men were employed and ten power drills were operated.

Underground work is conducted through two shafts, each 8x10 feet in dimensions and known as East shaft and West shaft. East shaft is 300 feet deep. West shaft is 325 feet deep. The "caving" system is used for recovering the product and the physical condition of the property is being modified and materially improved. It is operated on practical lines and just right for getting the best all-round results. Shaft was sunk 14½ deeper during 1907. Daily capacity is about 280 tons of ore, 64,273 feet of timber, board measure, were used for mining purposes last year. Considerable re-construction work was done and the position of the mine strengthened. Skips operate singly and carry 2 tons to a trip.

Equipment is in good running condition and embraces a 10-drill capacity air compressor, an 18x25 ft. hoisting engine with 2-5 ft. drums and supplementary fittings and additions adequate for immediate requirements.

Mining captain, Harry Marks; clerk, S. T. McKercher.

PITTSBURG & LAKE ANGELINE MINE.

This is one of the oldest as well as one of the best known iron ore mines in the Lake Superior region. It was organized in 1861 and since the beginning of operations, ore shipments stand credited with total of 7,784,752 tons of ore.

Company's property is located within the corporate limits of the city of Ishpeming in Section 15, Town 47, Range 27 and consist of 5,400 acres of land including both Old and East End mines. Ores produced are high grade Brown Specular Hematite. Analysis: Angeline Hematite 65.10 per cent, F. E., .014 per cent phos.; South Angeline 63.29 F. E., .111 phos. No. 1 Hard Ore, 66.96 per cent F. E., .014 per cent phos. Shellield, 66.10 per cent F. E. .035 phos.

In 1908 for both mines ore shipments amounted to 220,410 tons.

The mine is operated through one main shaft 700 feet deep and a sub-shaft 290 feet deep. The average length of openings in ore body vary from 1 to 300 feet and one level is being extended from shaft. Ore product comes from different levels and is mined on the "top-slicing" method which works admirably. Shafts are connected at various level and underground workings are well ventilated and comparatively safe and comfortable for working in. No reasonable work is omitted nor expense spared that would result in making

the mine safe. The ore occurs within folds of diorite making north of east about 30 degrees and dipping westward. Tram-cars are operated by electricity and answers admirably for the work and much appreciated by the men. Skips operate in balance, carry 2½ tons to a trip and dump automatically in cars.

ROLLING MILL MINE.

This mine is operated by Jones & McLaughlin Ore Company.

Thos. Walters, general manager; Thos. P. Walters superintendent; Edward Corey, mining captain; Elmer E. Jeffery, chief clerk.

The property is situated in Town 47, Range 26 and consists of 80 acres of land. The mine practically forms a part of the town of Negaunee and contributes in a substantial way to its support.

Ore shipments reported for 1908 amounted to 52,107 tons which compares with 49,204 for the previous year.

The ore body mined is a brown Hematite. Property is a development proposition with bright prospects for forming a substantial mine and a first-class business enterprise. It is now sending out a considerable product. Operations are conducted through one shaft, 10 by 12 feet within timber and 645 feet deep. Skips are operated singly and carry 2½ tons to a trip.

Development work underway consists of drifting and looking for fresh reserves of ore. The product comes from a depth of 645 feet. Future prospects are considered fair, but a great deal of rock was encountered in the development work. The property is being opened up and developed on modern methods of mining and when in full swing, it will be efficiently and economically operated. The management is of the best. Tram-cars are operated by hand labor and the mine ventilation, so far, is good.

Equipment includes an E. P. Allis 2-foot drum, one operating skip and the other, cage.

REPUBLIC IRON & STEEL CO.

General manager, C. F. Fairbairn, Duluth, Minn.; superintendent, John Deacon; mining captain, A. F. Datson; engineer, E. J. Pearce; cashier, J. E. Nelson. Postoffice address, Negaunee, Mich.

This company forms one of the enterprising and successful iron ore producing organizations operating on the Marquette Range. It works the Cambria and Lillie mines.

CAMBRIA.

This mine lies just east of the Lillie mine and carries a continuation of the ore measures of the latter property.

During 1908 this mine employed 75 men, operated six machine drills and produced 98,498 tons of ore. Total amount of ore produced to date, 1,814,925 tons.

Ore runs about 59 per cent metallic iron. Mine is operated through one shaft, 6x10 feet in dimensions and 825 feet deep. All told, 13 levels are extended from shaft and the product is recovered from the 11th, 12th and 13th levels. Ore is hoisted in skips carrying 1⅔ tons to a trip operating singly. Daily capacity of the mine is about 600 tons. A Rand compressor, 20 drills, is operated and tram-cars are operated by hand labor. Method in vogue for taking out the product is “top-slicing” system, which is among the safest and most economical methods in use. 15,000 feet of timber are consumed annually in the mine work. Face of openings are in ore of good quality and deposit looks strong and continuous. Bodies of ore are opened up on different levels that will last for some time to come and the deepest points penetrated look as well as any place in the mine. From time to time, considerable sums of money have been spent in strengthening the position of the mine and the success achieved has been, upon the whole, satisfactory. The management aims to get out the best there is in the property and development continues on a vigorous scale. Mine looks good for a substantial product for many years in the future. Equipment is good for present requirements and in first-class running order. The property is well managed and for the best interests of the company.

LILLIE MINE.

The Lillie mine adjoins the Cambria mine and lies in Section 35, Town 48, Range 27. It has been a substantial producer and looks good for many years to come. Officers of the Cambria are also in charge here.

In 1908 this mine employed 45 men, operated four machine drills and produced 32,330 tons of ore. Total amount of ore produced to date, 1,678,150 tons.

Ore runs 60 per cent iron and .080 per cent phosphorus. Ore bodies developed are large and substantial and look fairly well. Mine is opened upon practical lines and the work of taking out the product is conducted in the best way for getting the best results. Product is trammed by hand labor, dumped in skips and hoisted to surface. Underground operations are carried on through one shaft, 6x8 feet in dimensions and 900 feet deep. Levels are connected at different points, and men may go from place to place whenever they desire or in cases of emergency. Ventilation is good and workings are comparatively comfortable. Equipment is efficient, in good working condition and capable of doing the work of the mine.

The property Is ably and skillfully managed and for the best interests of the company. The management knows the mining business and is running the mine the best way to get the best there is in it.

Mechanical equipment includes a 10-drill capacity air compressor, hoisting engine, 21x24 cylinder with 8-foot drum, three tubular boilers with supplementary additions and fittings adequate for general requirements. The plant is in good condition and running very smoothly. I visited the property some time ago.

REPUBLIC MINES.

The Republic Iron Company operates the Republic and West Republic mines. West Republic is operated in connection with the Republic mine without additional surface equipment at the shaft in the form of a power plant, etc.

General manager, William Kelly, Vulcan, Mich.; superintendent, W. A. Siebenthal; mining captain, Peter W. Pascoe, clerk, Hiram R. Gamble; engineer, W. F. Slaughter. Mine Postoffice address, Republic, Mich.

The mines are located in Section 7, Town 46 North, Range 29 West in the town of Republic.

The number of men employed during 1908 was 300 and the product of ore amounted to 107,575 tons.

The ore deposit mined is a hard Specular and Magnetic mineral running, iron 61.66 per cent; phosphorus, .052-.039 per cent. The deposit looks well and promises to hold out for some time to come. The company is operated through two shafts working both singly and in balance carrying three tons to a trip. No. 8 being two-compartment and 1,150 feet deep. No. 9, vertical, three-compartment, and 1,665 feet deep. Pascoe shaft is incline, angle 45 degrees from vertical with skips working in balance, two compartment and 2,800 feet deep. West Republic is operated through one shaft, 800 feet deep with skips operated singly and carrying about two tons ore to a trip. These mines were operated very ably and results accomplished are of the best. Republic is a substantial mine and maintained in fine physical condition. No reasonable expense is spared in making every department safe and comfortable for men and all work is conducted practically to perfection.

The mechanical equipment is powerful and in first-class condition. It is maintained up to the standard of repair work and installment of new machinery when needed. It includes Hydraulic Air Compressor Plant, Electric Power Plant for operating electric pumps and surface machinery; Sullivan Steam First Motion Hoisting Plant operating skips in Pascoe shaft; Allis Engines operating geared hoists for No. 9 and No. 8 Shafts; Allis Air Compressor (steam) in reserve or for operation when water supply is low; Ore Crushing Plant operated by electricity during shipping season.

EMPIRE.

This mine is operated by the Empire Iron Company. E. W. Hopkins, Commonwealth, Wis., general manager; W. B. Pattison, superintendent; J. S. Buddle, mining captain; Jas. Carpenter, clerk. Post-office address of mine, Negaunee or Palmer. Property is located in the east half, Section ¼ 19-47-26, Marquette County, Mich. Lands consist of 80 acres.

This is a new mine and made its first shipments of ore in 1907, which amounted to 40,535 tons.

In 1908 the number of men employed was 55 and five power drills were operated. The product of ore amounted to 53,537 tons.

Besides sending out a product of ore, the management is opening up and developing the mine for bigger and better results. People behind the enterprise know the business and are conducting operations so as to operate the mine economically and produce ore at a minimum cost. Progress has been continuous and substantial from the start. The ore body mined is Hematite. The deposit is known to be large, but rather lean, as no hanging wall has been reached up to the first of the present year. Ore runs about 44 per cent metallic iron and .060 per cent phosphorus. Mine is opened by one large substantial shaft, 6x12 feet in dimensions and 105 feet deep. Product comes from one level with the opening extending in ore 300 feet in length. Drifting, cross-cutting and opening up new ground for future needs continue vigorously. The future prospects of the property are reported good. The “milling” system is used for recovering the product. It answers well and requires but little timber. Skips operate singly and dump automatically in ore cars. The physical condition of the mine shows steady improvement. There is every indication that Empire will be developed into a big producer. The mechanical plant is new, up-to-date, of the best and doing first-class duty. It includes: Two Milwaukee 150 h. p. 150-pounds pressure Horizontal Tubular Boilers; one Double Cylinder Double Drum Hoist; 15x20 engines; one Sullivan Corliss Compressor; No. 6 Gates Crusher and one Belt Conveyor.

BREITUNG HEMATITE NO. 2.

This mine is operated by the Breitung Hematite Mining Company, Ltd. E. W. Breitung, manager; H. L. Kaufman, assistant manager; J. F. Foley, superintendent; Joseph Hodgson, assistant superintendent. Postoffice address, Negaunee, Mich. Mine location, Marquette, Mich. Mining Captain, Jos. Hodgson; engineer, T. H. Bennett; chief clerk, G. E. Neault; R. C. Dutton, accountant at Marquette.

This is practically a new mine, having made its first shipment of ore in 1903. The work of opening up the property and receiving the product is conducted on practical and systematic lines. Everything is modern and up-to-date. The "caving" system is used for taking out

the product of ore and it answers first-rate for the mining of ore body contained in this property.

The average number of men employed in 1908 was 88 and the amount of ore produced, 61,500 tons. This is a first-rate showing for a new mine.

Ore body mined is a Hematite. Underground work is carried on through one big shaft 5x14 feet in dimensions, three-compartment and 247 feet deep. Opening up and developing new ground for future requirements continues in a vigorous manner. During 1907, there were 2,500 feet of drifting, 2,000 feet of crosscutting and 65 feet of shaft sinking done. This is the kind of work that counts and adds to the future worth and stability of the property. Mules are used for hauling tram-cars underground. Skips operate in balance, carry 1½ tons of ore to a trip and dump automatically. The product of ore comes from two levels while the third is being developed for future demands. Future needs are anticipated, provided for in season and the physical condition of the property shows steady improvement. Mine plant is efficient, running smoothly and doing first-rate duty. It includes air compressor, 150-horse power boiler, a two-cylinder Sullivan geared hoist besides tools, buildings, etc., adequate for requirements.

BARON MINE.

This mine is now being pumped out for examination and perhaps operation. It is located near Humboldt, Marquette County and owned by the Breitung interests. It has been idle about 20 years, built an engine and boiler house; also blacksmith shop and other additions. It has two 125 H. P. boilers, one hoisting engine geared friction type and a 6-drill capacity air compressor. P. O. address, Marquette, Mich. James F. Foley, superintendent; Joseph Hodgson, assistant superintendent; R. Finley, mining captain; R. C. Dutton, clerk.

In 1908 this mine was operated with considerable vigor and very fair success. A good deal of development work of a practical kind was accomplished and the appearance of the property much improved. 70 men were employed and a product of 21,025 tons of ore obtained.

MARY CHARLOTTE MINING COMPANY.

This company operates the Mary Charlotte mine and the Mary Charlotte mine No. 2.

MARIE CHARLOTTE MINE.

This mine is located about three miles southeast of the town of Negaunee and has 80 acres of mineral land situated in Town 47, Range 26. This is practically a new organization, formed by people of the best type, and who do things right. Property is operated with energy, and substantial progress has been made in all its departments. Ore produced is Hematite; analysis not given.

In 1908 the company employed 158 men and produced 88,480 tons of ore.

Mine is developed through one large substantial shaft, 7x18 feet in dimensions, three compartment and 182 feet deep. Skips balance and carry two tons to a trip. Ore body from which the product comes is large and continuous and is opened up ahead for some time to come with three levels averaging 500 feet in length extended to and in the ore bodies mined. Every department runs smoothly and the mine is in fine physical condition. Mine looks well and is in a prosperous condition and bigger and better things are predicted for it. Mine builders and power houses are substantial and located for direct work and bring the best results. Surface equipment is efficient, adequate for requirements and economically operated. It embraces a two-boiler Webster-Camp hoist, an eight drills capacity compressor, besides mine buildings and fittings for doing the work of the company.

E. N. Breitung, General Manager; Jas. F. Foley, Superintendent; Joseph Hodgson, Mining Captain; W. R. Bauder, Engineer. Postoffice address, Marquette, Mich.

MARY CHARLOTTE NO. 2.

During 1908 the management of this property employed 35 men and produced 4,740 tons of ore. It is chiefly a development proposition with very fair future prospects.

RICHMOND MINE.

This is an open pit and low grade ore proposition, there being no shafts. It is located just south of the town of Palmer in Town 47, Range 26, and consists of 40 acres of land.

During 1908 the management employed 36 men and produced 60,386 tons of ore. Ore shipments previous to 1908, 524,895 tons.

Progress has been substantial and operations are conducted in a practical way. The property is ably managed and opened up with a view of getting out the best there is in it in the best way. The ore, when mined, is loaded into small cars, and these cars are hauled out of the mines with horses and mules and the ore runs through a crusher and loaded into railroad cars. It is necessary to crush all the ore before shipment. The ore is mined at a cheap cost. The work of taking out the product is readily and economically performed and the mine is only in operation during the shipping season. Equipment now includes one Gates crusher and a Corliss engine.

Superintendent, John Huhtala; chief clerk, B. C. Hayes. Post-office address, Palmer, Marquette County, Michigan.

MENOMINEE RANGE.

Menominee Range, including the mines of Menominee and Iron Counties. Total number of men employed in and about the mines of these two counties during 1908 was 4,703.

On this Range, the Oliver Iron Mining Company operated the Aragon, Chapin, Mansfield and Dober mines during 1907. All other properties belonging to this company on this range were idle.

O. C. Davidson, general superintendent; Geo. J. Easele, assistant superintendent.

CHAPIN MINE.

This mine still holds the distinction of being the heaviest iron ore producer in the State of Michigan and forms one of the most substantial mines in the whole region of the Upper Peninsula. It has solid merit, forms a splendid business enterprise and is the mainstay of the town of Iron Mountain.

In 1908 the management employed 368 men, operated about 50 machine drills and produced 450,177 tons of ore.

The ore body mined is a Hematite, Analysis: Chapin-Iron 58.90; Phos. .065; Ajax-Iron 51.50; Phos. .060.

The ore bodies mined consist of a series of lenses extending easterly and westerly for 6,100 feet in length. It varies from 50 to 150 feet in width. Underground operations are conducted through two fine shafts substantially constructed and in first class running order. Shafts are Hamilton and B. Ludington. Hamilton is 7x21 feet in dimensions, three compartment and 1,418 feet deep. B. Ludington is 7x18 feet, three compartment and 1,324 feet deep. Chapin shaft is 1,023 feet deep, and C. Ludington is 1,525 feet deep. During the year 1907, the sinking of New "C" Ludington shaft has been completed, making its total depth 1,525 feet from surface, and the runners placed in both skip and cage compartments. A new 30x60 inch single cylinder reversing 12 ft. drum hoisting engine has been installed and is now in use handling the large cage in this shaft. There is also on the ground at the mine to be installed during the next few months, a new skip hoist, two cylinders, each 34x72 in., drum 12 ft., to be used in hoisting ore from "C" Ludington, and it is now expected that by July 1st next, this large hoisting engine will be installed and all other work completed to permit of hoisting the mine production from the 14th level through the "C" Ludington shaft. This engine is designed to go 50 revolutions per minute and lift a load of 22,000 pounds not including the wire rope. The engine for operating the Cornish Pump in "C" Ludington shaft, as previously reported, has been erected and the management is now at work installing the pump parts and water column in the shaft. The details of this pumping plant have been given in my previous reports.

The Chapin is very ably and skillfully managed, and results obtained are of the best. Order and system prevails everywhere and the duties in every department are performed with precision and exacting knowledge. No part seems to be overlooked. Future requirements are anticipated in good time and provided for in due season.

Underground openings are developed on broad, practical lines with shafts and levels connected at numerous places making the workings a veritable network.

Chapin is one of the wettest mines on the whole ranges, making steadily from 2,800 to 3,000 gallons of water per minute. The bulk of this water has been handled through the Hamilton or No. 2 shaft

The main workings of this remarkable mine have been described at some length in my previous reports.

I have visited the property on different occasions and was always impressed with the way the work is done there. Hamilton shaft, I think, holds the record of the district for big hoisting. One of the captains of the mine told me they hoisted and dumped to stockpile 2,530 tons of ore in one night shift of ten hours.

The mechanical equipment is of the best, highly efficient and in good running order. Buildings are substantial and located for giving the best results. Workshops are equipped with modern tools and fittings for doing mine work and turn out everything needed except new machinery.

Mining Captain, Martin Goldsworthy; Chief Clerk, Jno. A. Ryan; Engineer, S. J. James.

ARAGON MINE.

Aragon is a substantial mine and located in the town of Norway and forms a main support of the town. Mine location lies in Section 9, Town 39, Range 29, and consists of 120 acres of land.

The number of men employed in 1908 was 227 and the output of ore amounted to 248,954 tons. 40 power drills were in operation. Ore produced is a Hematite. Analysis; Granada grade, iron 58.75 per cent; phosphorus, .062 per cent; Cadiz grade, iron 51.20 per cent, phosphorus 59 per cent.

Mine is opened and developed through two working shafts, Nos. 4 and 5. No. 4 is 1,000 feet deep while No. 5 is 1,050 feet deep. Both shafts are in good running order, and substantial in every particular. Development work and general mining is conducted on practical lines and the product is taken out in the best way for the ore body mined. The "caving" system is used and answers

well. It protects the mine from accidents and permits taking out practically all the ore body as the work proceeds. Levels are going forward in 2 shafts developing ore reserves with openings averaging 1,370 feet in length. Underground openings are extensive, forming quite a network and contain some fine stopes and every department, both underground and on surface, was running vigorously and order prevailed everywhere. Every effort is made to make the mine safe and up-to-date. About 600,000 feet of timber, board measure, is consumed annually in this mine. Tramming is done by pneuatic haulage. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load is transferred to the stockpile. The work is readily and economically done. Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most business-like way. Results accomplished have been fairly substantial and satisfactory. Mechanical equipment is of the best, in good running order and includes hoisting plants, an air compressor plant, pumping outfit, workshops conveniently located, and supplementary appliances adequate for requirements.

MANSFIELD MINE.

This mine is located in the village of Mansfield, Section 17, Town 43, Range 31 with 132 acres of land. Town is named after the mine, and of this it forms one of the main supports. Mansfield has been operated off and on for about a dozen years and just getting in shape for making a substantial product.

The 1908 product of ore was 57,628 tons, number of men employed 40 and power drills operated same as last year. The ore mined is Hematite yielding 58.65 per cent iron; phosphorus .105 per cent.

Daily capacity of the mine is about 600 tons. Product is recovered from the 12th level. Skips operate in balance and carry 3 tons to trip. Mine is developed by means of one working shaft, three compartment, 16x7 feet in dimensions and 1,058 feet deep. Product is taken out on the “slicing system” and no timber is used, only for shaft repairs. Operations are conducted with marked ability and the mine is opened up on up-to-date methods. Underground openings are connected at various places and the workings are well ventilated. Development work and opening up fresh reserves of ground for future needs goes forward steadily and eight levels averaging 1,240 feet in length are extended from shaft into the ore body mined. Openings are extensive and contain some good stopes of ore, but the mine has its limitations. Development work is continued in the most practical way for bringing the best results. Mine is ably managed and in a prosperous condition. Future outlook is fairly promising and bigger and better things are anticipated. Mechanical equipment is actuated by steam power. Tramming is done by hand labor and mule power. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is economically and readily done. Mechanical equipment is in good running order, and includes hoisting plants, an Ingersoll-Sargent 330drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements.

J. S. Wall, Superintendent; Jas. P. Edwards, Mining Captain; W. H. Crago, Engineer.

RIVERTON MINE.

Riverton combines the Dober and Iron River mines located at Stambaugh in Town 42 and 43, Range 35, consisting of 60 acres of land. P. O. address, Stambaugh, Mich., J. S. Wall, district superintendent; Harry E. Duff, mining captain; Wm. H. Crago, engineer.

In 1908 the number of men employed was 70 and the product of ore amounted to 72,772 tons. Number of drills operated same as last year.

Management aims to get out the best there is in the mines, and progress with a view of getting better results has been substantial and of the kind that counts. Openings are extensive and contain some fine stopes that will turn out well. A number of improvements have practically been made all over the mines and their position strengthened in many ways. In the Iron River mine the “square sets system” is used for taking out the product and in the Dober, the “milling system” is used. These systems are practical and bring satisfactory results. Mines are in good physical condition and economically operated. Mechanical equipment is of the best, practical, modern, located and arranged for direct work and the best results. Mine buildings are substantial and well equipped.

Tramming is done by hand labor. Trams dump directly in skips, which are hoisted to surface and in turn dump in ore cars and the lode is transferred to the stockpile. The work is readily and economically done. Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most business-like way. Results accomplished have been fairly substantial and should be, in the main, satisfactory. Mechanical equipment is in good running order, and includes hoisting plants, a 24-drill Rand Compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements. Plant is in good running order and capable of doing practically any mine work.

THE PEWABIC COMPANY.

The Pewabic Company is a Wisconsin corporation with its general financial offices located in Milwaukee. The general mine office is located at Iron Mountain, Mich. President, George Van Dyke. General manager, E. F.

Brown; mining captain, Ed. J. Lord; chief clerk, W. G. Monroe; engineer, A. J. Myers.

The company forms one of the progressive, successful organizations producing iron ore on the Menominee range and operates, among other mines the Pewabic, which includes the property formerly known as the Walpole. The Pewabic is located just to the northeast of the town of Iron Mountain, in Sections 29, 30, 32 and 33, Town 40, Range 30 and embraces 840 acres of land. Ore produced is a Red Hematite ranging from high grade Bessemer, low in phosphorus and high in iron to a high silicious ore, which is low in iron and also low in phosphorus. The analysis of the various ores produced as to iron and phosphorus are given below: Pewabic 66 per cent iron and .009 per cent phosphorus; Toledo 48 per cent iron and .010 per cent phosphorus; Genoa 40 per cent iron and .010 per cent phosphorus; .38 per cent silica; Wolpole 59 per cent iron and .120 per cent phosphorus.

During 1908 the management employed 432 men, operated 31 power drills and produced 383,467 tons of ore.

The Mine is opened up and developed on broad, practical lines, ably and skillfully managed, and progress have been continuous and the results accomplished should be very satisfactory. Mine product comes from the 1st, 4th, 5th, 6th and 7th levels and sinking No. 1 and No. 2 shafts are underway. The mine is operated through four active shafts: No. 1 is 6x14½ feet in dimensions and 823 feet deep; No. 2, 7x20 and 521 feet deep. No. 3 6x9½ and 381 feet deep; Walpole No. 2, 6x9½ and 678 feet deep. Skips lift two tons to a trip, are operated in balance and dump automatically. Shafts generally are sunk in the foot-wall and connected with the ore bodies by cross cuts driven from different stations. Seven levels have been extended from shafts, and which are connected, makes air circulation good and the openings comfortable for working in. No effort has been left undone or expense spared to make the mine safe. About 850,000 feet of timber is consumed annually for supporting and holding up the ground in order that ore may be stoped out or caved, as the case may be, with safety to all connected with the work. The “block caving” method is most largely used in producing ore. Where the ores are very soft, however, sub-level caving is used. Wire rope trams are operated underground and on surface for hauling the ores to and from the shafts. At the Walpole, where the distance is greater than 1,000 feet for moving ores, it has been decided to install an electric haulage to do the work.

On different occasions, I have visited the property of this company, but never without being favorably impressed with its general appearance and the smooth and efficient manner in which each department connected with the mines were running.

NANAIMO MINE.

This mine is operated by the Mineral Mining Company, a Wisconsin organization, with headquarters at Milwaukee, Wisconsin. President, George Van Dyke; general manager, E. F. Brown; chief clerk, W. G. Monroe; mining captain, Ben Martin; engineer, A. J. Myers. Postoffice address, Iron Mountain, Mich.

Property is located in Section 26, 43, 35 and 120 acres of land. The Nanaimo was one of the first mines to be opened in the district, although it had never been extensively opened. It was taken over by the Mineral Company in 1903. Ore bodies are substantial and apparently good for many years in the future. The mine is opened on broad, practical lines and up-to-date methods. It is down to the 4th level and 362 feet deep. A modification of the "Sub-level caving" method is used for taking out the product and it answers admirably without the use of much timber.

In 1908 the mine was not operated at full capacity. The average number of men employed was 23 and the product of ore was 876 tons.

Ore body mined is a soft Hematite. The mine is opened and developed through one shaft, two compartment and substantially constructed. Skips lift two tons ore to a trip and operate singly, dumping automatically in ore cars. The opening work done during 1907 consisted of driving 720 feet of drifts and 937 feet of crosscuts. Three levels are extended from shaft and product comes from the 2nd and 3rd levels. A winze has also been sunk to the 4th level from which stoping is conducted. Daily capacity of the mine is about 650 feet and tram-cars are operated by hand labor. No ordinary expense is spared in making the mine safe for working in and mine ventilation is very good.

Mine equipment includes one Ingersoll-Sargent compressor, 16 drills, three 100 H. P. boilers, one 18x8x18 Duplex Prescott pump, two 11x16x4 ft. drum Lake Shore Engine Works hoists, machine and blacksmith shops and all other necessary machinery and equipment for mine work. The mine is well managed and economically operated. Everything appears to be running smoothly and doing first-class duty.

THE BREEN MINE.

This mine was idle during 1908.

KONWINSKY MINE.

Idle during 1908.

CLIFTON AND TRADERS.

This property is operated by the Antoine Ore Company. General Manager, E. W. Hopkins, Commonwealth, Wis.; P. O. address Iron Mountain, Mich. Mine is located in Section 17 and 20-40-30, Dickinson County, Mich., with 591 acres of land. Mining Captain, Frank Carbis; Clerk, W. K. Carter,

This property was not operated during 1908.

YOUNGS MINE.

The Huron Iron Mining Company operates the Youngs mine, which owns 160 acres of land situated in Town 42, Range 35 and located in Stambaugh, Iron County, Mich.

G. W. Youngs, general manager and superintendent; mining captain, John Looney; engineer, Chas. Linstrom. P. O. address, Iron River, Mich.

During 1908 the management employed 120 men, operated 20 power drills and produced 70,093 tons of ore.

The appearance of the ore body is large with good quality hematite and running 57 per cent metallic iron. The mine is opened up on sound, practical methods and in the best way for getting the best results. Progress has been continuous and substantial. The mine is in fine physical condition and looks well. Operations are carried on through one shaft, 6x11 feet in dimensions, 350 feet deep and down to the 3rd level. Product is lifted in skips carrying 2 tons to a trip operating singly. Openings in the ore body run from eight to nine hundred feet in length and the product comes from two levels.

The property is skillfully managed and in the interest of all connected with it. It appears to be in a prosperous condition and good for many years substantial returns.

PICKANDS, MATHER AND COMPANY.

Samuel Mather, president; Walter Scranton, vice-president; H. S. Hassleton, secretary; H. G. Hamilton, treasurer. Main office, Cleveland, Ohio; mine office, Iron Mountain, Mich. C. A. Mungor, general manager, Duluth, Minn.; Charles E. Lawrence, general superintendent, Iron Mountain, Mich.

The company operates the Baltic, Hemlock, Caspian, Vivian, Calumet and Fogerty mines on the Menominee Range and the Mikado, Brotherton, Sunday Lake and Pike mines on the Gogebic Range.

BALTIC MINE.

This company is located at Palatka with 200 acres of land in Town 42 North; Range 34 West.

In 1908 the management employed 150 men, operate twenty power drills and produced 130,800 tons of ore.

Mine's operations are conducted through one shaft, 7x9 feet in dimensions and substantially constructed and is 385 feet deep. Mine is being opened up on broad, practical lines and economically operated. Since the beginning of work, progress has been steady and substantial.

In all, 5 levels are extended from shafts and the product is taken from the 4th and 5th levels. Development is underway at the 5th level. Skips operate in balance, carry two tons to a trip, and dump in cars automatically. Tram cars are operated by electricity. The "back-stoping" method is used for taking out the product and it works admirably. Mine is in good physical condition and economically worked. Equipment is highly efficient and includes hoisting engine, air compressor with three boilers for furnishing power besides supplementary appliances and shops for doing the work of the mine. Underground ventilation is good and the physical condition of the mine all over is first-rate. The daily capacity of the mine is about 600 tons.

HEMLOCK RIVER MINING COMPANY.

This company operates the Hemlock mine, located at Amasa, from River county, on the Menominee Range, and owns 400 acres of land in Section 4, Town 44, Range 33. The ore mined is non-Bessemer running about 52 per cent iron.

In 1908 the mine employed 150 men, operated 35 machine drills and produced 83,600 tons of ore.

The mine is opened and developed by means of one fine shaft 7x15 feet in dimensions, 1,000 feet deep with a capacity for lifting 300 tons daily. The ore bodies furnishing the product look well; are large and continuous and are reached by various levels, which being connected, make free circulation of air and the underground openings are fairly comfortable for the miners working there. Average length of openings in ore bodies is about 700 feet. The ore body in the deepest openings looks well. Nine levels are extended from the shaft and the product is recovered from the 8th, 9th and 10th levels.

CASPIAN MINE.

This is a comparatively young mine with a very promising future outlook and gives every promise of developing into a fine property and is a profitable business enterprise. It made its fiscal shipment in 1903 and is located at Palatka, Iron County, Michigan, and situated in the N. E. quarter of Section 1, Town 42, Range 34, with 160 acres of land.

Local superintendent, W. H. Jobe; mining captain, James Brew; clerk, C. S. Hopkins.

In 1908 the mine employed 175 men, operated 20 power drills and produced 102,400 tons of ore.

Operations are conducted on the most up-to-date methods for getting the best results. Mine development is carried on through one fine shaft 8x12 feet in dimensions and 300 feet deep. Three levels are extended from shaft and the product of ore comes from the 3rd level. Ore body from which the product comes is large and continuous, is opened up ahead for some time to come. Every department runs smoothly and the mine is in fine physical condition. Its future outlook is good for bigger and better things. Product is taken out by the "back-stoping" system, and seems to be admirably adapted for the ore body mined. Future requirements are anticipated and provided for in good time and every thing in and about the mine runs smoothly and appears to be in good trim. Product is taken out by the "back-stoping" method and it answers first-rate for the ore body mined. Levels are connected and ventilation is good. For a young mine, it is in fine physical condition. Skips operate in balance and carry two tons to a trip and dump in cars automatically. Tram cars are operated by electricity.

VIVIAN MINE.

The Vivian mine is located at Quinnesec, Michigan, and has the west half of Section 34, Town 40, Range 30, and was organized in 1901. James Brew, mining captain; G. D. Crippen, engineer. P. O. address, Quinnesec.

This mine was idle during 1908.

FOGERTY MINE.

This is a development and mining proposition which is situated at Palatka, Iron County, Mich. Mining captain, Thomas Thompson; engineer, I. N. Woodworth; chief clerk, C. S. Hopkins.

During 1908 the mine employed 75 men, operated ten power drills and produced 32,500 tons of ore.

The ore body under development is a Hematite running about 57.60 per cent metallic iron.

Operations are conducted through one shaft 6x16 feet in dimensions and 190 feet deep. Skips operate singly and carry 1¼ tons to a trip. Shaft was sunk during 1907, 135 feet deep, drifts extended 816 feet and crosscuts driven 710 feet. Average length of openings in ore body is 710 feet. Two levels are extended from shaft and the product is taken from the 1st and 2nd levels. Daily capacity of the mine is about 75 tons. The product of this mine is included in that of Baltic. Tram cars are operated by hand labor. Method in vogue for taking out the product is "back-stoping" and it answers first-rate. The product is skillfully managed and with a view to taking out the best there is in the property and at the same time, its future is not overlooked. Mechanical equipment is running very nicely and the property has an encouraging outlook.

CALUMET MINE.

This mine is opened by the Calumet Ore Company and located at Felch, Dickinson County, Mich., with 200 acres of land in Town 41, Range 23.

General manager, C. H. Munger, Duluth, Minn.; superintendent, Chas. E. Lawrence; clerk, C. S. Hopkins; mining captain, James Powers, engineer, I. N. Woodworth. P. O. Address, Felch, Mich.

The ore produced is a Red Hematite running 42.30 per cent iron. The deposit is of good size and promises to hold out first-rate. During 1908 the mine employed 25 men and produced 15,000 tons of ore.

Underground work is conducted through three shafts substantially constructed. No. 1 is 7x9 feet in dimensions and 80 feet deep; No. 2 is 7x14 feet in dimensions and 116 feet deep; No. 3 is 7x10 feet in dimensions and 206 feet deep. Thus far, skips operate singly and carry two tons of ore to a trip. The back-stoping method is used for taking out the product and tram cars are run by hand labor. Opening and developing work done in 1907 consisted of sinking shaft 29 feet, driving 904 feet of drifts and 123 feet of crosscuts. Ore product comes from the 1st and 2nd levels.

Calumet iron mine is a young proposition with a promising outlook and the management hopes to develop it into a substantial producer and a profitable business enterprise. It is opened up and developed on modern lines and in the best way for bringing the most satisfactory results. Everything considered, progress has been satisfactory and of the kind that counts for the future as well as for the present time. The management aims to get out the best there is in the property and it is well managed.

PENN IRON MINING COMPANY.

The mines operated by this company are managed with distinct skill and economy and according to the latest and most approved methods of modern mining.

During 1908 the management employed 650 men, operated 80 power drills and produced 214,883 tons of ore.

The properties owned and operated by the corporation are located at Vulcan and Norway in the Menominee Range and have an annual capacity of from 350,000 to 500,000 tons of ore. For many years the mines have been vigorously and successfully worked employing a

large force of men and stands credited with having shipped, previous to the 1907 season, 3,852,005 tons of ore. In 1907 the company's product of ore was 396,669 tons of ore. The hydro-electric plant, referred to in my previous reports, was completed early in the year and put into successful operation. The equipment was furnished by the General Electric Company. Electric power is now used for operating hoists, compressors and pumps at East Vulcan, West Vulcan and Curry mines. The plant is located at Sturgeon River, between three and four miles from the mines. This change from steam to electricity will give the Penn Company one of the most complete and up-to-date electrical plants in the Upper Peninsula of Michigan and result, it is estimated, in reducing operating costs approximately $100,000 per annum.

The properties operated are known as East Vulcan, West Vulcan, Curry, Brier Hill, Norway and Cyclops. The workings on the West Vulcan, Curry and Brier Hill are connected in one mine and Norway and Cyclops are contiguous. The ores produced make six grades from special Bessemer to low grade silicious. Mines are developed and operated through six fine shafts, well located, substantially constructed and in fine running order. Shafts are connected on different levels, which makes ventilation good and producing places comparatively safe and comfortable for working in. Skips carry heavy loads, counter-balance in shafts, dump automatically and are lowered and lifted with great speed. Deepest shaft Is down 1,500 feet. Development work underway include sinking a new shaft for the West Vulcan-Curry mine and drifting into new ground, opening up fresh reserves of ore for future products.

Machinery is of the best, highly efficient, practical in mechanical construction, in first-class trim and economically operated. Many conveniences and privileges are provided for the employes that contribute largely in making home life at the mines comfortable and pleasant. The plant is very complete, adequate for present requirements and good for some time to come.

