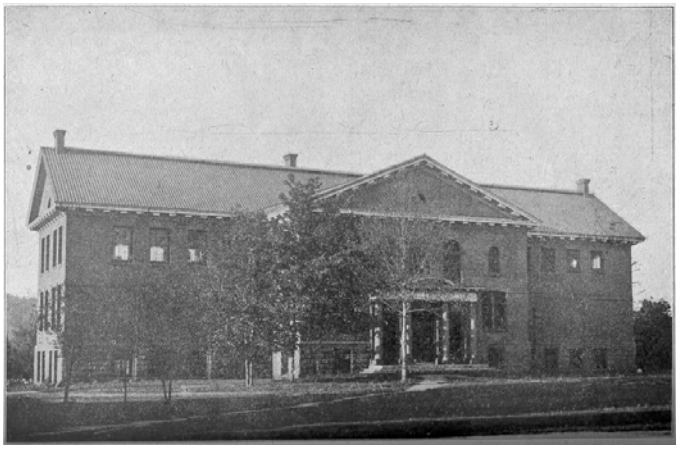
STATE OF MICHIGAN

Department of Mineral Statistics

Annual Report 1909

Roger M. Andrews
COMMISSIONER OF MINERAL STATISTICS

BY AUTHORITY



METALLURGY BUILDING, MICHIGAN STATE COLLEGE OF MINES, HOUGHTON.

HERALD-LEADER CO., PRINTERS
MENOMINEE, MICHIGAN

LETTER OF TRANSMITTAL

STATE OF MICHIGAN,
Department of Mineral Statistics.

Menominee, Mich., April, 1910.

FRED M. WARNER, Governor:

Sir:—In conformity with the statutes, I herewith submit the report of the Commissioner of Mineral Statistics for the year ending March 31, 1910.

I have the honor to be,

Your Obedient Servant,
[Signed] R. M. Andrews
Commissioner.

Michigan 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	March 19, 1891
James P. Edwards	March 19, 1891	Jan. 10, 1893
James B. Knight	Jan. 10, 1893	March 28, 1895
George A. Newett	March 28 1895	April 1, 1899
James Russell	April 1, 1899	March 31, 1901
Thomas A. Hanna	April 1, 1901	March 31, 1905
James L. Nankervis	April 1, 1905	March 31, 1909
Roger M. Andrews	April 1, 1909	

FOREWORD

Statistics, facts and figures comprise this report. Extraneous comment is omitted, I believe the report is thorough, complete and fair.

In view of the pending questions of state txation of mines and mineral lands, I have specially endeavored to compile and present a complete statistical review of the mining operations in every part of the state.

ROGER M. ANDREWS, Commissioner.

Menominee, April 1st, 1910.

THE IRON INDUSTRY

1909 was a record year-from the ore producers of the Lake Superior district.

The total of shipments was the largest in the history of the region and showed a gain of more than 70 per cent over 1908.

Notwithstanding a shortage of labor and the somewhat restless condition of general business, the work of producing and shipping iron ore proceeded with great

vigor. Important discoveries were made and large bodies added to the total known ore reserves.

The figures below show the shipments by ranges, including in Michigan, the Marquette, Menominee and Gogebic ranges, and in Minnesota, the Mesabi and Vermillion ranges. It will be observed that the great Mesabi range in Minnesota shipped nearly twice the amount shipped by all the other ranges combined.

The following table shows the shipments, by ranges, of Lake Superior iron ore form 1902 to 1909, inclusive.

Year.	Marquette.	Menominee.	Gogebic.	Mesabi.	Vermilion	Total
1902 ..	3,868,025	4,612,509	3,654,929	13,342,840	2,084,263	27,562,566
1903 ..	3,040,245	3,749,567	2,912,708	12,892,542	1,676,699	24,271,761
1904 ..	2,843,703	3,074,848	2,398,287	12,156,008	1,282,513	21,755,359
1905 ..	4,215,572	4,495,451	3,705,207	20,158,699	1,677,186	34,252,115
1906 ..	4,057,187	5,109,088	3,643,514	23,819,029	1,792,355	38,421,173
1907 ..	4,388,073	4,964,728	3,637,102	27,495,708	1,685,267	42,170,878
1908 ..	2,414,632	2,679,156	2,699,856	17,257,350	841,544	25,892,538
1909 ..	4,256,172	4,875,385	4,088,057	28,176,281	1,108,215	42,504,110

Total production of Lake Superior iron ore by ranges, from discovery to 1909, inclusive, in long tons:

Mesabi	195,703,424
Marquette	91,903,991
Menominee	71,313,115
Gogebic	60,820,503
Vermilion	29,125,385
	448,966,418

In 1909 the total shipment of Lake Superior iron ores amounted to 41,700,000 long tons, of which about 7,000,000 tons were distributed in Lake Michigan, and 33,700,000 tons reached ports on Lake Erie, a small quantity passing on to Lake Ontario and beyond.

At the west end of Lake Superior water shipments, amounting to 29,200,000 long tons, coming from the Mesabi and Vermilion ranges, were made from Two Harbors and Duluth, Minn., and Superior, Wis. These were increased to 33,000,000 long tons by the addition of 3,800,000 tons from the Gogebic range forwarded from Ashland, Wis., and were still further increased to 35,900,000 tons by shipments from the Marquette range, via Marquette, Mich., and by a small quantity from the Michipicoten range in Canada.

With the exception of a comparatively small tonnage required for local blast furnaces, this immense quantity passed through the Sault Ste. Marie canals and moved on to the Straits of Mackinac, where a part of the ore from the Lake Superior ports, together with some ore from the port of Escanaba (the point of shipment both for the Menominee range ores and for part of the Marquette range ores), proceeded down Lake Michigan to various ports, such as Milwaukee, Fruitport, Chicago, and Gary. Some of the furnaces at these ports also obtain considerable ore from local mines in Wisconsin. The remainder of the ore from Escanaba passed eastward through the Straits of Mackinac and, with the shipments from Moose Mountain, Ontario, joined the main column through Lake Huron, some being disposed of at Midland, Ontario, and Detroit, Mich., but the great bulk being distributed to the lower lake receiving docks at Toledo, Sandusky, Huron, Lorain, Cleveland, Fairport, Ashtabula, and Conneaut, Ohio, Erie, Pa., and Buffalo and Tonawanda, N. Y.

MARQUETTE COUNTY

There are 48 operating mines in Marquette County, employing a total of 6,546 men in and about the industry.

One of the best authorities in the iron ore world is George A. Newett, of Ishpeming, who said, regarding the 1909 situation on the Marquette range: "There are enormous bodies of low grade material in the Marquette region, but it will not be necessary to touch these for decades yet. Even now, in fact, the limits of the range are still to be determined. The discoveries of the new beds in the Negaunep and Swanzey districts have been followed by fully as important finds in the territory to the west of Ishpeming until it has come to be believed that there is an almost unbroken stretch of ore all the way from Ishpeming to a point beyond Lake Michigamme. It was in the vicinity of the American mine, in this district west of Ishpeming, that the deepest diamond drill hole ever bored in North America was put down during the year by George J. Maas. The work was done by Cole & McDonald. The hole was bottomed at 3,265 feet. It required six months to sink to that depth.

OLIVER IRON MINING COMPANY.

This company 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 tons.

The mines owned and controlled by the Oliver Iron Mining Company are distributed all over the iron region of the bake Superior district and embrace some of the richest and finest developed and equipped iron mines on the globe, as well as development propositions 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.

In 1909 the demand for iron ore supplies as compared with that of 1908 was extremely active. Total shipments from the Lake Superior region were 42,586,869 tons for 1909.

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.

W. J. Olcott is president of the Oliver Iron Mining Company; Pentecost Mitchell is vice president; John H. McLean, general manager, and J. H. Hearding, assistant general manager. Postoffice 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, and the Stegmiller mine. General superintendent, William H. Johnston; assistant to general superintendent, D. J. Sliney; superintendent, F. E. Keese; chief clerk, J. C. W. Chipman; mining captain, H. T. Hulst, and assistant engineer, C. A. Barabee.

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 stands credited with having produced 14,961,563 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 has been employed at good average wages, which are invariably paid as soon as due.

During 1909 the average number of men employed was 642 and the amount of ore produced 344,205 tons as compared with 383,261 tons for the previous year. 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 N½ of SE¼ of Section 9, and the N½ of the SW¼ of Section 10, T. 47, R. 27 W., in the southern part of the Town of Ishpeming. Three shafts are in operation at present, viz: No. 2, 15 ft. 6 in. by 6 ft. 3 in., 440 feet deep; No. 6, 8 ft. 6 in. by 9 ft. 6 in., 840 feet deep, and No. 7, 8 ft by 10 ft, 920 feet deep.

No. 2 shaft dips west at an angle of 40 degrees and is located in the older workings of the mine where floors and pillars are being removed. Originally it reached to the 14th level, but has been mined out and filled to the 7th level, where present work is being conducted.

No. 6 shaft is vertical and is used only for lowering and hoisting men and handling timber and supplies.

No. 7 shaft dips north at an angle of 60 degrees to the 15th level, thence it is vertical to the 19th. Ore is being mined and hoisted form the 5th, 7th, 8th, 9th, 10th, 11th, 14th, 18th and 19th levels.

Pump station is located on the 15th level, where a compound duplex Worthington condensing pump discharges through No. 7 shaft. A No. 7 Cameron pump in the bottom of the shaft handles all the water which makes below the 15th level.

A central hoisting plant located near No. 2 shaft handles the skips in No. 2 and No. 7 shafts. The equipment consists of four 12-foot drums, 6 feet face, grooved for 1¼ inch rope, bulit by Webster, Camp and Lane, geared to a pair of 24 in. by 48 in. simple duplex Brown hoisting engines. Steam is supplied by five 72 in. by 15 ft. horizontal return tubular boilers.

The cage in No. 6 shaft is operated by a 16 in. by 36 in. duplex reversible E. P. Allis hoisting engine, geared to a 7 ft. 6 in. drum, 7 ft. 7 in. face, grooved for 1½ in. rope, located in a separate building north of the shaft. Steam is supplied from the central plant.

Compressed air is supplied from Section 16 mine.

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.

W. H. Johnston, general superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk; John McEncroe, mining captain.

HEMATITE MINE.

The Hematite mine is located in the SW¼ of Section 10, T. 47, N., R. 27 W., a part of which also includes the Hard Ore Mine workings. No. 1 and No. 2 shafts, situated near the old shore line of Lake Angeline, are not now in commission. No. 3 shaft, on the south side of Lake Angeline basin, is 5 ft. by 7 ft 6 in. and reaches a depth of 190 feet. The cage shaft is 6 ft. 3 in. by 8 ft. 3 in., and 513 feet deep. In no. 3 shaft the product is

obtained from the 150 and 190 foot levels. Five hundred feet north of the shaft a small hoisting plant operates the skip. In the cage shaft mining operations are being conducted on the 4th, 5th and 6th levels. The hoisting here is done from the central plant (See Hard Ore Mine), and air is supplied by the compressor at Section 16 mine.

W. H. Johnston, general superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk, and Samuel Jewell, mining captain.

SECTION 16 MINE.

Section 16 Mine is located in the N½ of the NE¼ of Section 16 and the SE¼ of the SE¼ of Section 9, T. 47 N., R. 27 W. The main hoisting shaft is 7 ft. by 16 ft. in dimension, 1,080 feet deep, and has four compartments. Fifteen levels extend from the shaft to the ore bodies and the product is recovered from the 530, 630, 680, 730, 830, 955 and 1,080 foot levels.

A duplex, cross compound, Rand compressor supplies air for Section 16, Hard Ore, and Hematite mines, being carried to the latter two by an 8 in. air line 3,000 feet long.

The hoisting engine was made by the E. P. Allis Company and is geared to a Webster, Camp and Lane drum 10 feet in diameter by 8 ft. 9 in. face, grooved for a 1⅜-inch rope. Skips hoist in balance and hold three tons. Steam for the entire plant is supplied by four 72 in. by 18 ft. Kewaunee horizontal return tubular boilers.

W. H. Johnston, general superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk, and William Trebilcock, mining captain.

SECTION 21 MINE.

Located in the S½ of NW¼ and SW¼ of NE¼ of Section 21-47-27. Ore body is a soft and medium hard Hematite running 58 per cent iron and less, Non-Bessemer. Two shafts are in operation, the East shaft, and West shaft, both 7 ft. by 18 ft. in dimensions. Four tons are hoisted to a trip, skips operating in balance at East shaft and singly at the West. Both shafts are 820 feet in depth. The mine has not been producing since April, 1907, but development work is in progress on the 760 and 820 foot levels.

W. H. Johnston, general superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk, and John Trebilcock, mining captain.

HARTFORD MINE.

This mine is situated about one-half a mile northwest of the Town of Negaunee in the East half of Lot 5, and Lots 6 and 7, Section 36, Township 48, Rrange 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 1909 the company employed 208 men, operated 20 power drills and produced 249,176 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 1,025 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 connected 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, five drifts are extended from shafts.

W. H. Johnston, regional superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk, and Elijah Toms, mining captain.

REGENT MINES.

This group includes the Buffalo, Queen, Blue and Prince of Wales mines, the latter two being the only ones now operating.

The Blue mine comprises the SW¼ of the SW¼ and a portion of the SE¼ of the SW¼ of Section 5, 47-26. The shaft is located in the footwall, is vertical, 6 ft. by 15 ft. 10 in. dimensions, divided in three compartments, and reaches the pockets on the 895 foot level. Balanced skips holding 2¾ tons are operated in the shaft by a pair of 26 in. by 60 in. duplex reversing Corliss first motion hoisting engines, drum 10 ft. diameter, 9 ft. face, grooved for 1⅜ in. rope, built by the Sullivan Machinery Company. A complete motor haulage tramming system is in operation on the 740 foot and 895 foot levels. On the 895 foot level a triple expansion duplex Prescott condensing pump throws water to the surface. Steam for the entire plant is supplied by four 72 in. by 18 ft. return tubular boilers situated in a building directly West of the engine house. One 14 in. by 30 in. simply Corliss engine, direct connected to a 100 K. W. direct current generator, located in the engine house, supplies the electric power for haulage at the Blue and Prince of Wales mines, and also furnishes light in the main traveling ways throughout the two mines. A modern change house with metal lockers, shower baths, etc., which will accommodate 250 men, has been completed at the Blue Mine.

THE PRINCE OF WALES MINE.

The Prince of Wales mine is located in the NE¼ of the SW¼ of Section 5, 47-26, being about a quarter mile West of the old North Buffalo mine location. The shaft is vertical, 6 ft. by 16 ft, has three compartments, and is 810 feet deep. Ore is being mined on the 610 foot level, and on the 810 foot level development is in progress. The surface equipment is entirely new and includes steel headframe, engine house, boiler house, combined office and warehouse, blacksmith and machine shop, mine captain's office, and a modern dry similar to the one at the Blue shaft. The hoisting engine and boiler equipment are exactly the same as at the Blue shaft. In the engine house is situated a Rand simple, duplex, two stage air compressor, which supplies air for both the Prince of Wales and Blue mines.

W. H. Johnston, general superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk, and Richard Roberts, mining captain.

CHAMPION MINE.

This property is located near the Town of Champion in Section 31, Township 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 1909 the management employed 54 men, operated five power drills and produced 11,468 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 tare 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. 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.

W. H. Johnston, general superintendent; H. S. Thompson, assistant superintendent; J. C. W. Chipman, chief clerk, and Charles Champion, mining captain.

STEGMILLER MINE.

This mine is located in the SW¼ of Section 17, 45-25. The shaft is 6 ft. by 8 ft. within timbers, divided into a skipway and ladderway. Total depth, 300 feet. Product is hoisted from the 300 foot level by a single 1¼ ton skip. Hoisting plant consists of a pair of 14 in. by 16 in. duplex, simple, slide valve engines geared to a 6 ft. drum, 58 in. face, grooved for a 1¼ inch rope, built by the Marinette Iron Works. Compressed air is furnished by one Sullivan compound, straight line compressor. Steam is supplied by one 60 in. by 14 ft. fire-box boiler, built by the Milwaukee Boiler Company.

W. H. Johnston, general superintendent; F. E. Keese, superintendent; J. C. W. Chipman, chief clerk, and Thomas Trebilcock, mining captain.

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. 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 an army of men.

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. Rough; 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, Imperial and Jackson.

Following are the 1909 products of the mines operated In Marquette county by the Cleveland-Cliffs Iron Company:

	Tons of Ore, 1909
Lake Shaft Mine	402,302
Cliff Shaft Mine	248,254
Negaunee Mine	279,498
Maas Mine	148,072
Princeton Mine	134,704
Moro Mine	91,177
Austin Mine	188,806
Salisbury Mine	72,709
Stephenson Mine	134,356
Imperial Mine	81,505
Ashland Mine	256,674
Total	2,038.057

LAKE SHAFT MINE.

Operated at Ishpeming. Gross output for 1909 is 402,302 tons. Gross shipments for 1909 is 459,229 tons. Men employed, 1908, 274; 1909, 302.

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 strong and looks well. In 1909 this mine employed 302 men, operated 10 power drills and produced 402,302 tons of ore. T. H. Bargh, chief clerk; H. O. Moulton, mining engineer; Alfred Collick, mining captain.

CLIFF SHAFT MINE.

Operated at Ishpeming. Gross output for 1909, 248,254 tons. Gross shipments for 1909, 395,206 tons. Men employed, 1908, 229; 1909, 180.

This mine lies just west of the town of Ishpeming in Section 9, Town 47, Range 27and 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 1909 product of ore was 248,254 tons. 180 men were employed. On an average, 41 power drills were operated. Method in use for breaking down the product is “breast and underhand stoping” and it answers to perfection. Ore mined, Red Specular running Lump 60 per cent; Crushed 59 per cent. Underground operations are conducted through two shafts known as “A” shaft and “B” shaft, each 10x14 feet inside measurement. “A” shaft is 788 feet deep. During 1910 both shafts were sunk 50 feet from the 10th level and are now 788 feet. Superintendent, L. Eaton; Captain, Duncan Campbell; Engineer, M. H. Barber; Clerk, J. F. Vanbrocklin.

NEGAUNEE MINE.

Operated by the Cleveland-Cliffs Iron Co., at Negaunee. Gross output for 1909, 298,080 tons. Gross shipments for 1909, 312,218 tons. Men employed, 1909, 294.

The Negaunee is situated just east of the town of Negaunee in Section 5, Town 48, Range 26. During 1909 the management employed 294 men, operated 10 power drills and produced 298,080 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 hoisting a 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 1200 tons of 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. A new shaft is being sunk from the surface to the 10th level, a depth of 933 feet. This is circular, inside diameter being 17 feet. It will be made of concrete and in time will replace the present operating shafts.

Superintendent, S. R. Elliot; Mining Captain, Fred Wane; Engineer, W. H. Barber; Clerk, J. N. Whiting.

PRINCETON MINE.

This is operated by two shafts, one on the SE. ¼ of Section 18-45-25 and the other on the NW. ¼ of Section 20-45-25, the shafts being joined by underground drifts. During 1909 the output was 134,704 tons. 142 men were employed.

The air is supplied by means of the central power plant compressor. Mining captain, William Jory; G. J. Sarasin, clerk; Daniel Nicholle, supply clerk.

AUSTIN MINE.

This property is located on the NE. ¼ of the SW. ¼ of Section 20-45-25. It is south of the Princeton Mine and directly north of the Stephenson Mine. The 1909 product was 188,806 tons. 161 men are employed. The mine is 350 feet deep. Mining captain, John Ellis; clerk, P. W. Hirwas; supply clerk, A. W. Collick.

Air is supplied by means of the central power plant compressor. The hoist is supplied by steam from the central power plant.

SMITH.

The Smith is in the development stage and during 1909, 36 men were employed. The shaft is 740 feet deep. Captain, Aug. Fogerberg; clerk, T. I. Engman.

NORTHWESTERN SEC 27-45-25.

This shaft is located on the NW. ¼ of the SW. ¼. It is circular in form and anchored in ledge about 104 feet from surface.

KIDDER.

The Kidder is located near the center of the NW. ¼ of the NE. ¼ Sec. 28-45-25. This property joins the Smith

on the East. The shaft was sunk through the sand and water overburdened to ledge, a distance of about 113 feet, by the Foundation Co., of New York. It is the same size as the Northwestern shaft.

MORO MINE.

Operated at Ishpeming, Mich. Gross output for 1909, 91,177 tons. Gross shipments for 1909, 47,074 tons. Men employed, 1908, 119; 1909, 110.

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

In 1909 the management employed 110 men, operated 9 machine drills and produced 91,177 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, 59.00 per cent Iron; Silica, 52 per cent Iron. Ore bodies are good only for a short time ahead.

Superintendent, L. Eaton; mining captain, J. H. Gill; engineer, E. G. Sterling; chief clerk, James Murphy.

SALISBURY MINE.

Operated at Ishpeming, Mich. Gross output for 1909, 72,709 tons. Gross shipments for 1909, 6,695. Men employed, 1908, 147; 1909, 145.

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 1909, 72,709. Number of men employed, 145, and eight machine drills were in operation.

The ore mined is a soft Hematite running 50 per cent Clinton Silica, 61 per cent Iron for Salisbury, Bessemer and 60 per cent Iron for Clinton. Product is recovered through one shaft 7x20 feet inside measurement and 1,170 feet deep.

Superintendent, L. Eaton; Clerk, W. M. Sterling; Mining Captain, J. H. Dunstan; Engineer, E. C. Weinsheimer.

MASS MINE.

Operated by Cleveland Cliffs Iron Company at Negaunee, Mich. Gross output for 1909, 155,577 tons. Gross shipments for 1909, 159,197 tons. Men employed, 1908, 137; 1909, 155.

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 1909 the mine employed 155 men, operated 15 machine drills and produced 155,577 tons of ore.

Underground work is conducted through a shaft, 8x12 feet in dimensions and 1,150 feet deep. Ore mined is a soft Hematite. Skips operate in balance and lift three 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. The equipment is new, up-to-date and includes Thompson and Green, first motion hoist, 8-foot drum; cage hoist; Allis and Chalmers second motion hoist, 8-foot drum; Ideal high speed engine and General Electric generator; three Stirling boilers—forced draft and Murphy stokers.

Superintendent, S. R. Elliot; mining captain, Joseph Thomas; engineer, M. H. Barber; chief clerk, E. A. Doty. Postoffice address, Negaunee, Mich.

SWANZY DISTRICT.

(Cleveland Cliffs Iron Co.)

The operations of the Cleveland Cliffs Iron Company in the Swanzy District are under the direction of Mr. M. M. Duncan, Agent of the Company at Ishpeming, Michigan; the district officers are G. R. Jackson, superintendent; A. H. Tillson, engineer, and J. I. Keeton, chief clerk.

There are three producing mines, namely, The Princeton, Stephenson and Austin. There are also three non-producing shafts, namely, the Smith, Kidder and Northwestern, which are concrete shafts, which have been sunk through the overburden by the Foundation Company and are anchored in ledge.

The company's district office is located at Princeton, and here also is located the central power plant, with machine shops, laboratory, etc. The central power plant contains four Sterling boilers, 260 H. P. Capacity each, with Murphy mechanical stokers and Sturtevant economizers, and subdued draft. The power plant contains one Allis-Chalmers compressor, with a capacity of 4,000 cu. ft. of fresh air per minute. This compressor supplies all of the mines in the district.

