HON. FRED M. WARNER.
GOVERNOR STATE OF MICHIGAN

STATE OF MICHIGAN

MINES AND MINERAL STATISTICS

By James L. Nankervis
Commissioner of Mineral Statistics

BY AUTHORITY

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LETTER OF TRANSMITTAL

STATE OF MICHIGAN
Office of
Commissioner of Mineral Statistics

Calumet, April 1, 1908.

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

Sir:—In fulfillment of the duties of my office, I have the honor to submit herewith the following report upon the mines and mineral interests of the State for the year ending March 31, 1908.

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

Commissioners of Mineral Statistics.

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

INTRODUCTORY.

In its varied forms of development and operation, no interest has lately excited more curiosity and wide-spread attention among business people and the general public than the industries of mining and metallurgy. These industries during the past few years have prospered and grown at an unprecedented rate and to an extent practically beyond ordinary comprehension and almost beyond belief. Every now and then, the discovery of new mineral bearing districts are announced by prospectors, which are developed and put in shape to send out an economic product at record speed. Financial stringency or not, there is always a plenty of money within reach to finance a mining proposition of merit. As a natural consequence, the mineral and metal producing capacity of the country is expanding in a wonderful manner and in practically all directions. The evolution of mining and metallurgy has kept pace with trade and commerce. Progress toward bigger and improved results has been continuous and substantial. The success achieved all over the land has been little short of phenomenal. In the modern way of doing things, industrial enterprises are developed and put in condition to make returns, unless of very large proportions, in an almost incredible short period of time. Operating companies with established records are strengthening the physical condition of their properties

and getting them in position to send out increased products.

The value of mineral products recovered annually from the earth's rock beds is enormous and now increasing faster than in any former period of the world's history. At the present rate of production, in the course of a few years, the mineral values produced in the United States will reach an amount beyond comprehension by the human mind. By illustration, the mind may apprehend the amount, but it will be incomprehensible by human intelligence. Since 1903, the annual product of minerals and metals in the United States have increased from $1,107,020,352 to $2,087,119,999. The product of coal increased from 263,537,465 tons to 463,493,303 tons. Iron ore from 27,553,161 tons, long, to 48,907,900 tons. Pig iron from 13,789,242 tons to 25,740 tons. Copper from 606,000,000 pounds to over 916,000,000 pounds. Barrels of salt from 20,869,342 to 36,978,198. Other products increased in like proportion. But to go back a little further. The value of mineral products of the United States increased from 1885 to 1906 from $434,137,994 to $1,902,517,565 or on increase of *one billion, four hundred and sixty-eight million, three hundred and seventy-five thousand, five hundred and seventy-one dollars.*

A careful compilation made by The Mining World shows that 114 mines and metallurgical works in the United States paid dividends of $81,601,426 in 1907 making a grand total of $538,734,083 since organization. These figures represent our growth in production of actual wealth. With such figures and facts in view, is it any wonder that people with means and energy should invest heavily in mining, metallurgal and other industrial enterprises. There are but few more desirable investments going than one in a good, solid mine that is well and honestly managed. In the estimation of the business and commercial world, legitimate mining stands higher today than ever before. That the mineral and metal industries are destined to further grow in popularity with the public in general, there is no doubt whatever.

An eminent authority has well said that "the flag follows the pick." Nothing truer was ever said. But the remark may be amplified by stating that the locomotive likewise follow the pick; also the plow, the mill, the factory, the school-house, the church and all industrial enterprises and privileges of modern civiliation. The aptness of this observation is being splendidly illustrated in many places and especially so in South Africa, Australia, Canada, Alaska, Arizona, Butte and in many other parts of the United States, but in no place more forcibly than in our own Lake Superior region. For instance, between 39 and 40 years ago, the author of this work was employed in an official capacity in the old Edward's mine near Humboldt, Marquette County. Mr. Pentecost Mitchell, Sr., was superintendent; Mr. A. A. Kidder, agent. Since that time, the Lake Superior region has yielded up 375,000,000 tons of iron ore. If placed in one pile, this output would form quite a little bump on the earth's surface. Human intelligence may apprehend such a quantity, but it cannot comprehend it. If it were possible to load this ore in ships at one time, it would take 38,000 ships about the same size as the United States Steel Corporation's steamship "Wolvin" to carry the amount. The Wolvin is about 600 feet long and carries about 10,000 tons for a cargo. If placed in line across the Atlantic ocean with the bow of one ship touching the stern of the next ship ahead, the line would form a ship-bridge stretching from New York to Liverpool and a double line of ship bridges across the Straits of Dover connecting England and the United States and France and England. After these bridges had been formed, there would still be a few thousand ships left over to fill in gaps occasioned by accident. Over such a thoroughfare, people might walk to and from the Eastern and Western continents dry shod. *Try and imagine such a structure and then think of its value*.

Deep pessimism prevails in many localities and I refer to these excellent results out of the many splendid ones obtained for the special purpose of showing what we have accomplished in the past few years. The success achieved can be more than duplicated and we shall soon be doing it. The panic of 1907 struck Michigan rather hard, but not so severely as some other states. Most of its industries were operated at full capacity and many had record years. The annual product of copper in the state, however, was 3,186,973 pounds less than the product for the previous year. Cement manufacturers also report a smaller number of barrels of cement produced in 1907 than in 1906. A few other industrial concerns likewise report somewhat reduced outputs for 1907. Products, however, brought better than average prices and upon the whole, the year was a fairly prosperous one.

At the present time, business in general is dull and dragging, but this condition of affairs will not continue always. It is merely a matter of sentiment,—confidence. Confidence again established and the wheels of industrial enterprise will soon be going on as briskly as ever with employment for all who wish to work. In fact our furtherest seeing financiers claim to see an improvement coming about now. The encouraging crop reports and the steady accumulation of money in the banks are making for increased confidence. There is a growing desire to employ the idle money and this is having a distinct bearing upon corporate and mercantile credit, as well as upon investment securities. That the worst is over is confirmed by the reports that come in from every source. People should take a cheerful view of things for there are better times ahead. The improvement may be a little slow, but it is sure to come. The world must and will have our iron and copper; coal and cement; salt and other products for it couldn't get along without them. The time is not far away when they will be wanted and in larger quantities than ever.

It affords me much pleasure in being able to announce that my previous reports seems to have given general satisfaction. A great many more applications for copies

came to this office than I was able to fill. The unfilled ones were referred to the Secretary of State at Lansing. Many complimentary letters were received, which is gratifying and I am sincerely glad the work is appreciated. I have again endeavored to prepare this report with just as much care with the hope of giving such a work as may prove useful to them and also full value for the amount appropriated for its preparation and publication. On different occasions, I have visited the mines and properties of the Lake Superior districts and have seen what the properties are like, the methods used for recovering products and the mechanical equipments in service. With but one or two exceptions, all figures regarding products, number of men employed, machine drills operated, depths of shafts, extent of ground developed and general data are official, up-to-date and as correct as it is possible to get them. This report is prepared on practically the same lines as my previous ones. Remarks on iron and copper mining and allied interests together with the condition of labor in the Upper Peninsula of Michigan form the bulk of the work.

Industrial enterprises located in the lower part of the State and the condition of labor are inspected and reported on annually to the Commissioner of Labor at Lansing by inspectors appointed for the work. These reports are very complete, contain a vast amount of valuable data and form a part of the Annual Report of the Michigan Bureau of Labor and Statistics. Copies of the reports may be secured by addressing applications to the Bureau of Labor, Lansing, Mich. Because of this provision, a compilation of the products made and the number of men employed, followed by a brief summary of results would appear all that is needed or expected from the Commissioner of Mineral Statistics on the Coal, Salt and Cement industries of the State.

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

COMMISSIONER.

MICHIGAN'S COPPER DURING YEAR 1907.

Unlike the mines in most other mining camps of the country, in 1907 the Michigan copper mines, like the iron ore mines of the Lake Superior region, were operated, in most instances, at full capacity and had a successful year. In some particulars the year was troublesome, disappointing, short of expectations, but it could have been worse. Productions of copper obtained in a number of instances were record ones. The average number of men employed in and about the mines was greater than in any former twelve months in the history of copper mining in Michigan. Wages and supplies of all kinds were exceptionally high. The amount of money paid out by the companies for all purposes was larger than in any like period.

The average number of men employed in Houghton county was 17,759; in Keweenaw county, 2,003, and in Ontonagon county, 1,252. In all three counties, 21,014. In the early months of the year there were not men enough to go around and they were in demand at practically their own terms. Operating costs soared to heights and cut deeply into treasury balances. Annual reports recently issued forcibly illustrate this fact. Such conditions must change or before long a number of mines, now active, will be idle. However, this condition is changing and in the course of a month or two the general situation will be back to normal again. Men are already doing much more efficient service and cost sheets reflect the changes going on.

The produce of copper obtained for the calendar year was 220,217,892 pounds which compares with 224,407,859 for the previous year and 217,762,382 pounds for 1905. Fiscal year reports will vary slightly from these totals. Michigan copper is the best brand in the world and unless the market conditions are decidedly bad it finds a ready market at the best prices going. Dividends paid, including Copper Range company, St. Mary's Mineral Land company and Union Land company amounted to $15,114,760.

In the amount of copper produced and dividends paid, excepting 1906, the year under review was a record one. But for the financial stringency and business depression occurring through the latter months, still better results would have been witnessed for the year's work. In fact but for this condition, 1907 would have been a record breaker worthy of note for the Michigan copper district. Copper sold for much better than average prices and the mines that worked at full capacity and sold their products have no room for complaint. Whether the price of copper happens to be high or low, the policy followed by the Lake managements is to keep on mining with characteristic energy, producing copper for the general good and making dividends for stockholders or developing properties with this end in view. And this is

the chief end of legitimate mining and the goal aimed for by consistent managers.

In a general way, Lake managements are up-to-date, progressive, among the best going and conduct operations in a practical businesslike way. The future wellbeing of properties are considered as much so as their immediate physical conditions. In 1907, a considerable portion of the money earned by the Lake companies was put back in the properties with the result that the positions of the miners have been strengthened and improved in practically every working department. New power houses were added to mine plants, additional mechanical equipment installed, more shafts started, active ones sunk deeper, fresh levels commenced, established ones driven further into virgin territory, reserves of ground carrying average values of the lodes mined increasd and put in shape for economical extraction, rock houses overhauled, remodelled and improved, stamping facilities increased and new shops were built. Besides such improvements, other economics were incorporated that served to maintain equipments up to a high standard of efficiency.

Taken as a whole, Michigan copper mines were never in better condition than they are at this time and the future outlook for them is especially bright the price of copper the principal contingency. Barring accidents and shut-downs, I predict for 1908, in amount of copper produced, the banner year of copper mining in the Michigan district of the Lake Superior region.

After careful consideration, I have formed an opinion that future developments may show that discoveries made, new mining enterprises started and modifications in mining methods of operation introduced will result in proving 1907 to have been a very eventful and important year for the future of the copper industry in Michigan. Foremost among these events and undertakings may be placed, perhaps, the developments now underway at the Lake Copper mine, Ojibway, Gratiot, Ahmeek, Isle Royale, Globe shaft, electrifications of mines and Calumet & Hecla recrushing mill. Other innovations might be Included.

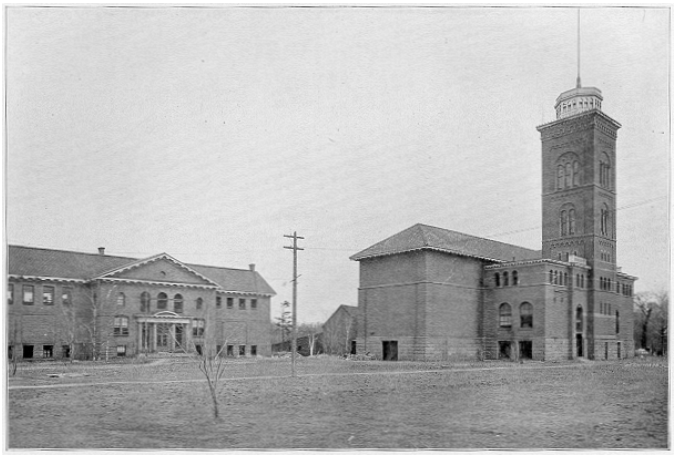
Calumet & Hecla—always interesting—in 1907 had a year of distinct success. The company's product of copper, while not the largest, was one of the best, amounting to 88,000,000 pounds, which compares with 95,000,000 for 1906 and 82,500,000 for 1905. Dividends paid amounted to $6,500,000. Copper Range Consolidated made a record product which amounted to 33,140,297 pounds. The three mines, Baltic, Champion and Trimountain, together produced 41,385,015 pounds. If desired the management can take out a much larger product of copper in 1908. Dividends paid, $2,304,810, besides one declared of one dollar payable in January, 1908. One half of Champion's product goes to St. Mary's Mineral Land company. Copper Range Consolidated product for 1906 was 32,382,983 pounds.

Quincy also had a year of decided success. Product of copper, 19,976,058 as against 16,194,786 pounds for the previous year and 18,827,557 for 1905. Dividends paid, $1,350,000. Osceola was operated with a reduced force and product of copper obtained much smaller than those of former years. It amounted to 14,134,753 pounds as compared with 18,588,451 pounds for 1906. A better showing promises to be made in 1908. Dividends paid in 1907, $1,249,950. Tamarack was also worked with a reduced force, but produced 11,078,604 pounds of copper as compared with 9,832,644 pounds for 1906. Dividends paid, $420,000. Wolverine's product was about an average one, being 9,372,982 pounds. Dividends paid, $1,050,000. Mohawk had a record product amounting to 10,107,266 pounds as compared with 9,352,252 pounds for 1906. Dividends paid $900,000. Ahmeek had a record year of distinction while Centennial, Winona and Victoria also had record products. Elsewhere in this report each mine is referred to separately and at some length.

In a general way Lake copper companies have been stretching out for bigger and better results and continued improvements have been made in all branches of mining. The people behind the mines know the business thoroughly and conduct it for the best interest of the companies and likewise for the future wellbeing of the properties. Future requirements are anticipated; kept well in the foreground and provided for in good season. To anticipate the future is the most important effort of human endeavor and intelligence in minig as well as in the course of every day life. Mines are opened on broad, practical lines and economically operated. The splendid success achieved, all over the upper peninsula becomes possible only by taking out enormous products with the aid of the best machinery the genius of man can invent and money buy, combined with a thorough knowledge of the business by the managements and working the mines in the most practical way for bringing the best results.

During the past few months copper mining companies have been passing through a strenuous season. Many of them felt obliged to suspend operations entirey or to run along with a reduced force. Copper is now selling for 12¾ or 13 cents a pound according to brand as against 26 cents a year ago. There is not much money in 13 cent copper even for the richest and best conditioned mines. But there are better times ahead. In fact we are now, it is well believed, on the threshold of them. The keenest financiers of both the United States and Europe are already discounting the future. General business shows unmistakable signs of picking up and getting in condition for enlarged mining transactions. Farm products promise to be abundant and prices good with a ready market for every bushel of grain invested. Upon crops of grain and soil products more than anything else hinges the prosperity of the people. With three-quarters of the population of North America rolling in wealth, hard times will soon vanish and pass away like an unpleasant dream. The world must have copper. It has to be electrified and copper will form an important factor in the work. Michigan will contribute its share of the metal and her mines are in prime condition for

furnishing the best brand on earth. All should be of good cheer. Just exercise a little patience and everything will turn out well.



MINING AND METALURGY BUILDINGS WITH STAMP MILL IN THE DISTANCE.
MICHIGAN COLLEGE OF MINES, HOUGHTON.

MICHIGAN COLLEGE OF MINES.

This institution offers four years' courses leading to the degree of Engineer of Mines and Bachelor of Science; it also affords facilities for graduate work leading to the degree of Doctor of Philosophy. The engineering department is fully equipped to give courses in all the branches of engineering in which a mining engineer needs to be proficient. Besides the faculty of eight professors, there is a staff numbering 31 assistant professors and instructors. The college year is divided into four terms, the out-door practical work being confined mainly to the summer term.

The Michigan College of Mines at Houghton, is a State institution established by an act of the Legislature of 1885, and opened for reception of students in September, 1886. The college exists for the purpose of training men to take an active part in the development of the mineral wealth of the state and nation, and concentrates its efforts on this particular line of work.

The methods of instruction give great prominence to laboratory work and trips of inspection to plants which exemplify often on a large scale the application of principles taught in the classroom to problems of commercial operation.

It is plain that an engineering school must derive immense advantage from a location in which its immediate surroundings continually illustrate and enforce the principles which it teaches. Even without effort on the part of the school, such environment must serve as an efficient aid to the instruction. But when those in control of these operations are in sympathy with the institution—are ready to place their plants tinder their charge at its service for instruction, and when the institution makes wise use of the opportunities thus afforded, these plants become truly a part of its equipment, and the location then becomes a factor which must increase the efficiency of the instruction by an amount hardly to be overestimated. Such is the relation of the adjacent mines, mills and smelters of the college, giving students access to the vast equipment of many of the most successful mines in the world.

The location of a college in a district where its students live in a mining atmosphere, together with its special methods of instruction and the manner of using the mining environment have brought to the institution a large measure of success. It is a noteworthy fact that of the 328 men graduated to date, but 7 have left engineering for other pursuits.

Most of the students of the college have been from Michigan, as it is a Michigan institution, but it has trained men from all parts of the United States and from a number of foreign countries in both hemispheres.

During its twenty years of existence the Michigan College of Mines has accomplished an incalculable amount of good in training and fitting young men for filling responsible positions requiring practical as well as technical knowledge. The practical knowledge is acquired in a measure, from personal observation and investigation of methods of operation used in some of the most vigorously worked and successful iron and copper mines on the globe.

The college is well organized with each branch of learning in charge of instructors eminently qualified by education and experience for training work of which the institution makes a specialty. At its head is Professor F. W. McNair, deeply learned and highly accomplished in the sciences taught, and possessing the rare faculty of being able to impart, in a clear, terse style, the knowledge and instruction that always proves helpful to the progress of students.

The board of control is made up of the following well-known gentlemen: James MacNaughton, General Manager Calumet & Hecla Mine, Calumet; Norman W. Haire, General Manager Osceola, Tamarack, Isle Royale and Ahmeek Mines, Houghton; Dr. L. L. Hubbard, General Manager Challenge, King Phillip and Winona Mines, Houghton; M. M. Duncan, General Manager Cleveland-Cliffs Iron Company, Ishpeming; William Kelly, General Manager Penn Iron Mining Company, Vulcan, and Hon. J. M. Longyear, Marquette, Michigan.

IRON MINING INDUSTRY.

The Lake Superior Iron Ore mines are worked harder and more vigorously than are the mines of any other district in the world and for results accomplished and success achieved, the region is not surpassed any where on the globe. Three record years in succession now stand accredited to producing companies with the gain from season to season running well into the millions of tons. The three year period forms a new epoch in the interesting history of iron ore production in this wonderful region. 1907 was the busiest and measured by the tonnage of ore produced, the most successful year for the lion Mining Industry, thus far experienced in the Lake Superior region. In no former period were there worked so many producing mines, developing properties and exploring prospects. Contracts for ore were made in the latter part of 1906 when industrial activity throughout the world was going on at an unprecedented rate. The demand for supplies up to the last quarter of the year was continuous and mines with a full complement of labor were operated to the limit of capacity. Wages were high and a greater number of men were emlpoyed than in any former year. For labor and supplies millions of dollars were paid out and the value of the mineral recovered far exceeded that of any previous season. For progress made and results obtained, these three years, 1905, 1906 and 1907 form a remarkable period in iron ore mining in the Lake Superior region and stand unequalled by any other mining district on the globe. The quantity of iron ore mined is given as 41,288,755 tons and the quantity shipped 42,245,070 tons. But for the financial depression, products and shipments would have still been increased by a considerable tonnage.

A comparison of ore shipments for three years are as follows, in tons: 1905, 34,242,065; 1906, 38,522,239; 1907, 42,245,070. The comparison shows a healthy growth and such as could only come from a first-class conditioned, thriving industry.

The record year, previous to 1905, was in 1903 when shipments amounted to 27,571,121 tons of ore. The gain of 1907 over the output of 1905 is 8,003,005 tons. At this rate of increase, the 50,000,000 ton mark will be reached at the close of 1910 season.

In 1902, when 27,571,121 tons measured the outgo from the Lake Superior iron region, the production was heralded as a wonderful achiev-ment, which it was, the nearest approach to the record having been 20,593,507 tons, registered the previous season. The production dropped to 24,290,000 tons in 1903, and further fell to 21,820,000 tons in 1904. The following year saw all records smashed with a movement of 34,242,065 tons, this exclusive of 169,227 tons shipped from the Michipocten district of Canada and 111,391 tons from two small mines in southern Wisconsin. The output, thus compared with that of the banner year of 1902, showed a gain of 24 per cent for the three seasons intervening. Now, the record of 1906 has been surpassed by that of 1907 to the extent of 9 per cent.

Comparative figures, showing the production, by ranges, follow:

	1905	1906	1907
Mesaba	20,153,699	23,792,882	27,492,949
Menominee	4,495,451	5,109,088	4,964,728
Marquette	4,210,522	4,057,187	4,388,073
Gogebic	3,705,207	3,641,985	3,637,907
Vermillion	1,677,186	1,792,355	1,685,267
Miscellaneous		128,742	76,146
Total	34,242,065	38,522,239	42,245,070

That during the season of 1907 ore was forwarded to the furnace from 190 mines in the Lake Superior iron region is an interesting fact gleaned from the annual table of shipments compiled by the Iron Trade Review of Cleveland, O. Twenty-two shippers were added to the list during the year. Of the 190 mines, ninety-three are located on the Mesaba range, forty on the Menominee, twenty-nine on the Marquette, twenty-three on the Gogebic, and six on the Vermillion. The total shipments were 42,245,070 gross tons, of which 41,288,755 were removed by water and 956,315 by rail. Shipping a total of 27,492,949 gross tons the Mesaba produced materially more ore than all the other four ranges combined. Of the entire output of the Lake Superior region, it forwarded no less than 65 per cent of the total, the Marquette 10.5 per cent, the Gogebic 8.7 per cent and the Vermillion 4 per cent. The Steel corporation's outgo constituted 60 per cent of the total shipments. Listed by companies, the leading producers were:

Steel corporation	22,710,898
Pickands-Mather company	3,014,980
Corrigan-McKinney company	3,020,933
Cleveland-Cliffs company	2,399,363
Cambria Steel company	1,333,148
Oglebay, Norton & Co.	890,097
Pittsburg Ore Co.	837,549
Republic I. & S. Co.	774,493
Jones & Laughlin	664,461
Fer, Schlesinger	591,796

Three-fifths of all the ore produced was of Bessemer grade. The value of the year's output for the region was not far from $200,000,000.

The world's demand for iron ore and its allied products has, of late, exceeded the current product and it was found necessary to draw upon stockpiles that had been standing for years to meet the demand. And this has occurred in spite of the fact that producing companies have been starting up new mines, increasing the efficiency of old ones and running them to the utmost of their capacity.

The consumption of finished and raw material, structural iron, sheets, iron bars and such material as is used for building locomotives, ships, bridges, wire fencing and similar products in 1906 and for the first half of 1907 was very great and hardly equalled in any former period of the world's history.

To date, since the discovery of iron on the Marquette range, more than sixty years ago, there have been mined in and shipped from Lake Superior fields the

stupendous amount of 380,417,085 tons of ore. It was not until the season of 1901 that as much as 20,000,000 tons were produced while it required until the year 1895 to reach an output of 10,000,000 tons. In 1888 the shipments overcapped the 4,500,000 ton mark for the first time, just rounding it, and in 1884 they were only 2,518,693 tons; in fact, although the region has been producing for practically three score years, the mines have sent out approximately 70 per cent of their product within the last decade. The relative importance of the various ranges may be noted from the following figures of output and date of opening of each district:

	Opened.	
Marquette	1864	85,245,313
Menominee	1877	63,641,213
Gogebic	1884	54,107,342
Vermillion	1884	26,785,426
Mesaba	1892	150,235,558
Miscellaneous		401,672
Total		380,417,085

People may apprehend such a quantity, but they cannot comprehend it. If it were possible to load this ore output in ships at the same time, it would take 38,000 ships about the size of the United States Steel Corporation's steamship "Wolvin" to carry the amount. If placed in a row across the Atlantic Ocean with the bow of one ship placed against the stern of the ship ahead, they would form a bridge stretching from New York to Liverpool and a double line of bridges crossing the Straits of Dover connecting England with France. After these bridges had been formed, there would still be a few thousand ships left over to fill in gaps occasioned by accident. Over such a thoroughfare, people might walk or ride to and from the Eastern and Western continents of the world dry shod. *Try and imagine such a structure*.

Just now, the outlook for the iron industry is not particularly bright and it is quite likely that the output of ore mined during 1908 will fall considerable below the quantity produced last year. Stocks of ore at the lower Lake ports are heavy and the largest, it is said, ever seen there at the close of any preceding season. This is a presidential year and a season when business usually becomes unsettled. Then the financial stringency or panic, which culminated in the closing quarter of 1908 had a most disastrous effect upon industrial enterprise all over the land. Financial concerns went under in quick succession, money became practically unobtainable for a time even for legitimate business and shops and manufacturers had to be closed throwing thousands of people out of employment. These conditions of affairs, however, will not last long. The country at large is overflowing with resources and the American people are chuck full of energy that must and will be put to practical use. When a change for the better sets in, the improvement will be rapid and the volume of business transacted soon restored to its normal basis.

At a meeting of prominent iron ore mining companies held in Cleveland on February, 1908, it was agreed that there would be no change in the prices asked for ore, they to remain the same as last year, viz: Bessemer Standard $5.00 per ton; Mesaba Bessemer $4.75 per ton; Old Range Bessemer $4.30 per ton and Non-Bessemer $4.00 per ton.

PIG IRON PRODUCTION.

The American Iron and Steel Association gives pig iron production of 1907 as 25,781,361 gross tons, against 25,207,191 in 1906, 22,992,380 in 1905, and 16,497.033 in 1904. Half yearly production compares, in gross tons:

	1907	1906	1905
First half	13,478,044	12,582,250	11,163,175
Second half	12,303,317	12,724,941	11,829,205
Total	25,781,361	25,307,191	22,992,380

Production in the second half of 1907 was 1,174,727 tons less than in the first half.

Furnaces in blast on Dec. 3ist, 1907, were 167 against 359 on June 30, 1907, and 340 on Dec. 31, 1906. The number at the end of 1907 was the smallest since 1896, when but 159 were active. At the close of 1907 there were 276 idle furnaces, as compared with 89 at the close of 1906. The number in blast at the second half of 1907 was 388, as compared with 382 in the first half. In 1906 the number in blast during the last half was 374, against 361 in the first half. On Dec. 31, 1907, there were 30 furnaces in erection, four being rebuilt, and one to be revived. There were six furnaces projected and two partly erected.

For the present, pig iron prices are certainly away off from the high point of 1907. The American Metal Market gives the following summary of comparative quotations on Jan. 9, this year, and one year ago:

Pig Iron per gross ton:	1908	1907
Foundry No. 2 Stand. Phila.	$18.25	$25.50
Foundry No. 2 Southern Cinn.	16.25	26.00
Foundry No. 2, Local Chicago	18.00	25.00
Bessemer Pittsburg	18.90	23.35
Gray forge, Pittsburg	17.40	22.85
Lake Superior charcoal, Chicago	22.50	27.00
Billets, etc., per gross ton:		
Bessemer Billets, Pittsburg	$28.00	$29.50
Forging billets, Pittsburg	30.00	36.50
Open-hearth billets, Philadelphia	30.00	33.00
Wire rods, Pittsburg	34.00	37.00
Steel rails, heavy East mill	28.00	28.00
Old Material, per gross ton:		
Steel rails, melting, Chicago	$12.00	$18.00
Steel rails, melting, Philadelphia	11.50	18.75
Iron rails, Chicago	15.00	28.00
Iron rails, Philadelphia	16.50	27.50
Car wheels, Chicago	19.00	25.00
Car wheels, Philadelphia	19.00	23.00
Heavy steel scrap, Pittsburg		19.00
Heavy steel scrap, Chicago	10.75	17.00
Heavy steel scrap, Philadelphia	11.50	18.50

THE WORLD'S IRON ORE RESERVES.

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

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

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

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

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

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

An idea of the magnitude and growth of the mineral industrial in the United States may be had by perusing the accompanying table, which gives the value of the products for the 25 years from 1883 to 1907 inclusive:

	Total Production	Annual Increase	Per Cent.
1883	$ 446,859,473	$ 5,041,686	1.1
1884	406,110,405	40,749,068	9.1
1885	418,803,180	12,692,775	3.1
1886	434,137,994	15,334,804	3.7
1887	507,387,674	74,249,680	17.1
1888	524,624,536	16,236,862	3.2
1889	531,392,513	6,767,977	1.3
1890	606,476,380	75,083,867	14.1
1891	605,385,029	1,091,361	0.2
1892	622,543,381	17,158,352	2.8
1893	543,693,967	78,849,414	12.7
1894	549,374,767	5,680,800	1.1
1895	640,771,528	91,386,761	16.6
1896	640,544,221	227,307	0.1
1897	646,992,582	6,448,361	1.0
1898	724,278,854	77,286,272	11.9
1899	1,014,355,705	290,076,851	40.1
1900	1,107,020,352	92,664,647	9.1
1901	1,142,000,029	34,979,677	3.1
1902	1,323,102,717	181,102,688	15.9
1903	1,491,928,980	118,826,263	12.8
1904	1,361,067,554	130,861,426	8.8
1905	1,623,928,720	262,861,166	19.3
1906	1,902,517,565	278,588,845	17.1
1907	2,077,119,999	184,602,434	9.7

x Decrease.
xx Mining World.

MARQUETTE COUNTY.

Total number of men employed in and about the mines of this County in 1907, 6744.

OLIVER IRON MINING COMPANY.

This company has been referred to at some length in my previous reports. It holds the unique position of being the heaviest producer and shipper of iron ore in the world with an annual capacity of between 20,000,000 and 30,000,000 millions of tons. Record years have now grown to be common occurrences, but in 1907, the company had the most successful and prosperous year in its history. The amount of ore produced is given at 22,710.898 tons and but for a scarcity of labor early in the season and the financial depression that set in later, the output would have been heavier still.

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

impossible without iron ore and the demand for structural iron, sheets, iron bars, and similar products during the year 1906 and the early part of 1907 was wholly unprecedented and without a parallel in the history of civilization.