P. O. address of the mine, Vulcan, Mich. Officers: President, Powel Stockhouse; Secretary-Treasurer, A. P. Robinson; General Manager, William Kelly; Chief Clerk, Anton Johnson; Engineers, F. A. Janson and F. H. Armstrong; Mining captains, East Vulcan, William Harris; West Vulcan, William Harris; West Vulcan-Curry, William Bond; Norway-Cyclops, William Williams.

MUNRO MINE.

This mine is a substantial property operated by the Munro Iron Mining Company. Postoffice address, Norway, Mich. G. L. Woodworth, general manager, Iron River, Mich.; H. McDermott, superintendent, Norway, Mich.; Geo. R. Paul, engineer; Gilbert Moody, chief clerk; H. McDermott, mining captain.

In 1908 the number of men employed was 57 and the amount of ore produced 30,400 tons. Skips are operated in balance and carry 1¾ tons to a trip. Shaft is about 70 feet deep and about 200 feet of ground was drifted in 1907 and 20 feet cross-cutted. Development work underway includes drifting and raising. As far as quantity of ore goes, the future prospects of the property looks first-rate. Seven drills are operated with one 12-dirll Norwalk compressor and one 10-drill Sullivan compressor in operation. Tram cars are operated by hand labor. The “milling” process is used for taking out the product. There is good ventilation in this mine from the raises to the surface. Mechanical equipment is in good running order.

FEW MINE.

Few mine is operated by E. C. Eastman & Co., Marinette, Wis., E. C. Eastman, general manager; Harry Sincock, mining captain; B. W. Hicks, engineer; Richard ByQuist, chief clerk. Main office, Marinette, Wis. P. O. address of mine, Norway, Mich.

Mine is located 1½ miles west of Norway on S. ½ N. W. ¼ of Section 6, Town 39, Range 29. Dickinson County, Mich. Lands consist of 160 acres of land. Few mine is situated within 400 feet of the main line of the Wis. & Mich. Ry. and within ½ mile of the C. & N. W. Ry. and through trackage agreement, we also connect with the C. M. & St. Paul Ry., which gives our mine direct access to the main line of the Milwaukee road.

In 1908 the average number of men employed was nine and the amount of ore produced about 3,000 tons. Future prospects of the property is good unless hard times continue, so that demand for low grade iron ore happens to be light. A Norwalk 5-drill capacity compressor is used and tram cars are operated by hand labor. Mine ventilation is good and assisted by a 4x4 feet vertical chimney connecting first level with surface and in which is a ladder-way for escape in case of necessity. Equipment includes a Power house 45x65 ft. in which are one boiler 125 H. P. and one boiler 30 H. P., water heater, Air Compressor, 40x64 in. double drum reversible Engine, Webster, Camp & Lane hoist, one engine and dynamo producing 125, 16 C. P. electric lamps for surface and underground lighting, two Cameron No. 4 pumps, Blacksmith shop equipped with power hammer, Dry house heated with steam, shaft house 75x32 feet square base built with 12x12 in. square hemlock timber with 6 ft. diameter bicycle sheave wheels. Hercules hoisting cable 1⅛-inch diameter, skips sheet steel 2 tons capacity, 5 steel tram cars 2 tons capacity.

THE LORETTO MINE.

This property is operated by the Loretto Iron Company, which is located in Dickinson County, Mich., and owns 800 acres of land in Section 7, Town 39, Range 28.

Last year about 75 men were employed and 13,354 tons of ore shipped.

Equipment includes one Direct Acting Corliss Bullock Flat Rope hoist for main shaft; Camp & Lane hoist for timber shaft; two 200 H. P. Spect. Tubular boilers and one 250 H. P. furnace marine boiler built for high pressure, machine, blacksmith shop and saw mill well equipped with lathes, steam hammers, drill sharpeners, etc.

Two additional forties of adjoining land were added to the leasehold and the aforesaid principal vein is now being explored into said new land on the last six levels of the mine.

New steel shaft-house and modern automatic skips and cable or electric trestle dump are among the improvements contemplated. "Caving" system is contemplated and may be adopted for taking out the product from the vein contained in the new land secured in December, 1906.

Air compressor has the capacity to run 35 drills, and as developments are extended, additional drills will be placed in commission. Progress has been substantial and continuous. The mine is developed and opened up on practical, systematic lines and economically operated. The ore bodies that furnish the mine product are quite large, continuous and persistent with no place looking more promising than the deepest points penetrated. Average length of openings in ore bodies is about 600 feet. Stoping or ore extraction is continued on different levels and the amount of ore developed in sight and available for production is sufficient for a long successful run at the present rate of producing.

Mechanical equipment is powerful, fairly complete, in good running order and capable of doing the work of the mine.

General manager, J. Ward Amberg, 438 Fulton St., Chicago, Ill. C. H. Baxter, Superintendent; T. Donovan, mining captain; Warren McLaughlin, engineer; P. O. address, Loretto, Mich.

CORRIGAN, McKINNEY, & COMPANY.

This company stands among the up-to-date, progressive iron ore producing organizations operating in the Iron Region of the Upper Peninsula of Michigan and has a fine record. Large tracts of iron and timber lands situated throughout the Iron districts are owned and controlled by the company. It is an enterprising concern and stands up well in the estimation of the business and financial institutions of the country.

A considerable portion of the profits earned have been put back in the properties which have strengthened the position of the company in all its branches and added to its capacity. Order and system prevails everywhere and the business affairs of the Company seem to be performed promptly and with excellent efficiency. I visited the mines of the company some time ago and found everything running smoothly and on up-to-date methods. Like practically all other mining companies located in the Upper Peninsula of Michigan, the Corrigan, McKinney & Company pay special attention to the needs and requirements of its employes and their families, and provide them with many privileges and conveniences that help much toward making social conditions in and about the mines enjoyable and pleasant.

The company controls and operates the following mines:

On the Gogebic Range: the Ironton and Colby. In the Crystal Falls district, Menominee Range; the Tobin, Armenia, Deen, Lamont, Fairbanks, Kimbal, also the Lincoln mine, Crystal Falls mine, Great Western mine Quinnesec mine, besides different properties under exploration.

Main business office, Cleveland, Ohio; mine office, Crystal Falls, Mich.; president, James Corrigan; general superintendent, W. J. Richards; secretary-treasurer, J. F. Feris; chief clerk, E. J. Oswald; engineer, Fred C. Roberts; Head mining captain, W. J. Trevarthen.

TOBIN MINE.

Tobin is a substantial mine, has solid merit and according to present indications, a fine future. As age goes, it is a young concern, having made its first shipment of ore in 1901. Recent developments have been quite satisfactory and resulted in opening up some substantial stopes of ore.

The property is located in Town 43 North, 32 West and has 160 acres of land.

In 1908 the number of men employed was about 125 and the amount of ore produced 160,000 tons.

Genesee ore is included in these outputs. Besides other development work going on at the 9th level, 300 feet of shaft sinking was done in the year under review. Ore produced is a Red Hematite running 58.90 per cent metallic iron and high in phosphorus. Daily capacity the mine is about 975 tons ore and still better things are predicted for this property. All told, shipments of ore sent out from Tobin and Genesee foot up well over a million tons. Property is located at Crystal Falls in Town 43, Range 32 with 80 acres of land. Underground operations are conducted through one shaft, four compartments, 7 ft. 8 in. by 21 ft. in dimensions and 975 feet deep. Eight levels are extended from shaft and the product comes from practically all over.

Tram cars are operated by electricity, a method highly appreciated by the men. Skips are operated in balance and lift three tons of ore to a trip. They dump automatically in ore cars. Air compressor is a Rand Imperial 25 drill capacity machine. The method in vogue for taking out the product is by the caving system and subbing. It works admirably. Mine is not deep and ventilation is good. There is now going down at the Tobin, one of the finest and largest shafts in the Crystal Falls district and will measure 8x26 feet inside of timbers, giving room for four compartments. The shaft will be sunk to a depth of 800 feet vertical. In order to reach the shaft underground a tunnel 200 feet long must be run. The country rock which the shaft is supposed to go down in is slatey material and the operators are figuring on this kind of formation for the entire distance down. It is proposed to attack the shaft from the top and bottom and hustle the work through as fast as possible.

The mechanical equipment of the mine is up-to-date, in fine running order and includes: One 20x48 twin Corliss Nordberg Hoist, first motion; one 16x20 Marinette hoist, second motion; four 125 horsepower horizontal tubular boilers; one triple expansion Prescott pump; one Jeffery electric dynamo; one Green economizer and supplementary additions adequate for requirements.

CRYSTAL FALLS MINE.

The mine is located at Crystal Falls, Iron County, Mich., and situated in Town 43, Range 32, with 40 acres of land.

This mine was idle during 1908.

GREAT WESTERN MINE.

This mine is located at Crystal Falls, situated in Town 43, Range 32, with 80 acres of land. It forms a substantial mine and a fine business enterprise. Operations are conducted with energy and the success achieved is of the best. Still, operating an iron mine is not all profit. A considerable portion of the revenue received from the sale of ore must be put back into the property for the purpose of opening up fresh reserves of ore and for various other uses.

The product of ore for 1908 was 124,246 tons.

Ore body mined is a High Phosphorus and Hematite running 58 per cent iron. There is no regular body, but large pockets of ore and the future prospects of the property are reported to be uncertain. These pockets, however, are likely to prove persistent, and to keep turning up for some years to come. Underground operations are conducted through two shafts, three-compartment, 6x18 feet in dimensions and 908 feet deep. Skips lift three tons of ore to a trip and operated in balance. Thirteen levels are extended from the shaft and the development work underway consists of drifting and opening up ground. Product is being taken from the 12th and 13th levels and the ore reserves are substantial. The mine is opened up on broad practical lines and economically operated. Progress has been substantial and of the right kind for bring results. Daily capacity of the mine is about 850 tons. Tram cars are operated both by electricity and hand labor. Method in vogue for taking out the product is “back-stoping.” The property is electrically equipped throughout. Equipment is up-to-date and includes a 15-drill capacity Rand compressor; one 24x48 Twin Sullivan hoist, first motion; one 18x42 Bullock Corliss hoist; one Compound Prescott pump, 700 gallons; one Triple Prescott pump; 1,000 gallons; 2,000-gallon Harris Blowing system.

I visited the property some time ago and everything about the mine appeared to be running very smoothly and doin first-class duty.

DUNN MINE.

This mine is located at Mastodon, Iron Co., with 80 acres of land in Town 42, Range 33 West. The mine has been a considerable producer of iron ore and has a very good record.

The 1908 product of ore was 145,000 tons. 25 machine drills were operated. The ore bodies developed in this property seem to be similar to those found in Crystal Falls and the Great Western Mines, which are irregular pockets and not well defined veins. They hold out well, however, and appear to be persistent. Underground work is carried on through one shaft three compartment, 5x16 feet in dimensions and 900 feet deep. The amount of ore hoisted in skips to a trip is three tons, operated in balance and dump automatically. 200 feet of shaft sinking was done during the year besides the usual development work. In all 7 levels are extended from shaft and the product comes from two of them. The mine is opened and worked on the best methods going for bringing the most satisfactory results. All openings are in good condition and developed with a view to getting out the product of ore economically and for the best interest of the company and the future well-being of the property. Daily capacity of the mine is about 400 tons of ore. Tram cars are operated by hand labor. The method in vogue for taking out the product is “back-stoping,” and it is well adapted to the ore bodies developed in this mine. Workings are not deep and ventilation is good.

Mechanical equipment includes one 20x48 Twin Corliss Sullivan Hoist “fist motion”; three 150-horsepower horizontal tubular boilers; one Compound Prescott pump, 500 gallons. The plant is in good running order and doing first-rate service. It is adequate for requirements.

LAMONT MINE.

This mine location is near the town of Crystal Falls in Town 40, Range 32 and leased 80 acres of land.

This property was idle during 1908.

ARMENIA MINE.

This property is located just west of the town of Mansfield in Town 43 North, Range 32 West with 80 acres of land, and is quite an old producer, it having made its first shipment in 1889.

This mine was idle all year. The only work done was on surface. A new shaft house was erected; new crusher plant installed; new engine and boiler house completed, new Lake Shore hoist 22x48 installed; new boiler plant consisting of 3 Hor. tubular boilers installed, and equipments moved from old engine house to new.

FAIRBANKS MINE.

Fairbanks adjoins the Great Western at Crystal Falls with 40 acres of land in Town 43 North, Range 32 West.

This mine was idle all the year. The only work done was to complete installation of machinery started in 1907.

KIMBALL MINE.

This is an exploratory and developing proposition located at Crystal Falls in Town 43 North, Range 32 West with 80 acres of land.

Idle during 1908.

BAKER MINE.

This is still a development mine with the work well in hand going on steadily. Progress has been continuous and considerable headway has been made in sinking, drifting and preparing the property for sending out a product of ore. The property is located at Stambaugh, Iron County in Town 43 North, Range 34 West with 160 acres of land.

Thomas G. Brooks, Clerk.

The mine openings are laid out in the most practical way for bringing the best results and the property has a prosperous outlook.

SAGINAW MINING COMPANY.

This company is doing exploratory and development work, and has a lease on the S. W. ¼ of Section 4, Town 39, Range 29, Dickinson County, Michigan.

Development and exploratory work is conducted through one shaft, 5x9 feet in dimensions and divided into skip and ladderway. Shaft is 230 feet deep and has three levels. The work is conducted on systematic, practical lines and indications are favorable for developing a substantial property.

In 1908 the number of men employed was 65 and the amount of ore produced 39,364 tons. Four power drills were in operation. Since 1905 this company has mined and shipped 86,749 tons of ore.

Mine is ably managed and in a prosperous condition. Future outlook is fairly promising and bigger and better things are anticipated.

Skips carry 2 tons ore to a trip, operate singly, and the product is recovered by the “slicing and caving” method.

The equipment includes hoist on surface and hoist underground; 8-drill compressor; three boilers with capacity of 450 H. P.; two No. 8 pumps underground; boiler and engine house; office and warehouse; blacksmith shop, dry and shaft house.

George A. Baird of Chicago is president and treasurer; E. W. Jones of Norway, Michigan, is secretary and general manager. Thos. W. Willis is mining captain. Postoffice address, Norway, Mich.

BRISTOL MINE.

This property is operated by the Bristol Mining Company. General Manager, E. W. Hopkins, Commonwealth, Wis.; Superintendent, Arvid Bjork, Crystal Falls, Mich.; P. O. address of Mine, Crystal Falls, Michigan.

Company has 80 acres of land in Town 43 North; Range 32 West. Mining Captain, Emil Carlson; Engineer, Henry Kieren; Clerk, F. W. Miller.

This property is located just north of the town of Crystal Falls. In 1908 the management employed 111 men and produced 177,200 tons of ore. Total previous shipments 1,544,800 tons. The mine is developed through one substantial shaft 8x16 feet, three compartment and 740 feet deep. Product is taken out with the “milling” system and it seems to be the best for the property. About 25,000 feet of timber, board measure, was consumed last year in connection with the work. Skips operate in balance and carry three tons to a trip. Development underway embraces shaft sinking, opening up new ground and blocking out fresh reserves of ore. The property is ably managed and very economically operated. It is in good physical order. Mine plant is efficient, modern, and in good running order. It includes a double drum, first motion, hoist capable of lifting six tons net loads from a depth of 700 feet at a speed of

from 1,500 to 2,000 feet per minute, a 40-drill capacity air compressor and the usual equipment necessary to run a modern mine.

MILLIE MINE.

The Dessau Mining Company is opening up and developing the Millie mine, which is an open cut proposition. Real estate holdings of the company consist of 70 acres of land situated in Town 40 North, Range 40 West and located in Iron Mountain, Dickinson County, Mich. General manager, Silas J. McGregor. Postoffice address, Iron Mountain, Mich.

The number of men employed by this mine during 1908 was 20 and the product 3,322 tons. Four drills were operated. The mine was operated only a part of the year. Besides mining the product of ore the shaft was sunk 110 feet besides which 220 feet of drifting and crosscutting was completed. Development work underway includes sinking a shaft and supplementary work to take out a product in an up-to-date way and on economical methods.

HIAWATHA MINE.

This mine is operated by the Munro Iron Mining Company. G. L. Woodworth, general manager; D. H. Campbell, superintendent; Bert Baumgartner, mining captain; H. L. Botsford, engineer.

P. O. address, Iron River, Mich.

Property is located at Stambaugh in the S. W. ¼ of S. E. ¼ Section 35, Town 43, Range 35 about 1¼ miles South of Iron River, Mich., with 160 acres of land.

During 1908 the number of men employed was 99 and the product of ore shipped 138,190 tons. 10 power drills were operated besides which a heap of practical development work was completed.

Development work underway consists of drifting and cross-cutting and developing new ground for future product. The property is skillfully managed and in the most modern way according to the latest and most approved methods of iron mining. Underground openings are developed on practical lines and operated on modern methods of mining. Work during the year was confined to development except during the last four months when a little stoping was done. Tram cars are operated by hand labor and skips dump automatically. Method in vogue for taking out the product is “sub-leveling, backstope and underhand stope.” Amount of timber used in the mine annually is about 25,000 feet B. M. Equipment is in good running order and includes four 100 H. P. return tubular boilers; one single drum geared hoist-cylinder 14x18 in.; one Sullivan straight line air compressor, 12-drill capacity; one No. 8 McCully crusher and engine to operate same; one 13x21x34x10x24 in. Tripple expansion Prescott pump. Ore crusher and engine to operate same were installed during the year. This company is enterprising and deserve to be rewarded with a good mine.

THE JAMES MINE.

This mine is operated by the Mineral Mining Company and under the same management as the Pewabic, Nanaimo and Breen mines. The property is located in the N. ½ of the N. E. ¼ of Section 3, Town 43, Range 25. P. O. Address, Iron River, Mich. Ernest Truran, mining captain. This mine made its first product in 1907, which amounted to 6,889 tons ore.

During 1908 the management employed 109 men, and produced 55,274 tons of ore. Besides this product of ore a heap of practical, up-to-date work was accomplished.

In this property, the management is opening up a substantial mine and first-rate progress has been made. The management is of the best and the work is conducted the best way for bringing the most practical results. Ore body under development is a soft Hematite running 52½ per cent iron. The average number of men employed is 57 with 6 power drills in operation. The James was an old exploration taken over by this company the early part of 1906. The old shaft, which was 198 feet deep was re-timbered and sunk to a depth of 312 feet, its present bottom. In addition to the James and Nanaimo properties the company holds under exploring option 180 acres of land. The shaft is 6x9 feet in dimensions and the product is taken from the 2nd and 3rd levels. Ore reserves for future needs are being developed on the 3rd level and for taking out the product, the sub-level system is in service and it answers first-rate. The physical condition of the property shows steady improvement and mine ventilation was good.

The mechanical equipment is in good running order and include one 18x9x18 and one 12x8x12 Prescott pump; three 100 H. P. boilers; one 11x16 Lake Shore Engine Works hoist; one 16-drill capacity air compressor and all tools, supplies and buildings necessary for operation of a mine of this size.

Additions and improvements completed during 1907 included a substantial large shaft house to replace the old one. A spur track of the C. & N. W. Ry., was completed to the mine during the late fall of 1907. It is about 2½ miles long

ZIMMERMAN MINE.

The Zimmerman is operated by the Spring Valley Iron Company, Jerry Marrow, general manager; A. L. Burridge, superintendent. A. L. Burridge, mining captain. P. O. address of mine, Iron River, Michigan.

Property is located at Spring Valley, Iron County, Mich., with 80 acres of land in Town 42 North; Range 34 West. This is an exploring and developing proposition with bright future prospects. The management struck ore in the shaft at a depth of 22 feet. Analysis of ore 57 per cent iron. The work is conducted on practical lines and up-to-date methods. Good progress is being made. The people back of the concern know the business and are doing it right to get the best results. In 1907, 1,000 tons was taken out through development work. Two power drills are operated and 25 men are employed.

Equipment includes two 60 H. P. boilers; one double cylinder 11 in. by 16 ft. hoist 5 ft. drums; one 3-drill capacity compressor; one No. 7 and No. 5 Cameron pump. In the near future a new engine and boiler house will be constructed. The property has a good appearance and will likely develop into a prosperous mine.

GROVELAND MINING COMPANY.

This company is opening up and developing the Groveland mine situated in Town 42 north; Range 29 west; with 80 acres of land. G. W. Youngs, president and general manager; F. W. Youngs, superintendent; D. M. Youngs, secretary and treasurer; M. H. Lawry, mining captain. P. O. address, Iron River, Mich.

Ore shipments from this property during 1908 were 9,123 tons.

HOLLISTER MINE.

This mine is operated by the M. A. Hanna Company. Superintendent, Frank Scadden; Mining Captain, Robert Phillips; Engineer W. J. Staples; P. O. address of mine, Crystal Falls, Mich.

In 1908 the mine employed 45 men and produced 12,000 tons of ore. The management is doing a heap of practical development work that will come in good in due time.

Property is located in Iron County, Mich., with 80 acres of land in Town 43 North, Range 32 West. The average number of men employed during 1907 was 40. Ore body mined is a Hematite. As regards size and quality of ore body under development is narrow towards the surface, but appears to widen as it goes down. Analysis 54 to 57 per cent Iron.

The development work underway includes sinking a shaft and opening up the mine for shipping ore. The shaft is a fine one, being 6x10 feet in dimensions and 150 feet deep. The work is well in hand and conducted on up-to-date methods and on lines that promise to bring the best results. People behind the proposition know the business and are doing it right. Progress has been substantial and the management expects to have the property in condition for sending out a much heavier product of ore. The product was taken from the 3rd level. Skips lift 1½ tons to a trip, operate singly and dump in ore cars automatically. Development work underway include sinking a shaft and winze. No. 1 shaft will likely be sunk a couple of lifts and two levels developed with raises, etc., for producing ore during the season in hand. Last year, 6 dwellings and a boarding house for employes were completed.

Equipment is in good running order and includes one 6-Webster Camp & Lane engine and drum, one 200 H. P. boiler, one 10-drill Rand compressor. (Straight Line.)

BRULE MINING COMPANY.

E. W. Hopkins, general manager; F. D. Klungland, superintendent; Gust Anderson, mining captain; Milton D. Rowe, clerk; E. H. Edgreen, engineer. Mine's P. O. address, Stambaugh, Iron County, Mich.

This company is doing considerable mine development and exploring work in promising locations on the Menoninee Range that will likely bring good results and substantial returns. Development and exploring work is difficult and tedious anywhere and under the most advantageous conditions and such effort deserves to be rewarded. Ore bodies are frequently buried from sight with heavy overburdens of quick sand and gravel and then deep beds of country rock that make them difficult to locate. When found, they are often hard and costly to get at, for sinking through quick-sand and gravel is the most costly work connected with mining. But it is the explorer who reclaims the wilderness and opens up and paves the way for towns and cities and industrial enterprise in all its forms of usefulness for the general good of mankind. The Brule Mining Company is opening up and developing into a mine with much promise the Chatham besides exploring the Birkshire and Lenox. The three properties are under the same management.

CHATHAM MINE.

This property is located in the N. E., S. E., Section 35, Town 43, Range 35, Iron County, Mich. Head Mining Captain, Gust Andees; Engineer, E. H. Edgreen; Milton D. Rowe, Chief Clerk.

In 1908 the number of men employed was 104 and ore 45,825 tons. Ore body mined is Red Hematite running about 56 per cent metallic iron. The mine is opened up and developed through two shafts. Shafts are 200 feet deep and skips lift 1½ tons of ore to a trip and dump automatically. No product of ore was recovered during 1907, but the property is credited with having produced 16,000 tons of ore previous to 1907. Its future prospects are reported good. The average number of power drills operated was 10. Equipment includes a Sullivan Straight Line Corliss 15-drill capacity air compressor;

three 150 H. P., pressure horizontal tubular boilers; one 12x16 double conical single drum hoist and other appliances adequate to do the work of the mine. Everything in and about the property is in good running order and doing good service. The property is ably and economically managed. Operations are conducted on up-to-date methods and of the kind that bring substantial results.

BIRKSHIRE MINE.

Birkshire is located in S. W., N. W. and N. W., S. W. Section 6, Town 42, Range 34, Iron County, Mich. The average number of men employed during 1908 was 20. Ore body is Soft Red Hematite. The future prospects of the property are reported good. Mechanical equipment will include a Sullivan Straight Line Corliss 15-drill capacity air compressor with additions and appliances adequate for present requirements.

The work is conducted on practical lines and up-to-date methods which promise to bring the best results. Everything moves along nicely. The people behind the enterprise know the business thoroughly and are doing it in the best way to bring the best results, and at the same time economically and well.

CHARBOONE MINE.

Charboone is located in the N. ½ N. W. ¼, Section 6, Town 42, Range 34, Iron County, Mich., with 80 acres of land.

Idle.

LENOX MINE.

Lenox is situated in Section 36, Town 43, Range 35, S. E., S. W. Iron County, Mich., with 80 acres of land. On average the number of men employed was 13 and the work of opening and developing the property proceeds in a practical way and good results are obtained.

The outlook for this property is considered first-rate and some people think it contains important values. Work is conducted in the most practical way of progress continues at a satisfactory rate. Mechanical equipment is adequate for immediate requirements and everything is running along smoothly. Lenox will likely give a good account of itself. These four properties are under the same management.

GIBSON MINE.

This mine is located southeast of the town of Amaza, Iron County, Mich., and has 120 acres of land. It is operated by the Rogers-Brown Ore Company. C. D. Tripp of Chicago, Ill., is general manager; T. H. Martin, superintendent; C. Jacobson, mining captain; Frank Glass, engineer; Nils Jacobson, clerk.

The property is believed by many to contain a considerable deposit of ore of non-Bessemer grade. Gibson is not a new mine nor yet an exhausted one for it was worked years ago only in a limited way. The management is now sinking a new shaft and pumping water out of an old one and hope to open up and develop a substantial mine.

Sixty men were employed and fine progress made in developing the property. Moreover a product of 4,548 tons of ore were produced.

The work is well in hand and conducted along lines that are up-to-date and that promise to bring the best kind of results. Mechanical equipment embraces one Sullivan 12-drill capacity air compressor, two 150 H. P. boilers, two hoisting engines and other appliances for doing mine work. Property is well managed and everything connected with it seems to be in good running order.

GOGEBIC RANGE.

The number of men employed on this Range during 1908, was 4,277.

There is hardly a mine on the Gogebic that is not sinking to develop ore bodies at lower levels. In this respect the range is undergoing what has been truly styled a transformation. The great majority of the shippers are now mining between depths of a thousand and two thousand feet; a few shafts are bottomed still further down and are opening up even greater resources than met with nearer the surface, and at two or three properties 3,000 feet is the goal in sight. Given in order on the strike of the formation from east to west, the active mines are the Castille, Sunday Lake, Brotherton, Pike, Mikado, Eureka, Anvil, Tilden, Colby, Yale, Ironton, Newport, Pabst, Aurora, East Norrie, Norrie and Ashland on the Michigan side of the border line, and the Germania, Cary, Superior, Ottawa, Montreal, Atlantic and Iron Belt on the Wisconsin end of the range.

On this range the Oliver Iron Mining Company operates the Norrie mines, Tilden, Geneva, Davis and Puritan mines. O. C. Davidson, General Superintendent; D. E. Sutherland, Supt.

NORRIE MINE.

This group forms one of the best known and most successful iron ore producing properties in the state and has a first-class record. The combined mines form a fine business enterprise and contribute in a substantial manner to the suport of the town of Ironwood. The property has been a heavy producer with the banner

year in 1902 when the output is reported to have been 1,082,032 tons of ore.

In 1908 the management employed 1,057 men, operated 40 power drills and produced 917,543 tons of ore. Ore mined is a Hematite running Iron 62.75, Phosphorus, .040. The mines are worked through 8 active shafts: "A" Norrie 6x22 ft. by 10 in.; "C" East Norrie 8x22 ft.; "A" Aurora 7 ft. 6 in. by 18 ft.; "B" Norrie 5x10 ft. 4 in.; "D" East Norrie 10x18 ft. 8 in.; No. 1 Aurora 5 ft. 10 in. by 14 ft.; "C" Pabst 6x16 ft.; "G" Pabst 10x18 ft. 8 in.

Air for operating machine drills, etc., for these mines is furnished by the Aurora mine compressor. The shafts are substantially constructed, in good running order and capable of caring for an enormous output. Shafts generally are sunk in the footwall side and ore bodies reached by a series of crosscuts. Underground openings are developed on up-to-date, practical methods, and the product is taken out in the best way for bringing the best results, no matter whether the method be caving, stoping, slicing or any other method. Every department is in fine physical condition and doing good duty. Shafts are going down and the usual number of drifts are going ahead developing additional new ground in accordance with the policy of the management. Future requirements are anticipated and provided for. This matter is kept well in the foreground. Levels are connected by various openings, well secured and air circulates freely through practically every part of the underground department. Different methods are used for taking out the products of ore. Conditions are not always the same and the method best adapted for each situation is used. Skips counter-balance in shafts, dump automatically and carry four tons to a trip. Everything runs practically to perfection. Order prevails everywhere and affairs of the mine seemed to be dispatched with care and precision. Mechanical equipments are of the best kind for requirements, highly efficient, in good running order and economically operated. Workshops are conveniently located, equipped with the best tools and fittings and can turn out nearly every kind of work, which is required in a modern mine. Mine is in a prosperous condition, with officers and men alike, well satisfied with the existing conditions. Tramming is done by electricity and the system is highly appreciated by the men. Trams dump directly into skips, which are hoisted to surface and dump in ore cars in turn and the load transferred to the stockpile. The work is economically done. Mechanical equipment is in good running order, and includes hoisting plans, A. C. C. Cooper Duplex Corliss 50-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements.

Mining Captains are: Norrie mine, S. J. Gribble; East Norris mine, A. G. Hedin; Aurora mine, B. T. McNamara; Pabst mine, T. J. Stewart.

TILDEN MINE.

This property is located near Bessemer in Section 15, Town 47 North, Range 46 West, with 320 acres of land. It has been a good producer for a number of years, and appears to grow with age, as most good things do.

In 1908 the mine employed 205 men, operated fifteen power drills and produced 69,166 tons of ore.

Ore mined is a soft Hematite. Analysis: 62 per cent iron, .050 per cent phosphorus and .5 per cent silica. Underground work is conducted through three shafts; Nos. 6, 9 and 10. Nos. 6 and 9 are 7 ft. 6 in. by 18 ft. 3 in. and 1,381 and 670 feet deep respectively. No. 10 is 9x16 ft. 6 in. in dimensions and 932 feet deep.

Shafts are connected in different levels and underground openings are developed on modern lines of mining. Openings are connected practically all through the workings and air circulates freely through them and they are comfortable for working in. Product is recovered from various openings, located practically all over the mine, and taken out in the most modern way. Mine is opened up well ahead and in good physical condition. Mine equipments are adequate for requirements and in good running order. People in charge of the property know the mining business and do it right and conduct operations with a view to taking out its values to the best advantage. Ore bodies are substantial and good for some time to come a the present rate of production. Skips dump automatically in cars, counter-balance in shafts, and carry from two to four tons to a trip. Mine buildings are substantial and well located for direct service. Machinery is modern, in first class running order and generally adequate for requirements. Mine appears to be in a satisfactory condition and looks thrifty. Tramming is done by mules. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically done. Results accomplished have been fairly substantial and should be, in the main, satisfactory. Mechanical equipment is in good running order, and includes hoisting plants, an Allis Chalmers 20-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements. W. H. Knight, mining captain.

PURITAN EXPLORATION.

Is located between Ironwood and Bessemer in Section 17, Town 47, Range 46 and consists of 160 acres leased land. Property is being developed on modern methods and in the most practical way for getting the property in condition for sending out a product of ore.

In 1908 the mine employed 76 men, operated 6 power drills and sunk the shaft to a depth of 1,139 feet.

It is a good opinion that the property will develop into a substantial and profitable producer. Surface equipment

is good for present requirements and embrace a hoisting plant, 10-drill capacity air compressor and supplementary appliances.

James Stanlake, mining captain.

GENEVA EXPLORATION.

Is a development property located in Section 18, between Ironwood and Bessemer, Town 47, Range 46, with 160 acres of land, which is leased. The organization was formed in September, 1902.

In 1908 there were 36 men employed, 2 power drills operated and the shaft sunk to a depth of 2,188 feet.

Operations underway include opening up and developing an ore body for future production. The work is well in hand and conducted on up-to-date methods and on lines that promise to bring the desired results.

Its future outlook is considered decidedly encouraging. Equipment is adequate for requirements. Mine will be put in the best condition for bringing satisfactory results. James Stanlake, mining captain.

DAVIES EXPLORATION.

This property is located between Bessemer and Ironwood in Town 47, Range 46 and consists of 80 acres of land. It is as the title indicates, an exploring proposition with one shaft sinking.

The company is engaged in sinking what will be known as one of the deepest shafts ever put down on the range and one of the most substantial as well. Last year 54 men were employed and the shaft sunk to a depth of 1,248 feet. Two power drills were in service. It is 10 ft. by 18 ft. 8 in. inside measurement and steel lined, similar to the big “B” shaft at the “giant” Norrie. The last year has added largely to the horizon of the Gogebic Range’s future, and it is confidently believed that many of the difficulties in the more superificial formations will not be met at depth of 2,000 feet, where the ore bodies seems to widen out and be freer from intercepting dykes. However, the grade of ore for which the Gogebic has been so famed is somewhat less fine in quality, though in a number of instances, it is expected that deeper explorations will bring a return to former grades of product. James Stanlake, mining captain.

ASHLAND MINE.

This mine is owned and operated by the Cleveland-Cliffs Company and located within the corporate limits of the town of Ironwood. Gogebic county and has 110 acres of land in Section 27, Town 47, Range 47. P. O. address, Ironwood, Mich. J. M. Bush, superintendent; W. H. Moore, clerk; S. J. Perkins, mining captain; P. H. Cummings, engineer.

The Ashland forms a substantial producer and is one of the best known mines in Gogebic County. Ore mined is a soft Hematite running 60.00 per cent iron; Phosphorus .45 per cent.

The 1908 product of ore was 274,008 tons. Twelve power drills were operated and 254 men were employed. The mine is opened up and developed on broad, practical lines and economically operated. From time to time, big sums of money have been spent on the property that resulted in strengthening its position and adding to its producing capacity. Mining operations are conducted through two shafts, Nos. 3 and 9. No. 3 is 9 ft. 10 in. by 6 ft. 8 in. inside and 834 feet deep. No. 9 is 9 ft. 10 in. by 15 ft. 10 in. inside and 1,335 feet deep. Skips operate singly and carry 3 tons ore to a trip. Property is in fine condition and good for a long successful run. Mechanical equipment is powerful efficient and in good running order. It is run by steam and adequate for requirements. There is a fine solid brick-cement “dry” for men. It is provided with a system of shower baths and has metal lockers and much appreciated by the employes. The property has a substantial appearance and looks like a very successful enterprise.

NEWPORT MINING COMPANY.

This company operates in the Gogebic county the Newport and Anvil mines.

L. C. Brewer, General Manager, Chief clerk, R. V. Brewer, Engineer, Frank Blackwell.

In 1908, 972 men were employed and 719,749 tons of ore mined.

Newport is located about one mile Northeast of the town if Ironwood in Section 24, Town 47 North, Range 47 West, with 320 acres of land. The property now stands among the foremost iron ore producers of the state. It is a fine mine and a good business enterprise.

The management aims to take out of the property the very best there may be in it in the most practical and economical way and the success achieved is indicated by the steady growth in the mine’s producing capacity from year to year. Efficiency is reflected all over the property and nothing seems to be neglected or overlooked.

The product is now recovered through two shafts; one is 5 ft. 8 in. by 12 ft. in dimensions and 2,100 feet deep; the other is 6 ft. by 16 ft. and 1,820 feet deep.

At this mine a new steel frame shaft is being sunk as rapidly as possible with a view to good work and economy. The newer finds of excellent ore at depths of about 2,000 feet in the East end of this mine have been known for a long time and this shaft is being sunk to

develop them for extensive mining. It is 28x8.5 feet and contains five compartments, four skipways and a pipeway. From the collar down to and into the solid rock, the shaft will be lined with concrete and made especially permanent. It is not expected that much ore will be lifted through the shaft, if any, before early in 1909. This shaft is now 1,400 feet deep. Underground workings are in the best sort of condition and the product is recovered the best way for getting the best results. Tram cars are operated by electricity and works very successfully. Skips operate in balance and lift 4 and 5 tons of ore to a trip. 350,000 lineal feet of round timber and 2,000 cords of laging are consumed annually in mine work, and no reasonable expense is spared to make the mine safe for working in. The mechanical equipment is highly efficient, in first-class running order and doing the best of service.

The mine is in a prosperous condition skillfully managed and economically operated.

Mining Captain, John Clemens.

ANVIL MINE.

This mine is located in the northeast corner of Section 4, Town 47, Range 46, with 160 acres of land. It is about one mile S. E. of the town of Bessemer. P. O. address, Ironwood, Mich.

In 1908 the mine employed 135 men, operated 10 power drills and produced 57,662 tons of ore.