The power plant also contains an Allis-Chalmers Parsons steam turbine with 1,000 K. W. generator which supplies the district with electricity. This power plant is connected with the Negaunee by transmission line so that power can be sent from here to Negaunee or from Negaunee to this station.

STEPHENSON MINE.

This mine is located on the S. ½ of the SW ¼ of Section 20-45-25, at Princeton or about a mile and one-half from the town of Gwinn.

In 1909 the mine employed 172 men, operated from 7 to 10 machine drills and produced 134,356 tons of ore. Mining operations are conducted through a shaft 10 ft. 10 in. x 14 ft. 10 in. inside dimensions. It is 459 feet deep. The ore mined is soft Hematite.

During the year 1909 mule haulage was used, but at present we are using electric haulage. The two ore skips are operating in balance.

The mine equipment is new, including a Sullivan Corliss Hoist for skips and an Allis-Chalmers Company 14x26 geared hoist for cage. There is a modern brick dry with separate bath and change house, also a convenient office building.

Mining captain, John Ellis; clerk, P. R. Perring.

IMPERIAL MINE.

This mine is situated near Michigamme, Michigan, and although a producer of ore for years, it is an irregular shipper. The ore body mined is a brown hematite running 54 per cent iron.

The 1908 product of, ore was 77,900 tons; 76 men were employed and 10 power drills were operated. The product for 1909 was 81,505 tons; 82 men were employed and 13 drills were operated. Shipments, 115,478 tons.

Underground work is conducted through two shafts, each 8 ft. x 10 ft. in dimensions and known as East and West shafts. The East Shaft is 148 ft. deep or 300 ft. on the incline; the West shaft is 199 ft. deep or 320 ft. on the incline. The "caving" system is used for recovering the product and the physical condition of the property is being modified and materially improved. The East shaft was sunk 30 ft. during 1909. It is operated on practical lines and just right for getting out the best all-around results. The daily capacity is about 280 tons of ore; 64,273 ft. of timber, board measure, were used for mining purposes during 1908 and 58,265 for 1909. Considerable reconstruction work has been done and the position of the mine generally strengthened. The skips are operated singly and carry a load of two tons.

The equipment embraces a 10-drill capacity air compressor, an 18 ft. x 25 ft. hoisting engine with two five foot drums and supplementary fittings and additions adequate for immediate requirements.

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

PITTSBURGH & LAKE ANGELINE.

Pittsburg & Lake Angeline Mining Company. Operating at Ishpeming. Gross shipments for 1909, 280,298 tons.

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 a total of 8,285,460 tons of ore.

The company's property is located within the corporate limits of the City of Ishpeming in Section 15, Town 47, Range 27, and consists of 200 acres of land, including both Old and East End mines. The ores produced are high grade Brown Specular Hematite. Analysis: Angeline Hematite 65.10 per cent, F. E. .045 per cent phos; South Angeline, 63.29 F. E. .111 phos.

In 1909 for both mines ore shipments amounted to 280,298 tons.

The mine is operated through one main shaft 422 feet deep and a sub-shaft 100 feet deep. The average length of openings in ore body vary from 1 to 300 feet. Ore product comes from different levels, a drift starting in diorite extending 2,000 feet east and west of the hoisting shaft, approaching the ore bodies from this drift to the south, making it safe operating for the men. The ore is mined on the "top-slicing" method, which works admirably. The shafts are connected at various levels 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 answer admirably for the work and much appreciated by the men. Skips carry 2½ tons to a trip and dump automatically in cars.

ROLLING MILL MINE.

Operated at Negaunee. Office postoffice address, Negaunee, Mich. Gross output for 1909, about 100,000 tons. Gross shipments for 1909, about 130,000 tons. Men employed, 1908, 130; 1909, 145.

This mine is operated toy Jones & Laughlin Ore Company. Thos. Walters, general manager; Thos. P. Walters, superintendent; Edward Corey, mining captain; Daniel J. Ryan, 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 1909 amounted to 130,000 tons, which compares with 100,000 for the previous year.

The ore body mined is a brown Hematite. The property is a development preposition 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, 10x12 feet within timber, and 745 feet deep. Skips are operated singly and carry 2½ tons to a trip.

CAMBRIA MINE.

Operated by the Republic Iron & Steel Company at Negaunee. Office postoffice address, Negaunee, Mich. Gross output for 1909, 99,068 tons. Gross shipments for 1909, 140,466 tons. Men employed, 1908, 75; 1909, 120. Prices and market conditions in 1909 were about the same as in 1908. The outlook for 1910 is given as "nothing extra."

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

During 1909 this mine employed 120 men, operated six machine drills, and produced 99,068 tons of ore. Total amount of ore produced to date, 1,933,993 tons.

Ore runs about 57.50 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 500 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. Fifteen thousand 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.

Operated by the Republic Steel & Iron Co., at Negaunee. Gross output for 1909, 44111 tons. Gross shipments for 1909, 58056 tons. Men employed, 1908, 45; 1909, 50. Prices and market conditions in 1909 were about the same as 1908.

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 a few years to come. Officers of the Cambria are also in charge here.

In 1909 this mine employed 50 men, operated four machine drills and produced 44,111 tons of ore.

Ore runs 57 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. Equipment is efficient, in good working condition and capable of doing the work of the mine.

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.

REPUBLIC MINES.

Operated by the Republic Iron Company at Republic. Office postoffice address, Republic. Gross output for 1909, 196, 841 tons. Gross shipments for 1909, 176,575 tons. Men employed, 350.

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

General manager, William Kelly, Vulcan, Mich.; superintendent, W. A. Siebenthal; mining captain, Peter W. Pascoe; clerk, Hiram R. Gamble; engineer, R. Bruce Wallace. 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 1909 was 350 and the output of ore amounted to 196,841 tons.

The ore mined is mostly a hard specular with a small part magnetic. The deposit promises to hold out for some time to come. The mine is operated through several shafts: No. 8 being 1,150 feet deep; No. 9, vertical, 1,815 feet deep; Pascoe shaft, inclined at an angle of 45 degrees from the vertical with skips working in balance, and 1,950 feet deep, vertical. The West Republic mine is operated through one shaft, 800 feet deep.

The mechanical equipment is powerful and in first class condition. It includes one hydraulic air compressor plant; electric power is used for operating electric pumps and

surface machinery; Sullivan steam first motion hoisting plant operating skips in Pascoe shaft; Allis engines operate geared hoists for No. 9 and No. 8 shafts; an Allis air compressor (steam) is held in reserve or for operation when water supply is low; an ore crushing plant is operated by electricity during the shipping season.

EMPIRE MINE.

Gross output for 1909, 108,993 tons. Gross shipments for 1909, 108,993 tons. Men employed 1909, about 65. Outlook for 1910 is about the same as last year.

The mine is operated by the Empire Iron Company. E. W. Hopkins, Commonwealth, Wis., general manager; W. B. Pattison, superintendent; Christopher Marshall, mining captain; Postoffice address of mine, Negaunee. Property is located in the east half, Section S. W. ¼ 19-47-26, Marquette County, Mich. Lands consist of 80 acres.

This is a comparatively new mine and made its first shipments of ore in 1907. In 1909 the number of men employed was 65 and 10 power drills were operated. The product of ore amounted to 108,993 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. Ore runs about 41 per cent metallic iron and .060 per cent phosphorus. Mine is opened by one large substantial shaft, 12x7 feet in dimensions and 105 feet deep. Product comes from one level with the opening extending in ore 500 feet in length. Drifting, crosscuting 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 in balance and dump automatically in crushers. The physical condition of the mine shows steady improvement. 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; 2 No. 6 Gates Crusher and one belt conveyor.

BREITUNG HEMATITE MINE.

Breitung-Hematite No. 2, operating at Negaunee, Mich. Office postoffice address, Marquette, Mich. Gross output for 1909, 130,233 tons. Gross shipments for 1909, 116,098 tons. Men employed, 1908, 88; 1909, 145. Breitung Hematite Mine No. 2 is operated by the Breitung Hematite Mining Company, Limited. Ore mined is Hematite, hoisted by balanced skips, operated by a Sullivan geared hoist, power being furnished by the boiler plant at M. C. No. 1 shaft. The shaft contains three compartments, 350 ft. deep, size of shaft 8x18 ft.

On the third level, this shaft is connected with M. C. No. 1 and M. C. No. 2 shafts. All three shafts will be connected on the 4th level which is now being developed.

The officers are: E. N. Breitung, general manager; H. L. Kaufman, assistant general manager; S. W. Shaull, 2nd assistant general manager; James F. Foley, general and consulting superintendent; Joseph Hodgson, supt.; W. Ralph Bauder, assistant supt.; W. H. Goodman, milling captain; Wm. Janzen, Jr., mining engineer; Oscar Goudge, chief clerk.

BARRON MINE.

Operated by the Washington Iron Company, at Humboldt, Mich. Office postoffice address, Marquette, Mich. Gross output, 1909, 51,926 tons. Gross shipments, 1909, 44,715 tons. Men employed, 1908, 70; 1909, 145. Mine is located on the Republic branch of the D. S. S. & A. Railroad, one mile from Humboldt. This is a hard ore proposition, the ore being hoisted through a single compartment shaft by means of a geared hoist. The surface equipment consists of a boiler house containing 4 100 H. P. portable boilers, a new compressor house containing a 35-drill compressor, a new office and warehouse, a new blacksmith shop and machine shop, a new laboratory, a crusher house, containing a gyratory crusher, rotary screen, crushing rolls and belt conveyors, etc., a crusher engine house, oil house and a change house.

E. N. Breitung, general manager; H. L. Kaufman, assistant general manager; S. W. Shaull, 2nd assistant general manager; James F. Foley, general and consulting superintendent; Joseph Hodgson, supt.; W. Ralph Bauder, asst. supt. Besides the general officers, there are: W. H. Holman, mining captain; Wm. Janzen, Jr., mining engineer L. N. Theobold, chief clerk.

MARY CHARLOTTE, Nos. 1 and 2.

Operated by the Mary Charlotte Mining company, (Brietung Group) at Negaunee, Mich. Office postoffice address, Marquette, Mich. Gross output for 1909, No. 1 shaft, 180,832 tons, No. 2 shaft, 36,648 tons. Gross shipments for 1909, No. 1, 212,756 tons, No. 2, 47,860 tons. Men employed, 1908, No. 1, 123, No. 3, 35; 1909, No. 1 200, No. 2, 77.

Mary Charlotte Mine No. 1 ore mined is Hematite, hoisted by balanced skips, operated by a Webster-Camp-Lane geared hoist. The power for hoisting and pumping is furnished by two 125 H. P. Return Tubular

Boilers, and one 150 H. P. Marine Boiler. The shaft is the same size and depth as the B. H. No. 2. The surface equipment consists of a boiler house, engine house, blacksmith shop, carpenter shop, warehouse, oil house, laboratory, office, sample house barn and two change houses.

Mary Charlotte No. 2 ore mined is Hematite, hoisted by balances skips, operated by a new Lake Shore, first motion hoist. The shaft contains four compartments, 440 feet deep, size 11x15 feet. The cage is operated by a new Lake Shore geared hoist. The surface equipment consists of a new boiler plant and engine house, containing four 150 H. P. return tubular boilers, a 25-drill capacity air compressor, a first and second motion hoist, and a new D. C. generator for lighting and underground electric haulage and a new machine shop.

Besides the general officers there are: W. H. Goodman, mining captain; William Janzen, Jr., mining engineer; Oscar Goudge, chief clerk.

RICHMOND MINE.

Operated by M. A. Hanna & Co., of Cleveland, Ohio. Gross output for 1909, 102,091 tons. Gross shipments for 1909, 102,091 tons. Men employed, 1908, 36; 1909, 100.

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 1909 the management employed 100 men and produced 102,091 tons of ore.

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 by a small steam locomotive. 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. The equipment now includes one Gate's crusher and a Corliss engine.

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

MENOMINEE RANGE

This range includes the Counties of Dickinson and Iron. The former county's mining activities gave employment in 1909 to 2865 men and the latter county 2645 men.

CHAPIN MINE.

Operated by the Oliver Mining Company. O. C. Davidson, general superintendent; George J. Eisele, assistant superintendent.

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 1909 the management employed 662 men, operated about fifty machine drills and produced 522,141 tons of ore.

The ore body mined is a Hematite; Analysis: Chapin, iron 58.50, phosphorus .065; Ajax, iron 51.00, phosphorus .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 shafts substantially construction and in first-class running order. Shafts are Hamilton, C Ludington and B Chapin. Hamilton shaft is 7 ft x 21 ft. 4 in. in dimensions, two compartment and 1,434 feet deep. B. Chapin shaft is 8 ft. x 12 ft. in dimensions, two compartment, and 1,035 feet deep. "C" Ludington shaft is 10 ft. 4 in. x 21 ft. 3 in. in dimensions, has four compartments and a depth of 1,522 feet. This is at present the principal working shaft at the Chapin mine. At this point a large Cornish pumping plant has been installed and is in operation, pumping to surface the greater portion of the mine water. Here also the entire product of the mine is hoisted to surface.

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 range, 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 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.

O. C. Davidson, general superintendent; George J. Eisele, assistant general superintendent; John A. Ryan, chief clerk; Martin Goldsworth, mining captain, and S. J. James, engineer.

ARAGON MINE.

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

The number of men employed in 1909 was 361 and the output of ore amounted to 308,010 tons. Forty power drills were in operation. Ore produced is a Hematite. Analysis: Granada grade, iron 58.50 per cent, phosphorus .062 per cent; Cadiz grade, iron 50.50 per cent, phosphorus .060 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 combined on practical lines and the product is taken out in the best way for the ore body mines. The "caving' system is used and answers well. It protects the mine from accidents and permits taking out practically all the ore body at the work proceeds. Levels are going forward in two 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 A 500,000 feet of timber, board measure, is consumed annually in this mine. Tramming is done by pneumatic haulage. Trams dump directly if into skips, which are hoisted to surface and in turn dump 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 outfits, workshops conveniently located, and supplementary appliances adequate for requirements.

O. C. Davidson, general superintendent; George J. Eisele, assistant general superintendent; John A. Ryan, chief clerk; G. A. Alver, mining captain, and G. A. Hellberg, engineer.

MANSFIELD MINE.

This mine is located in the village of Mansfield, Section 17, Township 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 is just getting in shape for making a substantial product.

The 1909 product of ore was 114,820 tons; number of men employed, 110. The ore mined is Hematite, yielding 56.00 per cent iron, phosphorus .150 per cent.

Daily capacity of the mine is about 600 tons. Product is recovered from the 14th level. Skips operate in balance and carry 3 tons to trip. Mine is developed by means of one working shaft, three compartments, 16 ft x 7 ft. in dimensions and 1,272 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 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 33-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements.

O. C. Davidson, general superintendent; Geo. J. Eisele, assistant general superintendent; J. S. Wall, superintendent; John A. Ryan, chief clerk; Jas. P. Edwards, mining captain, and G. A. Hellberg, engineer.

RIVERTON MINE.

The Riverton mine comprises properties known as the Dober and Isabella, located at Stambaugh, Michigan, in Township 42 and 43, Range 35, consisting of 200 acres of land.

During the year 1909 an average of 163 men were employed and 169,680 tons of ore were produced. Met. iron, 55.00 per cent, phosphorus, .675 per cent. Number of drills operated, fifteen.

The method of mining pursued at the Dober mine is that known as the "Milling" system.

The work thus far done at the Isabella mine has been of an explanatory nature only and the ore mined has been put in stockpile, no shipments having as yet been made.

O. C. Davidson, general superintendent; J. S. Wall, superintendent; Geo. J. Eisele, assistant general superintendent; John A. Ryan, chief clerk; Harry E. Duff, mining captain, and G. A. Hellberg, engineer.

THE PEWABIC COMPANY.

Operating at Iron Mountain. Office postoffice address, Iron Mountain, Mich. Gross output for 1909, 452 500. Gross shipments for 1909, 465,453. Men employed, 1908, 465; 1909, 464. Prices and market conditions in 1909 were practically the same as in 1908. The outlook for 1910 is not good at present as far as general business is concerted. The output is contracted for however, and the production will be about the same.

The Pewabic Company is a Wisconsin corporation with its general financial officers located in Milwaukee. The general mine office is located at Iron Mountain, Mich. President, George Van Dyke; general manager, E. F. Brown; mining captain, Edward 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. The ore produced is a Red Hematite ranging from high grade Bessemer, low in phosphorous and high in iron, to a high grade silicious ore, which is low in 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; Walpole, 59 per cent iron and .120 per cent phosphorus.

During 1909 the management employed 464 men and produced 452,500 tons of ore.

The mine is opened up and developed on broad, practical lines, ably and skillfully managed, and progress has been continuous and the results accomplished should be very satisfactory. The 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 gunk 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 or expense spared to make the mine safe. About 850,000 feet of timber are 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.

No. 1 shaft has now been sunk to the 8th level, making a total depth of 850 feet. No. 3 shaft has also been sunk an additional level of 100 feet. A new equipment of boilers has been installed at No. 1 shaft consisting of seven horizontal tubular boilers of 150 H. P. each carrying pressure of 175 pounds.

NANAIMO MINE.

This mine is owned 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 has never been extensively opened. It was taken over by the Mineral Company in 1903.

In 1909 the mine was not operated.

BREEN MINE.

This mine was idle during 1909.

CLIFTON AND TRADERS MINE.

Operating at Iron Mountain. Gross output for 1909, 100,608 tons. Gross shipments for 1909, 100,608 tons. Men employed. 1908, none, 1909, 87.

This property is operated .by the Antoine Ore Company. Mine is located in section 17 and 20-40-30, Dickinson County, Mich., with 591 acres of land. General Manager, C. Q. Fairburn, Pittsburg, Pa., Superintendent and Mining Captain, Frank Corbin, Iron Mountain, Mich., clerk, Ernest Johnson.

YOUNG'S MINE.

Operated at Stambaugh, Mich.; office postoffice address, Iron River, Mich. Gross output for 1909, 180,000 tons. Gross shipments for 1909, 154,150 tons. Men employed 1908, 120; 1909, 160. During 1909 prices were better than 1908 and the demand much greater. The present market for this ore is exceedingly quiet and shipments will not exceed 75,000 tons.

The Huron Iron Mining Company operates the Young's mine, which owns 160 acres of land situated E½ of E½, Section 12, in tow 42, Range 35, and located in Stambaugh, Iron County, Mich.

F. W. Youngs, general manager and superintendent; mining captain, John Looney; engineer, Love Whiting. Postoffice address, Iron River, Mich.

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 third level. Product is lifted in skips carrying two 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 interests of all connected with it. It appears to be in a prosperous condition and good far many years' substantial returns.

Another level has been opened out the past year, the total depth now being 425 feet. A new shaft house of western fir 86 feet high, has been erected, a four-ton, skip is in operation, a crushing plant installed considerable surface improvements made. Extensive diamond drill work has been carried on, both underground and on the surface. The mine is now in shape to produce heavily.

VERONA MINING COMPANY. (Baltic.)

The Verona Mining Company operates Baltic Mine No. 1 and No. 2, at Palatka, Mich. Office postoffice address, Palatka, Mich. Gross output for 1909, 185,107 tons. Gross shipments for 1909, 174,426 tons. Men employed, 1908, 125; 1909, 250. Prices and market conditions in 1909 were a little better than 1908. The outlook for 1910 is poor.

This company is located at Palatka with 160 acres of land in Town 42 North, Range 34 West. Under management of Pickands, Mather & Co., Cleveland, Ohio. G. H. Munger, general manager, Duluth, Minnesota; C. E. Lawrence, general superintendent, Iron Mountain, Michigan.

HEMLOCK MINE.

Hemlock River Mining Company. Operating at Amasa, Mich. Gross output for 1909, 117,600 tons. Gross shipments for 1909, 112,481 tons. Men employed, 1908, 150; 1909, 125. Prices and market conditions in 1909 were a little better than 1908. The outlook for 1910 is poor.

The Hemlock mine is located at Amasia, Iron County, Section 4, Town 44, Range 33. The ore mined is non-Bessemer, running about 52 per cent iron.

Under management of Pickands, Mather & Co., Cleveland, Ohio. C. H. Munger, general manager, Duluth, Minnesota; C. E. Lawrence, general superintendent, Iron Mountain, Mich.

CASPIAN MINE.

Operated by the Veronica Mining Company at Palatka, Mich. Office postoffice address, Palatka, Mich. Gross output for 1909, 205,703 tons. Gross shipments for 1909, 189,023 tons. Men employed, 1908, 200; 1909, 275. Prices and market conditions in 1909 were a little better than 1908. The outlook for 1910 is poor.

Located in Iron County, Mich., NE¼ of Secsion 1-42-35. Under management of Pickands, Mather & Co., Cleveland, Ohio. C. H. Munger, general manager, Duluth, Minn.; C. E. Lawrence, general superintendent, Iron Mountain, Mich.

VIVIAN MINE.

Operated by the Verona Mining Company at Quinnesec, Mich. Office postoffice address, Quinnesec, Mich. Gross output for 1909, 6,405 tons, (December only.) Gross shipments for 1909, none. Men employed, 1908, none; 1909, 75, (one month.)

The Vivian mine is located at Quinnesec, Mich., and has the west half of Section 34, Town 40, Range 30. The mine was idle during all but two months of 1909. It is under the management of Pickands, Mather & Co., Cleveland, Ohio. C. H. Munger, general manager, Duluth, Minn.; C. E. Lawrence, general superintendent, Iron Mountain, Mich.

FOGERTY MINE (Baltic No. 3.)

Operated by the Verona Mining Company at Palatka, Mich. Gross output for 1909, 86,155 tons. Gross shipments for 1909, 77,355 tons. Men employed 1908, 75; 1909, 75. Prices and market conditions in 1909 were little better than in 1908. Outlook for 1910 is poor. Mine closed down. Located in Iron County, Michigan, SE¼ of SE¼, Section 1-42-35.

Under management of Pickands, Mather & Co., Cleveland, Ohio. C. H. Munger, general manager, Duluth, Minnesota. C. E. Lawrence, general superintendent, Iron Mountain, Michigan.

CALUMET MINE.

Operated by the Calumet Ore Company at Felch, Mich. Office postoffice address, Felch, Mich. Gross output for 1909, 16,480 tons (three months). Gross shipments for 1909, none. Men employed, 1908, 50 (six months); 1909, 75 (six months.) Prices and market conditions in 1909 were a little better than 1908. The outlook for 1910 is poor. The mine is now closed down.

Located in Dickinson County, Mich., NE¼ and S½ of NW¼ in Section 8-41-28.

Under management of Pickands, Mather & Co., Cleveland, Ohio. C. H. Munger, general manager, Duluth, Minn.; C. E. Lawrence, general superintendent, Iron Mountain, Mich.

PENN IRON COMPANY.

Operating at Vulcan. Office postoffice address, Vulcan, Mich. Gross output for 1909, 377,744 tons. Gross shipments for 1909, 428,175 tons. Men employed, 1908, 650; 1909, 725.

During 1909 the management employed 725 men, operated 80 power drills and produced 377,744 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. The mines have shipped, previous to the 1907 season, 3,852,005 tons of ore. The hydroelectric plant is located at Sturgeon River, between three and four miles from the mines. Electric power is now used for operating hoists, compressors and pumps at all the mines.