The total output of iron produced in 1907 by the Michigan mines of this company, as officially reported to this office was 4,290,492 tons. The Oliver Iron Mining Company is the iron ore producing branch of the United States Steel Corporation—the largest and most comprehensive producer of finished and raw material on the globe. The gross earnings of this company for the year was close to $700,000,000 with net profits of $160,984,477.

The corporation also operates water supply plants; a hard ore crushing and conveying plant at Escanaba; extensive ore docks at different lake points besides various other works. The mines operated employ more men, square a larger monthly pay roll and produce a larger output of ore than any other single interest in this or any other country. Mineral, timber and other lands owned by the companies are located in different ranges of the district and contain immense bodies of ore of both hard and soft varieties. To meet existing demands for ore, every mine of the district had to) be worked to its full capacity and the resources of the region drawn upon more heavily than ever before.

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. On such stock an annual bonus of 5 per cent in addition to the regular dividend is paid for a period of five years to such employes as remain in the company's employ. The corporation offered employes 25,000 shares of preferred stock a short time ago an a basis of $87.50 per share. The amount was largely over-subscribed. Employes of the U. S. Steel Corporation who hold stock subscribed for under the profit sharing plan of 1903 were notified that they will receive an extra dividend of 65.4 per cent on their stock. The policy of sharing profits with employes was adopted in 1903 and has been extended gradually as its favorable periods have been recognized. It scarcely needs argument that the relation between the employer and employee are made more cordial and permanent if the latter feels that he has a direct interest in making the business as large and as profitable as possible. That the idea is met with favor is evident by the alacrity with which the employes have availed themselves of the privilege. Last year 12,256 employees subscribed for 2,400,000 worth of its preferred stock at par.

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

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

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

LAKE SUPERIOR IRON COMPANY.

This group of mines forming this organization consist of the Hard Ore, Hematite, Section 16 and Section 21. The company ranks among the best known and most successful iron ore producing concerns operating in the Lake Superior Iron region. It was first organized in March, 1853 and stands credited with having produced 14,617,737 tons of iron ore. Quite a substantial output and represents big values. The mines have been operated with distinct skill and the success achieved practically tells the whole story. From time to time an army of men have been employed at good average wages, which are invariably paid as soon as due. During 1907 the average number of men employed was 900 and the amount of ore produced 527,775 tons as compared with 742,427 tons for the previous year and 1,025 men employed. For holding up ground and making the underground department safe for working in, 834,000 lineal feet of Lagging and 662,000 feet B. M. Stull timber were used in the mines. No reasonable amount of money is spared for making the mines as safe as possible and comfortable for working in.

HARD ORE MINE.

This mine is located in the N. ½ and the S. E. ¼ Section 9 and the N. ½ of the S. W. ¼ Section 10, Town 47, Range 27, just south of the town of Ishpeming on a line of the C. & N. W. Railway. Ishpeming is a pretty town with about 12,000 inhabitants. Hard Ore mine is opened

and developed through three working shafts. Dimensions: No. 6 shaft, 8x10 feet and 840 feet deep; No. 2 shaft, 7x9 feet and 720 feet deep; No. 7 shaft, 15½x6¼ feet and 920 feet deep. Skips operate singly and lift 2.5 tons of ore to a trip. All told, 19 levels are extended from shafts and the product of ore is recovered from No. 2 shaft, 6th level; No. 6 shaft, 7th and 9th levels and No. 7 shaft, 8th, 9th, 10th, 18th and 19th levels. 200 men are employed. In 1907, a new engine house was built to handle man cage at No. 6 shaft.

Shafts generally are sunk in the footwall side of the ore bodies and the product recovered through a series of crosscuts driven from the shaft stations or levels. Operated in that manner, shafts are hardly ever disturbed and last as long as the mine. And when any particular place has been exhausted of ore, the walls may come together and fill up the openings or stand up, so far as the management is concerned, as they can in no way interfere with the future work. Underground openings are developed on practical lines and operated on modern methods of mining. Shafts are connected at different levels, which ventilate the workings and keep them airy, cool and comparatively comfortable for doing all underground work. Levels in turn are connected by raises or winzes making a complete network of openings. Future requirements are anticipated and provided for well in advance. The ore body mined is substantial and continuous and so far as appearances go, good for years ahead at the present rate of production. The "stoping" method is used for taking out the product. The work is readily and economically performed. Compressed air for operating machine drills, etc., is supplied from Section 16 mine.

Mechanical equipment is modern, highly efficient and generally adequate for requirements. Machinery buildings are substantial and well located. Equipment includes one 24x48 inch simple duplex Brown hoisting engine, geared motion, operating 4x12 foot drums 6-foot face grooved for 1¼ inch rope, built by Webster, Camp & Lane. Hoists from No. 2 Hematite shaft skip and Hard Ore No. 6 shaft and Hard Ore No. 7 shaft, one 22x36-inch reversible simple slide valve Hoisting Engine geared to two 8-foot drums, 4-foot face, grooved for 1¼ inch rope. Engine built by Iron Bay Mfg. Co., drums by Webster, Camp & Lane, hoists from Hard Ore, No. 2 shaft and No. 2 Hematite Cage. One 72-inch by 18-foot return tubular boiler. Three 72-inch by 15-foot return tubular boilers. A complete main and auxiliary pumping plant underground. The plant is practically complete, in good running order and economically operated.

Mining Captain, John McEncore.

HEMATITE MINE.

The Hematite is located in Section 10, Town 47, Range 27 with 80 acres of land and directly south of Ishpeming. Mine is opened and developed through two working shafts substantially constructed and in first-class running order. No. 2 shaft is 7x14 feet in dimensions and 570 feet deep. No. 3 shaft is 5x7 feet 6 inches in dimensions and 190 feet deep. Two compartments are used for hoisting ore, etc., the third for ladder-way and pumping outfit. Men are lowered in and lifted out of the mine workings with cage operated with Hard Ore hoist. About 300 men are employed and compressed air for operating machine drills are supplied from Section 16 compressor. There is considerable development work going ahead on this property and three levels are being extended from shaft to ore body. Work is conducted vigorously and in up-to-date methods. Ore body is substantial and contains some fine blocks of ground opened up in systematic order. Underground openings are connected in different places and air circulates freely through them. This is a comfortable mine and men like to work in it. The product is taken out by means of the "caving" system, which answers admirably for the ore deposit mined. The product is taken from the 570-foot level and also the 190-foot level; and developing work and opening up fresh reserves of ore is conducted on the 190-foot level of No. 3 shaft.

Management aims to get out the best there is in the property and progress has been substantial. The ore mined runs about 62.50 per cent iron and less. Bessemer and Non-Bessemer comes out. Mine is in a prosperous condition and looks well. Its future outlook is very promising. For amount of timber consumed annually and product of ore, see Lake Superior Iron Company. The product of this mine is lifted with Hard Ore hoists. Its equipment includes workshops, substantial mine buildings, well situated for the best results, besides a complete main and auxiliary pumping outfit and supplementary additions adequate for requirements.

Mining Captain, Joseph Hodgson.

SECTION 16.

Lake Superior Section 16 adjoins Pittsburg and Lake Angeline on the east and lies in the S. E. ¼ of the S. E. ¼ Section 9, N. E. ¼ of N. E. ¼ Section 16 in Town 47, Range 27 and consist of 80 acres of land. Mine location is just south of Ishpeming. On an average 290 men are employed.

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

Completed improvements for the last year included a new boiler-house with four 72x18 feet return tubular boilers, a new Tile Stack and Electric Light and Haulage, and changing hoisting shaft to permit the use of standard

skips and cages. The amount of timber used in this mine and the product recovered are included in the Lake Superior Iron Company's statement. Underground openings are in good shape and the physical condition of the mine is first-rate. Ore body is opened up well ahead and apparently good for years to come. Drifts are going forward and the usual amount of ground is being opened up in accordance with the policy of the management. Underground openings are connected at various points and well vetilated. The "stoping" method is used for taking out the product and it seems just the thing for the ore deposit mined. Men are distributed to the best advantage for general results. No money or effort is spared to make the mine safe and comfortable and every department seems to be running to perfection. Opening work is conducted with a view to getting the best results and the progress has been substantial. Compressed air for Hard Ore and Hematite are supplied from compressor located on this property. The product is trammed by hand labor and mules. Mechanical equipment is of the best, powerful, practical, highly efficient and economical. Machinery buildings are substantial and arranged for the best service. Equipment includes one 24x48-inch single Corliss Hoisting Engine geared to one drum to feet in diameter, 8 ft. 9 in. face, grooved for 1⅜ in. rope. Engine built by E. P. Allis Co., Drums built by Webster, Camp & Lane. Hoist in balance. One Duplex compressor, 26 in., and 42x48 in. cross compound Corliss Engine 25½ in. and 40x48 in. two stage air cylinders. Engine built by Rand Drill Co., air cylinders by Nordberg Mfg. Co. furnishes air for Section 16, Hard Ore and Hematite Mines. Average number of drills operated, 80. Four 72 in. by 15 ft. return tubular tubular boilers furnish power for operating the machinery. A complete main and auxiliary pumping plant underground and supplementary additions and fittings adequate for requirement complete the equipment.

Joseph Hodgson, Mining Captain.

SECTION 21 MINE.

This mine is operated by the Oliver Iron Mining Company.

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

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

The average number of men employed during 1907 was 200 to April and 70 for the balance of the year. The ore body mined is a soft and medium hard Hematite running 58 per cent Iron and less, Non-Bessemer. Two shafts are in operation. East shaft, 8x18 and West shaft, 7x12 feet in dimensions. Four tons are hoisted to a trip and skips operate in balance at the East shaft and singly at the West shaft. East shaft is 760 feet deep and West shaft 700 feet deep. Six levels are extended and the product is being taken from the 700 feet and 760 feet levels in the East shaft and 580 feet and 640 feet levels in the West shafts. Tram-cars are operated by hand labor and mule power, and the method in vogue for taking out the product is "caving and stoping."

Additions made and improvements completed during 1907 is as follows: Boiler house with battery of five 72 in. by 18 feet Return Tubular boilers; Tile Chimney; Change House with metal lockers, shower baths, etc.; Change of pumping station from East to West shaft.

HARTFORD MINE.

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

In 1907 the company employed 250 men, operated 20 power drills and produced 333,839 tons as compared with 336,856 tons produced the previous year. Total shipments to date are 1,266,377 tons. Ore runs about 58 per cent iron and less Non-Bessemer.

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 in 5x15 feet in dimensions and 975 feet deep. Underground openings are developed on up-to-date methods. Future requirements are anticipated and planned well in advance of actual necessities. Ore bodies are opened up and blocked out in the best way for bringing the best results and form some fine stopes of ground. Levels are connected at various points and producing places well ventilated. The mine is well managed and seems to be in a prosperous condition. The "sloping" system is in use for taking out the product. Product now comes from the 650, 750 and 825 foot levels. In all, 5 drifts are extended from shafts. Every effort is made to keep the mine in safe condition and comfortable for working in. About 300 men are employed on the average and a 25-drill capacity air compressor operated. Operations are conducted economically and order prevails everywhere. Mechanical equipment is in good running order, well adapted for the work and adequate for requirements. Skips counter-balance in shaft and dump automatically carrying 5½ tons to a trip.

Equipment embraces: One pair 24x48 in. reversible duplex first motion Corliss hoisting engines operating one 9-foot drum, face 130 inches, grooved for 1⅜ in. rope. Built by Bullock Mfg. Co.; one Duplex compressor 16x30x36 in. Compound Corliss engine 17½x28x36, two stage air cylinders; four 72 in. by 18 feet return

tubular boilers furnish steam to operate plant. Equipment is very complete, up-to-date, adequate for requirements and running apparently to perfection.

Mining Captain, Elijah Toms.

REGENT GROUP OF MINES.

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

The ore mined in this property is Soft Hematite, Non-Bessemer and running 60 per cent iron or less. In 1907 the company employed 340 men operated 25 power drills and produced 323,004 tons of ore. Total shipment to date 2,857,364 tons of ore. The Prince of Wales product of ore is included in this also. Product of ore is recovered on the 740 and 895 foot levels.

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

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

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

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

Richard Roberts, Mining Captain.

PRINCE OF WALES.

This is a development proposition located in the N. E. ¼ of S. W. ¼ Section 5, Town 47, Range 26, with about 64 acres of land. Average number of men employed during 1907 was 15. Property is being developed through one shaft 6x16 feet in dimensions, 3 compartment and 610 feet deep. Output of ore is included in the shipments made by the Blue or Queen Group of mines.

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

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

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

CHAMPION MINE.

This property is located near the town of Champion in Section 31, Town 48, Range 29, with realty holdings of 18,000 acres of land. It is among the oldest iron mines in the Lake Superior region, having been in operation off and on since 1868. Ore produced is Bessemer and Non-Bessemer and runs 64 per cent iron and less. During 1907 the mine employed 180 men and produced 108,949 tons of ore. Underground operations are conducted through two working shafts Nos. 5 and 7. No. 5 is vertical 9x18 feet, three compartment and 2,070 feet deep. No. 7 has the same dimensions as No. 5 and is 1,920 feet deep. In all, 34 levels have been extended from shaft and at the present time, product is taken from the 19th and 31st levels. Since the beginning of operations the mine is credited with a total output of 4,486,419 tons of ore. 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 "underhand and milling" method is in use for taking out the product and in mine work last year 14,000 feet B. M. timber was used for shaft work. Operations are conducted economically and order and system prevails in every department of the mine. Skips carry four tons to a trip and dump automatically in ore cars.

Champion has fine equipment. Buildings are substantial and conveniently located for service required. Machinery is of the best, powerful and adequate for requirements. Machinery has recently been overhauled

and put in thorough order and it now stands ready to have the steam turned on at a minute's notice.

Mining Captain, Chas. Champion.

THE CLEVELAND-CLIFFS IRON MINING CO.

The Cleveland-Cliffs company forms one of the largest and most important iron ore mining producing organizations in the state, with works scattered and varied and its record for up-to-date progressive mining and business methods stand among the highest in the land. Although, under titles somewhat modified, this company has been in aggressive and successful operation in the Lake Superior iron region for upwards of fifty years. 1907 was its banner year in Michigan. Within this state, during the year under review, this excellent, enterprising company worked a dozen mines, on a shipping basis, and produced 2,231,009 tons of commercial iron ore. Any company may justly be proud of such an achievement. But for a shortage of desirable men during the early part of the season, this record output would have been distinctly eclipsed. Most of the mines are substantial and lasting, and have solid merit. They are opened up, developed and worked on the latest and most approved methods of modern mining with large reserves of ore block outs for economical extraction; are splendidly equipped with mechanical plants including electric appliances of great power and efficiency and managed, practically, to perfection. They form the finest kind of business enterprises, develop the resources of the region and contribute in a substantial way to growth, prosperity and wealth of the state and of the nation. Power-houses are imposing structures built in many instances of stone and brick or both and also steel. Besides working the shipping mines, the company is exploring, opening up and developing new properties of promise and which may form in the years to come substantial, profitable mines. Moreover, the company operates blast furnaces, turning out pig iron and other industries scattered over the Upper Peninsula of Michigan. The combined works employ a little army of men. All employees earn good wages and receives 100 cents on the dollar every 30 days. The mines are ably and vigorously operated and for the best interest of the company. Order and system is kept well in the foreground and the business affairs of the mines are transacted with precision and exactness. The ore bodies developed and available for production are sufficient to last for years to come and the physical condition of the various mines was never better than at the present time, nor did the future outlook for them ever look better.

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

The demand for iron ore during 1906 was continuous and the Cleveland-Cliffs Company, with others, had a very prosperous year. Officers of the company are: President, W. G. Mather; vice-president, J. H. Wade; auditor, R. C. Mann; secretary, J. H. Sheadle; treasurer, W. G. Mather; main office, Cleveland, Ohio; mine office, Ishpeming, Mich.; mine agent, M. M. Duncan; mine auditor, A. J. Yungbluth; mining captain, J. H. Rowe; engineer, J. E. Jopling.

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

Lake Shaft Mine	556,573
Cliff Shaft Mine	291,222
Negaunee Mine	308,104
Maas Mine	33,632
Princeton Mine	175,303
Moro Mine	79,807
Austin Mine	193,494
Salisbury Mine	131,485
Stephenson Mine	10,161
Imperial Mine	84,406
North Jackson Mine	61,345
Ashland Mine	305,477
Total	2,231,009

LAKE SHAFT MINE.

This remarkable mine had another successful year in 1907 and produced 556,573 tons of ore as compared with 567,904 tons for the previous season. Since the beginning of shipments, the mine has yielded millions of tons of good grade ore and is apparently good for millions more. The mine is located within the limits of the town of Ishpeming and lies under the bottom of old Lake Angeline in Section 10, Town 47, Range 27. Ore mined is a soft Hematite enclosed between walls of diorite running nearly due east and west. Analysis of ore: Lake Bessemer Iron 62.50 per cent; Phosphorus, .048; Lake Iron 60 per cent. Ore body is substantial and strong and looks well. Its lines of demarkation are clear and distinct. In 1907 there were employed in this mine 409 men on an average and 10 power drills were operated. The "caving" system is used for taking out the product and it works admirably. Mine is opened and

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

CLIFF SHAFT MINE.

This mine lies just west of the town of Ishpeming in Section 9, Town 47, Range 27 and forms a substantial, prosperous mine with a fine record. It is claimed to be a comfortable mine, well ventilated, and men like to work in it. 340 men were employed in 1907 and the output of ore was 291,222 tons as compared with 269,845 the previous year and 230,915 in 1905. The comparison presents a substantial, steady gain and indicates that the property must be in first-class physical condition. On an average, 39 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 62 per cent; Crushed 61 per cent. Underground operations and conducted through two shafts known at "A" shaft and "B" shaft each 10x14 feet inside measurement "A" shaft is 693 feet deep. During 1907 "B" shaft was sunk from the 9th to 10th level and is now 738 feet. Two cages operated in balance are lifted at once, each carrying two tons of ore, making four tons of ore hoisted to a trip. Speed, 800 feet per minute. Underground department is in fine condition and looks well. Operations are practical and up-to-date. Work is dispatched in the best way for bringing the most satisfactory results. Tramming is done by hand labor and mules. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically done. Mechanical equipment is in good running order and includes hoisting plants, a 50-drill Nordberg air compressor plant, pumping outfit workshops conveniently located and supplementary appliances adequate for requirements. Superintendent, W. W. Graff; Captain, James Stephens; Engineer, M. H. Barber; Clerk, J. F. Vanbrocklin.

NEGAUNEE MINE.

The Negaunee is nicely situated just east of the town of Negaunee in Section 5, Town 48, Range 26. For years the mine has been a substantial producer and stands credited with having shipped since the commencement of operations with over three millions of tons ore. In 1907 the output of ore was 308,104 tons as against 249,403 for the previous season and 242,617 tons for 1905. Like most of the other mines of this competent management, the comparison presents a healthy growth and goes to show that the physical condition of the property is steadily improving. 419 men were employed during 1907 and 10 power drills were operated. Ore mined is a Soft Hematite. Analysis: Bessemer 60 per cent Iron; .058 Phosphorus; Negaunee 59 per cent. Underground operations are conducted through two shafts: No. 1 is cage shaft, 8x8 feet in dimensions, and 620 feet deep. No. 2 is a hoisting shaft 8x16 feet in dimensions, three compartment and 750 feet deep. Skips operate in balance carrying three tons to a trip. Daily capacity of the mine is 100 tons ore. Ventilation is fine. No. 1 and No. 2 are connected and these are connected with the Maas shaft. The "caving" system is used for taking out the product and it works well. No reasonable expense is spared to make the mine safe and comfortable for working in. 1907 over 500,000 feet of timber, board measure, was used for supporting and holding up ground. Underground tramming is done by an "electric haulage" system, which renders first class service and is highly appreciated by the trammers. It is a big improvement over the old method of pushing cars. Surface equipment is ample for requirements and embrace "geared hoists" with two shafts in No. 2 shaft, cage in No. 1, 12-dnll capacity compressor and the usual mine buildings and appliances that go to complete a well-appointed mining plant.

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

PRINCETON MINE.

Princeton is located at the town of Princeton and adjoins the Austin mine on the North. It is a substantial mine with solid merit and on the way to bigger and better results, than the management has so far succeeded in obtaining. 217 men were employed during 1907 and 8 power drills were operated. The product of ore was 175,303 tons. Only for a shortage of desirable men, a larger tonnage would have been recovered. The 1906 product was 178,524 tons and that of 1905, 59,667. The mine is opened up and developed according to the latest and most approved methods of modern mining. Ore product is a Soft Hematite running 59 per cent Iron for

Princeton and 59.70 per cent Iron for Cambridge. Mine is opened and worked through two fine shafts each 6x16 feet in dimensions and three compartment. No. 1 is 380 feet deep. No. 2 is 390 feet deep. Skips operate in balance and tram cars are run by hand labor. Ventilation is good. The "caving" system is in use for taking" out tire product and the underground department as well as other parts of the mine is in first-rate physical condition. Ore body is substantial and apparently good for the present output for considerable time in the future. Last year 299,726 feet, board measure, of timber was used in the mine for holding up the ground and making the works safe and secure for the men. Mine equipment is up-to-date, efficient and in good running order. It embraces a Sullivan Straight Line lo-drill capacity air compressor, a two drum hoisting engine, single drum reversable geared hoisting engine and supplementary appliances adequate for requirements.

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

AUSTIN MINE.

This property is located at Princeton and adjoins the Princeton. It is practically a young mine of solid merit and forms a fine business enterprise. 190 men were employed in 1907 and the output of ore 193,494 tons as against. 166,145 for the previous season and 61,813 in 1905. This shows a healthy growth and indicates excellent progress. The physical condition of the mine is broadening out and steadily improving. Three power drills are operated and the "caving" system is in use for recovering the product of ore. Underground openings are developed on the latest and most approved methods for working an iron ore mine and substantial progress has been made all over the property. Nothing seems to be neglected. Future requirements are anticipated. Analysis of ore mined: Bessemer Iron 63 per cent; Phosphorus .60 per cent; Austin Iron 61.50 per cent. Mine, is opened and developed through one shaft, 10 feet 8 inches by 11 feet 4 inches in dimensions and 338 feet deep. Skips operate singly and carry two tons to a trip. No ordinary expense is spared to make the underground department safe and comfortable for working in. The mine is in a prosperous condition and good things are predicted for it.

Tramming is done by, hand labor. Trams dump directly into skips which are hoisted to surface and in turn dumped in ore cars and the load transferred to the stockpile. The work is readily and economically done. Mechanical equipment is in good running order and includes hoisting plants, an air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements.

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

MORO MINE.

This mine lies in Section 10, Town 47, Range 27 and is situated just east of Ishpeming and is quite a uniform, substantial -producer. In 1907, there were employed 123 men with 14 power drills in operation. The product of ore amounted to 79,807 as against 74,932 shipped the previous season. Daily capacity of the mine is about 269 tons ore. It is opened and developed through one large shaft substantial in construction and 812 feet deep. Shaft is 10x15 feet in dimensions and double compartment. Ore produced is a Red Specular. Analysis, Scotch, 61.70 per cent Iron. Ore bodies are large and apparently good for a considerable time ahead. The product is recovered on the "breast, back and underhand stoping" systems. The mine is developed on practical lines and its physical condition is first-rate. The amount of ore hoisted to a trip is 1¾ tons and skips operate singly. The property is ably and skillfully managed and for the best interest of the company and its future well-being. Tramming is done by hand labor. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically operated. Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most business-like way. Mechanical equipment is in good running order, and includes hoisting plants, a Nordberg 50-drill capacity air compressor plant, pumping outfit workshops conveniently located and supplementary appliances adequate for requirements.

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

SALISBURY MINE.

This mine is located about a mile and one-half south of Ishpeming in Section 15, Town 47, Range 27, and forms one of the best known iron properties in the Marquette range. It has been profitably operated for many years and forms a fine business enterprise. It is worked on up-to-date methods and every department is running satisfactorily. In 1907, there were employed on an average, 163 men 4 power drills were operated and 131,485 tons of ore produced as compared with 147,417 tons for the previous year. The ore mined is a soft Hematite running 60 per cent Iron for Salisbury and 61 per cent Iron for Clifton. Product is recovered through one shaft, 7x20 feet inside measurement and 1,170 feet deep. Skips operate singly and dump automatically in cars, which carry two tons to a trip.

The property is opened up and mined on the most practical way for bringing the best results. Progress has been continuous, substantial and of the right kind.

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

Mechanical equipment is of the best, in good running order and includes a 16-drill capacity air compressor plant, Webster Camp & Lane second motion hoist and supplementary additions, workshops, etc., for doing mine work. Everything in and about the mine runs satisfactory.

Mining captain, James Mathews; engineer, M. H. Barber; clerk, W M. Sterling. Postoffice address, Ishpeming, Mich.

MAAS MINE.

While this mine has now reached the distinction of being a producer of ore, it is still a development proposition. It has a fine future outlook and promises to form a fine substantial mine and a first-class business enterprise. Its first accredited output of ore was made last year and amounted to 33,632 tons. Quite a substantial product for a beginner and certainly a good showing. The property is located northeast of the town of Negaunee in Section 6, Town 47, Range 26. Underground openings in the Maas are connected with those of the Negaunee mine, which helps ventilation for both properties and should prove a very good convenience in case of any emergency. 125 men are employed and 9 power drills are operated. Underground work is conducted through one fine shaft, 8x12 feet in dimensions and 1,150 feet deep. Ore mined is a soft Hematite. Skips operate in balance and lift 3 tons to a trip. Tram cars are run by an electric haulage system.

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

STEPHENSON MINE.

Although this mine made a small product during 1907, it is still claimed among the development properties. The amount of ore produced was 10,161 tons, which is very good for a beginner. 67 men were employed and 5 machine drills operated. The mine is worked through out shaft, 10 feet, 10 inches by 14 feet, 10 inches inside measurement, 3 compartment and 459 feet deep.

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

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

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

NORTH JACKSON MINE.

This is an old poineer mine and bears the honor of being the first iron ore property opened and worked in the entire Iron Range of the Lake Superior district From its ores was manufactured the first iron and steel produced in the state and on the lands that now form the company's property the first iron ore deposit, of which there is no record, was discovered. That discovery led to others of vast importance and the good work continued until the Lake Superior district has become the most notable iron ore producing spot on the globe.

North Jackson adjoins the Negaunee on the west and really forms a part of the City. 73 men were employed at this property in 1907, three power drills in operation and 61,345 tons of ore shipped. Ore produced is Red Specular running 54.00 per cent Iron. The property is an Open Pit proposition with double skip road laid on face of the pit. Present workings are about 100 feet deep. Equipment is limited in size, but efficient and in good running order. It embraces an 18x30x30 in. Corliss-Compound Air Compressor and one small hoist built by the Lake Shore Engine Works. A 750 ft. Trestle and endless rope tramming system to transfer the ore from pit to pocket on the L. S. & I. Railway.

S. R. Elliott, supenintendent; Wm. Penglase, mining captain; John Mitchell, clerk.

SOUTH JACKSON MINE.

This mine, described in previous report was idle during 1907.

IMPERIAL MINE.

This mine is situated near Michigamme, Mich., and although a producer of ore for years, it is an irregular shipper. The ore body mined is a brown Hematite running 54.00 per cent Iron. In 1907, the mine employed 115 men, operated 10 machine drills and produced 84,406 tons of ore. Previous to 1907, the property stands credited with total shipments of 157,226 tons of ore. Underground work is conducted through two shafts, each 8x10 feet in dimensions and known as East shaft and West shaft. East shaft is 300 feet deep. West shaft is 325 feet deep. The "caving" system is used for recovering the product and the physical condition of the property is being modified and materially improved. It is operated on practical lines and just right for getting the best all-around results. Shaft was sunk 14½ deeper during 1907. Daily capacity is about 280 tons of ore, 64,273 feet of timber, board measure, were used for mining purposes last year. Considerable re-construction work was done and the position of the mine strengthened. Skips operate singly and carry 2 tons to a trip.

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

Mining captain, John H. Dunstan; clerk, S. T. McKercher.

SMITH MINE.

This is a development proposition located at Princeton and has attracted a good deal of attention all over the Iron region. Up to the present time the work at the property is confined to sinking one fine shaft through the overburden of water, quicksand and gravel, which is most difficult to pass through successfully. The shaft is 14 ft, 4 in. by 18 ft. 4 in. at surface and 10 ft. 10 in. by 14 ft. 10 in. inside at junction with the ledge. Shaft is 62 feet deep and solidly connected with the ledge. From surface to ledge, it is concreted throughout. Concrete is 3 feet thick, reinforced by steel bars set horizontally and perpendicularly six inches apart. Shaft is perfectly dry, as no water entered it while work was going on. Smith mine is an interesting property, believed to contain important values and to form the making of a fine mine. Despite the fact that water is reached within a few feet of surface at the Smith shaft will not be wet, as the concrete walls are so thick and well constructed that it will be impossible for water to work through.

August Gogerberg, Mining Captain.

OGDEN MINE.

Ogden lies south of Negaunee in Town 47, Range 27, and is an open pit mine producing a Hard Hematite ore. Mine was idle during 1907. Postoffice address, Ishpeming, Mich.

LUCY MINE.

This is a Negaunee property and was idle during 1907.

BARON MINE.

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

PITTSBURG & LAKE ANGELINE MINE.

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

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

In 1907 the average number of men employed for both the East End and Old mines was about 450. For both mines, shipments of ore amounted to 283,373 tons as compared with 269,116 tons for the previous year. The mine is operated through one main shaft 700 feet deep and a sub-shaft 290 feet deep. The average length of openings in ore body vary from 1 to 300 feet and one level is being- extended from shaft. Ore product comes from different levels and is mined on the "top-slicing" method which works admirably. Shafts are connected at various 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 answers admirably for the work and much appreciated by the men. Skips operate in balance, carry 2½ tons to a trip and dump automatically in cars.

The mine plant is efficient and powerful, in good running order and adequate for requirements. Mine buildings and power houses are substantial and well located for direct service. It includes a 25-drill capacity Rand compressor, two Corliss and one Westinghouse engine, besides well equipped shops and supplementary appliances that go to fill in arid round out a complete plant. I visited the property in 1907.

PITTSBURG & LAKE ANGELINE—2.

For many years the property has been a substantial producer, a fine business enterprise, developing the resources of the region and contributing in no uncertain way to its natural growth and prosperity. The property is ably and skillfully managed and for the best interests of the company and its future well being. From time to time, big sums of money have been spent in sinking shafts, driving levels, developing ore bodies and providing powerful mine plants for dispatching work in an efficient and economical manner.

Thomas Walters, general manager; W. H. Tregambo, mining captain; G. R. Persons, chief clerk; Rudolph Erickson, engineer.