Operations are conducted one shaft 1,300 feet deep. Developments underway is shaft sinking and drifting. The product is trammed by hand labor, and skips operate singly lifting 2 tons to a trip. The physical condition of the mine is first rate. Shafts are substantial and in good running order and connected at various points enabling men to pass from place to place when desired or in case of emergency. Air circulates freely through the workings and they are cool and comparatively comfortable, as mining goes, for working in. The management is progressive and everything in and about the property appear to be running smoothly and successfully. Mine building and power houes are well located. William Rowe, mining captain.

IRONTON MINE.

The Ironton is operated by Corrigan, McKinney and Company. G. S. Barer, superintendent; head mining captain, George Buzzo; H. Dietz, engineer; chief clerk, A. R. Kohlmetz. P. O. address, Bessemer, Mich.

Ironton is located Southwest of Bessemer in Town 47, Range 46, with 320 acres of land. The mine has solid merit and forms a fine business enterprise. The management is progressive, up-to-date, know the mining business thoroughly and do it in the right way to get out of the property the best there is in it.

Last year the company employed 325 men operated 20 power drills and produced 175,523 tons of ore. A new 35 drill capacity air compressor was installed and 35 dwelling houses completed it.

The ore body mined is a soft Hematite forming a deposit lying on the footwall side 300 feet long. Analysis of ore mined; Iron 60.00 per cent and phosphorus .050 per cent. Mine is operated through two active shafts, 5x16 feet and 6x10 feet inside measurement. No. 3 shaft is 1,100 feet deep. No. 4 is 1,150 feet deep. Skips operate in balance and carry 3 tons of ore to a trip. Opening work done in 1907 included shaft sinking 200 feet and drifting in new ground 4,000 feet. Levels underground are connected at different points and ventilation is good. Daily capacity of the mine is about 1,000 tons. Product of ore comes from the 9th, 10th, 11th and 12th levels. Tram cars are operated by electricity and highly appreciated by the men. Management is capable and aims to get out of the property the best there may be in it and in the most practical and successful way. The mine is opened on up-to-date methods and operations are conducted economically. The “subbing” method is used for taking out the ore, and in doing the work of the mine, about 7,000 pieces 6 ft. to 10 ft. by 7 in. timber are consumed annually. Underground developments and mechanical construction have been continuous for some time and the property is surely broadening out for an increased output and improved results. The mine plant is actuated by steam power and the equipment includes a 5 ft. two-drum hoist, a 12-drill capacity air compressor and the usual auxiliary machinery and well equipped shops for doing the work of a well appointed mine.

Ironton mine is in much better condition today than one year ago. The ore body continues in depth to show good size and quality. The 13th level has been opened up during the year and sub-drifts extended. On this level, a north ore body has been located and shows promise of developing into a deposit of considerable size. The property is ably managed and in a prosperous condition. Everything appears in good, physical condition and running successfully.

COLBY MINE.

This property is operated by Corrigan, McKinny & Co., also and referred to at some length in connection with the Menominee mines under its control. Colby is a substantial mine with a very creditable record. It is just South of the town of Bessemer and adjoins the Tilden mine on the West. Lands are situated in Section 16, Town 47, Range 46, with 160 acres. P. O. address, Bessemer, Mich. Superintendent, G. S. Barber, head mining captain, Wm. Crowgey; chief clerk, A. R. Kohlmetz, engineer, I. J. Carmichael.

In 1908 the number of men employed was 300 with twenty power drills in service. The product of ore was 88,313 tons. Ore body is a soft, red Hematite running 60.00 per cent Iron and .050 per cent phosphorous.

Operations are conducted two shafts. No. 1 is. 1,610 feet deep while No. 2 is 1,640 feet deep.

A 25-drill capacity air compressor is in operation and tram-cars are operated by mule power. "Back-stoping" system is used for taking out the product and it is just the thing for recovering such a deposit. About 300,000 feet of timber are consumed annually in the mine work. The employes are provided with many privileges and advantages by the management that help to make their home life comfortable and pleasant. The mine equipment is highly efficient, in good working condition and adequate for present requirements. It includes a 14-ft. 2-drum hoist, a 25-drill capacity Rand compound compressor, besides auxiliary machinery and well equipped shops for doing the repair work of the mine. The property is in fine physical condition and looks good for many more years of successful operation.

YALE MINE.

This mine is operated by the Lake Superior Iron and Chemical Company, William Wilkins, Ashland, Wis., general manager; J. D. Shea, superintendent and mining captain. P. O. address, Bessemer, Mich.

Property is located at Bessemer, Gogebic County, Mich., and has 80 acres of land in Town 47 North, Range 46 West.

The mine is practically a new one, having made its first product in 1901.

In 1908 the mine employed 60 men and produced 20,078 tons of ore. Besides making this product a heap of practical work was completed and the physical condition of the property much improved. The mine is opened and developed through one shaft, 5 ft. 2 in. by 8 ft. 10 in. and 1,678 feet deep. Product comes from the 17th, 18th and 19th levels and openings in the ore bodies run as much as 500 feet in length. “Back-stoping” is used for taking out the product and about 40,000 lineal feet of timber is used annually in mine work. Opening work last year included driving 2,562 feet in ore, 918 feet in rock, besides sinking shaft 225 feet. The property is well managed and appears in a prosperous condition. During 1907, a new hoisting engine was installed, which increased the efficiency of the mine plant.

Equipment includes hoisting plant, 6-drill capacity air compressor, pumping outfit, and supplementary fittings adequate for requirements and the mechanical equipment is run by steam power. Machinery is in good running order and doing full duty.

EUREKA.

CASTILE MINING COMPANY.

This company operates the Eureka, Castile and Asteroid mines. The Eureka is located between the Mikado and Anvil mines at Ramsey about two miles Southeast of the town of Bessemer in Sections 12 and 13 in Town 47, Range 46 and owns 120 acres of land.

Geo. H. Abeel, general manager; Charles J. Jones, superintendent; J. F. Rumagge, chief clerk; John Martin, mining captain; J. W. Weldon, engineer; Postoffice address, Ramsey, Mich.

Eureka is gradually developing into a substantial mine and establishing a new record. Some very good people are of the opinion that this property will show up to much better advantage with greater depth and added developments. The mine is now being opened up and developed on systematic and practical lines for energetic operations and the indications for making a successful mine are considered first-rate. In 1908 this mine employed 211 men and shipped 122,324 tons of ore.

Mine equipment embraces a 12-drill capacity air compressor, three 72x18 in. boilers, one 20x42 in. Sullivan hoisting engine and buildings adequate for present requirements.

CASTILE MINE.

This mine is located between Eureka and Mikado mines with 320 acres of land on the strike line of the iron ore formation on the Gogebic range in Sections 12 and 13, Town 47 and Range 46. Mine location is just Northeast of Ramsey.

Castile is practically a developing proposition with the work well in hand and making fair progress. In 1908 the mine employed 32 men and produced 1,903 tons of ore.

Mine equipment includes a 2-boiler hoisting plant, an air compressor, besides miscellaneous buildings, which are adequate for present requirements. Machinery is running smoothly and everything in and about the mine seems to be in good order. Location has a good appearance and the business affairs of the company are dispatched promptly and efficiently.

Mining captain, John Danielson.

PICKANDS-MATHER & CO.

On the Gogebic Range, this enterprising company operates the Mikado, Brotherton, Sunday Lake and Pike mines. This company is referred to at some length in connection with the Menominee Range properties.

General manager, C. H. Munger, Duluth, Minn.; general superintendent, C. E. Walton; engineer, A. L. Smith;

chief clerk, Theodore Dalnodar. P. O. address, Wakefield, Gogebic County, Mich.

MIKADO MINE.

This mine is located on the Gogebic Range about three miles East of the town of Bessemer in Section 18, Town 47, Range 46 and owns 160 acres of land. The mine is a substantial producer, has solid merit and is making a very creditable record.

In 1908 there were employed at this mine 125 men and a product of 86,617 tons of ore produced. Besides making this output a good deal of sound, practical work was accomplished.

Ore produced is a high grade Bessemer, running about 58.00 per cent iron and .245 per cent phosphorus. In any kind of market there is always a demand for these ores.

The mine is opened up and developed through one shaft divided into two compartments and 7x16 feet in dimensions and about 1,000 feet deep. Ore bodies look first-rate and the physical condition of the underground workings shows steady improvement. It is opened and developed on modern methods of mining and economically operated. Or bodies developed are large and robust in character. The circulation of the air in the underground departments is good and the producing points are comfortable for working in. Method used for recovering the ore is "subbing." Tram cars are operated by mules and lift two tons of ore to a trip. Two levels are extended from shaft and the product comes from the 12th level. Opening work finished during 1907 embraced sinking shaft 100 feet, drifting 1,000 feet and crosscutting 100 feet.

The general equipment of the mine is adequate for requirements for a considerable time. Everything in and about the property is in good running order. James Coole, mining captain.

BROTHERTON MINE.

This mine is located northeast of the town of Wakefield in Section 9, Town 47, Range 45 and adjoins the Sunday Lake mine on the northeast. Property consists of 220 acres well located within the iron belt.

In 1908 the number of men employed was 150 with six power drills in service. The product of ore mined was 96,775 tons.

The ore mined is a red Hematite running 58.47 per cent iron and .029 per cent phosphorus.

The mine is opened up and developed through two working shafts each 7x14 feet in dimensions, double compartment and 1,080 feet deep. One air compressor is operated and progress has been substantial and continuous. Shafts are substantially constructed, in good running order and doing satisfactory service. The ore is trammed by hand labor, dumped directly into skips and hoisted to surface. Shafts and levels are connected underground and air circulates freely through the workings. No effort is left undone to make the mine safe and secure for taking out the product and 2,000 sets of timber are consumed annually in the mine work. Ventilation is good and the mine is comfortable for working in. The underground department is opened up and developed on practical lines and different levels contain substantial ore bodies of distinct values. Product is recovered through the best method for bringing the most satisfactory results. Physically, the mine is in good condition. The mechanical equipment is in good running order. Property is well managed and economically operated.

James Jones, mining captain.

SUNDAY LAKE IRON CO.

This mine is located just northeast of the town of Wakefield in Section 10, Town 47, Range 45, and own 320 acres of mineral land, adjoining the Brotherton on the northwest. Company mines a Hematite ore running 59.33 per cent iron and .025 per cent phosphorus. The mine has been operated for many years and has been a steady producer of a fine grade of ore.

Last year this mine employed 165, worked six power drills and produced 111,241 tons of ore. Besides making this output of ore a heap of practical developing work was accomplished.

The mine is opened up and developed through two working shafts, 7x16 feet in dimensions, two-compartment and 1,080 feet deep. Shaft connections are affected on different levels and in turn are connected by raises or winzes and form quite a network of underground openings that efficiently ventilate the workings and makes them cool and airy. In a cool, airy mine, men can always do a good day's work. No reasonable expense is spared in making the mine safe and solid and 1,500 sets of timber are used annually in the work. The "subbing" method is used for taking out the product. Tram cars are operated by hand labor. Skips operate singly and carry 1½ tons to a trip. Product of ore comes from the 18th and 19th levels. Ore body is reported rather small and irregular. It will likely improve at greater depth, as the future prospects of the mine are reported good.

Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most business-like way. The work is readily and economically done. Mechanical equipment is in good running order and includes hoisting plants, a 15-dirlls capacity air compressor besides supplementary appliances and additions adequate for requirements.

Also a complete pumping outfit and workshops conveniently located.

John Trudgeon, mining captain.

PIKE MINE.

Pickands-Mather & Co. have added the Pike to their Gogebic holdings. The property lies near the Brotherton mine and quite likely the product recovered by both mines comes from one and the same ore body. This mine is located in Section 9, Town 7, Range 45, adjoins Chicago property on the east and borders on the Sunday Lake, and consists of 80 acres of land.

Last year the mine employed 67 men and produced, besides doing considerable development work 24,900 tons of ore.

The property contains a considerable deposit of ore and is believed by many good people to have a bright future. Better things are predicted for it. The property combines a producer of ore and also a development proposition. The management is conducting development work on practical lines and for better and bigger results. Underground openings are developed the best way for getting the most satisfactory results.

Development work underway is crosscutting to ore deposit to develop fresh reserves. Property is well managed and economically operated. Equipment includes hoists, pumps, a six-drill capacity compressor and workshops conveniently located for economical and efficient service.

Mining Captain, A. S. Johns.

MICHIGAN BLAST FURNACES—PIG IRON OUTPUT.

According to reports received at this office, eight Blast Furnaces were operated making Pig Iron in Michigan during 1908.

This number compares with ten operated in 1907. The 1908 output was 142,744 tons as against 292,897 tons reported for the previous year. As compared with the number of tons made in 1907 the output of last year fell off something over one-half which shows quite a material shrinkage.

Following are the Furnaces operated, showing the number of men employed and tons of Pig Iron produced at each plant.

PIONEER AND CLEVELAND-CLIFFS IRON COMPANY.

Geo. A. Garretson, President; William G. Mather, Vice President; Fred A. Morse, Treasurer; E. V. Hale, Secretary; Austin Farrell, Supt.

	Men	Tons Pig Iron
Marquette furnace	82	20,083
Gladstone furnace	69	29,135
Total		49,218

LAKE SUPERIOR IRON & CHEMICAL COMPANY.

E. H. Flynn, President; W. G. Sharp, Vice-President; W. H. Krinkle, 2nd Vice-President; John Christian, Secretary; W. G. Smith, Treasurer; C. F. Fraser, Asst. Treas.; Fred Smith, Superintendent.

	Men	Tons Pig Iron
Manistique Furnace	73	9,061
Newberry, idle	4	
Boyne City	91	17,923
Elk Rapids	47	9,933
		36,917

ANTRIM IRON COMPANY.

T. J. O'Brien, president; J. C. Holt, secretary-treasurer; N. M. Langdon, manager; Postoffice address, Mancelona, Mich.

In 1908 this company employed 100 men and produced an output of 22,885 tons of Pig iron.

MITCHELL-DIGGINS IRON COMPANY.

Jos. C. Ford, president; W. W. Mitchell, vice president; Edward Fitzgerald, secretary; Delos F. Diggins, treasurer. Postoffice address, Cadillac, Mich.

The 1908 output for this furnace was 7,949 tons Pig iron, average number of men employed 75.

This plant out of blast first nine months of the year.

THE SPRING LAKE IRON COMPANY.

J. C. Ford, president and treasurer; Postoffice address, Fruitport, Mich.

This company reports an output of 25,775 tons of Pig iron for last year with an average of 75 men employed.

RECAPITULATION.

Company.	Tons.	Names and address of manager.
Pioneer	49,218	Austin Farrell,..Marquette, Mich.
L. S. Iron & Chemical Co...	36,917	Fred Smith,.....Boyne City, Mich.
Antrim Iron Company	22,885	N. M. Langdon,..Marcelona, Mich.
Mitchell-Diggins	7,949	J. C. Ford,.....Cadillac, Mich.
Spring Lake	25,775	J. C. Ford,.....Fruitport, Mich.
	142,744	

These companies produce by-products in connection with Pig iron.

THE COPPER INDUSTRY.

Copper to-day is an actual necessity of civilization and ranks along with iron, coal and steel in point of usefulness. It forms not only one of the great indispensable products of the earth but one of the most useful and valuable. In this age the nations of the world could no more carry on their business without copper than they could without iron, steel, coal or any other indispensable product. The business for the metal is not confined to any country or people but is world wide and stretching out into all quarters of the globe. Its universal use is only a question of a few years. The world must and will be electrified and copper is the electrician's metal. Through temporary depression of general business such as has been experienced since the panic of the latter part of 1907 its consumption may show a slackening tendency but the universal mercantile need of copper is much greater now than in any former period known in the history of applied mechanics.

The time may not be very remote when a demand for supplies will again spring up and tax every operating Company, in the country, to meet.

Business is picking up all over and the consumption of practically every metal and mineral product is on the increase. There is but little doubt but what the country is entering upon a period of greater prosperity than the American people has ever known. A glance over our mineral production for twenty years furnishes abundant encouragement for it has more than quadrupled in two decades. In 1885 the product of copper in the United States was about 75,000 tons. Twenty years later, in 1908, it was about 420,000 tons showing an increase of 550 per cent.

The Bureau of the Census report gives $5,000,000 as the total electrical investment for the United States on January 1, 1908.

The Bell telephones lines furnishes an excellent example for illustrating the growth of the electrical business. These lines increased, so it is reported, from 320,000,000 pounds in 1905 to 375,000,00 in 1906 and to 430,000,000 in 1907 and they will soon reach a billion pounds. While the industry has increased at an astounding rate it is still in its infancy and on the road to enormous proportion.

As an instance of electrical expansion in other countries than the United States, Germany in 1908, consumed 432,212,800 pounds of copper as against 358,886,080 for the previous year. England, 301,262,080 as compared with 267,862,680 pounds for 1907.

When the era of long distance electric power transmission opened a little more than 10 years ago the United States product of copper was about 500,000,000 pounds now its mines are on a billion pound basis with the era of railroad electrification just begun. Already many of the great railroads have began the work of elctrification and orders for supplies have been placed running into the hundred of millions of dollars.

The foreign business in the metal have been uniformly good throughout the year and it continues so still. Exports from American ports were heavy exceeding those of any previous year. The amount exported in 1908 was 639,066,240 pounds as against 511,156,400 pounds for the previous year.

At this time it is impossible to give the exact amount of copper produced in the United States during 1908 but the people in the business place it at 930,000,000 pounds as against 868,996,491 for 1907.

The average price of Lake copper in New York was 13.434 cents per pound. That of electrolytic was 13.259 cents and casting copper, 13.006. General average price of copper in 1908 was 13.233 cents per pound in New York.

L. C. Gratton of the United States geological survey has the following in regard to the production of copper in this country during the year 1908:

To the copper industry of the United States, the year 1908 was a period of gradual recovery from the severe depression suffered in the last part of 1907. Many companies that had curtailed or even suspended production in that year again to increase output practically at the opening of 1908, and in spite of the low price of the metal, nearly all the important producers of 1907 were in operation throughout most of 1908, and a few new companies began production during the year. The rate of production has been steadily increasing, and is now greater than at any other time in the history of the industry.

Stocks of refined copper are still undoubtedly very large. Domestic consumption of new copper will show a decline from the 485,000,000 pounds of 1907. The prospect is bright at the present for a still larger copper production in the year 1909, but it is evident that the principal producers will, more than in recent years, gauge their operations by the consumption of the metal, which can not at this time be safely forecasted.

Aron Hirsch & Sohn, Halberstadt, Germany, in their annual statistical publication gives 734,545 tons of copper as the world's production for 1908 as against 702,044 tons in 1907 an increase of 52,501 tons.

World's consumption of copper in 1908, 724,134 tons as compared with 702,044 tons for the previous year, an increase of 26,108 tons.

Excess of 1908 world's production of copper over consumption, 10,411 tons.

The world's stocks of copper at the beginning of 1909 they estimate as follows:

United States	61,128	long tons.
England	40,961	" "
France	5,366	" "
Rotterdam and Holland.....	3,000	" "
Total	110,355	

The world's stock at normal times may be assumed as 40,000 tons.

Accumulations at the beginning of the year shows an excess of 70,000 tons over normal times, which is less than one-tenth of the world's production.

World's production of copper for four years, long tons:

1905	1906	1907	1908
701,252	712,000	710,000	714,464

United States production for three years, in pounds:

	1906	1907	1908
Alaska	8,695,646	7,034,763	4,800,000
Arizona	262,566,103	256,778,437	274,800,100
California	28,153,202	33,696,602	27,750,000
Colorado	7,427,253	13,998,496	10,166,370
Idaho	8,578,046	9,707,290	10,080,506
Michigan	229,695,730	219,131,503	222,917,568
Montana	294,701,252	224,263,780	244,446,438
Nevada	1,090,635	519,694	11,145,381
New Mexico	7,099,841	10,140,140	7,099,940
Utah	50,329,110	66,418,370	73,448,438
Other States*	20,569,489	27,797,092	50,122,918
	917,805,682	868,996,491	936,777,659

*Include Georgia, North Carolina, Tennessee, Missouri, Massachusetts, Vermont, Oregon, Washington, Wyoming and Texas.

Exports of copper from the United States for four years, in tons:

1905	1906	1907	1908
239,863	205,460	228,185	294,226

Foreign visible supply on the first of January for four years:

1905	1906	1907	1908
16,734	12,983	16,924	55,677

Following are the highest, lowest and average prices of copper covering a period of ten years:

Years	Low	High	Average
1899	13.25	19.24	17.76
1900	16.00	17.25	16.65
1901	13.00	17.00	16.72
1902	11.00	13.50	12.16
1903	12.00	15.50	13.70
1904	12.25	15.50	13.27
1905	14.75	20.00	15.70
1906	18.00	25.00	19.50
1907	11.75	26.50	20.66
1908	12.00	14.63	13.23

MICHIGAN COPPER INDUSTRY IN 1908.

Based on the amount of copper produced, the Michigan copper industry, had a successful year in 1908, one of the best, but based on the amount of money earned and dividends paid it had no better than an average year. Except in 1906 when production was greatly stimulated by exceptionally high prices for the metal the 1908 output of copper, produced by the Michigan mines, was a record one and only 1,490,291 pounds less than that of 1906, the banner year.

While the product of copper fell off somewhat as compared with the 1906 output, yet a larger tonnage of ore or copper rock was mined and treated at the stampmills during 1908 than there was in 1906 ore in any previous year in the history of Lake copper mining.

Last year's product of refined copper was 222,917,568 pounds as compared with 220,117,892 pounds for 1907, 224,407,859 for 1906 and 217,762,382 pounds for 1905.

Ten years ago, in 1898, the Michigan product of copper was 147,965,738 pounds. In the decade the gain figures up 74,951,830 pounds and better than 33⅓ per cent.

In Houghton county the number of men employed on an average was 17,224, in Keweenaw county, 2,060, in Ontonagon county, 906. In the three counties, 20,190, as compared with 21,014 for the previous year.

Michigan copper is recognized the world over as the best brand produced and unless general business is extremely bad it finds a ready market at the highest prices going.

Very largely on account of the low prices received for the metal the amount paid in dividends by the companies during 1908 was but $5,478,640 as compared with $13,409,950 paid during the previous year. In this matter, however, Michigan mines fared no worse than the copper mines worked in other parts of the country and upon the whole, perhaps, not so bad.

Iron has been aptly styled "A prince or a pauper." With almost equal appropriateness this social distinction might be applied to copper but not to the copper industry of Michigan for whether the price of the metal happens to be high or low Lake copper mines are worked with splendid energy and at practically normal capacity.

Worked in this very sensible way, as a whole, the physical conditions of the properties are maintained in a high state of efficiency and the mines are always ready to send out a product. Men are not laid off and taken on spasmodically as the price of the metal swings upward or downward bringing embarrassment on the employes, the bulk of which usually falls on women and children.

VARIATIONS IN PRICE.

In March, 1907, copper sold as high as 26¼ cents per pound with supplies in great demand by consumers. Indeed so urgent was the demand for supplies that buyers even offered to pay premiums for "hurried up" deliveries of booked orders. Seven month later, in October, similar brands of copper sold as low as 12½ cents a pound with producers glad to get the price. In this brief period the domestic market slumped from unparalleled activity to a state of actual paralysis. Such a condition of affairs, however, is entirely out of joint with our American energy and enterprise and in the very nature of things could not last long. From that time to the present the condition of the copper business has been one of gradual recovery. The world has got to be electrified and copper is the only metal that can be used to do the work successfully. General business is picking up in a wholesome manner and the volume of trade is

again reaching large proportions. Electrification of railroads, entering cities, goes on apace and orders for supplies in which copper is largely used are rapidly increasing in number and in size. Preparations are underway for a tremendous business in copper supplies and the time is not far distant when consumption of the metal will be going at a rate that will tax the producing capacity of the country. During the next ten years or so copper will be a larger element in commercial development than it has ever been in the past.

Lake copper mines are operated with rigid economy and splendid ability. Future requirements are anticipated and provided for in advance of actual necessities. Upon such details depend the success of Michigan mines. Compared with the copper bearing beds worked profitably in any other part of the world the best of the Lake copper mines are poor and low grade. Even Calumet & Hecla, with its unequalled record for dividends paid, is mining a hard belt that yields but two per cent copper or forty pounds to the ton of rock treated. In 1908 there was treated at the Lake Superior stamp-mills about ten millions, five hundred tons of ore or copper rock.

From this enormous rock tonnage there was recovered 219,340,000 pounds of copper or about 21 pounds to the ton of rock treated.

Lake managements are up-to-date, progressive and conduct general operations in a practical, business-like way. Although the price of copper was low during 1908 yet in this year there was spent fully two millions of dollars for new construction, exploration and general improvements. As a result the positions of Michigan mines have been strengthened and improved in practically every working department. Physically the mines were never in better trim than they are at he present time and the future outlook for them could hardly be any better, the price of copper, the only contingency.

CALUMET & HECLA.

Calumet & Hecla, the foremost copper mine in the world and from a multitude of standpoints always extremely interesting, had in 1908, all things considered, a year of wonderful success and progress the value and importance of which will require years to fully realize and comprehend in a commercial way. While the company's product of copper was not a record one, still it was substantial and more than was the total output of the Lake copper district 22 years ago, in 1886.

Four quarterly dividends of $5.00 each were paid making $20.00 per share and $2,000,000 for the year. Since beginning the payment of dividends the company has distributed to stockholders the enormous total of $107,860,000 or over forty-three times its capitalization.

For the calendar year 1907 the company's product of copper was 88,000,000 pounds, for the fiscal years 1907-8 it was 78,940,466 pounds. Physically the great mine is in the pink of condition and in spite of pessimistic rumblings will be making copper for the general good when a few of the younger mines will have been forgotten.

Osceola had a record year and produced 21,250,794 pounds of copper as compared with 20,472,459 produced in 1904, its previous banner year. Dividends paid from earnings of 1908 amounted to $596,900 or $6.00 per share. Total dividends paid to date $7,612,550 or nearly three and one-half times the company's capitalization. Physically the mine is in better condition today than ever before and is being developed along lines that must lead to bigger and still better results than anything hitherto obtained.

Quincy also had a record year in the amount of copper produced and from a business standpoint a most successful one—such a one as stockholders should appreciate. The annual product of copper was 20,600,361 pounds as against 19,796,058 pounds for the previous year. Dividends paid $4.50 per share and $495,000 for the year. Total amount paid to date in dividends, $18,560,000.

In the amount of copper produced Baltic and Champion mines of the Copper Range Consolidated made record product while Trimountain had the smallest since 1902 which was 5,732,160 pounds against 6,034,908 for the last year. The combined output of Baltic, Champion and Trimountain in 1908 was 41,546,525 pounds. Baltic's product was 17,724,854 pounds, Champion's 17,786,763 pounds. Four quarterly dividends of $1 each were paid amounting to $1,536,740. Total dividends paid to date by Copper Range Consolidated, $9,214,415.

Wolverine's annual output of copper varies but slightly from year to year. The product of 1907-8 was 9,356,123 pounds as compared with 9,372,982 pounds for the previous year. Dividends paid amounted to $600,000 or $10 per share. Total paid to date $5,400,000. Since the beginning of opperations the "Little Calumet & Hecla" has paid $90 per share to stockholders.

BUT SEVEN PAY DIVIDENDS.

Mohawk's product of copper for the year was 10,295,881 pounds as compared with 10,107,266 pounds for 1907. Amount of dividends paid was $2.50 per share aggregating $250,000. Total dividends paid to date $1,650,000. These include all the lake copper mines that succeeded in paying dividends during 1908. Of the 37 mines worked but seven managed to earn and make returns to stockholders. Ahmeek will be next to enter the ranks of dividend payers. The mine is making a fine record and the god things predicted for the property will be forthcoming in due time. Ahmeek's product of copper last year was 6,280,241 pounds as compared with 5,510,985 pounds for 1907. Other mines and developing propositions are worthy of favorable remarks

but space here forbids at this time. In my forthcoming report all are referred to in their proper order.

During the year under review copper mining companies had a strenuous season but the worst is over and better times are ahead for them. The price of copper at this writing is 13¾ cents per pound. One year ago this time it was 12½ cents a pound with buyers very indifferent regarding loading up with supplies. But copper business is picking up nicely. Consumption of the metal is increasing and there is an improved demand for supplies. During May month the accumulated stock of copper in producers' hands decreased over 13,000,000. This reflects a healthy state of affairs and is but a forerunner of what looms up in the future. The keenest financiers of the United States and Europe have been discounting the future for some time and they are now frank in expressing the belief that the nations of the earth are almost on the threshold of all-around better times.

LAKE SUPERIOR COPPER PRODUCTION.

	1908	1907	1906	1905
Calumet & Hecla...	82,549,790	88,000,000	95,000,000	82,500,000
Quincy	20,600,361	19,796,058	16,194,838	18,827,557
Osceola	21,250,794	14,134,753	18,588,451	18,938,965
Baltic	17,724,854	16,704,868	14,397,557	14,384,168
Champion	17,786,763	16,489,436	16,954,986	15,707,426
Tamarack	12,806,127	11,078,604	9,882,644	15,924,008
Mohawk	10,295,881	10,107,266	9,352,252	9,387,614
Wolverine	9,356,123	9,272,351	9,681,706	9,729,971
Trimountain	6,034,908	8,190,711	9,507,933	10,476,462
Ahmeek	6,280,241	5,510,985	3,077,507	1,552,957
Franklin	3,703,421	4,401,248	4,368,538	4,206,085
Allouez	3,047,051	2,934,116	3,486,900	1,167,957
Isle Royale.....	3,011,664	2,667,608	2,937,098	2,937,761
Michigan	3,006,206	2,556,365	2,875,341	2,891,796
Centennial	2,196,377	2,373,572	2,252,015	1,446,584
Mass	1,766,930	2,078,677	2,106,739	2,007,950
Adventure	90,870	1,244,874	1,552,628	1,606,208
Victoria	1,290,040	1,207,387	546,334	
Atlantic	16,931		1,393,082	4,049,731
Keweenaw Copper..	108,236			
Tecumseh			58,008	
Miscellaneous		83,200		75,000
	222,917,568	220,117,892	224,407,859	217,762,382

DIVIDENDS PAID BY MICHIGAN COPPER MINES IN 1908.

Calumet & Hecla	$ 2,000,000
Copper Range Con.	1,536,740
Wolverine	600,000
Osceola	596,900
Quincy	495,000
Mohawk	250,000
	$5,478,640

HOUGHTON COUNTY MINES.

The average number of men employed in and about the copper mines of Houghton County during 1908 was 17,224, which compares with 17,509 employed during the previous year.

NORTH OF PORTAGE LAKE.

CALUMET & HECLA MINING COMPANY.

In my previous reports Calumet & Hecla has been described at considerable length and in detail and anything may further state, touching the property, will be largely a repetition of what I have before written.

Calumet & Hecla Mining Company is capitalized in $2,500,000 with 100,000 shares of par value $25.00 each.

Alexander Agassiz, president; Col. T. L. Livermore, vice-president; Quincy A. Shaw, Jr., second vice-president; Rudolph L. Agassiz, third vice-president; preceding officers, Francis L. Higginson, Francis W. Hunnewell and James MacNaughton, directors. George A. Flagg, secretary-treasurer; James MacNaughton, general manager; Will A. Childs, second assistant superintendent; W. M. Gibson, third assistant superintendent; Thomas Soddy, superintendent motive power; F. S. Eaton, chief clerk; E. S. Grierson, chief engineer; John Knox, chief mining captain; Henry Fisher, assistant mill superintendent; James B. Cooper, smelter superintendent at Lake Linden; Morris B. Patch, smelter superintendent at Buffalo; Hon. Chas. Smith, chief mill and smelter clerk at Lake Linden works.

Main office, 12 Ashburton Place, Boston, Mass.

Mine office, Calumet, Houghton County, Mich.

Mill office, Lake Linden, Houghton County, Mich.

Smelter office, Hubbell, Houghton County, Mich.; 1 Austin St., Buffalo, New York.

Calumet & Hecla is the first copper mine in the Lake Superior copper district, perhaps in the world, and forms one of the solid, substantial mining enterprises in the State of Michigan and is the mainstay and suport of the town of Calumet. From the start, the property has been a decided success and no mine has a better record. Its management is up-to-date, progressive, practical, among the best going and the affairs of the company are dispatched with distinct efficiency and exact knowledge. In 1908, again a heap of new work, practical and of the right kind was done, which resulted in maintaining the high state of efficiency obtained in every working department of the mine.

MAIN WORKINGS.

The main workings of the company are at Calumet and there are 5,000 names on the pay-roll. There, the Calumet conglomerate is vigorously worked, the Osceola amygdaloid moderately so, and the Kearsarge amygdaloid undergoing development. The Calumet conglomerate is a unique deposit and richer in copper contents than any other belt mined in the Lake district. It is made up of sand, pebbles, boulders and copper cemented together. In some primeval age, it was a sea beach or the bed of a vast body of water. In the deepest openings of the Calumet and Hecla or Tamarack, from one or two miles below the earth's surface, pebbles and boulders, worn as smooth and rounded as those on the shores of Lake Superior, are found and apparently identical with them. Copper fills in the interstices that once existed betwen the boulders and pebbles and comes out in every conceivable form and shape. In some instances where the pebbles forming the lode are fine and small, the copper is formed infinitely more beautiful and delicate than the richest and finest piece of lace work. Occasionally, copper boulders are found, generally on the footwall side, varying from the size of a man's head to that of a goose egg. Many are formed almost solidly of pure copper, while others are simply copper shells enclosing decomposed porphyry.

The conglomerate dips to the northwest at an angle of 37½ degrees from horizontal. It averages about 14 feet wide and yields about 32 pounds of copper to the ton treated. It is mined through nine active shafts—eight incline, sunk in the lode, and one vertical—the Red Jacket shaft. For convenience, the workings are divided into four branches: Calumet branch, Hecla branch, South Hecla branch and Red Jacket shaft branch. Each branch is quite a complete mine in itself. South Hecla embraces shafts Nos. 11, 10 and 9—a double one—and 8, and takes in the complete south end of the conglomerate carrying copper in paying quantities. No. 11 is the southernmost one in commission. Reserves of ground tributary to it are limited, but No. 10 and No. 8 are fine deep shafts with large reserves yielding the usual values belonging to that quarter. Hecla branch includes shafts numbered 7, 6, 3 and 2 Hecla. This branch is in the heart of the rich deposit and has always been an important producer. From these shafts, millions of dollars' worth of copper have been mined and they still continue to yield the usual quota of the mine product.

Since the commencement of operations the company has paid in dividends the enormous sum of $107,860,000 or over forty-three times the capitalization of the corporation.

The dividend record over a period of years follows:

1890	$20	$2,000,000	1899	$100	$10,000,000
1891	20	2,000,000	1900	75	7,500,000
1892	20	2,000,000	1901	45	4,500,000
1893	20	2,000,000	1902	25	2,500,000
1894	15	1,500,000	1903	35	3,500,000
1895	20	2,000,000	1904	40	4,000,000
1896	25	2,500,000	1905	50	5,000,000
1897	40	4,000,000	1906	70	7,000,000
1898	50	5,000,000	1907	65	6,500,000
			1908	20	2,000,000

No other company can show a better record and the future outlook for stockholders is superb and about all that could be desired with the price of copper the only contingency. During the year under review, the company employed at the highest wages 5,000 men on an average and operated underground somewhere about 300 machine drills. Substantial progress was made all over. Every department appears to be running to perfection.

The management of the Calumet & Hecla is considered as good as there is in the country. The company's affairs are conducted with exacting knowledge. System and order prevails in every department and all over the property. Every branch is in the hands of an expert, who knows his business thoroughly and does it promptly and efficiently.

The continued success of General Manager MacNaughton is reflected all over the property and nowhere more forcibly than in the company's annual reports. So practical, far reaching and fundamental has been the improvements made in the methods of operating the property during the present manager's administration that the most of producing copper has been reduced from about $5.00 to $3.50 per ton of rock treated.

Summary of the operations of the Calumet and Hecla Mining Company, during the fiscal year ending April 30, 1908.

During the past year the Company produced mineral equal to 43,264 ton, 9 lbs. refined copper, as against 46,297 tons 167 lbs. last year. The product of refined copper was 39,490 tons, 466 lbs. In the year ending April 30, 1907, the product of refined copper was 46,949 tons, 963 lbs. The price of copper has varied from 26 cents to 12 cents per pound. It is now about 13 cents.

There have been paid during the past year one dividend of $20, one of $15, one of $10, and one of $5.

The Company has lost the services of Mr. H. W. Cake who died in April. He had been in our employ for nineteen years and Superintendent of the Company's Stamp Mills at Lake Linden for the past five years. During Mr. Cake's term of office the mills were remodelled, and electric power plant and a new boiler plant were installed. The immediate superintendence of this work was most thorough and he showed a high standard of executive ability and great devotion to the interests of the Company.