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 five grades, from Special Bessemer to low grade silicious. The mines are developed and operated through six shafts. The deepest shaft is 1,500 ft.

Postoffice address of the mine, Vulcan, Mich. Officers: President, Charles S. Price, Johnstown, Pa.; treasurer, E. T. Stuart, Philadelphia, Pa., general manager, William Kelly; chief clerk, Anton Johnson; chief mining engineer, F. A. Janson; mechanical engineer, F. H. Armstrong; mining captains: East Vulcan, William Harris; West Vulcan-Curry, William Bond; Norway-Cyclops, William Williams.

MUNRO MINE.

Operating at Norway, Mich. Postoffice address, Iron River, Mich. Gross output for 1909, 23,241 tons. Gross shipments for 1909, 23,241 tons. Men employed, 1908, 75; 1909, 55.

This mine, located one and one-fourth miles west of the city of Norway, is operated by the Munro Iron Mining Co., general mining office of which is located at Iron River, Mich. G. L. Woodworth, Manager of Mines, Iron River, Michigan. H. McDermott, Supt., Norway, Mich.

The mine is operated during the summer months only as the ore is a low grade ore and only a limited amount can be used as a mixture. The open pit milling system is used. The first level is at a depth of 72 feet. All the mining so far has been done from this level. The shaft was sunk during the fall o 1909 75 feet deeper and the 2nd level started at a depth of 147 feet. Tramming is done by hand. The equipment consists of two 75 in. x 16 ft. boilers, geared hoist, double drum and cylinder 11 in. x 15 in., operating 1¾ ton skips in balance; 12 drill Norwalk air compressor, 10 drill Sullivan air compressor; No. 7½ crusher and operating engine.

Total production and shipment during 1909, 23,241 tons.

Average number of men employed, 55.

FEW MINE.

Operated by E C. Eastman & Co., of Marinette, Wis., on Section 6, Town 39, Range 29, about 1¾ miles west of Norway, Michigan.

Gross output for 1909 about 5,000 tons. Men employed 1909 and 1910 average about 15. Did not ship any ore during 1909, stockpiled only. Outlook for 1910 not favorable. E. C. Eastman, general manager, Marinette, Wisconsin. Harry Sincock, mining captain, Quinnessec, Mich. Jessie Cleary chief clerk, Marinette, Wisconsin. Have 160 acres of land under option. Mine is situated within 400 feet of main line of Wisconsin & Michigan Railway, within ½ mile of the Chicago & Northwestern Ry. Co., and also connect with C. M. & St. P Ry. Co, and have trackage arrangements over their line into Iron Mountain.

Demand for low grade ore seems to be light. Stout down operations at main shaft about July 1st, 1910, and are at present sinking another shaft within about 16 feet of present one, hoping to strike a higher grade body of ore, and of larger quantity.

A Norwalk 5-drill capacity compresser 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 a ladder-way for escape in case of necessity. Equipment includes a power house 45x65 feet in which are one

boiler 125 H. P. and one boiler 30 H. P. water heater, Air Compressor, 40x64 inch double drum reversible Engine, Webster, Camp & Lane hoist, one engine and dynamo producing 125, 16 C. P. electric lamps for underground and surface 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 hemolck timber with 6 foot diameter bicycle seave wheels. Hercules hoisting cable 1⅓ inch diameter, skips sheet steel 2 tons capacity, 5 steel tram cars 2 tons capacity.

LORETTO MINE.

Operated at Loretto, Mich. Gross output for 1909, 96,613 tons. Gross shipments for 1909, 96,613 tons. Men employed, 1908, 75; 1909, 190.

This property is operated by the Loretto Iron Company, which is located in Dickinson County, Mich., and owns 280 acres of land in Section 7, Town 39, Range 28.

Last year 190 men were employed and 96,613 tons of ore shipped.

The equipment includes one direct acting Corliss Bullock flat rope hoist for the main shaft; Camp & Lane hoist for the timber shaft; three 200 H. P. Spect. tubular boilers, and one 250 H. P. furnace marine boiler; machine, blacksmith shop, well equipped with lathes, steam hammers, drill sharpeners, etc. Laidlaw, Dunn, Gordon, four-stage, cross-compound compressor, 1,000 lbs. pressure, for underground locomotives; Rand compressor, cross-compound, 35 drills.

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

General manager, J. Ward Amberg, 1400 Fulton St., Chicago, III.; C. H. Baxter, superintendent; T. Donovan, mining captain; Warren McLaughlin, engineer. Postoffice address, Loretto, Mich. Clerk, John Simon.

CORRIGAN, McKINNEY & COMPANY.

This firm 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 we 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 firm in all its branches and added to its capacity. Order and system prevails everywhere and the business affairs of the firm seem to be performed promptly and with excellent efficiency. Like practically other mining companies located in the upper peninsula of Michigan, Corrigan, McKinney & Company pay special attention to the needs and requirements of their 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 firm controls and operates the following mines:

On the Gogebic Range, the Ironton and Colby mines; in the Crystal Falls district, Menominee Range, the Tobin, Armenia, Lament, Fairbanks, Kimbal, Lincoln, Crystal Falls, Great Western and Quinnesec mines; besides different properties under exploration.

Main business office, Cleveland, Ohio; mine office, Crystal Falls, Mich. General superintendent, W. J. Richards.

TOBIN MINE.

Operated at Crystal Falls. Office postoffice address, Crystal Falls, Mich. Gross output for 1909, 279,486 tons. Gross shipments for 1909, 425,252. Men employed, 1909, 170.

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.

Genesee ore is included in these outputs. All development work was at the eleventh level. The ore produced is a red Hematite running 58.90 per cent metallic iron and high in phosphorus. Daily capacity of the mine is about 975 tons ore and still better things are predicted for this property. All told, the shipments of ore sent out from Tobin and Genesee foot up well over a million, tons. The 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, 8 ft. 6 in. by 24 ft. in dimensions and 1,100 feet deep. Eleven 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. The mine is not deep and the ventilation is good. There is now going down at the Tobin mine one of the finest and largest shafts in the Crystal Falls district and it will measure 8x26 feet inside of timbers, giving room for four compartments. The shaft

will be sunk to a dept of 820 feet vertical. In order to reach the shaft underground a tunnel of 200 feet long must be run. The country rock which the shaft is supposed to run down is a 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 H. P. horizontal tubular boilers; one triple expansion Prescott pump; one Jeffery electric dynamo; one Green economizer and supplementary additions adequate for requirements.

The shaft is now being sunk from the tenth to the eleventh level, present development work on the eleventh level being conducted through a transfer winze.

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 and 1909. No prospect of starting up this year.

GREAT NORTHERN MINE.

Operated by Corrigan MJcKinney & Company, at Crystal Falls, Mich. Gross output for 1909, 145,834 tons. Gross shipments for 1909, 112,747 tons. Men employed 1909, 200. The outlook for 1910 is fair.

The mine is located at Crystal Falls, situated in Town 43, Range 32, with 80 acres of land. 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 inside dimensions and 1125 feet deep. Skips lift three tons of ore to a trip and operate in balance. Sixteen levels are extended from the shaft and the development work under way consists of drifting and opening up ground. Product is being taken from the 14th and 15th levels and opening up the sixteenth under way. Daily capacity of the mine is about 850 tons. Tram cars are operated both by electricity and hand labor. The property is electrically equipped throughout. Equipment is up-to-date and includes a 25-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.

DUNN MINE.

Operated toy Corrigan, McKinney & Co., at Crystal Falls. Gross output for 1909, 119,814 tons. Gross shipments for 1909, 189,396 tons. Men employed 1909, 150. The outlook for 1910 is fair.

This mine is located in Mastodon Township, Iron County, 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 1909 product of ore was 198,814 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 compartments, 5x16 feet inside dimensions and 1300 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 10 levels are extended from shaft and the product comes from three of them. Daily capacity of the mine is about 800 tons of ore. Tram cars are operated by electric power.

Mechanical equipment includes one 20x48 Twin Corliss Sullivan Hoist "first motion"; four 150-horse power horizontal tubular boilers; one compound Prescott pump, 500 gallons. An electrical equipment is now doing duty at the mine furnishing power for underground and stockpile haulage, and lights throughout the mine plant. A fourth, boiler was added during the year.

LAMONT MINE.

This mine's location is near the Town of Crystal Falls, in Town 40, Range 32, and leased 80 acres of land. This property is idle. This mine is being dismantled and there is no prospect of reopening for the immediate future.

ARMENIA MINE.

Armenia Mine, operating at Crystal Falls, Mich. Office postoffice address, Crystal Falls, Mich. 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. Mine was idle during 1909; was unwatered during December, 1909 and January, 1910, and is now in active operation. During 1909 a new coal dock was put up, new tracks to shaft house and some of the old mine buildings moved to new locations.

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, no prospect of re-opening this year.

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. This mine is still idle and probably will be for the remainder of the year.

BAKER MINE.

Operated by the Crystal Falls Iron Mining Co., at Stambaugh, Office P. O. address, Stambaugh. Gross output for 1909, 63,583 tons. Gross shipments for 1909, 45,002 tons. Average number of men employed 1908, 50; 1909, 80.

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. In 1909 mine was producing daily product of about 200 tons of ore taken principally from development work.

BRISTOL MINE.

Bristol Mining Company, operating at Crystal Falls. Gross output for 1909, 406,500 tons. Gross shipments for 1909, 396,489 tons. Men employed, 1908, 111; 1909, 233. General manager, E. W. Hopkins, Commonwealth, Wis.; Superintendent, Arvid Bjork, Crystal Falls, Mich.

Company has 80 acres of land in Town 43 North, Range 32 West. Mining captain, Emil Carlson; Engineer, Henry Kleren; Clerk, F. L. Johnson.

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 under way 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, hoists 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.

Operated by the Dessau Mining Company at Iron Mountain, Mich. Gross output for 1909, 12,329 tons. Gross shipments for 1909, 10, 887 tons. Men employed, 1908, 20; 1909, 30. Market conditions were better in 1909 than in 1908. To date, in 1910, the iron ore production seems to exceed the market requirements, especially on low grade ores.

The Dessau Mining Company is opening up and developing the Millie mine. The 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, Michigan. General manager, Silas J. McGregor.

The number of men employed by this mine during 1909 was 30, and the product 12,329 tons. Four drills were operated. The development work for the year 1909 consisted of 605 feet of drifting and cross-cutting.

HIAWATHA MINE.

Operated by the Munro Iron Company, at Stambaugh. Post office address, Iron River. During 1909 the average number of men employed was 118. The amount of ore shipped was 136,000 tons. Development work under way consists of drifting, cross-cutting and developing new ground. An unusual amount of rock work is necessary in order to win the ore. The mine is opened up to the sixth level, which is 665 feet from the surface. Tramming is done principally by electricity. The equipment consists of four 125 H. P. return tubular boilers; one 22x48 first motion hoist; one No. 8 crusher and engine to operate same; 1 triple expansion pump; one cross-compound crank and fly wheel pump; two straightline air (compressors of capacity of 12 and 6 drills respectively.

The ores are low grade Hematites and are consumed at the furnaces of the Rogers-Brown Iron Company of Buffalo, N. Y.

JAMES MINE.

Gross output for 1909, 93,616 tons. Gross shipments for 1909, 90,888 tons. Men employed, 1908, 125; 1909, 125.

This mine is operated by the Mineral Mining Company and under the same management as the Pewabic, Nanimo and Breen mines. The property is located in the N. ½ of the N. E. ¼ of Section 23, Town 43, Range 35. Postoffice Address, Iron River, Mich. This mine made its first product in 1907, which amounted to 6,889 tons of ore.

During 1909 the management employed 125 men, and produced 93,616 tons of ore.

In this property, the management is opening up in 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 52 1-2 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 315 feet, its present bottom. In addition to the James and Nanimo 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 third 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 is good.

The mechanical equipment includes 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.

During the past year a large new shaft has been sunk on this property to a depth of 410 feet, or to the 4th level. The size of this shaft is 6x16 ft. inside of timbers, and it is divided into four compartments, two skip ways, one cage way for handling men and timber and a pump and ladder way compartment. A direct acting first motion, hoisting plant with Corliss engines has been installed, and a boiler plant with ultimate capacity for 1,000 H. P., and carrying a pressure of 175 pounds of steam has been installed. The buildings all being of concrete block construction. A steel shaft house 75 feet in height has been erected, a new and well equipped machine shop and blacksmith shop is also a part of the new equipment for the year.

New tracks have been laid by the Northwestern Railway to the new shaft and the mine is now in shape for a large production for 1911 if the business conditions warrant such operations.

KONWINSKI.

Adjoining the James to the South and Southwest, that is, the SW. of the NE. and the SE. of the NW. of Section 23, Town 43, Range 35, this company has developed the property known as the Konwinski, upon which a shaft has been sunk, 6x9 feet inside of timbers, to a depth of 300 feet. A drift and crosscut has shown the existence of a considerable body of ore. Temporary plants have been installed at this property and a track will undoubtedly be completed to the property during 1910.

The officers of the Mineral Mining Company are as follows: George D. Van Dyke, president, Milwaukee, Wisconsin; Elwin F. Brown, Secretary and general manager, Iron Mountain, Michigan; J. A. Monroe, superintendent. Iron River, Michigan; Ernest Truran, mining captain, James Mine; Benj. Martin, mining captain, Konwinski; A. J. Myers, mining engineer.

ZIMMERMAN MINE.

Operated by the Spring Valley Iron Company, near Iron River, Michigan. Postoffice address, Iron River. President, E. H. Willis; secretary-treasurer, J. H. Browne.

Exploring and development work in progress. Employed $4 men in 1909 and mined 13,196 tons of ore.

GROVELAND MINE.

Groveland Mining Company, operating at Randville, Mich. Gross output for 1909, 24,933 tons. Gross shipments for 1909, 24,933 tons. Men employed, 1908, 60; 1909, 60. Market conditions were better in 1909 but prices were lower than 1908. We expect to ship 50,000 ton of ore in 1910 as there is now a better demand for this particular grade of ore.

This company is 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. Post-office address, Iron River, Mich.

A large body of ore has been proven up during the past year with diamond drills, both north and east and west. A crushing plant has been installed and the 1910 product is being crushed. A new 25-drill compressor and 15x20 hoist has also been installed and the equipment is now complete and the mine in shape to produce heavily.

HOLLISTER MINE.

Hollister Mining Company, operating at Crystal Falls. Gross output for 1909, 26,000 tons. Gross shipments for 1909, 26,000 tons employed, 1908, 46; 1909, 75. The outlook for 1910 is "fairly strong."

Superintendent, Frank Scadden; mining captain, William Jayne.

In 1909 the mine employed 75 men and produced 26,000 tons of ore. The management is doing considerable practical development work.

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 1909 was 75. 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 under way includes sinking a shaft and opening up the mine for shipping ore. The shaft is a fine one, being 6x10 feet in dimensions and 600 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 1909 product was taken from the 6th level. Cage lift 1½ tons to a trip, operate singly and dump the ore into a pocket. Development work under way includes sinking the shaft. The shaft will likely be sunk, another lift and two levels developed with raises, etc. for producing ore during the season in hand. Last year three frame dwellings and a boarding house for employes were completed

Equipment is in good running order and includes one 6 H. P. Webster Camp & Lane engine and drum, one 100 H. P. boiler, two 150 H. P. boilers, one 10-drill Hall compressor (straight line.)

BRULE MINE.

Brule Mining Company, operating at Stambaugh Township, Mich. Office postoffice address, Stambaugh, Mich. Gross output for 1909, 100,031 tons. Gross shipments for 1909, 100,031 tons. Men employed, 1908, 139; 1909, 180. The outlook for 1910 is good.

E. W. Hopkins, general manager; F. D. Klinglund, superintendent; Gust Anderson, Thos. Wills, mining captains; Milton D. Rowe, clerk; J. D. Spew, engineer. Mine's postoffice address, Stambaugh, Iron County, Mich.

This company is doing considerable mine development and exploring work in promising locations on the Menominee 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 quicksand 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 enterprises 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 and Burkshire, besides exploring the Claibourne and Lenox. The four properties are under the same management.

CHATHAM MINE.

Chatham mine, operated by the Brule Mining Company at Stambaugh. Office Postoffice address, Stambaugh, Mich. Gross output for 1909, 65,736 tons. Gross shipments for 1909, 65,736 tons. Men employed, 1908, 104; 1909, 80. The outlook for 1910 is fairly good.

This property is located in the N. E. S. E., Section 35, Town 48, Range 35, Iron County, Mich. Head mining captain, Gust Anderson; engineer, J. D. Sperr; Milton D. Rowe, chief clerk.

In 1909 the number of men employed was 80 and ore shipments 65,736 tons. Ore body mined is a red Hematite running about 56 per cent metallic iron. The mine is opened up and developed through two shafts. Shafts are 300 and 500 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 ten. 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.

BERKSHIRE MINE.

Operated by the Brule Mining Company at Stambaugh Township, Mich. Office postoffice address, Stambaugh, Mich. Gross output for 1909, 34,295. Gross shipments for 1909, 34,295. Men employed, 1908, 20; 1909, 30. Outlook for 1910 is good.

Berkshire is located in S. W, N. W. and N. W. S. W. Section 6, Town 412, Range 34, Iron County, Mich. Mining captain, Thos. Wills. Ore body is soft red Hematite. The future prospects of the property are reported good. Mechanical equipment includes 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.

CLAIBOURNE MINE.

Claibourne mine is owned by the Brule Mining Company at Stambaugh Township. Office postoffice address, Stambaugh.

Claibourne is located in the N½ of NW¼, Section 6, Town 42, Range 34, Iron County Mich., with 80 acres of land. It is now being explored by diamond drilling.

LENNOX EXPLORATION.

Operated by the Brule Mining Company at Stambaugh Township. Office postoffice address, Stambaugh, Mich. Men employed, 1908, 13; 1909, 20.

Lennox is situated in Section 36, Town 43, Range 35, S. E.; S. W., Iron County, Mich., with 40 acres of land. On an average the number of men employed was 20, and the work of opening and developing the property proceeds in a practical way and good results are obtained, exploratory work being done on 250 and 350 feet levels.

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 and progress continues at a satisfactory rate. The mechanical equipment is adequate for immediate requirements and everything is running along smoothly.

GIBSON MINE.

Operated by Rogers Brown Ore Company, of Chicago, Ill., at Amasa, Mich. Chicago office. Corn Exchange Bank Building. Gross output for 1909, 27,481 tons. Gross shipments for 1909, 36,246 tons. Men employed, 1908, 58; 1909, 69.

This mine is located southeast of the town of Amasa, Iron County, Mich., and has 120 acres of land. C. D. Tripp, of Chicago, Ill., is general manager; T. H. Martin, Superintendent; C. Jacobsen, mining captain; Nels Jacobsen, 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.

Sixty-nine men were employed and a product of 36,246 tons of ore were produced in 1909.

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 by mining companies of the Gogebic Range in 1909 was 4,584.

The Oliver Mining Company operates some of the best Gogebic mines. D. E. Sutherland, superintendent, Ironwood, Michigan.

NORRIE-AURORA 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 support of the town of Ironwood. The property has been a heavy producer.

In 1909 the management employed 1,255 men, operated 40 power drills and produced 1,086,529 tons of ore. The mines are worked through 8 active shafts; “A” Norrie, 6x22 ft. 10 in., “C” East Norrie, 8x22 ft., “A” Aurora, 7 ft. 6 in. x 18 ft., “B” Norrie, 5x10 ft. 4 in., “D” East Norrie, 10x18 ft. 8 in., No. 1 Aurora, 5 ft. 10 in. x 14 ft., “C” Pabst, 6x16 ft., “G” Pabst, 10x18 ft. 8 in.

Air for operating machine drills, etc., for these mines is furnished toy 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 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 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 counterbalance 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 despatched with care and precision. Mechanical equipments are of the best 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 plants, A. C. C. Cooper-Duplex Corliss 50-drill capacity air compressor plant, pumping outfits, workshops conveniently located and supplementary appliances adequate for requirements.

Mining captains are: Nome Mine, S. J. Gribble; East Norrie Mine, A. G. Hedin; Aurora Mine, T. B. McNamara; Pabst Mine T. J. Stevens.

TILDEN MINE.

Operated at Bessemer, Mich. Office postoffice address, Ironwood, Mich. Gross output for 1909, 125,090. Gross shipments for 1909, 154,658. Men employed, 1908, 205; 1909, 253.

This property is located near Bessemer in Section 15, Town 47 North, Range 46 West, with 320 acres of land.

In 1909 the mine employed 253 men and produced 125,090 tons of ore.

The 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.

The 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. The product is recovered from various openings, located practically all over the mine, and taken out in the most modern way. The mine is opened up well ahead and in good physical condition. The mine equipments are adequate for requirements and in good running order. The 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. The ore bodies are substantial and good for sometime to come at the present rate of production. Skips dump automatically in cars, counter-balance in shafts, and carry from two to four tons to a trip. The mine buildings are substantial and well located for direct service. The machinery is modern, in first class running order and generally adequate for requirements. The 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 the surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically done. The results accomplished have been fairly substantial and should be, in the main, satisfactory. The mechanical equipment is in good running order, and includes hoisting plants, an Allis-Chalmers 20-drill capacity air compressor plant, pumping outfits, workshops conveniently located and supplementary appliances adequate for requirements. W. H. Knight, mining captain.

TILDEN MINE.

This property is located near Bessemer in Sec. 15, Town 47 North, Range 46 West, with 320 acres of land.

In 1909 the mine employed 253 men, operated fifteen power drills and produced 125,090 tons of ore.

Ore mined is a soft Hematite. 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 1,406 and 670 feet deep respectively. No. 10 is 9x16 ft. 6 in., in dimensions and 957 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 minin 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 at the present rate of production. Skips dump automatically in ears, 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 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 aconomically 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 1909 the mine employed 67 men, operated six power drills and sunk the shaft to a depth of 1,264 feet.

It is good opinion that the property will develop into a substantial and profitable producer. Surface equipment is good for present requirements and embraces a hoisting plant, 10 drill capacity air compressor and supplementary appliances. James Stanlake, mining captain.

GENEVA EXPLORATION.

Is a development property located in Section 13, between Ironwood and Bessemer, Town 47, Range 46, with 160 acres of land, which is leased. The organization was formed in September, 1902.

In 1909 there were 46 men employed, two power drills operated. The shaft is sunk to a depth of 2,188 feet. The production was 2,088 tons.

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. The equipment is adequate for requirements. Mine will be put in the best condition for bringing satisfactory results. James Stanlake, mining captain.

DAVIS 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 production was 372 tons.

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 61 men were employed. The shaft is 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 "A" 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 superficial formations will not be met at depth of 2,000 feet, where the ore bodies seem 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 land 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. Postoffice address, Ironwood, Mich. J. M. Bush, superintendent; W. H. Moore, clerk; S. J. Perkins, mining captain.

The Ashland forms a substantial producer and is one of the best known mines in Gogebic county. Ore mined is a soft Hematite running 58.00 per cent iron; phosphorus, .049 per cent.

The 1909 product of ore was 256,674 tons. Twelve power drills were operated and 235 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 1,535 feet deep.

NEWPORT MINING COMPANY.