Postoffice address, Ishpeming, Mich.

ROLLING MILL MINE.

This mine is operated by Jones & McLaughlin Ore Company.

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

The property is situated in Town 47, Range 26 and consists of 80 acres of land. The mine practically forms a part of the town of Negaunee and contributes in a substantial way to its support. Ore shipments amounted to 49,204 tons. The ore body mined is a brown Hematite. Property is a development proposition with bright prospects for forming a substantial mine and a first-class business enterprise. It is now sending out a considerable product. Operations are conducted through one shaft, 10 by 12 feet within timbers and 645 feet deep. Skips are operated singly and carry 2½ tons to a trip.

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

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

The property is in good condition, well worked and the management aims to work it the best way for bringing the best results. There has just been completed at this property, one of the most modern and best arranged changing houses on the Marquette range. It is a two-story structure of brick, equipped with steel lockers, baths and all conveniences and it will accommodate 400 men. A force of 150 miners has been employed, but now that the "dry" is finished more men will be taken on as fast as they can be secured. The mine is equipped to get out a much larger production than has been obtained up to the present time. One of the latest improved Prescott triple expansion pumps has been ordered and it is expected to arrive very shortly. It will have a capacity of 700 gallons per minute.

REPUBLIC IRON & STEEL CO.

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

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

CAMBRIA.

This mine lies just east of the Lillie mine and carries a continuation of the ore measures of the latter property. During 1907, about 110 men were employed and an output of 93,650 tons of ore were shipped. The mine has been a substantial producer with a good record. Since the commencement of operations, it stands credited with total shipments of 1,659,082 tons of ore. Ore runs about 59 per cent metallic iron. Mine is operated through one shaft, 6x10 feet in dimensions and 825 feet deep. All told, 13 levels are extended from shaft and the product is recovered from the 11th, 12th, and 13th levels. Ore is hoisted in skips carrying 1⅔ tons to a trip operating singly. Daily capacity of the mine is about 600 tons. A Rand compressor, 20 drills, is operated and tram-cars are operated by hand labor.

Method in vogue for taking out the product is "top-slicing" system, which is among the safest and most economical methods in use. 15,000 feet of timber are consumed annually in the mine work. Face of openings are in ore of good quality and deposit looks strong and continuous. Bodies of ore are opened up on different levels that will last for some time to come and the deepest points penetrated look as well as any place in the mine. From time to time, con-ciderable sums of money have been spent in strengthening the position of the mine and the success achieved has been, upon the whole, satisfactory. The management aims to get out the best there is in the property and development continues on a vigorous scale. Mine looks good for a substantial product for many years in the future. Equipment is good for present requirements and in first-class running order. The property is well managed and for the best interests of the company.

LILLIE MINE.

The Lillie mine adjoins the Cambria mine and lies in Section 35, Town 48, Range 27. It has been a substantial producer and looks good for many years to come. Officers of the Cambria are also in charge here. During 1906 the mine employed 50 men and produced 27,890 tons of ore. Ore runs 60 per cent iron and .080 per cent phosphorus. Ore bodies developed are large and substantial and look fairly well. Mine is opened upon practical lines and the work of taking out the product is conducted in the best way for getting the best results. Product is trammed by hand labor, dumped in skips and hoisted to surface. Underground operations are carried on through one shaft, 6x8 feet in dimensions and 900 feet deep. Levels are connected at different points, and men may go from place to place whenever they desire or in cases of emergency. Ventilation is good and workings are comparatively comfortable. Equipment is efficient, in good working condition and capable of doing the work of the mine. Total output of ore previous to 1907, credited to the Lillie mine, is 1,609,956 tons.

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

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

REPUBLIC MINES.

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

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

The mines are located in Section 7, Town 46 North, Range 29 West in the town of Republic. In 1907 the mine employed 475 men, operated 40 power drills and including West Republic's output, produced 173,000 tons of ore. West Republic employed from 25 to 30 men, operated four power drills and produced 7,450 tons ore. Total output of the two mines since the beginning of the shipments, 5,956,324 tons ore. The ore deposit mined is a hard Specular and Magnetic mineral running, iron 61.66 per cent; phosphorus, .052-.039 per cent. The deposit looks well and promises to hold out for some time to come. The company is operated through two shafts working both singly and in balance carrying three tons to a trip. No. 8 being two-compartment and 1,150 feet deep. No. 9, vertical, three-compartment, and 1,665 feet deep. Pascoe shaft is incline, angle 45 degrees from vrtical with skips working in balance, two compartment and 2,800 feet deep. West Republic is operated through one shaft, 800 feet deep with skips operated singly and carrying about two tons ore to a trip. These mines were operated very ably and results accomplished are of the best. Republic is a substantial mine and maintained in fine physical condition. No reasonable expense is spared in making every department safe and comfortable for men and all work is conducted practically to perfection.

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

WEST REPUBLIC MINE.

This mine is operated by the Republic Iron Company. The average number of men employed during 1907 was from 25 to 30 and four power drills in operation. The ore bodies are small and irregular in shape running Iron, 62.00 per cent; phosphorus, .050 per cent. The mine 4s operated through one shaft, single compartment, carrying 1.7 tons to a trip. Depth of the shaft, 800 feet. Daily capacity of the mine is about 20 tons. The number of tons of ore produced in 1907 Is 7,400. Future prospects are poor. Tram-cars are operated by hand

labor and the "back-stoping" system is used for taking out the product. Mine ventilation is good.

EMPIRE.

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

This is a new mine and made its first shipments of ore in 1907, which amounted to 40,535 tons. During 1907, an average force of 25 men were employed and 10 power drills were operated. Besides sending out a product of ore, the management is opening up and developing the mine for bigger and better results. People behind the enterprise know the business and are conducting operations so as to operate the mine economically and produce ore at a minimum cost. Progress has been continuous and substantial from the start. The ore body mined is Hematite. The deposit is known to be large, but rather lean, as no hanging wall has been reached up to the first of the present year. Ore runs about 44 per cent metallic iron and .060 per cent phosphorus. Mine is opened by one large substantial shaft, 6x12 feet in dimensions and 105 feet deep. Opening work during 1907 included driving 200 feet of levels and 300 feet of crosscuts. Product comes from one level with the opening extending in ore 300 feet in length. Drifting, cross-cutting and opening up new ground for future needs continue vigorously. The future prospects of the property are reported good. The "milling" system is used for recovering the product. It answers well and requires but little timber. Skips operate singly and dump automatically in ore cars. The physical condition of the mine shows steady improvement. There is every indication that Empire will be developed into a big producer. The mechanical plant is new, up-to-date, of the best and doing first-class duty. It includes: Two Milwaukee 150 h. p. 150-pounds pressure Horizontal Tubular Boilers; one Double Cylinder Double Drum Hoist; 15x20 engines; one Sullivan Corliss Compressor; No. 6 Gates Crusher and one Belt Conveyor.

This mine was entirely equipped during 1907. The above machinery was purchased and installed and a new shaft house, conveyor and ore pocket boiler and engine house, 50x90 feet, a changing house, office and two dwellings were erected.

RICHMOND MINE.

This is an open pit and low grade ore proposition, there being no shafts. It is located just south of the town of Palmer in Town 47, Range 26, and consists of 40 acres of land. The average number of men employed during 1907 was 60 and the output of ore amounted to 35,156 tons. Since the beginning of operations the property is credited with ore shipments amounting to 534,895 tons. Progress has been substantial and operations are conducted in a practical way. The property is ably managed and opened up with a view of getting out the best there is in it in the best way. The ore, when mined, is loaded into small cars, and these cars are hauled out of the mines with horses and mules and the ore runs through a crusher and loaded into railroad cars. It is necessary to crush all the ore before shipment. The ore is mined at a cheap cost. The work of taking out the product is readily and economically performed and the mine is only in operation during the shipping season. Equipment now includes one Gates crusher and a Corliss engine.

General manager, J. R. Thompson, Ironwood, Mich.; captain, John Huhtala; chief clerk, B. C. Hayes. Postoffice address, Palmer, Marquette County, Michigan.

AMERICAN MINE.

This property is located northeast of Humboldt in Town 28 North and Range 48 West. General manager, J. R. Thompson, Ironwood, Mich. It is a development proposition with work well in hand and practically and economically operated.

In 1907, the mine produced while doing development work and general work also, 13,764 tons of ore. Ore produced is Hard Hematite. The mine is operated through one shaft, which was sunk 150 feet last year. Skips operate singly and carry 1½ tons of ore to a trip. Its daily capacity is about 150 tons. Development work underway consists of sinking the shaft deeper and drifting and opening up fresh reserves of ore for future requirements. After 1908, Boston mine with American will be known as one mine. The American is well managed and has a promising outlook.

Frank Platto is mining captain. Postoffice address, Ishpeming, Michigan.

BREITUNG HEMATITE NO. 2.

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

This is practically a new mine, having made its first shipment of ore in 1903. Previous to the present year, it stands credited with having produced a total output of 56,394 tons of ore. The work of opening up the property

and receiving the product is conducted on practical and systematic lines. Everything is modern and up-to-date. The "caving" system is used for taking out the product of ore and it answers first-rate for the mining of ore body contained in this property. The average number of men employed in 1907 was 140 and 8 power drills were operated. Product of ore was 87,404 tons. Ore body mined is a Hematite. Underground work is carried on through one big shaft 5x14 feet in dimensions, three-compartment and 247 feet deep. Opening up and developing new ground for future requirements continues in a vigorous manner. During 1907, there were 2,500 feet of drifting, 2,000 feet of crosscutting and 65 feet of shaft sinking done. This is the kind of work that counts and adds to the future worth and stability of the property. Mules are used for hauling tram-cars underground. Skips operate in balance, carry 1½ tons of ore to a trip and dump automatically. The product of ore comes from two levels while the third is being developed for future demands. Future needs are anticipated, provided for in season and the physical condition of the property shows steady improvement. Mine plant is efficient, running smoothly and doing first-rate duty. It includes air compressor, 150-horsepower boiler, a two-cylinder Sullivan geared hoist besides tools, buildings, etc., adequate for requirements.

STAR WEST.

This mine has been a small shipper of ore from time to time, but has not sent out a shipment for a number of years. It is now being opened up and put in shape for a fresh trial and its future prospects are fairly good. In 1907 twenty men were employed monthly and four machine drills were used in development work. It has one shaft 300 feet deep, with opening work going forward on the first level. Last year the shaft was sunk two feet and a considerable amount of new work was dispatched. Underground work is conducted on practical lines and general progress has been continuous. The property is getting in good condition for systematic operations on a creditable scale.

Mechanical equipment embraces a 10-drill Franklin Compressor, Morrison hoist, two tubular boilers and additional appliances for mine work. Everything is new and runs to perfection.

Star West is located at Palmer, Marquette County, in Town 47, Range 26 West, and has 160 acres of land.

Postoffice address of mine, Palmer, Mich.

This property is operated by Corrigan, McKinney & Company.

W. J. Richards, General Superintendent.

MENOMINEE RANGE.

Menominee Range, including the mines of Menominee and Iron Counties. Total number of men employed in and about the mines of these two counties during 1907 was 4844.

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

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

CHAPIN MINE.

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

In 1907 the Chapin employed 838 men, operated 60 machine drills and produced 795,376 tons of ore. Previous to the year under review, the total amount of ore shipped was 14,465,492 tons. The ore body mined is a Hematite, Analysis: Chapin-Iron 58.90; Phos. .065; Ajax-Iron 51.50; Phos. .060.

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

and water column in the shaft. The details of this pumping plant have been given in my previous reports.

The Chapin is very ably and skillfully managed, and results obtained are of the best. Ordor 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. Air circulates freely through connections and make practically every part of the workings comparatively comfortable for all engaged in the underground work. The product is recovered by the "caving" system, making* the mine secure against accidents and permitting the taking out of practically all the ore as the work proceeds. An electric haulage system is used for tramming the ore, which works to perfection. Twelve cars are considered a load for a motor, but at times as many as fifteen cars are hauled. Trams dump in pockets formed in the ends of shafts which in turn are emptied into skips. Each pocket holds just a skip load. An apron is adjusted to a pocket operated by a wheel. With a twist of the wheel, the pocket is emptied, the skip filled and is away towards the surface like the wind. The work is readily and economically done. Skips counter-balance in shafts, carry five tons to a trip and dump automatically. The usual number of openings are going forward and developing fresh reserves in accordance with the policy of the management. Location and works are lighted by electricity.

In 1907, for mining purposes 1,750,000 feet of timber B. M., were used in mine work.

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

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

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

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

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

ARAGON MINE.

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

Mining Captain, G. A. Alvar; engineer, G. A. Hellberg.

The average number of men employed during 1907 was 528 and 40 power drills were in operation. Ore produced is a Hematite. Analysis: Granada grade, iron 58.75 per cent, phosphorus, .062 per cent; Cadiz grade, iron 51.20 per cent, phosphorus 59 per cent.

The 1907 output of ore was 427,969 tons as compared with 416,215 tons for the previous year and 430,134 tons shipped in 1905. The mine is quite a uniform Producer and a very substantial property. Its ore deposits are large, continuous and appear good for some time to come. Descriptions of the mine appear in my previous reports and no material change was made in physical condition of the property during the year under review.

Mine is opened and developed through two working shafts, Nos. 4 and 5. No. 4 is 1,000 feet deep while No. 5 is 1,050 feet deep. Both shafts are in good running order, and substantial in every particular. Development work and general mining is conducted on practical lines and the product is taken out in the best way for the ore body mined. The "caving" system is used and answers well. It protects the mine from accidents and permits taking out practically all the ore body as the work proceeds. Levels are going forward in 2 shafts developing ore reserves with openings averaging 1,370 feet in length. Underground openings are extensive, forming quite a network and contain some fine stopes and every department, both underground and on surface, was running vigorously and order prevailed everywhere. Every effort is made to make the mine safe and up-to-date. About 600,000 feet of timber, board measure, is consumed annually in this mine. Tramming is done by pneumatic haulage. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load is transferred to the stockpile. The work is readily and economically done. Operations are conducted on practical lines and the management aims to get out the best there is in the property and in the most business-like way. Results accomplished have been fairly substantial and satisfactory. Mechanical equipment is of the best, in good running order and includes hoisting plants, an air compressor plant, pumping outfit, workshops conveniently located, and supplementary appliances adequate for requirements.

MANSFIELD MINE.

This mine is located in the village of Mansfield, Section 17, Town 43, Range 31 with 132 acres of land. Town is named after the mine, and of this it forms one of the main supports. Mansfield has been operated off and on for about a dozen years and just getting in shape for making a substantial product. In 1907 the number of men employed was 86 with 9 machine drills in operation. Ore product was 75,453. Total shipments previous to 1907, 802,280 tons of ore. The ore mined is Hematite yielding 58.65 per cent iron; phosphorus .105 per cent.

Daily capacity of the mine is about 600 tons. Product is recovered from the 12th level. Skips operate in balance and carry 3 tons to a trip. Mine is developed by means of one working shaft, three compartment, 16x7 feet in dimensions and 1,058 feet deep. Product is taken out on the "sliding system" and no timber is used, only for shaft repairs. Operations are conducted with marked ability and the mine is opened up on up-to-date methods. Underground openings are connected at various places and the workings are well ventilated. Development work and opening up. fresh reserves of ground for future needs goes forward steadily and eight levels averaging 1,240 feet in length are extended from shaft into the ore body mined. Openings are extensive and contain some good stopes of ore, but the mine has its limitations. Development work is continued in the most practical way for bringing the best results. Mine is ably managed and in a prosperous condition. Future outlook is fairly promising and bigger and better things are anticipated. Mechanical equipment is actuated by steam power. Tramming is done by hand labor and mule power. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is economically and readily done. Mechanical equipment is in good running order, and includes hoisting plants, an Ingersoll-Sargent 33-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements.

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

RIVERTON MINE.

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

In 1907, there were employed 135 men, 13 power drills were operated and the product of ore mined was 91,089 tons. Ore produced is a Hematite. Analysis: 57.00 per cent iron; .515 per cent phosphorus. Total shipments of ore previous to 1907 were 467,555 tons.

The underground developments are conducted through one main substantial shaft, 6x14 feet in dimensions and 485 feet deep. Operations are dispatched in the most practical way for bringing the best results and substantial progress has been made. Skips operate in balance and carry 2½ tons to a trip. Shaft sinking done during the year under review was 97 feet, drifting and crosscutting, 1,375 feet. Total opening work, 1,472 feet.

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

Tramming is done by hand labor. Trams dump directly in skips, which are hoisted to surface and in turn dump in ore cars and the 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 should be, in the main, satisfactory. Mechanical equipment is in good running order, and includes hoisting plants, a 24-drill Rand Compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements. Plant is in good running order and capable of doing practically any mine work.

THE PEWABIC COMPANY.

The Pewabic company is a Wisconsin corporation with its general financial offices located in Milwaukee. The general mine office is located at Iron Mountain, Mich. President, George Van Dyke. General manager, E. F. Brown; mining captain, Ed. J. Lord; chief clerk, W. G. Monroe; engineer, A. J. Myers.

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

percent iron and .010 per cent phosphorus; .38 per cent silica; Walpole 59 per cent iron and .120 per cent phosphorus.

The product of this mine for 1907 was 454,629 tons of ore as compared with 476,403 tons for the previous season. Since the beginning of production, the property stands credited with total shipments of 6,083,739 tons of ore. On the company's pay-roll, there are 523 names and during 1907, 31 power drills were operated. Besides taking out the product during the year under review, 964 feet of drifting and 416 feet of crosscutting were done for the purpose of opening up new ground and developing fresh reserves of ore for future requirements.

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. Mine product comes from the 1st, 4th, 5th, 6th and 7th levels and sinking No. 1 and No. 2 shafts are under-way. 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 to balance and dump automatically. Shafts generally are sunk in the foot-wall and connected with the ore bodies by cross cuts driven from different stations. Seven levels have been extended from shafts, and which are connected, makes air circulation good and the openings comfortable for working in. No effort has been left undone or expense spared to make the mine safe. About 850,000 feet of timber is consumed annually for supporting and holding up the ground in order that ore may be stoped out or caved, as the case may be, with safety to all connected with the work. The "block caving" method is most largely used in producing ore. Where the ores are very soft, however, sub-level caving is used. Wire rope trams are operated underground and on surface for hauling the ores to and from the shafts. At the Walpole, where the distance is greater than 1,000 feet for moving ores, it has been decided to install an electric haulage to do the work.

On different occasions, I have visited the property of this company, but never without being favorably impressed with its general appearance and the smooth and efficient manner in which each department connected with the mines were running. The management knows the business thoroughly and do it in the best way for bringing the most satisfactory results. Every department runs along to perfection and is doing first-class service. Everything seems to be looked into in good time and the future requirements are anticipated and provided for in due season. The general appearance of the property indicates prosperity and the best of management. Nothing seems to be neglected, no matter what its significance may be. It is run on up-to-date methods and progress has been substantial and of the right kind. Machinery and power houses are substantially constructed and conveniently located for direct, economical work. Power plants are highly efficient and adequate for requirements. The various workshops are well appointed and fitted with the necessary tools and appliances for doing the work of the mine. The equipment is actuated by steam power. It includes two 10-foot first motion drum plants with Corliss engines capable of hoisting from a depth of 1,500 feet; one first-motion drum plant, seven-foot drum with Corliss engines capable of hoisting from a depth of 1,200 feet. Triple expansions pumping engines capable of pumping 4,000 gallons of water per minute from a depth of 1,000 feet, using a steam pressure of 150 pounds to the square inch at the pumps; compound Corliss duplex air compressor with capacity to operate 42 drills. These, with other supplementary appliances, round out and complete the mine equipment.

In the way of improvements, the management is erecting at No. 1 shaft a steel shaft house to replace the timber structure, which has been in use for the past 17 years. Total height of the shaft house will be 101 feet and it will be equipped with all the modern appliances for handling several grades of ore.

NANAIMO MINE.

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

Property is located in Section 26, 43, 35 with 120 acres of land. The Nanaimo was one of the first mines to be opened in the district, although it had never been extensively opened. It was taken over by the Mineral Company in 1903. Ore bodies are substantial and apparently good for many years in the future. The mine is opened on broad, practical lines and up-to-date methods. It is down to the 4th level and 362 feet deep. A modification of the "Sub-level caving" method is used for taking out the product and its answers admirably without the use of much timber. Timber costs now means something to a company. The average number of men employed during 1907 was 142 and the product of ore recovered was 68,386 tons as compared with 93,579 tons shipped the previous season. Total shipments from the property 392,279 tons. Ore body mined is a soft Hematite. The mine is opened and developed through one shaft, two compartment and substantially constructed. Skips lift two tons ore to a trip and operate singly, dumping automatically in ore cars. The opening work done during 1907 consisted of driving 720 feet of drifts and 947 feet of crosscuts. Three levels are extended from shaft and product comes from the 2nd and 3rd levels. A winze has also been sunk to the 4th level from which stoping is conducted. Daily capacity of the mine is about 350 tons. The average length of openings in the ore body is about 650 feet and

tram-cars are operated by hand labor. No ordinary expense is spared in making the mine safe for working in and mine ventilation is very good.

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

THE BREEN MINE.

This property is also operated by the Mineral Mining Company and under the same practical management. The mine is located in Section 22, Town 39 North, Range 28 West with 120 acres of land. This is the oldest mine on the Menominee range, it having been explored in the early seventies. It produced less than 20,000 tons of high grade ore and had been abandoned on account of the low iron contents of its remaining ore, which until recent years was not marketable. During 1907 the mine produced 20,366 tons of ore as compared with 21,004 tons for the previous year. Total shipments to date, 75,425 tons. 16 men were employed for 9 months of 1907. The ore body mined is hard lean Hematite running 40 per cent metalic iron and .015 per cent phosphorus. Underground operations are conducted through two shafts, 8x10 feet in dimensions. No. 1 is 100 feet deep and No. 2 is 258 feet deep. Average length of openings in ore bodies is about 800 feet and one level is extended from shaft and from it the product is recovered. The daily capacity of the mine is about 200 tons. Four power drills are operated. Tram-cars are operated by hand labor, and the method in vogue for taking out the product is "open pit milling." The amount of timber used in the mine annually is nominal.

Equipment includes one Ingersoll-Sargent compressor, eight drills, one 100 H. P. boiler, one 7x10 hoist, one No. 8 Cameron pump and other necessary equipment used for a small open pit mine.

This mine is well managed and economically operated. Everything in and about the property runs nicely. P. O. address, Naucedah, Mich.

CLIFTON AND TRADERS.

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

The mine is operated on the most approved methods of modern mining and substantial progress has been made. The average number of men employed during 1907 was 75 with 15 power drills in operation. Ore body mined is a bright specular Hematite, long and narrow, running 35 per cent to 50 per cent metalic iron. The output of iron ore for 1907 was 100,995 tons as against 196,000 tons reported for 1906. Only for a scarcity of men, shipments would have been larger. Product is recovered through one fine shaft 7x23 feet in dimensions and 150 feet deep. During the year under review, besides taking out a product of ore, considerable new ground was opened up and put in condition to furnish a large supply of ore. Six hundred feet of drifting- and over one hundred feet of crosscutting was done besides sinking a big 4-compartment shaft 70 feet down. The product is recovered from two levels, 80 feet and 150 feet. The "milling" system is used for taking out the product and it answers admirably in this property. Openings have been extended through the ore bodies as much as 1,400 feet in length and the future prospects for taking out a good round product are reported good. The management is of the best and general progress has been substantial and of the kind that bring the best results. Developments underway embrace a new shaft house and opening up additional ground or fresh ore reserves. Skips carry one and one-half tons of ore to a trip, operate singly and dump, in cars, automatically.

Last year the lower level has been opened up and a crosscut driven to the south for a distance of about 300 feet and a raise put up to the surface and widened out for a four compartment shaft. This has been completed and the old shaft house is being moved to the location and will be rebuilt and the intervening ground between the old shaft and the new one will be stripped and welled down during the coming season. Mechanical equipment is not large but adequate for present requirements. It embraces three 72x16 in. horizontal tubular boilers, 750 pound pressure and 150 pound horsepower each; one 15x20 in. geared hoist besides tools, fittings and other appliances for doing the mine work. The property is well managed and everything about the property runs along apparently to perfection.

YOUNGS MINE.

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

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

Youngs is practically a new mine, having made its first product in 1905. The success achieved by the management has been substantial and may be readily appreciated by comparing the following products of iron ore reported for the first three years work:

	1905	1906	1907
Gross tons	10,926	50,000	93,000

Everything goes to indicate that the mine has an exceptionally bright future. The average number of men employed during 1907 was 200 and 16 machine drills were operated. The appearance of the ore body is large with good quality Hematite and running 57 per cent metallic iron. The mine is opened up on sound, practical methods and in the best way for getting the best results. Progress has been continuous and substantial. The mine is in fine physical condition and looks well. Operations are carried on through one shaft, 6x11 feet in dimensions, 350 feet deep and down to the 3rd level. Product is lifted in skips carrying 2 tons to a trip operating singly. Openings in the ore body run from eight to nine hundred feet in length and the product comes from two levels. Three levels are extended from shaft and during 1907 from 300 to 400 feet of drifting were driven and 400 feet of crosscuts extended. Development work underway includes opening up ground for future requirements and doing diamond drill work in search of additional ore deposits. Development work underway consists of drifting, etc., Ventilation is good and the underground department, as mines go, is comfortable for working in. Daily capacity of the mine is 1,000 tons. 16 power drills are operated with an Ingersoll Rand 20-drill capacity air compressor installed. Method in vogue for taking out the product is “milling” and it answers first-rate. It is comparatively safe and requires but little timber. The equipment is new, of the best and includes one 20-drill compressor, one double hoist 6 ft. drum 16x20 engines capacity, 20,000 pounds hoist, one 1,000 H. P. heater, two boilers 6x18 feet, one upright boiler 6x18 feet, 15-drill Rand full compressor of pumps, office, dry, two boarding houses, blacksmith shop, store houses, power house and barns. The company has built 25 dwelling houses for employes.

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

PICKANDS, MATHER AND COMPANY.

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

This company stands among the most prominent in the development of the iron industry on the ranges. From the beginning of work the company has been active—its activities take on varied forms but always important in magnitude and accomplishment. It is one of the institutions which has been worked with considerable means and in a practical way. Its properties are all in fine physical state. The activities of the company by no means ceases at the production of the ore, for Pickands-Mather are one of the biggest factors in the ore markets and have a prominent place in the lake transportation commerce. The company has been an important factor in recovering the wilderness, developing the resources of the Lake Superior region and making it the most successful mining district on the globe.

The mines operated by this company are, as a whole, in fine physical condition and in trim to turn out a heavy product. The management aims to carry on operations on a scale somewhat commensurate with the possibilities of the properties, and to get out of them the best there may be in them, besides making provisions for future requirements. The success achieved has been substantial and gives general satisfaction. The machinery plants are highly efficient, as liberal allowances have been spent in putting them in first class running order. The mines are ably and skillfully managed and for the best interests of all concerned with the enterprise. The mines are opened on broad, practical lines and worked on up-to-date methods. Order and system Is kept well in the foreground and maintained in every department. Business affairs of the company are dispatched promptly with precision and in a very capable manner.

The company operates the Baltic, Hemlock, Caspian, Vivian, Calumet and Fogerty mines on the Menominee Range and the Mikado, Brotherton, Sunday Lake and Pike mines on the Gogebic Range. The total output of iron ore for 1907, as reported for Pickands-Mather and Company, is 3,014,980 tons. Had there not been a scarcity of labor in the early part of the season, shipments of ore would have been increased by a considerable tonnage.

BALTIC MINE.

This company is located at Palatka with 200 acres of land in Town 42 North; Range 34 West. The average number of men employed during 1907 was 201, eighteen power drills were operated and the output of ore was 197,758 tons. Previous to 1907, the property stands credited with total shipments of 676,081 tons. Ore mined runs 50 per cent metallic iron.

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

In all, 5 levels are extended from shafts and the product is taken from the 4th and 5th levels. Development is underway at the 5th level. During 1907, opening work consisted of driving 680 feet of drifting and 450 feet of crosscuts. Skips operate in balance, carry two tons to a trip, and dump in cars automatically. Tram cars are operated by electricity. The "back-stoping" method is used for taking out the product and its works admirably.

Mine is in good physical condition and economically worked. Equipment is highly efficient and includes hoisting engine, air compressor with three boilers for furnishing power besides supplementary appliances and shops for doing the work of the mine. Underground ventilation is good and the physical condition of the mine all over is first-rate. The daily capacity of the mine is about 600 tons.

Improvements completed during 1907 include new shaft house, electric light dynamo and engines, new cross compound corliss compressor, new boiler house, two 150 H. P. horizontal tubular boilers. Mining captain, W. H. Bengry; Clerk, C. S. Hopkins; Engineer, I. W. Woodsworth.

HEMLOCK RIVER MINING COMPANY.

This company operates the Hemlock mine, located at Amasa, from River county, on the Menominee Range, and owns 400 acres of land in Section 4, Town 44, Range 33. The ore mined is non-Bessemer running about 52 per cent iron. The mine became a producer in 1891 and since the beginning of operations has produced 1,390,511 tons of ore. The 1907 output was 114,189 tons. On an average, 142 men were employed and 15 power drills were operated. The mine is opened and developed by means of one fine shaft 7x15 feet in dimensions, 1,000 feet deep with a capacity for lifting 300 tons daily. The ore bodies furnishing the product look well; are large and continuous and are reached by various levels, which being connected, make free circulation of air and the underground openings are fairly comfortable for the miners working there. Average length of openings in ore bodies is about 700 feet. The ore body in the deepest openings looks well. Nine levels are extended from the shaft and the product is recovered from the 8th, 9th and 10th levels. In 1907 the shaft was sunk 92 feet while 910 feet of levels and 60 feet of crosscuts were driven. The "back-stoping" method is in use for breaking down the product and the tram-cars are operated by mule and hand labor. Improvements added to the plant last are included one Erie 18 ft. by 125 in. boiler installed and endless rope haulage on surface. The mine equipment is powerful, efficient and includes hoisting plant, two air compressors, five boilers for furnishing steam power, besides supplementary additions.

General Manager, C. H. Hunger, Duluth, Minn.; Chas. E. Lawrence, Gen'l Superintendent, Iron Mountain, Mich.; Mining Captain, C. W. Hughes; Engineer, I. W. Woodsworth; Clerk, C. S. Hopkins. P. O. address of mine, Amasa. Iron County, Mich.

CASPIAN MINE.

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

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

Ore produced is a Hematite running about 56 per cent iron.