In several of the previous annual reports, the attention of the stockholders has been called to the unsatisfactory character of the conglomerate below the 57th level in the northern part of the mine. In 1900 the year before Mr. MacNaughton became General Manager of the Company, the conglomerate yielded about 59.93 pounds of copper to the ton. I regret to state that since then this percentage has annually been diminishing. In 1902 it had fallen to 52.44 pounds to the ton. For the past fiscal year its yield was 39.68 pounds. To maintain our

product we have stamped an additional amount of conglomerate rock in addition to the amygdaloid rock mined from the Osceola lode which has been increased from 74,235 tons in 1905 to 603,891 tons in 1907-08. The amount of conglomerate stamped has gradually increased from 1,464,697 tons in 1900 to 1,894,176 tons in 1907-08. Thus in 1907-08 eating into the available conglomerate at a rate far in excess of that we had been accustomed to consider the normal output, plainly shows that your Directors did not seek too soon for an additional source of copper supply to replace that obtained from the waning conglomerate lode. We anticipate a still further reduction in the percentage. During the last five years the cost per ton of rock has been greatly reduced, partially off-setting the decrease in the copper contents of the rock.

The sub-shaft has been extended into the district of the five forties to the 67th level; the quality of he rock has remained as stated in the last report. We have continued to take out the shaft pillars of Hecla Nos. 2 and 3 and of South Hecla No. 11.

On the Osceola lode the openings have been pushed as rapidly as practicable and continue satisfactory. We have continued all the shafts and drifts mentioned in the last annual report and opened No. 18 shaft and equipped it with a boiler and a Lidgerwood engine.

During the fiscal year the Osceola lode has yielded 11,145,220 pounds of copper. We are now producing from it at the rate of over 12,000,000 pounds a year and this is being gradually increased to offset as much as possible the decrease in production from the conglomerate lode.

Two Nordberg engines have been installed at shafts Nos. 13 and 16 and are hoisting with 7½ ton balanced skips.

On the Kearsarge lode we have temporarily suspended work at Nos. 19 and 20; the openings are now limited to sinking No 21 shaft; the character of the lode there is good.

The new foundry has been in commission since last July; from its operation our saving approximates $20 a ton for our castings.

The following construction work is unusually large, but it will decrease operating expenses and effect saving in copper from material now going to waste.

We are placing electric pumps at Calumet shafts Nos. 5 and 6.

The changes on the Man Engine's at the Red Jacket shaft have been completed and the plant has run successfully since last fall.

The work of changing the track of our Railroad to the standard gauge has progressed satisfactorily and it is hoped that the new equipment will be running by next fall. The third rail has been laid except at a few unimportant places. The three new broad gauge locomotives and 150 rock cars have been received; the necessary alterations have been made to the rockhouse bins and mills. An addition of two stalls has been built to the locomative round house.

At the Superior engine house we have taken down two of the drums and the large rope wheel preparatory to installing in the space occupied by them a set of Nordberg compressors of a capacity of about 120 drills.

We are remodelling the Calumet blacksmith shop to install three mechanical drill sharpeners.

We have completed the electric power house plant.

The Calumet mill and sand wheels are now run by electricity, as well as one of the Hecla sand wheels and part of the Hecla mill.

We have completed the erection of the new boiler house at the mills and are preparing to run the electric power plant with its high pressure boilers. All boilers at the mills will be fed with Lake Superior water, and for this an additional 8 inch pipe has been laid from the Mine stand pipe to the Mills.

The building for the regrinding mill has been erected, and the foundations for the Chilian mill built and twelve of the forty-eight mills are nearly ready to be installed. This section of the mill ought to be in operation by the fall. The new 50 foot Calumet sand wheel is on the ground and its erection is underway.

The new Manual Training and High School building is completed and is occupied by all its departments.

No changes have taken place at the Lake Linden Smelting Works since the last annual report.

The only changes made the past year at the Buffalo Smelting Works have been the enlargement of our machine shop and the installation there of a power crane for handling heavy moulds, and the practical completion of the new electrolytic tanks house with a capacity of 20,000,000 pounds of refined copper per annum. We hope to have tanks for half that capacity ready for operation by October.

Under the terms of our option we have acquired 50,100 shares of the stock of the Gratiot Mining Company.

We have abandoned our option on the Pointe aux Mines, Canada, but are continuing the examination of the Mamainse lands. Our exploration work on the Sibley lands near the "Nonesuch" has thus far not been satisfactory. We are exploring the lands to the East of the "Nonesuch" with fair results. In the Treasurer's Report will be found a statement of our holdings in other Mining Companies. For other particulars I would refer to the reports and extracts of reports of these Companies hereunto appended.

The expenditures of the Aid Fund during the fiscal year amount to $65,171.60. The value of the Aid Fund at cost is $125,722.71.

The evidence for a final hearing of the suits against this Company as a shareholder in the Osceola Company,

has been taken and printed. Arguments were heard by the court on this evidence in May. We hope for a speedy decision. The issues in these suits remain unchanged, but the amendment by the Michigan Legislature of the law which limited land holdings of Mining Companies, has made that question important. The continuance of the injunction forbidding the Osceola Company to hold its annual meeting except to adjourn the same until the final decision of the suit of the President of that Company against it and this Company, has prevented the Osceola shareholders from choosing their officers, (although a majority of the shares are held by persons not parties to these suits) and the management has remained unchanged. The annual report of the Osceola Directors for the year ending December 31, 1907, shows a profit of $722,755.04, from which a dividend of $673,050.00 was paid for the first six months, leaving a surplus of $49,705.04. No dividend was paid for the last six months of the year.

For the Directors,

Alexander Agassiz, President.

STATEMENT OF ASSETS AND LIABILITIES.

CASH AND QUICK ASSETS.

Cash at Mine Office	$ 182,070.92
" New York Office	15,000.00
" Boston Office, Exchange, Copper at 13c. Mineral at 7c.	4,488,352.20
Bills and Notes Receivable at Boston and Mine	650,017.92
Development and Equipment Fund	554.29
Insurance Fund	959,724.36
	$6,295,719.69

LIABILITIES.

Drafts in Transit	$ 112,159.37	
Bills, Notes, and Accounts Payable at Boston and Mine	1,225,578.49	
Note of the Keweenaw Association Due Jan. 2, 1909,	250,000.00	
Employes Aid Fund	7,017.10	1,594,754.96
Balance		$4,700,964.73

The Calumet and Hecla Mining Company owns:

42,978 shares of the Allouez Mining Co., of 100,000 shares issued.

46,080 shares Centennial Consolidated M'ng Co., of 90,000 shares issued.

20,000 shares of the Frontenac Copper Co., of 20,000 shares issued.

50,100 shares of the Gratiot Mining Co., of 100,000 shares issued.

160,050 shares of the La Salle Copper Co., of 302,977 shares issued.

18,000 shares of the Manitou Mining Co., of 20,000 shares issued.

22,671 shares Osceola Consolidated Mining Co., of 96,150 shares issued.

50,100 shares of the Superior Copper Co., of 100,000 shares issued.

35,450 shares of the Dana Copper Co., of 40,000 shares issued.

36,400 shares of the St. Louis Copper Co., of 40,000 shares issued.

1,900 shares of the Laurium Mining Co., of 40,000 shares issued.

891 shares of the Seneca Mining Co., of 20,000 shares issued.

For details of the operations of these Companies, I beg to refer to the reports and extracts of reports of these companies hereunto appended.

For the Directors,

GEORGE A. FLAGG, Treasurer.

Boston, April 30, 1908.

OSCEOLA CONSOLIDATED MINING COMPANY.

Capital stock, $2,500,000 in 100,000 shares at $25 each.

Officers: President, Albert S. Bigelow; secretary-treasurer, W. J. Ladd; general manager, Norman W. Haire; general superintendent, Will J. Uren; assistant superintendent, Frank H. Haller; clerk, William Veale; stampmill superintendent, A. L. Burgan; J. T. Reeder, purchasing agent; A. G. Gulberg, superintendent construction and motive power; mining captain, Osceola branch, James Rowe; mining captain, South Kearsarge branch, Frank Lander; mining captain, North Kearsarge branch, Jos. Biscombe. Eastern office, 199 Washington St., Boston, Mass.; general office, Houghton, Mich.; mine office, Opechee, Mich.

Osceola mine forms a fine property with solid merit and has been a substantial producer and dividend payer for many years and in the time to come will pay stockholders more money in dividends than it ever has in the past. It is a better property today than ever before, and it is being developed along lines that will lead to bigger and better results than anything hither-to obtained. There is not much doubt about this. During the past year or two, a great deal of practical work has been done in and about all the branches of the property, which resulted in strengthening the position of the enterprise and that will soon begin to show an increased product and a lowering of operating costs. A year or two is almost too short a period in which to work any great change in the appearance or physical condition of a mine so extensively developed and equipped as the Osceola, but its physical condition all over shows steady improvement.

Osceola is described at some length in my previous reports and whatever I might now state touching the

property would be little other than a repetition of that which appears in the works referred to.

Osceola is today making the best showing of costs in its history. This applies more particularly to the cost as measured against the rock tonnage, although it is almost equally true with respect to the cost of producing a pound of copper.

In order to secure the best results at the stamp mill a large tonnage is necessary. Seven heads at the mill are now dropping, and over 5000 tons of rock daily are being milled. This is equal to about 130,000 tons per month of 26 days. The management has ambitions to bring the monthly tonnage up to 140,000 tons, which is pretty near the capacity of the seven steeple compound stamps.

The average refined copper yield of Osceola rock is not high; in fact, unusually low. The enormous rock tonnage is at the expense of a smaller ingot recovery per ton, but in general efficiency the operating department was never so well organized, and never before has the company been able to show a lower expense for miring, hoisting and stamping a ton of rock.

The sinking of the new North Kearsarge shaft has been a laborious proposition. Quicksands were encountered for the first 150 feet, but now all is serene, and within 12 months this shaft should be giving a good account of itself. The equipment on the surface at this point is the best that money can buy, and in fact a careful inspection of all the Bigelow properties impresses the observer with the fact that great care is being exercised to keep the plant up to date and in position to treat a maximum tonnage at the minimum of expenditure.

The Directors submit the following report of the operations of this company for the year ending Dec. 31, 1908:

Gross value of fine copper produced:		
Sold 19,815,046 pounds at 13.39c.	$2,654,140.02	
*Unsold 1,435,748 pounds estimated at 14.25c.	204,594.09	
Total 21,250,794 pounds		$2,858,734.11
Balance of interest receipts and other income		55,810.20
		$2,914,544.31
Running expenses at Mine	$1,857,079.94	
Smelting, transportation, commissions, and all other charges	234,743.62	
		2,091,823.56
Gross profit from operations		$ 822,720.75
From which deduct:		
Construction expenses:		
New construction at all branches	$145,124.96	
Cash paid for land	490.40	
		145,615.36
Net profit for the year		$ 677,105.39
From which deduct:		
Dividend of $2 a share paid July 29, 1908	$192,300.00	
Dividend of $4 a share paid Jan. 29, 1909	384,600.00	
		576,900.00
Surplus for the year		$ 100,205.39
Balance of assets Dec. 31, 1907		1,386,869.21
Balance of assets Dec. 31, 1908		$1,487,074.60

*Of the above amount there has since been sold up to January 31, 1909, 1,112,008 pounds at 14.54 cents per pound.

Total amount paid in dividends to January, 1909, $7,612,550.

COMPARATIVE RESULTS FOR 1907 and 1908.

	1907.	1908.
Tons rock stamped	811,603	1,241,400
Pounds mineral obtained	18,607,747	26,912,944
Percentage refined copper in mineral	75.962	78.961
Pounds refined copper per ton of rock stamped	17.4	17.1
Product fine copper	14,134,753 lbs.	21,250,794 lbs.
Cost per pound at Mine, excluding construction	10.59c.	8.74c.
Cost per pound construction	0.60c.	0.69c.
Cost per pound of smelting, freights, eastern expenses, commissions, and all other charges	1.25c.	1.10c.
Total cost per pound of refined copper	12.44c.	10.53c.
Cost of mining and stamping per ton of rock stamped	$1.84	$1.50
Gross cost of stamping per ton	17.47c.	15.78c.
Net cost of stamping per ton after deducting profit on custom rock	11.71c.	13.36c.

In the annual report of the Osceola Consolidated just out, General Manager Haire says:

In many respects the past year was the most successful in the history of the Osceola Consolidated mines. It far surpassed all former annual records in the amount of rock handled and in the product of fine copper. Considering the price of labor and materials, the cost of mining and stamping a ton of rock compares very favorably with past achievements in that line. There was a slight decrease from last year in the percentage of refined copper per ton of rock; on the other hand, the smelter gave us a substantial increase in the percentage of refined copper in the mineral.

The gratifying result for 1908 is a culmination of favorable conditions brought about by years of persistent effort in equipping and thoroughly opening the mines on a vast scale.

With No. 4 installation and the shop at Osceola completed in the near future, the surface plant at every branch will be in first-class condition and amply sufficient for heavy operations at great depths.

Underground there are miles of drift stopes opened ahead ready for stoping when required. For the future good of the mines we are still keeping openings far ahead of stoping requirements. All new drifts are extended to the boundaries before extensive mining operations are begun, thus insuring stability to the mines and safer places for our employees to work.

For some months underground openings in the Osceola branch were not up to average for copper values. This caused a reduction in the per cent of mineral in the rock stamped, although the tonnage was the largest in its history. At present a decided improvement is noticeable in the new drifts contiguous to both working shafts. The reserves of copper-bearing ground in this mine are large and have been kept well ahead of stoping requirements. The repairs at No. 6 were completed, and hoisting

resumed, on Feb. 1. Since then, except for a short time in June, both shafts have been continuously in service throughout the year. On surface no further large amounts of construction are deemed necessary for some time in the future, and not then unless we should conclude to sink a new shaft farther south on the lode.

Production of a consistently high tonnage of a good quality of rock and at a low cost of mining has been the record of South Kearsarge for the past year. During the year 12 drifts reached the boundary, leaving only a limited amount of development for the future. This can easily be accomplished in another year, when South Kearsarge thereafter will be merely a stoping proposition—an ideal condition for cheap mining. Some shaft repairs were necessary during 1908 and more will be required from time to time to keep pace with deterioration, but it is not likely that the regular rate of production from this branch will be interferred with for some years to come.

Development in ground contigous to No. 1 and 3 shafts is years ahead of stoping requirements. However, attention has been given to further proving by diamond drilling and drifting of long-abandoned areas near the surface. Good stoping ground has been proved up between No. 1 and No. 3 shafts, heretofore, considered practically worthless. We are extending this exploration into virgin territory with encouraging prospects.

During the last six months of 1908 North Kearsarge Branch established a new high rate of production in quantity and quality of rock. Upon the whole it appears to be in good shape to continue the same on even a larger scale. No. 4 shaft will not be able to help much before June or July, but by the end of 1909 it should be a considerable factor in the monthly production. It has been our aim to make No. 4 shaft fireproof. Wherever possible the construction is of concrete. The lining of the shaft for over 185 feet from the surface is all solid concrete. The latter piece of work was completed Oct. 15. Since that date we have had little trouble with surface water, which had heretofore retarded our progress. Construction at this shaft has necessarily been very heavy for the year. We are now installing at this point a complete, fire-proof, up-to-date plant with high-power modern machinery of sufficient capacity to last for the entire life of the mine.

The amount of rock stamped at the mill aggregated 1,426,339 tons, of which 1,241,400 belonged to Osceola Consolidated and 184,939 to the Ahmeek Mining company. The gross cost per ton for treating Osceola rock was 15.779 cents; deducting the profit made on Ahmeek rock, the net cost was 13.36 cents per ton. It is apparent from the tonnage handled that it ran throughout the year with great regularity.

According to a recent careful survey, the depths on the incline of the several operating shafts on Dec. 31, 1908, were as follows:

Osceola—	
No. 5 shaft	4,456.0 feet.
No. 6 "	4,408.0 "
South Kearsarge—	
No. 1 shaft	2,604.5 feet.
No. 2 "	1,992.5 "
North Kearsarge—	
No. 1 shaft	3,873.5 feet.
No. 3 "	3,192.0 "
No. 4 "	916.0 "

QUINCY MINING COMPANY.

Incorporated by special charter of the State of Michigan, March 30th, 1848. Organized under the mining laws of the State of Michigan, March 6, 1878.

Capital Stock, $3,750,000. In One Hundred and Fifty Thousand Shares of Twenty-five Dollars each of which 110,000 shares have been issued.

Officers: President, Wm. R. Todd; vice-president, Walter O. Bliss; secretary-treasurer, W. A. O. Paul.

Quincy is an exceptional interesting mine, has solid merit and an excellent record stretching back for fifty years. It is one of the most remarkable and successfully operated properties in the Lake Superior copper district and with the sole exception of the Calumet & Hecla, has produced a greater quantity of copper and paid more in dividends to stockholders than any other mine in the three counties of Houghton, Ontonagon and Keweenaw. Although the mine has been continually sending out a product, for so long a period, in the opinion of some very good people not since the pick was first thrown into the ground or the first round of holes blasted, has the mine been more resourceful in mineral wealth or promised better things for the future as well as the present than at the present time. Never before were its reserves of developed ground carrying average values of the lode worked, so great. Of course, it has been working continuously longer than any other mine in the district and to my personal knowledge, its management has been of the best for more than fifty years. And it is quite true that an enormous quantity of the lode has been dug out and its mineral turned to the general good of the human race; its shafts and workings are getting deep—over a mile in depth at the South end and more expensive to operate, yet there is more rock coming out daily now than ever before in the company's interesting history. Moreover, the physical condition of the property is such that the present rock output can be maintained for an indefinite period and a little later on considerably increased with operating costs perceptably lowered.

1908 operations compare with previous years as follows:

	1908	1907	1906
Pounds copper	20,600,361	19,796,058	16,194,838
Gross receipts	$2,796,230	$3,717,500	$3,159,011
Profit	504,160	1,275,151	1,130,530
Cost, including construction	11.2c.	12.2c.	11.95c.

The directors of the Quincy Mining Co., submit the following report of the business of the mine for the year

1908, with statement of the financial condition of the company:

The product of the mine was 32,754,745 pounds of mineral, yielding 20,600,361 pounds of refined copper, for which has been realized		$2,796,230.14
Mining expense	$1,980,867.30	
Smelting, transportation, etc.	175,081.24	2,155,948.54
		$640,281.60
Taxes paid in Michigan		47,909.65
Leaves mining profit		$592,371.95
Interest Receipts	$ 11,550.52	
Hancock real estate receipts	4,482.40	16,392.92
		$608,764.87
Construction cost, at mine	$ 78,763.20	
Construction work, at smelting works	11,098.21	
No. 9 shaft work	14,743.51	104,604.72
Business profits for 1908		$504,160.15
Paid on account purchase of Franklin lands		50,000.00
		$454,160.15

The statement of assets and liabilities in our last report showed a balance on hand,

January 1, 1908		$1,032,204.10
Add net income for year 1908		454,160.15
		$1,486,364.25
Deduct dividends declared payable March 23, 1908	$165,000	
Deduct dividends declared, payable June 15, 1908	110,000	
Deduct dividends declared, payable Sept. 14, 1908	110,000	
Deduct dividends declared, payable Dec. 21, 1908	110,000	495,000.00
Gives balance of assets, January 1, 1909		$991,364.25

A dividend of one dollar per share, or $110,000 for three months ending December 31st last, has been declared, payable March 22nd next, making total amount of dividends from earnings of past year $440,000.

We have recently purchased form the Franklin Mining company their old mine and former mill location for the sum of $170,000, of which $50,000 has been paid in cash, leaving a balance of $120,000 to be paid during the next six months.

Further reference to this purchase is made in the report of the general manager, presented herewith, which also gives a detailed account of operations at the mine during 1908.

Report of General Manager, Charles L. Lawton.

The operations of the Quincy for the year just closed, like those of the preceding year, have been strenuous and successful. Much of the development, construction, and re-construction work, as then planned, has been carried on and completely with satisfactory results. The assurances that were given of averting further unfavorable conditions underground have been fulfilled. The opening work of nearly six lineal miles has developed copper ground that is of about the usual quality; and, although the output of the mine, both in copper rock and ingot copper, has been the largest in the mine's history, the reserves, nevertheless, have been increased.

Sinking has been going on in all of the shafts, and all have proven up average copper-bearing ground.

The Pontiac shaft is sinking in the foot wall, adjacent to the lode, and has an exceedingly auspicious beginning. Not only is good copper rock shown in the shaft itself, about two tons of mass copper having been produced in sinking the last one hundred and twenty-five feet, where the lode bends into the shaft, but in the twentieth level, north of the Mesnard shaft, at a point about seven hundred feet from the projected line of the No. 9 shaft, it has been in good copper rock for upwards of one hundred feet.

The shaft collar, including fifty feet of the shaft has been built of heavily reinforced concrete, with steel fire trap doors.

A temporary equipment has been installed, which consists of one duplex 16x20 Nordberg single hoist, and one 125 horse-power Burt boiler, including with the exception of the shaft rock-house to be erected this month, all other adjuncts necessary for the complete temporary equipment.

Regarding the construction work, the air compressor and boilers that were mentioned in the last report for the No. 8 equipment were installed during the early part of the year, and have been giving continued satisfactory service since that time. More recently, the rockhouse been raised eight feet in height, so as to increase the capacity of the copper-rock bin, which receives the copper-rock direct from the skips, facilitating and economizing the labor of handling this rock in the rockhouse. Heavy backstays were also added to the rock-house, made necessary by the increased height.

The changes in the blacksmithshop and drill shop finally resulted in our remodeling old No. 6 change-house into a steel and iron storehouse, together with a storehouse for coke and coal for the blacksmith shop. A short connecting railroad track was laid, all the stock of iron, steel, coal and coke in the blacksmith shop was removed to this building, which is exceedingly well located and well adapted for the purpose.

On June twentieth, work was commenced on the erection of No. 2 steel reinforced concrete rockhouse, which work proceeded until July first, when the work of razing the old wooden structure was begun. At the same time, the building of the new steel structure, and the work of tearing down the old one to make room for the new, were carried forward until on August twenty-second, when the main portion of the steel rockhouse part was completed. At that time, the building of the new steel shaft-house portion made it necessary to cease all hoisting of copper rock in No. 2 shaft until the twenty-fifth of November.

This loss of three months of time in the hoisting of copper-rock in the No. 2 shaft caused a heavy handicap to the year's output. During the time that copper-rock could not be hoisted, new rails were laid in both skip roads to a depth of over 3,000 feet. The shaft was overhauled and repaired from top to bottom, so that at this time it is in most excellent condition. The new shaft rock house stars off in a very satisfactory manner, having already demonstrated that it is considerably more efficient than any of the other rockhouses, and will fully meet expectations.

No. 7 rockhouse has continued to afford the same efficiency and satisfaction with which it was credited in the report of last year.

The machinery for a saw-mill has been purchased, and the building erected in which it will soon be in a position to do our own sawing of special and odd sizes of timber, such as brake shoes, wedges, pulley blocks, etc., necessary for the operation of the mine.

Seven six-room dwelling houses have been added to the Mesnard and Pontiac location. Thirty-seven dwelling houses were repaired and painted during the year. These houses have long needed such attention, as to other dwellings and buildings about the mine, which will receive like attention the coming season, as fast as conditions about the mine will warrant.

The old No. 7 drill-shop has been turned into a storehouse for the idle mining machinery, pulleys, shaftings, etc., in order that they can be kept under cover and preserved for future use as needed.

The Quincy and Torch Lake railroad now has all its rock-cars remodeled to side-action bottom dumps, and the equipment of automatic couplers and air brakes has been completed. Never has the cost of operating the road been lower, nor have the accidents been fewer, than in the year 1908.

At the stamp mills many real successes have been achieved during the year, and we feel greater confidence in our ability to considerably lessen the stamping cost during the coming year. The twenty-four inch stamp-heads have proven a success, and the recrushing rolls have given encouraging results.

There is much work of reconstruction needed at No. 1 stamp mill to increase its capacity and efficiency. No 1 twenty-four-inch stamp-head has continued in satisfactory operation. A second head was installed, and the third head is nearly completed and will soon be in operation, leaving two more heads to be installed during the year.

One set of crush rolls has been installed at No. 5 head, No. 1 stamp mill. It is expected that four more will be in use during the coming year. To run these, the large 14x36 Allis-Corliss engine from No. 2 rockhouse will be installed. A smaller, more appropriate and less expensive engine has been purchased for No 2 rock-house.

One battery, or one-third of the boilers at No. 1 boiler-house has been equipped with water-tube furnaces similar to those at No. 2 boiler-house.

The official corps about he mines and mills remains the same, as the excellent results in every department attest.

The smelter has done well during the year, and, like the other departments, has made a new record of low cost.

Many minor changes have taken place in the methods to the betterment of the institution, and, if possible, its product. Expense has not been spared in matters affecting the high standard always maintained, and nothing has been done which would in any way impair the well known high quality and reliability of the “Quincy” brand of copper. The mixing of cuprous material from different mines is most scrupulously avoided.

Many improvements, not only in construction but also in the operating department of the smelting works, have been made, and are in contemplation, among which may be mentioned the physical laboratory.

A complete set of machinery and apparatus for testing the electrical conductivity of the copper, and to prepare samples for chemical analysis if the various materials which are handled at the smelter, has been installed.

All our analysis are now made of dry samples. The old wet-box method has been abandoned as inaccurate. Each sample of mineral as taken, now amounts to at least two hundred pounds, as against a few ounces formerly.

Determination of slag, iron, oxide and lime, into cupola waste slag, are made daily. This enables us to mix charges so that we may run a slag of uniform composition. The running of a good liquid slag permits the small shots of copper to separate and settle, giving a much cleaner waste slag.

Instead of making the determinations by the colorimetric method, the electrolytic method is now employed. The samples of the waste cupola slag are now taken regularly after each tap; that is to say, only after, the furnace had been empties of its contents of molten, or liquid copper. A sample, as formerly taken, naturally tended to show results more favorable than actually existed. The present method faithfully reflects actual conditions.

The chemist's work may now be done with all the refinements known to science.

We have under contemplation, with the plans practically completed, an exceedingly accurate automatic sampler for the low grade mineral, to enable us the better to determine the copper contents of the mineral, and thereby the better to check the different operations of the smelter, which, with self-registering scales about the plant, should make the work as efficient and as accurate, to a degree of fineness as can be secured.

The purchase of the old Franklin mine by the Quincy, recently consummated, is an important acquisition, since the possession of 325 acres of this property, lying as it does completely within the lines of the Quincy workings, surface and underground, will be an important advantage to future mining operations. The copper-rock still lying in the depths of the Franklin mine is available from the workings of the Quincy shafts. The ownership of the two-half-mile squares of surface at the mine location also embraces many dwellings and other buildings thereon, and removes the control by any but the Quincy from this important territory.

The area of sixty or more acres of ground which fronts on Portage Lake and which for nearly three-quarters of a mile adjoins the smelter property, also acquired in the purchase, will be of much value to the smelter, as there was great need of more ground about the plant, especially of land on which to dump the slag, and on which to erect suitable dwellings for smelter employes.

TAMARACK MINE.

A. S. Bigelow, president; W. J. Ladd, secretary-treasurer; Norman W. Haire, general manger; W. J. Uren, general superintendent; John T. Been, assistant superintendent; C. Hohl, engineer; William M. Harris, clerk; A. G. Gulberg, Superintendent Motive Power and Construction; A. L. Burgan, superintendent Stamp Mills; Edwin Waters, mining captain, Old Tamarack; William Rosevere, mining captain, North Tamarack; John Rowe, mining captain, No. 5 shaft.

This is an interesting mine and one of the most remarkable mining organizations on the globe. For many years, it has been a substantial producer and a fine business enterprise. Since the beginning of operations, the company has distributed $9,420,000 in dividends, besides building up one of the finest mining locations in the country and developing and equiping a great mine. The company has paid over 6 times its entire capitalization in dividends, as well as provided steady employment at good wages to a force of from 1,000 to 2,000 men year in and year out. Capitalization is $1,500,000 divided into 60,000 shares of par value of $25 each. Tamarack Mining Company was organized in 1882 for the purpose of mining the Western continuation of the Calumet conglomerate lode as it passes from the lands of the Calumet & Hecla Mining Company into those of Tamarack. This lode is the same one, which Calumet & Hecla mines and from which Calumet & Hecla Company has paid stockholders $107,850,000 in dividends and built up the finest mining location and mining equipment in the world. Tamarack also mines the Osceola amygdaloid lode, but conglomerate forms the chief source of product supply.

Underground operations are conducted through 5 working shafts, which are large, deep and vertical, and known as Nos. 1, 2, 3, 4 and 5. No. 1 is the oldest and now used principally for getting the water out the workings. The conglomerate tributary to this shaft is exhausted, besides the shaft was badly damaged by the fire. It is 3,409 feet deep, and 3 compartment. No. 2 is 4,355 feet deep, 8x16 feet inside measurement and 3 compartment. Nos. 1 and 2 form “Old Tamarack” while Nos. 3 and 4 constitute “North Tamarack.” No. 3 is 5,200 feet North of No. 1 and 16x8 feet in dimensions, three compartment and 5,253 feet deep or practically a mile down vertically. This is the deepest vertical shaft in the Lake Superior region, if not, in the world and it happens to be the best one of the Tamarack mine. No. 4 is located just North of No. 3 is 4,540 feet deep and a duplicate of No. 3 in dimensions. No. 5 is one of the greatest shafts in the world, being 27 feet long by 7 feet wide within timbers, divided into 5 compartments and 5,089 feet deep.

COMPARATIVE RESULTS FOR 1907 and 1908.

	1907.	1908.
Tons rock stamped	533,600	654,897
Pounds mineral obtained	17,071,730	19,134,429
Percentage refined copper in mineral	64.89	66.93
Pounds refined copper per ton of rock stamped	20.8	19.6
Product fine copper	11,078,604 lbs.	12,806,127 lbs.
Cost per pound at mine, excluding construction and explorations	13.33c.	13.14c.
Cost per pound construction and explorations	0.84c.	0.64c.
Cost per pound of smelting, freights, eastern expenses, interest, commissions, and all other charges	1.49c.	1.46c.
Total cost per pound of refined copper	16.66c.	15.24c.
Cost of mining and stamping per ton of rock stamped	$2.98	$2.57
Gross cost of stamping per ton	28.12c.	22.8c.

ASSETS AND LIABILITIES.

ASSETS.

Cash and accounts receivable at Boston, and copper not paid for	$ 569,441.81	
Cash and accounts receivable at mine	84,354.56	
Supplies and fuel on hand at mine	387,610.53	
Wood and timber lands	186,343.54	
Hancock & Calumet Railroad Company 5 per cent bonds	99,000.00	
Mineral Range Railroad Company stock	364,700.00	
Lake Superior Smelting Company stock	100,000.00	
		$1,791,450.44

LIABILITIES.

Accounts payable at mine	$ 224,989.00	
Accounts and bills payable at Boston (including advances on copper sold, but not yet paid for)	1,089,125.12	
		1,314,114.12
Balance of assets December 31, 1908		$477,336.32

OPENING WORK DONE DURING 1908:

Total shaft sinking	175.0 feet.
Total drifting and drift stoping on conglomerate	4,810.5 feet.
Total drifting and drift stoping on amygdaloid	3,414.0 feet.
Total drifting at Cliff	1,913.0 feet.
Total cross-cutting	1,605.5 feet.
Total sinking of winzes	516.5 feet.
Total sinking for rock bin	28.0 feet.
Total openings in all classifications	12,462.5 feet.

Concluding his report, General Manager Norman W. Haire says:

“General Remarks.—There was a further decrease from last year in the yield of refined copper, amounting to 1.2 pounds per ton of rock stamped, caused in the main by treating a larger tonnage of low-grade rock from developments on the Osceola amygdaloid. This is quite likely to improve somewhat when regular mining is begun on the amygdaloid vein.

"Coupled with the decrease yeild and the low price have come large outlays at all points. The extraordinary items of expense necessitated by enforced changes in methods of mining and development underground and the handling of water problem have been very heavy. The replacing of worn-out equipment in the older parts of the mine has made no small part of the expense. In addition to the above, exploration at the Cliff aggregated

$50,000 outlay. All this increased very materially the cost of mining. We also had the heavy construction at the water works and coal dock, which could not be longer postponed; then the underground development was the largest since 1902. Furthermore, it will be observed that we have opened a new and quite extensive mine on the Osceola amygdaloid at No. 2, from which we have not yet been able to realize any substantial returns.

"On the other hand, in spite of this extraordinary expense as compared with last year, we have very materially decreased the cost of mining and stamping a ton of rock. It may be further noted that the changes and additions have been permanent and in the nature of investments for the future well-being of the property; that the Osceola amygdaloid, before the end of 1909, will probably be giving us a larger increased tonnage of rock; that the stamp mill and Lake Superior water-works plants are complete and up-to-date in every particular; that the underground water problem is nearing a solution, and that the changes in the method of mining and handling rock at No. 2 and No. 3 shafts are well under way. When the latter are completed we expect to be able to handle a larger increased tonnage at a lower cost. It need hardly be said that these changes and improvements take time and a large amount of money."

WOLVERINE MINE.

Main office, 15 William St., New York; mine office, Kearsarge, Mich. President, Joseph E. Gay; secretary-treasurer, John R. Stanton; agent, Fred Smith; mining captain, William Pollard; clerk, Chas. Noetzel; engineer, W. F. Hartmann.

Wolverine mine is capitalized at $1,600,000 divided into 60,000 shares of a par value of $25 each. The amount of cash paid in on the capital stock is $780,000. The first disbursement to stockholders was made in 1898, since when the aggregate amount received by them is $5,400,000 or $90.00 per share.

The excellent record built up by the Wolverine is being fully maintained from year to year and there is absolutely nothing in view to indicate that it is likely to suffer for years in the future. Its physical condition is superb with ground enough developed to last for years at the present rate of production. Away down in the deepest and furthest advanced openings, the lode shows up about the usual width and bearing the remarkable copper values characteristic of the mine. At these points, there is no perceptible change in its enrichment unless it is towards further improvement. Through prompt repair work and the incorporation of improved machinery now and then, the mechanical equipment of the property is maintained at a high standard of efficiency. Operating costs in all departments are among the lowest in the Lake copper district, perhaps in the world for the duty performed. The splendid success achieved has been made possible largely through the property's fine physical condition all over.

Skips lift 4 tons of rock to a trip, operate in balance and dump automatically on rock house grizzles. The fine stuff passes through the grizzles into rock bins, needing no further manipulation for the mill. Coarse rock rolls by gravity over the grizzles to the rockhouse floor. The waste is then picked out and discarded while vein rock is fed into crushers leading into the rock bins. This work finished, the product is ready for the stampmill. It is readily and economically done. Underground operations are conducted through two shafts, Nos. 3 and 4 sunk in the lode. Both shafts have like dimensions, being 8x17 feet with two skiproads and ladder way. No. 3 is 3,400 feet deep and No. 4 is 2,900 feet deep. Shafts are substantial and in thorough repair.

The annual report of the Wolverine Copper Mining company for the year ended June 30, 1908, is issued. It compares as folows:

	1908	1907
Receipts	$1,244,444	$2,017,577
Total exp	685,041	669,036
Min. profits	559,402	1,348,541
Construction		42,137
Net profits	559,402	1,306,403

	1908	1907
Dividends	750,000	1,140,000
Total sur	811,629	**1,150,588

**Total surplus of June 30, 1907, has been marked down $153,361 to $1,002,227, because of over-estimate of value of copper then on hand.

The report shows 12,117,000 pounds of mineral produced in the year ended June 30, 1908, which yielded 77.21%, or 9,356,123 pounds of refined copper, compared with 9,372,982 in 1907and 9,681,706 in 1906.

Average price received per pound was 13.16 cents, against 21.36c. in 1907; 17.17c. in 1906 and 13.83c. in 1905.

Operating results of Wolverine are:

Rock hoisted (tons)	367.795
Rock stamped (tons)	348,360
Product mineral (lbs.)	12,117,000
Product refined (lbs.)	9,356,123
Yield rock treated per ton (lbs.)	26.82
Cost ton rock hoisted	$1.62
Cost of rock stamped	$1.71
Cost lb. ref. at mine	6.379c
Smelt, frt., etc	.942c
Total cost	7.321c

Balance sheet as of June 30, 1908, shows:

Assets:—	
Cash in banks	$ 12,032
Deposits in trust cos	345,696
Cop. bills and cop. on hand	408,067
Cash and suplies at mines	41,907
Stock Mich. Smelt. Co	80,000
Liabilities:—	
Debt at mine	$ 57,459
Accts. payable	18,613
Total	76,072
Bal. assets	811.629

For a series of years the output, receipts and dividends have been as follows:

	Cop. lbs.	Av. price received
1907-8	9,356,123	13.16c
1906-7	9,372,982	21.36c
1905-6	9,681,706	17.17c
1904-5	9,729,971	13.83c
1903-4	9,300,695	12.75c
1902-3	8,250,386	12.48c
1901-2	4,984,367	13.21c

	Gross receipts.	Dividends
1907-8	$1,244,444	750,000
1906-7	2,017,577	1,140,000
1905-6	1,662,142	840,000
1904-5	1,345,402	540,000
1903-4	1,185,745	390,000
1902-3	1,033,259	270,000
1901-2	658,602	240,000

In the report President Gay says: "Operations have been satisfactory and we secured a normal production. No additions were made during the year. It has been decided to compound the cylinders at the stamp-heads, also to install electric pumps to handle mine water. These together with belt-conveyor system will constitute practically all construction expenditure during coming year."