The Newport and Anvil Mines are operated by the Newport Mining Company, at Ironwood. Gross output for 1909, 930,535 tons. Gross shipments for 1909, 1,008,354. Men employed, 1908, 972; 1909, 1100. The outlook for 1910 is reported as fair.

Officers as follows: L. C. Brewer, general manager; B. W. Valiat, superintendent; G. L. Olson, chief clerk; Frank Blackwell, mining engineer. Mining captains, John Grigg and William Bond.

The Newport Mining Company controls 320 acres of land, in Section 24, Town 47 North, Range 47 West. Mine being located about one mile east of the City of Ironwood. Production is now recovered from two shafts, one being 28 ft. 8 in. x 6 ft, divided into five compartments, four of which are for hoisting, and the fifth for ladder way, pipes, etc. The second shaft is 16 ft. x 6 ft, and has three compartments. The old shaft, 12 ft. x 5 ft. 8 in., was abandoned two years ago, and all ore from the west end of the property is now being hoisted through the large five compartment shaft. Both producing shafts on the property are bottomed at the same elevation, 2300 feet, being connected by a drift in the foot wall, 2640 feet in length.

Electricity for underground and surface haulage, shop and other motors, miscellaneous lighting, etc., is furnished from an electric plant located in the main

power house. Over 1,000,000 lineal feet of round timber and 5,000 cords of lagging are consumed annually in mine work.

IRONTON MINE.

Operated by Corrigan, McKinney & Co. at Bessemer. Gross output for 1909, 195,003 tons. Gross shipments for 1909, 277,594 tons. Men employed, 1908, 325; 1909, 285. G. S. Barber superintendent; George Buzza, head mining captain; W. B. Rosenberger, engineer; J. E. Nemachuck, chief clerk. Postoffice address, Bessemer, Mich.

Ironton is located southwest of Bessemer, in Town 47, Range 46, with 320 acres of land. In 1909 the company employed 285 men, operated 20 power drills, and produced 195,003 tons of ore.

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. The mine is operated through two active shafts, 5x16 feet and 6x10 feet, inside measurement No. 3 shaft is 1,000 feet deep and No. 4 is 1,300 feet deep. Skips operate in balance and carry three tons of ore to a trip. Opening work done in 1907 included shaft sinking 200 feet and drifting in new ground, 4,000 feet. The 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 12th to the 15th levels. Tram cars are operated by electricity and highly appreciated by the men. The 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 of 6 ft. to 10 ft. by 7 in. timbers are consumed annually. Underground developments and mechanical construction have been continuous for some time and the property is broadening out for an increased output and improved results. The mine plant is operated by steam power and the equipment includes a 5-foot two-drum hoist, a 25-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 showing steady improvement. The ore body continues in depth to show good size and quality. The fifteenth level has been opened up during the year and sub-drifts extended.

COLBY MINE.

Operating at Bessemer. Gross output for 1909, 136,403 tons. Gross shipments for 1909, 166,449 tons. Men employed, 1908, 300; 1909, 305.

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, Joseph Webb; Chief clerk J. E. Newacheck; engineer, W. B. Rosenberger.

In 1909 the number of men employed was 305 with 30 power drills in service. The product of ore was 136,403 tons.

A 25-drill capacity air compressor is in operation and tram-cars are operated by mule power. 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 foot, 2-drum hoist, a 25-drill capacity Rand Compound compressor, besides auxilliary machinery and well equipped shops for doing the work of the mine.

YALE MINE.

Operated at Bessemer, Mich. Office postoffice address, Detroit. Mich. Gross output for 1909, 79,000 tons. Gross shipments for 1909, 71,458 tons. Men employed, 1908, 60; 1909, 155. The outlook was good at the commencement of the year, but ore sales are somewhat slack at present.

The Yale mine is operated by the Lake Superior Iron & Chemical Company, W. E. McRandle, superintendent; Harry Olds, mining captain; George J. Wealton, engineer.

The property is located at Bessemer, Gogebic County, Mich., post office address, Bessemer, Mich., and has 80 acres of land in the S. ½ of the N. W. ¼, Section 16, Township 47 North, Range 46 West.

During 1909 a force of 155 men was employed, four power drills operated and an output of 79,000 tons of ore produced. A new find of ore was made off the footwall in August of 1908 which has proven to be of considerable extent. The ore is soft Hematite averaging about 60 per cent iron and .060 per cent phosphorous. The mine is opened and operated through one shaft 5 ft. 2 in. by 8 ft 10 in. and 1,915 deep. The product comes from the tenth level and the openings in the ore body run as much as 800 feet in length. The subbing system is used to take out the product and about 300,000 lineal feet of timber is used annually in supporting the openings.

Two 150 H. P. horizontal tubular boilers and a new 15 drill compressor were added to the plant equipment during the year and the tonnage of the skip was

increased from two to three tons. The mime is in a very prosperous condition.

EUREKA MINE.

Operated by the Castile Mining Company, at Ramsay, Mich. Office P. O. address, Ramsay, Mich. Gross output for 1909, 118,831 tons. Gross shipments for 1909, 116,222 tons. Men employed 1908, 215; 1909, 223. Market conditions the latter part of 1909 were better than in 1908.

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 Section 13, in Town 47, Range 46 and owns 120 acres of land.

Geo. H. Abeel, Superintendent, P. S. Williams, Assistant Superintendent; J. S. Aummage, chief clerk; George Saunders, mining captain; R. A. Iregoning, 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, four 72-18 in. boilers, one 20x42 in. Sullivan hoisting engine and buildings adequate for present requirements.

CASTILE MINE.

Castile Mining Company operating at Wakefield. Gross output for 1909, 27,730 tons. Gross shipments for 1909, 28,499 tons. Men employed 1908, 17; 1909, 90. Market conditions were better in 1909 than in 1908. The outlook for 1910 is increased tonnage with partial sales.

ASTEROID MINE.

The mine is located between the Eureka and the Mikado mines with 160 acres of land in Section 13, Town 47 N, Range 46 West. The Asteroid up to this spring has produced no ore but the company is now finding some ore in development work. The property was closed down about six months in 1908 but operated regularly in 1909, employing an average of 42 men a day, surface and underground labor.

MIKADO MINE.

Operated by Pickands, Mather & Company, Office Postoffice Address, Wakefield, Mich. Gross output for 1909, 89,415 tons. Gross shipments for 1909, 99,195 tons. Men employed, 1908, 123; 1909, 133. No material change in prices in 1909 over 1908 but demand larger.

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 200 acres of land.

In 1909 there were employed at this mine 133 men and a product of 89,415 tons of ore produced. Besides making this output a good deal of sound, practical work was accomplished.

Ore produced is a non Bessemer, running about 58.00 per cent and .160 per cent phosphorus.

The mine is opened up and developed through two shafts; into two compartments 7x16 ft. in dimensions and about 1,000 ft. The circulation of the air in the underground departments is good 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 and the product comes from the 13th level. Opening work finished during 1907 embraced sinking 1 shaft 100 ft., drifting 1,000 ft. and cross-cutting 100 ft.

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.

John Johnson, Mining Captain.

BROTHERTON MINE.

Gross output for 1909, 108,598. Gross shipments for 1909, 103,089 tons. Men employed, 1908, 153; 1909, 141. No material change in prices over 1908, but demand larger in 1909.

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 west. Property consists of 120 acres well located within the iron belt.

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

The ore mined is a red Hematite running 60 per cent iron and .029 per cent phosphorus.

The mine is opened up and developed through one working shaft, 6x18 feet in dimensions, three compartments and 1,180 feet deep. Progress has been continuous. Shaft is substantially constructed, in good running order and doing satisfactory service. The ore Is trammed by hand labor, dumped directly into skips and

hoisted to the surface. Levels are connected underground with Sunday Lake and air circulates freely through, the workings. No effort is left undone to make the mine safe and secure for taking out the product. Product is recovered by the best method for bringing the most satisfactory results. Physically, the mine is in good condition. The mechanical equipment is in good running order. James Johns, mining captain.

SUNDAY LAKE MINE.

Gross output for 1909, 91,950. Gross shipments for 1909, 93,712. Men employed, 1908, 169; 1909, 135.

This mine is located just northeast of the Town of Wakefield in Section 10, Town 47, Range 45, and owns 320 acres of mineral land, adjoining the Brotherton on the east. The company mines a Hematite ore running 59.33 per cent iron and .027 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 135 men, worked six power drills and produced 91,950 tons of ore. Besides making this output of ore, much developing work was accomplished.

The mine is opened up and developed through one working shaft, 7x18 feet in dimensions, three compartment and 1,180 feet deep. Shaft connections are effected on different levels with Brotherton mine and in turn, and connected by raises or winzes and form quite a network of underground openings that efficiently ventilate the workings and makes them cool and airy. No reasonable expense is spared in making the mine safe and solid and sufficient timber is used annually in the work. The "subbing" method is used for taking out the product. Tram cars are operated by hand labor. Skips operate double and carry 2½ tons to a trip. The product of ore comes from the nineteenth level. The ore body is reported rather small and irregular.

The mechanical equipment is in good running order and includes hoisting plant, a 15-drill capacity air compressor, besides supplementary appliances and additions adequate for requirements. John Trudgeon is the mining captain.

PIKE MINE.

Pickands, Mather & Co. have added the Pike mine to their Gogebic holdings. The property lies near the Brotherton mine. This mine is located in Section 9 Town 47, Range 45, between Chicago property on the east and Brotherton on the west, and consists of 80 acres of land. The shipments for 1909 amounted to 22,173 tons from the stock pile. The mine is now idle.

PIONEER IRON COMPANY.

Austin Farrell, manager; office, Marquette; operating the C. C. I. furnace at Gladstone and the Pioneer at Marquette.

The Cleveland-Cliffs iron Company furnace at Gladstone employed 86 men in 1909 and made 42,131 tons of pig iron.

The Pioneer furnace at Marquette employed 76 men in 1909 and made 34,014 tons of pig iron.

NORTHERN IRON & CHEMICAL COMPANY.

(Succeeding Lake Superior Iron & Chemical Co.)

E. H. Flynn, president; John Christian, secretary; C. F. Fraser, treasurer. Office, Union Trust Building, Detroit.

1909 Pig Iron Production.

Manistique	32,760 tons
Newberry	
Boyne City	18,380 tons
Elk Rapids	10,449 tons
Chocolay	
	61,589 tons

Men Employed.	Furnace.	Chemical Works.	Kilns.	Total.
Manistique	109	17	31	157
Newberry	—	—	—	—
Boyne City	57	—	—	57
Elk Rapids	88	48	36	172
Choco'ay	—	—	—	—

Neither the Newberry nor Chocolay plants were operated during 1909.

ANTRIM IRON COMPANY.

Charcoal blast furnace. Operating at Mancelona, Mich. Office postoffice address, Mancelona, Mich. Gross output for 1909, 36,119 tons pig iron. Men employed, 1908, 100; 1909, 100. Prices and market conditions in 1909 were not so good as in 1908. The outlook for 1910 is very unfavorable.

Willard Barnhart, president; J. C. Holt, vice president and treasurer; N. M. Langdon, manager. Postoffice address, Mancelona, Mich. H. J. Bennett, secretary.

MITCHELL-DIGGINS IRON COMPANY.

Manufacturers of Pig Iron. Operating at Cadillac, Mich. Gross output for 1909, 36,040 gross tons. Men employed, 1908, 75; 1909, 75. Officers: W. W. Mitchell, president, Cadillac, Mich.; J. C. Ford, vice-president and secretary, Fruitport, Mich.; F. A. Diggins, treasurer, Cadillac, Mich. Furnace in blast entire year 1909.

SPRING LAKE IRON COMPANY.

Operating at Fruitport, Muskegon County. Office postoffice address, Fruitport, Mich. Gross output for 1909, 26,375. Gross shipments for 1909, 25,558. Men employed, 1908, 75; 1909, 75.

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

This company reports an output of 26,375 tons of pig iron for last year with an average of 75 men employed.

COPPER INDUSTRY

LAKE SUPERIOR COPPER CONDITIONS

For the year ending March 31, 1910 production of copper by Lake Superior mines showed very little change. During the calendar year 1909 Lake copper fluctuated 2¼ cents in price, the high price of 14¾ cents being made in January, and the low price of 12½ cents in March, with a recovery, by December, to a high price of 14⅛ and a low price of 13½, the average price of Lake copper for the year 1909 being 13.48 cents per pound.

Production of Lake copper during 1909 showed but little change from the preceding year. The productive capacity of the Lake Superior mines, however, is expanding slowly, but steadily, and in case of necessity the Michigan copper mines are capable of increasing production, during any given year, by 10 per cent and possibly by nearly 15 per cent, without undue depletion of ore reserves. It has been considered the part of wisdom, however, by the mine managements, not to crowd production unduly, during a period of low prices and indifferent demand, attention being devoted rather to maintaining former production and increasing ore reserves developed, for some more propitious season in the future.

In the shares of copper mining stocks there was a gradually rising tendency during practically all of 1909, culminating in decidedly high prices during January, 1910, with a consequent break in prices, of the sort that always follows a boom, this depression in copper shares continuing until July 27, 1910, since which time there has been a slow but fairly steady improvement.

The copper industry progresses by jumps, rather than by steady advances, and in consequence there are numerous eras of unduly high prices, alternating with equally numerous eras of unduly low prices. Copper is a commodity in which there is free trade, without tariff restrictions, in practically all of the great countries of the world, with the sole exception of Russia, which imposes an exceedingly high tariff, amounting to nearly 7 cents per pound, for the benefit of the Russian and Siberian mines. In consequence of practically absolute worldwide free trade in copper, with the exception of Russia, no consideration of Michigan copper production can be complete without taking into view also the copper industry of the world as a whole.

The panic of 1907 in the United States, which was followed by trade recessions in the principal European countries, brought about such a restriction of consumption, especially marked in this country that a surplus of about 450,000,000 pounds of copper was accumulated throughout the world, this reaching high water mark about April, 1909, since which time consumption has been slightly greater than production. During August, 1910, there was a restriction of output by a number of leading mines throughout the world, which has brought about since that time a much more rapid decrease in the copper surplus reported from month to month. While there was no formal agreement to restrict production, there were conferences between leading producers, and a general understanding was brought about, leading to such restriction, amounting to about 10 to 15 per cent in the case of numerous important mines. In the case of Michigan mines, I am unable to find any restriction in output since August, 1910, and do not think that any Michigan mine is a party to this understanding, although the Calumet & Hecla voluntarily reduced production, about 10 per cent, nearly a year before the understanding referred to went into effect but has not joined with other producers in any further restriction of output.

The making of a Lake Superior copper mine is a costly task, and many attempts are unsuccessful, but of nearly 50 corporations organized since 1895, to operate in the Michigan copper district, a number have made good mines, and others have opened good prospects. Among the successful mines developed within the past 15 years are the Ahmeek and Mohawk mines, entirely new properties, in Keweenaw county; the Allouez, Centennial and Isle Royale mines, which are new mines opened on old properties, and the Baltic, Champion and Trimountain mines, which are entirely new, in Houghton county. Among the newer properties that are developing with much promise are Lake, Hancock, Ojibway and Winona, with still other prominent new properties, not so far advanced, including such mines as New Baltic, Algomah and others.

MICHIGAN COPPER PRODUCTION BY MINES.

The total copper produced from all Michigan mines in 1909 was 230,123,525 pounds.

The Michigan copper production by mines in lbs. refined copper for 1908 and 1909 is given below. Those names in capital letters were the only dividend producers in 1909.

Mine.	1908.	1909.
Adventure	90,870	
Ahmeek	6,280 241	8,900,523
Allouez	3,047,051	4,031,432

Mine.	1908.	1909.
Atlantic		43,483
BALTIC	17,724,854	17,817,836
CALUMET & HECLA	81,660,723	78,652,618
Centennial	2,196,377	2,583,783
CHAMPION	17,786,763	18,005,071
Franklin	3,703,421	1,615,556
Isle Royale	3,011,644	5,719,056
Keweenaw	122,474	
Lake		120,000
Mass	1,766,930	1,723,436
Michigan	3,000,206	1,979,305
MOHAWK	10,295,881	11,248,474
OSCEOLA	21,250,794	25,296,657
QUINCY	20,600,361	22,511,984
Tamarack	12,806,127	13,533,207
Trimountain	6,034,908	5,282,404
Victoria	1,290,040	1,062,218
WOLVERINE	9,955,233	9,971,482
Estimated Miscell.	50,000	25,000
	222,674,898	230,123,525

According to Horace J. Stevens, the Lake copper authority, the average price received for all Lake Superior copper, from 1845 to 1907, inclusive was 13.86 cents per pound, with average dividends of 3.7 cents per pound, leaving an estimated cost of 10.16 cents for all years. While this may be accepted as an arbitrary figure, the cost might be figured much higher, or materially higher. By adding $60,000,000 to the cost of production, for money lost in unproductive ventures, the cost of copper produced would be made almost exactly 11.5 cents per pound. By adding another $15,000,000 for assessments on mines that have since repaid in dividends the original assessments, cost of copper would be increased to about 11.85 cents per pound, leaving a net margin of profit, for the entire production, of almost exactly 2 cents per pound, plus the present aggregate values of the mines, which would be about equal to total dividend disbursements to date, or about 3.7 cents per pound.

Omitting the production of mines that have not proven profitable, the average cost of copper produced by dividend-paying Lake Superior mines probably has been about 9.5 cents per pound, for all years.

The following table shows the high, low and average price of copper for the last five years:

Year.	Low.	High.	Average.
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	13.28
1909	12.50	14.75	13 48

MICHIGAN COPPER DIVIDENDS.

Another interesting Stevens table shows the total of Lake Superior copper mine dividends from 1849 up to and including 1909:

Total Lake Superior Dividends.
1849—1909.

Name of Company	Present Status.	Dates Paid. First.	Dates Paid. Last.	Number of Dividends.	Total Amount.
Atlantic	a	1879	1905	19	$ 990,000
Baltic	b	1905	1909	10	5,550,000
Calumet	c	1870	1871	3	300,000
Calumet & Hecla	b	1871	1909	148	109,600,000
Central	c	1864	1905	31	2,130,000
Champion	b	1903	1909	43	5,700,000
Cliff	d	1849	1867	37	2,518,620
Copper Falls	a	1864	1871	3	100,000
Franklin	b	1863	1894	21	1,240,000
Hecla	c	1869	1871	7	650,000
Kearsarge	e	1890	1897	3	160,000
Minnesota	f	1854	1876	19	1,820,000
Mohawk	b	1906	1909	7	1,950,000
National	a	1861	1872	9	320,000
Osceola	b	1878	1909	64	8,381,750
Pewabic	g	1862	1873	11	1,000,000
Phoenix	a	1877	1877	1	20,000
Quincy	b	1862	1909	90	18,890,000
Ridge	h	1873	1880	4	100,000
Tamarack	b	1888	1907	43	9,420,000
Trimountain	b	1903	1908	3	800,000
Wolverine	b	1898	1909	23	5,700,000
Totals				588	$177,340,370
Copper Range Cons.	i	1905	1909	24	9,219,186
Copper Range Co.	i	1905	1909	12	2,050,000
St. Mary s M. L. Co.	i	1886	1909	29	3,640,000
Grand Totals				626	$192,249,556

a. Idle.
b. Active.
c. Absorbed by Calumet & Hecla.
d. Absorbed by Tamarack.
e. Absorbed by Osceola.
f. Absorbed by Michigan.
g. Absorbed by Quincy.
h. Absorbed by Mass.
i. Not a direct copper producer.

MICHIGAN COPPER DIVIDENDS PAID IN 1909.

Baltic	$1,000,000
Calumet & Hecla	2,700,000
Champion	500,000
Mohawk	300,000
Osceola	769,200
Quincy	440,000
Wolverine	600,000
Total	$6,309,200
Copper Range Consolidated	1,536.740
Copper Range Company	400,000
St. Mary's Mineral Land Co.	160,000
1909 Grand Total	$8 405,940

HOUGHTON COUNTY COPPER MINES.

CALUMET & HECLA MINING COMPANY.

Capital stock, $2,500,000. President, Quincy A. Shaw; vice-presidents, T. L. Livermore, R. L. Agassiz; secretary-treasurer, George A. Flagg. General manager, James MacNaughton, Calumet, Mich. Eastern office, 12 Ashburton Place, Boston. Mill office, Lake Linden, Michigan.

The main workings of this company, operating one of the greatest copper mines in the world, are located at Calumet, giving employment to more than 5,000 men.

During the fiscal year ending April 30, 1910, the Calumet & Hecla mines produced mineral equal to 78,652,618 lbs. of copper, as against 81,178,326 for the previous year. The lbs. of copper per ton of rock were 27.414 lbs. in 1909-1910, as against 30.06 for the preceding year. There were paid during the last fiscal year a total of $30 per share dividends. The table of dividends for previous years is given in the report of the State Mineral Statistician for 1908.

Statement of Assets and Liabilities.

Cash and Quick Assets.

Cash at Mine Office		$ 167,370.92
Cash at New York Office		15,000.00
Cash at Boston Office, Exchange, Copper at 13c and Mineral at 7c.		6,272,864.88
Bills and Notes Receivable at Boston and Mine		708,254.61
Development and Equipment Fund		1,482.33
Insurance Fund		983,176.90
Employes Aid Fund		29,351.68
Sinking Fund		369,205.17
		$8,546,705.49

Liabilities.

Drafts in Transit	$213,311.96	
Bills, Notes and Accounts Payable at Boston and Mine	666,096.38	$879,408.34
Balance		$7,667,298.15

The Calumet and Hecla Mining Company owns:

42,978	shares	Allouez Mining Co.,	100,000 shares issued
44,350	"	Centennial Copper Mining Co.,	90,000 " "
19,400	"	Cliff Mining Co.,	60,000 " "
20,000	"	Frontenac Copper Co.,	20,000 " "
50,100	"	Gratiot Mining Co.,	100,000 " "
153,500	"	LaSalle Copper Co.,	302,977 " "
18,000	"	Manitou Mining Co.,	20,000 " "
32,781	"	Osceola Consolidated Mining Co.	96,150 " "
50,100	"	Superior Copper Co.,	100,000 " "
36,500	"	Dana Copper Co.,	40,000 " "
35,450	"	St. Louis Copper Co.,	40,000 " "
33,397	"	Laurium Mining Co.,	40,000 " "
11,207	"	Seneca Mining Co.,	20,000 " "
27,507	"	Isle Royale Copper Co.,	150,000 " "
24,796	"	Ahmeek Mining Co.,	50,000 " "
19,400	"	Tamarack Mining Co.,	60,000 " "
465	"	Pfd. White Pine Copper Co.,	

LAURIUM COPPER COMPANY.

Subsidiary of the Calumet & Hecla. The annual report for 1909 says:

Active developments on your property were commenced in August, 1909. A shaft about 2,200 feet from the southwest corner of Section 26 has been sunk 456 feet on the Kearsarge lode to a point 94 feet below the 4th level and 88 feet of drifting has been done. This shaft is located with a view to sinking a second shaft about 2,600 feet to the north. The openings have shown a good vein with encouraging copper values.

The equipment at this shaft consists of a rock house of about 606 tons daily capacity; a boiler house with one large Belpaire boiler; an engine house with small engine and compressor, and a dry house.

The treasurer's statement is given below.

OSCEOLA CONSOLIDATED.