In 1907 the mine employed on average 184 men, operated 18 power drills and produced 139,513 tons of ore as compared with 85,000 tons for the previous year, which shows a substantial gain. Total output to date, 236,966 tons of ore. Operations are conducted on the most up-to-date methods for getting the best results. Mine development is carried on through one fine shaft 8x12 feet in dimensions and 300 feet deep. Three levels are extended from shaft and the product of ore comes from the 3rd level. Ore body from which the product comes is large and continuous, is opened up ahead for some time to come. Every department runs smoothly and the mine is in fine physical condition. Its future outlook is good for bigger and better things. Product is taken out by the "back-stoping" system, and seems to be admirably adapted for the ore body mined. Future requirements are anticipated and provided for in good time and every thing in and about the mine runs smoothly and appears to be in good trim. Product is taken out by the “back-stoping" method and it answers first-rate for the ore body mined. Levels are connected and ventilation is good. For a young mine, it is in fine physical condition. Skips operate in balance and carry two tons to a trip and dump in cars automatically. Tram cars are operated electricity. Opening and developing work done in 1907 consisted of sinking shaft 80 feet, driving 1,150 feet of drifts and 925 feet of crosscuts. This is the kind of work that counts. Progress was substantial and results fairly satisfactory. Mine equipment is good for present requirements and in first-class order. This mine has an encouraging outlook.

VIVIAN MINE.

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

In 1907 the mine employed a strong force of men and produced 51,304 tons of ore. Total output since shipments were commenced 398,167 tons of ore. The mine produces rather low grade ore running 40 per cent iron, and has a daily capacity of 500 tons. It is opened and operated through one large shaft, 5x14 feet in dimensions. Shaft is 210 feet deep with lateral openings extending in ore body averaging in length 1,000 feet. Skips counterbalance in shafts and work very smoothly. The "back-stoping" method is used for recovering the

ore. Shaft connections are connected on different levels, and levels in turn are connected by raises or winzes and form quite a network of underground openings that efficiently ventilate the workings and makes them cool and airy. In a cool, airy mine, men can always do a good day's work. No reasonable expense is spared in making the mine safe and solid for working in. And this work must constantly be kept up, or the product will begin to fall off. All tramming is done by hand labor. Trams dump driectly into skips which are hoisted to surface and in turn dump into ore cars and the load transferred to the stockpile. The work is readily and economically done. Operations are conducted on practical lines and the management aims to get out the best there is in the property. The general equipment is efficient and adequate for present requirements. It is in good condition, powerful and in good running order. Buildings and power houses are substantial and well located for direct service which is the best.

CALUMET MINE.

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

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

The ore produced is a Red Hematite running 42.30 per cent iron. The deposit is of good size and promises to hold out first-rate. In 1907, the mine employed 72 men, operated 8 power drills and produced 59,147 tons ore as compared with 17,008 tons for the previous season, which shows a substantial gain. Underground work is conducted through three shafts substantially constructed. No. 1 is 7x9 feet in dimensions and 80 feet deep; No. 2 is 7x14 feet in dimensions and 116 feet deep; No. 3 is 7x10 feet in dimensions and 206 feet deep. Thus far, skips operate singly and carry two tons of ore to a trip. The back-stoping method is used for taking out the product and tram cars are run by hand labor. Opening and developing work done in 1907 consisted of sinking shaft 29 feet, driving 904 feet of drifts and 123 feet of crosscuts. Ore product comes from the 1st and 2nd levels.

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

During 1907 a crusher and an elevator were installed and six new dwelling houses built for employes. Mechanical equipment is in good running order and doing good service.

FOGERTY MINE.

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

The average number of men employed during 1907 was 23 with 3 power drills in operation. The ore body under development is a Hematite running about 57.60 per cent metallic iron.

Operations are conducted through one shaft 6x16 feet in dimensions and 190 feet deep. Skips operate singly and carry 1¼ tons to a trip. Shaft was sunk during 1907, 135 feet deep, drifts extended 816 feet and crosscuts driven 710 feet. Average length of openings in ore body is 710 feet. Two levels are extended from shaft and the product is taken from the 1st and 2nd levels. Daily capacity of the mine is about 75 tons. The product of this mine is included in that of Baltic. Tram ears are operated by hand labor. Method in vogue for taking out the product is "back-stoping" and it answers first-rate.

The product is skillfully managed and with a view to taking out the best there is in the property and at the same time, its future is not overlooked. Mechanical equipment is running very nicely and the property has an encouraging outlook.

PENN IRON MINING COMPANY.

The mines operated by this company are managed with distinct skill and economy and according to the latest and most approved methods of modern mining. Management is progressive, up-to-date and is constantly on the look-out for improved results from one department or another of the properties worked. Nothing seems to be neglected. Order and system prevails everywhere. Future requirements are anticipated and provided for in due season. Obstructions are removed. Weak parts, if there happen to be any, are strengthened and the physical condition of the properties, all over, maintained in first-class condition. The properties owned and operated by the corporation are located at Vulcan and Norway in the Menominee Range and have an annual capacity of from 350,000 to 500,000 tons of ore. For many years the mines have been vigorously and successfully worked employing a large force of men and stands credited with having shipped, previous to the 1907 season, 3,852,005 tons of ore. In 1907 the company's product of ore was 396,669 tons of ore. The hydro-electric plant, referred to in my previous reports, was completed early in the year and put into successful

operation. The equipment was furnished by the General Electric Company. Electric power is now used for operating hoists, compressors and pumps at East Vulcan, West Vulcan and Curry mines. The plant is located at Sturgeon River, between three and four miles from the mines. This change from steam to electricity will give the Penn Company one of the most complete and up-to-date electrical plants in the Upper Peninsula of Michigan and result, it is estimated, in reducing operating costs approximately $100,000 per annum.

The properties operated are known as East Vulcan, West Vulcan, Curry, Brier Hill, Norway and Cyclops. The workings on the West Vulcan, Curry and Brier Hill are connected in one mine and Norway and Cyclops are contiguous. The ores produced make six grades from special Bessemer to low grade silicious. Mines are developed and operated through six fine shafts, well located, substantially constructed and in fine running order. Shafts are connected on different levels, which makes ventilation good and producing places comparatively safe and comfortable for working in. Skips carry heavy loads, counterbalance in shafts, dump automatically and are lowered and lifted with great speed. Deepest shaft is down 1,500 feet. Development work underway include sinking a new shaft for the West Vulcan-Curry mine and drifting into new ground, opening up fresh reserves of ore for future products. Shaft was sunk last year 441½ feet and 11,882½ feet of drifting was done. On an average, 80 power drills were operated. Train cars are operated by hand labor and mule power. Method in vogue for taking out the product is "caving and rooming on timber floors." Machinery is of the best, highly efficient, practical in mechanical construction, in first-class trim and economically operated. Many conveniences and privileges are provided for the employes that contribute largely in making home life at the mines comfortable and pleasant. The plant is very complete, adequate for present requirements and good for some time to come.

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

MUNRO MINE.

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

Fifty-five men were employed during 1907 and 46,834 tons of ore produced. Previous to 1907 there was 180,766 tons of ore produced. Nature of the ore body mined is a hard low grade iron ore running about 36 per cent metallic iron. One shaft is in operation, which is 14x6 feet inside timbers, two skiproads and one ladderway. Skips are operated in balance and carry 1¾ tons to a trip. Shaft is about 70 feet deep and about 200 feet of ground was drifted in 1907 and 20 feet cross-cutted. Development work underway includes drifting and raising. As far as quantity of ore goes, the future prospects of the property looks first-rate. Seven drills are operated with one 12-drill Norwalk compressor and one 10-drill Sullivan compressor in operation. Tram cars are operated by hand labor. The "milling" process is used for taking out the product. There is good ventilation in this mine from the raises to the surface. Mechanical equipment is in good running order. It includes one double hoist 12x14 feet, drums 54 in. diameter; one Sullivan Compound straight line compressor 20x20 and 13x20; one Norwalk compressor 22x24 and 22x14½; one No. 6½ Gates Crusher; one 12x16 slide valve engine for same; one No. 10 Cameron pump; one No. 6 Knowles pump; two 20x16 ft. boilers and 2-ton steel self dumping skips.

Additions made and improvements completed consisted in taking out No. 6 Gates crusher and replacing with No. 7½ Austin crusher and one 14x28 Buckeye engine to drive crusher.

Considerable stripping will have to be done from time to time to furnish room for breaking down the product of ore. The property is in capable hands and is efficiently and economically operated. Everything appears in a thriving and prosperous condition.

FEW MINE.

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

Mine is located 1½ miles west of Norway on S. ½ N. W. ¼ of Section 6, Town 39, Range 29. Dickinson County, Mich. Lands consist of 160 acres of land. Few mine is situated within 400 feet of the main line of the Wis. & Mich. Ry. and within ½ mile of the C. & N. W. Ry. and through trackage agreement, we also connect with the C. M. & St. Paul Ry., which gives our mine direct access to the main line of the Milwaukee Road. Average number of men employed during 1907 was 20 and 4 power drills were operated. Ore body mined is Hard Silicious, low phos. Iron Ore. From developments so far made, the company has opened into an ore body over 1,000 feet long, 278 feet wide and into which have been sunk a shaft 195 feet, the ore assaying from 40 per cent to 54 per cent metallic iron with an average phos. of .014 to .036 per cent. The mine is opened up and developed through one double compartment shaft 5½x14 feet inside, and skips lift 2 tons to a trip and work in balance. Shaft sinking done during 1907 was 195 feet, drifted 550

feet and crosscutted 480 feet. Development work underway consist of sinking single compartment shaft below first level and at a depth of 200 feet and drift west and cross cut N. & S. Product is being taken from one level. Daily capacity of mine is about 300 tons and in 1907 the product of ore recovered was 10,000 tons, which makes a first-rate beginning. Future prospects of the property is good unless hard times continue, so that demand for low grade iron ore happens to be light. A Norwalk 5-drill capacity compressor is used and tram cars are operated by hand labor. Mine ventilation is good and assisted by a 4x4 feet vertical chimney connecting first level with surface and in which is a ladder-way for escape in case or necessity. Equipment includes a Power house 45x65 ft. in which are one boiler 125 H. P. and one boiler 30 H. P., water heater, Air Compressor, 40x64 in. double drum reversible Engine, Webster, Camp & Lane hoist, one engine and dynamo producing 125, 16 C. P. electric lamps for surface and underground lighting, two Cameron No. 4 pumps, Blacksmith shop equipped with power hammer, Dry house heated with steam, shaft house 75x32 feet square base built with 12x12 in. square hemlock timber with 6 ft. diameter bicycle sheave wheels. Hercules hoisting cable 1⅛-inch diameter, skips sheet steel 2 tons capacity, 5 steel tram cars 2 tons capacity. One large double action pump underground and about 33 ft. tramways. Office building 16x24 ft. Tool room 12x16 ft. Underground powder house that is built in hill side and 1,200 ft. of Railroad side tracks on premises including coal track.

Much of the above buildings and improvements were constructed in 1907, although work was begun early in 1806. Possibilities of this property are large. The world must have iron ore and indications are that it will be developed into a substantial mine and a fine business enterprise. The work is now well in hand and conducted on up-to-date methods that promise to bring the best results. People behind the concern know the mining business and are doing it in the right way.

THE LORETTO MINE.

This property is operated by the Loretto Iron Company, which is located in Dickinson County, Mich., and owns 800 acres of land in Section 7, Town 39, Range 28. The average number of men employed was 185 and 25 power drills were operated. Principal vein dimensions as discovered to date, are 1000 feet long, 800 feet deep and the average width is 35 feet. Analysis of ore now being 54.50 per cent Iron and .060 per cent Phosphorus. Mine is opened up and developed through two fine shafts, 6x14 feet inside timber and 7x8 feet respectively. Amount of ore hoisted to a trip is 1⅓ tons. Skips operate in balance and dump automatically. Shafts are 800 feet deep. Altogether, 7 levels are extended from shaft and development work underway is very extensive. Product has been taken from the 3rd, 4th, 5th, 6th, 7th and 8th levels. The product of ore in 1907 was 85,000 as compared with 97,980 for the previous season. Tram cars are operated by hand labor, but it is planned to run them by air power. "Eight foot timber set" system is used for recovering the product. Mine ventilation is excellent.

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

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

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

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

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

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

CORRIGAN, McKINNEY & COMPANY.

This company stands among the up-to-date, progressive iron ore producing organizations operating in the Iron Region of the Upper Peninsula of Michigan and has a fine record. Large tracts of iron and timber lands situated throughout the Iron districts are owned and controlled by the company. It is an enterprising concern and stands up well in the estimation of the business and financial institutions of the country. The total product of ore credited to the Company for 1907 is 3,020,933 tons.

Few companies are better known and its credit is good for practically any sum of money in trade and commerce.

Stockholders are men of the best and soundest type who know the business thoroughly and conduct it for the best interests of all connected with the enterprise. Lands contain large bodies of soft ore characteristic of the district, some of which have been opened up and developed into profitable mines that form solid, substantial industries, with ample room for further expansion and employing a large number of men at good wages. The trade coming from the employes of the mines is the mainstay and principal support of the towns located all over the iron region. Mines are opened on broad, practical lines, and vigorously operated. The management aims to work them on a scale somewhat commensurate with their possibilities, and to get out the best there is in them; and the success achieved had been quite satisfactory. The machinery plant is as good as there is going for requirements. Mines are ably and skillfully managed, and progress towards bigger and better things has been substantial and continuous.

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

The company controls and operates the following mines:

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

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

TOBIN MINE.

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

The property is located in Town 43 North, 32 West and has 160 acres of land. The average number of men employed in 1907 was 220 and 30 machine drills were operated. Ore produced amounted to 293,055 tons as compared with 316,838 tons the previous year. Genesee ore is included in these outputs. Besides other development work going on at the 9th level, 300 feet of shaft sinking was done in the year under review. Ore produced is a Red Hematite running 58.90 per cent metallic iron and high in phosphorus. Daily capacity of the mine is about 975 tons ore and still better things are predicted for this property. All told, shipments of ore sent out from Tobin and Genesee foot up well over a million tons. Property is located at Crystal Falls in Town 43, Range 32 with 80 acres of land. Underground operations are conducted through one shaft, four compartments, 7 ft. 8in. by 21 ft. in dimensions and 975 feet deep. Eight levels are extended from shaft and the product comes from practically all over.

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

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

CRYSTAL FALLS MINE.

The mine is located at Crystal Falls, Iron County, Mich., and situated in Town 43, Range 32, with 40 acres of land. The company employes 114 men on an average and 10 machine drills are operated. Nature of mineral body mined is a High Phosphorus Hematite running 58.66 per cent iron. There is no regular vein, but small ore pockets. The future prospects of the mine are reported not very good, which is regretted by all interested in the future of the district.

Mine is developed and operated through one shaft, three compartment 5x16 feet in dimensions and 1100 feet deep. Average number of men employed during 1907 was 120 and 10 machine drills were operated. Product of ore was 111,283 tons. Total output of ore to date, 1,733,969 tons.

The mine is developed on up-to-date principals and all things considered, the underground workings are in fine physical condition. Levels are connected and ventilation is good. Everything in and about the mine appears to be in first class shape with every department except the ore bodies in shape for a long continuous run. In all, 12 levels are extended from shaft and in 1907, the shaft was sunk 125 feet. Ore product comes from the 12th and 13th levels.

Air compressor is a Rand 10-drill capacity machine. Tram cars are operated by both electricity and hand labor and the method in vogue for taking out the product is "back-stoping." Mechanical equipment is efficient and includes one 24x48 single-cylinder Bullock Hoist second motion, three 300-horsepower boilers with supplementary additions adequate for requirements. All over the property has been skillfully managed.

GREAT WESTERN MINE.

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

The average number of men employed in the Great Western during 1907 was 340 and the amount of ore produced, 256,580 tons. 25 machine drills were operated.

Ore body mined is a High Phosphorus and Hematite running 58 per cent iron. There is no regular body, but large pockets of ore and the future prospects of the property are reported to be uncertain. These pockets, however, are likely to prove persistent, and to keep turning up for some years to come. Underground operations are conducted through two shafts, three-compartment, 6x18 feet in dimensions and 908 feet deep. Skips lift three tons of ore to a trip and operated in balance. Thirteen levels are extended from the shaft and the development work underway consists of drifting and opening up ground. Product is being taken from the 12th and 13th levels and the ore reserves are substantial. The mine is opened up on broad practical lines and economically operated. Progress has been substantial and of the right kind for bringing results. Daily capacity of the mine is about 850 tons. Tram cars are operated both by electricity and hand labor. Method in vogue for taking out the product is "back-sloping." The property is electrically equipped throughout. Equipment is up-to-date and includes a 15-drill capacity Rand compressor; one 24x48 Twin Sullivan hoist, first motion; one 18x42 Bullock Corliss hoist, second motion; four 200-horsepower Wickes vertical water tube boilers; one Compound Prescott pump, 700 gallons; one Triple Prescott pump, 1,000 gallons; 2,000-gallon Harris Blowing system.

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

DUNN MINE.

This mine is located at Mastodon, Iron Co., with 80 acres of land in Town 42, Range 33 West. The mine has been a considerable producer of iron ore and has a very good record. It stands credited with total shipments of 1,319,646 tons of ore. The average number of men employed in 1907 was 175 and amount of ore shipped 145,955 tons. 25 machine drills were operated. The ore bodies developed in this property seem to be similar to those found in Crystal Falls and the Great Western Mines, which are irregular pockets and not well defined veins. They hold out well, however, and appear to be persistent. Underground work is carried on through one shaft three compartment, 5x16 feet in dimensions and 900 feet deep. The amount of ore hoisted in skips to a trip is three tons, operated in balance and dump automatically. 200 feet of shaft sinking was done during the year besides the usual development work. In all 7 levels are extended from shaft and the product comes from two of them. The mine is opened and worked on the best methods going for bringing the most satisfactory results. All openings are in good condition and developed with a view to getting out the product of ore economically and for the best interest of the company and the future well-being of the property. Daily capacity of the mine is about 400 tons of ore. Tram cars are operated by hand labor. The method in vogue for taking out the product is "back-stoping," and it is well adapted to the ore bodies developed in this mine. Workings are not deep and ventilation is good.

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

LAMONT MINE.

This mine location is near the town of Crystal Falls in Town 40, Range 32 and leased 80 acres of land. The average number of men employed during 1907 and 60 and 8 power drills were operated. Amount of iron ore

shipped was 39,405 tons, as compared with 111,871 tons shipped the previous year. Paint River product is included in these shipments. Ore body mined is a High Phosphorus and Hematite running 58 per cent iron. Skips hoist 2½ tons to a trip, which are operated in balance and dump automatically in ore cars. Underground operations are conducted through one substantial shaft, 6x18 feet in dimensions, and three compartment. The mine is 1,000 feet deep. Altogether, 13 levels are extended from shaft, and as regards workings, the mine is in fair, physical condition. It has been skillfully managed and economically operated with a daily capacity of about 20 tons. Tram cars are operated by hand labor and the method in vogue for taking out the product is "back-stoping."

Mechanical equipment is in good running order and doing full duty. It embraces a 10-drill capacity air compressor, one 20x42 Single Bullock hoist, "second motion"; three boilers 250-horsepower; one Compound Prescott pump, 500 gallons, besides supplementary fittings and appliances adequate for doing the mine work.

ARMENIA MINE.

This property is located just west of the town of Mansfield in Town 43 North, Range 32 West with 80 acres of land, and is quite an old producer, it having made its first shipment in 1889. It was idle, however, during a number of years. In 1907 the number of men employed was 125 with 10 power drills in operation. The output of ore was 43,452 tons. Total shipments to date 311,608 tons. The ore produced is low grade, about 52 per cent iron, and high grade in silica. Operations are conducted through one shaft 5x16 feet in dimensions and three-compartment. It is 600 feet deep with development work in four levels extended about 150 feet in length. The management has discovered at considerable depth, a body of ore that proves the mine a good one. In all, six levels are extended from shaft and the product comes from the 5th and 6th levels.

The mine has been well managed on up-to-date methods and quite a fine location has been built up.

Mechanical equipment embraces a 10-drill capacity Air Compressor, one Compound pump with capacity to lift 1,500 gallons water per minute besides the necessary machinery and tools for doing mine work.

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.

During 1907 the number of men employed was 85 and in conducting the work 27,609 tons of ore were taken out. Work was carried on in a practical, business-like way and good progress was made. Work is conducted with a portable plant at the present time, which will likely be replaced with a permanent one as soon as requirements demand a change, which may be some time in the near future.

The mine is 360 feet deep with 4 levels extended and undergoing development. Product of ore comes from the 3rd and 4th levels. The shaft was sunk 120 feet in 1907. Skips operate singly and lift 1½ tons to a trip. The future outlook for the property is reported to be fair. Like other mines of the Company, Kimball is well managed and successfully worked.

FAIRBANKS MINE.

Fairbanks adjoins the Great Western at Crystal Falls with 40 acres of land in Town 43 North, Range 32 West. It has developed into a mine of fair proportions and in 1907 produced its heaviest output of ore for a single season which amounted to 75,774 tons. Ore body mined is a Soft Hematite. During the year, 60 men were employed on an average and 8 power drills were in operation. The mine is developed through on fine shaft 475 feet deep. Four levels are extended from shaft and the product is taken out on the 4th level by the "back-stoping" method. Underground operations are carried on through practical methods and such as will bring the best results. Openings are connected and ventilation is good. Tramming is done by hand labor and fresh ore reserves have been blocked out on the 4th level. Besides the usual developments, 125 feet of shaft sinking was done during 1907. Skips operate singly, dump automatically and lift 3 tons of ore to a trip. Mechanical equipment is adequate for requirements and in good running order. Like other mines of the Crystal Palls Iron Mining Company, Fairbanks is well managed and adapted to the best advantage.

BAKER MINE.

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

Thomas G. Brooks, Clerk.

In 1907, severity-five men were employed monthly and 6 power drills were used in sinking, drifting and doing- the usual development work. A shaft 300 feet is going down and four levels have been drifted and opened up thus far. The mine openings are laid out in the most practical way for bringing the best results and the property has a prosperous outlook.

Equipment embraces a 6-drill Rand Compressor, Sullivan hoist, three horizontal tubular boilers and other appliances for mine work. The equipment is new and in the best condition. Baker has not yet become a shipper of ore.

SAGINAW MINING COMPANY. ;

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

Development and exploratory work is conducted through one shaft, 5x9 feet in dimensions and divided into skip and ladderway. Shaft is 230 feet deep and has three levels. The work is conducted on systematic, practical lines and indications are favorable for developing a substantial property. About 60 men are employed and seven power drills operated. Good progress is being made. The company is enterprising and deserves to be rewarded. A promising ore body of the Bessemer grade has been located on the property with a diamond drill, which is being developed in the lower levels; it is looking well and runs about 52 per cent Iron and .020 per cent Phosphorus. Developments underway include sinking a winze to develop the 4th level. Saginaw is reported to have mined 22,036 tons of iron ore for the season ending September 30th, 1907. Previous to 1907, the mine is reported to have shipped about 400,000 tons of ore. Skips carry 2 tons ore to a trip, operate singly, and the product is recovered by the "slicing and caving" method.

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

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

BRISTOL MINE.

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

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

This property is located just north of the town of Crystal Falls. It has been operated for some years and credited with producing previous to 1905, an output of 1,190,770 tons of ore. It is well managed and good progress has been made in its development. It has no uniform iron ore course with organized form, but small irregular bodies of hard known Hematite running about 51 per cent iron. The property is thought to contain important values and at greater depth, these ore bodies may unite and form one substantial deposit. There are about 250 men employed and 16 machine drills operated on an average. Daily capacity about 350 tons. In 1907, the mine produced 354,030 tons of ore. 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 conection with the work. Skips operate in balance and carry three tons to a trip. In addition to taking out 354,030 tons of ore last year, 1,000 feet of drifting, 1,000 feet of crosscutting and 85 feet of shaft sinking was done underground. Developments underway embraces shaft sinking, opening up new ground and blocking out fresh reserves of ore. The property is ably managed and very economically operated. It is in good physical order. Mine plant is efficient, modern and in good running order. It includes a double drum, first motion, hoist capable of lifting six tons net loads from a depth of 700 feet at a speed of from 1,500 to 2,000 feet per minute, a 20-drill capacity air compressor and the usual equipment necessary to run a modern mine.

MILLIE MINE.

The Dessau Mining Company is opening up and developing the Millie mine, which is an open cut proposition. Real estate holdings of the company consist of 70 acres of land situated in Town 40 North, Range 30 West and located in Iron Mountain, Dickinson County, Mich. General manager, Silas J. McGregor. Postoffice address, Iron Mountain Mich.

The average number of men employed during 1907 was 25. Four power drills were operated and the amount of ore produced was 18,691 tons as compared with 36,815 tons for the previous year. Total shipments to date 354,056 tons. Ore body mined is a Blue Hematite running Iron 39.70 per cent; phosphorus .022 per cent. Operations are conducted through one shaft 6x8 feet in dimensions and 110 feet deep. Development work underway includes sinking a shaft and supplementary work to take out a product in an up-to-date way and on economical methods.

The property has an encouraging outlook and may develop into a substantial producer of ore. During 1907 the shaft was sunk 110 feet and connected with the old Millie workings, 225 feet of drifting and 150 feet of crosscut work was done. Tram cars are run by hand labor, skips operate singly and lift 1½ tons ore to a trip, and the method in vogue for taking out the product is "Open Cut," which happens to be the most economical way for recovering the ore. The property is skillfully managed and economically operated. Everything connected with

the works appears to be running smoothly and successfully. Equipment consists of battery of boilers, hoisting engine, an 8-drill capacity air compressor, a No. 6 Gates Ore Crusher and supplementary fittings adequate for requirements—all are in good running order.

HIAWATHA MINE.

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

P. O. address, Iron River Mich.

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

During 1907 the mine employed 90 men, operated seven machine drills and produced 18,000 tons of ore, besides doing a heap of development work. Hiawatha is practically a new mine and stands credited with having produced, all told, 24,300 tons of ore. The ore body mined is rather irregular, lumpy and low grade. Mine is operated through one shaft, 6x9 feet inside and 545 feet deep. Product comes from the 3rd, 4th and 5th levels. Skips operate singly and lift 1½ tons to a trip. During 1907 the shaft was sunk 100 feet and 866 feet of drifting were driven. Development work underway consist of drifting and cross-cutting and developing new ground for future product. The property is skillfully managed and in the most modern way according to the latest and most approved methods of iron mining. Underground openings are developed on practical lines and operated on modern methods of mining. Work during the year was confined to development except during the last four months when a little stoping was done. Tram cars are operated by hand labor and skips dump automatically. Method in vogue for taking out the product is "sub-leveling, backstope and underhand stope." Amount of timber used in the mine annually is about 25,000 feet B. M. Equipment is in good running order and includes four 100 H. P. return tubular boilers; one single drum geared hoist-cylinder 14x18 in.; one Sullivan straight line air compressor, 12-drill capacity; one No. 8 McCully crusher and engine to operate same; one 13x21x34x10x24 in. Tripple expansion Prescott pump. Ore crusher arid engine to operate same were installed during the year. This company is enterprising and deserve to be rewarded with a good mine.

THE JAMES MINE.

This mine is operated by the Mineral Mining Company and under the same management as the Pewabic, Nanaimo and Breen mines. The property is located in the N. ½ of the N. E. ¼ of Section 3, Town 43, Range 25. P. O. address, Iron River, Mich. Ernest Truran, mining captain. This mine made its first product in 1907, which amounted to 6,889 tons ore. In this property, the management is opening up a substantial mine and first-rate progress has been made. The management is of the best and the work is conducted the best way for bringing the most practical results. Ore body under development is a soft Hematite running 52½ per cent Iron. The average number of men employed is 57 with 6 power drills in operation. The James was an old exploration taken over by this company the early part of 1906. The old shaft, which was 198 feet deep was re-timbered and sunk to a depth of 315 feet, its present bottom. In addition to the James and Nanaimo properties the company holds under exploring option 180 acres of land. The shaft is 6x9 feet in dimensions and the product is taken from the 2nd and 3rd levels. Opening and development work completed during 1907 consisted of driving 869 feet of drifting, 1,041 feet of crosscutting and 117 feet of shaft sinking. Total opening work, 2,027 feet. Ore reserves for future needs are being developed on the 3rd level and for taking out the product, the sub-level system is in service and it answers first-rate. The physical condition of the property shows steady improvement and mine ventilation was good.

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

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

ZIMMERMAN MINE.

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

Property is located at Spring Valley, Iron County, Mich., with 80 acres of land in Town 42 North; Range 34 West. This is an exploring and developing proposition with bright future prospects. The management struck ore in the shaft at a depth of 22 feet. Analysis of ore 57 per cent iron. Underground work is conducted through one shaft 150 feet deep, which was sunk during 1907. The work is conducted on practical lines and up-to-date methods. Good progress is being made. The people back of the concern know the business and are doing it right to get the best results. In 1907, 1,000 tons was taken out through development work. Two power drills are operated and 25 men are employed.

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

HOLLISTER MINE.

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

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

The development work underway includes sinking a shaft and opening up the mine for shipping ore. The shaft is a fine one, being 6x10 feet in dimensions and 150 feet deep. The work is well in hand and conducted on up-to-date methods and on lines that promise to bring the best results. People behind the proposition know the business and are doing it right. Progress has been substantial and the management expects to have the property in condition for sending out a much heavier product of ore. Besides doing considerable development and construction work for 1907, the management succeeded in producing 6,400 tons of ore. 500 feet of drifting, 250 feet of crosscutting and 40 feet of shaft sinking was done last year. The product was taken from the 3rd level. Skips lift 1½ tons to a trip, operate singly and dump in ore cars automatically. Development work underway include sinking a shaft and winze. No. 1 shaft will likely be sunk a couple of lifts and two levels developed with raises, etc., for producing ore during the season in hand. Last year, 6 dwellings and a boarding house for employes were completed.

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

BRULE MINING COMPANY.

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

This company is doing considerable mine development and exploring work in promising locations on the 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 quick-sand and gravel is the most costly work connected with mining. But it is the explorer who reclaims the wilderness and opens up and paves the way for towns and cities and industrial enterprise in all its forms of usefulness for the general good of mankind. The Brule Mining Company is opening up and developing into a mine with much promise the Chatham besides exploring the Birkshire, Charboone and Lenox. The four properties are under the same management.

CHATHAM MINE.