Agent Smith says: "Of rock hoisted 5.15% was discarded as poor. Average yield refined copper per ton rock hoisted was 25.42 pounds and per ton stamped 26.82 pounds.

During the coming year it is intended to do all mine pumping electrically. Power will be furnished by the Houghton County Electric Light company. Work is under way on a plant for elevating tailings similar to that operated at Mohawk."

CENTENNIAL MINING COMPANY.

Capital stock, Two Million Five Hundred Thousand dollars in 100,000 shares of $25 each. $22.25 per share paid in.

H. F. Fay, president; A. Agassiz, F. L. Higginson, F. W. Hunnewell, Quincy A. Shaw, Jr., R. L. Agassiz; H. F. Fay, W. L. Frost, Geo. G. Endicott, James MacNaughton of Michigan, directors. Geo. G. Endicott, secretary-treasurer; James MacNaughton, general manager. Office, 60 State Street, Boston, Mass.

Centennial still continues to be a good deal of a developing mine, although the management sends out a regular monthly product of copper. The company is working the Kearsarge lode through two large shafts substantially constructed and sunk on the plane of the lode, about 38 degrees from horizontal. This lode is recognized as one of the most persistent and valuable copper bearing formations mined in the Lake Superior district. It runs, however, to bunchiness and irregularity with the best values, making at a depth of from 900 to 3,000 feet below grass-roots. Average width is about 14 feet but varying. Underground operations are conducted on practical lines and up-to-date methods. Shafts are connected by different levels and air circulates freely through the works. Workings are comparatively comfortable and safe for men breaking down the product. The two shafts are sinking deeper and different levels are going ahead opening up and developing fresh reserves of ground in accordance with the usual policy of the management.

Opening or development work completed during 1908 included shaft sinking 496 feet and drifting 3,756 feet.

The annual report of the Centennial Copper Mining company for the year ended December 31, 1908, shows the following:

Copper product, lbs.	2,196,377
Price received for copper	13.3032c
Receipts—	
Sale of copper	$294,165
From assessment	24
Cent. Heights townsite	310
Previous cash balance	129,975
Total receipts	$424,484
Payments—	
Work exps. at mine	$354,075
Smelt. freight, marketing, etc	35,877
Construct. and equip	16,273
Total expenses	$406,224
Balance	$ 18,260

The balance at the end of 1907 was $129,985.

Rock hoisted (tons)	179,913
Rock discarded (tons)	10,220
Percent. discarded	.05681
Rock treated (tons)	169,693
Min. prod. (lbs.)	3,352,790
P. C. min. in rock treated	.00988
Refined copper (lbs.)	2,196,377
P. C. ref. copper in min.	.65509
P. C. ref. cop. in rock treated	.00647

President Fay says in his report to the stockholders:

The opening work during the past year was confined almost exclusively to sinking No. 2 shaft to a depth approximately that of No. 1 shaft, and extending the lower levels of the mine to the north—93 per cent of all drifting being in that direction. The improvement in the lower levels which began to show itself in the latter part of 1907, and was referred to in our last annual report, has steadily increased, and for several months as our drifts have penetrated farther into our northerly territory the returns from mills have shown a satisfactory increase in the number of pounds of refined copper recovered.

As stated in the general manager's report, there was an increase of a little more than a pound of copper per ton of rock treated for 1908 as compared with the previous year, and the first quarter of 1909 shows an increase of about two and one-half pounds over the same period in 1908. This result was accomplished notwithstanding a decrease in the percentage of the rock discarded from 11.2 per cent. in 1907 to 5.6 per cent in 1908.

The general conditions at the mine are good, the special feature being the improvement in the lower level north of No. 2 shaft, where excellent ground is being opened. This improvement should permit us to take advantage of the increased capacity at the mill, where two new compound heads are being installed. When this work is completed the mill will be able to treat nearly 3,000 tons of rock per day.

At the annual meeting of the Centennial Copper Mining company, the retiring board of directors was re-elected.

Total shares represented 76,830.

On January 1, 1909,—

No. 1 shaft was down to very near the 34th level, a total distance from surface of 3,624 feet.

No. 2 shaft was down to a point just above the 33rd level, a distance from surface of 3,550 feet.

A gradual improvement has been noted in the drifts north of No. 2 shaft.

On January 1, 1909, Mr. F. W. Ridley was appointed and assumed the duties of superintendent of the property.

Credit is due the heads of the various departments for the efficient work performed during the year.

John Pentecost, mining captain; Alonzo Nichols, mining clerk; A. G. Andrews, mill superintendent.

FRANKLIN MINING COMPANY.

Company is capitalized at $2,500,000 in 100,000 shares, par value $25 each. Total assessments levied, $220,000 and dividends paid $1,240,000.

Francis H. Raymond, president; R. M. Edwards, superintendent; Arno Jaehnig, clerk.

Franklin, Jr., was bought with the hope that it might prolong the life of the company. The property is an interesting one with a large acreage carrying all the prominent copper bearing lodes mined in Houghton county north of Portage Lake. It adjoins the land recently bough by the Quincy Mining company from the Arcadian Copper Company and is about four miles from the town of Hancock.

The annual report of the Franklin Mining company for the year ended December 31, 1908, follows:

Mineral prod. lbs.	7,009,120
Copper prod. lbs.	3,703,421
Copper sold, lbs.	2,962,018
Receipts—	
Previous cash bal.	$220,429
Copper sales	396,579
From sale of balance 1907 copper over est.	8,001
From sale old Fr. mine	107,000
Total receipts	795,010
Total expenses	602,748
Surplus	$192,261

The balance sheet as of December 31, 1908, shows as follows:

Assets—	
Cash on hand	$22,279
Accts. receivable and copper on hand	330,830
Supplies at mine	67,645
Total	$420,754
Liabilities—	
Notes payable	$ 50,000
Drafts outstanding	11,932
Accts. and bills payable	65,765
Total	$127,697
Balance of assets	$293,056

President Dow says:

The sale of the old mine to the Quincy Mining company, the one possible purchaser of the property for mining purposes, was determined upon for the following reasons:

Our rock has come from old openings almost entirely, and the condition of the shaft and levels is such that expensive opening of the limited amount of new ground remaining would require the expenditure of a large amount of money with limited results in the way of profits assured.

The Quincy company, through the extensions of its levels on either side of the old mine, can open this ground at a low cost.

The $170,000 used in developing the same lode in the Junior property promises much more satisfactory results.

The increase in capitalization was necessitated in order to acquire the Rhode Island shares, and possibly other adjoining property.

The 800 acres in the Rhode Island carries the extension of all lodes in the Franklin and La Salle, and, in our judgment, were acquired on a reasonable basis for both companies.

It is the intention of the Franklin management to assume control of the Rhode Island company at the annual meeting in June, after which time the north drifts from the Franklin No. 1 shaft may be continued in the Rhode Island property and open up what we believe to be valuable ground at very little expense.

At present our work will be confined to the Pewabic lode, it being our intention to develop this lode extensively through five shafts.

On the Junior amygdaloid from which no returns were had this year, the ground blocked out and unstoped represents values many times in excess of the cost.

From the 20th level down over 650 feet, with levels extending north and south of the shaft for a total of 3400 feet, we have opened a large body of ore, 90 p. c. of the drifts being good stoping ground.

Over $100,000 has been expended during the past year in development work.

Superintendent Edwards mentions in his report to the directors the fact that the foot-wall lode at the 25th level

is sufficiently well charged with copper to warant drifting on it as well as on the hanging-wall lode. This will enable us to open double the amount of stoping ground on this level—the levels above being opened only on the hanging-wall lode.

Practically all work at the mine the past year has been done at reduced costs, and with the mill running at its full capacity on Pewabic rock, we feel confident that the New Franklin will be in a position to make satisfactory returns to the stockholders in the near future.

R. M. Edwards' report of operations for the year 1908, shows a total of 349,576 tons of rock hoisted, of which 342,596 tons were stamped, and the yield of refined copper per ton of rock stamped was 10.82 pounds. The total cost per ton of rock stamped was $1.5730.

Old Franklin Mine—The old mine was operated for eleven months, having been turned over to Quincy Mining company on December 1st. During this time there were stamped 65,059 tons of rock from the old mine which yielded 17.22 lbs. of refined copper per tons, and the total costs of treatment were $1.85 per ton of rock stamped. Total openings for the year at old mine were 207 feet.

Franklin Junior Mine—Early in the year it was decided to gradually transfer opening work from the conglomerate to the Pewabic amygdaloid lode which lies about 450 feet west of the conglomerate.

As a result of this policy all openings on the conglomerate have now been stopped and opening on the amygdaloid is progressing rapidly, eleven machines being now engaged in this work.

There was a total of 1088.5 drifted on the conglomerate during the year, and 2511 feet on the Pewabic lode; raising No. 1 shaft 124 feet, sinking No. 1 shaft 228 feet; sinking No. 2 shaft 215.5 feet, making total openings for the year 4,305 feet.

Seventy-five per cent of the drifting on the Pewabic lode has been stoping ground.

The 15th level driving south to connect with No. 3 shaft is the only one of the various openings that has not shown fair copper values. This level while following a large and well defined lode has shown but little copper to date.

Beginning with the 20th level and down, all the drifts have opened long stretches of good stoping ground, the lode in the lower levels being richer and wider.

Practically all the work has been done on the hanging lode. The foot lode has been cut by the crosscuts at 23rd and 24th levels, and recently at the 25th level. At all these points it shows copper. It is separated from the hanging lode by a varying thickness, of from 10 to 25 feet, of barren trap. No drifting has been done on it. At the 25th level where we have just gone through it, this lode is 9 feet thick with good copper, making a very encouraging showing. We will start a machine opening in it at this point very soon. At the old mine most of the work was done at this foot lode. At the 23rd level a rich chute of copper was opened about 300 feet south of No. 1 shaft. The 24th level is now driving towards this, and very interesting developments may be expected when this chute is reached as the general run of ground opened by 24th so far has been better than that opened by 23rd at points directly above.

Rock stamped for the year from junior property amounted to 279,416 tons, of which 244,180 tons came from the conglomerate and 35,236 tons from the amygdaloid.

Refined copper produced was 2,619,133 lbs., and total costs per ton, including development work on amygdaloid, amounted to $1.48 per ton of rock stamped.

The mill ran smoothly for the year but at a slightly increased cost per ton owing to decreased tonnage treated.

Walker smokeless furnaces were installed in the two batteries of Sterling boilers at the mill, and from careful tests conducted, they will accomplish a decided saving in coal consumption.

HANCOCK CONSOLIDATED MINING COMPANY.

Organized under the mining laws of the State of Michigan, June, 1906. Capital stock $5,000,000 in 100,000 of $25 each, issued and 100,000 shares not issued.

John D. Cuddihy, president; Thomas Hoatson, vice-president; John H. Hicok, secretary-treasurer; John L. Harris, superintendent; John Peterson, mining captain.

Hancock mine is described in my previous reports. Maps of the property are annexed in the last report showing geological section of the land. The property is still a development one with the work well in hand and conducted vigorously and according to the latest and most approved methods of mining. People behind the enterprise know the business of mining thoroughly and see to it that work in each department is despatched promptly and in the most practical way for getting results. Progress has been continuous and the physical condition of the mine shows steady improvement. The two shafts are going down deeper right along and levels are extending into virgin territory opening and developing additional reserves of ground that promise to make good stopes when production begins.

Following is a copy of the directors' report for 1908:

Receipts—		
Interest		$ 1,165.29
Assessment No. 1—		
Installment No. 1	$ 90,798.00	
Installment No. 2	56,557.00	
Installment No. 3	267.00	147,622.00
		$148,787.29

Disbursements—		
Real estate	$ 1,350.00	
Superintendence, office,		
Superintendence, officefi, legal expenses, etc....	12,823,33	
Taxes	8,237.86	
Constructing and development	205,289.60	
Excess, disbursements over receipts		$ 78,913.50
Surplus, December 31st, 1907		134,332.25
Leaving a surplus December 31st, 1908, of		$ 55,418.75

Since the organization of the company, June 11th, 1906, the work accomplished by way of unwatering the old Hancock mine from surface to the 10th level and developing this portion of the mine from the 9th and the 13th level, inclusive, has progressed satisfactorily and as rapidly as circumstances would permit, but considerable of this work has, necessarily, been slow and expensive.

The equipment installed is adequate for carrying on development work at No. 1 shaft as well as sinking No. 2 shaft to desired depth.

The principal development work done during the past year, tributary to No. 1 shaft, has been on the west veins, designated as Veins Numbers 2 and 3.

Very good progress has been made in sinking the large vertical shaft (No. 2) which, barring unforseen accidents, should intersect No. 3 vein the latter part of the coming summer. This shaft has been sunk to a total depth of 1435 feet. It will explore new territory northwest of No. 1 shaft for a distance of some 2,200 feet and intersect at depth, the various lodes known to exist farther north. It has been decided to use this shaft as the main working and hoisting shaft for the entire mine.

On May 5th an assessment of $3.00 per share was levied on the outstanding shares of the capital stock of the company, payable in installments as follows:

One dollar per share on or before June 25, 1908.

One dollar per share on or before November 25, 1908.

One dollar per share on or before May 20, 1909.

Application has been made for listing stock in the Boston Stock Exchange, the State Street Trust Co., of Boston, has been appointed Transfer Agent, and the City Trust Co., of Boston, Registrar.

To the statement of expenditures, and our Superintendent's Report, which explains fully what has been accomplished, and outlines in a general way the proposed method of operating, reference is made for detailed information.

Report of Superintendent John L. Harris:

As mentioned briefly in my two previous Annual Reports, practically all of the mining done on the old Hancock Copper Company's property (consisting of 132 acres in the southwest quarter of section twenty-six (26) town fifty-five (55) north of range thirty-four (34) west) was on the Hancock main vein, and the mine was operated through a single compartment inclined shaft sunk on the lode to the 10th level, which is 906 feet on the inclination below the collar of shaft.

Before mining operations were suspended at the old Hancock mine, quite a little stoping was done on the West Branch Vein, so called, from the 6th to the 9th level, where a block of ground 200 to 400 feet south of shaft was stoped with very satisfactory results, judging from the length and width of stopes, and the character and quality of the broken vein rock remaining in that section of the mine.

Our development work has been done on three lodes, namely: The Hancock Main Lode, on which No. 1 shaft is sunk; the West Branch Lode and the new West Lode, now designated as Veins Numbers 1, 2 and 3 respectively. During the past year most all of our development work, by way of drifting, was confined to No. 2 and No. 3 veins.

No. 1 shaft was sunk 242 feet to the 14th level. Plat was cut at the 13th level and crosscut from this point driven west 763 feet. This crosscut intersected No. 2 and No. 3 veins at 325 and 381 feet, respectively. The average width of these lodes, measured at right angles to the dip, is 12 to 14 feet. They are of good character and quality, especially No. 3 at the 13th level. Drifts were extended north and south on this vein at this level 126 and 245 feet, respectively, in good character vein well charged with stamp copper and small mass or "barrel work." Judging from the heavy mineralization of this lode and the length of stoping ground opened at the 11th level, as well as at the 13th, it is but fair to assume that this NO. 3 vein is the main mineral bearing lode of the three.

The total drifting done during the year was 2,463 feet, and total drifting to date 5,700 feet.

As we are not in a position to handle sufficient rock for continuous stamping, with the present equipment and facilities, no stoping has been done, but assuming that the vein averages in width as shown in opening work, we have, at the present time, a total of some 400,000 tons of ground blocked out that should yield good returns.

In order to avoid replacing the present equipment at No. 1 shaft (which was installed for development purposes only) with an expensive plant of sufficient capacity for permanent operating, it has been decided to discontinue sinking No. 1 shaft and transport all rock to be hoisted to No. 2 shaft. This will also obviate the necessity of enlarging No. 1 shaft from a single compartment to three compartments, from surface to the 10th level, as well as constructing the necessary railroad spurs to No. 1 shaft.

Rock mined in the territory of No. 1 shaft, at or above the 13th level, will be conducted through chutes to that level, loaded into cars, trammed to No. 2 shaft where it will be dumped into bins, or station pockets, and from there hoisted to surface in large skips.

This method of transporting rock thorugh No. 2 shaft, thereby eliminating the otherwise necessary initial cost of installing a permanent equipment, etc., at No. 1 shaft, as mentioned above, will not only result in this first saving cost, but will, on account of centralizing the

permanent equipment at No. 2 plant, enable us to win all rock, to be hoisted, at lower cost and at greater speed.

A winze, or secondary shaft, on No. 3 vein at the 13th level, about 50 feet north of crosscut, has been started and will be sunk on vein and utilized in connection with this method of transporting rock to No. 2 shaft.

A station at No. 2 shaft, 1179 feet below the collar, has been completed. It is substantially built of concrete and steel I Beams. The capacity of bins at this station for the four hoisting compartments is 39 tons and they will be equipped for the easy loading of 8 ton skips.

Cross-cut from this station, to connect with cross-cut being driven west from No. 1 shaft, was started during the latter part of the year and driven east 170 feet. This cross-cut will be connected with cross-cut being dirven from No. 1 shaft about the middle of March next.

No. 2 shaft, which is a five compartment vertical shaft (30 feet by 9 feet over all) was sunk and timbered 904 feet to a point 1,435 feet below the collar. Deducting the delay caused by cutting station at 13th level, very good progress has been made during the year, averaging 87 feet per month. The badly broken up nature of some of the ground passed through necessitated timbering very solidly and in some instances timber sets are but three feet apart. This retarded to a considerable extent, more rapid progress in sinking.

At 725 feet below the collar a copper bearing amygdaloid vein 6 feet in width—measured at right angles to the dip—was intersected but no development work was done on same. This was the only copper bearing lode intersected, the various strata passed through being barren conglomerates, broken up amygdaloids, sandstones and traps.

On the present dip of the formation No. 2 shaft should intersect No. 3 vein 2,150 feet below the collar or about 700 feet below present bottom and allowing time required for cutting the next station and starting a crosscut east to No. 3 vein—to connect with winze now being sunk on this vein below the 13th level,—shaft should, baring unforseen accidents, reach No. 3 vein during the latter part of the coming summer, and if found as well mineralized, as shown in openings to date tributary to No. 1 shaft, will warrant installing a complete permanent equipment for hoisting and treating the maximum amount of rock that can be transported daily and hoisted through this shaft.

The present equipment is of sufficient capacity for sinking shaft and carrying on develpoment work to desired depth, but is not adequate, neither was it designed, for a permanent plant. When sufficient development warrants a modern equipment throughout to answer all future requirements will be installed.

The results of last year's development work have been very encouraging, and from present indications conditions will, in the very near future, warrant the installation of a permanent plant for carrying on all mining operations on an extensive scale, thereby placing the mine on a profitable producing basis.

ARCADIAN COPPER COMPANY.

The Arcadian Copper Company was organized under the laws of New Jersey, in March, 1899, with a capital of $3,750,000 divided into 150,000 shares, par value $25 each. The company owns 3,200 acres of mineral land adjoining the Quincy and Franklin mines.

Nearly all the main copper bearing lodes of the copper range pass through Arcadian property and the opinion has been held for years that somewhere in these lands, important values lie buried up and that sooner or later, they will be brought to view and turned to profitable use. An important change in the affairs of the company at the last annual meeting of the stockholders, when the Burrage element, so long identified with the company, was practically eliminated. The management of the property now rests practically with the Lake people.

The present board is now made up of the following gentlemen: Robert H. Shields of Houghton; W. B. Anderson of Calumet; S. T. Everett of Cleveland, Ohio; J. C. Shields of Phoenix; L. W. Kilmar of Calumet; James W. Shields of Hubbell and Simon J. Beahan of New York. Robert H. Shields, who is superintendent of the company's property, is elected president and William F. Miller of Houghton is secretary and treasurer.

Mr. Robert H. Shields has been superintendent of the mine for some years and the policy followed for some time past will likely be continued, which is that of exploring works. The memebers of the new board are well known local people, except Mr. Everett and Mr. Russell, who know the copper mining business and how to conduct the work.

At this writing Arcadian is idle but the property is too promising to remain so long.

ONECO.

A limited amount of exploring work was done on this property during 1907 but no distinctive mineral values were discovered. A portion of the rock broken, however, showed a sprinkling of copper, but hardly enough to be worth especial remark. Some good people are of the opinion that the property is well worth a practical systematic trial. Oneco is described in my previous reports.

It is a 100,000-share company organized under Michigan laws in 1899. The property was originally known as the Hungarian, more recently, for a short time, as the Fitzgerald. The earliest work was done in 1862, when a shaft was put down less than 100 feet. The next work done was in 1899, but is was only limited. Then it 1898, Mr. Fitzgerald financed some exploration before

the present company was organized. The porperty is an extensive one, consisting of 800 acres lying in Sections 2, 3 and 10, Town 55, Range 33. Various copper bearing belts traverse the lands and Mr. Edwin J. Hulbert, discoverer of the famous Calumet Conglomerate, maintains that at least one of them carries substantial values. I have read letters written by Mr. Hulbert to Mr. Fitzgerald, president of the Oneco, making his claim. Oneco location is situated east of the channel in which occurs the Calumet & Hecla, Quincy, Osceola, Wolverine and some other successful mines on the north range, but years ago, the feeling was quite general that a lode or lodes carrying important values did exist somewhere in these eastern lands.

Oneco is now idle but it is rumored that work will be started up there the coming summer.

LA SALLE COPPER COMPANY.

Capitalization $10,000,000 in 400,000 shares, par value $25 each.

President, Quincy A. Shaw; Secretary-treasurer, Geo. A. Flagg; General Manager, James MacNaughton. Main office, 12 Ashburton Place, Boston, Mass. Mine office, Calumet, Mich.

Lands of the company consist of 3,000 acres joining Osceola on the South and Rhode Island on the North. Lands were formerly held by Caldwell, 560 acres; LaSalle, 840 acres; Calumet & Hecla, 400 acres; Tecumseh, 560 acres; St. Mary's Mineral Land, 360 acres; Sheldon, 280 acres. Total 3,000 acres:

La Salle is practically a new organization and under the control and management of the Calumet & Hecla Mining Company. All, or nearly all the profitable lodes thus far mined North of Portage Lake run through these lands for a distance of 12,000 feet or more on the strike line of the formations. The company is now exploring and developing the Kearsarge amygdaloid, which forms one of the master mineralized formation of the Lake copper district. It runs from 8 to 20 feet wide averages about 14 feet wide and yeilds from 16 to 30 pounds of copper to the ton of rock treated in the stampmill. The best values develop with depth ranging from 900 to 3,000 feet or more beneath the earth's surface.

James MacNaughton, general manager of the Calumet & Hecla Mining company, is manager of the La Salle.

Summary of the operations of the La Salle Copper company for the year ending April 30, 1908:

During the past year we have sunk Nos. 1 and 2 shafts on the old Caldwell property to a depth of 492 feet and 405 feet respectively. A small amount of drifting has been done at each shaft. Although a very litttle copper has been found, the general character of the vein seems to indicate an improvement with depth.

Diamond drilling has been done to the west of the Kearsarge lode to locate the Osceola amygdaloid and Calumet conglomerate, both of which outcrop on the property. The drill cores have shown no copper.

No additions have been made to the surface plant.

Your company now owns 54,633 shares out of a total issue of 54,959 shares of the Tecumseh Copper Company, and I beg to refer to the report of that company, hereunto appended, for details of operations.

For the Directors,
QUINCY A. SHAW, JR.,
President.

La Salle Copper Company—Statement of assets and liabilities:

Assets—	
Cash at Mine office	$ 7,384.91
Cash at Boston Office and Securities	732,421.19
Notes Receivable at Boston and Mine	131,169.10
	$870,975.20
Liabilities—	
Bills and accounts payable at Boston and Mine	$ 4,496.50
Balance	$866,478.70

TECUMSEH COPPER COMPANY.

April 30, 1908.

To the Stockholders of the Tecumseh Copper Company:

No. 1 shaft has been sunk to a depth of 1,469 feet. Drifts on the 8th, 9th, 10th, 11th, 12th, 13th and 14th levels have, during the past year, been dirven north and south a total distance of about 2,872 feet. There is a good showing of copper.

We have produced 59,874 lbs., of copper secured from rock mined previous to 1907. The openings are not yet sufficient to warrant continuous milling of rock.

A new engine, boiler, and compressor have been installed at No. 1 shaft and a small blacksmith shop has been erected to take the place of the one destroyed by fire.

For the Directors,
R. L. AGASSIZ,
President,

Tecumseh Copper Company—Cash assets and liabilities April 30, 1908:

Assets—	
Cash at Boston Office	$ 480.69
Cash at Mine Office	8,855.43
	$ 9,336.12
Liabilities—	
Notes and Bills Payable at Boston and Mine	$137,929.73
Debit balance	$128,593.61

For the Directors,
GEO. A. FLAGG,
Treasurer.

Boston, April 30, 1908.

OLD COLONY.

President, H. F. Fay; Secretary-treasurer, George C. Endicott; Superintendent, James Chynoweth; John Ford, Mining Captain,

This is another exploring proposition adjoining the Calumet & Hecla on the east, the Osceola and Mayflower on the north and the St. Louis and Canal lands on the south.

Company was incorporated in 1899 under the Michigan Mining law. Capitalization. $2,500,000, par value $25 each, in 100,000 shares. Lands consist of 1,200 acres located about a mile and a half northeast of the town of Calumet in Sections 17 and 18, Town 56, and Range 32.

For some time exploratory work has been conducted in the Old Colony by trenching, sinking, drifting, cross-cutting and also by diamond drilling and a number of lodes carrying more or less values were discovered. No important disclosures have resulted from this exploration, however, and it has been determined to see if greater depth may prove more successful in finding copper values in paying quantities. It is hoped with additional depth, at least, one lode may be found containing sufficient value to make a profitable mine.

The openings from December 1, 1907, to November 30, 1908, are as follows:

Crosscut west of 9th level south drift	345	feet
Drift south of crosscut	153	"
Drift north of crosscut	248	"
Crosscut west of above north drift	15	"
Crosscut east of above north drift	23	"
Total openings	784	feet

On October 1, 1908, the treasurer's statement showed a balance of $18,152.40 over liabilities.

MAYFLOWER MINING COMPANY.

This mining company organized and incorporated in 1899 under the mining laws of Michigan. Capitalization $2,500,000 par values $25 each and in 100,000 shares.

Lands owned by the company consist of 840 acres in Town 56, Range 32. The property was idle in 1907.

President, H. F. Fay; Secretary-treasurer, George C. Endicott; Superintendent, James Chynoweth.

HOUGHTON COUNTY MINES.
South of Portage Lake.

COPPER RANGE CONSOLIDATED COMPANY.

This company is a security holding organization incorporated under the laws of the State of New Jersey. Capital stock, $38,364,900 in 383,649 shares of $100 each. President, William A. Paine; secretary-treasurer, Frederic Stanwood; F. W. Denton, general manager. Main office, 6-27 Brazer Bldg., Boston, Mass.

Another successful year has been added to the fine record of this company. The company's product of copper was sold for 13.39 cents per pound, and the year under review proved a profitable one for everybody interested in this enterprise, which is one of the best in the country. The subsidiary properties forming the organization were vigorously operated and substantial progress was made in the several departments of each proposition. Every department is running successfully and doing full duty. The policy outlined and followed by the management has been liberal, progressive and of the kind that bring the best results. Progress has been continuous and the company has had a remarkable growth. Copper Range Consolidated forms one of the solid, subtsantial copper mining enterprises of the Upper Peninsula of Michigan that will keep on growing in size and material worth for years and years to come. Though a young organization, as age goes, and no more than in a period of youth so to speak, yet it ranks among the Michigan copper mines next to Calumet & Hecla as a producer of copper and money maker. From the start, the property has been managed with decided success and ability in all its working departments. The management is up-to-date, progressive, among the best going and the affairs of the company are transacted with distinct efficiency. The future prospects of the company are very satisfactory, indeed, and if the management deems it for the best interest of the stockholders, the rock output and the product of copper can be considerably increased whenever the management thinks it for the best interest of the company to do so.

Copper Range Consolidated own all of Baltic, Trimountain and one-half of Champion. The growth of the three mines during the past four years is shown by the following tabulation:

In 1908 the company paid quarterly dividends of $1.00 per share amounting to $1,536,740.

Directors' Report in Part.

The total production from which the earnings were derived, that is, Baltic, Trimountain, and one-half Champion, was 32,653,143 pounds, a decrease as against 1907 of 487,154 pounds, made up as follows:

Trimountain decrease		2,155,803 lbs.
Baltic increase	1,019,986	
Champion increase (one-half)	648,663	
	1,668,649	
		487,154 lbs.

The average cost of copper sold and delivered was as follows:

	Production.		
Baltic	17,724.854 lbs.	7.72 cents	per pound
Trimountain	6,034,908 "	12.50 "	" "
Champion (one-half)	8,893,381 "	8.34 "	" "
Copper Range Consolidated Company	32,653,143 lbs.	8.78 cents	per pound

With net earnings of $1,486,774.82, the Copper Range Consolidated Company paid dividends during the year amounting to $1,536,740, leaving a deficit of $49,965.18; and in addition there was expended for construction at the mines, $170,928.78; on the railroad, $51,885.77; making the total expenditures over and above net earnings of $272,779.73. However, during the years 1904, 1905, 1906, and 1907, the company earned, over and above dividends, an aggregate sum of $4,066,222, from which there was expended a new construction, including the Michigan Smelter, $1,919,091.42, leaving a surplus over all expenditures of $2,147,131, which amount is properly available for any deficiency in dividends in lean years.

The balance sheet shows that on December 31 the company had notes payable of $1,150,000, besides advances from the United Metals Selling Company of $175,000. The available cash assets on that date were as follows:

Amount of uncollected copper bills and undelivered copper	$1,550,727.00
Copper Range Railroad Company first mortgage bonds...	615,000.00
Cash	518,254.00
Total	$2,683,981.00

The openings made during the year at Baltic and Champion have shown that we can expect from these mines a further increase in output. More important, however, is the change during the last few months at the Trimountain. Especially since the first of the year there has been a very marked and steady improvement in the character of the openings in all the shafts which is holding at all points, and there is every indication that a general change for the better is occurring throughout the mine.

Notwithstanding our failure to find a mine on the Globe property, your Directors believe it is the wise policy for a company with such a large undeveloped territory as ours to keep some exploration work in progress, either on our own lands or on lands so related to ours that developments on them will have an important bearing upon our undeveloped territory. In line with this policy, as soon as it appeared that the Globe explorations would not result satisfactorily, we secured, in October, 1908, a long time option from the St. Mary's Mineral Land Company on about twelve hundred and forty acres of land in Sections 7, 8, 9, 17, and 18, Township 54, Range 34, lying between the Atlantic mine and lands now owned by this company. Three diamond drills are now at work in cross-cutting this ground, and any promising lodes cut will be prospected by more extensive mining operations. These lands comprise the only large tract north of us on the South Range which has not been prospected, and are so situated that any lodes discovered on them could probably be followed into our own lands.

Comparative Statement.

	1908	1907	Increase
Tons of rock stamped	1,893,749	1,914,331	*20,582
Average yield refined copper	21.94	21.62	0.32
Copper produced, pounds	41,546,525	41,385,015	161,510
Average price per pound	13.39c.	17.28c.	*3.89c.
Received from copper sales	$5,561,887.84	$7,149,984.54	*$1,588,096.70
Mining expenses, including smelting, freight, marketing, etc.	3,474,577.03	3,805,376.07	*330,799.04
Taxes paid Houghton County	131,395.41	154,539.48	*23,144.07
Copper Range Railroad Company:			
Earnings	768,808.98	860,434.84	*91,625.86
Operating expenses	602,718.35	602,456.21	262.14
	1908	1907	Increase.
Taxes and int. on bonds	149,711.54	146,680.12	3,031.42
Net earnings	16,379.09	111,298.51	*94,919.42
Net earnings Copper Range Consolidated Company	1,486,774.82	3,137,449.71	*1,650,674.89

*Decrease.

Total dividends paid to December 31, 1908, $7,682,446.00.

The profits from the individual mines were as follows:

Baltic	$1,004,200.66
Champion (one-half)	449,060.45
Trimountain	53,414.97

There was expended for new construction at the

Baltic	$99,035.98	
Champion (one-half)	60,320.38	
Trimountain	11,572.42	
		$170,928.78
Copper Range Railroad Company		51,885.77
		$222,814.55

Balance Sheet, Boston, December 31, 1908.

Assets.

99,659 shares of the Baltic Mining Company, 99,699 shares of the Copper Range Company and 99,185 shares of the Trimountain Mining Company	$36,939,400.00
791 shares of Copper Range Consolidated Company held by the Treasurer for exchange for the outstanding shares of the Baltic Mining Company and the Copper Range Company	79,100.00
Notes receivable, Champion Copper Company	125,000.00
Notes receivable, Baltic Mining Company	156,617.00
Notes receivable, Copper Range Railroad Company	71,379.92
Copper Range Railroad Company, bonds at par	615,000.00
Copper Range Railroad Company, stock at par	1,398,600.00
Copper Range electric plant	46,810.80
General exploration	511,460.84
Accounts receivable	6,000.00
Cash	518,254.24
	$40,467,622.80

Liabilities.

Capital stock	$38,418,500.00
Notes payable	1,150,000.00
United Metals Selling Company	175,000.00
Michigan Smelting Company deposit	64,070.56
Trimountain Mining Company deposit	176,744.67
Copper Range Company deposit	17,719.40
Stock suspense	38.00
Profit and loss	465,550.17
	$40,467,622.80

BALTIC MINE.

General office, Boston, Mass.; mine office, South Range, Houghton County, Mich. President, W. A. Paine; secretary-treasurer, Frederic Stanwood; general manager, F. W. Denton; mining captain, John Jolly; clerk, William C. Cole; engineer, Clarence Mason; mining captain, Martin Trethewey.

Baltic is a substantial mine with solid merit, a fine business enterprise and forms one of the permanent industries of Houghton County and the State of Michigan. It is located near the town of South Range and is the chief support of this town. Lands owned by the company lie in Sections 20 and 21, Town 54, Range 34 and consist of 800 acres. The mine has been in successful operation for about 9 years and developed a fine record.

About 9 years ago, the place that is now Baltic location was a part of the wilderness with the primeval forest all around. Today, it is a substantial mine with a location built up that any company might be proud to own and affording employment for about one thousand workmen. From the beginning the mine has been ably and conservatively managed. Progress has been substantial, continuous, of the right kind that brings results and practically every department is running successfully. Everything in and about the mine looks well and nothing seems to be neglected.

Underground operations are carried on through four active shafts sunk in the lode: Nos. 2, 3, 4 and 5, which are numbered from South to North. The four shafts are practically duplicates, are connected underground with different levels and air circulates freely through the openings. The mine is cool and comparatively comfortable for working in. Since the beginning, the management has been bending its energies toward strengthening the position of the mine and increasing its producing capacity. Progress has been continuous, substantial and of the right kind.

The following tabulation shows the annual products of copper for the past four years:

	1908	1907	1906	1905
Copper products....	17,724,854;	16,704,868;	14,397,557;	14,384,684
Net profits.....	$ 1,004,200;	1,157,971;	1,369,942;	1,059,165

The company mines the Baltic lode, which is opened up on broad, practical lines and taken out on methods splendidly adapted for such a wide, irregular formation that develops its best values in bunches, sometimes in the foot, sometimes in the hanging and then again somewhere else. The management aims to get out practically all the values contained in the lode in the best way for getting the best results. The work has been well done and all over, the property is in fine condition. Underground openings are developed for years ahead and the product comes from all over the mine. Average length of openings in the lode is now 5,000 feet. No place shows better values than the deepest openings. The mine is now sending out about 2,400 tons of rock daily, which can be increased to 3,000 tons at a moment's notice. Two additional heads have been installed at the stampmill and are ready to start in pounding out mineral. The product is recovered from the 4th to the 16th levels and from practically all over the mine.

Summary of work done by the Baltic Mining Company during the calendar year 1908:

Sinking and drifting were carried on steadily throughout the mine.

Sinking.

	Sunk in 1908.	Total depth.	Bottom level
No. 2 shaft	269 ft.	1,424 ft.	14th
No. 3 shaft	155 ft.	1,723 ft.	18th
No. 4 shaft	201 ft.	1,689 ft.	18th
No. 5 shaft	171 ft.	1,349 ft.	15th
Total	796 ft.		

A total of 10,443 feet of drifting was done during the year. Total cross-cutting was 588 feet.

Tons of rock hoisted.....	810,506	
Tons of rock stamped.....	764,117	
Tons waste hoisted.....	46,389	or 5.72 per cent.

The rock stamped yielded 23.19 lbs. of refined copper per ton. Last year the yield was 21.94 lbs., and the year before 22.15 lbs.