Osceola Consolidated Mining Company, operating at Osceola, Mich. Gross output for 1909, 1,494,845 tons. Gross shipments for 1909, 1,494,845 tons or 25,296,657 lbs. Ingot Copper. Men employed, 1908, 1,721; 1909, 1898.

Officers of the Osceola Consolidated Mining Company (Capital stock, $2,500,000), President, Rodolphe L, Agassiz; secretary-treasurer, George A. Flagg; general manager, Jas. MacNaughton; general superintendent, William J. Uren; assistant superintendent, Frank H. Haller; clerk, William Weale; stand mill superintendent, A. L. Burgan; J. T. Reeder, purchasing agent; A. G. Gullberg, superintendent construction and motive power; mining captain, Osceola branch, James Rowe; mining captain, South Kearsarge branch, Frank Rander; mining captain, North Kearsarge branch, Jos. Biscombe. Eastern office, No. 12 Ashburton Place, Boston, Mass.; general office, Calumet, Mich.; mine office, Osceola, Mich.

The directors submit the following report of the operations of this company for the year ending December 31, 1909:

Gross value of fine copper produced:

Sold 24,659,729 lbs., at 13.30 cents	$3,279,743.95	
636,928 lbs. sold since January 1 at 14c	89,169.92	
Total, 25,296,657 lbs. at 13.32 cents		$3,368,913.87
Balance of interest receipts and other income	36,942.87	
Dividend, $4 per share, Lake Superior Smelting Company	60,000.00	96,942.87
		$3,465,856.74
Running expenses at mine	2,034,158.23	
Smelting, transportation, commissions, eastern office, etc.	251,243.13	
New construction at all branches	109,810.24	2,395,211.60
Net profit for the year		$1,070,645.14
From which deduct:		
Dividend of $4 a share paid July 29, 1909	384,600.00	
Dividend of $6 a share paid Jan. 26, 1910	576,900.00	961 500.00
Surplus for the year		$ 109,145.14

Comparative Results for 1908 and 1909.

Tons of rock stamped	1,241,400	1,494,845
Cost of mining, transportation, stamping and taxes per ton of rock	*$1.50	$1.36
Pounds of mineral obtained	26,912,944	33,107,579
Pounds of refined copper produced	21,250,794	25,296,657
Per cent of refined copper in mineral	78.961	76.407
Pounds refined copper per ton of rock stamped	17.1	16.9
Cost per lb. at mine, excluding construction	8.74c.	8.04c.
Cost per lb. construction	0.69c.	0.44c.
Cost per pound of smelting, freight, commission, eastern office, etc.	1.10c.	0.99c.
Total cost per pound refined copper	10.53c.	9.47c.
	$.28c.	
	10.25c.	

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 6th, 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 exceptionally 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 than any other mine in the three counties of Houghton, Ontonagon and Keweenaw.

The 1909 product of the mine was 35,025,225 pounds of mineral, yielding 22,511,984 pounds of refined copper, for which has been realized

		$3,034,810.04
Mining expenses	$1,765,965.05	
Opening mine expense	216,130.64	
Taxes paid in Michigan	58,749.24	
Smelting, Transportation, etc.	206,461.55	$2,247,306.48
Leaves Mining Profit		$ 787,503.56
Interest receipts	9,631.26	
Hancock real estate receipts	3,125.10	$ 12,756.36
		$ 800,259.92
Construction cost,		
At Mine	68,136.90	
At Smelting Works	8,433.97	
No. 9 Shaft work	34,838.63	$ 111,409.50
Business profits for 1909		$ 688,850.42

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

January 1, 1909		$ 991,364.25
Add income for year 1909		688,850.42
		$1,680,214.67
Deduct dividends declared,		
Payable March 22, 1909	$110,000	
Payable June 21, 1909	110,000	
Payable Sept. 20, 1909	110,000	
Payable Dec. 20, 1909	110,000	$ 440,000.00
		$1,240,214.67
Paid balance account purchase of Franklin property		$ 120,000.00
Gives balance of assets January 1, 1910		$1,120,214.67

A dividend of One Dollar and Fifty Cents per share, or $165,000, for three months ending December 31st last, has been declared, payable March 21st next, making total amount of dividends from earnings of past year $495,000.

General summary of receipts and expenditures of the Quincy Mining Company from its organization to Dec. 31, 1909:

Expenditures.

For Expenditure on Location previous to 1856	$ 42,097.98
For Expenditure on Quincy vein, 1858, not now worked	55,000.00
For Openings and Explorations on 3,800 feet, Pewabic vein, extending to Portage Lake, preparatory to future work	11,500.00
For Real Estate and permanent improvements	6,531,944.78
For Mining, smelting and marketing copper, and all incidental costs	41,433,100.91
Balance carried down	20,010.214.67
	$68,083,858.34

Receipts.

From Capital Stock paid in	$ 200,000.00
From Capital Stock (Scrip)	1,250,000.00
From Capital Stock, 10,000 shares increase	700,000.00

From Proceeds of Copper and Silver (435,386,390 lbs. Copper)	65,194,688.10
From Interest	392,816.42
From Profit on sale P. L. & R. Improvement Company Stock, and other investments	79,637.16
From Sales Real Estate, Hancock, Mich.	266,716.66
	$68,083,858.34
Balance brought down, being receipts over expenditures	$20,010,214.67
Deduct dividends declared, Nos. 1 to 90 inclusive	18,890,000.00
Makes balance as per statement on preceding page	$ 1,120,214.67

The operations of the Quincy for the year 1909, have resulted in an output of refined copper over nine per cent, greater than has been obtained during any previous year of the mine's long existence. This increased production has been secured at a reduction over last year of about three-quarters of a cent in the cost of a pound of copper, which is directly traceable to the continued carrying out of a plan of underground development and of construction along the general lines that nave been followed during the past three years.

The lineal feet of development work was greater than last year. All of the shafts, with the exception of No. 6 shaft, which had sufficient depth for its reserves, have been sinking during the year, still increasing the mine's reserves, and thus giving definite assurance of the life of the mine for many years to come.

The copper rock reserves developed are of about the quality of former years. The method of mining has afforded opportunity for a little closer selection of copper rock, sand the stamp mills have been operated a little more efficiently, the combined result of which has been the recovery of a small increase in the amount of refined copper per ton of rock treated.

TAMARACK MINING COMPANY.

Operating at Calumet. Office, Postoffice Address, Calumet Gross output for 1909, 13,533,207 lbs. Men employed, 1908, 1594; 1909, 1657.

Tamarack Mining Company, capital, $1,500,000. Officers, R. L. Agassiz, president; Geo. A. Flagg, secretary-treasurer; Jas. MacNaughton, general manager; W. J. Uren, general superintendent; John T. Been, assistant superintendent; C. D. Hohl, mining engineer; J. T. Reeder, purchasing agent; William M. Harris, clerk; A, G. Gullberg, superintendent Motive Power & Construction; A. L. Burgan, superintendent stamp mills; Edwin Walters, mining captain, Old Tamarack; William Roseveare, 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 provided steady employment at good wages to a force of from 1,000 to 2,000 men year in and year out. 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 Mining 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, tout the conglomerate forms the chief source of product supply.

Underground operations are conducted through five 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 of the workings. The conglomerate tributary to this shaft is exhausted besides the shaft was badly damaged by 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, located just North of No. 3, is 4,450 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 5,210 feet deep.

The following statistics are taken from the report of the operations of this company for the year ending December 31, 1909:

Gross value of fine copper produced:

Sold 13,118,785 lbs. at 13.32 cents		$1,747,422.16
414,422 lbs. sold since January 1 at 14 cents	58,019.08	
Total, 13,533,207 lbs. at 13.34 cents		$1,805,441.24
Miscellaneous income		1,436.31
		$1,806,877.55
Running expenses at mine	$1,679,056.79	
Smelting, transportation, commissions, eastern office etc.	160,329.20	
New construction at all branches	44,613.99	1,883,999.98
Net loss from operations for the year		$ 77,122.43
To which add balance of interest paid		51,424.13
		$ 128,546.56
Less dividend, $4 per share, Lake Superior Smelting Company		100,000.00
Decrease in assets for the year		$ 28,546.56
Balance of assets December 31, 1908		477,336.32
Balance of assets December 31, 1909		$ 448,789.76

Comparative Results for 1908 and 1909.

Tons of rock stamped	654,897	689,099
Cost of mining, transportation, stamping and taxes per ton of rock	$2.57	$2.44
Pounds of mineral obtained	19,134,429	20,286,174
Pounds of refined copper produced	12,806,127	13,533,207
Per cent of refined copper in mineral	66.93	66.71
Pounds refined copper per ton of rock stamped	19.6	19.6
Cost per pound at mine, excluding construction	13.14c.	12.41c.
Cost per pound construction	0.64c.	0.33c.
Cost per pound of smelting, freight, commission, eastern office, etc.	1.36c.	1.18c.
Cost per pound interest paid	0.10c.	0.38c.
Total cost per pound refined copper	15.24c.	14.30c.

Summary of Results:

Rock broken	872,245 tons
Rock discarded	183,146 tons
Percentage of discard	21

No. 1 Shaft.

During the year the 500-foot crosscut was finished and the installation of the pumps at the 500-foot and 900-foot levels was completed, together with a 10-inch discharge column.

A small electric lighting plant was placed in the 500-foot level pump station, and both pumps are now working satisfactorily at the rate of about 750 gallons per minute.

No. 2 Shaft.

The reconstruction and repairs at No. 2 rock house if or a proposed Kimberly skip hoist were discontinued.

This shaft was out of commission for eleven and one-half days in September in order to place concrete gutters around the shaft and connect these with a pipe line to the pumps in No. 1 shaft.

The repairs to this shaft have taken all the time between Saturday night and Monday morning, weekly during the year, and the between the 2nd and 9th levels is still heavy, but apparently lateral movement of the shaft is steadily diminishing.

Osceola Amygdaloid Lode.

After the 1st of September drifting was gradually curtailed and stoping increased, but the results shown by separate milling on this rock gave a return of only about 13 pounds per ton. Underground conditions and the present price of copper do not warrant operations of this lode, and they were discontinued January 1, 1910.

No. 3 Shaft.

A bin for poor rock was built at No. 3 rock house.

The plan of sinking the inclined shaft from the 13th level had to toe abandoned as the ground was found too heavy above the 16th level. The inclined shaft was therefore started below the 18th level, and is down to the 21st level, showing good copper values all the way. The 18th level was driven north 750 feet, but as it showed no copper values it has been discontinued. About 1,000 feet of 8-inch air pipe line was renewed in this shaft.

No. 5 Shaft.

A crusher was installed in the rock-house and the rock bins raised one foot. The 40th level plat was cut, and sinking has been resumed. It may not be feasible to mine all the ground near the south boundary on the 30th, 31st and 32d levels owing to the plan hitherto pursued in stoping these and the lower levels in this portion of the mine.

Connection was made on the 31st level north with the Calumet & Hecla workings, and this, together with the connections made on the 39th level north and the 17th level south of No. 3, has materially improved ventilation.

Cliff Mine.

The explorations which have been conducted on the old fissure veins for the past few years were discontinued in January. No rock of commercial value was encountered. The total cost of this work to date was $172,515.97. The Cliff lands are now the property of the Cliff Mining Company, and it is expected that exploration work on the Kearsarge lode will be started in the spring.

Stamp Mills.

There was no new construction, but Nos. 1, 6 and 7 stamps were equipped with mortar discharges.

Tests were made during the year which showed that an increased extraction of from 2 to 2½ pounds per ton could be made in treating Tamarack conglomerate rock at the Calumet & Hecla mill as compared with the Tamarack mill, while the Tamarack mill gave as good results in the treatment of the Osceola amygdaloid rock. Since January 1 the Osceola amygdaloid rock from the Calumet & Hecla mines was sent to this mill, and the conglomerate rock of the Tamarack mine was sent to the Calumet & Hecla mill for treatment.

WOLVERINE MINE.

Operated by the Wolverine Copper Company at Kearsarge. Office postoffice address, Kearsarge, Mich. Gross output for 1909, 12,676,100 lbs. mineral, 9,971,482 lbs. refined copper. Men employed, 1908, 461; 1909, 475.

Main office, 15 Williams St., New York; mine office, Kearsarge, Mich. President, Joseph E. Gay; secretary, J. Wheeler Hardley; treasurer, John R, Stanton; agent, Fred Smith; mining captain, William Pollard; clerk, Charles L. Noetzel; engineer, W. F. Hartmann; assistant superintendent, Willard J. Smith; superintendent at stamp mill, David L. Vivian.

The 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 excellent record built up by the Wolverine mine 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 furtherest advanced openings the lode shows up about the usual width and bearing the remarkable copper values characteristic of the mine.

The skips lift four tons of rock to a trip, operate in balance and dump automatically on rock house grizzles. The fine stuff passes through the grizzles into the 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 stamp mill. 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 skip roads and ladder way. No. 3 is 3,400 feet deep and No. 4 is 2,900 feet deep. The shafts are substantial and in thorough repair.

The annual reports of the Wolverine Copper Mining Company for the years ending June 30, 1909, and June 80, 1910, compare as follows:

	1910.	1909.
Receipts	$1,294,198	$2,017,577
Total Expense	720,393	669,036
Mining Profits	573,805	1,348,541
Construction	2,939	42,137
Net Profits	570,866	1,306,403
Dividends	600,000	1,140,000

The report shows 12,359,000 pounds of mineral produced in the year ended June 30, 1910, which yielded 78.95 per cent, or 9,757,101 pounds of refined copper, compared with 9,995,748 in 1909. The average price received per pound was 13½ cents.

Operating results of Wolverine are:

Operating results of Wolverine are:	
Rock hoisted (tons)	405,790
Rock stamped (tons)	390,837
Product mineral (lbs.)	12,359,000
Product refined (lbs.)	9,757,101
Cost ton rock hoisted	$1.55
Cost of rock stamped	$1.61
Cost lb. ref. at mine	6.453c
Smelt, frt., expenses, etc.,	.930c
Total cost per lb. of refined copper	7.383c

CENTENNIAL COPPER MINING COMPANY.

Capital stock. $2,500,000. President, Quincy A. Shaw; secretary-treasurer, G. A. Flagg; assistant secretary-treasurer, George G. Endicott; general manager, James MacNaughton, Calumet, Mich. Eastern office, 12 Ashburton Place, Boston.

Gross value of fine copper produced:

Sold, 2,583,793 lbs. at 13.277 cents		$343,050.77
Miscellaneous receipts		2,602.00
		$345,652.77
Running expenses at mine	$357,213.26	
Smelting, transportation, commissions, eastern office, etc.	40,146.94	
New construction at all branches	1,983.33	399,343.53
Loss from operations for the year		$53,690.76
To which add balance interest paid		3,934.32
Net loss for the year		$57,625.08
Balance of assets December 31, 1908		18,260.50
Balance of liabilities December 31, 1909		$39,364.58

Comparative Results for 1908 and 1909.

	1908.	1909.
Tons of rock stamped	169,693	196,525
Cost of mining, transportation, stamping and taxes per ton of rock	$2.086	$1.818
Pounds of mineral obtained	3,352,790	3,941,820
Product of refined copper	2,196,377	2,583,793
Per cent of refined copper in mineral	65.51	65.55
Pounds refined copper per ton of rock stamped	12.94	13.15
Cost per pound at mine, excluding construction	16.12c.	13.82c.
Cost per pound construction	.74c.	.08c
Cost per pound of smelting, freight, commission, eastern office and all other charges	1.63c.	1.56c.
Cost per pound of interest paid		.15c.
Total cost per pound refined copper	18.49c.	15.61c.

FRANKLIN MINING COMPANY.

Capital stock, $5,000,000. President, Stephen R. Dow; secretary-treasurer, Alvin R. Bailey; superintendent, R. M. Edwards. Eastern office, 60 Congress St., Boston. Mine office, Houghton, Mich.

The total output of this company in 1909 was 1,615,556 lbs. of copper, while the average selling price per pound during that period was 13.1837 cents. The 1909 receipts, including the unsold copper metal at a valuation of 14 cents per pound, were $218,750.05. From this amount deducting the expense of operation of $215,740.49 leaves a net mining profit for 1909 of $3,009.56. In addition to the above expense, $109,950 was expended in development work on the Pewabic lode. Superintendent Edwards' annual report gives the following additional statistics:

Rock hoisted during the year amounted to	176,417 tons
Rock stamped during the year amounted to	170,546 tons
Amount of mineral produced was	3,306,820 lbs.
Amount of refined copper produced was	1,615,556 lbs.
Amount of mineral in ton of rock stamped	19.38 lbs.
Amount of refined copper in ton of rock stamped	9.47 lbs.

The total costs per ton of rock stamped were—

Mining expense	$1.0616	per ton stamped
Compressor and drills	.0789	"
Hoisting	.1367	"
Rock house expense	.0662	"
Surface expense	.0653	"
Transportation	.1009	"
Stamping expense	.3099	"
General expense	.0969	"
Office expense	.0249	"
Total operating and development expense	1.9413	per ton rock stamped
Construction expense	.1160	
Total expense	$2.0573	per ton rock stamped

Explanation of the above cost lies in the fact that it includes a large amount of development work on the Pewabic Lode on the Rhode Island as well as on the Franklin property.

The stamp mill ran smoothly during 1909, stamping 181,826 tons of Ahmeek rock in addition to 170,546 tons Franklin.

HANCOCK CONSOLIDATED MINING COMPANY.

Organized under the mining laws of the State of Michigan, June, 1906. Capital stock, $5,000,000. John D. Cuddihy, president; Thomas Hoatson, vice president; John H. Hicok, secretary and treasurer; John L. Harris, general manager; John O. Peterson, mining captain; Daniel Fisher, clerk. Operating at Hancock. Postoffice address, Hancock, Mich. Gross output for 1909, none. Gross shipments for 1909, none. Men employed, 1908, 165; 1909, 200. The outlook for 1910 is very bright.

General Manager Harris says in his annual report of operations for the year ending Dec. 31, 1909:

The equipment installed at No. 1 Plant, on the old Hancock Copper Company's property, where we first commenced operations in the year 1906, has given entire satisfaction and will answer all purposes for which it was intended, or until No. 2 Plant is fully equipped and in commission, art which time the duty required by the present Plant at No. 1 Shaft will be reduced to a minimum and the handling of rock, men, timber, and all supplies will be done through No. 2 Shaft.

As the openings on No. 3 Vein have continued to be so promising all work in the development line has been confined exclusively to this lode at the 11th, 13th, 14th, 15th, 16th, and 17th levels. Although most of the drifting has been done along the hanging side of vein it is, where tested at various places from foot to hanging, found to be well mineralized and from 12 to 14 feet in width. This No. 3 vein is approximately 380 feet west of the Hancock main lode.

The total amount of drifting done in vein of good character and quality is 4,285 feet. We have blocked out to date approximately 700,00 tons of ground, making due allowance for pillars and unprofitable ground, that should yield good results when stoped.

The proposed method of handling, transporting and hoisting rock mined is outlined fully in last year's report. The cross-cut referred to in that report between No. 1 and No. 2 Shafts at the 13th level connected during the latter part of March.

The Winze or Secondary Shaft, was sunk, on No. 3 vein, to a point 397 feet below the sole of the 13th level.

The Raise on No. 3 Vein, above the 13th level, was holed to the 11th level; the inclined distance being 280 feet. It was in vein of good character and quality for the entire distance averaging from 12 to 14 feet in width; measured at right angles to the dip of the formation.

Practically all the development work on No. 3 Vein, tributary to No. 1 Shaft, has been of a very encouraging nature and should yield excellent results.

No. 2 Shaft was sunk 635 feet to a point 2,070 feet below the collar. At 2,038 feet No. 3 Vein was intersected and found to be from 12 to 14 feet in width. Drifts were extended 84 and 81 feet north and south of shaft, respectively, not only to demonstrate the character and quality of the vein, but to enable us to cut plat and station for the dumping of cars, substantially as outlined in previous report. Although these levels were in vein of good character the main copper course is apparently, 350 feet, approximately, south of breast of south drift or 450 feet south of No. 2 Shaft.

Stations and bins were completed at 1,500 feet, 1,800 feet and 2,060 feet, respectively, below the collar of shaft. Cross-cut at the 18th level was driven east from shaft 216 feet. This cross-cut will intersect No. 3 Vein at 680 feet east of No. 2 Shaft and 500 feet, on the inclination, below the sole of the 13th level

Considerable delay was caused this year, as well as the previous year, in sinking No. 2 Shaft on account of cutting stations, as well as by the treacherous ground, in places, necessitating close timbering.

On account of the encouraging results attained by development work on No. 3 Vein and the available stoping ground blocked out on same, it was decided to contract for the permanent equipment for our No. 2 Plant. When same is in commission we will be in a position to hoist and treat rock for transportation for custom stamping or to our own proposed Stamp mill as the case may be.

The necessary right of way, for constructing railroad, from the Mineral Range Railroad Company's main line was acquired and railroad branch completed to our No. 2 Shaft. All supplies are now being delivered direct to our No. 2 Plant.

Before erecting our stamp mill it will be necessary to construct some 5,000 additional feet of railroad from our

branch railroad line. Everything, in general, is well in hand for all construction work.

The development work, throughout the mine, since the commencement of operations, and more especially during the past year, has been of a very encouraging nature and barring unforseen accidents, we should be on a profitable producing basis in the comparatively near future.

NEW ARCADIAN COPPER COMPANY.

The New Arcadian Copper Company is a successor to the Arcadian Copper company which was organized under the laws of New Jersey in March, 1899. The New Arcadian is a Michigan corporation with a capitalization of $3,750,000, divided into 150,000 shares of a par value of $25, $11 having been paid in. The old company did considerable work on the property, which consists of about 3,200 acres in the very heart of the copper belt, but there still remains enough unexplored territory to make several mines and the reorganization of the company was made for the purpose of putting the financial affairs of the company in better shape.

This has been accomplished and on May 1, 1910, the cash on hand amounted, in round numbers, to $87,000 and the company was free of debt.

At this time work is being pushed vigorously and the whole property is to be diamond drilled. Recently the drill core exposed an encouraging vein which was well mineralized and this vein is being exposed by a test pit.

Nearly all the well known veins of the copper district traverse the property of the New Arcadian Copper Company, and it is the best opinion that important values lie buried up somewhere in this vast mineral acreage, which the present management hopes to reveal.

The present board is made up of the following gentlemen: Robert H. Shields, Sylvester T. Everett, William B. Anderson, John C. Shields, C. M. Higgins, John Merton, James W. Shields, Lucius W. Killmar and Alien F. Rees. The officers of the company are: President, Robert H. Shields; vice president, S. T. Everett; secretary and treasurer, Wm. F. Miller. The general office of the company is at Houghton, Mich.

ONECO MINE.

Oneco Copper Mining Company. Operating at Calumet.

It is a 100,000 share company, 70,000 only issued, 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 was done in 1899, but it was only limited. Then, in 1898, Mr. Fitzgerald financed some exploration before the present company was organized.

The property is an extensive one, consisting of 800 acres lying in Sections 2, 3 and 10, Town 55, Range 33. 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.

The eastern office is at 50 State St., Boston, Mass. The following constitute the board of directors: John D. Cuddihy, president, Calumet, Mich.; George N. Towle, vice president, Boston, Mass.; W. F. Fitzgerald, Boston, Mass.; John C. Watson, Boston, Mass.; John Brooks, secretary and treasurer, Boston, Mass.; John L. Harris, superintendent, Hancock, Mich.