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

The average number of men employed during 1907 was 70. Ore body mined is Red Hematite running about 56 per cent metallic iron. The body is opened up and developed through two shafts. Shafts are 200 feet deep and skips lift 1½ tons of ore to a trip and dump automatically. Shaft sinking done during 1907 was 200 feet. Daily capacity of mine is about 600 tons. No product of ore was recovered during 1907, but the property is credited with having produced 16,000 tons of ore previous to 1907. Its future prospects are reported good. The average number of power drills operated was 10. Equipment includes a Sullivan Straight Line Corliss 15-drill capacity air compressor; three 150 H. P. pressure horizontal tubular boilers; one 12x16 double conical single drum hoist and other appliances adequate to do the work of the mine. Everything in and about the property is in good running order and doing good service. The property is ably and economically managed. Operations are conducted on up-to-date methods and of the kind that bring substantial results.

BIRKSHIRE MINE.

Birkshire is located in S. W., N. W. and N. W., S. W. Section 6, Town 42, Range 34, Iron County, Mich. The average number of men employed during 1907 was 20. Ore body is Soft Red Hematite. Opening work accomplished during 1907 consisted of sinking a shaft 165 feet deep, driving 100 feet of drifts and crosscutting 40 feet. The future prospects of the property are reported good. Mechanical equipment will include a Sullivan Straight Line Corliss 15-drill capacity air compressor with additions and appliances adequate for present requirements.

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

CHARBOONE MINE.

Charboone is located in the N. ½ N. W. ¼, Section 6, Town 42, Range 34, Iron County, Mich., with 80 acres of land. The average number of men employed during 1907 was 6. Operations are conducted through one shaft 5½x8 feet in dimensions and 50 feet deep, which was sunk during 1907.

The work is well in hand and carried forward skillfully and on up-to-date methods. Behind the enterprise are people who know the exploring work thoroughly and are doing it the best way to secure the desired results.

LENOX MINE.

Lenox is situated in Section 36, Town 43, Range 35, S. E., S. W. Iron County, Mich., with 80 acres of land. On an average the number of men employed during 1907 was 20. The mine is being opened up and developed through one shaft 250 feet deep, which was sunk during 1907. The number of feet drifted during 1907 was about 100 while 40 feet of ground was crosscutted.

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. Mechanical equipment is adequate for immediate requirements and everything is running along smoothly. Lenox will likely give a good account of itself. These four properties are under the same management.

GIBSON MINE.

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

The property is believed by many to contain a considerable deposit of ore of non-Bessemer grade. Gibson is not a new mine nor yet an exhausted one for it was worked years ago only in a limited way. The management is now sinking a new shaft and pumping the water out of an old one and hope to open up and develop a substantial mine. A small amount of ore will likely be shipped during 1908. On an average, during 1907, about 50 men were employed and 3 power drills were operated. Operations underground will be conducted through two shafts, which are 160 feet deep and 330 feet deep, respectively. One is 5½x6½ feet in dimensions while the other is 6 ft. 4 in. by 16 ft. 4 in. in dimensions, which makes a commodious shaft. The big shaft is a fine one with sufficient capacity to lift a big product and would indicate that the management must have strong faith in the future of the property.

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.

GROVELAND MINING COMPANY.

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

In 1907 the mine employed on an average 60 men, operated 5 machine drills and produced 13,913 gross tons of iron ore. Since the beginning of operations the property is credited with having produced, all told, 40,036 tons of iron ore. The ore mined is a Red Hematite running 47 per cent metallic iron. Development work continues in a vigorous manner and the outlook for the mine is considered quite promising. Mine is opened up and run on practical lines and up-to-date methods. The work of taking out the product is conducted in the best way for getting the best results. Hand labor is used for tramming the ore to shaft and cars are dumped directly in skips which in turn dump automatically on reaching surface. Underground work is carried on through one fine shaft 200 feet deep and 6x12 feet in dimensions. From surface to bottom, it is constructed substantially and is in good running order. Average length of openings in ore body is 100 feet and the product comes from two levels. Present capacity of the mine is about 200 tons daily, but better things are in view. Underground ventilation is good. Physical condition of the works shows steady improvement. Developments are underway that will result in materially increasing the producing capacity of the mine. The property is well managed and appears to be in a prosperous condition. A new shaft is being sunk about 150 feet east of No. 1. It will be known as No. 2 and sunk to a depth of 300 feet where good ore is known to exist. The mechanical equipment will be strengthened with larger and more powerful machinery for handling a larger product than the present one. Mine plant now includes a Sullivan 8-drill capacity air compressor, hoisting engine, pumping outfit and other appliances and fittings adequate for doing the work of the mine.

GOGEBIC RANGE.

The number of men employed on this Range during 1907, was 3,572.

There is hardly a mine on the Gogebic that is not sinking to develop ore bodies at lower levels. In this respect the range is undergoing what has been truly styled a transformation. The great majority of the shippers are now mining between depths of a thousand and two thousand feet; a few shafts are bottomed still further down and are opening up even greater resources than met with nearer the surface, and at two or three properties 3,000 feet is the goal in sight. Given in order on the strike of the formation from east to west, the active mines are the Castile, Sunday Lake, Brotherton, Pike, Mikado, Eureka, Anvil, Tilden, Colby, Yale, Ironton, Newport, Pabst, Aurora, East Norrie, Norrie and Ashland on the Michigan side of the border line, and the Germania, Cary, Superior, Ottawa, Montreal, Atlantic and Iron Belt, on the Wisconsin end of the range. Michigan properties in course of development are the New Davis, Section 13, Geneva, Puritan, and Asteroids. The latter two should enter the producing list this season, and the New Davis and Geneva early in 1909. The old Comet (now the Meteor) mine of Oglebay, Norton & Co., is a possible shipper this year; its last output was 60,000 tons in 1904.

On the Gogebic Range the Oliver Iron Mining Company operates the Norrie, East Norrie and Pabst, Tilden, Geneva, Davies and Dunn mines.

NORRIE MINE.

This group forms one of the best known and most successful iron ore producing properties in the state and has a first-class record. The combined mines form a fine business enterprise and contribute in a substantial manner to the support of the town of Ironwood. The property has been a heavy producer with the banner year in 1902 when the output is reported to have been 1,082,032 tons of ore. To date, the property stands credited with total shipments of 22,322,627 tons of ore. It is good for millions more.

Norrie mines embrace: Norrie, East Norrie, Aurora and Pabst, and lie in Sections 22 and 23, Town 47, Range 46, with mine buildings forming a part of the town of Ironwood. Real estate holdings consist of 320 acres of land. In 1907 the average number of men employed was 1,472 with 40 machine drills in operation. The year's shipments amounted to 1,141,891 tons of ore. Ore mined is a Hematite running Iron 62.75, Phosphorus .040. The mines are worked through 8 active shafts: “A” Norrie 6x22 ft. by 10 in.; “C” East Norrie 8x22 ft.; “A” Aurora 7 ft. 6 in. by 18 ft.; “B” Norrie 5x10 ft. 4 in.; “D” East Norrie 10x18 ft. 8 in.; No. 1 Aurora 5 ft. 10 in. by 14 ft.; “C” Pabst 6x16 ft.; “G” Pabst 10x18 ft. 8 in.

Air for operating machine drills, etc., for these mines is furnished by the Aurora mine compressor. The shafts are substantially constructed, in good running order and capable of caring for an enormous output. Shafts generally are sunk in the footwall side and ore bodies reached by a series of crosscuts. Underground openings are developed on up-to-date, practical methods, and the product is taken out in the best way for bringing the best results, no matter whether the method be caving, stoping, slicing or any other method. Shafts are connected on different levels, and the levels in turn are connected in various places that ventilate the workings and keep them airy, cool and comparatively comfortable for doing mine work. Underground workings form a regular network with drifts going forward, opening up new ground that may be drawn upon whenever needed. No reasonable expense is spared to make the working departments safe and comfortable for men, and 4,000,000 feet of timber, board measure, are consumed annually for holding up the ground and in doing mine work. Every department is in fine physical condition and doing good duty. Shafts are going down and the usual number of drifts are going ahead developing additional new ground in accordance with the policy of the management. Future requirements are anticipated and provided for. This matter is kept well in the foreground. Levels are connected by various openings, well secured and air circulates freely through practically every part of the underground department. Different methods are used for taking out the products of ore. Conditions are not always the same and the methods best adapted for each situation is used. Skips counter-balance in shafts, dump automatically and carry four tons to a trip. Everything runs practically to perfection. Order prevails everywhere and affairs of the mine seemed to be dispatched with care and precision. Mechanical equipments are of the best for requirements, highly efficient, in good running order and economically operated. Workshops are conveniently located and 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 outfit, workshops conveniently located and supplementary appliances adequate for requirements.

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

TILDEN MINE.

This property is located near Bessemer in Section 15, Town 47 North, Range 46 West, with 320 acres of land. It has been a good producer for a number of years, and appears to grow with age, as most good things do. Its product in 1907 was 179.881 tons of ore as compared with 183,447 tons for the previous season. 365 men were employed and 15 power drills operated.

Ore mined is a soft Hematite. Analysis: 62 per cent iron, .050 per cent phosphorus and .5 per cent silica. Underground work is conducted through three shafts; Nos. 6, 9 and 10. Nos. 6 and 9 are 7 ft. 6 in. by 18 ft. 3 in. and 1.381 and 670 feet deep respectively. No. 10 is 9x16 ft. 6 in. in dimensions and 932 feet deep.

Shafts are connected in different levels and underground openings are developed on modern lines of mining. Openings are connected practically all through the workings and air circulates freely through them and they are comfortable for working in. No effort is spared to render the mine safe everywhere and something over 850,000 feet of timber, B. M. are consumed annually in the mine work. Developments are conducted vigorously and in the best manner for bringing the best results. Shafts are going down and the usual number of drifts are going ahead in different directions from shafts, developing fresh reserves in accordance with the policy of the management. Product is recovered from various openings, located practically all over the mine, and taken out in the most modern way. Mine is opened up well ahead and in good physical condition. Mine equipments are adequate for requirements and in good running order. People in charge of the property know the mining business and do it right and conduct operations with a view to taking out its values to the best advantage. Ore bodies are substantial and good for some time to come 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. Mine buildings are substantial and well located for direct service. Machinery is modern, in first class running order and generally adequate for requirements. Mine appears to be in a satisfactory condition and looks thrifty. Tramming is done by mules. Trams dump directly into skips, which are hoisted to surface and in turn dump in ore cars and the load transferred to the stockpile. The work is readily and economically done. Results accomplished have been fairly substantial and should be, in the main, satisfactory. Mechanical equipment is in good running order, and includes hoisting plants, an Allis Chalmers 20-drill capacity air compressor plant, pumping outfit, workshops conveniently located and supplementary appliances adequate for requirements. W. H. Knight, mining captain.

PURITAN EXPLORATION.

Is located between Ironwood and Bessemer in Section 17, Town 47, Range 46 and consists of 160 acres leased land. Property is being developed on modern methods and in the most practical way for getting the property in condition for sending out a product of ore. In 1907, there were employed 69 men with 4 machine drills in operation. In the work of developing the property, a product of 8,800 tons of ore was taken out. Ore body is a Hematite running 61.00 per cent iron and .046 phosphorus. Underground work is conducted through one shaft 6 ft. by 16 ft 4 in. in dimensions and 854 feet deep. It is good opinion that the property will develop into a substantial and profitable producer. Surface equipment is good for present requirements and embrace a hoisting plant, 10-drill capacity air compressor and supplementary appliances.

James Stanlake, mining captain.

GENEVA EXPLORATION.

Is a development property located in Section 18, between Ironwood and Bessemer, Town 47, Range 46, with 160 acres of land, which is leased. The organization was formed in September, 1902. Mine has produced previous to 1906, 2,904 tons of ore, but shipped no ore in 1907. In 1907, the number of men employed was 32 with three power drills in operation. 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. Underground operations are conducted through one shaft 5 ft. 6 in. by 8 ft. in dimensions and 1,887 feet deep.

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

DAVIES EXPLORATION.

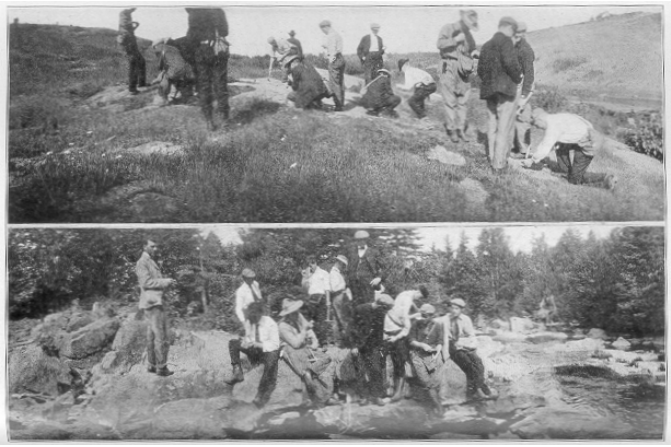
This property is located between Bessemer and Ironwood in Town 47, Range 46 and consists of 80 acres of land. It is as the title indicates, an exploring proposition with one shaft sinking.

In 1907 fifty-seven men were employed.

Prospects for striking a deposit of ore at an approximate depth of 1,000 feet are considered distinctly favorable. The shaft has now reached this depth. Work is conducted in the most practical manner and progress continues at a satisfactory rate.

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. It is now 1,051 feet deep, having been sunk 587 feet since my last report was written up. This is one of the most notable shafts in the country. It is 10 ft. by 18 ft. 8 in. inside

measurement and steel lined, similar to the big "B" shaft at the "giant" Norrie. The last year has added largely to the horizon of the Gogebic Range's future, and it is confidently believed that many of the difficulties in the more superficial formations will not be met at depth of 2,000 feet, where the ore bodies seems to widen out and be freer from intercepting dykes. However, the grade of ore for which the Gogebic has been so famed is somewhat less fine in quality, though in a number of instances, it is expected that deeper explorations will bring a return to former grades of product. James Stanlake, mining captain.



FIELD GEOLOGY—MICHIGAN COLLEGE OF MINES, HOUGHTON.

ASHLAND MINE.

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

The Ashland forms a substantial producer and is one of the best known mines in Gogebic County. Ore mined is a soft Hematite running 60.00 per cent iron; Phosphorus .45 per cent. 287 men were employed during 1907, 15 machine drills operated and an output of 305,477 tons of ore were produced. Operations are conducted on practical lines and the management aims to get out the best there is in the property and n the most business-like way. Mine contains some fine stopes of ore and look first-rate. Property was opened up in 1884 and since the beginning of operations is credited with producing a total output previous to 1907 of 4,569,877 tons of ore. It is opened up and developed on broad, practical lines and economically operated. From time to time, big sums of money have been spent on the property that resulted in strengthening its position and adding to its producing capacity. Mining operations are conducted through two shafts, Nos. 3 and 9. No. 3 is 9 ft. 10 in. by 6 ft. 8 in. inside and 834 feet deep. No. 9 is 9 ft. 10 in. by 15 ft. 10 in. inside and 1,335 feet deep. Besides other opening work 155 feet of shaft sinking was done in 1907. Shafts and levels are connected and ventilation is first-rate. Tramming is done by hand labor. The product is recovered through the stoping square sets and caving system. For holding up the ground in order to get the ore out safely and successfully, 422,000 feet timber B. M., was used in and about the mine during the year under review. Skips operate singly and carry 3 tons ore to a trip. Property is in fine condition and good for a long successful run. Mechanical equipment is powerful, efficient and in good running order. It is run by steam and adequate for requirements. There is a fine solid brick-cement "dry" for men. It is provided with a system of shower baths and has metal lockers and much appreciated by the employes. The property has a substantial appearance and looks like a very successful enterprise.

NEWPORT MINING COMPANY.

This company operates in Gogebic County the Newport and Anvil mines. J. R. Thompson is general manager. P. O. address, Ironwood., Mich.

Newport is located about one mile Northeast of the town of Iron-wood in Section 24, Town 47 North, Range 47 West, with 320 acres of land. The property now stands among the foremost iron ore producers of the state. It is a fine mine and a good business enterprise. Under the vigrous, progressive policy of the present management, the physical condition of the property has been steadily improving and it is in better shape for sending out a substantial product than ever before in any period of its history. A considerable portion of the revenue received from sales of ore has been put back in the property for sinking shafts deeper, developing fresh reserves of ore, installing additional machinery and doing general repair work and re-construction. The result is that the position of the mine and property has been strengthened all over. It has been transformed from an ordinary mine into a first-class one.

In 1907 the number of men employed was 760 and 15 machine drills were operated. The product of ore was 551,873 tons as compared with 517,063 for the previous year and 350,222 tons for 1905. Total number of tons of ore produced previous to 1907 was 3,705,799. The management aims to take out of the property the very best there may be in it in the most practical and economical way and the success achieved is indicated by the steady growth in the mine's producing capacity from year to year. Efficiency is reflected all over the property and nothing seems to be neglected or overlooked. Developments completed during 1907 included shaft sinking 1,035 feet, drifting 3,000 feet and crosscutting 2,000 feet. Total opening work, 6,035 feet. Sinking and drifting continues underway, opening up and developing fresh reserves for future needs. The product is now recovered through two shafts; one is 5 ft. 8 in. by

12 ft. in dimensions and 2,100 feet deep; the other is 6 ft. by 16 ft. and 1,820 feet deep.

At this mine a new steel frame shaft is being sunk as rapidly as possible with a view to good work and economy. The newer finds of excellent ore at depths of about 2,000 feet in the East end of this mine have been known for a long time and this shaft is being sunk to develop them for extensive mining. It is 28x8.5 feet and contains five compartments, four skipways and a pipeway. From the collar down to and into the solid rock, the shaft will be lined with concrete and made especially permanent. It is not expected that much ore will be lifted through the shaft, if any, before early in 1909. This shaft is now 1,400 feet deep. Underground workings are in the best sort of condition and the product is recovered the best way for getting the best results. Tram cars are operated by electricity and works very successfully. Skips operate in balance and lift 4 and 5 tons of ore to a trip. 350,000 lineal feet of round timber and 2,000 cords of lagging; are consumed annually in mine work, and no reasonable expense is spared to make the mine safe for working in. The mechanical equipment is highly efficient, in first-class running order and doing the best of service.

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

Mining Captain, John Clemens; engineer, Frank Blackwell; chief clerk, R. V. Brewer.

ANVIL MINE.

This mine is located in the northeast corner of Section 4, Town 47, Range 46, with 160 acres of land. It is about one mile S. E. of the town of Bessemer. P. O. address, Ironwood, Mich. J. R. Thompson, general manager; L. C. Brewer, superintendent. This property is under the same vigorous, progressive management as the Newport mine. In 1907, the mine employed 109 men, operated 4-power drills and produced 39,923 tons of ore. The total tonnage of ore produced previous to 1907 was 668,603. Underground work is conducted through one shaft, 6x14 feet in dimensions and 1,300 feet deep. Opening work done in 1907 consisted of sinking 170 feet, crosscutting 400 feet, drifting 800 feet. Total opening work 1,370 feet. Developments underway is shaft sinking and drifting. The product is trammed by hand labor, and skips operate singly lifting 2 tons to a trip. The physical condition or the mine is first-rate. Shafts are substantial and in good running order and connected at various points enabling men to pass from place to place when desired or in case of emergency. Air circulates freely through the workings and they are cool and comparatively comfortable, as mining goes, for working in. The management is progressive and everything in and about the property appear to be running smoothly and successfully. Mine building and power houses are well located. William Rowe, mining captain; Frank Blackwell, engineer; R. V. Brewer, chief clerk.

IRONTON MINE.

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

Ironton is located Southwest of Bessemer in Town 47, Range 46, with 320 acres of land. The mine has solid merit and forms a fine business enterprise. The management is progressive, up-to-date, know the mining business thoroughly and do it in the right way to get out of the property the best there is in it. Average number of men employed during 1907, was 306, with 8 machine drills in operation. The product of ore was 181,823 tons as compared with 112,391 for the previous year. Total shipments to date 478,459 tons. The ore body mined is a soft Hematite forming a deposit lying on the footwall side 300 feet long. Analysis of ore mined: Iron 60.00 per cent and phosphorus .050 per cent. Mine is operated through two active shafts, 5x16 feet and 6x10 feet inside measurement. No. 3 shaft is 1,100 feet deep. No 4 is 1,150 feet deep. Skips operate in balance and carry 3 tons of ore to a trip. Opening work done in 1907 included shaft sinking 200 feet and drifting in new ground 4,000 feet. Levels underground are connected at different points and ventilation is good. Daily capacity of the mine is about 1,000 tons. Product of ore comes from the 9th, 10th, 11th and 12th levels. Tram cars are operated by electricity and highly appreciated by the men. Management is capable and aims to get out of the property the best there may be in it and in the most practical and successful way. The mine is opened on up-to-date methods and operations are conducted economically. The "subbing" method is used for taking out the ore, and in doing the work of the mine, about 7,000 pieces 6 ft. to 10 ft. by 7 in. timber are consumed annually. Underground developments and mechanical construction have been continuous for some time and the property is surely broadening out for an increased output and improved results. The mine plant is actuated by steam power and the equipment includes a 5 ft. two-drum hoist, a 12-drill capacity air compressor and the usual auxiliary machinery and well equipped shops for doing the work of a well appointed mine. In the way of betterments, 25 dwellings have been built and there has been installed a battery of five boilers, a Sullivan 20x48 in. direct acting two-drum hoist and a 75 Killowatt generator and a 14x14 ft. ground electric haulage system.

Improvements contemplated include a five compartment shaft to be made of the old "Winona" shaft 850 ft east of the present No. 4 shaft. The Winona is 450 feet deep, two-compartment. Will raise to this shaft from the 13th level (963 feet vertical) and strip it down. Drift is now in from No. 4 under this shaft.

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

COLBY MINE.

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

In 1907, the average number of men employed was 265 and 8 machine drills were operated. Output of ore was 91,847 tons. Amount 94,480 tons shipped. This compared with 111,767 tons for the previous year. Ore body mined is soft, red Hematite running 60.00 per cent Iron and .050 per cent phosphorus.

The ore body has increased in size since a year ago. Operations are conducted through two shafts, 5x12 ft. 6 in. in dimensions, the other, 15½x9½ feet. These are fine shafts. No. 1 is 1,300 feet deep, and No. 2, 1,327 feet deep and sinking. Each shaft was sunk 100 feet during 1907. Length of opening in ore body averages 1,000 feet. Four levels are going forward. Product is recovered from the 9th, 10th, 11th and 12th levels. Skips lift two tons to a trip operating in balance. Opening work done during 1907 included shaft sinking 200 feet and drifting 2,000 feet.

Improvements contemplated on sinking Nos. 1 and 2 shafts 800 feet and equipping mine with an electric haulage system underground. Twelve levels are extended and development work underway includes sinking 2 shafts. A 25-drill capacity air compressor is in operation and tram-cars are operated by mule power. "Back-stoping" system is used for taking out the product and it is just the thing for recovering such a deposit. About 300,000 feet of timber are consumed annually in the mine work. The employes are provided with many privileges and advantages by the management that help to make their home life comfortable and pleasant. The mine equipment is highly efficient, in good working condition and adequate for present requirements. It includes a 14-ft. 2-drum hoist, a 25-drill capacity Rand compound compressor, besides auxiliary machinery and well equipped shops for doing the repair work of the mine. The property is in fine physical condition and looks good for many more years of successful operation. In 1905, 25 new dwellings were completed and operated and conducted the best way for bringing the best results.

YALE MINE.

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

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

The mine is practically a new one, having made its first product in 1901. During 1907 a force of 95 men were employed, 4 power drills in operation and an output of 34,421 tons of ore produced. The ore body is small, but good and the future outlook for the property is reported first-rate; it runs about 52 per cent Iron. Since the beginning of operations, the mine stands credited with having produced a total of 288,100 tons of ore. The mine is opened and developed through one shaft, 5 ft. 2 in. by 8 ft. 10 in. and 1,678 feet deep. Product comes from the 17th, 18th and 19th levels and openings in the ore bodies run as much as 500 feet in length. “Back-stoping” is used for taking out the product and about 40,000 lineal feet of timber is used annually in mine work. Opening work last year included driving 2,562 feet in ore, 918 feet in rock, besides sinking shaft 225 feet. The property is well managed and appears in a prosperous condition. During 1907, a new hoisting engine was installed, which increased the efficiency of the mine plant.

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

EUREKA.

CASTILE MINING COMPANY.

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

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

Eureka is gradually developing into a substantial mine and establishing a new record. Some very good people are of the opinion that this property will show up to much better advantage with greater depth and added

developments. The mine is now being opened up and developed on systematic and practical lines for energetic operations and the indications for making a successful mine are considered first-rate.

The shaft has been sunk deeper, levels extended further and good progress has been made in putting the property in condition for sending out a regular product and its position has been materially strengthened. In 1907 ore shipments amounted to 57,904 tons as against 37,525 tons for the previous season. The ore body mined is Hematite running about 65 per cent Iron. Some good stopes of ore have been developed and put in shape for economical mining, which promises to turn out very well. Underground developments are conducted through one shaft, 6x10 feet in dimensions, two compartments and 870 feet deep.

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

CASTILE MINE.

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

Castile is practically a developing proposition with the work well in hand and making fair progress. In carrying on the work, a small product of ore is recovered. The amount of ore shipped in 1907 was 6,157 tons as against 2,010 for the previous season. Ore produced is red Hematite, 55 per cent Iron and .045 per cent Phosphorus.

The organization is a new one, having been formed in 1903 and it made its initial product in 1904, which amounted to 823 tons of ore. Mine is developed by means of one shaft substantially constructed and divided into two compartments. It is 8x16 feet in dimensions and 980 feet deep with five levels extended laterally for various distances. Levels are connected and air circulates freely through the underground workings. The proposition has an encouraging outlook and the general feeling seems to be that it will develop into a substantial mine and a good business enterprise. Development work continues on up-to-date methods and the physical condition of the property shows a healthy, wholesome growth. The people behind the enterprise are of the best type and mean business. They have put considerable money into the property and deserve to be rewarded. Developments indicate that they will be in a substantial way. Mine equipment includes a 2-boiler hoisting plant, an air compressor, besides miscellaneous buildings, which are adequate for present requirements. Machinery is running smoothly and everything in and about the mine seems to be in good order. Location has a good appearance and the bnsiness affairs of the company are dispatched promptly and efficiently.

Mining captain, John Danielson.

PICKANDS-MATHER & CO.

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

General manager, C. H. Munger, Duluth, Minn.; general superintendent, C. E. Walton; engineer, A. L. Smith; chief clerk, Theodore Dalnodar. P. O. address, Wakefield, Gogebic County, Mich.

MIKADO MINE.

This mine is located on the Gogebic Range about three miles East of the town of Bessemer in Section 18, Town 47, Range 46 and owns 160 acres of land. The mine is a substantial producer, has solid merit and is making a very creditable record. The average number of men employed during 1907 was 220 and the output of ore amounted to 180,000 as against 156,839 tons for the previous year. Ore produced is a high grade Bessemer, running about 58.00 per cent iron and .245 per cent phosphorus. In any kind of market there is always a demand for these ores.

The mine is opened up and developed through one shaft divided into two compartments and 7x16 feet in dimensions and about 800 feet deep. Ore bodies look first-rate and the physical condition of the underground workings shows steady improvement. It is opened and developed on modern methods of mining and economically operated. Ore bodies developed are large and robust in character. The circulation of the air in the underground departments is good and the producing points are comfortable for working in. Method used for recovering the ore is "subbing." Tram cars are operated by mules and lift two tons of ore to a trip. Two levels are extended from shaft and the product comes from the 12th level. Opening work finished during 1907 embraced sinking shaft 100 feet, drifting 1,000 feet and crosscutting 100 feet.

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

BROTHERTON MINE.

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

of 220 acres well located within the iron belt. Property has a good record and is credited with having produced, all told, 1,552,632 tons of ore. Average number of men employed during 1907 was 200 with 5 power drills in operation. Output of ore for the season of 1907 was 150,000 tons as compared with 129,368 tons reported for the previous season. The ore mined is a red Hematite running 58.47 per cent iron and .029 per cent phosphorus.

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

The opening work completed during 1907 consisted of sinking a new shaft 800 feet deep, drifting 500 feet and crosscutting 200 feet. Product is taken from the 16th, 17th and 18th levels. Development work underway is sinking a new shaft. James Jones, mining captain.

SUNDAY LAKE IRON CO.

This mine is located just northeast of the town of Wakefield in Section 10, Town 47, Range 45, and own 320 acres of mineral land, adjoining the Brotherton on the northwest. Company mines a Hematite ore running 59.33 per cent iron and .025 per cent phosphorus. The mine has been operated for many years and has been a steady producer of a fine grade of ore. In 1907, the mine's product of ore was 85,000 tons as compared with 81,554 tons reported for the previous year. Total shipments to date 1,102,133 tons of ore. The average number of men employed in 1907 was 100 and 4 machine drills were operated in opening up the mine and breaking down the product.

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

Development work done during 1907 consisted of sinking the shaft 60 feet deeper, driving 500 feet of drifting and crosscutting 300 feet.

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

John Trudgeon, mining captain.

PIKE MINE.

Pickands-Mather & Co. have added the Pike to their Gogebic holdings. The property lies near the Brotherton mine and quite likely the product recovered by both mines comes from one and the same ore body. This mine is located in Section 9, Town 7, Range 45, adjoins Chicago property on the east and borders on the Sunday Lake, and consists of 80 acres of land. In 1907, the average number of men employed was 50 and 5 machine drills were operated. The product of ore was 22,500 tons as against 17,934 tons for the previous year and 11,000 tons for 1905. Mine is being developed through one shaft 8x12 feet in dimensions, two compartment and 840 feet deep. The property contains a considerable deposit of ore and is believed by many good people to have a bright future. Better things are predicted for it. The property combines a producer of ore and also a development proposition. The management is conducting development work on practical lines and for better and bigger results. Underground openings are developed the best way for getting the most satisfactory results. The product of ore comes from the 18th level. Development work done in 1907 consisted of sinking shaft 112 feet, drifting 200 feet and cross-cutting 250 feet. Total opening work 562 feet. Development work underway is crosscutting to ore deposit to develop fresh reserves. Property is well managed and economically operated. Equipment includes hoists, pumps, a six-drill capacity compressor and workshops conveniently located for economical and efficient service.

Mining Captain, A. S. Johns.

MICHIGAN BLAST FURNACES.

Ten charcoal blast furnaces were operated in Michigan during year making pig iron. All are well equipped for the work and in first class condition. The largest percentage of iron ore is now shipped east to points along Lake Erie, near the coal fields and where cheap fuel may be had the year round.

Following are the charcoal furnaces operated:

PIONEER IRON COMPANY AND CLEVELAND CLIFFS IRON COMPANY. Geo. A. Garretson, president; William G. Mather, vice president; Fred A. Morse, treasurer; E. V. Hale, secretary; Austin Farrell, superintendent.