The openings made during the year show the usual amount of good ground. Construction expense was confined to the completion of work started in 1907.

Summary of Results.

Rock stamped	764,117 tons.
Product of mineral.....	25,282,145 lbs.
Product of refined copper	17,724,854 lbs.
Yield of rock treated.....23.197 lbs. per ton or 1.16 per cent.	
Cost per ton of working expenses	$1,509
Cost per ton of working expense, including taxes	1.56
Cost per pound of copper delivered, including taxes	.0772

CHAMPION MINE.

Champion is another fine mine, has solid merit and a splendid future. As age goes with mines it is young, strong, in first-class physical condition and on the road to bigger and better results. It forms a fine business enterprise and such a one as any company might take a certain pride in and be glad to own. The mine is one of the best known in the Lake copper district and a general favorite with a host of people. Only about eight years old, hence it has a long life ahead and a profitable one. This fact is assured. The property contains the lode carrying the necessary copper values and its operation is in charge of a management that is making good in every essential. Champion is near and forms the main support of the town of Painesdale on a line of the Copper Range railroad and about seven miles from the city of Houghton. It adjoins the Trimountain on the south and the Globe property on the north. Lands owned consists of 1,240 acres and carries the Baltic lode in which the mine is developed for over 9,000 feet in length.

One-half the Capital Stock issue, 50,000 shares, is owned by the St. Mary's Canal Mineral Land Company. Copper Range Consolidated owns the other 50,000 shares. In 1907 the company paid $10.00 per share in dividends or $1,000,000.

The property was opened up, developed, epuipped, put in successful operation and brought to a legitimate dividend basis with record speed. And the work was done in the most practical businesslike way. Results obtained reflect excellent management.

The following table gives the number of tons of rock treated, pounds of rock recovered per ton and the products of copper made during the past four years:

	1908	1907	1906	1905
Tons rock stamped..	794,703;	708,685;	671,785;	603,745
Lbs. copper obtained	17,786,763;	16,489,436;	16,954,986;	15,707,426
Lbs. of copper per ton rock treated	22.381	23.3	25.24	26

The comparison shows a healthy growth and a most satisfactory condition of affairs. To be sure, there is a noticeable slight falling off in the percentage of copper recovered, but with the prices that have ruled for the metal during the past year or two, rock can be stamped at a profit that would hardly pay a few years ago. Besides the mine openings are continually getting deeper and longer, and practically certain to run into some lean ground sooner or later that will bring down the percentage of copper to a lower average. However, at the present time the lode looks first rate and is in the "pink" of physical condition.

Underground openings are over 6,000 feet in length and hold an enormous amount of ground reserves containing the average values of the Baltic lode. The lode looks well all over and nowhere better than in the latest points penetrated. The product comes from various stopes and openings on different levels, but all tributary to the four shafts, each sending out its allotted quota of rock. Shafts are going down and the usual number of drift stopes are going forward into new ground, developing fresh reserves in accordance with the policy of the management. The "back-caving-filling-in" method is used for taking out the lode and it works admirably. It is comparatively safe for men and requires but little timebr. Skips counter-balance in shafts carrying from two to four tons of rock to a trip and dumps automatically on grizzles. Practically all the rock selecting is done underground.

Work done by the Champion Copper Company during the calendar year 1908:

Sinking and drifting were carried on throughout the mine.

SINKING.

	Sunk in 1908.	Total depth.	Bottom level
"B" shaft	219 ft.	1,546 ft.	13th
"C" shaft	201 ft.	1,519 ft.	11th
"D" shaft	201 ft.	1,629 ft.	14th
"E" shaft	214 ft.	1,685 ft.	14th
Total	835 ft.		

Total drifting was.....	10,216 ft.	
Total cross-cutting	385 ft.	
Tons of rock hoisted.....	854,716	
Tons of rock stamped.....	794,703	
Tons waste hoisted.....	60,013	or 7.0 per cent.

The yield of refined copper per ton stamped was 22.38 lbs., which compares with 23.36 lbs. in 1907, and 25.2 lbs. in 1906. We hope to be able to maintain the yield around 21 to 23 lbs. per ton, as at the Baltic.

The openings made during the year show a good proportion of copper ground. The area at the south end of the mine continues to hold good, and an additional shaft will soon be required.

As at the Baltic, the main items of the construction account cover the cost of completing work that was carried over from the previous year.

The management is progressive and aims to get out the best there is in the property and turn it into profitable account. While progress has been continuous and results substantial, the property is little, if any, more than its infancy, and the management plans to develop and operate it on a far larger scope than the present scale of operations.

The plant is in thorough repair and works well. Location and works are lighted by electricity. Underground and on surface, Champion is in fine physical condition and economically operated.

Richard Trevarrow, mining captain; H. F. Mercer, engineer; W. E. Kruka, clerk.

TRIMOUNTAIN MINE.

Trimountain is a fine mine and a valuable one, although results obtained during the past two or three years fell below expectations and turned out rather disappointing. But there are better things ahead for the property. It has been passing through its trial stage, so to speak,—going through a bar of poor ground,—which is nothing particularly unusual with the copper mines of the Lake Superior district. All over our best mines have had similar experiences in times past.

The property is situated about midway between Baltic and Champion mines and owns 1,120 acres of land located at Section 19, 20 and 30 in Town 54, Range 39, purchased at a cost of $800,000. Capitalization $2,500,000 divided into 100,000 shares. Par value, $25 each. Paid in $20 per share. Of the 100,000 shares issued, Copper Range Consolidated control 98,649.

Main office, 27 State St., Boston, Mass.; mine office, Trimountain, Michigan.

The following table shows the number of tons of rock treated, pounds of copper recovered per ton and the products of copper made during the past four years:

	1908	1907	1906	1905
Tons of rock treated..	334,929;	444,317;	506,924;	570,843
Refined copper produced	6,034,908;	8,207,586;	9,507,933;	10,476,462
Llbs. of copper per ton of rock treated...	18.0;	18.50;	18.76;	18.36

The mine is opened and developed through four fine shafts of large capacity. Each is 3-compartment, two of which are used for hoisting rock, the third for laderway, pipes, etc. Shafts are connected underground, at different levels, and as the deepest openings are not very far down, air circulates freely through the main works, making them comparatively cool and comfortable for working in. The product comes from the 2nd to the 15th levels and practically all over the mine from end to end. During 1908, shaft sinking and level extension will be continued vigorously and fresh ground reserves developed on up-to-date methods and put in shape for economical extraction. The new ground, it is believed, will return substantial values and pay well for mining.

Since passing to the control of the Copper Range, the mine has failed to develop such satisfactory values as the former management succeeded in obtaining. This, however, is due to the lack of equal copper contents contained in the lode at increased depth. When first opened, the mine developed ground carrying mineral values of exceptional richness in mass and barrel copper, which held down to the 7th level, and the property was opened up, equipped and put on a dividend basis with record speed.

General manager Denton, in his report to the company, says in part:

No. 1. Shaft. In this shaft the ground opened during the year on the 16th and 17th levels was poor. A strong and regular lode was found, but without copper. We have recently cut the lode in this shaft at the 18th level, and while a good-looking lode is shown, it is still without copper. However, the openings on this bottom level are too limited to show the value of the ground.

No. 2 Shaft. In this shaft a stretch of good ground was developed on the 14th level south. This was just being opened at the time of my last report. The north drift on this level in places has shown some good ground, especially at a point about half way between Nos. 2 and 3 shafts, and the drift is still showing copper. The 15th level has shown a small amount of copper ground on the south side. The north drift was not started until the good ground of the 14th level was met with, and is not yet in far enough to cut the probable extension of that good ground downwards. The 16th level has not yet shown enough of the lode to disclose its value at that depth.

No. 3 Shaft. The first decided improvement in the openings of this shaft took place at the 15th level, where first opened by the cross-cut from the shaft. At this place the lode was quite rich, and today we have a drift about eighty feet long in good ground. A little copper was found in the 14th level north of the shaft soon after starting the drift. This petered out and the level continued poor until January of this year, when copper began to show, especially in the bottom of the level, and this drift is good today.

No. 4 Shaft. The upper levels opened in this shaft have kept up to the average of the past and the lowest levels have, we think, shown an improvement. Th 11th level south developed a little copper ground. The shaft itself, which is sinking in the lode, has for the last 30 feet, been in very good copper ground. The shaft is below the 13th leve.

As during the previous two years, a great deal of dead work was done during 1908, both in sinking shafts and in exploring for copper in ground partially opened. The average of the new ground opened during the year continued to improve slowly. Since the close of 1908, however, we have had more marked improvement, especially in Nos. 3 and 2 shafts.

We shall soon have additional new levels opened in all shafts and have reason to expect a fair proportion of copper ground in them.

The construction account has been small. At the mine one electric pump was installed underground. At the mill the installation of crushing rolls was finished. A new general store building was erected at Beacon Hill and the laundry equipment of the general hospital located at the Trimountain mine was completed.

Opening work done during 1908:

Sinking.

	Sunk in 1908.	Total depth.	Bottom level
No. 1 shaft	199 ft.	1,881 ft.	18th
No. 2 shaft	219 ft.	1,831 ft.	16th
No. 3 shaft	231 ft.	1,667 ft.	15th
No. 4 shaft	219 ft.	1,319 ft.	12th
Total	868 ft.		

The total drifting amounted to	6,616 ft.
The total cross-cutting was	562 ft.
Tons of rock hoisted.....	388,682
Tons of rock stamped.....	334,929
Tons waste hoisted.....	53,753 or 13.8 per cent.

The rock stamped yielded 18.0 lbs. per ton. In 1907 the yield was 18.43 lbs. In 1906, 18.76 lbs.

Summary of Results.

Rock stamped.....	334,929 tons
Product of mineral.....	9,634,979 lbs.
Product of refined copper.....	6,034,908 lbs.
Yield of rock treated .....18 lbs. per ton, or 0.9 per cent.	
Cost per ton of working expenses.....	$1.935
Cost per ton of working expense, including taxes	2.048
Cost per pound of copper delivered, including taxes	.125

Richard Bowden, mining captain; Benj. S. Noetzel. clerk; H. F. Mercer, engineer; F. G. Coggin, mill superintendent.

COPPER RANGE RAILROAD COMPANY.

This company was organized in 1899 under the laws of the State of Michigan. Authorized capital, $5,000,000 par value, $100.00. Issued, $3,886,900.

President, William A. Paine; secretary-treasurer, Frederic Stanwood; general manager, R. T. McKeever; general superintendent, C. S. Fales; main office, Boston, Mass.; local office, Houghton, Michigan.

The Copper Range Railroad runs from Calumet to Mass City, a distance of 59 miles. It connects with the Chicago, Milwaukee & St. Paul Railroad at Mass for all points southeast and west, runs through the center of the mining district of the South Range and crosses Portage Lake at Houghton and Hancock; extends to Calumet and Laurium and will connect with the Keweenaw Central Railroad, which is building along the North Range to Lac La Belle and Copper Harbor. The Copper Range equipment is of modern type, its engines of the finest, and all passenger trains are made up of Pullman coaches. The road runs through a prosperous country and its business, both passenger and freight, is steadily increasing.

COPPER RANGE COMPANY.

The Copper Range Company was organized in 1899 to construct a railroad in the copper district of Michigan and managed to secure the rights and franchise of the Northern Michigan R. R. Company. It was afterwards reorganized under the title of the Copper Range Railroad Company. The company owned about 10,000 acres of mineral land south of the Baltic mine and furnished one-half of the land forming the Champion mine tract and on which the mine is located. The St. Mary's Mineral Land Company provided the other half.

The Copper Range Company organized and incorporated the Champion Mining Company, in 1899, and though the company's mine is practically new, it now forms one of the most valuable copper properties in the Lake district.

Included in the company's assets are 9,360 acres of land, 50,000 shares of the Champion Copper Company's stock and 26,051 shares of the Copper Range Railroad Company.

President, William A. Paine; secretary-treasurer, Frederic Stanwood.

On the 23rd of April the Copper Range Company declared a dividend of $1.50 per share.

ISLE ROYALE CONSOLIDATED MINING COMPANY.

A. S. Bigelow, president; W. J. Ladd, secretary-treasurer; Norman W. Haire, general manager; W. J. Uren, general superintendent; James E. Richards, assistant superintendent; Henry Lukey, clerk; J. T. Reeder, purchasing agent; A. G. Gulberg, superintendent construction and motive power; Edward Colenso, mining captain; J. G. Glanville, stamp mill superintendent; Eastern office, Boston, Mass.; general office, Houghton Mich.; mine office, Houghton, Mich.

The policy of expansion and a broadening out for bigger and better results for Isle Royale, entered upon by the management a couple of years ago, is followed up right along and in 1907 a great deal of practical work was dispatched all over the property. Isle Royale mineral lands form a very large tract, over 3,000 acres and carrying the Baltic and all other notable lodes south of the Portage Lake on their strike line for over two miles in length. The lode area of this large acreage is simply enormous, practically beyond computation and it contains copper bearing rock in the form of amygdaloid beds in inexhaustible quantities. Even if operated on a moderate scale, there is not a man in the world who will live long enough to see the lodes worked out. Only a small portion of these lands have been explored or investigated and no man on earth knows what copper values may lie enfolded with in the rock beds below. The more the property is investigated the better it looks. Through recent disclosures made, the present local management has become quite well convinced that Isle Royale can be opened up, broadened out and developed into a great big successful mine.

The annual report of the Isle Royale Copper Company for the year ended December 31, 1908, shows as follows:

	1908
Fine copper produced, pounds	3,011,660
Received for fine copper	13.29c
Uusold copper, pounds	**222,812
Gross value	$402,347
Other income	25,017
Total income	$427,264
Running expenses at mine	$509,124
Miscellaneous	59,990
Total expenses	$569,115
Profit	*$141,751
***Total construction	$309,460
Net deficit	$451,211
Bal. assets December 31	$501,158
Total surplus	$ 49,949

*Loss.

**Of the above amount there has since been sold up to January 31, 1909, 68,875 pounds at 14.04 cents per pound.

***Construction work in detail for the year follows:

Equipment No. 4 and No. 6 shafts, including hoisting machinery, air compressors, boilers, buildings, etc	$196,716
Railroad construction and equipment	33,687
Remodeling stamp mill	28,595
Dwelling house construction	24,349
Miscellaneous construction	7,297
Exploration work at sec. 11 and upon Baltic lode	13,259
Cash paid for land	5,557
Total	$309,460

Results for the year ended December 31, 1908:

	1908	1907
Tons rock stamped	218,940	175,450
Pounds min. obtained	4,013,590	3,614,799
P. c. refined copper in mineral	75,027	73,797
Pounds refined copper per ton rock stamped	13.8	15.2
Prod. refined copper	3,011,664	2,667,608
Cost per pound at mine ex. con.	16.91c	13.70c
Cost per ton cons.	9.65c	1.05c
Cost per pound, sm. etc.	1.99c	2.34c
Cost per pound refined copper	28.55c	17.09c
Cost per pound exp. and ad.	.44c	3.17c
Total cost per pound refined copper	28.99c	20.60c
Cost min. and Stp. per ton rock stamped	$2.33	$2.08
Cost Stmp. per ton	27.85c	32.05c

The balance sheet as of December 31, 1908, compares with previous year as follows:

Assets.

Cash and debts rec. at Boston and copper on hand sold, not paid for	$322,706	$542,999
Fuel and supplies	74,795	47,342
Lake Superior smelting stock	32,000	32,000
Cash and ac. rec. at mine	16,025	39,879
Total	$445,527	$662,220

Liabilities.

Accts. pay. at mine	$ 92,430	$ 76,217
Accts. pay. at Boston	303,151	84,845
Total	$395,581	$161,062
Bal. assets December 31	$49,946	$501,158

General Manager Norman W. Haire's remarks are as follows:

No. 2 shaft was sunk 199 feet in somewhat disturbed vein carrying little copper, and on December 31 was bottomed at the 25th level. 5033 feet of drifts, largely drift stopes were opened. North of the shaft all openings were poor; on the south they were well up to the average. A very large proportion of the product for the year was taken from this shaft.

No. 4 shaft is down to the 5th level and the plat cut. At a point about 125 ft. from the surface there was encountered a roll in the formation, which left the shaft at the 2d level 23 feet in the footwall. This distance between the shaft and the lode has been increased at the 11th level to 74 feet. These distances were determined by the underground diamond drill. The cores taken from the lode were well charged with copper. The drill has been found indispensable in situations of this kind.

No. 5 is bottomed at the 4th level and the plat cut. There was the same throw of the lode to the west at this shaft as at No. 4. At the intersection with the second level, the diamond drill proved the lode to be 28 feet from the shaft, while at the 4th level it is 51 feet away. The lode is mineralized at all points penetrated by the drill. This shaft is also being sunk with a curve toward the lode. Copper conditions are about the same as at No. 4. Rock taken from the shaft is footwall trap. The drifts show the lode to be fairly good for copper.

The present equipment is sufficient to sink the shaft to a depth of over 1200 feet. Air to run the drill will be furnished as needed from the compressors at Nos. 4 and 6. The temporary equipment at No. 5 is sufficient for all its needs during the year 1909.

No mining was done here until after the enlargement of the shaft was completed in April. During the year we cut down the shaft 259 feet, and sunk in new ground 344 feet. The shaft for its entire depth is sunk in vein-carrying copper, and is now bottomed at the 6th level.

No good results having come from the exploratory work done at "Section 12 shaft," it was abandoned early in the year. Operations with heavier equipment may be resumed at this point some time in the future.

We started this shaft in November by sinking a verticle pit in the vein near the south boundary, of section 11, about 800 feet east of the quarter post. It is on the south side of what is known as the Hussey-Howe tract. The ground was then leveled up and the shaft sunk on an incline dip of 52 degrees. We had reached a depth of 52 feet on December 31.

The vein in some places has shown a litttle copper. A diamond drill core taken from the lode in this vicinity was well mineralized. Sinking is now going on as rapidly as possible.

In order to conduct our explorations advantageously for our proposed shafts along the Baltic lode, we bought the surface of the southeast quarter of the southeast quarter of section 11, Township 54, Range 34. The fee to the mineral was already in the Isle Royale Copper Company.

Before starting to sink shaft “A” we did considerable trenching between Superior No. 1 shaft and the south boundary of the Isle Royale property for the purpose of definitely locating the lode. Geological experts have correlated the data thus secured with other explorations and feel sure that the point selected for the shaft is on the Baltic lode. The vein matter taken from the shaft appears to corroborate this opinion.

During 1908 we have had the rather unique and unprecedented experience of sinking and equipping four new shafts on one property and at the same time having only one producing shaft to furnish the mining product and bear the burden of expense for the entire operations. In addition to the above, extensive explorations at other places on the property have been under way during the entire year. Hereafter each month should show an increase in output until the mill reaches its full capacity. As indicating the upward trend of the business, the month of January, 1909, shows an increase in rock stamped of 4315 tons over the monthly average for 1908. Isle Royale is very much nearer the position of a remunerative mine than it was a year ago.

SUPERIOR COPPER COMPANY.

This property has decided merit and is one of the coming mines of the Lake Superior copper district. It is no longer an exploring proposition nor a prospect, but a mine containing decided values and undergoing systematic development for turning out a product of

copper. The property is described at some length in my previous reports and every good thing said in the works referred to touching the enterprise is making good and the very latest reports from there are distinctly encouraging. The average number of men employed is 45, two power drills are used for sinking and six for drifting. The average number of men employed is 45, two power drills are used for sinking and six for drifting. The shaft is sinking in the footwall at an incline of 53 degrees, which conforms to the dip of the lode, compared with the dip of 72 degrees at the Baltic.

Development of the mine is under the direct supervision of Mr. James MacNaughton, general manager of the Calumet and Hecla Mining Company. The directors are as follows: A. Agassiz, F. W. Hunniwell, Q. A. Shaw, Jr., R. L. Agassiz and James MacNaughton. President, Q. A. Shaw, Jr.; Secretary and treasurer, Geo. A. Flagg.

The Superior Copper Company was organized in 1904 under the laws of the State of Michigan, with capitalization of $2,500,000 in 100,000 shares, par value $25.00 each. The company has 400 acres of land in Section 15, Township 54 North, Range 34 West in Houghton County, Michigan. It is situated just east of Section 16, belonging to the Atlantic mine, which is next, and north of the Baltic Copper Mining Company, belonging to the Copper Range Consolidated group of mines. It has about one mile of the outcrop of the "Baltic" lode and has about 400 acres of surface with underlay of the lode.

Superior has two shafts, Nos. 1 and 2, although the bulk of development work has been done through and is contributary to No. 1, the first shaft started. At this writing, No. 2 is idle but it will be started up again in the spring. It is in the neighborhood of 200 feet deep.

President Quincy A. Shaw, Jr., of the Superior Copper Company issues a statement covering operations for the year ended April 30, 1909.

The cash assets and liabilities as of date April 30 were as follows:

Assets.

Cash at mine	$14,501
Cash at Boston and copper and mineral on hand	46,831
Total	61,332

Liabilities.

Bills payable at Boston and mine	25,593
Balance on hand	35,739
Total	$61,332

The above credit balance of $35,739 compares with a debit balance of $91,002 on the same date a year ago, which would indicate that the company has improved its financial condition during the year by $126,741.

President Shaw says in part: In January we began shipments of rock to the Atlantic mill and have stamped 16,836 tons, nearly all of which came from openings. We produced 579,550 pounds of mineral, equal to 374,077 pounds of copper. This showed 22.22 pounds of copper per ton of rock. The mill losses were high. It is probable that a mill especially equipped for treating this character of rock would permit of a higher extraction of copper.

We shall stamp the rock now in stamp pile and expect to increase the product from the mine.

The No. 1 shaft has been widened for two skipways and retimbered from surface to the 5th level.

The openings have shown very good copper rock in No. 1 shaft and drift. This shaft was sunk 199 feet, drifted on 2,130 feet, and crosscut 253 feet.

The shaft is now below the 11th level and the crosscut has reached the vein, showing copper.

Last year's hoisting engine widened for two skipways preparatory to future sinking.

SUMMARY OF THE OPERATIONS OF THE SUPERIOR COPPER COMPANY, FROM APRIL 30, 1907, to APRIL 30, 1908.

At No. 1 shaft sinking and drifting have been continued with satisfactory results as to the character of the lode and the amount of copper contained. The vein rock, as well as the foot wall rock in which the shaft is sunk, is much more solid and the copper contents from the fifth level down has improved, though at the seventh and eighth levels the vein is much narrower than at the sixth level, where it was about seventy feet wide. No. 1 shaft has been sunk below the ninth level, and the ninth level crosscut is being pushed, and should disclose the vein in about two weeks. The fourth, fifth, sixth, seventh and eighth levels have been driven both North and South, and have developed a block of very fair ground.

No. 2 shaft was unwatered last May and some work in drifting and cross-cutting was done to verify the location of the lode. Work was discontinued during the winter.

Sinking, No. 1 shaft, 363 feet.

Drifting, No. 1 shaft 2,626 feet; No. 2 shaft, 20 feet.

Cross-cutting, No. 1 shaft, 291 feet; No. 2 shaft, 260 feet.

A new engine has been installed at No. 1 shaft to provide adequate hoisting facilities for the increased depth, and the old hoist has been moved to No. 2 shaft.

Negotiations are in progress with the Atlantic Mining Company for the transportation and stamping of our rock. When arrangements are concluded, we shall have to lay about one and one-half miles of track to connect with their railroad, to erect a new shaft-rockhouse, and widen and retimber the upper portion of No. 1 shaft.

We have a stock pile of about 16,000 tons of stamp rock, and with the above work completed the mine will be in shape to make a small product.

We have erected during the past year a small captain's office and supply house, and six dwelling houses.

ATLANTIC MINING COMPANY.

President, Joseph E. Gay; treasurer, John R. Stanton; agent, F. McM. Stanton; superintendent, Theo. Dengler; clerk, A. D. Edwards; mining captain, John Stratton.

Capitalization $2,500,000 in 100,000 shares, par value $25 each.

Atlantic is among the widest and oldest known copper mines in the Lake Superior copper district and has a very creditable record. No effort has yet been made to re-open the workings on the Ashbed Amygdaloid, which caved in early in May, 1906. Nor has it yet been determined by the management just when the work of opening them up for fresh mining will commence. The work of investigating the Baltic lode in the company's section 16 still continues and substantial headway has been made.

The Atlantic Mining company reports for the fiscal year ended December 31 last:

Surplus December 31, 1907	$206,843
Work expenses	89,090
Expenditures N. Y. and Boston	7,855
Total expenditures	$ 96,955
Balance	$ 96,955
Surplus	$109,888

The annual report states that during the year the railroad and stamp mill was kept in commission, handling and stamping the output of the Michigan mine, and arrangements have been made with the Superior Copper company to transport and stamp the output from their property.

The balance sheet shows assets of $198,108 and liabilities of $88,221, leaving a balance of assets over liabilities of $109,888.

Surface work at the Atlantic mine during the year was made at a total cost of $34,129, and construction at the mine and mills $37,020. The total cost of exploring during the year was $88,897; construction of shaft house, engine house, etc., $9,415; diamond drill work, $1,311; total, $136,642. Less received for custom work rents, etc., $47,552, making total net expenditures at the mine of $89,000.

Frank McM Stanton, agent, in his report says that on the whole the situation is more promising today than it has been in anticipation of starting another shaft to command the northern portion of the mine. Mr. Stanton says the compressor plant has been increased, as well as the hoisting facilities, in order to take care of this additional work without causing much extra outlay of money to provide a plant for the new shaft.

The rock stamped during the year was as follows: Michigan 190,585 tons, Superior 963 tons, Atlantic (old mine) 150 tons, Section 16, 270 tons, making a total of 191,968 tons.

At the annual meeting of the Atlantic Mining company, Judge E. B. Hinsdale and Geo. T. Roessler were elected directors in place of W. C. Stuart, deceased, and C. R. Corning, resigned. At a subsequent meeting the directors organized by re-electing the retiring officers.

On Dec. 31, 1908 Atlantic exploring shaft had reached a depth of 1,786 feet or 14 feet below the 20th level.

WINONA COPPER COMPANY.

Capital stock, One Hundred Thousand Shares, Par $25, $16 per share paid in.

Officers: President, Chas. J. Paine, Jr.; vice-president, Nathaniel H. Stone; secretary-treasurer, Edward B. O'Conner; general manager, Dr. L. L. Hubbard; superintendent, R. R. Seeber. Transfer agent, American Trust Company, 53 State St., Boston, Mass. Office 713 Sears Bldg., Boston, Mass.

The annual meeting of the stockholders is held on the last Tuesday in March in every year.

Winona is practically under the control of the St. Mary's Mineral Land Company, one of the best organizations in the country. The property is in excellent hands and is well managed all over. Mine location is situated in Houghton county near the dividing line between Ontonagon and Houghton counties. It adjoins King Phillip on the North and is in the direct channel of the richest lodes mined South of Portage Lake. The company owns 1,568 acres of mineral land with the Winona amygdaloid and other mineral beds running through them for more than a mile and one -half of the strike like of the formation. Underground operations are carried on through two working shafts, Nos. 3 and 4 sunk in the Winona amygdaloid lode.

No. 3 shaft is 6x18 feet in dimensions, three compartment and 1,272 feet deep. No. 4 is 7x18½ feet in dimensions, three compartment and 852.5 feet deep. Skips operate in balance and lift 2½ tons to a trip.

Opening work for the year included shaft sinking,	512 feet
Drifting on the lode in different levels	5,001 "
Cross-cutting	597 "
Total opening work	6,110 feet

Dr. Hubbard, General manager of the property, in his report to the company says, in part:

A small amount of work also was done in the south stopes, off No. 3 shaft, at the sixth and seventh levels.

At No. 4 shaft the plat was completed at the ninth level, and double skip-road, ladder-road and 5-inch air line put in. The drills formerly in No. 3 were transferred to this shaft, where six are employed in extending the drifts at the fifth, sixth, seventh and eighth levels. The openings show rock as rich as any heretofore found in the mine, the sixth and seventh levels north and eighth level south being particularly good. The rich copper and chute appears to pitch from the sixth level north, towards the south. The average width of the lode in the different cross-cuts from the shaft is about 29 feet.

The rock-house at this shaft is completed, and if shipments be resumed in the spring the two shafts combined can soon produce 750 tons daily, and more than that amount with increased development.

The principal items of construction were the completion of the rock-house at No. 4 shaft, with crusher, motor, rock trestles, wiring for light, power and telephone, and pulley stands to engine house:

The installation, at No. 4 hoisting plant, of the motor generator set, switch board and direct current motor geared to the hoist; also lining the building with brick and providing a small boiler for heating purposes when the plant is shut down:

Also, some alterations in the warehouse, and the rebuilding of the machine and blacksmith shop.

When production is renewed, some more dwelling houses will have to be built, to accommodate the necessary increase in our working force.

The expenditures at the mine will have been reduced wherever practicable and consistent with economic development. My acknowledgements are due to my associate officers, for their efficient co-operation.

ASSETS.

Cash in bank	$19,900.46	
Supplies and Cash at the mine	34,889.77	
Accounts receivable	1,839.39	$56,629.52

LIABILITIES.

Accounts payable at Boston	$ 1,137,38	
Accounts payable at the mine	13,862.50	$14,999.88
Excess of Assets, December 31, 1908		$41,629.64

Your Directors have been considering for some time the erection of a stamp-mill on or near the mining location. Careful measurements have been made for a period of about two years of the water flow of the Sleeping River, and your General Manager and Superintendent are satisfied that there is at the site under consideration ample water to treat 3,000 tons of rock per day, which is about what a four-head stamp-mill is capable of handling under favorable conditions. The King Philip Copper Company is ready to join with your Company and pay half the cost of the proposed mill. Your General Manager has recently estimated that there was actually opened up and in sight in the Winona mine at the present time 1,400,000 tons of milling rock, or enough to keep your half of the proposed mill busy for about six years. The saving in transportation and stamping charges by treating this rock in our own mill near the location over sending it to a custom mill on the lake shore is estimated at not less than 20 cents per ton, and if the rate for stamping was the same as we paid in 1907, it would be much more. On February 3, 1909, your Directors voted to have plans and specifications drawn up for a two-head stamp-mill, and appointed a committee with power to accept the same in conjunction with a similar committee appointed by the King Philip Copper Company.

An electric hoist was installed at No. 4 shaft last autumn, and is now running smoothly and giving complete satisfaction.

On December 1st, the three drills at work in No. 3 shaft were transferred to No. 4 shaft, where there were already five drills at work. This was done to increase the extent of the openings tributary to this shaft, thereby bringing the two shafts to a more equal state of development.

ST. MARY'S MINERAL LAND COMPANY.

This is a very interesting company and is recognized far and wide as one of solid merit and of high financial standing. Its business affairs are managed with distinct success and its treasury holdings are steadily appreciating in value. The company's report for 1907 is out and like former ones issued, it makes interesting reading. It can hardly be anything but satisfactory to stockholders for the year has been a successful one all around. Assets consist of cash, broad tracts of mineral and timber lands, a large number of shares of stock of different mining companies and other industrial enterprises. No one can form any conception whatever of the real value of the company's assets as thousands of acres of lands remain unexplored and many contain mineral deposits of immense value. Indeed, it must be very singular if they do not for large tracts happen to be located well within the mineralized zone and a considerable quantity lies directly within the channel of some of the most successful mined lodes in the Lake copper district. For the past year or two, St. Mary's Company has not sold its lands for cash, preferring to take payment in shares of stocks for the lands purchased. Thus far, this policy has proved very successful and reflects excellent judgment on the part of the management. As a result, the company has built up a treasury of great value and large possibilities.

The St. Mary's Mineral Land Co. issues its annual report for the year ended Dec. 31, 1908. Receipts and expenditures were as follows:

Receipts:	1908
Cash on hand beginning year	$230,390
Champion Co. dividends	250,000
Payments for land	73,760
Notes collected	38,000
Miscellaneous	7,963
Total	$595,113
Expenditures:	
Challenge location	$ 53,500
King Philip stock	60,828
King Philip assessment	167,810
Winona assessment	1,684
Hancock assessment	40,000
Miscellaneous	33,981
Cash on hand, Dec. 31	237,308
Total	$595,113
Sales during the year were as follows:	
200 acres, in fee simple, and 160 acres mineral rights	$144,000
35.21 acres surface, min. rights to which were reserved	1,760
Total sales	145,760

The real property of the company, Dec. 31, 1908, consisted of 94,923.61 acres, besides which the

company owns the mineral rights in 14,098.82 additional acres.

The balance sheet follows:

	Dec. 31, '08
Land unsold, acres	94,923.61
Mineral rights, acres	14,098
Champion rights	50,000
Hancock shares	20,000
King Philip shares	83,905
La Salle	20,165
Copper Range shares	208
Winona shares	842
Old Colony shares	80
Mayflower shares	25,000
St. Mary's shares	640
Ojibway shares	2,000
North Lake shares	9,000
Amphidrome shares	10
Cash on deposit	$237,308

In addition the company has the Challenge location.

There are no liabilities outstanding.

President Nathaniel Thayer says:

During the past year your company has made but one sale of land of importance. This was the sale of 360 acres to the North Lake Mining Co., for $72,000 and 9,000 shares of the North Lake Mining Co. stock, stamped as having had $8 per share paid in.

An option has been granted on satisfactory terms to the Copper Range Consolidated Co., on 1240 acres of our land lying in Sections 7, 8, 9, 17, 18, Township 54, Range 34. The Copper Range Consolidated Co. has already started diamond drilling on this tract.

The exploration work at the Challenge location has been continued throughout the year with indifferent results.

The new ground opened by the Champion Copper Co. the past year compares favorably in character and extent with previous years.

General Manager Lucius L. Hubbard says:

The recent explorations at the Globe property, three and a half miles northeast of our Challenge property, show the strike of the Baltic lode at that place to be S. 31 degrees W. If the beds continue without change in strike and without material faulting, down to our location, the Baltic bed lies some 1375 feet east of the breast of our cross-cut. For this reason I believe it a necessary precaution to sink a diamond drill hole easterly from the crosscut before abandoning our search for the Baltic lode, and have made preparations to this end.

The strike of the beds three or four miles southwest of us, as nearly as can be ascertained, is North 39 degrees East and the computed strike in our openings is about North 38 degrees East, so that it is quite probable that between us and the Globe there is a change in strike that may have thrown the Baltic bed across some of the openings already made by us. As long as the drill continues in the copper-bearing series, there is a chance of finding a commercial deposit of copper even if it be not in the Baltic bed.

PHILIP COPPER CO. ANNUAL REPORT—PREPARING FOR ROCK SHIPMENTS.

The third annual report of the King Philip Copper Co. for the year ended Dec. 31, 1908, shows a surplus of $90,004, compared with $13,949 a year ago and $17,887 on Dec. 31, 1906. Expenditures at the mine were $178,611, compared with $121,134 in the previous year and $96,076 in 1906.

President Charles J. Paine, Jr., says: During the past year both shafts have been deepened and considerable drifting has been done at No. 1 shaft, where the character of the ground opened has been uniformly encouraging. At No. 2 shaft the first crosscut to the lode was at a depth corresponding to the fourth level in No. 1 shaft and found traces of copper, but not in quantities to be of commercial value. Since the first of this year we have crosscut again at the shaft at the sixth level and there found a very much better looking lode than above.

For some time your directors have been considering the question of building a stamp mill in conjunction with the Winona Copper Co. They have recently appointed a committee with power to join with the Winona Copper Co. in building a two-head stamp mill.

General Manager Lucius L. Hubbard says that by next July shaft No. 1 should have reached the 13th level, when, with adequate rock-house facilities, 18 drills could be employed in the drifts in breaking rock for shipment.

The St. Mary's Mineral Land Co. owns 83,905 out of the 100,000 King Philip Copper Co. shares issued.

WYANDOTTE COPPER COMPANY

President, Henry Stackpole; secretary-treasurer, Wm. O. Gay; superintendent, F. L. Van Orden; clerk, Wm. Van Orden; mining captain, Louis La Rochelle.

This company was organized and incorporated under the mining laws of the State of Michigan in 1899. Capitalization $2,500,000 divided into 100,000 shares, par value $25 each. The realty holdings of the property adjoins the Winona mine to the northeast and carries the Winona lode for 1½ miles in length, besides other unidentified beds containing more or less copper values.

Wyandotte is still an exploring proposition with the work well in hand and substantial progress has been made in the way of shaft sinking and driving on the formations under investigation. Operations are skillfully conducted and on lines that should bring the desired results. The property is located well within the channel of the chief lodes of the South Range mineralized beds of importance, and it is certainly worthy of a thorough trial, this, the management is doing and in a conservative, intelligent businesslike way.

The mine is opened and worked on practical mining principles and up-to-date methods. In all departments, substantial progress has been made and of the kind that

bring the desired results. The mechanical equipment is of the best, in good running order and doing first class duty. It embraces a 40-drill capacity air compressor, direct hoists with additions and fittings adequate for present requirements.

The annual report of the Wyandotte Copper company shows cash assets on hand April 1, 1909, of $73,782, compared with $35,309 on April 1, 1908.