Considerable diamond drilling has been done since the fall of 1909, and two fairly good lodes located; the "Oneco" and the "Stranger," a core of unusual richness was taken from the latter lode la December, 1909, and several cores later, of less commercial value. The Oneco lode is well thought of by Houghton County mining men, and will some day be given attention.

At present writing, diamond drilling is still in operation on the eastern end of the property in the hopes of locating the "Baltic Lode."

LA SALLE COPPER COMPANY.

This is an auxiliary of the Calumet & Hecla and now includes the old Tecumseh mine. President Shaw makes the following report:

The charter of the Tecumseh Copper Company expired February 3, 1910 and on May 11 your company purchased the entire property of that company. Inasmuch as your company owned all but 159 shares of Tecumseh and was also a creditor to a large amount the cash outlay was not great. The operations of the Tecumseh Copper Company for the period May 1, 1909, to April 30, 1910, are included in this report.

No. 1 Shaft, (Formerly Tecumseh No. 1), Sinking 215 feet Drifting 3,864.9 feet, Crosscuts 140.5 feet. This shaft is now below the 19th level, a depth of 2,041 feet. The copper values shown in the ground opened are of fair quality and about the same as last year.

No. 2 Shaft was started in August, 1909, about 1,800 feet south of No. 1 on Tecumseh property. It has been sunk 708 feet to a point 40 feet below the 7th level. The vein is of good quality but contains only small bits of copper. The equipment consists of a rock house boiler and engine house and dry.

No. 5 Shaft: (Formerly called No. 1), Sinking 302 feet, Drifting 189.1 feet, crosscuts 438 feet. This shaft is below the 9th level, a depth of 1,220 feet. Developments are still unsatisfactory.

No. 6 Shaft, (formerly called No. 2), Sinking 40 feet, to a depth of 882 feet. This shaft was closed down in June, 1909, for reasons given in last year's report, and the machinery was moved to the present No. 2 shaft

During March and April 13,754 tons of rock were stamped, which yielded mineral equivalent to 167,257 pounds of copper. About 90 per cent. of the rock came from the stock pile, and the balance from openings. As soon as the stock pile is cleaned up, stoping will be started.

OLD COLONY COPPER COMPANY.

Operating at Houghton County. Office postoffice address, Calumet, Mich. Incorporated in 1898, under the laws of Michigan. Lands, about 1,200 acres on the Mineral Range, Houghton County, Mich., east of the Calumet & Hecla, and south of the Mayflower. A cross-section was secured, 1899-1901, by a tunnel driven for about 3,000 feet and by diamond drill borings eastward to the western end of the tunnel; this cross-section showed upwards of seventy-five amygdaloidal and conglomerate beds, a number of which carried a little copper in the drill ores, and where cut in the tunnel. There are five shafts, aggregating about 2,200 feet in depth, and over 6,000 feet of drifts and cross-cuts, all of which have shown indifferent results. Work was discontinued at the mine in 1909, pending the results of diamond drill operations on the property adjoining it on the north.

Capital stock, authorized and issued, $2,500,000. Shares $25, of which $11 was paid in. Transfer agent, American Trust Co., Boston, Mass. Registrar, Old Colony Trust Co., Boston, Mass. Annual meeting second Wednesday in December. Stock is listed on the Boston Stock Exchange.

Directors—H. F. Fay, J. C. Watson, Stephen R. Dow, Rogers L. Barstow, Wm. Howell Reed, C. J. Morrissey, Boston, Mass.; John G. Stone, Houghton, Mich.
Officers—H. F. Fay, president; C. J. Morrissey, secretary and treasurer. General office, 70 State St., Boston, Mass.

MAYFLOWER MINING COMPANY.

Operating at Houghton County. Office postoffice address, Calumet, Mich. Incorporated in 1899, under the laws of Michigan, and owns 840 acres on the Mineral Range, joining on the east the Wolverine and South Kearsarge branch of the Osceola. In August, 1909, the company began diamond drill operations to explore the eastern portion of the Mineral Range which has lately attracted so much attention on the upper peninsula of Michigan and on which several new and remarkable discoveries have recently been made. It is the intention of the management to thoroughly investigate this portion of the property which extends from the Eastern Sandstone to the Wolverine mine, a distance of one and one-half miles.

Capital stock, authorized and issued, $2,500,000. Shares $25, of which $8 was paid in. Transfer agent, American Trust Co., Boston, Mass. Registrar, Old Colony Trust Co., Boston, Mass. Annual meeting, third Wednesday in March. Stock is listed on the Boston Stock Exchange.

Directors—H. F. Fay, J. C. Watson, S. R. Dow, Manning Emery, C. J. Morrissey, Boston, Mass.; John G. Stone, Houghton, Mich.

Officers—H. F. Fay, president; C. J. Morrissey, secretary and treasurer. General office, 70 State St., Boston, Mass.

COPPER RANGE CONSOLIDATED COMPANY.

Capital stock, $38,433,500. President, William A. Paine; vice-presidents, F. W. Denton, R. T. McKeever; secretary-treasurer, Frederic Stanwood. Eastern office, 82 Devonshire street, Boston.

The Copper Range Consolidated owns all the Baltic and Tri-Mountain properties, and one-half of the Champion holdings. It is next to the Calumet & Hecla in production and earnings and one of the leading copper mines of the country.

The following statistics are taken from the consolidated statement of the operating companies for the year ending December 31, 1909:

41,105,311 lbs. of copper produced and sold at average of 13 cents per pound		$5,340,728.28
Interest		12,386.93
		$5,353,115.21
Mining expenses, including smelting, freight, marketing, etc.,		3,499,128.39
		$1,853,986.82
Taxes, Houghton County Michigan		192,544.18
Total income from mining operations		$1,661,442.64
Copper Range Railroad Company:		
Gross earnings	$754,293.75	
Operating expenses $432,875.88		
Interest on bonds 104,437.50		
Taxes 46,718.57		
	584,031.95	
		170,261.80
		$1,831,704.44
Deduct general expenses of Copper Range Consolidated Company	59,822.77	
Deduct one-half of net mining profit of Champion Copper Company, which belongs to the St. Mary's Mineral Land Company	408,318.77	
		468,141.54
Balance of net income for 1909		$1,363,562.90

Comparative Statement.

	1909.	1908.	Decrease.
Tons of rock stamped	1,891,576	1,893,749	2,173
Average yield refined copper	21.73	21.94	0.21
Copper produced, pounds	41,105,311	41,546,525	441,214
Average price per pound	13c.	13.39c	0.39c.
Received from copper sales	$5,340,728.28	$5,561,887.84	$221,159.56
Mining expenses including smelting, freight, marketing, etc.	3,486,741.46	3,474,577.03	*12,164.43
Taxes paid Houghton County	192,544.18	131,395.41	*61,148.77
Copper Range Railroad Company Earnings	754,293.75	768,808.98	14,515.23
Operating expenses	432,875.80	602,718.35	169,842.55
Taxes and interest on bonds	151,156.07	149,711.54	*1,444.53
Net earnings	170,261.80	16,379.09	*153,882.71
Net earnings Copper Range Consolidated Company	1,363,562.90	1,486,774.82	123,211.92
Total dividends paid to December 31, 1909			$9,219,376.00

*Increase.

The profits from the individual mines were as follows:

Baltic	$892,646.38
Champion (one-half)	408,318.77
Trimountain (deficit)	47,841.29

The total production of copper from the mining operations of the Copper Range Consolidated Company was 32,102,775 pounds a decrease of 550,368 pounds over last year, made up as follows:

Trimountain decrease		752,504 lbs.
Baltic increase	92,982	
Champion (one-half) increase	109,154	
		202,136
		550,368 lbs.

The dividends declared during the year by all our Operating Companies were:

Baltic Mining Company	$1,000,000.00
Champion Copper Company	800,000.00
Copper Range Railroad Company	424,430.00
	$2,224,430.00
Of which the Consolidated Company received:	
Baltic Mining Company	$ 996,590.00
Champion Copper Company	400,000.00
Copper Railroad Range Company	362,114.00
	$1,758,704.00
Deduct interest charges, taxes and all other expenses	59,822.77
Net income for 1909	$1,698,881.23
Dividends paid	1,536,930.00
Balance to credit of profit and loss account	$161,951.23
Cash and quick assets December 31:	
Copper sold but not paid for	$1,327,072.82
Copper Range Railroad Company first mortgage bonds	870,000.00
Cash	557,379.98
	$2,754,452.80
Notes payable	1,400,000.00
	$1,354,452.80

Production and cost of copper sold and delivered:

	Production.	Cost.
Baltic	17,817,836 lbs.,	7.98 cents per pound
Trimountain	5,282,404 lbs.,	13.89 cents per pound
Champion (one-half)	9,002,535 lbs.,	8.45 cents per pound
Consolidated	32,102,775 lbs.,	9.08 cents per pound

The increase of 3-10 cents per pound in cost over 1908 is due entirely to an increase of $61,148.77 in the Houghton County taxes and to an Increase of 1.39 cents per pound in the cost of Tri-mountain's reduced output. The Houghton County taxes were equal to nearly one-half cent per pound of all the copper produced and were one-half as much as the entire cost of smelting, freight, selling commissions, and all other expenses, except the mining costs.

All construction expenditures at the mines were charged to the cost of copper.

The price at which our copper was sold, namely, 13 cents, was the lowest for seven years. The average price we have received for the past seven years, however, is 14.96 cents, which is a considerable higher average than most of the Lake Superior mines received for that period, as shown by the annual reports.

The outlook at the mines is good. Baltic is as strong as ever and can be depended upon to keep up its good work. The Champion is looking better than it has for two years and is opening splendid new copper ground in the lowest levels. But Trimountain has again disappointed us with the lowest production it has ever made.

In November, 1909, the Copper Range Railroad Company declared its first dividend, of $10 per share, out of its accumulated earnings. The dividend amounted to $424,430 all of which accrues to the Consolidated Company. Since the road was completed ten years ago, the company has expended very large amounts for new motive power, rolling stock, buildings, docks, and steel bridges, some or which has been charged to Construction, but most of it to Operating Expenses. The physical condition of the road is now so high that in the last report of the Railroad Commissioners of Michigan, covering the road in its entirety they state, "The general condition was found to be first class," a classification which is not enjoyed by any other railroad in the upper peninsula.

An extension of the road has been completed to Senter, where the E. I. DuPont de Nemours Powder Company has expended $750,000 in the construction of works for the manufacture of explosives on a large scale.

BALTIC MINE.

Operating at Baltic, Mich. Office postoffice address, Baltic, Mich. Gross output for 1909, 17,817,836 lbs copper. Men employed, 1908, 1039; 1909, 1092. 1908 average market price 13.39 cents per lb. 1909 average market price, 13.0 cents per lb. Outlook for 1910 is a far still lower average price.

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

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 the Sections 20 and 21, Town 54, Range 34, and consist of 800 acres. The mine has been in successful operation for about nine 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:

	1909.	1908.	1907.	1906.
Copper Products	17,817,836	17,724,854	16,704,868	14,397,557
Net Profits	$ 892,646	$1,004,200	$1,157,971	$1,369,942

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 1909:

Sinking and drifting were carried on steadily throughout the mine.

Sinking.	Sunk in 1909.	Total Depth.	Bottom Level
No. 2 shaft.	256 feet.	1680 feet.	17th.
No. 3 shaft.	194 feet.	1917 feet.	20th.
No. 4 shaft.	193 feet.	1882 feet.	20th.
No. 5 shaft.	173 feet.	1522 feet.	16th.
	Total 816 feet.		

A total of 9,659 feet of drifting was done during the year. Total crosscutting was 788 feet.

Tons of rock hoisted	851,208
Tons of rock stamped	814 260
Tons of waste hoisted	36,948
	pr. 4.3 per cent.

The rock stamped yielded 21.88 lbs. of refined copper per ton. Last year the yield was 23.19 lbs., and the year before 21.94 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	814,260 tons
Product of Mineral	27,421,000 lbs.
Product of refined copper	17.817,836 lbs.
Yield of rock treated	21 88 lbs. per ton or 1.09 per c.
Cost per ton of working expenses	1.48
Cost per ton of working expense, including taxes	1.554
Cost per pound of copper delivered, including taxes	.0798

CHAMPION MINE.

The Champion Copper Company. Operating at Painesdale. Office postoffice address, Painesdale. Gross output for 1909, 18,005,071 lbs. Men employed, 1908, 1,196; 1909, 1,188. Average price of copper marketed in 1908, 13.39 cents per lb.; average price 1909, 13.0 cents per lb. The outlook for 1910 is for still lower average price.

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 consist 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. Marys Canal Mineral Land Company. Copper Range Consolidated owns the other 50,000 shares. In 1907 the company paid $10 per share in dividends or $1,000,000.

The for owing 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.

	1909	1908	1907	1906
Tons rock stamped	753,908	794,703	708,685	671,785
lbs. copper obtained 18,005,071		17,786,763	16,489,436	16,954,986
lbs. of copper per ton rock treated	23.88	22.381	23.3	25.24

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 slopes 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 timber. Skips counterbalance in shafts carrying from two to four tons of rock to a trip and dump automatically on grizzles. Practically all the rock selecting is done underground.

Work done by the Champion Copper Company during the calendar year 1909.

Sinking and drifting were carried on throughout the mine.

	Sunk in 1909.	Total Depth.	Bottom Level
"B" shaft .....230 ft.		1,776 ft.	15th
"C" shaft .....214 ft.		1,733 ft.	15th
"D" shaft .....195 ft.		1,824 ft.	16th
"E" shaft .....201 ft.		1,886 ft.	17th
Total .....840 ft.			
Total drifting was .....12,828 ft.			
Total cross-cutting ..... 404 ft.			
Tons of rock hoisted 854,716			813,103
Tons of rock stamped 794,703			753,908
			59,195

The yield of refined copper per ton stamped was 23.88 lbs., which compares with 22.38 lbs. in 1908, and 23.26 lbs. in 1907.

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.

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 in 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.

John Trevarrow, mining captain; H. F. Mercer, engineer; E. W. Kruka, clerk.

TRIMOUNTAIN MINE.

Operated at Trimountain. Office postoffice address, Trimountain. Gross output for 1909, 5,282,404 lbs. copper. Men employed, 1908, 637; 1909, 610. Average market price of copper in 1908, 13.39 cents per lb.; average market price of copper, 1909, 13 cents per lb. The outlook for 1910 is for a still lower price.

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. 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.

The property is situated about midway between Baltic and Champion mines and owns 1,120 acres of land located at Sections 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 controls 98,649.

Main office, 82 Devonshire St., Boston, Mass.; mine office, Trimountain, Mich.

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.

	1909	1907	1906	1905
Tons of rock treated	323,408	444,317	506,924	570,843
Refined copper produced 5,282,404		8,207,586	9,507,933	10,476,462
Pounds of copper per ton of rock treated	16.33	18.50	18.76	18.36

The mine is opened and developed through four fine shafts of large capacity. Each is three-compartment, two of which are used for hoisting rock, the third for ladderway, 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 second to the fifteenth levels and practically all over the mine from end to end. During 1910 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 seventh level, and the property was opened up, equipped and put on a dividend basis with record speed.

As during the previous two years, a great deal of dead work was done during 1909, 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 1909, however, we have had more marked improvement, especially in Nos. 3 and 2 shafts.

Opening work done during 1909:

SINKING.

	Sunk in 1909—ft.	Total Depth—ft.	Bottom Level.
No. 1 shaft	265	2.146	20th
No. 2 shaft	318	2,149	20th
No. 3 shaft	281	1,948	17th
No. 4 shaft	262	1,581	14th
Total	1,126		

The total drifting amounted to	8,823 ft.
The total cross-cutting was	802 ft.
Tons of rock hoisted	389,980
Tons of rock stamped	323,408
Tons waste hoisted	66,572
,	or 17 per cent.

The rock stamped yielded 16.58 lbs. per ton. In 1908 the yield was 18 lbs. In 1907, 18.43 lbs.

SUMMARY OF RESULTS.

Rock stamped	323,408 tons
Product of mineral	9,118,095 lbs.
Product of refined copper	5,282,404 lbs.
Yield of copper treated	16.33 lbs. per ton, or 0.82 per cent
Cost per ton of working expenses	$1.92
Cost per pound of copper delivered, including taxes,	$.1389

Richard Bowden, mining captain; Benj. S. Noetzel, clerk; H. F. Mercer, engineer; Ed. Koepel, 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 McKeever, a distance of 59 miles. It connects with the Chicago, Milwaukee & St. Paul Railroad at McKeever 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 connects 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.

ISLE ROYALE CONSOLIDATED.

Isle Royale Consolidated Mining Company. Capital stock, $3,750,000. Operating at Houghton. Office postoffice address, Houghton. Gross output for 1909, 401,280 tons rock stamped. Gross shipments for 1909, 5,719,056 lbs. ingot copper produced. Men employed 1908 550; 1909, 773.

Rodolphe L. Agassiz, president; George A. Flagg, secretary-treasurer; James MacNaughton, general manager; W. J. Uren, general superintendent; James E. Richards, assistant superintendent; Henry Lukey, clerk; J. T. Reeder, purchasing agent; A. G. Gullberg, superintendent construction and motive power; Edward Colenso, mining captain; J. G. Glanville, stamp mill superintendent. Eastern office, Boston, Mass.; general office, Calumet, Mich.; mine office, Houghton, Mich.

The directors submit the following report of the operations of this company for the year ending Dec. 31, 1909:

Sold 5,081,910 lbs. at 13 cts.	$660,440.11	
Unsold, 637,146 lbs., estimated at 13.50 cts.	86,014.71	
Total, 5,719,056 lbs.		$746,454.82
Sales of silver		12,073.18
		$758,528.00
Running expenses at mine	$750,504.76	
Smelting, transportation, commissions, eastern office, etc.	82,048.89	
New construction at all branches	72,947.44	
Exploration and equipment, Shaft "A"	31,526.87	937,027.96
Net loss from operations for the year		$178,499.96
To which add balance interest paid		14,491.09
		$192,991.05
Less dividend of $4 per share, Lake Superior Smelting Company stock		32,000.00
Decrease in assets for the year		$160,991.05

Balance of assets Dec. 31, 1908, ...	49,946.00
Balance of liabilities Dec. 31, 1909, ...	$111,045.05

Comparative Results for 1908 and 1909.

	1908.	1909
Tons of rock stamped	218,940	401,280
Cost of mining, transportation, stamping and taxes per ton of rock	$2.33	$1.87
Pounds of mineral obtained 4,013,590		7,926,015
Pounds of refined copper produced 3,011,664		5,719,056
Per cent of refined copper in mineral	75.04	72.16
Pounds refined copper per ton of rock stamped....	13.8	14.3
Cost per pound at mine	16.91 c.	13.12 c.
Cost per pound construction	9.65 c.	1.28 c.
Cost per pound exploration and equipment, Shaft, "A"	0.44 c.	0.55 c.
Cost per pound of smelting, freight, commission, eastern office, etc.	1.99 c.	1.44 c.
Cost per pound interest paid	0.00 c.	0.25 c.
Total cost per pound refined copper	28.99 c.	16.64 c.

SUPERIOR COPPER COMPANY.

Subsidiary of Calumet & Hecla. President Shaw's report for 1909 includes the following statistics:

During the past year your company produced mineral equal to 2,205,453 pounds of copper as against 374,077 pounds last year. The comparative results of operations for the two years are as follows:

	1908-1909	1909-1910
Rock stamped	16,835 tons	107,458 tons
Pounds copper produced	374,077 lbs.	2,205,453 lbs.
Pounds copper per ton rock	22.22 lbs.	20.52 lbs.

Since November 1,550,028 pounds of copper have been sold at an average price of 13.65 cents per pound. Details of costs are not given because they would be of little comparative value, inasmuch as rock stamped came principally from drifts and the stock pile.

Cash Assets.

Cash at mine .....$	10,537.17
Cash and bills receivable at Boston office	23,078.68
Copper on hand at 13 cents	159,835.26
	$193,451.11

Liabilities.

Bills and accounts payable at mine and Boston office	211,202.19
(Debit) Balance .....$	17,751.08

ATLANTIC MINING COMPANY.

The Atlantic Mining Company is now operating at Section 16. Office postoffice address, Atlantic Mine. Gross output for 1909, 43,483 lbs. copper. Gross shipment for 1909, 43,483 lbs. copper. Men employed 1908, 160; 1909, 152.

President, Joseph E. Gay; treasurer, John R. Stanton; agent, F. McM. Stanton; superintendent, Theo. Dengler; clerk, A. D. Edwards; mining captain, Thomas Straton. Capitalization, $2,500,000 in 100,000 shares, par value $25.00 each.

The Atlantic Mining Company reports for the fiscal year ended December 31st 1909:

Surplus December 31st, 1909 .....$	222,212.31
Working Expenses and Exploration in 1909	60,553.29
Expenditures, N. Y. and Boston in 1909	11,859.41
Total Expenditures, 1909 .....$	72,412.70

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.

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 that 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 147,332 tons, Superior 81,308 tons, Atlantic (old mine) 268 tons, Section 16, 500 tons, making a total of 229,408 tons as against 191,968 tons in 1908.

WINONA COPPER COMPANY.

Exploration work at Winona, Houghton County. Office Postoffice Address, Winona, Mich. Men employed, 1908, averaged 150; 1909, averaged 175. Capital stock $2,500,000.

Officers: President, Chas. J. Paine, Jr.; vice -president, Nathaniel H. Stone; secretary-treasurer, Edward B. O'Connor; general manager, Dr. L. L. Hubbard; superintendent, R. R. Seeber. Transfer agent, American Trust Company, 50 State St., Boston, Mass. Office 703 Sears Bldg., Boston, Mass.

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 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 on the strike line 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 1475 feet deep. Skips operate in balance and lift 2½ tons to a trip.

Operations in 1909 included shaft sinking	317 ft.
Drifting on the lode in different levels	4597 ft.
Cross-cutting	571 ft.
Total Opening Work	5479 ft.

Dr. L. L. Hubbard, general manager of the property, in his report to the company says, in part:

No work was done during the year in No 3 shaft.

No. 4 shaft was sunk to the 12th level, the shaft was cased and the ladder road and 5-inch air line were brought down to that point.

The 5th, 7th, 8th and 9th levels were extended to the southern boundary of the property, and levels, from the 5th to the 8th, inclusive, were connected with the corresponding levels from No. 3 shaft.

The 8th level is connected with the same level in the King Philip mine, and the 5th level can be holed through whenever necessary.

Eight drills have been in commission in the shaft and in the drifts tributary to it. By next August, at which time the stamp mill is expected to be finished, the number of openings will be sufficient to take at least eighteen drills.

The character of the rock found in the openings made in 1909 was for a time not up to the average of that previously found off this shaft, but of late it has improved, notably in the 9th and 10th levels.

Construction.

Aside from some small expenditures made for No. 3 rock house and No. 2 hoisting plant, the principal items of construction were as follows:

No. 4 Rock House. Drop hammer, 24-inch by 36-inch crusher, and rock bin with appurtenances.

Electric Light and Telephone. Stringing of 3,000 feet of telephony wire and 6,900 feet of electric wire.