This company operates three furnaces,—Marquette, Excelsior and Pioneer located respectively at Marquette, Carp Lake and Gladstone.

Following are the products of the 3 furnaces with number of men employed:

	Men.	Tons.
MARQUETTE	623	38,718
EXCELSIOR	41	13,844
PIONEER	485	37,612
TOTAL	1,149	90,174

LAKE SUPERIOR IRON & CHEMICAL CO.

Fred Smith, manager; John Christian, secretary.

The above company reports the following products of Pig iron and number of men employed in 1907 for Michigan:

	Men Employed	Tons of Pig Iron Produced
Manistique	125	33,206
Newberry	285	23,700
Elk Rapids	65	31,320
Boyne City	55	24,462
Total		112,688

Chocolay made no pig iron product in 1907.

ANTRIM IRON COMPANY.

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

In 1907 this company employed 92 men when working and produced an output of 33,502 tons.

MITCHELL-DIGGINS IRON COMPANY.

Jos. C. Ford, president; W. W. Mitchell, vice president; Edward Fitzgerald, secretary; Delos F. Diggins, treasurer. Postoffice address, Cadillac, Mich. 30,248 tons of pig iron was produced during 1907 and 75 men employed. Furnace was out of blast from April 14th to 28th in 1907. Furnace blown out Dec. 18th, 1907 for an indefinite time.

THE SPRING LAKE IRON COMPANY.

J. C. Ford, president and treasurer; Postoffice address, Fruitport, Mich. 26,285 tons of pig iron was produced and 75 men employed during 1907.

RECAPITULATION.

	Tons.	Name and Address of Manager.
Pioneer Iron Co.	90,174	Austin Farrell, Marquette, Mich.
L. S. Iron and Chemical Co.	112,688	Fred Smith, Boyne City, Mich.
Antrim Iron Co.	33,502	N. M. Langdon, Mancelona, Mich.
Mitchell-Diggins Iron Co.	30,248	J. C. Ford, Cadillac, Mich.
Spring Lake Iron Co.	26,285	J. C. Ford, Fruitport, Mich.
Total	292,897	

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

Michigan shipments of Iron ore for the past eleven years, in tons:

1897	6,397,788	1902	11,316,353
1898	7,391,001	1903	9,153,823
1899	9,775,602	1904	7,957,696
1900	9,011,862	1905	11,648,339
1901	9,707,960	1906	12,101,992
		1907	12,267,739

THE COPPER INDUSTRY.

Copper forms one of the indispensable products of the world and civilization today could no more get along without this metal than it could get along without iron or coal. In value, the product of copper in the United States ranks next to that of iron. In recent years, no economic interest has attracted keener attention or excited more curiosity than the industry of copper mining.

At the present time, deep pessimism prevails in mining circles nearly everywhere, but people engaged in taking out economic products should take a cheerful view of the future, for viewed from an industrial standpoint, the worst is surely over. Better times are ahead. Before we are hardly aware of the fact, confidence will be restored, business will pick up, industrial enterprises will be revived to normal conditions, there will be employment for all who wish to work and people will forget there ever was a panic or even an approach to one.

1907 was a very troublesome year and proved one of much disappointment. On account of the money stringency and business depression, the copper industry suffered with other enterprises, but fared no worse. In the Michigan copper district, upon the whole, copper mines had a successful year. With only a few exceptions, they worked at full capacity. Whether the price of the metal—copper—happens to be high or low, this is customary in the Lake Superior district. Although the decline in the price of copper resulted in reducing the amount available for dividends, active companies has a prosperous year. The Michigan product of refined copper was only about 3,000,000 pounds less than the record product of 1906, and the mines were never in better physical condition than at the present time. Copper mines in many other fields were either closed down entirely or worked with a reduced force. The year 1907 opened in a whirl of prosperity with copper consumers clamoring for a delivery of supplies. Domestic and foreign consumers were doing a tremendous business and using up enormous quantities of the metal. Electrical development was going on at an unprecedented rate. A spirit of aggressive progress and expansion was the dominant tendency. The statistical position of the metal was considered superb. Supplies of unsold copper were made to appear small and insufficient to meet actual requirements. Mines were operated to the limit of capacity. The cost of labor and supplies rose to record prices, conditions were apparently utopian and expectations ran high. The price of copper rose from 24¼ cents a pound in January to 26½ cents in February with the demand for suplies urgent. Predictions were frequent that 30 cent copper was inevitable. Large quantities were sold ahead and prices were maintained at 26 cents up to July. Before the end of this month, however, money showed symptoms of becoming scarce and the price of the metal dropped to 22 cents a pound. The decline then continued to October when sales were made for 11¾ cents, the lowest price of the year. In the short space of three months, the business sentiment of the country dropped from a high plane of optimism to one of extreme pessimism. People with copper to sell rushed into the market and simply dumped it for any price offered. The decline in prices was swift and drastic. In London, England, the highest price touched for standard copper was in March, when it sold for £111, 12 S., 6 D. In October the price was down to £55, 10 S. At these figures English, French and German interests bought large quantities and the price rapidly recovered to 13 cents. While 26 cents a pound is too high a price for copper, 13 cents is no better than cost to producing companies and decidedly too low. But this is a contingency of the copper market and no new condition. similar instances have happened before and will occur again. But for the financial stringency and business depression, 1907 would have undoubtedly been the banner year in the history of copper mining and its allied industries. The event, however, has again demonstrated the fact that Europe can always be depended upon to absorb an enormous quantity of copper when prices are low and down to about cost. A steady outflow of the metal has recently been going across the Atlantic ocean at an unprecedented rate. During the past six months, a total export of 1 403,674,876 pounds was shipped at an average price of 13.4 cents, according to government figures as against an estimated product of 400,000,000 pounds. This indicates that exports are now greater than the United States' total production. Domestic consumption is now estimated at about 50 per cent of normal. The strain imposed upon the copper! situation by the accumulated surplus, which overhung the market for three or four months has now been practically removed. Already, there are signs of a healthy reaction from the sentiment of depression. What is now needed is a restoration of confidence. With confidence established, the wheels of industrial enterprise will be going again as briskly as ever with employment for all who wish to work. Our foremost financiers claim to see an improvement coming about now. The encouraging crop reports and the steady accumulation of money in the banks are making for increased confidence. The demand for copper will soon spring up again and more vigorously than ever before in the past. Among other branches of industrial enterprise, electrical development is but in its infancy. The expansion of this industry will start up once more with increased energy and enormous quantities of copper will be needed for the work. Suspended improvements will be taken up and resumed. New construction work in telephone and trolley lines, railroad electrification and other great enterprises will forge ahead once more creating an immense demand for copper and economic products of all kinds. Industry after industry has been electrified; machine after machine has been directly connected to the labor and time saving electric motors. From the dainty little motor, small enough for a watch charm to the monster 6,000 h. p. motor used in the steel mills Gary, Ind., the powerful little engines are made in every size and installed wherever power is required, until today nearly 2,000,000

electrical horse power is used in this country alone. So rapidly is the demand increasing for electric motors throughout the industrial world that the great plants of the General Electric company during the year just closed averaged nearly 3,000 motors of all sizes each month to keep pace with the orders. With all these motors scattered broadcast over the land and used daily by thousands, very few people, outside practical electricians, understand the working principles of the motor beyond the fact that it is a device, which does mathematical work at the expense of electrical energy. Many consuming companies are now in the market, which is taken as an indication that stocks in consumers' hands have been practically exhausted. The volume of business is yet below normal, but reports indicate a gradual improvement here and there. Viewed from all standpoints, there is abundant reason to anticipate a bright future for copper. The business world must have the metal or civilization will remain at a stand still. The highest price recorded for copper during 1907 was 26½ cents; the lowest 11¾. The average price is given as 20.65.

While official figures have not been secured, the estimated product of copper in the United States during 1907 is 837,000,000 as against 917,804,108 for 1906, a decrease of approximately 80,404,108.

Aron, Hirsch & Sohn., Halberstadt, Germany. In their annual statistical publication, issued in February gives 706,460 tons as the world's production of copper in 1907, a decrease of 46,440 tons as compared with the figures of 1906. Of the total for 1907, the United States contributed 52.9 per cent. Considering the production of the mines alone; the additional amount of refined metal produced from imported smaller products, increases this amount to 68 per cent. Of the other copper producing countries, Mexico contributed 8.2 per cent of the world's production; Spain and Portugal, 7.2 per cent; Australia, 6.5 per cent; Japan, 5.6 per cent; Chile, 4 per cent; Germany, 3.4 per cent; Canada, 3.3 per cent; Sweden and Norway, 2.6 per cent; Russia, 2.1 per cent; Peru, 1.4 per cent; South Africa, 0.8 per cent; Italy, 0.4 per cent; Bolivia, 0.3 per cent; Newfoundland, 0.3 per cent; Austria-Hungary, 0.1 per cent; Turkey, 0.3 per cent; and other countries, 0.3 per cent.

COPPER PRODUCTION OF THE UNITED STATES.

1903-1906 (In pounds).

	1906	1905	1904	1903
Alaska	1,339,590	2,043,586	4,900,866	8,685,646
Arizona	147,648,271	191,602,958	235,908,150	262,566,103
California	17,776,756	28,529,023	16,697,489	28,153,202
Colorado	4,158,368	9,506,944	9,404,830	7,427,253
Idaho	778,906	2,158,858	7,321,585	8,578,046
Michigan	192,400,577	208,309,130	230,287,992	229,695,730
Montana	272,555,854	298,314,804	314,750,582	294,701,252
New Mexico	7,300,832	5,368,666	5,334,192	7,099,842
Utah	38,302,602	47,062,889	58,153,393	50,329,119
Other States ✤	15,782,761	19,640,409	19,148,764	20,569,489
Total	698,044,517	812,537,267	901,907,843	917,805,682

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

Stocks of copper on hand at beginning of the year 1907 are estimated to be about 100,000,000 pounds. Final figures giving the total production of copper in the United States for 1907 will not be available before the middle of 1908 and estimates, except in one instance, are omitted. Owing to the large curtailment made by many companies during the last half of 1907, estimates may prove misleading. The Michigan product of copper for 1907, however, is official and final for the calendar year.

WORLD'S COPPER PRODUCTION BY COUNTRIES FOR FOUR YEARS.

(Long tons).

Country	1903	1904	1905	1906
Algena			415	440
Argentine	135	155	155	106
Australia	29,468	34,160	33,940	36,250
Austria	1,055	1,275	1,175	1,224
Bolivia	2,000	2,000	2,000	2,500
Canada	19,321	19,185	20,535	25,460
Cape Colony	5,230	7,775	7,325	6,540
Chile	30,930	30,110	29,165	25,745
Great Britain	500	500	7,115	500
Germany	21,305	22,160	22,345	20,340
Hungary	330	175	150	210
Italy	3,100	3,335	2,950	2,865
Japan	31,360	34,850	35,910	42,740
Mexico	50,480	50,945	64,440	60,625
Newfoundland	2,710	2,200	2,280	2,295
Norway	5,415	5,915	6,305	6,120
Peru	7,800	6,755	8,625	8,505
Russia	10,320	10,700	8,700	10,490
Sweden	455	390	550	500
Spain and Portugal	49,740	47,035	44,810	49,320
United States	311,582	362,739	402,704	409,414
Turkey	1,400	950	700	425
Total	585,081	641,694	695,709	712,614

Copper Exports from the United States: (In Tons).

1907	1906	1905	1904
228,185	205,460	239,863	247,735

Foreign visible supply of copper in tons:

January	1908	1907	1906	1905
	19,710	16,924	12,983	16,734

The year 1907 proved a record breaker in transactions in copper warrants on the London Metal Echange, a total of approximately 666,514,000 pounds having been traded as compared with 365,000,000 pounds in 1906.

There has been a wide fluctuation in G. M. B. copper quotations on the London Exchange in 12 months of 1907, there being change of about £55 per ton between the high and the low levels.

The price ranges for the year:

	Spot	Futures	Best Selected
High	£110-15	£112	£118
Low	£ 55-10	£ 55	£ 60
Range	£ 55-5	£ 57	£ 58

Following are the highest, lowest and average prices of copper for a period of twenty years:

Years.	Low.	High.	Average.
1887	9⅞	17.90	11.22
1888	15.90	17.65	16.78
1889	11.00	17.50	13.49
1890	14.00	17.50	15.60
1891	10.25	14.50	12.76
1892	10.50	12⅝	11.56
1893	9.50	12.50	10.75
1894	9.00	10.25	9.52
1895	9.35	12.25	10.73
1896	9.75	12.00	10.98
1897	10.75	12.00	11.36
1898	11.00	13.25	12.05
1899	13.25	19⅜	17.76
1900	16.00	17.25	16.65
1901	13.00	17.00	16.72
1902	11.00	13.50	12.16
1903	12.00	15.50	13.70
1904	12.25	15.50	13.27
1905	14.75	20.00	15.70
1906	18.00	25.00	19.50
1907	11¾	26½	20.66

LAKE SUPERIOR COPPER PRODUCTION.

	1907.	1906.	1905.	1904.
Calumet & Hecla	88,000,000	95,000,000	82,500,000	90,341,049
Quincy	19,796,058	16,194,838	18,827,557	18,343,160
Baltic	16,704,868	14,397,557	14,384,168	12,177,729
Champion	16,489,436	16,954,986	15,707,426	12,212,954
Osceola	14,134,753	18,588,451	18,938,965	20,472,429
Tamarack	11,078,604	9,882,644	15,924,008	14,961,885
Mohawk	10,107,266	9,352,252	9,387,614	8,149,515
Wolverine	9,272,351	9,681,706	9,729,971	9,300,685
Trimountain	8,190,711	9,507,933	10,476,462	10,211,230
Ahmeek	5,510,985	3,077,507	1,552,957	376,678
Franklin	4,401,248	4,368,538	4,206,085	4,771,050
Allouez	2,934,116	3,486,900	1,167,957	
Isle Royale	2,667,608	2,937,098	2,937,761	2,442,905
Michigan	2,556,365	2,875,341	2,891,796	2,746,127
Centennial	2,373,572	2,253,015	1,446,584	641,294
Mass	2,078,677	2,106,739	2,007,950	2,182,931
Winona	1,285,963	278,182		646,325
Adventure	1,244,874	1,552,628	1,606,208	1,380,480
Victoria	1,207,337	546,334		
Atlantic		1,493,082	4,049,731	5,321,859
Phoenix			273,219	1,162,201
Tecumseh		58,008		
Miscellaneous	83,200		75,000	50,000
Total	220,117,892	224,407,859	217,762,382	208,329,248

The product of the Calumet & Hecla mine for the fiscal year 1907-8 was about 85,000,000 pounds of copper.

Dividends paid by Michigan copper mines and copper properties in 1907:

	1907	Total to date
Calumet & Hecla	$6,500,000	$105,650,000
Copper Range Con.	2,304,810	6,136,214
Mohawk	900,000	1,500,000
Osceola	1,249,950	7,420,250
Quincy	1,350,000	17,170,000
Tamarack	420,000	9,600,000
Wolverine	1,050,000	4,500,000
Copper Range Company	450,000	
St. Mary's M. L. Co.	750,000	
Union Land	200,000	
	$15,114,760	

HOUGHTON COUNTY MINES.

The average number of men employed in and about the copper mines of Houghton County during 1907 was 17,509 which compares with 16,506 employed during the previous year.

NORTH OF PORTAGE LAKE.

CALUMET & HECLA MINING COMPANY.

In 1907 Calumet & Hecla had another very successful year, although the sharp decline in the price of copper resulted in reducing the amount netted for dividends. The price of copper—the metal—propped from 26 cents per pound in March, April, May, June and July to 11¾ cents in October. The decline was sharp and severe. This, however, is a contingency of copper mining and is not a new condition. Similar things have happened before. Other companies suffered also in a greater degree in proportion to the amount of copper produced and marketed.

Calumet & Hecla is the first copper mine in the Lake Superior copper district, perhaps in the world, and forms one of the solid, substantial mining enterprises in the State of Michigan and is the mainstay and support of the town of Calumet. From the start, the property has been a decided success and no mine has a better record. Its management is up-to-date, progressive, practical, among the best going and the affairs of the company are dispatched with distinct efficiency and exact knowledge. In 1907, again, a heap of new work, practical and of the right kind was done, which resulted in maintaining the high state of efficiency obtained in every working department of the mine. New power houses and work shops were added to the plant, additional equipment was installed and put in successful operation. Active shafts were sunk deeper, a new one started, which is underway to greater depth new levels were started in fresh ground, established ones were driven further into virgin territory, additional reserves of ground carrying leverage copper values of the lodes mined, were developed and put in shape for economical mining,

besides many other finished improvements all of which resulted in strengthening the position of the mine. Then at Lake Linden, a 10,000 H. P. boiler plant was completed and put in commission. Boiler house is 220x108 feet with 24 boilers of the Babcock and Wilcox type installed. Coal is fed to the boilers automatically by Roney stokers. Improvements underway include a 2,000 Kilowatt electrical addition to the electric plant besides the recrushing mill referred to in my last year's report. The building for this mill is 365 feet long by 180 feet wide and will have 136 wash tables with capacity to treat daily 1,500 tons of oversized tailings from the Calumet mill. Tailings from the both mills are estimated about 35,000,000 tons carrying from .04 per cent to nearly, one per cent of mineral arid to contain in the neighborhood of 200,000 tons of copper. These and other improvements were finished and undertaken for the main purpose of maintaining the spllendid efficiency of the property, keeping down operating costs and producing copper as cheaply as practicable. Whether the price of copper happens to be high or low, the Calumet & Hecla management "moves along in the even tenor of its way" operating the mine at full capacity, producing copper with characteristic energy and making dividends for stockholders. And this is the chief end of legitimate mining the world over and the goal aimed for by conservative companies. The company knows the copper business thoroughly and generally succeeds in getting the highest prices for its product. The copper of the Calumet & Hecla is recognized the worlld over as an excelent brand and sells in the market for the highest prices. A considerable amount of the products is exported and sold direct to consumers. The company has no copper selling agents, but markets its own product to the best advantage and in the interest of the stockholders. So long as the present management holds control stockholders will get all that belongs to them to the uttermost cent.

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

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

Main office, 12 Ashburton Place, Boston, Mass.

Mine office, Calumet, Houghton County, Mich.

Mill office, Lake Linden, Houghton County, Mich.

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

Since the beginning of operations, the company has paid in dividends the enormous total of $106,350,000, forty-two and one-half times its capitalization and 4,254 per cent on $2,500,000. The policy followed by the management is broad, practical, progressive and of the kind that brings the best results. The property's future is kept in view just as well as its present physical condition. During the calendar year 1907 upwards of 2,000,000 tons of rock was mined and treated at the company's stampmill. The product of refined copper obtained was 88,000,000 pounds. This compares with 95,000,000 pounds produced in the previous year and 82,500,000 in 1905. Dividends paid amounted to $6,500,000 or $65.00 per share distributed as follows: $20, March 22; $20, June 28; $15, Sept. 28 and $10, Dec. 24. In January, the stock sold as high as $1,000 per share and in October, as low as $535.

The dividend record over a period of years follows:

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

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

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

The continued success of General Manager MacNaughton is reflected all over the property and nowhere more forcibly than in the company's annual reports. So practical, far reaching and fundamental has been the improvements made in the methods of operating the property during the present manager's administration that the most of producing copper has been reduced from about $5.00 to $3.50 per ton of rock treated. When it is remembered the mine product is over 2,000,000 tons rock annually, some conception of the improvements made may be realized. Then as age goes, the mine is getting old and deep and operating costs always increase as greater depth is attained. Calumet & Hecla is described at some length in my

previous reports and in a year or two, no material change can be wrought in the physical appearance of such an immense concern. From time to time, a great deal of the company's earnings has been put back in the property and it has proved a splendid investment, resulted in strengthening its position and enhancing its value from every practical standpoint. The mine is more extensively developed and equipped than any other mine in the country, perhaps in the world.

The company's main tract of mineral land and in which the great mine is opened consists of about 2,700 acres situated in Town 56 North, Range 33 West and about 12 miles North of Houghton, the county seat. Name of mine location is Calumet and has a population of between 30,000 and 40,000 and includes people from nearly every quarter of the globe. Location is laid out with wide streets and avenues and many of the substantial mine buildings and neat residences with well kept lawns and cultivated gardens would be features of attraction almost anywhere. Employees own about 1,000 homes built on the company ground for which a nominal ground rent is charged. They are worthy of a place in almost any town. All houses have water on tap for domestic purposes, free of charge pumped from Lake Superior.

MAIN WORKINGS.

The main workings of the company are at Calumet where the Calumet conglomerate and the Osceola amygdaloid beds are vigorously a worked and the Kearsarge amygdaloid bed in a limited way. The conglomerate has hitherto formed the chief source of supply for the output of rock and copper product. In regard to the growth and development of the property, as before remarked, the mine has been vigorously and continuously operated since 1866 and during its natural period produced as nearly as have been able to ascertain 1,986,314,810 pounds of as fine a brand of copper as there is to be found in the world. Besides, the company has reclaimed a goodly portion of the wilderness and built thereon one of the finest mine locations of which there is any record. In producing this enormous amount of copper, something like 35,000,000 or 40,000,000 tons of rock must have been mined and treated. When it is remembered that every ton represents 12 cubic feet, a faint idea may be realized regarding the vast inroads that have been wrought in the company's mineralized conglomerate belt. Still in spite of such gigantic results, the management has succeeded in maintaining the usual amount of ground reserves and even adding a little to them from year to year.

The same successful policy of operating the property on a scale somewhat commensurate with its possibilities and taking out the best there is in it is being fully maintained and will continue to be in the future the same as in the past, but in a greater degree. When the limit may be reached, the capacity of the company's properties and the efficiency of the plants brought up to the point aimed at by the management, must be judged by the achievements of the past. The dividends paid and money made for development and equipment practically all came from the conglomerate. Until recent years, the amygdaloids were quite neglected. The Osceola amygdaloid is now, however, being more vigorously worked than in any former period with a view, apparently, of somewhat conserving the richer reserves of the conglomerate. The conglomerate dips to the northwest at an angle of 37½° from horizontal. It averages about 14 feet wide and yields from 40 to 45 pounds of copper to the ton treated. It is mined through nine active shafts—eight incline, sunk in the lode and one vertical—the Red Jacket shaft. For convenience the workings are divided into four branches: Calumet, Hecla, South Hecla and Red Jacket shaft branches. Each branch is quite a complete mine in itself. South Hecla embraces shafts Nos. 11, 10 and 9—a double one—and 8, and takes in the complete south end of the conglomerate carrying copper in paying quantities. No. 11 is the southernmost one in commission. Reserves of ground tributary to it are limited, but No. 10 and No. 8 are fine deep shafts with large reserves yielding the usual values belonging to that quarter. No. 11 shaft is 2,400 feet deep. Work in this shaft is confined to taking out the pillars of vein rock. No. 9 and 10, a double shaft, is down to the 63rd level.

Alex Cameron is mining captain at South Hecla.

Hecla branch includes shafts numbered 7, 6, 3 and 2. This branch is in the heart of the rich deposit and has always been an important producer. From these shafts, millions of dollars worth of copper has been mined and they still continue to yield the usual quota of the mine product. No. 7 shaft is down to the 70th level; No. 6 to the 69th level; No. 3 to the 40th level and No. 2 to the 44th level.

William Daniell is mining captain at Hecla.

CALUMET & HECLA MINING COMPANY

Calumet branch joins Hecla on the north. The extreme north and of the conglomerate carrying profitable values includes shafts numbered 2, 4, 5 and 6—5 and 6 are double shafts and are, perhaps, in importance and value next to Red Jacket shaft. Reserves of ground tributary to these shafts are very extensive and contain copper values fully as good as the average of the mine. No. 4 is

the deepest incline shaft in the world, being bottomed 8,100 feet deep on the dip of the lode below the earth's surface. No. 5 with two compartments is the northernmost shaft on the conglomerate workings. Red Jacket shaft has six compartments. It is vertical and located directly west of the Calumet branch. All the lode mined in this quarter above the 56th level is hoisted through the incline shafts. The average depth of the shafts is about 6,000 feet on the plane of the lode. All are connected underground and the openings from end to end are dry and comfortable for working in. Air circulation is as good as it is possible to make it in a great deep mine and every means is taken advantage of to make the mine safe and secure. Total length of the conglomerate on its strike, contained in the company's property, is 13,000 feet and the total length of openings approximate 1,000 feet.

Alex McKenzie is mining captain at Calumet.

VILLAGE OF LAKE LINDEN.
WHERE CALUMET AND HECLA MINING COMPANY'S STAMP MILLS ARE LOCATED.

SURFACE EQUIPMENT.

Each shaft has a seperate rock-house built on similar lines and practically the same plans with the exception of that for Red Jacket shaft. Skips carry from 5 to 7½ tons and dump automatically on grizzles, the fine stuff passes through to rock bins while the coarse stuff rolls by gravity into the jaws of powerful rock crushers, which reduces it to a proper size for stampmill. The company has its own rolling stock consisting of 15 locomotives varying weight from 27 to 90 tons. Also a large number of rock cars and does its own hauling. The rolling stock is powerful, designed by the management especially for doing the work on the mine, which consists of heavy hauling. All the working parts of the property are connected by the Hecla & Torch Lake Railroad, also owned by the company. Mr. Will A. Childs, who has been with the campany for many years, has charge of the work. The railroad is narrow guage, but work is now underway changing it to one of the standard guage. The road bed will be widened and a third rail laid. This change became necessary in order to handle the company's rock output to the best advantage, as it has been steadily increasing for some time past and likely to show a further increase in the future.

New rock cars of 40 tons capacity and standard guage width have already been received at the mine. The company's rolling stock is also being remodelled to fit in the new conditions. All engine fittings and mechanical alterations are made at the mine shops. These shops are modern in every particular and fitted with equipments and tools for doing all kinds of work no matter whether it happens to be heavy and ponderous or light and delicate. The machinery plant of the mine is not only powerful, efficient and complete in every particular and detail, but handsome to look upon and proves a great attraction to visitors from other mining fields. Power houses and machinery buildings are massive and spacious and built of mine rock or brick and look well. Rock is lifted out of the mine workings by eleven powerful hoisting engines especially designed for that kind of work. Air compressors operating power drills, underground hoist, etc., have an aggregate capacity of about 400 power drills and have an air compressing to operate as many more. All underground pumping belt surface are operated by electricity.

RED JACKET SHAFT.

In mining and engineering, this shaft is one of the wonders of the world, including plant and equipment, represents more money, perhaps, than any other similar works in existence. It is vertical, one of the largest and deepest shafts in the world, being 24½x14½ feet within timbers, six compartments and 4,900 feet deep. It is an admirable piece of work built in solidly with brick and cement from collar well down into the settled rock and below that point, substantially timbered with only the best Georgia pine. Practically everything science and skill could provide was worked in to make it safe and perfect in every particular. Two compartments are used for hoisting rock with Kimberly skips in service carrying from 7 to 8 tons of rock to a trip; two compartments for hoisting water and two for lowering and raising men and supplies in and out the workings. In the bottom of the shaft, the thermometer registers 87.6 degrees Fahrenheit. The Red Jacket shaft and No. 4 shaft Calumet connect on the 56th level. Reserves of ground tributary to these shafts are very extensive and contain the usual values of the Calumet conglomerate. Daily output of rock is about 1,200 tons. Output, however, may be materially increased when desired. The slope shaft, started at the 57th level 3,400 feet vertically and sinking for the purpose of taking out the vein in the 5-forties of land located between North Tamarack, Tamarack Junior and also east of Tamarack Junior, and is now down to the 67th level. Broken vein is loaded in sort of tram-cars constructed for the work and hauled without unloading on the way to the Red Jacket shaft and dumped directly into bins. From the bins, it is run into Kimberly skips and hoisted to surface. Thus, the rock is handled but once underground, although it is

hauled through an incline shaft, conveyed over a long cross-cut and hoisted to surface through one of the deepest vertical shafts in the world. It is a remarkable undertaking, but that it will prove decidedly successful, there is no doubt whatever. On the 57th level, an electric haulage is being installed for tramming from the slope shaft to Red Jacket shaft. The shaft house for Red Jacket shaft is built almost entirely of iron, fitted with powerful rock crushers and other modern appliances for economical manipulation of rock. In this branch, as in others, a number of improvements have been incorporated into the equipment that have resulted in bringing about a big saving in expense to the company, have resulted in bringing about a big saving in expense to the company.

John Lindstrom, mining captain at Red Jacket shaft.

Red Jacket shaft is equipped, with a sinking engine house of stone, 69x36 feet, containing a pair of horizontal tandem Corliss engines with cylinders 16x32 inches in diameter with a 48-inch stroke and a 25 ft. diameter drum. The main hoisting engine house, built of stone, 220x70 feet, contains two pairs of triple expansion engines of 3,000 H. P. per pair, having cylinders 20⅛, 31¾ and 50 inches diameter with a 72-inch stroke, to run 60 revolutions per minute and fitted with the Whiting drum system, arranging to hoist 10 tons per load at a speed of 60 feet per second. To give the reader some idea of the size of the engines, the weights of some of the parts is here given: Engine bed 76,106 pounds; main pedestal plate 120,722 pounds; end pieces for bed plate 19,464 pounds; two cylinders 25,550 pounds; details of brake, 51,171 pounds; one foundation bed plate, 38,547 pounds; wheels carrying rope, 143,577 pounds; engine beam forged of steel, 64,920 pounds; crank shaft, 26,000 pounds; air pump, 13,540 pounds; the total weight of the pieces enumerated and they are few compared with the complete engine, is about 520,000 pounds or 260 tons.

The product comes from all over the mine.

OSCEOLA AMYGDALOID BED.