In the annual report of the Wyandotte Copper Company, President Watson says:

Wyandotte must carry all the lodes from the eastern sandstone to the western limits of its property, including the Baltic and Lake lodes. Already we have cut six veins in our crosscut, most of them carrying copper, one having considerable heavy copper, these discoveries being made in a distance of 700 feet from the bottom of our No. 11 exploration shaft, with 2,000 feet more to drive before reaching the sandstone.

Total openings, including sinking, in the fiscal year ended March 31, 1909, aggregated 1,202 feet. Expenses at mine were $28,156. There is due the company from unpaid assessments $7,424.

F. L. Van Orden, Superintendent of the mine, in his report to the company, covering the operations for the year, says, in part:

The main feature of the exploration, to date, is to be found Lode No. 3, which was encountered in last October. This lode, located between beds of badly shattered trap, is a peculiar mixture of an amygdaloid and epidote. There is a slickenside showing a great movement on the foot-wall side of this lode, and the trap, which forms the true foot-wall, is a perfect network of Laumontite seams, which does not, as a rule, augur well for the occurrence of copper in paying quantities. Immediately on the foot-wall we find a copper-bearing seam that ranges from a few inches in width up to five feet. Drifting on this seam at first disclosed a very encouraging condition, and at times the showing of copper was spectacular.

The drift South-west on this lode was extended 129 feet, while the North-east drift was driven but 65.5 feet. Considerable copper was extracted from these drifts, but the copper-bearing portion of the lode was so narrow that I deemed it best to conserve our funds for something better.

Diamond Drilling.

In August last a diamond drill was set up 500 feet North-east of Drill Hole No. 19, for the purpose of recuting a lode that was cut in Hole No. 19, which occupies the theoretical position of the Lake Lode. While the lode carried some copper in its cores, when cut in Hole No. 19, we were not as fortunate in securing such cores from Hole No. 20. We did, however, get some fine cores of a strong amygdaloid.

Two Conglomerate beds were also cut in this hole, one of which carried a little copper. The drill hole ended in the latter Conglomerate after penetrating it 26 feet. I have left the standpipe intact, and the hole plugged, so we may deepen it at any future time, if we find it desirable. This hole, including a standpipe of 183 feet, 8 inches, was 1,514 feet, 5 inches deep when drilling ceased.

I would recommend the driving of the North-west cross-cut, on the 312-foot level, to intersect a lode that lies only 40 feet beyond its breast. The position of this lode was determined in drilling No. 7 Diamond Drill Hole, and the cores revealed a most promising amygdaloid, containing a little copper.

In closing, I wish to thank my associates for their faithful service.

ASSETS AND LIABILITIES.

Exclusive of Mine and Plant.

March 31, 1909.

Assets.

Cash and Accounts Receivable	$72,030.04	
Cash and Supplies at Mine	3,986.87	$76,016.91

Liabilities.

Accounts Payable	$28.92	
Adjustment Account	5.27	
Draft No. 263	2,200.00	2,234.19
Net surplus		$73,782.72

(There is also due from unpaid assessments $7,424.50).

ELM RIVER MINING COMPANY.

This company was organized and incorporated in the spring of 1899, under the laws of the state of New Jersey, with a capital of $1,200,000 divided into 100,000 shares, par value $12 each, fully paid and issued. The company owns 2,300 acres of mineral lard situated in the heart of the mineral range and in the line of the master lodes of the Lake Superior copper district. It is located some distance south of the Champion and north of the Winona mines in Town 52 North, Range 36 West.

The property is an exploration proposition with the work well in hand and conducted along practical, up-to-date methods. Substantial progress has been made and something good may be run into almost any time. It is well located and in the very quarter where copper values should naturally be found.

The following report of operations at the mine for the year ending March 31, 1909, is herewith submitted:

Openings.

April 1, 1908 to March 31, 1909.

No. 7 Shaft—		
Drift 1st level south	135	feet
No. 8 Shaft—		
Shaft	170	"
Crosscut west at 100-foot point	42	"
Crosscut east at 160-foot point	207	"
Crosscut west at 160-foot point	195½	"
	749½	"

In June 1908, after drifting the 1st level south of No. 7 shaft 135 feet without satisfactory results, preparations were made for sinking a vertical shaft near the center of the southeast quarter of the northwest quarter of Section 12-52-36 in order to carefully and thoroughly explore the ground lying between No. 6 conglomerate and the eastern end of our property. This shaft was sunk 170 feet from the surface, and in November two crosscuts were started at the 160-foot point—one of which was driven 195½ feet west to the conglomerate, and the other 207 feet east of the shaft toward the boundary.

Several amygdaloid beds have been cut in this work and two of them, which give promise of commercial values, will be examined later by drifting on the course of the lode after the exploratory work now being done by the east crosscut is finished. It is our purpose to continue driving this crosscut to the eastern boundary of the property.

The Treasurer's Statement which follows shows the receipts and payments for the fiscal year ending December 31, 1908.

The balance on hand January 1, 1909 was $54,760.10 which was made up of:

Cash on hand		$54,219.85
Fuel		385.19
Supplies		990.82
Accounts receivable		365.00
		$55,960.86
Less accounts payable		1,200.10
		$54,760.10

ERIE-ONTARIO DEVELOPMENT COMPANY.

The following lands are held under option by the Erie-Ontario Development Company:

Southwest quarter 28, 53, 35.

Southeast quarter 30, 53, 35.

Northeast quarter 31, 53, 35.

Northwest quarter 32, 53, 35.

H. F. Fay, president; Geo. C. Endicott, secretary-treasurer; James Chynoweth, superintendent.

This property was idle during 1908.

The company was organized in January, 1905. A limited number of shares were sold and work began on the property in February of the same year. Several amygdaloid lodes were uncovered by trenching and test pits. None of the lodes exposed by this method of operation were of sufficient value to warrant extensive mining on them. This property was operated from January to August in 1906 and 30 men were employed. The shaft was sunk 53 feet and is now 148 feet deep. Besides this, 386 feet of drifting was done in the lode and 47 feet of crosscuts driven. For lack of funds, all work on the property has been suspended.

New developments on the Baltic lode will mean just as much for Erie-Antario as for other undeveloped propositions.

The mine is equipped with necessary machinery to accomplish the amount of work laid out. Two power drills are at work sinking the shaft which is going down very rapidly.

These lands are well located on the mnieral range of what is known as the copper bearing territory which is between the eastern and western sandstones.

Undoubtedly the Baltic lode traverses these lands, and also the vast area of unexplored territory in that district, and what is now a virgin forest will at some time in the future become great mining communities where thousands of men will be employed which will add millions of dollars to the wealth of Houghton County.

KEWEENAW COUNTY MINES.

The total number of men employed in and about the mines of Keweenaw county during 1908 was 2,060.

ALLOUEZ MINING COMPANY.

Capital Stock, Two Million Five Hundred Thousand Dollars in One Hundred Thousand Shares of $25 each; $22.25 per share paid in. President, H. F. Fay. Directors: A. Agassiz, F. L. Higginson, F. W. Hunnewell, Quincy A. Shaw, Jr., R. L. Agassiz, H. F. Fay, W. L. Frost, Geo. C. Endicott, James MacNaughton of Michigan. Geo. C Endicott, secretary and treasurer. Transfer office, 60 State St., Boston, Mass.; General manager, James MacNaughton.

Allouez has been developed and put on a producing basis at record speed and the work done is of the best and most practical for bringing economical results. Though entered upon a career of production, the mine, in the Kearsarge amygdaloid, is still very young in its infantile stages but without doubt on the way to a fine mining enterprise and a notable future.

The company works the Kearsarge lode of which it owns no outcrop. Allouez's outcrop, so to speak, is 1,400 feet below the surface of the earth and all underground work, including development ground for making a product, cutting plats, laying tram reads and the multitude of fittings and adjustments incident to starting up production in a new mine, had to be done below this depth. From the start, the mine has been in excellent hands as the success achieved plainly indicates.

The annual report of the Allouez Mining company for the year ended Dec. 31, 1908, is summarized as follows:

Receipts.

Lbs. copper sold	2,047,051
Aver. price rec'd for copper	13.349c
From sale of copper	$406,753
From interest	. .....
Total	$406,753

Payments.

Work exp. at mine*	$369,646
Smelting, freight, etc.	52,863
Total	$422,509
Mining profit	**$15,756
Con. and equip. at mine	6,572
Balance	**$22,328
Cons. and equip. and ass.	***84,579
Deficit	$106,926
Prev. deficit	38,556
Deficit	$145,428

*No. 1 shaft. **Deficit.
***Construction No. 2 shaft including $1,276 for real estate.

Operating statistics for the year ended Dec. 31, 1908.

Rock hoisted, tons	233,407
Rock discarded, tons	12,502
Percentage discarded	.05356
Rock treated, tons	220,905
Mineral prod. lbs.	4,716,105
% mineral in rock treated	.01067
Refined copper lbs.	2,047,051
% refined copper in mineral	.64609
% refined copper in rock	.00690

General Manager MacNaughton says:

"From the above it will be noted that during the year 1908 there was a slight increase in the number of pounds of refined copper per ton of rock treated over that of 1907.

On January 1, 1909, No. 1 shaft was down just below the 12th level, a total distance from surface of 2598 feet. No. 2 shaft was down just below the 12th level, a total distance from surface from 2226½ feet. On January 30, 1909, the vein was encountered in the bottom of No. 2 shaft at a depth of 2307 feet from surface. At this point there is a very good showing of copper."

Treasurer's Statement.

December 31, 1908.

Deficit January 1, 1908—	
Cash	$6,154
Copper sold	109,798
Accounts receivable	1,521
	$117,474
Fuel	26,909
Supplies	40,515
Total	$184,898
Less accounts and notes payable	233,455
Deficit	$38,556

Receipts.

From sale of copper product in 1908	$406,753
Balance	$368,196

Payments.

For working expenses	$513,670
Leaving a deficit Jan. 1, 1909, of	$145,481
Which is accounted for by—	
Cash and copper sold	$78,159
Accounts receivable	620
Fuel and supplies	59,245
Less accounts and notes payable	283,506
Total	$145,482

Directors' report to the stockholders follows:

"In June, 1908, No. 1 shaft was connected with No. 2 shaft by means of the 6th level crosscut which was holed through to No. 2 at a depth of 1660 feet from surface.

"On January 30, 1909, No. 2 shaft cut the Kearsarge lode at a depth of 2307 feet from surface.

"The policy of adding to our ground reserves has been persistently followed and the end of the year-shows an increase in amount of new ground opened of nearly 25% over that recorded for 1907, and this result was secured with a very considerable saving in total expense.

"The general underground conditions have shown a gradual improvement and the recovery of refined copper per ton of rock treated has materially increased during the last few months' notwithstanding a steady decrease in the percentage of rock discarded. The rock treated all came from No. 1 shaft as No. 2 shaft did not reach the Kearsarge lode until the latter part of January, 1909. As soon as the curve in No. 2 lode is finished it will be sunk on the plane of the lode and the very large item of expense for construction of this shaft would be rdeuced by production from that point."

AHMEEK MINE.

A. S. Bigelow, president; W. J. Ladd, secretary-treasurer; Norman W. Haire, general manager; W. J. Uren, general superintendent; Russell Smith, assistant superintendent; Thomas Rapson, mining captain; John G. Bennets, clerk; A. G. Gulberg, superintendent motive power and construction; John T. Reeder, purchasing agent. Eastern office, 199 Washington St., Boston, Mass.; general office, Houghton, Mich.; mine office, Allouez.

Capital Stock, $1,250,000 in 50,000 shares of $25.00 each.

The good things froecasted for Ahmeek in my previous reports are showing up in tangible, substantial form and the mine is well on the way to notable, profitable career.

The property is young and the management is opening up the underground department and developing it on methods that promise to bring the very best results. Its future as well as its present welfare is considered. Modifications are now going on underground that will, it has been pretty well demonstrated, lead to a perceptible reduction in rock handling costs when completed and in operation. The "milling" system or a modification of it, which has proved so successful in the iron districts and elsewhere, is to be given a trial in Ahmeek and there is no apparent reason why it should not work well in a copper mine and result in reducing somewhat the cost of conveying the rock product from the stopes to the shafts. Tramming is done much cheaper in the iron districts than in the Lake Copper Country, and the method is certainly worth giving a fair trial. Of course, there is considerable difference in handling the product of a copper mine with its narrow lode and that of an iron mine with its great, wide deposit of iron ore.

Ahmeek has a record of which any management may be proud for it is certainly one of the best that has come under my observation in an experience of over forty years. From the beginning, the property has been very skillfully operated and managed practically to perfection.

The following report is issued by the Ahmeek Mining Co., for 1908, which compares with period from Aug. 1, 1902, to Dec. 31, 1907:

	1908	1902-7
Copper sold	$ 779,130	$1,529,912
Copper unsold	**70,017	239,006
Total	849,147	1,768,919
Balance of int. receipts & other inc.	8,501	25,072
Total	857,648	1,793,991
Running expenses at mine	563,090	1,111,358
Smelting, transportation, commissions, and all other charges	70,296	125,551
Total	633,387	1,236,909
Gross profit from operations	224,261	557,082
From which deduct:		
Construction and improvement expense	161,975	438,870
Stamp mill site	84,640	.....
Net profit	*22,355	118,211
Instalment of $5 per share paid 1904	.....	250,000
Balance of assets Dec. 31	363,216	385,571

*Loss.

**491,351 pounds estimated at 14¼ cents a pound.

Sales of copper in 1908 aggregated 5,788,890 pounds, at an average price of 13.46 cents a pound.

Operating statistics follows:

	1908	1902-7
Rock mined, tons	400,240	736,065
Rock stamped, tons	298,178	582,453
Mineral obtained, pounds	8,029,690	13,998,350
Refined copper produced, pounds	6,280,241	10,518,136
Percentage copper in mineral	78.21	75.138
Lbs. ref. cop. per ton rock stamped	21.1	.....
Total cost per lb. ref. copper	12.66	.....
Tot. openings, all classifications, ft	9,575	18,758

The balance sheets as of Dec. 31 compare:

Assets:	1908	1907
Cash and accounts receivable in Boston	$ 444,559	$ 418,264
Cash and accounts receivable at mine	12,289	10,768
Supplies and fuel	48,378	43,848
Total	505,227	472,881
Liabilities:		
Accounts payable at mine	118,642	74,417
Accounts payable at Boston	23,367	12,892
Total	142,011	87,309
Balance of assets	363,216	385,571

General Manager Norman W. Haire, in the annual report of the Ahmeek Mining Co., says:

At the present time the Tamarack mill is handling the greater portion of Ahmeek tonnage. On account of lack of stamping facilities, Ahmeek's output of stamp rock was limited to a monthly average for the year of 24,848 tons.

The work under ground was directed chiefly to new openings, preparatory to mining on a large scale as soon as the new mill is in commission; consequently the proportion of new ground and more expensive development, as compared with actual stoping, was exceedingly large. With a modern mill and all parts of the mine working at full capacity and in proper proportion, we may expect to bring down the cost of handling the product to a very reasonable figure.

The percentage of mineral in the rock has been steadily improving since the middle of the year. The smelter returns of refined copper have thus far been excellent, both for quantity and quality.

Three hundred feet south on the 5th level of No. 1 shat a seam of Mohawkite has been encountered, varying from 4 to 12 inches in thickness. The same seam was again opened up at the 6th and 7th levels and again in the shaft between the 7th and 8th levels. It appears to be very persistent. Fifteen hundred feet south of No. 1 shaft in the 5th level another seam of the same kind of ore was encountered, varying from 2 to 12 inches in thickness. In extending the drifts through this seam 30 tons of Mohawkite were taken out and stored on surface. Assays show that all this material runs over 60% copper. When time permits, further attention will be given to these fissure ore veins.

In October, at Tamarack city, on the west shore of Torch lake, we purchased a commodious site for a stamp mill, including right of way and approaches to railroads, water frontage, 16 dwelling houses and sufficient land for future expansion. Excavations for a four-head mill have already been completed and the foundations are well under way.

It is our aim to have two heads of this mill in operation before the close of the present year; the others to be finished soon thereafter. When completed the mill will treat easily 2800 tons of Kearsarge amygdaloid rock per day. As the mine expands there is ground room to enlarge the mill to more than double this capacity.

MOHAWK MINE.

Office, 15 William St., New York.

Capital Stock, $2,500,000 in 100,000 shares of par value $25 each.

Officers: Joseph E. Gay, president; J. R. Stanton, treasurer; J. W. Hardly, secretary; Fred Smith, agent; Will G. Smith, superintendent; Frank Getchell, clerk; John Trevarrow, mining captain; William Hartmann, engineer.

As age goes Mohawk is a young mine with solid merit and steadily improving in physical condition and producing capacity. It still holds the distinction of being the heaviest copper producer and only dividend payer in Keweenaw county. Underground operations are conducted through 5 shafts sunk in the vein, substantially constructed and in first-class running order. Shafts are connected underground at many places and air circulates freely through the openings, making the mine airy, cool and fairly comfortable for men working below the surface.

I have visited this mine on different occasions, but never without being favorably impressed with its general appearance and the smooth, efficient manner in which each department connected with the mine was running. About every department appears to be going along practically to perfection and doing satisfactory duty. Everywhere, care and efficiency are reflected and nothing whatever seems to be overlooked, no matter what its significance may be.

Underground operations at the Mohawk are conducted through five shafts numbered from north to south but operations have been started to sink another shaft to be known as No. 6. It is located 266 feet south of No. 5.

During 1908 the shafts were sunk as follows:

No. 1, 167 feet to a point below the 17th level.

No. 2, 195 feet to a point below the 17th level.

No. 3, 140 feet to a point below the 13th level.

No. 4, 137 feet to a point below the 13th level.

No. 5, 103 feet to a point below the 8th level.

Total shaft sinking for the year, 742 feet.

Total drifting for the year 11,927 feet.

All five shafts are connected with development work going on all over in accordance with the policy of the management.

A two years' comparison of detailed costs, rock, treated, etc., follows:

	1908	1907
Rock hoisted, tons	189,694	474,361
Rock stamped	685,823	640,777
Product of mineral	13,310,820 lbs.	13,164,360 lbs.
Product refined copper	10,295,881 lbs.	10,107,266 lbs.
Pounds copper, per ton	15.01 lbs.	15.77 lbs.
Cost per ton rock hoisted	$1.252	$1.326
Cost per ton rock stamped	$1.442	$1.54
Total cost per pound refined copper including construction	10.755 cents	11.747 cents

The Directors present the following report of the operations during the year 1908:

RECEIPTS.

Sales of copper, 10,295,881 pounds, at 13.43 cents		$1,382,731.05
From interest		1,433.71
		$1,384,164.76

EXPENDUTURES.

Working expenses at mine	$988,965.63	
Smelting, freight, cost of marketing, and all other expenses	96,624.50	
		1,085,590.13
Mining profit in 1908		$298,574.63
There was expended for construction		21,796.11
Making a net gain in 1908		$276,778.52
Surplus December 31st, 1907	$557,821.36	
Less dividend July 10th, 1908	250,000.00	
		307,821.36
Net surplus December 31st, 1908		$584,599.88

GRATIOT MINE.

This Is a Keweenaw property and a subsidiary of the Calumet & Hecla Mining Company. Fifty men are employed. It is well located and adjoins the Mohawk mine on the north and Ojibway on the south. Lands owned form a long tract carrying the outcrop of the Kearsarge lode for practically its entire length. Two shafts are going down and there is room enough for a couple more without any crowding. I visited the property last winter and saw some nice looking copper rock hoisted out of the mine. It resembled very strongly the copper rock form No. 1 shaft of the Mohawk mine just a little to the south. It was well charged with mineral such as Kearsarge lode is noted for. Stamp copper showed up quite plainly as well as small horns. Gratiot is a developing proposition with the work well in hand and conducted on scientific principles and up-to-date methods. Shafts are sinking down and the lode reserves are being developed and put in shape for making a product of copper rock. Work is carried on in the right way to bring practical results and such as count. There is a method in everything done. All work is under the direct management of Mr. James MacNaughton, general manager of the Calumet & Hecla Mining Company.

SUMMARY OF THE OPERATIONS OF THE GRATIOT MINING COMPANY, FOR THE YEAR ENDING APRIL 30, 1098.

In conformance with the terms of the agreement between the Calumet and Hecla Mining Company and Bacon & Jacob, et al, the Calumet and Hecla Mining Company has acquired during the past year the 50,100 shares of Gratiot stock held under option, and operations have since been conducted by your Company.

During the past year No. 1 shaft has been sunk 550 feet, making a total depth from surface of 647 feet. Drifts on the first, second, and third levels have been started and driven a total of 477 feet.

No. 2 shaft has been sunk during the past year 486 feet and has reached a depth of 736 feet. Drifts on the first, second, third and fourth levels have been driven a total of 1,112 feet.

The vein has flattened slightly in the lower levels, and No. 2 shaft is now in the foot wall. The balance of the openings show a good character of vein rock, with fair copper values.

No addition has been made to the surface plant.

For the Directors,
QUINCY A. SHAW, JR.
President.

CASH ASSETS AND LIABILITIES APRIL 30, 1908.

ASSETS.

Cash at Boston Office	$ 491.56
Cash at Mine Office	11,721.45
	$12,213.01

LIABILITIES.

Notes and Bills Payable at Boston and Mine....	$80,867.35
Debit Balance	$68,654.34

KEWEENAW COPPER COMPANY.

Office, 45 Broadway, New York. Capital stock, $2,000,000. $10.00 per share paid in; $25 per share par value.

Officers: C. A. Wright, president; Thomas Hoatson, second vice-president and mining director; Spencer R. Hill, vice-president; C. A. Wright, Jr., secretary and assistant treasurer.

The property of this company is located in Keweenaw County.

During the year under review, a heap of practical work was dispatched and substantial progress made both at the mine and with the Kewenaw Central Railroad. All the railroad stock, and it forms a valuable asset, is owned by the Keweenaw Copper Company.

In the mining department, all work or practically so, was confined to the company's Medora shaft.

During 1908 the management made a test run on the Medora rock at the Phoenix mill for a few months, stamping about 100 tons of rock per day. The test, however, was made for the especial purpose of determining the value of the rock under different conditions.

The following is a copy of President C. A. Wright's report of operations for Keweenaw Copper Company for 1908.

The development work of this company, excepting a small amount of prospecting and exploration has, during the year 1908 been confined to openings from the Medora Shaft, and principally in the amygdaloid belt of that name, though a very limited amount of drifting and stoping has been conducted in the "North" amygdaloid belt, and the "West" fissure vein. In connection with this work a portion of the rock hoisted since July 28th, has been stamped at the mill of the Phoenix Consolidated Copper Company, which was released for the purpose of testing the copper contents of the rock from the lodes which are being developed by this company. The mill has done its work well, but thus far the Medora amygdaloid has not met expectations, and the greatest encouragement is derived from the "West" fissure vein which apparently widens and carries more copper as depth is obtained. It is possible that the Medora and "North" amygdaloids may also improve with depth, and it is the opinion of the directors that sinking of the present shaft should be continued to determine this question, as well as the value of the "West" fissure vein. The shaft is located in just the right place to accomplish these purposes, and some improvement in the lower levels warrant the effort being made. It is also expected that some exploratory work will be undertaken on the Calumet conglomerate, the Osceola amygdaloid, and the Kearsarge amygdaloid, during the present year.

Of late good rock is being produced from the "North" amygdaloid belt, and the Superintendent's report for last month states as follows: "The North lode near the West fissure continues to produce the best rock. The copper bearing ground is about 15 feet wide here and carries up the conglomerate.

During the past year the shaft has been sunk 300 to a depth of 1,307 feet; 4,474 feet of drifting and 255 feet of cross-cutting have been done, making the total at the end of the year 8,747 feet of drifting and 585 feet of cross-cutting. A rock house and five double dwelling houses were erected at the mine.

The Keweenaw Central Railroad, whose capital stock is owned entirely by this company, has been built and equipped at a cost of about $800,000. It has forty miles of track, including sidings, and its equipment consists of 82 freight cars, 7 passenger coaches, and 4 locomotives. The road connects at Calumet with the Copper Range Railroad, and is furnishing the necessary transportation facilities for the mining developments of this and other companies.

STATEMENT OF ASSETS AND LIABILITIES OF THE KEWEENAW COPPER COMPANY, DECEMBER 31, 1908.

ASSETS.

Real Estate	$1,290,204.67
Stock, Keweenaw Central Railroad Company	500,000.00
Other Investments	59,562.42
Cash	48,354.48
Due from Keweenaw Central Railroad Company	188,075.00
Accounts Receivable	61,927.97
Supplies at Mine	12,205.36
Copper on Hand	5,781.37
Development and Construction prior to 1908	301,418.99
Construction during year 1908	22,003.37
Explorations during year 1908	1,263.30
Expenses at Mine during year 1908	123,544.33
Other Expenses and Taxes during year 1908	17,349.74
	$2,634,691.00

LIABILITIES.

Capital Stock	$2,600,000.00
Accounts Payable at Mine	17,405.29
Accounts Payable at New York	452.00
Copper Sales	16,833.71
	$2,634,691.00

The last assessment levied on the shares of the Phoenix Consolidated Copper Company was not paid up very fully by the stockholders, as there remains unpaid $68,255. In 1907 the Keweenaw Copper Company obtained control of the Phoenix and since that time the latter corporation has leased to the former or parent company its stamp mill at an annual rental of $5,000. W. A. Dunn who was formerly superintendent of the Phoenix property, in a letter to C. A. Wright, president of the company, says that he had great faith in the Ashbed lode. "I am confident," he writes, "if you will make a mill test of this lode the results will be sufficiently satisfactory for you to go ahead and make a profitable mine of the Ashbed. With the improved methods of mining and milling rock there is no doubt in my mind that the Ashbed on the Phoenix would pay well to operate. The Ashbed lode appears to be about twenty feet wide and is situated so close to the stamp mill and is so easily mined and broken that it can be developed at very low cost and I believe that a recovery of from eighteen to twenty pounds of refined copper to the ton of rock stamped may confidently be expected."

OJIBWAY MINING COMPANY.

Capital stock $2,500,000 in 100,000 shares of $25 each, of which 84,000 shares has been issued.

President, Dr. L. L. Hubbard, Houghton, Mich.; vice-president and treasurer, Chas. A. Duncan, Duluth, Minn.; secretary, Frederick R. Kennedy, Duluth, Minn.; general manager, Dr. Hubbard, superintendent, Andre Formis; main office, Houghton, Mich.; mine office, Mohawk, Mich.

This is a new company organized in 1907 with mineral rights under 1,240 acres of land located in Keweenaw county. The property adjoins the Gratiot mine of the Calumet & Hecla Mining Company on the north and is about six miles from the town of Calumet. Lode to be worked is the Kearsarge amygdaloid from which a number of rich cores were secured in the company's land by the diamond drill. This formation is quite generally recognized as the "mother lode" of the mineral bearing amygdaloid beds north of the Portage Lake. It is certainly a lode of great strength and persistency and carries substantial copper values characteristic of the Lake Superior district. On its strike line, in different properties, this lode is now under development for a distance of over 10 miles in length. Ojibway is well thought of by some of the best people on the Upper Peninsula and recognized as a young mine of much promise and that may pay well to keep in view. Though the diamond drill cores came from the borings 1,200 feet apart, they showed much uniformity in general characteristics and were quite heavily filled with strong copper. Underground development work is conducted through two shafts known as No. 1 and No. 2. Both are 7x19 feet in the clear, three compartment, four-foot ladderways in north ends. Shafts are sunk 70 feet horizontally in the footwall from the lode.

Superintendent Formis, in his annual report says, in part:

No. 1 Shaft.

Sinking started October 10th, 1907, and the ledge was found at a vertical depth of 24 feet. At the end of the first fiscal year the shaft reached a depth of 158 feet; at the end of the second fiscal year its depth is 821 feet. Shaft plats were cut and timbered, one at the 500 and the other at the 650 ft. level. Cross-cuts were then driven through the east and west lodes. During the summer of 1908 the shaft collar was concreted for a depth of 100 feet; our surface water was thereby cut out and the pumping reduced to about fifteen per cent. of the previous amount.

No. 2 Shaft.

No. 2 shaft was started on August 8th, 1907; it reached the ledge at a vertical depth of 32 feet. At the end of the first fiscal year the shaft had reached the 300 ft. level; at the end of the second fiscal year it is 864 feet deep. Shaft plats are cut and timbered at the 350, 500, 650 and 800 ft. levels. Crosscuts were driven through the lode on these levels, excepting the last one, which is not yet completed. The lode was drifted upon on the 350 ft. level only. The collar of this shaft was concreted in the summer of 1908, making the shaft practically water-tight. The concrete extends to 125 feet from surface.

Development Work.

Nos. 1 and 2 shafts, size 8 ft. by 19 ft., dip 83 degrees.
Two standard gauge skip tracks and a four-foot ladder-way.

	No. 1 Shaft.	No. 2 Shaft.	Total
Overburden,	24 feet (vertical).	32 feet (vertical).	
Depth, May 1st, 1908,	158.5 feet (inclined).	350 feet (inclined).	
May 1st, 1909,	821.5 feet "	864 " "	1685.5 feet.

Crosscuts.

500 ft. level, 34 feet.	350 ft. level, 120 ft.	
650 ft. level, 30 feet.	500 ft. level. 116 ft.	
800 ft. level,	650 ft. level, 85 ft.	
	800 ft. level, 30 ft.	
Total, 64 feet.	351 ft.	415 feet.

Drifting on Lode No. 2 Shaft.

350 ft. level South,	84.5 ft.	West lode.
North,	65.5 "	" "
North,	20.5 "	East lode.
	170.5 "	

No. 1 Shaft.

In this shaft the lower copper bearing horizon was encountered about two feet in the hanging of the shaft, and is called the East lode. The East lode is from 24 feet in width on the 500 foot level to 17 feet on the 600 foot level and contains copper on both levels. The west lode was reached by crosscutting through 17 feet of trap rock. The west lode is 17 feet wide horizontally on both levels and contains copper. The rock in which the shaft is sunk in is hard and firm and remains without timber supports.

No. 2 Shaft.

On the 350 foot level the east lode was reached 60 feet from the shaft and found to contain heavy copper for about six feet in width. The west lode was reached 95 feet from the shaft and found 23 feet wide. It contains copper in both the north and south drifts. On the 500 foot and 650 foot no east lode was encountered, but the west lode on both levels showed about the same character as in the 350 level. The shaft is in course grained trap, firm and solid throughout, and stands without timber supports.

CURRENT ASSETS AND LIABILITIES, APRIL 30th, 1909.

ASSETS.

Bills Receivable	$ 64,230.00
Cash	38,437.58
Accounts Receivable	1,280.34
Supplies	16,677.19
	$120,625.11

LIABILITIES.

Vouchers Payable	6,532.25
Assets in excess of Liabilities	$114,092.86

RECEIPTS AND EXPENDITURES, May 1st, 1908 to April 30th, 1909.

RECEIPTS.

Cash on hand May 1st, 1908		$32,501.11
Subscriptions	$193,230.00	
Interest	3,174.42	
Bills Receivable	20,000.00	216,404.42
		$248,905.53

EXPENDITURES.

Operating Expense	$87,256.95		
Construction Account	41,117.03		
Office, General and Legal Expenses, Salaries, Postage, etc.	7,205.99	$135,579.97	
Bills Receivable bearing interest		84,230.00	
Decrease in Vouchers Payable		2,077.44	
		$221,887.41	
Less.			
Decrease in Supplies	$11,088.59		
Decrease in Accts. Receivable	330.87	11,419.46	210,467.95
Cash on hand April 30th, 1909.			$38,437.58

SENECA MINING COMPANY.

Office, Boston, Mass.; Capitalization, $500,000 per value $5 each. Lands are located North of Mohawk and Ahmeek mines. Lands consist of 1,800 acres situated in Keweenaw County and undoubtedly hold important values. This property has been idle for many years, but the management has planned to sink two shafts there during the coming summer. In 1907 a wagon road was completed connecting the property with the county road. A cross-section of the property was also diamond rilled and sites fixed for the new shafts. The property holds the underlay of the Kearsarge lode embracing a large area, and development there will be watched with considerable interest.

Seneca management is now sinking a permanent shaft and one of the finest in the copper district, perhaps in the world. It is concreted from brace well down into the settled formation or bed rock. The shaft is 9 feet 2 inches by 19 feet 3 inches in dimensions, three Compartment and 300 feet deep. About 40 men are employed.

A. S. Biglow, president; W. J. Ladd, secretary-treasurer; Norman W. Haire, general manager; W. J. Uren, general superintendent; Russell Smith, assistant superintendent; J. G. Bennets, clerk; A. G. Gullberg, Superintendent motive power and construction; J. T. Reeder, purchasing agent. Eastern office, 199 Washington St., Boston, Mass.; general office, Houghton, Mich.; mine office, Allouez, Mich.

Calumet & Hecla Mining Company now has control of the Seneca mine.

Miskawabic, Arnold, Humboldt, Meadow and Ashbed mines were idle during 1908.

ONTONAGON COUNTY MINES.

The number of men employed in and about the mines of this County during 1908 was 906 or thereabouts.

It Developments in the new copper bearing belt of the Lake Copper Company's property and which is now recognized as the Baltic lode have resulted in reviving fresh interest in the Ontonagon district. The belief is now more general than it has been before in years that there be a number of copper bearing lodes in the County which have never received a systematic, practical test and which may, if given a fair trial, be proved to contain profitable values and under up-to-date methods be developed into substantial mines and fine business enterprises.

NORTH LAKE MINING COMPANY.

This company was organized Aug. 22nd 1908 under the laws of Michigan. Capitalization $2,500,000 par value $25 per share. 100,000 shares. $8.00 per share paid in. Lands consist of 1,120 acres in sections 28, 29, 32 and 33 Ontonagon County, and adjoins the property of the Lake Copper Company on the north. President, Stephen R. Dow; Secty. and Treas., Alvin R. Baily. R. M. Edwards, Superintendent. Office, 50 Congress St., Boston, Mass., Mine Office, Greenland, Ontonagon Co., Mich.

At the annual meeting of the North Lake Mining Co. directors were re-elected.

The treasurer's report as of date Dec. 31, 1908, is as follows:

Receipts—	
Sale of 34,000 shares stock at $8 per share	$272,000
Interest to Jan. 1	3,784
Total	$275,785
Expenditures—	
Mine account	5,000
Sundry expenses to Jan. 1, '09	3,732
Total	8,732
Balance	267,051

Boston—At the annual meeting of the North Lake Mining Co., Supt. R. M. Edwards, said:

Some of the best ground at the Lake mine is now being found at the extreme north end of the second level drift, or in the direction of the North Lake lands. Two complete cross sections will be made on the North Lake property, about 8500 feet and 9500 feet long respectively, which when finished will accurately determine the strike and dip of all lodes crossing the property.

Diamond drill hole No. 1 was put down to a depth of 412 feet, but had to be abandoned without reaching the ledge, it being impracticable to advance the casing pipe any further.

Hole No. 2 was put down vertically 900 feet, encountering the ledge at 292 feet and immediately entering the eastern sandstone in which it continued to the bottom. This proves that the ground to the southeast of this hole is underlain with sandstone.

Hole No. 3 was started on an outcrop, and is now down 1050 feet. This hole has passed through the two conglomerates which are known to cross the Lake and Adventure properties under the Evergreen series and proves their position on North Lake.

The 1500 feet underlying the second of these conglomerates has never been explored on the Lake property, but on the Adventure several copper-bearing lodes have been located in this horizon. It is roughly estimated that drill hole number 3 should pass through the first of these lodes within the next 100 feet, and if possible the hole will be continued deep enough to cut the Lake lode at depth. This will be a very interesting exploration, as the depth at which Lake lode should be encountered will be something over 2000 feet.

Hole No. 4 is being sunk vertically and is now down 50 feet in the overburden. Apparently it is near the ledge. Assuming the Lake lode to lie at the same distance under the conglomerates at North Lake as it does at the Lake location, No. 4 drill hole should strike the ledge in the vicinity of the outcrop of the Lake lode.

LAKE COPPER COMPANY.

Officers and directors; Reginald C. Pryor, William D. Calverley, B. F. Chynoweth, John H. Rice, R. M. Edwards, Deen Robinson and E. M. Ingram.

The Lake Copper Company was organized in November, 1905, under the mining laws of the State of Michigan and was capitalized for $2,500,000 divided into 100,000 shares of par value of $25 each. The property owned by the Lake Company was formerly the Old Belt of Ontonagon county, but reorganized and incorporated for the purpose of acquiring, exploring, developing and operating this property. The realty holdings of this company consisting of 720 acres, are large and located in the direct line of the principal copper bearing lodes of the Ontonagon district. The Knowlton, Evergreen and other lodes stretch through the lands of the company for over a mile in length and shafts can be sunk on them to great depth and worked on a large scale.

During 1908 operations were confined to the "new lode" which is without doubt the southern continuation of the Baltic lode for it resembles that formation in practically every particular. It is from 40 feet to 60 feet wide, quite well filled in with similar grades of mineral as those recovered in the Baltic, Champion and Trimountain mines and reflects all the chief characteristics that denote continuity and future productiveness. The company's property is certainly one of distinct promise and will likely develop into a very substantial mine.