Dwelling Houses. A ten-room frame dwelling, 28 feet by 34 feet, for the mining captain, and two ten-room frame dwellings, 26 feet by 38 feet, for the mine physician and stamp mill superintendent, respectively, each with bath room, hot-water heating plant, and electric lighting.

Blacksmith Shop. The old No. 2 steel boiler house was moved next to the machine shop, on to a stone foundation, and enlarged to 65 feet by 41 feet, to be used as a blacksmith shop. Foundations have been made for the necessary tools.

Water Supply. Eleven hundred and forty feet of permanent water lines were laid.

Stamp Mill.

The excavation for foundations of the two-head stamp mill was commenced on the 19th of May and was practically completed by July 1.

In July we began to sink the caissons for the stamp heads. A railroad track was graded and laid from the main spur to the head of the mill for the delivery of rock, sand, cement, and other material. The excavation for the concrete core at the dam was also finished and the laying of the core begun. This dam will impound water sufficient to operate the mill for two months.

Early in September both caissons were bottomed at about 57 fet on a stratum of clay, and the caissons were filled with concrete.

Early in December all the foundations for the mill and coal trestle were completed and the boiler house and smoke stack erected.

By January 1, erection of the steel over the lower end of the mill had advanced considerably, and the steel coal trestle was finished. The electric locomotive has been in service for some weeks.

Some delays have occurred in the delivery of steel, which will probably defer the completion of the mill until August. Parts of the machinery have been delivered and much of the remainder is ready for delivery, so that we have no reason to anticipate further delay from any cause.

The mine map showing underground progress during the year has been forwarded to the Boston office.

Acknowledgments are due to my fellow-officers for their energy and interest in the work committed to their charge.

Assets.		
Cash in Bank	$83,406.25	
Supplies and cash at the mine	60,872.61	
Accounts receivable	11,249.61	$155,528.47
Liabilities.		
Accounts payable at Boston	$ 1,050.40	
Accounts payable at the mine	17,923.47	$ 18,973.87
Excess of Assets December 31		$136,554.60

During the year 1909 the development work on your property has been confined to No. 4 shaft, where eight drills have been kept at work. This shaft is now sunk to the 12th level. The ground opened, taking the year as a whole, has been much the same as the ground previously opened tributary to this shaft. During the fall months the drifts in the lower part of the mine seemed not to be in such good ground, but early in December they began to improve and this improvement has continued up to date (February 1). Apparently in the lower levels there is more heavy copper and less of the light flaky copper, which is very hard to save in the milling process,

The construction of the stamp mill which your Company is building in conjunction with the King Philip Copper Company is now progressing satisfactorily. The work was delayed about two months last fall by the non-delivery of supplies, but we anticipate no further delay and hope the mill may be started next August.

There are no indications that the cost of the mill will vary by any considerable amount from our original estimate.

There have been a few minor changes made in the plans, and the indications are now that the cost of the mill will not be far from $325,000.

With the completion of the mill your mine will be fully equipped, except that as production is increased provision must be made for the housing of additional miners and other employees.

ST. MARY'S MINERAL LAND COMPANY.

This is a holding company which has a splendid record of successful enterprise. The assets include cash mineral and timber lands, large share holdings of mining company stocks and other industrial propositions.

The officers of the company are as follows: President, Nathaniel Thayer; vice presidents, Charles J. Paine and J. Henry Brooks; secretary-treasurer, Charles J Paine, Jr.; general manager, Dr. L. L. Hubbard. The Michigan office is at Houghton.

The success of this company is due in considerable part to the technical knowledge of General Manager Hubbard, whose acquaintance with the copper district of Michigan is second to none and who for many years has been one of the leading geologists of the entire country.

The annual report of the company for 1909 includes the following statistics:

Receipts.

Cash on hand December 31, 1908	$237,308.91
Payments for land	1,338.00
Payments for wood and timber	13,883.50
Ground rent	2,663.92
Champion Copper Company dividends	400,000.00
Sundry other income	4,441.41
	$659,635 74

Expenditures.

Challenge Location	$25,500.00	
King Philip Copper Company assessments	167,810.00	
Winona Copper Company assessments	2,526.00	
Hancock Consolidated Copper Company assessment	40,000.00	
Salaries and expenses at Boston and Houghton	11,908.92	
Taxes	19,005.95	
Charter Tax	4,505.00	
Dividend No. 14	160,000.00	
Total expenditures		431,255.87
Cash on hand December 31, 1909		$228,379.87

President Thayer says in his annual report:

During the year 1909 the company made no sales of mineral land. Timber was sold to the extent of $13.883.50, and the surface of a tract of 200 acres, under which we reserved all the minerals, was sold for $1,338.00.

The option granted in 1908 to the Copper Range Consolidated Company on 1,240 acres of your lands lying in Sections 7, 8, 9, 17, and 18, Township 54 North, of Range 34 West, has been given up. They did some extensive diamond drilling and, although they cut two copper-bearing lodes, they did not consider the showing sufficiently good to warrant their spending more money for further explorations by means of shafts. The results of their explorations are at our service sand may be of value to us at some time in the future.

The exploratory work at the Challenge was stopped last summer. Although this exploration has been a disappointment, yet, nevertheless, we crosscut through some eighteen amygdaloid lodes, many of which showed more or less copper in the crosscuts. Although the work did not disclose copper in any of the lodes in commercial quantities, it should not be thought that our explorations have condemned this tract of land. On the contrary, they have demonstrated that the amygdaloid lodes of that portion of the copper range are quite generally copper bearing and, if the price of copper had been higher, making our income from the Champion larger, it is quite possible this exploration would not have been given up so soon. The tract on which this exploration was carried on contains 16,000 acres and stretches for nearly eleven miles along the eastern part of the mineral range.

Development work at the King Philip Copper Company, in which your company owns 83,905 shares out of 100,000 outstanding, progresses satisfactorily. The annual report for 1909 is bound herewith.

The Hancock Consolidated Mining Company, in which your company owns a one-fifth interest, has been calling for money the past year, and your company has advanced its share. The developments at this property are going ahead rapidly, and the present outlook is very promising.

The Champion Copper Company, in which your company owns a one half interest has paid in dividends the past year $800,000, of which your company has received as its share $400,000. A copy of the annual report of the Champion Copper Company will be mailed later.

The Lake Mine and the diamond-drill core recently taken from the Indiana property have caused a great deal of interest in mineral lands lying on the eastern edge of the range. Your company owns lands scattered all over the mineral belt, but with, perhaps, the greatest amount on the eastern part.

Since the first of the year your company has made two sales. The mineral rights under 120 acres have been sold to the Houghton Copper Company, and 640 acres of land to the Franklin Mining Company.

Assets, Dec. 31, 1909.

Land unsold, 94,723 acres.
Mineral rights to 14,298 acres.
50,000 Shares of Stock of the Champion Copper Company.
83,905 Shares of Stock of the King Philip Copper Company.
20,000 Shares of Stock of the Hancock Consolidated Mining Company.
20,165 Shares of Stock of the La Salle Copper Company.
20,000 Shares of Stock of the Pacific Copper Company.
208 Shares of Stock of the Copper Range Consolidated Company.
842 Shares of Stock of the Winona Copper Company.
80 Shares of Stock of the Old Colony Copper Company.
25,000 Shares of Stock of the Mayflower Mining Company.
640 Shares of Stock of the St. Mary's Mineral Land Company.
2,000 Shares of Stock of The Ojibway Mining Company.
9,000 Shares of Stock of The North Lake Mining Company.
10 Shares of Stock of the Amphidrome Company, Houghton, Mich. (Capital 7,500 shares, par value, $10; 3,750 shares issued.)
Cash on deposit $228,379.87

Liabilities—None.

General Manager Hubbard's report says:

The operations at the Challenge location during 1909 were as follows:

Second level—drifting	157 ft.
Third level—cross-cutting	32 ft.
Fourth level—drifting	334 ft.
Fourth level—cross-cutting	163 ft.
Total	686 ft.

Preparations for diamond drilling in the third level at the east end of the cross-cut were completed late in January. Two holes were put down, the first at an angle of 30 degrees to the horizon, and parallel with the direction of the cross-cut, S. 29 degrees, 4 minutes E. This hole penetrated to a depth of 436 feet and ended in what appeared to be the Eastern sandstone. Thinking that the hole might have entered the sandstone in an embayment on the contact of that sandstone and the Keweenaw series, and that if on a steeper dip it might have remained altogether in the latter series, we sank a second hole from the same point, at a dip of 35 degrees, 30 minutes, and in the same plane as the former. It was discontinued at 483 feet after having penetrated the sandstone for upwards of a hundred feet, as having apparently demonstrated that we had passed beyond the limits of the Keweenaw series.

In August all work at the Challenge was discontinued. All of the drill cores, and samples of rock from the different beds, duly numbered, have been preserved for possible future reference, and maps have been brought up to date.

KING PHILIP COPPER COMPANY.

Capital, $2,500,000. President, Charles J. Paine, Jr.; secretary treasurer, Edward B. O'Connor; general manager, Lucius L. Hubbard, Houghton. Eastern office, Sears Building, Boston. A development proposition now doing exploration work.

President Fame's report for 1909 says:

At No. 1 shaft the 11th and 12th level cross-cuts were the best that have been opened anywhere in the mine. No drifting has been done at the 11th and only a short distance at the 12th. The latest advices about this level are very good. At the 10th level about 1,364 feet of drifting has been done and the general character of the ground is perhaps the best we have opened up except for the short distance at the 12th level. Our longest drift south is on the 6th level, which is in about 1,085 feet, nearly all of it in satisfactory looking ground.

At No. 2 shaft about 300 feet of drifting was done during the year at the 6th level. This drift has been described as being as good as the average drift on the Winona lode. At the 8th level up to date about 150 feet of drifting has been done, and although the first 60 feet did not show copper values, the last part of this drift has run into copper ground, which our superintendent describes as a fair grade of stamp rock.

The construction of the stamp mill which your company is building in conjunction with the Winona Copper Company is now progressing satisfactorily.

WYANDOT COPPER COMPANY.

Capital, $2,500,000. President, John C. Watson; secretary-treasurer, Charles E. Adams; superintendent, Frank L. Van Orden. Eastern office, 68 Devonshire St., Boston. Mine office, Houghton.

This is an exploration proposition, although apparently having every prospect of development into a producing mine at some future time.

During 1909 the drifting and cross-cutting amounted to 1,238 feet, and Superintendent Van Orden recommends the driving further of the cross-cut southeast.

The treasurer reports as follows for 1909:

Receipts.

Cash assets on hand April 1, 1909,		$73,782.72
Assessment No. 2, First Installment	$ 1,107.50	
Assessment No. 2, Second Installment	1,302.50	
Interest	3,919.55	6,329.55
		$80,112.27

Disbursements.

General expenses, including salaries, rent, registration and transfer of stock, excise tax, etc.	$ 5,041.48	
Expenses at mine	22,359.45	27,400.93
Cash assets April 1, 1910		$52,711.34

ELM RIVER COPPER COMPANY.

The stockholders of this company authorized its consolidation covered in the report of The Contact Copper Company for 1910. C. J. Morrisey, secretary, 70 State Street, Boston.

whole transaction, together with details of the reorganization will be covered in the report of The Contact Company for 1910. T. J. Morrisey, secretary, 70 State Street, Boston.

MICHIGAN SMELTING COMPANY.

Operating at Cole's Creek. Office Postoffice Address, Houghton, Mich. Men employed, 1908, 125; 1909, 125.

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 S tan wood; superintendent, Frederick I. 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, Tri-mountain, Michigan, Mohawk and Wolverine mines are refined and prepared for the market. About 125 men are employed.

KEWEENAW COUNTY MINES

The copper industry in Keweenaw County gave employment in 1909 to 2,060 men.

ALLOUEZ MINING COMPANY.

Capital, $2,500,000. Operating in Keweenaw County. This company works the Kearsarge lode, on which it owns no outcrop. The Allouez outcrop, if so it may be termed, is 1,400 feet below the surface of the earth and all underground work had to be done below this depth.

The company's annual report for 1909 includes the following statistics:

Receipts:

Pounds copper sold	3,164,608
Pounds copper remaining unsold (Est.)	866,924
Price per lb. for copper sold (Av.)	13.26c
Miscellaneous receipts	$1,766.65
Total receipts for 1909	$542,764.36

(In arriving at the total receipts for 1909 the unsold copper on hand is estimated as worth 14 cents a pound.)

Expenditures.

Running expense at mine	$389,734.48
Smelting, Trans., eastern office, etc.	60,798.61
New construction and No. 2 shaft	75,878,62
Net profit for 1909, less interest paid,	3,065.58

Comparative Results for 1908 and 1909.

	1908.	1909
Tons of rock stamped	220,905	253,049
Cost of mining, transportation, stamping and taxes per ton of rock	$1.674	$1.540
Cost of No. 2 shaft expense per ton of rock	$0.377	$0.266
Pound of mineral obtained	4,716,105	6,384,450
Pounds of refined copper produced	3,047,051	4,031,532
Per cent of refined copper in mineral	64.61	63.14
Pounds refined copper per ton of rock stamped	13.80	15.93
Cost per pound at mine, excluding construction and No. 2 shaft expense	12.13c	9.67c
Cost per pound at mine, No. 2 shaft expense	2.73c	1.67c
Cost per pound construction	.22c	.21c
Cost per pound of smelting, freight, commission, eastern office and all other charges	1.40c	1.51c
Cost per pound of interest paid	.33c	.33c
Total cost per pound refined copper	16.81c	13.39c
Summary of Results:		
Rock broken	258,324 tons	
Rock discarded	5,185 tons	
Percentage of discard	2.01	

The construction and improvements during 1909 were as follows: Installation of an 84-inch Burt boiler in No. 1 boiler house; installation of grizzles in floor of No. 1 rock house; completion of 8-inch steam pipe from No. 1 boiler house to No. 2 shaft; erection of No. 2 temporary rock house and trestle approach to same from No. 2 shaft; Grading for railroad spur to No. 2 rock house; extension of a poor rock trestle to a piece of land leased from Ahmeek Mining Company for dumping purposes; fencing of dwellings at "New" Allouez.

Underground conditions have improved materially, as is shown by the increased mill return of more than two pounds of copper per ton of rock. The openings to the north of No. 1 shaft are better than on the south side. At No. 2 shaft the 16th level north has the best showing. The openings as a whole are promising.

AHMEEK MINING COMPANY.

Capital Stock, $1,250,000. Mine office, Allouez. General office, Calumet. President R. L. Agassiz gives the following statistics in his report for 1909:

Gross value of fine copper produced:

Sold 8,900,523 lbs. at 13.37 cents	$1,189,999.92	
297,587 lbs. sold since January 1 at 14 cents	41,662.18	
Total 9,198,110 lbs.		$1,231 662.10
Sales of domeykite		3,344 86
		$1,235,003.96
Running expenses at mine	700,234.22	
Smelting, transportation, commissions, eastern office, etc	101,206.40	
Equipment and sinking Nos. 3 and 4 shafts	134,640.57	
New construction at all branches	484,792.35	1,420,873.54
Net loss from operations for the year		$185,866.58
To which add:		
Real estate purchased	12,450.00	
Less real estate sold	2,100.00	10,350.00
Balance interest paid		2,780.40
Net decrease in assets for the year		$198,996.98
Balance of assets December 31, 1908		363,216.12
Balance of assets December 31 1909		$164,219.14

Comparative Results for 1908 and 1909.

	1908.	1909.
Tons of rock stamped	298,178	406,045
Cost of mining, transportation, stamping and taxes per ton of rock	$1.78	$1.72
Pounds of mineral obtained	8,029,960	12,409,042
Pounds of refined copper produced	6,280,241	9,198,110
Per cent. of refined copper in mineral	78.21	74.12
Pounds of refined copper per ton of rock stamped	21.1	22.7
Cost per pound at mine excluding construction	8.64c	7.61c
Cost per pound construction	2.40c	5.27c
Cost per pound equipment and sinking Nos. 3 and 4 shafts	0.51c	1.47c
Cost per pound of smleting, freight, commission, eastern office, etc.	1.11c	1.10c
Cost per pound interest paid	0.00c	0.03c
Total cost per pound refined copper	12.66c	15.48c

MOHAWK MINE.

Operated by the Mohawk Mining-Company at Mohawk, Keweenaw County. Office, 15 William St., New York. Capital stock, $2,500,000. 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.

Mohawk holds the distinction of being the heaviest copper producer and only dividend payer in Keweenaw County. Underground operations are conducted through five shafts sunk in the vein, substantially constructed and in first-class running order.

During 1909 there was produced from the mine 14,690,200 pounds of mineral, which yielded 76.57 per cent., or 11,248,474 pounds of refined copper. The following is a summary of the year's business:

Receipts.

11,248,474 lbs. copper @ 13.20 cents		$1,484,292.13

Expenditures.

Working expenses at mine as per statement hereafter	$1,149,678.68	
Smelting, freight and all other New York and Boston expenses	98,369.30	1,248,047.98
Showing a profit of		$ 236,244.15
There was expended for construction		12,552.54
Leaving a net profit of		$ 223,691.61

The following is the statement of receipts and expenditures of the Mohawk Mining Company from date of organization to December 31, 1909.

Receipts.

From capital stock (100,000 shares at $7.50 per share), paid in at organization	$ 750,000.00	
From assessments	1,049,990.00	
From sales of "Mohawkite"	116,407.79	
From sales of copper (65,052,153 lbs.)	9,649,209.97	
From interest	18,160.68	$11,583,768.44

Expenditures.

For real estate (mine location and Traverse Bay R. R.)	$ 450,000,00	
For lands since purchased	30,251.92	
For mining and surface labor, improvements, cost of smelting and marketing copper, and all incidental expenses	8,645,225.03	9,125,476.95
Receipts over expenditures		$ 2,458,291.49

Summary of Results.

Rock hoisted	902,691 tons
Rock stamped	819,019 tons
Product of mineral	14,690,200 lbs.
Product of refined copper	11,248,474 lbs.
Yield of rock treated, 13.73 lbs. per ton, or	.6867 %
Cost per ton of rock hoisted	$1.27
Cost per ton of rock stamped	$1.40
Cost per pound of refined copper at mine	10.22 cts.
Cost of smelting, freight and marketing product, including office expenses	.875 cts.
Total cost per pound or refined copper	11.095 cts.
Total cost per pound of refined copper, including construction,	11.207c.

GRATIOT MINING COMPANY.

A Keweenaw county subsidiary of the Calumet & Hecla Company. Development work in a small way is being done on two shafts.

KEWEENAW COPPER COMPANY.

Office, Hancock, Mich. Capital stock, $2,800,000. Officers: Chas. A. Wright, president; Spencer R. Hill, vice president; Thomas Hoatson, second vice president and mining director; C. A. Wright, Jr., secretary and treasurer.

The operations of the company during the year 1909 have been restricted to its Medora-Mandan-Resolute tract of 2,440 acres practically all of which carries the Kearsarge amygdaloid bed, now being opened by this company, which outcrops near the extreme southern boundary of this body of land. All development work at the Medora shaft, except diamond drilling, has been discontinued indefinitely owing to the present unsatisfactory appearance of the lodes which have been opened from this shaft. The thorough stamp mill test of rock from the Medora amygdaloid, which was begun July 28, 1908, and continued until March 31, 1909, proved disappointing in amount of copper recovered, and the limited openings made in the "North" amygdaloid and Allouez conglomerate have not up-to-date been sufficiently encouraging to justify their further development. Considerable diamond drilling has been done during the year, and cores have been extracted from the Calumet conglomerate, Allouez conglomerate, Osceola amygdaloid and Kearsarge amygdaloid beds, nearly all of which have contained some copper. The Kearsarge cores have been the most promising, and the company lately started an exploratory shaft on this amygdaloid bed, which here has a width of about twenty feet, half of which is well charged with copper so far as

opened. The location of this lode is particularly favorable for the development of a large mine on the company's property, and the Kearsarge amygdaloid has been so uniformly productive and is now being successfully developed at so many mines, much hope is entertained that will prove no exception here.

It is planned to continue during the present year the sinking of the Kearsarge shaft, which is now about sixty feet deep in the lode. Diamond drill explorations will also be continued on portions of the company's large holdings of mineral lands, which now amount to 18,500 acres, exceeding those of any single mining company in extent of territory and workable area on the productive, copper-bearing beds of the Lake Superior district.

The Keweenaw Copper Company is at present engaged in sinking a shaft (now 350 feet deep) on the Kearsarge amygdaloid bed which is the great master lode of this district, on which there are no less than fourteen mining companies now operating. This lode, together with the Osceola, Calumet & Hecla and other well known mineralized beds run through Keweenaw property for ten miles or more, giving opportunity for very extensive mining developments on the 20,000 acres of mineral lands owned and controlled by this company, which has found very encouraging values in its Kearsarge shaft and also in its recent diamond drill explorations on the Phoenix property, which it now controls.

OJIBWAY MINING COMPANY.

The Ojibway mine is operated at Ojibway, Keweenaw County, by the Ojibway Mining Company. Capital stock, $2,500,000. It is still in the development stage and hence had no output and made no shipments in 1909. Officers: Lucius L. Hubbard, president; Charles A. Duncan, vice president and treasurer; William G. Hegardt, assistant treasurer; Frederic R. Kennedy, secretary; Daniel R. Smith, assistant secretary; Oscar J. Larson, general solicitor; Henry B. Paull, auditor. General office, Duluth, Minn.; mine office, Houghton.

The board of directors submitted the following report of operations covering the year ending April 30, 1910:

The property of. the company is all located in Keweenaw County, Michigan, in Township 57 North, Range 32 West, described as follows:

The Southwest quarter of the East half of Section 11, the West half of Southeast quarter, the North half of Southwest quarter and the Northwest quarter of Section 13, the North half and the Southwest quarter of Section 14, the Southeast quarter and the North half of Southwest quarter of Section 15, aggregating 1,520 acres. The East half of Section 11, above described, was acquired during the past year, and it is tributary to the No. 1 shaft.

The plan of development work outlined in the report of 1909 has been systematically followed. Each shaft has been sunk to the 1,250 feet level. At the 800 feet level drifting has progressed between the shafts and they should be connected within another month. This work, besides giving better ventilation and greater security, enables us to ascertain the course of the lode which is quite irregular owing to frequent faulting. The ground tributary to No. 2 shaft has not been as favorable as that at No. 1 shaft. We have therefore deemed it best to concentrate our efforts largely in the latter shaft in developing ground at the different levels.

In two levels north of No. 1 shaft, we have opened good drifts and with a diamond drill have recently also cut rich ground at the 1,250 foot level, towards which we are now drifting.

At No. 2 shaft, besides drifting north at the 800-foot level, we are only sinking the shaft.

During the year there have been 882 feet of shaft sinking and 603 feet of diamond drilling; and there have been driven 389 feet of cross-cuts and 2,464 feet of drifts.

The average number of men employed each month in and about the property of the company was 85.

There have been added to our equipment during the year, a 300 H. P. Nordberg Jet Condenser and an Ingersoll-Rand, 640 cubic feet two stage, belt-driven compressor. This addition to our compressor plant enables us to use more drills than was possible last year.

These drills are being placed in commission as rapidly as dwelling house accommodation can be obtained for the employes required in their operation.

FINANCIAL STATEMENT—April 30, 1910.