This lode is situated about 750 feet east of the conglomerate and parallels it clear across the company's territory in Calumet. It dips to the westward at an angle of 38 degrees from horizontal, runs from a few feet to 30 feet wide, averages about 15 feet and yields about 19 pounds of copper to the ton of rock treated. The company has 6 shafts sunk in this amygdaloid lode on its strike and numbered from south to north. No. 13 is the southernmost and No. 18 the northernmost. All six are fine shafts, 3 compartment, substantially constructed, in good running order with combined capacity to lift an enormous product of rock. Each has permanent combination shaft and rock houses with ample rock bins and powerful rock crushers for reducing and handling the product. Levels 8x8 and 100 feet apart in depth are driven from shaft to shaft and connected, which makes air circulation good and afford means for passing from one part of the mine to another. The lode is more or less irregular and bunchy, but portions of the opened ground will make good stopes and turn out fair values. The underground department is developed on modern methods of mining and in the most practical way for getting the best results. The product is taken out on the "back-stoping" method typical of the district. Tramming is now done by hand labor, but electricity will soon be installed for the work. Tram cars dump directly in skips, which operate in balance, carry from 7½ to 8 tons to a trip and dump automatically on rock-house grizzles. Walls of this lode are sound and but little timber is consumed for holding up ground while breaking down the product. From end to end, there is an enormous amount of ground developed on this lode and in prime shape for economical extraction. Shafts are not deep, levels are connected in many places, the air circulates freely through the openings and upon the whole, this is a very comfortable mine to work in. Air for running machine drills, underground hoists, etc., is conveyed from the compressors located in the main workings on the conglomerate. In all, something over a hundred power drills are operated on the Osceola amygdaloid. No. 13 shaft is down to the 23rd level and 2,300 feet deep; No. 14 and No. 15 are down to the 16th level and 1,600 feet deep; No. 17 is down to the 8th level and 800 feet deep while No. 18 has just got down in settled rock matter and entered upon a course of systematic development. The lode in this shaft, though opened in only a limited way thus far, looks first-rate and shows up the regular values of copper belonging to the formation. No. 17 is also in development stages, but stretching out for bigger and better things. The management is now producing from this lode in an aggressive way from end to end. During the year under review, all six shafts have been in operation and more or less vigorously worked. A description of one is a description of all for they are practically duplicates. Shafts 13, 14, 15 and 16 are connected underground and the rock product comes from the different shafts and practically all over. In the deepest openings, copper values continue to show up with the persistency and strength characteristic of the Lake Superior copper bearing formations. Large lode reserves are maintained in accordance with the general policy of the management and the future outlook for this quarter is distinctly bright. Daily output of rock from the two lodes is about 7,000 tons of rock. On the Kearsarge lode, but one shaft, No. 22, is now working. It is down to the 9th level and under development for bringing the most practical results when sending out a product.

William Tretheway is mining captain on Osceola amygdaloid.

All over, the property is in fine condition physically with every department running practically to perfection. Of all the new additions and installations made during the past three or four years, not a single one so far as I know or have heard of, failed to make good and meet all expectations.

Stampmill re-construction has been completed. New improvements and economics put in operation have greatly increased the efficiency of the two mills and resulted in reducing operating costs and also in recovering a larger percentage of fine copper from passing out into the lake with the wash than formerly. This is a most important achievement and highly appreciated. 24 out of the 28 stampheads are now in operation and doing first-class duty. The other four may be started up whenever the management deems it for the best interest of the company to do so. They are ready for service. All jigs, slime tables and belt work in the mills are operated by electricity, which answers to perfection for this duty. Betterments at the smelting works have also been finished and the capacity of the plant increased. The plant is very complete in every particular, operated with ability and turning out as fine a brand of copper as the world can afford.

Other properties under the control and supervision of the Calumet & Hecla management are being developed on systematic, practical lines and up-to-date mining methods. Reference to them is made elsewhere in this report.

QUINCY MINING COMPANY.

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

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

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

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

QUINCY MINING COMPANY—MESNARD SHAFT SURFACE EQUIPMENT.

Underground openings are now over two miles in length and contain a vast amount of developed ground ready for stoping out. In the deepest openings, the lode is just as highly mineralized as the average of the mine and just as strong and robust as in the upper workings nearer surface. 1907 has ended a strenuous year and will always be a notable one for the excellent work done. Air blasts and underground disturbances, to say nothing of other things, had reached a serious condition and demanded quick, energetic attention of the most experienced and skillful kind. In a great mine like the Quincy, with openings a mile deep and more than two miles in length, the overhanging ground trembling, cracking and coming together here and there, is a mining problem of rare occurrence and of such a nature that no man but those who happened to be underground there at the time, can form the least conception of what it was really like. But the management including Captains, Whittle, Kendall and Jacobs know mining thoroughly and proved equal to the emergency. The ground has been taken up and supported and air blasts have been practically overcome. Weak places have been strengthened with heavy timber and openings filled in with waste rock so that Quincy is now as safe to work in as any deep mine. Altogether a heap of practical work and of the kind that count and bring results was done and the position of the property has been materially strengthened and improved all over. Most of the improvements are referred to in Superintendent Lawton's report, which annexed hereto. So successful and satisfactory to the company has been the management of the property during the past two or three years that Mr. Lawton was recently appointed its general manager.

During the year under review about 2,300 men were employed and 200 machine drills were operated. The daily output of the rock is something over 4,000 tons. The quantity of rock hoisted and treated at the company's stampmill is not given, but its mineral contents per ton of rock treated may not have varied material from the percentage recovered the previous

year. The mineral product was 31,339,170 pounds which yielded 19,796,058 pounds of refined copper. The copper was sold for $3,717,500.62 or an average of approximately 18.77 cents per pound.

The income account compares as follows:

	1907.	1906.	1905.	1904.
Mineral prod. lbs.	31,339,170	26,366,101	29,423,448	27,171,238
Lbs. copper	19,796,058	16,194,838	18,827,557	18,343,160
Gross receipts	3,717,500	3,159,011	2,981,120	2,444,749
Expense at mine	2,012,084	1,662,520	1,715,419	1,594,711
Construction	210,699	138,560	138,732	106,002
Smelt & Misc.	219,565	162,356	190,503	194,110
Profit	1,275,151	1,195,575	936,466	549,926

	1907.	1906.	1905.	1904.
Other income	21,520	27,411	29,285	27,630
Total net	1,296,671	1,222,986	965,750	577,555
Dividends	1,485,000	1,250,000	600,000	500,000
Surplus*	188,329	* 27,014	365,750	77,555
Total surplus	1,032,205	1,220,533	1,312,592	946,841

*Deficit.

STATEMENT.

Of Assets and Liabilities of Real Estate, Mine Plant and Supplies in Use January 1, 1908.

ASSETS.

Cash, Copper and Investments	$763,727.93
Accounts receivable	210,578.67
	$974,306.60

LIABILITIES.

Mine Drafts unpaid	$ 179.82	
Smelting Works Drafts unpaid	2,272.73	
Accts. Payable in New York	20,319.15	
Accts. Payable at Mine	269,388.21	
Accts. Payable at Smelts	10,901.03	$303,060.94
		$671,245.66
Add at Mine:		
Supplies per inventory on file	$289,196.23	
Teams, Etc., ...	4,293.84	
Accounts receivable	22,411.76	
		$315,901.83
Add at Smelting Works:		
Supplies per inventory on file	$ 44,374.28	
Teams, Etc., ...	522.17	
Accounts receivable	160.16	$ 45,056.61
		$1,032,204.10

Less Dividends:

Less dividends payable march 23, 1908, $1.50 per share or $165,000.

With 1907 the company has practically completed its half century of existence. During this period, it has produced 392,274,045 pounds of refined copper, paid for real estate and permanent improvements, $6,145,930 and $17,955,000 to stockholders in dividends. That is certainly a record to which any company may point to with commendable pride. That the Quincy stockholders will secure the utmost cent that the property can be made to yield is assured as long as the present management remains in power.

The dividend record of the company for the past ten years are as follows: 1907, $13.50; 1906, $12.50; 1905, $6.00; 1904, $5.00; 1903, $5.50; 1902, $7.00; 1901, $9.00; 1900, $9.00; 1899, $9.50; 1898, $6.50. In this period of ten years, shareholders received a total of $83.50 per share or something better than the present market price of the stock. There are on the books of the Quincy Mining Company a record number of stockholders' names between 2,200 and 2,300. At the time of payment of the last dividend, there were approximately 2,000 persons holding Quincy shares, this being an increase of about 250 over the number to whom the previous payment was made.

Quincy mine is described at some length in my previous reports.

The company is mining the Pewabic lode and a parallel belt known as the West branch. Pewabic lode forms a main source of production and runs from three to eighteen feet in width. West branch is a narrow, pockety belt with product running to mass and barrel copper.

Quincy mine is opened and operated through five working shafts along on the strike line of the outcrop for over a mile and one-half in length and numbered 2, 4, 6, 7 and 8. All five shafts are connected at different levels underground. Developments are conducted on an enormous scale. Underground openings from one end of the mine to the other are over two miles in length. Large reserves are opened up ahead on different levels, so that men breaking down the lode can be distributed to the best advantages. The lode is extracted on regular stoping system typical to the district, with modifications proved by experiments to be admirably adapted for the work. Dry walls built of waste rock take the place of stull timbers and but little of it is consumed in taking out the product.

The plant is maintained at a high state of efficiency through repair work and the installation of new machinery wherever needed. Rockhouses have been overhauled to such an extent that they appear the perfection of efficiency and economy. Rock-bins have been enlarged from 150 to 750 tons capacity. Bin chutes are filled with pneumatic gates and aprons from which the coarse rock is fed into immense 24x36 in. crushers. One man at each crusher with a lever operates the pneumatic gate and apron with perfect ease, and at the same time, picks out the waste rock and mass copper. The whole 24 hour's output of one shaft aggregating from 700 to 1,200 tons, besides other shaft house work is now prepared for the stampmill by 5 men. Before these changes were made, it took 10 men to do this work. Not a pick, shovel or wheelbarrow is now used in manipulating the rock product in either rock house. Tramming underground is done principally by electricity with 20 electric moors in service. Skips operate in balance and carry 8 tons of rock to a trip running at a speed of a mile in two minutes. While the success achieved has been of the best, the management is still bending its energies towards getting bigger and better things and they will be obtained. The whole property is very ably and skillfully managed and every department appears to be running practically to perfection. A short time ago in company with Supt. Lawton, I looked over the main features of the surface department and could not refrain from contrasting in imagination the Quincy mine of 42½ years ago with the Quincy mine of today. During this period, a few changes have been made in the appearance of the property.

Measured by results obtained what a change has been made in the status of the mine.

General Manager, Chas. L. Lawton; chief clerk, F. J. McLain; head mining captain, Thos. Whittle; assistant mining captain, Chas. Kendall, North Quincy; Geo. Jacobs, assistant mining captain, South Quincy, J. W. Shields, mill superintendent.

General Manager Lawton in his annual report says in part:

"Many reasons have conduced to increase the cost of production of copper at the mine; among which may be cited the greater depth of the workings; the subterranean disturbances; the lessening of contents of metal in the rock, due to increased amount of lower grade rock that it has been found profitable to stamp; to the narrower mineral lodes being worked, and to the higher cost of labor, material and all supplies. This rendered it necessary that a large amount of expenditures should be incurred, along the line of construction account, in order to secure such additions to the plant, repairs, alterations and improvements in the equipment as would insure a more economical working in other directions, to the end that a profitable outcome should crown our efforts. The year has thus been a strenuous one, and the work of strengthening the mine plant in its entirety has been carried on unremittingly and in corresponding degree will continue to prevail during the year to follow.

The old unused stone-boiler house South of No. 6 air-compressor has been repaired, remodeled, and supplied with concrete floor, an upper floor deck, concrete storm shed entrance, with double deck steel lockers and other necessary equipment to make it into an excellent dry or change-house for No. 6 shaft men.

A large new and long needed steam hammer was installed at the blacksmith shop.

On account of the exceedingly small capacity of No. 7 shaft rockhouse bins, and the saving of labor shown by No. 8 rockhouse system, which showing was 50 per cent lower than in all other rockhouses in 1906, the sheave frame with sheaves was raised about ten feet, all pulley stands raised to proper height, the lower working floor in the rockhouse removed, the three small rock-breakers removed and large 36x24 in. breakers installed about 10 feet higher, with an entirely new system of handling the rock. The changes and additions have increased the bin capacity from 150 to about 750 tons, and have reduced the cost of handling the rock about one half. The increased rock-bin capacity gives the very much needed elasticity of working between the mine, railroad and mill, having a tendency to lessening the cost of handling the rock in each department from the bottom of the mine to the tailings into Torch Lake.

Pontiac shaft, which was started last fall is located 2,600 feet North of Mesnard shaft. This No. 9 shaft is situated in the land purchased from Arcadian some time ago. Operations underground have been very expensive, made necessary on account of the measures taken to ablate the air blast condition and disturbances; but while expensive and at times very difficult, they seem to have been along beneficial lines, for very little trouble has been caused by air-blasts during the year. There is still much to be accomplished, yet the results of the stopes already taken appear to be of a permanent nature and encourage us to view the future with increasing confidence.

Nearly one quarter more development work was done during the past year than during the previous year, that also was larger than was accomplished during its predecessor (1905). The extra amount represents, in lineal feet, a distance greater than one mile of underground workings; the shaft sinking accomplished was three times greater than in the previous year. All development underground has opened satisfactory copper bearing ground of about the usual quality, producing the largest tonnage ever sent to the stampmills during one year, increasing the percentage of mass over 70 per cent, and augmenting the reserves so that they are now larger than at any time of the mine's existence.

The Mesnard shaft territory is developing about as expected. Drifts from the shaft with good showing of copper rock are well into the Pontiac territory, where by another year, raises will be commenced on a line of the Pontiac shaft.

Notwithstanding that the great increase of expenses all along the line, during the year, added to the average cost of a pound of copper, there are evidences of greater efficiency and economy in many directions that are well worth considering.

The cost of coal per ton was again higher than last year, yet the decrease in consumption per ton of rock stamped shows a total saving of 9,636 tons during the year, an amount greater than 10 per cent of our entire consumption. It is reflected in a reduction of cost of lineal foot of development, helping also to reduce the cost of hoisting a ton of rock, which was the lowest ever touched.

The rockhouse changes have resulted in giving an average low cost for the year never before reached, while the average cost of stamping a ton of rock is the lowest in the history of the stamp mill, especially at No. 2 mill, where such favorite results were obtained as to make it desirable that No. 1 stamp mill be given a like advantage.

The mine, the railroad, the mill and the smelter have been brought into closer relations and all have worked together with entire harmony during the year to the end that greater efficiency has been secured."

OSCEOLA CONSOLIDATED MINING COMPANY.

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

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

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

Osceola is described at some length in my previous reports and whatever might now state touching the property would be little other than a repetition of that which appears in the works referred to.

For many years, the management has been bending its energies toward strengthening the position of the mines and increasing their respective capacities. Substantial success has been achieved, although results obtained in 1907 were somewhat disappointing, which was brought abut by the financial stringency and the demoralized market for copper during the last half of the year.

The mine product during the year was quite materially curtailed and under such conditions, a comparison of results with those of the previous three or four years, especially in the matter of cost of production, carries but little significance. A comparison, however, of three years operations may be interesting. It follows:

	1903	1904	1905
Tons rock treated ...	924,400	1,095,520	1,007,200
Lbs. copper prod.	16,059,636	20,472,459	18,938,965
Net profit	$435,735.45	$622,819.77	$938,746.07
Balance	$131,599.63	$505,929.40	$867,775.47

	1906	1907
Tons rock treated ...	1,016,240	811,603
Lbs. copper prod.	18,938,451	14,134,753
Net profit	$1,623,189	$722,755
Balance	$1,337,164	$1,386,869

ASSETS AND LIABILITIES.

	1905	1906	1907
Assets including copper	$1,691,115.75	$2,442,844	$1,819,895
Liabilities including advances on copper	823,340.28	1,105,680.37	433,026
Balance of assets Dec. 31,	$ 867,775.47	$1,337,164.17	$1,386,869

The Directors report of operations for the year ending Dec. 1907: Gross value of fine copper produced:

Sold 11,080,210 lbs., at 18.17c	$2,012,842.74	
*Unsold 3,054,543 pounds estimated at 13c..	397,090.59	
Total 14,134,753 pounds		$2,409,933.33
Balance of interest receipts and other income		71,372.96
		$2,481,306.29
Running expenses at mine	$1,497,111.99	
Smelting, transportation, commission and all other charges	177,065.62	
		$1,674,177.61
Gross profit from operations		$ 807,128.68
From which deduct construction expenses:		
New construction at all branches		84,373.64
Net profit for the year		$ 722,755.04
From which deduct:		
Dividend of $7 a share, paid July 29, 1907, ...		673,050.00
Surplus for the year		$ 49,705.04
Balance of assets, Dec. 31, 1906		1,337,164.17
Balance of assets, Dec. 31, 1907		$1,386,869.21

*Of the above amount there has since been sold up to January 31, 1908, 858,342 pounds at 14 cents per pound.

From the operations of the year under review the company paid $7 per share as compared with $12 paid in 1906. Total dividends paid to date, $7,335,650. As may be seen by the directors' report, the company's treasury is in a healthy condition. It also contains 3,850 shares of Osceola stock.

The present refined copper capacity of the mine is about 20,000,000 pounds. In 1904, the product of fine copper was 20,472,459 pounds.

There is, however, being sunk in the North Kearsarge a new shaft, now down well into the solid rock, which when under full swing should result in increasing the capacity of this quarter about 5,000,000 pounds of copper annually and bringing the total capacity of the property up to about 25,000,000 pounds. I was underground in this shaft a short time ago and the work is well underway. It is concreted through the overburden and when finished will be second to but few hoisting shafts in the district. Levels are already underneath the point where it will come down and the work of getting through will be attacked from below and above at the same time thus hustling it along as rapidly as possible. There are three undeveloped 40's of land that will become contributary to this new shaft when down that are fairly well known to contain values as good as the average of the mine.

Osceola Consolidated embraces three active mines and a defunct one: Old Osceola, South Kearsarge, North Kearsarge and Tamarack, Jr. Tamarack, Jr. is idle. Average yield of copper when selected per ton of rock treated is about 18 pounds. Old Osceola adjoins the Calumet & Hecla mine in the South with 720 acres of mineral land. The lode is about 14 feet wide and irregular in trend and characteristics. Mineral makes in bunches and the mine is deep and old. Operating expenses increase with depth, but improved methods for taking out the product have recently been introduced

and put in force that will soon begin to show better results in the cost sheet. The mine is operated through two shafts, Nos. 5 and 6, located about 1,300 feet apart. Both are compartment and opened up ahead with substantial ground reserves carrying the average values of the lode. Shafts are connected and also with the old workings and ventilation is first-rate. Deepest openings look as well as any part of the mine. No. 5 is 4,309 feet deep and No. 6 is 4,423 feet deep. The old mine looks as well now as it has in many years past and promises just as much for the future. It is in quite a prosperous condition and good physical form. Surface equipment is powerful, efficient and in good running order. Each shaft has a separate hoisting plant good for 6,000 feet, operating counter-balancing Skips. No. 5 shaft skips, 5 ton capacity, No. 6 shaft skips, 7 ton capacity and carrying 4 tons to a trip. Machinery and power buildings are of stone trimmed with brick and makes a good appearance. Previous to the re-organization of the company in 1897, Old Osceola paid $2,172,500 in dividends.

South Kearsarge is located about two miles northeast of the Old Osceola and joins Wolverine on the South with 160 acres of land. Mine is working the Kearsarge lode through the two shafts, Nos. 1 and 2, about 1,100 feet apart and sunk at an angle of 39° from horizontal. Both shafts are 3-compartment operating 4-ton skips counter-balancing in shafts and lift about 1,300 tons rock daily. No. 1 is 2,587 feet deep. No. 2 is 1,787 feet deep. The lode averages 14 feet wide and produces a good grade of rock yielding over 20 pounds to the ton stamped. Shafts are going down and levels extending in new ground in accordance with the policy of the management and the usual reserves maintained throughout the mine. Deepest openings in the lode look as well as any part of the mine and carry the usual grades of copper. Shafts are connected in different levels and the underground workings well ventilated. Each shaft is equipped with a separate hoisting plant capable of doing the work of the mine satisfactorily. Surface equipment is adequate for requirements.

KEARSARGE.

Kearsarge is separated from South Kearsarge by the Wolverine mine, which it adjoins on the North and the Allouez and Ahmeek on the South. Lands consist of 1,120 acres, admirably located and carries the Kearsarge lode in which the mine is opened for over a mile in length. Operations are carried on through two main shafts, 3-compartment and sunk in the lode on its plane 1,800 feet apart. No. 1 is about 3,850 feet deep and No. 3 is 3,181 feet deep and conected by various levels. No. 4 is sinking and about 200 feet deep. Levels in turn are conected by winzes and raises that make free circulation of air and a comfortable mine for working in. Workings are developed on broad, practical lines and contain an immense amount of opened ground carrying values about the average of the mine. The lode averages about 14 feet. Extreme points penetrated look as well as any workings in the mine. This branch of the company's property has an encouraging outlook and better things are predicted for it. The surface equipment is very complete, practically new, up-to-date, highly efficient and adequate for requirements. The mine buildings are substantial, conveniently located and equipped with the best tools and machinery for doing mine work. The property is ably managed and economically operated. Each branch of the property is well provided with comfortable dwellings for employes.

In his report, General Manager Norman W. Haire says, in part: While undergoing thorough and extensive repairs, No. 6 Osceola Branch shaft has been out of commission since October 10, 1907. This shaft was becoming unsafe on account of the decayed timbers; besides, the foundation had begun to give way. The old skip tracks have been thoroughly repaired from top to bottom, new 7-ton skips, with safety appliances have been installed, the shaft and rockhouse has been overhauled and is now in first-class condition. Throughout the shaft sound timbers have been constituted wherever necessary. It has been our endeavor to make the entire equipment in and about No. 6 as good as new, and suitable for handling an increased rock production for many years to come. Hoisting will be resumed at this point about February 1, 1908. Since October 10, production at this branch has been confined to No. 5 shaft. Conditions at this shaft have not materially changed since last year's report was written.

The new No. 6 steel boiler house, with a stack of five boilers installed, went into commission on May 28. The new Nordberg 50-drill compressor was turned over on September 16, 1907 and the electric light plant was put into operation the following month. A new 10 in. air main, nearly one mile in length, connecting the compressor with the bottom of No. 6 shaft was also completed September 16. Since then, we have extended the 7 in. air main from No. 6 to No. 5 on the 42nd level. This work was finished December 14. A small office for the mining captain first went into service December 28. We have installed in No. 6 shaft an underground telephone system which works successfully. The foregoing refers to Osceola branch.

All the new equipment is of the best and most economical of its kind, and thus far, has given excellent satisfaction. It should result in a greatly decreased cost of production of rock.

Barring unforseen contingencies, we have a right to expect an increased rock production for 1908. The cost of the extensive repairs to No. 6 shaft, including shaft and rock house, was charged to mining expense.

SOUTH KEARSARGE BRANCH.

No. 1 shaft was sunk 377.5 feet in good, fair-loking vein matter. No. 2 shaft was not sunk for the year. Drifting at this branch aggregated 5,974 feet, all in good copper ground. We have very large reserves in this mine ready for stoping when required.

NORTH KEARSARGE BRANCH.

Repairs to No. 1 shaft, made necessary by the fire in September, 1906, were not completed until June 10, 1907. The shaft went into commission on that date. The damage done to the shaft by the fire far exceeded our first expectations. Besides the loss occasioned by the shaft being out of commission for so long a time, we expended in its repair, in 1907, the sum of $36,950.73, which was charged to operating expenses. This shaft is again in prime condition. To guard against fire in the is future, all the new timbering is now provided with a sprinkling system which keeps it thoroughly saturated all the time.

In No. 3 shaft 7-ton skips of the same pattern in use at No. 1 were installed in August. Somewhat extensive changes in the tracks and rock house were necessary to adapt them to the new conditions. Both No. 1 and No. 2 shafts, together with their equipment, are now in excellent condition for heavy work.

Underground conditions in these shafts are about the same as last year. Some of the new openings are fair for copper—others are poor. On the whole, developments in the new ground were of an encouraging nature.

At No. 4 shaft progress until recently has been slow on account of natural conditions. A few feet from the surface, we encountered an enormous bed of quicksand. The first perpendicular drop shaft reached the ledge in May, but on account of the pressure of sand and water, we were obliged to sink two more drop shafts back of the first before reaching the surface with the incline. Permanent timbering of the latter from the ledge to surface was finished late in November. On December 31, we had completed 50 feet of sinking in the rock. On that date, this shaft was 162 feet deep, of which distance 112 feet was through overburden and 50 feet in rock. Overcoming the quicksand and water at this point cost upwards of $50,000, charged to running expenses.

On account of the broken condition of the ground near the surface at North Kearsarge, this shaft was located a short distance back of the lode in solid foot-wall trap. We are at present driving a drift from the bottom of the shaft North, in which we will cut a fork to take care of the large volume of surface water, which has been an impediment to rapid sinking. We intend to crosscut to the lode at the intersection of the 6th level of No. 3.

STAMP MILL.

There was stamped at the mills during the year 1907, 811,603 tons of Osceola rock; 320,733 tons of Ahmeek rock, and 1,200 tons of Tamarack amygdaloid rock, at a gross cost of 17.47 cents per ton. Deducting the profit made on custom rock, the net cost was 11.71 cents per ton. We have now had 3½ years' experience with steeple compound stamps in Osceola mill. Results have completely demonstrated their high efficiency. Seven heads in the mill have been in use on an average of two years each, and the entire bill thus far for repairs has been but a trifle, amounting from the beginning to less than $1,200. In 1907 there was no considerable item of expense for this purpose aside from the normal wear and tear.

GENERAL REMARKS.

Costs for labor and materials were still higher in 1907 than in 1906. This condition, together with the complete shutdown at No. 1 North Kearsarge until June 10, on account of the 1906 fire, and the further curtailment of production during the last three months, necessitated by general financial conditions which demoralized the copper market, account for the increased cost of production as compared with former years. By February 1, we expect to be again on a normal basis of production at all branches.

In comparison with 1906, there was a falling off in the per cent of mineral. On account of the high grade of mineral obtained at the Osceola branch, we expect that resumption of rock shipments at No. 6 shaft will raise both percentages to normal.

TAMARACK MINE.

This is an interesting mine and one of the most remarkable mining organizations on the globe. For many years, it has been a substantial producer and a fine business enterprise. Since the beginning of operations, the company has distributed $9,420,000 in dividends, besides building up one of the finest mining locations in the country and developing and equipping a great mine. Dividends paid in 1907 amounted to $420,000—$3 per share was paid in January and $4 per share in July, or $7 per share for the year. The company has paid over 6 times its entire capitalization in dividends, as well as provided steady employment at good wages to a force of from 1,000 to 2,000 men year in and year out. Capitalization is $1,500,000 divided into 60,000 shares of par value of $25 each. Tamarack Mining Company was organized in 1882 for the purpose of mining the Western continuation of the Calumet conglomerate lode as it passes from the lands of the Calumet & Hecla Mining Company into those of Tamarack. This lode is the same one, which Calumet & Hecla mines and from which Calumet & Hecla Company has paid stockholders $106,000,000 in dividends and built up the finest mining location and mining equipment

in the world. Tamarack also mines the Osceola amygdaloid lode, but the conglomerate forms the chief source of product supply. The mine, however, has no outcrop of either lode but commands them, the lodes, through 5 vertical shaft. The main tract of mineral land consists of 1,280 acres of land adjoining the Calumet & Hecla on the West and North. Tamarack practically forms a part of the town of Calumet.

Tamarack is now getting very deep, as may be seen by reference to shaft descriptions a little further on in this report, with the main workings in the lode constantly slipping further away from working shafts. As a natural result, it is becoming comparatively a high cost producer. The air, which men must live in and breathe, has a long way to travel to reach the principal underground workings, and in some stopes and openings, the atmosphere is so hot that men cannot dispatch so much work as in shallower, cooler mines. Then, the mine is still suffering from the effects of the fire, which broke out over two years ago. One-half the capacity of No. 5 shaft,—one of the largest and deepest shafts in the world,—is still used for lifting water out of the workings. It will soon be relieved, however, from this duty and a big expense saved. Modifications made necessary by the damages wrought by the fire, are also underway that will result in reducing water costs when completed.

Tamarack is very ably and skillfully managed and with the greatest carefulness, yet operating costs are of necessity comparatively high and no management on earth could possibly reduce expenses sufficiently to make the mine a low priced copper producer. If the mine were not worked on economical, modern lines and up-to-date methods of the most practical kind, working costs would be much higher than they have thus far been for Tamarack is not only the most expensive mine in the copper country, but the most difficult one to work. The affairs of the company are transacted with exacting knowledge and if practically unerring precision. Separate and complete cost accounts of every department are kept, and the price of every item, whether big or small, is charged to the work performed, which in turn is charged to the proper department of the mine. System prevails everywhere and the cost of anything whatever done in the mine can be looked up and seen in a moment's time and any weakness readily detected. But Tamarack shafts are very deep, crosscuts lengthy and the vital workings of the mine a long way below the surface of the earth from which the product must be broken down, trammed to shaft and hoisted to surface.

Underground operations are conducted through 5 working shafts, which are large, deep and vrtical, and known as Nos. 1, 2, 3, 4 and 5. No. 1 is the oldest and now used principally for getting the water out the workings. The conglomerate tributary to this shaft is exhausted, besides the shaft was badly damaged by the fire. It is 3,409 feet deep, and 3 compartment. No. 2 is 4,355 feet deep, 8x16 feet inside measurement and 3 compartment. Nos. 1 and 2 form "Old Tamarack" while Nos. 3 and 4 constitute "North Tamarack." No. 3 is 5,200 feet North of No. 1 and 16x8 feet in dimensions, three compartment and 5,253 feet deep or practically a mile down vertically. This is the deepest vertical shaft in the Lake Superior region, if not, in the world and it happens to be the best one of the Tamarack mine. No. 4 is located just North of No. 3, is 4,540 feet deep and a duplicate of No. 3 in dimensions. No. 5 is one of the greatest shafts in the world, being 27 feet long by 7 feet wide within timbers, divided into 5 compartments and 5,089 feet deep. No. 5 and Old Tamarack workings are connected on the 29th level. The opening helps to ventilate the workings of both quarters and affords a way for escape for men in case of an accident.

During 1907 the company employed an average force of 1,479 men and operated 60.8 air machine drills. 596,194 tons of rock were hoisted of which 533,600 tons were treated at the stampmill. The product of mineral obtained was 17,071,730 pounds, which yielded 11,078,604 pounds of refined copper or 20.76 pounds per ton of rock treated. The product of refined copper in 1906 and 1905 were respectively, 9,832,644 pounds and 15,824,008 pounds. In 1906, however, the product fell off on account of the fire. Opening work 4,772.1 feet. In addition to this a great deal of necessary improvements were made practically all over the mine, which resulted in improving the condition of the property and strengthening its position very materially. Three shafts are in commission with two compartments each—one is used for hoisting rock and the other used for lowering timber, men, supplies and other purposes.