On an average about 35 men are employed with three power drills in operation. Development work last year

consisted of shaft sinking and drifting. The shaft was sunk 330 feet and is now down well on to 500 feet deep. Drifting done amounted to 830 feet into virgin ground which looks first rate and will make good stoping. Mechanical equipment was strengthened by the installation of a new 15 drill capacity air compressor which will be adequate for requirements for some time in the future.

Operations are conducted in a conservative, practical way and for the best interest of the company. The management is up-to-date and the progress made is of the right kind and such as will bring the best results in the long run as well as for the immediate future.

The showing throughout the ground investigated during 1908 is very satisfactory and I am officially informed that the lode in the deepest openings will compare quite favorrably with any portion thus far exposed.

The policy mapped out by the management is to sink the shaft down to substantial depth and prove up the belt in a practical, business-like way. The company is made up mostly of local people know copper rock and copper mining. Operations will be conducted along practical lines and the best way for getting results. The outlook for the property looks decidedely promising and it will be given a trial on modern methods of mining.

William Wearne, mining captain; R. C. Pryor, manager.

ADVENTURE CONSOLIDATED COPPER COMPANY.

This company was organized under the mining laws of the State of Michigan, October 17, 1898. Capital stock $2,500,000 in 100,000 shares of $25 each.

James L. Bishop, vice president; Wm. R. Tood, secretary-treasurer; W. A. O. Paul, assistant secretary-treasurer; Chas. L. Lawton, general superintendent; C. K. Hitchcock, superintendent. Main office, No. 32 Broadway, New York; mine office, Greenland, Mich.

Adventure Consolidated is one of the oldest mines in the Ontonagon district, and in early days formed quite a factor in the copper district. Mine location is situated at Greenland, Mich. in Sections 35 and 36, Town 51 and Range 39, and in Sections 1 and 2, Town 50 and Range 39 and consists of 1,706 acres of mineral land besides a mill-site of 320 acres on which the company has practically a new stamp mill. Adventure's annual report shows financial exhibits, as of December 31, from which the following table is summarized:

Expenditures.

Mining, smelting, etc.	$43,733
Diamond drilling	30,823
	$74,556

Receipts.

Copper and interest	$14,669
Deficit	$59,887
Assets Jan. 1, 1908	115,610
Assets Jan. 1, 1909	55,723
Cash, copper and receivable	53,054
Supplies	10,255
	$63,309
Accounts payable	7,586
Assets (as above)	$55,723

Here are extracts from the report of General Manager C. L. Lawton.

"Because of the continued low price of copper, it was deemed advisable to cease copper rock shipments at the end of January, 1908. Four machines were kept at work drifting, chiefly on the 8th level east, to open the ground under No. 4 shaft; and on the 10th level west, to open ground under No. 1 shaft; and also on the 12th and 31th levels, west, to open the copper-bearing run of ground under No. 2 shaft at the greatest possible depth. During four months there were drifted with the four machines 1,289 feet, or an average of 80½ feet per machine per month. The drifting disclosed ground that was of about the mine's average, and it was therefore decided to stop all underground work for the time being.

"Explorations by means of the diamond drill has been carried on by two outfits. This has given great encouragement, so that it seems to indicate that the property is crossed by two, and possibly by three, copper-bearing lodes. It has given a cross-section of the property from 500 feet north of the Knowlton lode to the southern boundary. It is impossible at present to say whether any one of these lodes is the continuation of that found at the Lake mine, but so far as can be judged from the geological features, it is not unlikely that this Is the case.

"A hole, which in point of succession was the fifth drilled, was started south from the Evergreen lode on the 6th level at No. 3 shaft on an angle so as to cut through the formation at right angles. There was a large gap between it and the location of No. 1 hole at Peppard, which gap it was purposed to explore. No. 5 hole was put down 1,574 feet and at 1,252 feet cut an amygdaloid which gave a considerable core of heavy copper. Because of the depth at which it was cut, and the poor coring qualities of the rock, it is impossible to tell just how wide the vein is, but the heavy copper core, which shows considerable loss due to grinding, aggregates nearly two feet.

"Meanwhile, hole No. 1 at Peppard had gone to a depth of 1,902 feet and stopped. No. 6 hole was then located at a point on the surface, so that it parallelel the hole underground at a distance of nearly 1,000 feet to the east of it. This hole showed only a small amount of copper in the copper-bearing lode cut by No. 5 hole, and known as No. 1 lode; but it cut No. 2 lode at 1,390 feet, in which considerable copper was shown; and No. 3

lode, showing well in what seems to be both mass and stamp copper was cut at a depth of 1,680 feet.

"With this encouragement, therefore, another hole, No.7, was located 1,500 feet west of No. 6 hole, or 500 feet west of the No. 5 or underground hole. It cut the same measures at approximately the same depths, but little copper was shown in any of the lodes, the best showing being from No. 2 lode. This result made it desirable to test this No. 2 lode again, which was done by putting down a vertical hole far enough south to catch it near its outcrop, but the findings of this hole have been perplexing. Two amygdaloids showing copper were cut, which may be the same as lodes No. 2 and No. 3 in the other holes, but it is impossible to say this at present with certainty. This hole was stopped at a depth of 1,493 feet.

"Hole No. 9 was located midway between No. 6 and No. 8 and was put down vertically 335 feet. It cut lode No. 1, but no copper was found at this point. Hole No. 10 was next started on an incline, a distance of 500 feet east of No. 6, which it is expected to parallel, just as did No. 7. No results can yet be announced.

THE MASS CONSOLIDATED MINING COMPANY.

Main office, No. 6 Beacon St., Boston, Mass.; Mine office, Mass City, Mich. Capital stock $2,500,000 in 100,000 shares of par value of $25 each. Capital paid in $1,900,000.

Officers: Vice-president, Geo. A. Dodge; secretary-treasurer, Wilfred A. Bancroft; mine superintendent, James M. Wilcox; clerk, W. H. Brown; engineer, E. F. Douglass.

City, Mich. capital stock $500,000 in 100,000 shares of par value of $25

Lands owned by the company consist of 2,400 acres stretching almost across the entire mineral belt and must, of necessity contain practically every copper bearing lode existing in the Ontonagon district. The company is mining the Knowlton and Evergreen lodes through four substantial shafts known as "A", "B", "C" and "D". These lodes are strong, healthy formations and well defined, but low grade and irregular with the copper values making in pockets separated by bars of lean ground. In some parts of the mine, these pockets of copper Hare found close together while in other places again they are wide apart.

Mass is opened and developed through three working shafts, “A” “B” and “C”. All are three compartment. “A” shaft is 1,757 feet deep. “B” shaft is 1,857 feet deep and “C” shaft is 1,000 feet deep. Skips operate singly, carry two tons to a trip and dump automaically on grizzles. Rockhouses are construced on practical lines and the rock product is handled there for low costs. Method in vogue for taking out the product vary, but the best one known for doing the work is used.

The Mass management is now opening up for investigaion an un-named lode which underlies the Evergreen belt. It is an amygdaloid with strong characteristics and looks quite promising. The formation seems to be a stampmill proposition and enriched with a good grade of mineral from foot wall to hanging wall. Its width is about 12 feet. I am told that the lode outcrops on the side of the hill just above the old stampmill site and that a little work was done on it by tributors in early days.

The annual report of the Mass Consolidated Mining company for the year ended Dec. 31, 1908, shows as follows:

Copper receipts	$238,609
Silver and other receipts	1,910
Total receipts	240,519
Mine and mill expenses	191,845
Smelt. freight and commission	16,196
Freight on rock and minerals	90,329
Diamond drill expense	25,977
Miscellaneous expenses	20,064
Total expenses	$289,411
Deficit for year	46,892

On Jan. 1, 1909, the company had cash assets on hand compared of $47,276, compared with $94,167 on Jan. 1, 1908, and $153,541 on Jan. 1, 1907. The average price received for last year’s output of 1,766,930 pounds of copper was 13½ cents a pound, compared with 18.26 cents in 1907, 19.52 cents in 1906 and 16.433 cents in 1905. The cost per ton of rock stamped was 25 per cent less last year than in the previous year.

General Manager James M. Wilsox, makes the following report of operations for the year 1908:

Rock broken, 2,409,696 cubic feet	200,808 tons
Rock hoisted	178,276 tons
Rock stamped	171,268 tons
Mineral produced	2,607,750 lbs.
Refined copper produced	1,766,930 lbs.
Percentage of mineral	.761 %
Percentage of refined copper in mineral	.67757 %

The average number of drills run during the year were 11.04, and the amount of rock broken amounted to 200,808 tons. While in the year 1907 we operated on the average 28.3 drills and broke 309,132 tons of rock, showing practically two-thirds as much work done with the 11.04 drills in 1908 as we formerly did with 28.3 drills, proving the efficiency of the men now employed, which averaged 175 against 330 in the previous year.

The total percentage of mineral per ton of rock stamped during 1908 was a little better than 1907, being .761 as against .71.

This year we opened 1,085 feet of drifts, and C Shaft has been put down fifteen feet to the eighth level, from which we have commenced drifting.

Our costs per ton of rock stamped for the year showed a reduction of over 25% and were as follows:

	Amount	Cost on a basis of Tons rk hoisted	Tons rk stamped
Mining	$117,849.46	.6612	.6881
Surface	27,855.14	.1563	.1626
Office and general	4,673.22	.0262	.0273
Freight on rock and mineral	30,329.15	.1702	.1771
Taxes	4,830.47	.0271	.0282
Insurance	3,754.13	.0211	.0219
Mill expense	53,244.75	.2987	.3109
Cost delivered to smelter	$242,536.50	1.3608	1.4161
Less cost of former development	8,777.44	.0492	.0512
Years cost	$233,759.06	1.3116	1.3649

MICHIGAN COPPER MINING COMPANY.

This company was incorporated under the mining laws of the State of Michigan June 15th, with an authorized capital of $2,050,000 divided into 100,000 shares of a par value of $25 each. The company owns 4,870 acres of mineral and 1,264 acres of timber lands located in Town 50 and Range 39 near Rockalnd, Ontonagon County, Michigan.

Officers: John Stanton, president; John R. Stanton, treasurer; Samuel Brady, superintendent; Henry Stubansky, clerk; Adolph Prees, ,ining captain; C. M. Haight, engineer.

Michigan mine still holds the distinction of being the heaviest copper producer in the Ontonagon district and from all accounts, is likely to maintain its relative position for some time to come. Developments in the new lode of the Lake Copper Mine, may however, result in changing the respective values of properties in the course of a year or so. But it is too soon to begin making comparisons.

The company is building a modern two-head stampmill on Keweenaw Bay where there is an inexhaustible supply of water for all purposes the year round. It is ready for the installation of machinery with boiler plant completed. The mill will be up to date in every particular and equipped with the best machinery known for copper washing. Some time this year, it should be completed and ready to go in commission.

Michigan is developed and operated through three shafts, A, B and C, sunk in the Calico lode. About 350 men are employed and 36 power drills are operated. "A" shaft is 7x18 feet within timbers, three compartments and 1,781 feet deep to below the 14th level. "B" shaft Is one thousand feet east of "A" shaft, 7x20 feet within timbers, three compartments and the same depth as shaft "A." "C" shaft is 1,375 feet east of "B" shaft with the same dimensions as shafts "A" and "B" and flown to the 10th level. The Calico and Branch lodes are mined. The Calico is an amygdaloid of peculiar appearance usually breaking to a face and displaying on the same varying colors. It is a strong, well defined belt, but irregular and bunchy in character. It looks very well, however, and seems to be developing first-rate values in the ground contributary to "C" shaft.

All over, the property is in good condition, appears to be prosperous, is well managed and economically operated.

Boston—The annual report of the Michigan Copper Mining Company for the year ended December 31, 1908, is issued.

	1908	1907	1906
Sales copper, pounds	3,000,206	2,665,404	2,875,341
Copper sold for	13.505c	15.41c	19.77c
Received from sale of coper	$399,186	$410,708	$568,399
Acct. of assess	193,660		
Prev. balance	def46,657	187,691	103,250
Total receipts	546,189	598,399	671,649
Expenses at mine	471,204	417,447	350,410
Smelting, freight, etc	25,816	23,145	27,406
Other expenses	64,561	204,464	106,140
Total expenses	561,581	645,056	483,956
Surplus	def 15,392	def 46,657	187,691

We compare balance sheets dated Dec. 31:

Assets	1908	1907	1906
Cash	$1,623	$20,596	$65,309
Copper Bills	118,025	110,407	*130,167
Cash and supplies at mine	26,097	37,323	39,160
Accounts receivable	877	897	877
Total	146,622	169,223	235,512
Liabilities:			
Indebtedness at mine	34,300	45,766	36,956
Accounts payable	127,713	170,113	10,865
Excess of liabilities	15,392	46,657	**187,691

*Copper on hand sold. **Balance of assets.

Operating details may be compared thus:

	1908	1907	1906
Rock hoisted, tons	240,854	183,556	180,440
Rock stamped, tons	190,331	150,407	140,225
Product of mineral, lbs.	3,270,250	2,556,365	2,601,045
Product mass copper, lbs.	1,226,845	1,402,425	1,669,055
Total mineral and mass, lbs.	4,497,095	3,958,790	4,270,100
Refined copper, lbs.	3,000,206	2,665,404	2,875,341

Boston—A total of 12,315 fathoms of stoping, 282 feet of sinking and 8623 feet of drifting was done at the Michigan mine during 1908.

Regarding the Bee property, Supt. Brady says: The lode has proved to be copper-bearing at three different points to the east in the crosscut from the Rockland in addition to the point now opening on it from the line of the adit, where it is intersected at a depth of 200 feet now below the outcrop.

Sinking at A shaft was resumed in January last, and at present it has reached a depth of 2111 feet. Drifting on the 15th level opened Copper ground. On 16th level the lode was opened for distance east and west of 600 feet, showing conditions practically the same as on the 15th.

The 14th level of B shaft was extended 950 feet for the purpose of proving the nature of the ground under the present line of C shaft at that depth on the Calico lode. Though the last 400 feet work was through a good hole.

Mass copper hoisted from the Branch vein was but 263 pounds per fathom of ground stoped, as compared with 350 and 345 pounds in 1905 and 1906. Drifting on the Calico lode did not continue to develop a character of high grade ground.

VICTORIA COPPER MINING COMPANY.

Capital stock, $2,500,000 in 100,000 shares of $25 each.

Officers: Fred H. Williams, president; Chas. D. Hanchette, vice-president; James P. Graves, secretary-treasurer; George Hooper, superintendent; George Williams, mining captain; R. C. Everett, clerk; Chas. Caddo, mill superintendent; R. S. Schultz, Jr., engineer.

Main office, 53 State St., Room 539, Boston, Mass.; mine office, Victoria, Ontonagon County, Michigan.

Victoria mine is described in my previous reports.

The property is located at the town of Victoria. Ontonagon County, on the top of a hill or plateau and about three miles from the village of Rockland. Lands owned consists of 2,300 acres and are crossed by the Minnesota and Forest conglomerates, besides several amygdaloid beds and one which the company works supposed to be the Evergreen. This Evergreen belt runs through the property of its strike line for a distance of 3,000 feet in length. In 1907 the amount of rock hoisted was 104,783 tons and treated at the stampmill, 95,035 tons. The mineral product was 2,062,210 pounds, which yielded 1,207,337 pounds of refined copper. The yield of refined copper per ton of rock treated was 12.7 pounds compared with 13.94 pounds for the previous year.

The mine is opened and developed through one shaft, 8x12 feet in dimensions and 2,100 feet deep. In all, 20 levels are extended from shaft and the product is taken from the 7th to the 14th levels inclusive. The method in use for breaking down the vein rock is "breast and back-stoping," and it answers admirably for the formation mined. But little timber is required to hold up the ground while the lode is being blasted out and this counts for a good deal.

The annual report of the Victoria Copper Mining Co. for year ended Dec. 31, 1908, compares as follows:

	1908	1907
Copper sold	$136,546	$183,152
Copper on hand	32,424	35,251
Profit sundry accts.	6,229	7,127
Rents	3,526	3,431
Total earnings	178,727	228,963
Mining expenses	122,023	124,263
Stamping	16,899	20,193
Freight and smelting	17,896	16,375
Construction	8,607	12,502
Surface work	11,962	12,232
Diamond drilling	10,777	.....
Miscellaneous	27,822	29,560
Total expenses	215,986	215,125
Net profit for year	*37,258	13,837
Surplus previous year	48,666	34,829
Total surplus	11,407	48,666

*Deficit.

In 1908 the company produced 1,290,040 pounds of refined copper, compared with 1,207,337 pounds in 1907, at a cost of 14.335c a pound, compared with 15.797c. in the previous year. The average price received for copper sold last year was 13.098 cents a pound, compared with 18.08c in 1907.

During the first six months of the year the cost of copper produced was two cents per pound less than the average cost of 1907, but there was an increase in cost the second six months owing to loss of time on account of shortage in the water supply, the season being the dryest on record.

SUMMARY OF RESULTS

Rock hoisted	115,052 tons
Rock stamped	109,015 tons
Product if Mineral	2,246,848 pounds
Product of Refined Copper	1,290,040 pounds
Yield of rock treated, 11.8 lbs. per ton	0.59 per cent
Cost per ton of rock stamped	$1.51
Cost per pound of refined copper at mine	12.366 cents
Cost of Smelting, freight and marketing product and office expense	1.969 cents
Cost per pound of refined copper	14.335 cents
Total openings for 1908	2,335½
Total of all openings to December 31, 1908	31,898.65

DIAMOND DRILLING.

Hole No. 1	825	feet
Hole No. 2	626	"
Hole No. 3	1,065	"
Hole No. 4	967	"
Hole No. 5	1,129	"
Total of diamond drilling for 1908	4,612	"

George Hooper, Superintendent of the mine, in his report to the company says, in part:

The general condition of the mine equipment is better than a year ago.

Our older horses have been replaced with new ones, our mill is in much better condition and our shaft house is in shape to handle a much larger tonnage. Our skip road with new rails and larger skips in mine places us in apposition to handle a larger tonnage than heretofore. Our power plant has been of very little expense the past year, but owing to a combination of circumstances we have been short of power during the fall months and about November first were compelled to reduce our operations to one shift. The circumstances that helped to bring such a low stage of water were a large area of our water shed was burnt over with forest fires, then from data taken from the Weather Bureau service we find that the temperature from June 1st to December 1st was above normal in each month and the precipitation below normal every month except July.

In conclusion, I wish again to extend thanks to my associate officers for their earnest interest and assistance extended to me.

COPPER CROWN MINING COMPANY.

This company is capitalized in $2,500,000 divided in 100,000 shares, par value $25 each. 25,000 shares in the treasury.

Main office, St. Louis, Mo.; local office, Matchwood, Mich.

The mine location is situated near Matchwood in towns 48 and 49 and consist of 3,700 acres of land. Property

embraces six old mines, the Hamilton, Trap Rock, Essex, Windsor, Norwich and Lafayette.

Copper Crown was idle during 1908.

SMELTING AND COPPER REFINING PLANTS.

The mineral products of the Lake copper mines are refined, melted into bars, ingots and plates and prepared for the market at local refineries. The refineries are conveniently situated in the shores of Portage Lake, Dollar Bay and Lake Linden and are classed among the most modern and complete refining plants in the country. People in charge of them are experienced, expert metallurgists and are sending out the best branch of copper on the market.

As stated in the report of the Calumet & Hecla mine, found elsewhere in this volume, the copper smelters and refineries of the company are located at Hubbell, Houghton County, Mich., on the shore of Torch Lake and at Buffalo, New York. The company's product of mineral is refined, melted into bars and ingots and prepared for the market at these works.

MICHIGAN SMELTING COMPANY.

This company was organized in 1903 under the laws of the State of Michigan. Capital $500,000, par value $25.

President, Wm. A. Paine; secretary-treasurer, Frederic Stanwood; superintendent, Frederick L. Cairns; clerk, W. H. Rowe.

Main office, Boston, Mass.; local office, Houghton, Mich.

The smelters and refineries of this company are located about three miles west of Houghton on the shore of Portage Lake. At these works, the mineral product of the Atlantic, Baltic, Champion, Michigan, Mohawk and Wolverine mines are refined and prepared for the market. About 125 men are employed.

QUINCY SMELTING PLANT.

This plant is also referred to in the report on the Quincy mine found elsewhere in this volume. Besides the mineral product of the Quincy, those of Franklin, Centennial, Allouez, Mass and Adventure mines are refined and prepared for the market at these works. Also a little miscellaneous mineral.

Location, Hancock, Mich. Will P. Smith, superintendent.

THE LAKE SUPERIOR SMELTING COMPANY.

The plant of this company is located at Dollar Bay, Houghton County, Michigan. Company refines the mineral products of the Osceola, Tamarack, Isle Royale and Ahmeek mines.

H. D. Conant, superintendent; L. E. Williams, clerk.

Postoffice address, Dollar Bay, Mich.

SALT.

MICHIGAN SALT PRODUCTION.

The salt producing territory of the State is divided into six districts.

Following is a two years comparison of the number of barrels of salt produced by the six districts:

	1907 bbls.	1908 bbls.	Increase or Decrease bbls.
District No. 1, Saginaw County	328,083	337,161	+ 9,078
District No. 2, Bay County	294,791	206,880	— 87,911
District No. 3, St. Clair County	1,632,969	1,543,844	— 89,125
District No. 4, Manistee County	1,966,335	2,329,940	+365,605
District No. 5, Mason County	974,861	679,564	—295,297
District No. 6, Wayne County	1,101,424	1,150,367	+ 48,943
Totals	6,298,463	6,247,756	
Net Decrease			50,707

COMPARATIVE TABLES.

Salt manufactured in the State of Michigan prior to the enactment of the state inspection law in 1869.

	Barrels
1860	4,000
1861	125,000
1862	243,000
1863	466,000
1864	529,073
1865	477,290
1866	407,997
1867	474,721
1868	555,690
Total	3,282,681

Salt inspected in the State of Michigan since the enactment of the state inspection law in 1869.

	Barrels
1869	561,288
1870	621,352
1871	728,175
1872	724,481
1873	823,346
1874	1,026,970
1875	1,081,856
1876	1,482,729
1877	1,660,997
1878	1,855,884

	Barrels
1879	2,058,040
1880	2,676,588
1881	2,750,299
1882	3,037,317
1883	2,894,672
1884	3,161,806
1885	3,297,403
1886	3,667,257
1887	3,944,309
1888	3,866,228
1889	3,846,979
1890	3,838,637
1891	3,927,671
1892	3,812,054
1893	3,514,485
1894	3,138,941
1895	3,529,362
1896	3,336,242
1897	3,622,764
1898	4,171,916
1899	4,732,669
1900	4,738,085
1901	5,580,101
1902	4,994,245
1903	4,387,982
1904	5,390,812
1905	5,671,253
1906	5,644,559
1907	6,298,463
1908	6,247,073
Total	132,296,073
The total amount of salt which Michigan has produced to date	135,578,754

The salt industry of Michigan is in a healthy condition and practically all the producing companies of the state had a fairly successful year in 1908.

To Mr. Emery Temple, Salt Inspector for the State, I wish to acknowledge my obligations for the figures contained in this report.

COAL.

THE COAL MINING INDUSTRY.

The coal industry, like that of Portland cement and others, has been fully written up and described in the "Annual Report of the Michigan Bureau of Labor Statistics." The report was prepared by Hon. Andrew Stephenson, inspector of coal mines. Mr. Stephenson's reports are always complete and cover practically every feature necessary to be made known or in which the public can feel any particular interest. The following remarks are taken from Mr. Stephenson's report on the coal industry:

Owing to the financial depression occurring in the country during the past year, it was feared that the mining industry of Michigan would receive a setback equally with other industries; but I am pleased to state that although nearly all other branches of business and labor in the state have been hard hit, the mining industry has moved along surprisingly well, as the tonnage or output of coal for the past year will show. The question has frequently been asked by many, how I would account for it, and would say in reply that the credit is due to the coal companies, who realized that it was up to them to do some thing under the conditions, and that by giving employment to their workmen and keeping their mines in operation, even at a very small profit to themselves, they would greatly benefit both mining and business men. The result was very gratifying. While the miners in the past year have not been earning large wages, yet they have been making a living, and all feel grateful to the coal companies who have kept their mines in operation through this crisis. Much could be said along this line, but it is not necessary, for on this occasion the actions of the operators speak louder than words.

The mines in Saginaw county, with the exception of the three which were abandoned (namely, Standard No. 2, Chappell & Fordney and the P. M. No. 2), have been kept open all through the hard times, the only shut-downs being chiefly for the purpose of making necessary repairs on some of the hoppers.

The Bay county mines did not fare so well on account of the destruction of hoppers of two of the largest mines by fire, thereby throwing nearly five hundred men out of employment, while two other mines were shut down. At the present time all of the twelve mines in the county are working fairly well.

SUMMARY FOR THE YEAR.

Average number of mines in operation	33
Average number of employes	3,087
Average number of hours worked per day	7.8
Average number of days worked per month	20.2
Average daily earnings of each employe	$3.02
Aggregate sum paid in wages	$2,260,196.88
Total number of gallons of oil used	33,966
Total number of kegs of powder used	73,857
Aggregate output of mines in tons	1,839,927
Aggregate cost of output	$3,088,956.79
Average cost per ton	$1.67

MICHIGAN COAL MINES, COUNTIES WHERE LOCATED, NAMES OF MANAGERS AND SUPTS.

Name of mines.	County where located.	Name of Mgr.	Name of Supt.
The Wolverine Mine No. 2	Bay	R. M. Randall	Alexander McElwain.
The Wolverine Mine No. 3	Bay	R. M. Randall	Thomas Thompson.
The Central Mine	Bay	R. M. Randall	Wm. Dempster.
The Wenona Beach Mine	Bay	E. B. Foss	John Spink.
The What Cheer Mine	Bay	E. B. Foss	William Williams.
The Black Diamond Mine	Bay	Wm. A. Knapp	Alfred Watkins.
The Michigan Mine	Bay	T. P. Young	Joseph Brown.
The Handy Bros. Mine	Bay	Thos. L. Handy	John Morris.
The United City Coal Mine	Bay	John Walsh	Isaac Jane.
The Robert Gage Coal Co. No. 5	Bay	Chas. Coryell	Humphray Lewis.
The Robert Gage Coal Co. No. 6	Bay	Chas. Coryell	William Jones.
The New Era Vitrified Brick Co.	Bay	H. C. Hart	Joseph Watten.
The Allen-Walker Mine	Eaton	Vern Allen.	
The Wright Mine	Eaton	Eben Wright.	
The Grand Ledge Mine	Eaton	Fargo Boyle.	
The Eagle Mine	Eaton	Frank L. Reed.	
The Sewer Pipe Mine	Eaton	Clyde Earl.	
The Montrose Mine	Genesee	H. Connor.	
The Cedar River Mine	Ingham	T. M. Jenkins.	
The Gage Mine	Jackson	Edward Mallet.	

Name of mines.	County where located.	Name of Mgr.	Name of Supt.
The Black Diamond Mine	Jackson	Warren Thurston.	
The Robert Gage Coal Co. No. 1	Saginaw	Chas. Coryell	John McElwain.
The Robert Gage Coal Co. No. 2	Saginaw	Chas. Coryell	Richard Jenkins.
The Robert Gage Coal Co. No. 3	Saginaw	Chas. Coryell	Henry Dous.
The Robert Gage Coal Co. No. 4	Saginaw	Chas. Coryell	John Ritson.
The Bliss Mine	Saginaw	Charles Linton	John Phillips.
The Caledonia Mine	Saginaw	A. Eynon	Peter Curren.
The Shiawassee Mine	Saginaw	R. M. Randall	Charles McKinney.
The Saginaw Mine	Saginaw	R. M. Randall	John Edwards.
The Northern Coal and Transp. Mine	Saginaw	R. M. Randall	Thomas Westwood.
The Barnard Mine	Saginaw	R. M. Randall	John Weaver.
The Uncle Henry Mine	Saginaw	R. M. Randall	John Snowball.
The Riverside Mine	Saginaw	R. M. Randall	George Nye-House.
The Buena Vista Mine	Saginaw	James McNabb	
The Consumers Dev. Coal Co. Mine	Saginaw	Otta L. Dittmar	Wm. Carmichael.
The Corunna Union Mine	Shiawassee	Anton Zamblasi.	
The New Haven Coal Co. Mine	Shiawassee	Chas. Farolli.	
The Detroit Vitrified Brick Co. Mine	Shiawassee	J. P. Krause.	
The Akron Mine	Tuscola	Thos. L. Handy	Andrew Walker.

CEMENT.

MICHIGAN PORTLAND CEMENT.

Upon the whole the Michigan Portland Cement industry had a fairly successful year in 1908 and a much better one than many people connected with the business had expected. Though the Wolverine Portland Cement Company's No. 1 plant was operated but six months of the year, the Bronson-Kalamazoo and Aetna plants but three months each and some others on short time yet the number of barrels of cement produced during the 12 months, as reported to this office, was 3,210,347 as against 3,558,727 barrels for the previous year In spite of these drawbacks and a bad year generally and in which most industries suffered more or less, the 1908 output fell off but 348,380 barrels as compared with the number of barrels manufactured in 1907.

New uses for this excellent economic mineral are constantly springing up and people doing all kinds of construction work are of the opinion that enormous quantities of the product will be consumed annually in the coming years. For general purposes, the Portland Cement manufactured in Michigan is considered among the best brands made and while orders for consignments come from nearly all over, the bulk of Michigan's product is consumed within the state. As a rule, operating plants are in fine physical condition and up-to-date in most particulars. Mechanical equipments and appliances are among the most modern and best known for bringing the most satisfactory results and they are about as automatic in operation as it seems practical to make them. Progress has been substantial and of the kind that counts for stockholders and for everybody else in any way interested with the industry. Generally speaking, plants are running to perfection and companies are doing well. The people connected with the business know it thoroughly and do it right. There is no guess work. The business is reduced to a mathematical problem and conducted with exacting knowledge and definite results. Annual costs for necessary improvements and betterments run into a considerable sum of money, but expenditures are well placed and the result is that plants are maintained in a high state of efficiency and in good running order.

While my remarks on the industry may be brief, it may not be amiss to state that the information submitted is official in every particular, for it came to this office direct from the managers in charge of the works.

I might further remark that Michigan operating Portland Cement plants have been described in my previous reports and anything I could now state would be little other than repetitions of what I have before written concerning them.

PORTLAND CEMENT PLANTS IN OPERATION IN MICHIGAN.

Name of Organiaztion.	Location.	Name of Manager.	Address of Manager.
Aetna Portland Cement Co.	Fenton	E. M. Bruce	Fenton, Mich.
Alpena Portland Cement Co.	Alpena	Herman Besser,	Alpena, Mich.
Bronson-Kalamazoo Portland Cement Co.	Bronson	J. F. Townsend,	Akron, Ohio
Burt Portland Cement Co.	Bellevue	W. R. Burt,	Saginaw, Mich.
Elk Rapids Portland Cement Co.	Elk Rapids	Homer Sly	Elk Rapids, Mich.
Egyptian Portland Cement Co.	Fenton	Chas. L. Bussey,	Fenton, Mich.
Great Northern Portland Cement Co.	Marlborough	W. S. Pritchard,	Marlborough, Mich.
Hecla Co.	Bay City	John F. Bush,	Detroit, Mich.
Newago Portland Cement Co.	Newago	W. J. Bell,	80 Penobscott Bldg. Newago, Mich.
Omega Portland Cement Co.	Mosherville	L. W. Sibbald,	Jonesville, Mich.
Peninsula Portland Cement Co.	Cement City	W. F. Cowham,	Cement City, Mich.
Peerless Portland Cement Co.	Union City	J. A. Petterson,	Union City, Mich.
Wolverine No. 1 Cement Co.	Coldwater	L. M. Wing,	Coldwater, Mich.
Wolverine No. 2 Cement Co.	Quincy	L. M. Wing,	Coldwater, Mich.
Wyandotte Portland Cement Co.	Wyandotte	H. J. Paxton,	Wyandotte, Mich.

PORTLAND CEMENT STATISTICS.

Name of Organization.	No. of men employed.	No. of bbls. manufactured
Aetna Portland Cement Company	125	125,000
Alpena Portland Cement Company	125	250,000
Burt Portland Cement Company	125	200,000
Bronson-Kalamazoo Portland Cement Company	80	25,000
Egyptian Portland Cement Company	87	149,000
Elk Rapids Portland Cement Company	92	178,259
Hecla Portland Cement Company	130	300,000
New Alpena Portland Cement Company	110	125,245
Newago Portland Cement Company	103	257,991
Omega Portland Cement Company	50	126,000
Peerless Portland Cement Company	110	217,000
Peninsula Portland Cement Company	140	350,000
Port Huron Portland Cement Company	135	225,100
Wolverine Portland Cement Company, No. 1	91	91,125
Wolverine Portland Cement Company, No. 2	300	380,726
Wyandotte Portland Cement Company	75	210,000
Total		3,210,347

MISCELLANEOUS MINERALS.

Graphite is produced at L'Anse, Mich., by the Deroit Graphite-Paint Company. A. A. Boutell, president, Detroit, Mich.; R. C. Williams agent, L'Anse, Mich.

During 1908 this company mined about 600 tons of graphite ore, equivalent to about 1,000,000 lbs. of refined graphite suitable for paint making. The mine is an open pit proposition located upon a side hill from which the ore is run out by gravity on a tram-way through a cut about 450 feet long to dump. Mine is located in Section 16, Town 49, Range 33, about 4 mile distance from the Taylor switch on the D. S. S. & A. Ry. The ore is mined and stock-piled during the summer months and hauled during the sleighing seasons to Taylor, where it is about 50 feet thick and 200 feet in length as far as developed. Ten men are employed at the mine during the summer months. At the factory in Detroit, they have about 40 men on the pay-roll continually.

The Hathaway Craphite Company's works located at L'Anse are in the hands of receiver and idle. Allen Campbell, Receiver, 610 Moffatt Building, Detroit, Mich.

GYPSUM.

Gypsum is found in remarkable abundance and purity at Grand Rapids and Alabaster, and in moderate quantities at various other places. This mineral is very properly classed among the useful products of the state and its production and manufacture forms an important growing industry. While the growth of this industry has been somewhat slow, yet it has been steady, wholesome and continuous. The stratum of Gypsum at Grand Rapids is about 18x20 ft. in thickness and from a foot or two to sixteen feet below the surface, and fully a thousand acres in extent, affording practically an inexhaustible supply to draw upon. The development of the gypsum industry in this state, while in a healthy condition, is practically confined to the city of Grand Rapids where the product is quarried in considerable quantities, ground and prepared as a basis for wall tintings, wall decoration, stucco work, plasters, fertilizers and for other uses. For wall tinting and decorating, Alabastine and allied gypsum products are among the best things made for such purposes. On account of the excellent sanitary properties of the articles and the ease with which the different preparations may be applied, they are becoming popular all over the United States and in many parts of Europe. Calcium gypsum is known as plaster of Paris. The finer grades are carefully reground and sold for dental plates, for casts and moulds and also for works of art and architecture. The demand for these products is constantly increasing and the outlook for the gypsum industry is reported promising.

The number of tons of gypsum produced in Michigan during 1908 was 250,000, and valued at over $700,000.

GOLD.

Gold exists in Marquette County about three miles northeast of the city of Ishpeming in Section 29, Town 48, Range 27. I have seen exceedingly rich and beautiful specimens that came from there. The quartz was literally laced and hung together with strings of pure gold. Some specimens are said to have yielded at the rate of $160,000.00 per ton and I don't doubt it for a moment. No companies, however, at the present time, are mining the deposit containing the precious metal. Some years ago, three organizations, the Ropes Gold and Silver Mining Company, Michigan Gold Mining Company and Fire Center Gold Mining Company were formed for the purpose of mining the gold bearing deposit. Each company worked it more or less extensively, but the Ropes people developed their property in the most practical way and succeeded in getting the best results. They opened up quite a rangy mine, equipped it with an extensive plant, treated a considerable output of ore and produced gold bullion to the value of several hundred thousand dollars. The mine received a pretty fair trial, but results turned out unprofitable and unsatisfactory. Under the methods of mining practiced, neither company was able to make both ends meet and all work was discontinued.

This Michigan Gold Mine is to be given a fresh trial, and it is hoped the people behind the proposition may succeed in developing the property into a profitable mine. Power drills have been installed and put into commission. They are to be operated by steam power until Spring. Night and day crews are to be employed in the mine and will extend the main drift east and west from No. 2 shaft. The vein is 12 feet in width in one end of the drift and 10 in the other. There are about 3,000 tons of quartz ready for stoping, but it will not be mined for the time being. The greater part of the quartz and rock removed from the drifts will be stocked underground until spring when it will be hoisted and sent direct to the crusher and mills.

Regarding silver, slate, asbestos and marble, there is nothing to be said other than what appeared in my previous report.