Capital Stock (paid in)		$924,000.00
Vouchers Payable		10,247.13
Mining Property	$459,919.29	
Accounts Receivable	18,406.81	
Cash	44,330.18	
Supplies	15,320.26	
Loss and Gain	396,270.59	
	$934,247.13	$934,247.13

Current Assets and Liabilities—April 30, 1910.

Assets.

Accounts Receivable	$ 18,406.81
Cash	44,330.18
Supplies	15,320.26
	$ 78,057.25

Liabilities.

Vouchers Payable	10,247.13
Assets in excess of Liabilities	$ 67,810.12

Receipts and Expenditures—May 1, 1909, to April 30, 1910.

Receipts.

Cash on hand May 1, 1909,		$ 38,437.58
Calls Paid	$ 66,744.00	
Interest	2,370.54	
Bills Receivable	64,230.00	$133,344.54
		$171,782.12

Expenditures.

Mining Property	$24,000.00	
Operating Expense	93,749,82	
Construction Account	9,501.86	
Office, General and Legal Expenses, Salaries, Postage, etc.,	5,401.60	$132,653.28
LESS		
Increase in Vouchers Payable	$ 3,714.88	
Decrease in Supplies	1,356.93	
Decrease in Accounts Receivable	129.53	5,201.34
Cash on hand April 30, 1910....		$ 44,330.18

SENECA MINING COMPANY.

Subsidiary of Calumet & Hecla. The report for 1909 shows a total of exploration and construction expense amounting to $62,140.30. This is still a development proposition.

ONTONAGON COUNTY MINES

The number of men employed in Ontonagon mines in 1909 was 800.

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. 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; secretary, and treasurer, Alvin R. Bailey. R. M. Edwards, superintendent. Office, 50 Congress St., Boston, Mass. Mine office, Greenland, Ontonagon County, Mich.

Supt. Edwards' report for 1909 says:

Two diamond drills have been at work on the property continuously since date of last report.

No. 3 hole was completed to a depth of 2100 feet.

No. 4 hole was completed to a depth of 1,044 feet.

No. 5 hole is still sinking at depth of 1,565 feet.

No. 6 hole was abandoned without reaching the ledge.

No. 7 hole is still sinking at depth of 1,878 feet.

The important results from the explorations to date have been

1st.—The determination of the strike of the formation in the vicinity of Holes No. 3 and No. 7. These two holes are 1300 feet apart on the line of the strike and pass through the same geological horizon. The correlation between the two is almost perfect as regards all the important beds cut, and the strike indicated is the same as we originally assumed it should be, viz: N. 50 degrees E.

2nd.—Holes No. 3 and No. 7 have both passed through two very good-looking amygdaloid lodes carrying copper. The first of these lodes carried the most copper in No. 3 hole, and the second looked the best and carried the most copper in No. 7 hole, where we have just passed through it. They are both worthy of development, and the question of sinking to them should be considered soon.

Copper has been encountered in ophite at other points in these holes, No. 3 cutting through 6 inches of solid copper at depth 1,702.

No positive identification of the Lake lode has yet been made.

LAKE COPPER COMPANY.

Officers and directors: Reginald C. Pryor, president; William D. Calverly, secretary-treasurer; B. F. Chynoweth, John H. Rice, R. M. Edwards, Deen Robinson and E. M. Ingram. T. H. Bennett, superintendent; William Wearne, mining captain.

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 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 1909 operations were continued on the "new lode" which may be 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 following is a statement of results for the eleven months ending April 30, 1910:

Tons rock stamped	10,125
Pounds mineral produced from same	339,320
Per cent mineral in rock stamped	1.6756
Pounds fine copper produced to April 1	170,801
Per cent fine copper in mineral smelted to April 1	63.638
Pounds fine copper per ton of rock stamped and smelted to April 1	21.064

ADVENTURE CONSOLIDATED COPPER COMPANY,

Organized in Michigan, 1898. Capital stock $2,500,000. James Bishop, president; Chester L. Dane, vice president; Wm. R. Todd, secretary-treasurer; .W. A. O. Paul, asst. secretary-treasurer. Office 32 Broadway, New York. Mine office Greenland, Ontonagon County, Michigan. Property includes 1706 acres of mineral land, besides 320 acres upon .which the company's stamp mill stands.

The annual report for 1909 shows:

Running expenses at mine	$14,388.12	
Taxes in Michigan	5,266.54	
Diamond drill work	3,990.30	
Sinking No. 5 shaft	18,931.79	
Construction No. 5 shaft	5,043.97	
Mine cost	$47,620.72	
All other expenses	7,525.61	
		$55,146 33
Receipts—Interest, etc.		707.31
		$54,439.02
The statement of assets and liabilities in our last report showed a balance on hand as of date January 1, 1909		$55,723.49
Deduct excess expenditures		54,439.02
Gives balance of assets January 1, 1910		$ 1,284.47

In order to provide funds for the sinking of the new shaft described in the accompanying report of the General Superintendent, an assessment of one dollar per share, payable February 1st, 1910, has been called on the capital stock of the Company.

The General Superintendent's report of the operations at the Adventure Mine for the year 1909 says:

The diamond drilling in progress at the time of the last annual report was finished by the end of February, with the result that lodes No. 1 and 2 were cut at seven hundred feet and one thousand four hundred and thirty feet, respectively, neither showing copper; and lode No. 3 at one thousand five hundred and seventy-three feet showing a little copper. This completed the drilling, which had given a cross section of nearly the entire width of the property, and had shown the existence of three amygdaloids called No. 1, 2 and 3 which had shown encouraging amounts of copper; or, to sum up the work more exactly: No. 1 lode showed heavy copper in hole No. 5, a little fine copper in hole No. 6, and none in holes 7, 9 and 10; lode No. 2 showed heavy shot copper in hole No. 6, some copper in hole No 7, and none in 10; and lode No. 3 showed well in apparently both mass and stamp rock in hole No. 6, and some copper in holes 7 and 10.

The results of this drilling warranted sinking a shaft to these lodes, and as the surface soil is deep and wet at their outcrops, it was decided to sink a vertical shaft, starting in a rock outcrop some distance out on the hanging wall side, and just west of the location of No. 6 drill hole. It is expected that lode No. 1 will be cut at a depth of nine hundred feet, while the other two lodes lie deeper. An estimate of what the shaft may be expected to find can only be based on the records of the drill holes, taking into consideration both the character of the rock and the actual copper contents of the cores, and comparison of these records leads to the expectation that while copper may be found in lode No. 1, it is with the other two lodes, especially the third, that the greatest expectations lie.

Early in April, work was started towards clearing the site for the shaft and moving in necessary buildings, machinery and supplies. The buildings and machinery at the mines have been used in equipping the shaft, so that the principal portion of the work of construction has been in adapting old plant and material to the new requirements; thus very little new material was required. The plant at No. 5 location consists of a 12 ft. x 20 ft. geared hoist and a 10-drill compressor under the same roof, with two boilers which furnish the required power, a shafthouse forty-five feet high, made largely of timber cut on the property, a small blacksmith shop, a change house, and a coal trestle, nearly all of which was either housed in or completed before the snow came.

Ground was broken for the No. 5 shaft on May 6th, before the snow had gone. The shaft is twenty feet by eight feet outside the timber, or eighteen feet by six feet inside, providing for two hoisting compartments each six feet two inches by six feet, and a ladder and pipe compartment four feet by six feet. Work was commenced with hand drilling; power drilling was introduced during June. A pony air hoist was used until the large hoist was put into commission on August 1st. When sufficiently solid rock had been reached in the shaft, a reinforced concrete collar with concrete dividers was put in. This extends to depth of twenty-four feet, and makes the shaft perfectly strong, safe, and fireproof at surface. Upon completion of the collar August 9th, eight-hour shifts of miners were started in the shaft, and sinking has been continued since without interruption. The shaft was three hundred and ten feet deep on December 31st.

Considerable work was done on the outcrop of the new Mass lode on the east side of the Adventure bluff, showing quite a little copper. Cross cuts were driven in the old mine from the Evergreen lode at the end of No. 1 tunnel, and on the sixth level at No. 3 shaft. The lode showed copper in both places—the latter place showing the better. However, the finances did not warrant further investigation, and work was therefore discontinued in October.

The stamp mill is being kept in good condition and repair by the watchman.

MASS CONSOLIDATED MINING COMPANY.

Capital $2,500,000. President, John W. Linnell, Jr.; secretary-treasurer, Wilfred A. Bancroft. Eastern office, 79 Milk St., Boston. Mine Mass City Ontonagon County Michigan.

The annual report for 1909 gives the following statistics:

Surplus assets on hand January 1, 1909,.....		$ 47,276.80
Income		
1,723,436 lbs. copper @ .13613 cts.	$234,605.16	
Silver	681.82	
Real Estate	1,549.90	
Sundries	6,911.92	243,748.80
		$291,025.60
Expenses.		
Expenses as per detailed statement	$205,773.23	
Freight on rock and mineral	24,774.81	
Smelting, freight and brokerage	14,364.29	
Insurance	4,206.11	
Taxes	6,981.37	
Interest	6,256.42	
Office and general expense transfer and registration of stock	9,004.43	
Diamond drill and exploring expense	8,807.08	
Real Estate	8,586.00	288,753.74
Surplus assets December 31, 1909		$ 2,271.86

1909 Statistics.

Rock stamped	139,404 tons
Mineral produced	2,319,620 lbs.
Refined copper produced	1,723,436 lbs.
Percentage of mineral	.832 %
Percentage of refined copper in mineral	74.298 %
Drifting on lodes	2,464 feet
Drifting on crosscuts	1,189 feet

Early in the year a new lode was located 120 feet southeast of the Evergreen and where first opened at the 17th level in "A" shaft the showing was very good. A mill test was made from this rock in June, and a report of same was forwarded to stockholders as soon as it could be made up. The showing at the 15th and 13th levels was not as favorable as where first opened, but we believe further attention should be given to this lode as soon as this shaft can be sunk another level. We have since opened this lode in an old tunnel, located a mile to the southwest and have done some work here near the surface, encountering good rock. This lode has also been opened over a mile away to the eastward, which proves that it is permanent.

We had considerable trouble in our diamond drill work tills year, on account of the ground holding the drills. At the 17th level "A" shaft, our A No. 2 drill went to a depth of 1,651 feet, and No. 13 drill (from surface) to a depth of 1,536 feet. Both of these drills were pinched for more than three months, although contractors used every known method to release them. Then on account of the condition of our finances and the low price of copper, we felt that further expenditure for diamond drilling at this time was not warranted. New developments on nearby properties have been such that we -believe we should continue this work, and we intend to do so in the near future.

MICHIGAN COPPER MINING COMPANY.

Capital stock, $2,500,000. Operating at Rockland, Ontonagon County. The company owns approximately 5,000 acres of mineral lands and 1,200 acres of timber land in Ontonagon County. Mine office, Rockland. Eastern office, 15 William St., New York City. President, Joseph B. Gay; secretary, J. Wheeler Hardley; treasurer, J. R. Stanton.

The company's 1909 report shows the following statistics:

Receipts.		
Sales of copper, 1,979,305 lbs., @ 13.16 cts.		$260,551.33
Account Assessment No. 5		4,778.00
Account Assessment No. 6		164,248.00
		$429,577.33
Expenditures.		
Expended at mine as per detailed statement hereafter	$362,858.65	
Smelting, freight and other charges	17,123.73	
Expenses of Boston transfer office, registration of stock, salaries, and all expenses	7,204.35	387,186.73
		$ 42,390.60
Taxes for 1909	$ 9,061.28	
Interest	6,429.13	15,490.41
		$ 26,900.19
There has been expended for exploration and construction, as per statement hereafter		19,682.36
		$ 7,217.83
Deficit Dec. 31, 1908		15,391.56
Deficit Dec. 31, 1909, ...		$ 8,173.73

Last October the directors decided to suspend mining operations and confine all work to further explorations at the "Bee" location and continue diamond-drill boring at the most promising points on the property, and the results both at the "Bee" and with the drills are encouraging.

Statement of Production.

Rock hoisted	181,034 tons
Rock stamped	148,172 tons
Product of mineral	2,457,346 lbs.
Product of mass copper	485,846 lbs.
Total mineral and mass	2,943,192 lbs.
Product of refined copper	1,979,305 lbs.

VICTORIA COPPER MINING COMPANY.

Capital, $2,500,000. President, Fred H. Williams; treasurer, James P. Graves; secretary, Sydney S. Millett Eastern office, 60 Congress St., Boston. Mine office and mine, Victoria, Ontonagon County, Mich.

The annual report of this company for 1909 gives the following statistics:

Production.

1,062,218 lbs. of copper at 13.28 cents	$141,090.63
Miscellaneous earnings	8,334.30
	$149,424.93

Cost.

Working expense at mine	$159,771.40	
Smelting, freight, marketing cost and office expense	21,744.35	$181,515.75
Net loss from mining operations, 1909		$ 32,090.82

Receipts.

Copper sold, 525,927 pounds	$ 68,691.35
Copper on hand, 536,291 pounds (estimated at 13½ cents)	72,399.28
Assessment No. 4	100,000.00
Profits on Sundry Accounts	5,274.41
Rents	3,059.89
Total Receipts	$249,424.93

Expenditures.

Mining	$121,550.80
Surface	11,197.92
General	4,780.47
Taxes	5,009.19
Insurance	635.31
Stamping	16,597.71
Freight and Smelting	14,012.38
Marketing and Office Expense	7,731.97
Interest	679.00
Construction	7,922.27
Development of Water Power	1,573.29
Real Estate	812.57
Diamond Drilling	23,127.69
Legal Expense	2,016.56
Exploration Expense	3,565.63
Total Expenditures	$221,212.76
Balance Receipts over Expenditures	28,212.17
Surplus from previous year was	11,407.65
Balance	$ 39,619.82

1909 Mine Operations.

Amount of ground stoped	5,747 cubic fathoms
Amount of rock hoisted	127,288 tons
Amount of rock discarded	9,952 tons
Amount of rock shipped from stock pile	1,269 tons
Amount of rock stamped	118,605 tons
Amount of mineral produced	1,843,152 pounds

Statement of receipts and expenditures from date of organization to December 31, 1909.

Receipts.

Received from Capital Stock	$700,000.00
Received from Assessments	600,000.00
Received from sales of copper	653,486.49
Interest	42,637.44
Rents	26,515.35
Profits on Sundry Accounts	31,554.80
	$2,054,194.08

Expenditures.

Organization Expense	$ 2,926.10
Real Estate	377,049.73
Unwatering Mine	7,849.71
Plant, Buildings and Equipment	228,308.27
Development of Water Power	212,285.08
Mining Expenses	732,402.51
Surface Expenses	124,912.68
General Expenses	92,991.07
Legal Expenses	14,737.10
Taxes	35,692.57
Insurance	6,802.04
Stamping	62,505.49
Smelting, Freight, Commission, etc., on Copper	60,343.86
Exploration	21,862.68
Diamond Drilling	33,905.37
	$2,014,574.26
Balance	$ 39,619.82

VICTORIA COPPER MINING COMPANY.

Capital stock, $2.500,000. Officers: Fred H. Williams, president; Chas. D. Hanchette, vice-president; James P. Graves, treasurer; Sydney S. Mellett, sec'y.; George Hooper, superintendent; Thomas Carl-yon, mining captain; C. R. Everett, clerk; Chas. Caddo, mill superintendent; R. S. Schultz, Jr., engineer.

Main office, 60 Congress street, Boston, Mass.; mine office, Victoria, Ontonagon County, Michigan.

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 consist 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.

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.

The annual report of the Victoria Copper Mining Co. for year ended Dec. 31, 1909, shows the following:

Receipts.

Copper sold, 525,927 pounds	$ 68,691.35
Copper on hand, 536,291 pounds, (Estimated at 13½ cents)	72,399.28
Assessment No. 4	100,000.00
Profits on Sundry Accounts	5,274.41
Rents	3,059.89
Total Receipts	$249,424.93

Expenditures.

Mining	$121,550.80	
Surface	11,197.92	
General	4,780.47	
Taxes	5,009.19	
Insurance	635.31	
Stamping	16,597.71	
Freight and Smelting	14,012.38	
Marketing and Office Expense	7,731.97	
Interest	679.00	
Construction	7,922.27	
Development of Water Power	1,573.29	
Real Estate	812.57	
Diamond Drilling	23,127 69	
Legal Expense	2,016.56	
Exploration Expense	3,565.63	
Total Expenditures		$221,212.76

Production.

1,062,218 lbs. Copper at 13.28 cents	$141,090.63
Miscellaneous Earnings	8,334.30
	$149,424.93

Cost.

Working Expenses at Mine	$159,771.40	
Smelting, Freight, Cost of Marketing Copper and Office Expense	21,744.35	181,515.75
Showing a loss from mining operations of....		$ 32,090.82

The following report for the calendar year 1909 is also submitted:

At Mine.

Amount of ground stoped	5,747 cubic fathoms
Amount of rock hoisted	127,288 tons
Amount of rock discarded	9,952 tons
Amount of rock shipped from stockpile	1,269 tons
Amount of rock stamped	118.605 tons
Amount of mineral produced	1,843,152 pounds

MICHIGAN SALT PRODUCTION.

The six salt producing districts of Michigan are located in the following counties of the lower peninsula: Saginaw, Bay, St. Clair, Manistee, Mason and Wayne. The figures here given are supplied by Hon. Temple Emery of Bay City, State Salt Inspector. Michigan has to date (December 1st, 1909,) produced 138,351,734 barrels of salt.

Comparative Inspection by Districts for 1908 and 1909.

	1908, Bbls.	1909. Bbls.	Increase or Decr. Bbls.
District No. 1, Saginaw County	337,161	344,729	+ 7,568
District No. 2, Bay County	206,880	178,415	— 28,465
District No. 3, St. Clair County	1,543,884	1,561,352	+ 17,468
District No. 4, Manistee County	2,329,940	2,107,489	—222,451
District No. 5, Mason County	679,564	851,669	+172,105
District No. 6, Wayne County	1,150,367	1,012,007	—138,360
Totals	6,247,756	6,055,661	
Net decrease			192,095

Barrels.

Number of barrels of sale inspected from December 1, 1908, to December 1, 1909	6,055,661
Estimated in bins, Dec. 1, 1909	1,195,885
Total manufactured, 1909	7,251,546
Deduct salt in bins December, 1908	738,056
Total manufactured, 1909	6,512,490
Decrease in inspection, 1909	192,095
Increase in manufacture, 1909	402,500

THE COAL MINING INDUSTRY.

The coal mining industry in Michigan was extended during 1909, so far as drilling and prospecting were concerned. The prospectors have gone outside the usual fields of Saginaw and Bay counties, into Tuscola, Genesee and Shiawassee counties. Three new shafts were sunk in 1909; two by the Consolidated Coal Company in Saginaw County and one near Flint, Genesee County, by the Genesee Coal Company. The year 1909, however, was not a very successful one, from comparative standpoints, for Michigan coal miners, nor for the coal miners of the county in general. The prospects for 1910 are better.

State Coal Mine Inspector Andrew Stevenson supplies the following statistics for the year 1909:

Average number of coal mines in operation	31
Average number of employes	2,960
Average number of hours worked per day	7.8
Average number of days worked per month	19.6
Average daily earnings of each employe	$2.93
Aggregate sum paid in wages	$2,117,865.42
Total number of gallons of oil used	34,961
Total number of kegs of powder used	67,412
Aggregate output of mines in tons	1,758,020
Aggregate cost of output	$2,905,573.07
Average cost per ton	$1.65

Michigan Coal Mines and Counties Where Located.

Name of Mines.	County where located.
The Wolverine Mine, No. 2	Bay
The Wolverine Mine, No. 3	Bay
The Central Coal Mining Co.	Bay
The Wenona Coal & Mining Co.	Bay
The What Cheer Coal and Mining Co.	Bay
The Black Diamond Coal Co.	Bay
The Michigan Mine	Bay
The Monitor	Bay
The United City Coal Mining Co.	Bay
The Robert Gage Coal Co., No. 5	Bay
The Robert Gage Coal Co. No. 6	Bay
The Michigan Vitrified Brick Co.	Bay

The Beaver Coal Mine	Bay
The Allen Co.s Mine	Eaton
The Wright Mine	Eaton
The Grand Ledge Coal Co.	Eaton
The Eagle Mine	Eaton
The Sattler Mine	Eaton
The Walker Mine	Eaton
The Riverside Coal Mine	Eaton
The Montrose Coal Co.	Genesee
The Cedar River Coal Mine	Ingham
The Gage Mining Co.	Jackson
The Black Diamond Mine	Jackson
The Robert Gage Coal Co., No. 1	Saginaw
The Robert Gage Coal Co., No. 2	Saginaw
The Robert Gage Coal Co., No. 3	Saginaw
The Robert Gage Coal Co., No. 4	Saginaw
The Bliss Coal Co.	Saginaw
The Caledonia Coal Mine	Saginaw
The Shiawassee Coal Co.	Saginaw
The Saginaw Coal Co.	Saginaw
The Jamestown	Saginaw
The Barnard Coal Co.	Saginaw
The Uncle Henry Coal Co.	Saginaw
The Riverside Coal Co.	Saginaw
The Buena Vista Coal Co.	Saginaw
The Consumers Devel. Coal Co.	Saginaw
The Corunna Union Coal Co.	Shiawassee
The New Haven Coal Co.	Shiawassee
The Detroit Vitrified Brick Co.	Shiawassee
The Akron Mine	Tuscola

MISCELLANEOUS MINERAL.

GRAPHITE.

Graphite is produced at L'Anse, Baraga County, by the Detroit Graphite Manufacturing Company. The mine is at L'Anse and the factory and offices in Detroit.

There was no graphite mined during 1909, enough mineral having accumulated on the stock pile to run the Detroit factory to the spring of 1911. About 600 tons were shipped to Detroit in 1909 and a similar quantity remained on hand. Roger C. Williams, superintendent, L'Anse.

GYPSUM.

Gypsum is found in large quantities in Kent County, near Grand Rapids.

During 1909 more than 180,000 tons of gypsum rock were produced; worth on the dump about $100,000.

The largest gypsum miner is the Grand Rapids Plaster Company. In 1909 this concern mined 108,000 tons. The deposit of gypsum in the Grand Rapids district is in two layers. The upper level is both mined and quarried. The lower level is mined. The room and pillar system is in common use.

CEMENT.

The following table shows the number of men employed and barrels of cement produced by the Portland Cement Industry in Michigan in 1909:

Name of Co.	Location.	Employes.	Production.
Aetna Co.,	Fenton.	150	300,742
Alpena Co.,	Alpena. Not running.		
Bronson Co.,	Bronson. Not running.		
Burt Co.,	Bellevue.	125	248,600
Egyptian Co.,	Fenton. In receiver's hasds.		
Elk Rapids Co.,	Elk Rapids.	105	189,263
Great Northern Co.,	Marlborough. Out of business.		
Hecla Co.,	Bay City.	135	250,000
New Alpena Co.,	Alpena. Not running		
Newago Co.,	Newago	85	192,606
Omega Co.,	Mosherville.	65	101,000
Peerless Co.,	Union City.	95	325,000
Peninsula Co.,	Cement City.	120	390,000
Wolverine Co. No. 1,	Coldwater.	196	337,346
Wolverine Co. No. 2,	Quincy. Idle during 1909.		
Wyandotte Co.,	Wyandotte.	85	221,557