The conglomerate is reached by a series of crosscuts driven from shafts and as depth is attained, the conglomerate gradually creeps further and further away from shafts and crosscuts grow longer and become more expensive to drive. The costs of mining the products are naturally increased with remoteness of lode from surface. Crosscuts are 120 feet apart vertically, which gives 200 feet of conglomerate backs or makes the levels 200 feet apart in the conglomerate. The "back-stoping" system typical of the district with modifications is used for taking out the lode. The best method for the work is practiced. The lode is taken out mostly in contract work. The rock is trammed underground by an endless rope system operated by mechanical power that works first-rate. Crosscuts are long and the system is highly appreciated by trammers. Filled trams are loaded on cages counted balancing in shafts, hoisted to surface and dumped on grizzles in the rock-houses. Safety clutches are fastened on each side of the cages. Rock is carefully and economically assorted and manipulated in rockhouse. The whole work is efficiently and economically performed. The management is aiming to get out the best there may be in the property. Future requirements must be anticipated and provided for in a great mine and they are in the Taramack. Tamarack has a very complete equipment in first class running order and efficiently operated. Much of it is of modern design and manufacture and good for years to come. Machinery buildings are substantial and

well located. Shops are equipped with the best tools and fittings and each shaft has a seperate hoisting plant of enormous power that lift cages with loaded cars at the rate of 3,000 feet per minute. The plant is operated by steam power and the location is lighted by means of electricity. Mine location forms a part of the town of Calumet and has a large number of comfortable dwellings for employes besides a well equipped hospital, Methodist church, a fine public school and other necessary buildings.

The company's stampmills are located at Torch Lake about six miles from the mine. The Mineral Range Railway hauls the rock from the mine to the mill. The company holds an interest in the road. The mill-site is an exceptionally fine one with an abundance of water for concentrating and domestic purposes the year round. Mills are equipped with 7 powerful heads and the best machinery known for washing and saving copper. Supplementary machinery is practically automatic and the plant is very complete and economically operated. Company's product is smelted at Dollar Bay smelting works. The Tamarack is in the hands of good people who know copper mining and are doing it right.

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

ASSETS AND LIABILITIES.

Assets.

Cash and accounts receivable at Boston, and copper not paid for	$789,299.16	
Cash and accounts receivable at mine	55,818.55	
Supplies and fuel on hand at mine	409,277.90	
Wood and timber lands	185,396.52	
Hancock & Calumet Railroad Company 5 per cent bonds	99,000.00	
Mineral Range Railroad Company stock	364,700.00	
Lake Superior Smelting Company stock	100,000.00	
		$2,003,492.13

Liabilities.

Accounts payable at mine	$184,192.64	
Accounts and bills payable at Boston including advances on copper sold, (but not yet paid for)	1,106,356.99	
		$1,290,549.63
Balance of assets December 31, 1907,		$712,942.50

WOLVERINE MINE.

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

Wolverine mine is capitalized at $1,600,000 divided into 60,000 shares of a par value of $25 each. The amount of cash paid in on the capital stock is $780,000. The first disbursement to stockholders was made in 1898, since which the aggregate amount received by them, including the dividend of $5 per share paid in April 1908 is $4,800,000 or $80 per share.

The excellent record built up by Wolverine is being fully maintained from year to year and there is absolutely nothing in view to indicate that it is likely to suffer for years in the future. Its physical condition is superb with ground enough developed to last for years at the present rate of production. Away down in the deepest and furthest advanced openings, the lode shows up about the usual width and bearing the remarkable copper values characteristic of the mine. At these points there is no perceptible change in its enrichment unless it is towards further improvement. Through prompt repair work and the incorporation of improved machinery now and then, the mechanical equipment of the property is maintained at a high standard of efficiency. Operating costs in all departments are among the lowest in the Lake copper district, perhaps in the world for the duty performed. The splendid success achieved has been made possible largely through the property's fine physical condition all over. Underground operations are conducted on practical lines and up-to-date methods. Nothing is done in a hap-hazard way. There is design and method in every move made. Results obtained are of the best and progress has been substantial and of the right kind. From one end of the mine to the other the workings are in sound condition and no difficulty about 600 feet per month is kept going on continuously. Large reserves of ground are developed ahead on different levels so that men may be distributed through the workings to the best advantage. The lode is extracted on the regular "stoping" method typical of the district with modifications proved by actual results to be admirably adapted for the work. In the main, the method consists of drift stoping followed up by swing or wing and overhand stoping. Levels are connected and air circulates freely through the workings rendering them comparatively cool and comfortable for working in. The product comes from all over the mine from the 13th level down to the bottom and is trammed by hand labor. Loaded tram-cars are always waiting at the shaft to be dumped into skips the moment they reach the level. A man is stationed there for this work. Skips are not allowed to be kept waiting for loaded cars to be brought to the shaft. Skips lift 4 tons of rock to a trip, operate in balance and dump automatically on rock house grizzles. The fine stuff passes through the grizzles into 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 stampmill. It is readily and economically done. Underground operations are conducted through two shafts, Nos. 3 and 4 sunk in the lode. Both shafts have like dimensions, being 8x17 feet with two skiproads and ladder way. No. 3 is 3,400 feet deep and No. 4 is

2,900 feet deep. Shafts are insubstantial and in thorough repair. Opening work done in 1907 consisted of shaft sinking 416 feet, drifting on the lode 5,080.6 feet and crosscutting 70 feet. Total opening work 6,366.6 feet or close to 1¼ miles. The average number of men employed was 435 with 30 machine drills in operation. Mine openings are 3,000 feet in length with ground enough developed to last for years. No reasonable expense is spared in making the mine safe for working in. During the year, 600 feet of stulls, 6,000 feet of flat timber and 6,700 feet of square timber were used in holding up the ground and in doing other work. In 1907, a good price was received for copper and the company had one of the most prosperous years in its history. The earning capacity of a substantial mine depends more on the price of the metal it produces than anything else. But Wolverine is managed with consummate success. Every detail receives careful attention. Nothing seems to be overlooked and every department is run practically to perfection. The company's fiscal year ends June 30th. In the fiscal year ending June 30th, 1907, the company treated at its stampmill 344,062 tons of rock. The mineral product was 12,525,210 pounds, which yielded 9,372,982 pounds of refined copper. Including construction costs, the copper was produced for 7.587 cents per pound. Number of pounds of refined copper recovered per ton of rock treated was 27.24.

Following is a tabulation of comparative results, costs and profits for the past three years:

	1907	1906	1905	1904
Pounds of fine copper produced	9,372,982	9,681,706	9,729,971	9,260,386
Tons of rock stamped	344,062	341,820	321,813	314,091
Pounds copper per ton	27.24	28.32	30.23	29.61
Operating expense per ton rock	$1.65	$1.54	$1.88	$1.91
Average price per lb. received (cents.)	21.36	17.17	13.83	12.75
Net earnings per share	$21.77	$16.79	$12.35	$9.28

The quantity of rock hoisted in 1907 was 359,718 tons or 999 tons a month per drilling machine operated, which is first-class work. It may be noted that the productiveness of the rock is maintained from year to year. The newest openings are in uniformly profitable ground from the north to the south end of the underground workings.

The following comparison of dividends paid in the past 6 years may be interesting: 1901-2, $240,000; 1902-3, $270,000; 1903-4, $300,000; 1904-5, $540,000; 1905-6, $840,000; 1906-7, $1,140,000; 1907-8, ————.

The mine location is almost a mile north of the town of Calumet, the metropolis of the copper country.

The Wolverine has a new stampmill located near the mouth of the Tobacco river, on Traverse Bay, Lake Superior. The structure is built of steel on stone foundation, 180x296 feet in dimensions. It is equipped with the 2-Nordberg heads striking about 106 blows a minute, and the best machinery known for washing and saving copper, which works satisfactorily. Daily capacity of the mill is about 1,050 tons rock. The mill is practically new, one of the best in the district and connected with the mine by the Mohawk and Traverse Bay railroad. Rock is being hauled by the Mineral Range Railroad Company. The mine and mill locations are provided with comfortable dwellings for the employes and rented to them on very liberal terms. Order and system prevails all over the property and the company's affairs are transacted with efficiency and exacting knowledge. The buildings and locations are lighted by electricity.

CENTENNIAL MINING COMPANY.

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

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

Centennial still continues to be a good deal of a developing mine, although the management sends out a regular monthly product of copper. The company is working the Kearsarge lode through two large shafts substantially constructed and sunk on the plane of the lode, about 38 degrees from horizontal. This lode is recognized as one of the most persistent and valuable copper bearing formations mined in the Lake Superior district. It runs, however, to bunchiness and irregularity with the best values, making at a depth of from 900 to 3,000 feet below grass-roots. Average width is about 14 feet but varying. Underground operations are conducted on practical lines and up-to-date methods. Shafts are connected by different levels and air circulates freely through the works. Workings are comparatively comfortable and safe for men breaking down the product. The two shafts are sinking deeper and different levels are going ahead opening up and developing fresh reserves of ground in accordance with the usual policy of the management. In 1907 about 340 men were employed with about 30 machine drills in operation. 225,271 tons of rock were hoisted of which 200,040 tons were treated at the stamp-mill. The product of mineral was 3,604,970 pounds and the yield of refined copper was 2,373,572 pounds.

Receipts:	1907	1906
Previous balance	$340,310	$331,779
Received from assessment	320	10,536
Received from Cent. Hts. townsite	278	109
Received from sales of copper	438,253	439,515
Received right of way	.....	1,000
Received from sale mill site	35,000	.....
Received from sale ½ stampmill	200,000	.....
Total	$1,014,161	$782,940

Payments:	1907	1906
Working expenses	$433,727	$308,147
Smelt, freight, marketing, etc	36,255	58,817
Construction and equipment	64,193	74,665
Surface purchased	.....	1,000
Notes paid	300,000	.....
Assessment, ½ stampmill	50,000	.....
Total payments	$884,176	$442,630
Balance	$129,985	$340,310

Total sales of copper aggregated 2,373,572 pounds sold at 18.4639c a pound against sales in 1906 of 2,253,015 pounds at 19.5078c a pound.

Statistics of mining operations follow:

	1907	1906
Rock hoisted, tons	225,271	192,866
Rock discarded, tons	25,231	26,866
Per cent discarded	11.20	13.930
Rock treated, tons	200,040	166,000
Mineral produced, lbs.	3,603,970	3,436,735
Per cent mineral in rock treated	.901	01.035
Refined copper, lbs.	2,373,572	2,253,015
Per cent refined copper in mineral	65.842	65.557
Per cent refined copper in rock treated	.593	.679

General Manager, James MacNaughton reports: "The total feet of openings for the year were 71 per cent greater than for the year 1906. There was a falling off in the refined copper of 1.72 lbs. per ton of rock treated as compared with the previous year. In the first half of the year, the refined copper amounted to 11.54 lbs. per ton of rock treated, while for the last half of the year, the refined copper amounted to 12.14 lbs. per ton of rock treated, indicating a slight improvement with depth. The new hoist at No. 2 shaft and the new compressor were both put in operation during the year. Retimbering the collar of No. 1 shaft, which was in bad repair, was started during the latter part of the year and at the date of this report has been completed." Opening work done during 1907 consisted of shaft sinking 334 feet; Raises 261 feet; Forks 8 feet; Drifting 3.579 feet. Total opening work 4,182 feet of nearly ¾ of a mile. The grade of rock treated is rather low, but should not be taken for an average of what the mine may do when further opened up and developed. Much of the rock came from advanced openings, which happened to be a little too good for the dump with copper bringing 19 or 20 cents per pound. Whether groundless or not remains to be proved, but for some time, a belief has been quite general that Kearsarge lode will be found carrying profitable copper values a little further to the westward than the deepest openings can yet command. In that direction, the land is low and appears like a favorable spot for lodgement and concentration of minerals. At any rate, the shafts are approaching a depth where levels can be run directly under the workings of the Wolverine and South Kearsarge mines. If the copper courses these mines are working hold down, then there is nothing to prevent Centennial from tapping them now very soon. The property is splendidly located and adjoins the Calumet & Hecla on the North and South Kearsarge and Wolverine mines on the South and West. Lands owned consists of the whole of Section 12 and a triangular corner of 20 acres adjoining the Southeast corner of its main tract. Acreage is 660 carrying the Calumet conglomerate, Osceola and Kearsarge amygdaloid lodes for over a mile in length on the strike line of the formations.

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

FRANKLIN MINING COMPANY.

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

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

In 1907 the company had a fairly successful year and but for the exceptionally high price of labor and supplies of every kind, and the falling off in the demand for refined copper later in the year, net profits for the 12 months would have been substantial and quite satisfactory. Only for the severe and abrupt decline in the price of copper—from 26½ cents in March to 11¾ cents in October—the company may have felt warranted in paying stockholders a small dividend. Such patience as Franklin stockholders have manifested for so many years surely deserves to be rewarded with something more substantial than hope deferred. Unless the market for the metal changes for the better, however, and quite materially, dividends are out of the question. In 1907 the company employed an average force of 575 men and operated 50 power drills. Four of the five stampheads in the mill were operated continuously. A total of 388,165 tons of rock were hoisted from both mines and 383,290 tons were treated at the stampmill. The product of mineral recovered was 8,547,696 pounds, which yielded 4,401,248 pounds of refined copper. The yield of refined copper per ton of rock treated amounted to 11.48 pounds as compared with 11.3 pounds for the previous year—no great difference. 2,381,178 pounds of refined copper was sold for an average price of 19.3377 cents per pound.

Compared with previous years, operating costs were high, but so were operating costs of every other active copper mine in this country. Labor was scarce, in demand and wages were high. Everything was high. Men were practically their own bosses,—dispatched just as much work as they pleased and no more. This year two “pairs” of men are doing as much work and more

than three “pairs” did in 1907. The property is ably managed and in view of the quality of the two mines economically operated.

Franklin mines are described in my previous reports.

The annual report of the company for the year ending December 31, 1906, compares with previous years as follows:

	1907	1906	1905
Mineral produced (pounds)	8,547,696	9,599,944	8,375,290
Copper produced (pounds)	4,401,248	4,571,570	4,206,085
Copper sold (pounds)	2,381,178	4,368,538	3,954,718
Copper on hand Jan. 1 (lbs.)....	2,020,070	203,032	251,367

The balance sheet of December 31, 1906 compares as follows:

ASSETS:

	1907	1906	1905
Cash on hand		$193,234	$77,128
Accts. receivable and capital on hand		41,458	40,080
Supplies at mine		88,341	93,372
Total		$323,033	$210,536

LIABILITIES:

	1907	1906	1905
Liabilities at mine		$ 78,875	$ 80,941
Drafts outstanding		1,417	16,012
Accts. and bills pay.		4,792	5,184
Total		$85,084	$102,137
Balance assets Dec. 31, ...		$237,949	$108,399

Franklin company is working two separate mines—Franklin and Franklin, Jr. These properties are described in my previous and any further description would not be much other than a repetition of which I have written before. Franklin is one of the oldest in the Lake district and for its size, only a few properties can of a better record. Since first opened, it has contributed to the world's wealth millions of dollars worth of copper, paid $1,240,000 in dividends besides building up a mine and a mine location that any company might be proud of. But the constant drain year after year has resulted in playing havoc with its copper bearing reserves and reduced them very limited dimensions. However, the ground is holding out remarkably well and surprising many people. The principal amount of rock that is coming to the surface at the present time comes almost entirely from the pillars and other rock that has been left standing in the mine for one reason or another. Old Franklin is worked through two shafts, Nos. 3 and 5. No. 3 is 3,200 feet deep and No. 5 is 3,800 feet deep. Franklin Jr. was bought with the hope that it might prolong the life of the company. The property is an interesting one with a large acreage carrying all the prominent copper bearing lodes mined in Houghton County north of Portage Lake. It adjoins the land recently bought by the Quincy Mining Company from the Arcadian Copper Company and is about four miles from the town of Hancock. The company is mining the Allouez conglomerate lode in which there are two shafts sunk, Nos. 1 and 2. No. 1 is 3,400 feet deep and No. 2, 1,700 feet deep. In this property the company is also working in a limited way the Pewabic,—sometimes called the Quincy lode through one shaft, 2,100 feet deep and connected with the workings on the conglomerate by crosscuts driven from the 21st and 23rd levels in the conglomerate. On the 21st level, considerable ground has been opened up and it reveals some good bunches of mass and barrel copper, and stamp rock. Some ground has also been opened on the 23rd level, which showed up, in places, the different grades of copper belonging to the formation, but further investigation is necessary to prove whether it can be mined at a fair profit or not. As to the conglomerate, it may never be a rich lode, but with a good round price for copper, it can be profitably worked. It is a 11 or 12 pound of copper to the ton proposition. Franklin Jr. rock is not only the hardest mined in the district, but it is also the most difficult to treat in the stampmill, for the reason that it contains a higher percentage of iro. For instance, stamp shoes last but a day and one-half crushing Franklin Jr. rock while they last several weeks crushing amygdaloid rock. The mine is ably and economically operated.

Cyrus Truan, mining captain, Old Franklin; John Doney, mining captain, Franklin, Jr.; Edward Warne, mill superintendent.

HANCOCK CONSOLIDATED MINING COMPANY.

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

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

Hancock mine is described in my previous reports. Maps of the property are annexed in the last report showing geological section of the land. The property is still a development one with the work well in hand and conducted vigorously and according to the latest and most approved methods of mining. People behind the enterprise know the business of mining thoroughly and see to it that work in each department is dispatched promptly and in the most practical way for getting results. Progress has been continuous and the physical condition of the mine shows steady improvement. The two shafts are going down deeper right along and levels are extending into virgin territory opening and developing additional reserves of ground that promise to make good stopes when production begins. In No. 1 shaft, which is the old one, the lode is about 12 feet wide and shows up some bunches of ground containing substantial copper values in the different grades of copper characteristic of the Lake district. During 1907 a heap of practical work has been accomplished and of the kind that counts when it comes to sending out a product and which must be done sooner or later. Underground levels are connected and ventilation is good. Opening work continues on

practical lines and the mine is rapidly approaching a condition for making a regular product and maintaining it. Considerable bodies of ground are now opened up on up-to-date methods and put in shape for economical extraction. The management plans to work the Hancock and Pewabic lodes and also the Hancock West lode. For the present, the Hancock two lodes will be developed and recovered through the Old Hancock Mine,—the Pewabic lode through a vertical shaft now sinking about 2,200 feet Northwest of Hancock No. 1 shaft. No. 1 is an inclined shaft, 9x20 feet in dimensions, three-compartment and down to the 13th level. Development work—that of opening up new ground—is carried on in the 9th, 10th, 11th and 12th levels. The 11th level is developing some exceptionally good values in the different grades of copper.

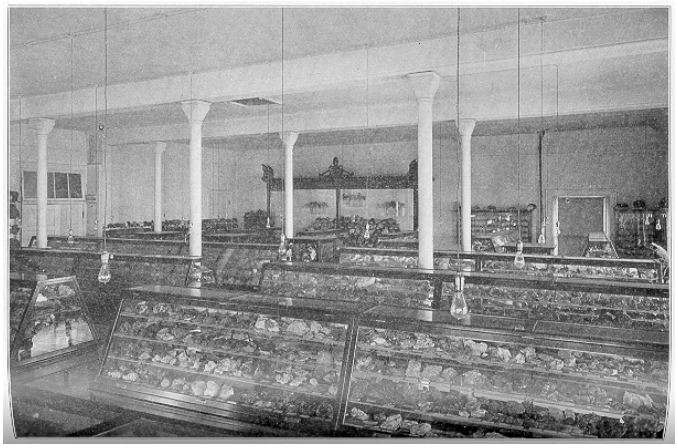
During 1907 the company employed about 160 men on an average and operated 10 machine drills. In addition to construction work during the year, No. 2 shaft was enlarged, straightened, re-timbered, sunk and completed down 264 feet deeper. Levels were drifted to the extent of 3,123 feet, crosscuts 790 feet, while No. 2 shaft was sunk, timbered and completed for 517 feet in depth. Total opening work, 4,694 feet. No. 2 is vertical and one of the finest shafts in the country and 650 feet deep at this writing. It is 9x30 feet in dimensions and divided into 5 compartments, four of which are for two pairs of balanced Kimberly skips to operate in while the other is for pipes, ladderway, etc. As near as it is possible to calculate, No. 2 shaft will intersect the Hancock West conglomerate, Hancock amygdaloid, Pewabic West conglomerate and Quincy main vein 2,000 ft., 2,500 feet and 3,600 feet respectively. Considering the amount of profitable stoping done, when last worked, the promising appearance of the vein since late operations have been underway and the probabilities of No. 2 shaft intersecting paying veins, before reaching the Hancock West branch and main vein, which are the only veins in this vicinity west of the “Quincy west lode” on which any extensive work has been done, it can readily be seen that prospects for developing Hancock into a profitable mine and a fine business enterprise are quite favorable.

The property of this company is picturesquely situated on the side of the Quincy hill and along the sloping hill-side bordering the North side of Portage Lake is connected with Lake Superior and forms the main water-way of the North and South Range mines of the Lake copper district.

The company was organized June 11, 1906. The following mineral lands have been acquired, consisting of 936 acres, all in Township 55, North of Range 34 West, as follows:

Southwest quarter of Section 26 (less 24 acres)	136	acres Old Hancock
Section 27	640	“
Southwest Quarter of Section 22	160	“
	936	“

Since the organization of the company, the surface right of the Anthony property (north half of Section 27) and various parcels of land have been acquired for the Tight of way for two railroad spurs from the Mineral Range railroad to Nos. 1 and 2 shafts; also 49 lots in the N. E. quarter of Section 27 (Condon's Second Addition) in the immediate vicinity of No. 2 shaft



MINERALOGICAL MUSEUM—MICHIGAN COLLEGE OF MINES, HOUGHTON.

The lands lie to the Southwest of, and adjoin the Quincy mine, one of the oldest and most successful dividend paying copper mines on the globe. These lands carry the Pewabic and West Quincy lodes—the lodes which Quincy people are working with splendid success and also the Sumner or Hancock lode. The management of the property is in competent hands, who know the mining business thoroughly and go at it in right way for getting the best results.

New additions and installations to mine equipment during 1907 include railroad spur to No. 1 shaft about 3,00 feet and railroad spur to No. 2 shaft about 6,000 feet long, which is to be completed during the summer. Engine, boiler and compressor house 50x96 ft. containing one direct acting duplex hoisting plant consisting of two 24x28 in. Corliss engines operating two drums 8 ft. diameter, 9 ft. face on one shaft and each drum has a capacity of 4,000 ft. of 1¼ in. rope in two layers. Engines operate drums either singly or in balance. Three 125 H. P. boilers of locomotive type. One Rand Imperial compound steam and air compressor with a capacity of 1,700 cubic feet free air per minute. A machine and blacksmith shop combined in a building 28x80 feet. The head frame for No. 2 shaft is 12x20x44 feet high and the shaft is enclosed by a temporary building 30x70 feet. The equipment is new, of the best and doing first-class duty.

The directors of the Hancock Consolidated Mining Company present the following report of operations for the year ending December 31, 1907:

RECEIPTS.

Interest	$7,616.77

DISBURSEMENTS.

Real estate	$12,550.00	
Superintendence, office, legal expenses, etc.	15,139.23	
Taxes	9,168.52	
Construction and development	227,681.23	$264,538.98
Excess disbursements over receipts		$256,922.21
Surplus, December 31, 1906		391,254.46
Leaving a surplus December 31, 1907 of		$134,332.25

ASSETS AND LIABILITIES.

ASSETS.

Cash	$122,097.66	
Supplies	18,272.50	
Accounts receivable	10,590.58	$150,960.74

LIABILITIES.

Accounts payable	16,628.49
Balance of assets	$134,332.25

LA SALLE COPPER COMPANY.

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

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

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

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

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

That the property will be opened up and developed on up-to-date methods and in the best way for getting the best results goes without saying. Furthermore, it will be operated on a scale commensurate with its scope. The management knows the business thoroughly and will see that is is conducted on scientific principles. The general opinion is that a great big successful mine will be developed in these lands and profitably operated. As everyone knows, it costs big sums of money to open up and equip on modern methods, a substantial mine, and some of the best people going have unbounded faith in the future of the property and are putting their money in its shares. In due time, they believe it will return fair interest on a valuation of its stock at higher prices than the shares sold for even in the recent copper boom. At the beginning of the work here, $1,000,000 were placed in the company's treasury for operating purposes, besides it has the backing of the Calumet & Hecla company, which is practically as good as money at command. Moreover, there are 100,000 shares of stock still unissued. It is planned to develop and work the La Salle through six modern shafts of large capacity sunk in the lode. Four of them are underway and sinking down, in the formation with good copper values showing up in places. The other two will be started in the regular course of developments. Of the four shafts sinking, two are in the Tecumseh tract and two are in the Caldwell tract. Tecumseh shaft No. 1 is 1,640 feet deep, 6x18 feet in dimensions, three compartment and down to the 14th level.

Opening work is conducted on practical lines with a view to future as well as to its present wellfare. It is economically operated and progress has been continuous. The lode is fairly well enriched with the different grades of copper for which this formation is noted. Stamp copper shows up nicely and the physical condition of this quarter shows steady improvement. A considerable quantity of ground, carrying, it is believed, average values have been opened up and put in shape for successful stoping. In the latter part of 1906, a test of copper rock from this shaft was made at the Franklin stampmill. The mineral product was refined at the smelting works of the Calumet & Hecla company and proved satisfactory to the present management of the company. After the test, rock shipments were discontinued. No. 2 shaft is practically a duplicate of No. 1, about 1,000 feet south and 45 feet deep.

La Salle is situated over one mile south of Tecumseh and joins Rhode Island on the North. Cross sections of the territory have been diamond drilled and thoroughly tested by the company. Cores showing strong copper values were recovered, which indicates substantial values with depth. The property is being developed through two modern shafts located 1,500 feet apart. They may be sunk to a depth of 9,000 feet before reaching the western boundary line of the property. No. 1 is 316 feet deep from surface and No. 2 is 269 feet deep from surface. About 40 men are employed. Each shaft is equipped with a hoist good for 3,000 feet deep. A 15-drill capacity air compressor, located at No. 1 furnishes air for both shafts. Each has a modern shaft house practically equipped and ready for duty. The lode developed thus far is irregular, which however, is characteristic of the lode as already noted. Operations are conducted in the most practical manner for getting the best results. Josiah Bartell is mining captain.

ARCADIAN COPPER COMPANY.

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

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

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

Mr. Robert H. Shields has been superintendent of the mine for some years and the policy followed for some time past will likely be continued, which is that of exploring works. The members of the new board are well known local people, except Mr. Everett and Mr. Russell, who know the copper mining business and how to conduct the work underway. Operations will be carried on in the most practical manner for bringing the deserved results. The work of exploring the property is well in hand and continued on up-to-date methods.

In 1907 the number of men employed was 20 and two power drills were operated. During the past year a crosscut has been driven East from the exploration shaft about a thousand feet. Several veins were cut through, but none of them disclosed sufficient copper values to warrant opening up. There still remains about 2,500 feet of unexplored territory on the Arcadian property east of the old Arcadian vein, and the management is now engaged in sinking a temporary vertical shaft in about the middle of this unexplored territory and when this shaft has attained sufficient depth, crosscuts will be driven both east and west. The shaft is being sunk at the apporximate strike of the Baltic lode and the result of this exploration will mean much to the Arcadian.

Following is a copy of the last financial report:

Real estate and improvements	$1,743,400	
Cash surplus and accounts received ..	42,249	
Profit and loss	1,967,499	
Total		$3,758,149
Capital stock and notes and accts. payable		$3,758,149

Otto Leiber, mining captain.

RHODE ISLAND.

Capitalization, $2,500,000, par value $25 each and divided into 100,000 shares. Balance of assets, January 1, 1906, $21,952.

President W. R. Todd; secretary-treasurer, W. A. O. Paul; superintendent, M. M. Dennis.

The property of this company has been described in my previous reports. It is still an exploring- proposition and situated about midway between the towns of Calumet and Hancock. It is centrally located and contains practically all the great prominent copper bearing belts north of Portage Lake. The company's realty holdings are large consisting! of 800 acres including all of Section 5 and the S. W. ¼ of Section 4 in Town 56 North, 33 West. The company employs about 21 men and operates two machine drills. Two shafts, Nos. 1 and 2, are sunk in the East lode 1,200 feet apart. Shafts are duplicates in dimensions, being 8x18 feet inside measurement and three compartment. No. 1 is 501 feet deep, and No. 2 is 1,265 feet deep. Considerable ground was opened up and tested in the 1st, 2nd, and 3rd levels of No. 1 and some bunches found showed fair values. Drifting south on the Pewabic lode on the 10th level developed a stretch of ground that showed up bunches off ground fairly good mineral. Development work done during the year included 2,965 feet of diamond drilling, 1,011 feet of drifting and 40 feet off crosscutting. The work has been conducted on modern lines and practical methods for finding such values be contained in the lodes crossings the property. Rhode Island is favorably situated with nothing but a wire fence dividing the mine from Franklin, Jr., on the South and La Salle on the North. Any valuable developments made in either of these properties should help Rhode Island.

Rhode Island is well thought of and some people think it contains important values. People behind the organization are enterprising and desire to be rewarded for the money spent and time devoted in the interest of the district.

Surface equipment is adequate for present requirements and includes besides mine machinery, a number of comfortable dwellings for employes.

TREASURER'S REPORT.

Statement in last report showed a balance onhand Dec. 1st, 1906	$ 6,275.65
Add assessment called Dec. 6th, 1906, payable Januayr 14th, 1907	100,000.00
Add amount received from interest	1,886.43
Add amount received from sales of copper	1,602.45
	$109,764.53
Paid for mining, taxes and all other expenses	$48,809.07
Leaves balance of date January 1st, 1908, as follows	$60,955.46
Cash	58,216.61
Assessment unpaid	2,896.50
Supplies, etc., at mine	2,559.78
	$63,672.89
Accounts payable in New York	625.00
Accounts payable at mine	2,092.43
	$60,955.46

ONECO.

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

It is a 100,000-share company, organized under Michigan laws in 1899. The property was originally known as the Hungarian more recently, for a short time as the Fitzgerald. The earliest work was done in 1862, when a shaft was put down less than 100 feet. The next work 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. Various copper bearing belts traverse the lands and Mr. Edwin J. Hulbert, discoverer of the famous Calumet Conglomerate, maintains that at least one of them carries substantial values. I have read letters written by Mr. Hulbert to Mr. Fitzgerald, president of the Oneco, making his claim. Oneco location is situated east of the channel in which occurs the Calumet & Hecla, Quincy, Osceola, Wolverine and some other successful mines on the north range, but years ago, the feeling was quite general that a lode or lodes carrying important values did exist somewhere in these eastern lands.

OLD COLONY.

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

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

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

In 1907 the company employed 13 men and kept In operation one power air-drill. Development work done included sinking the shaft 204 feet, driving 513 feet of drifting and 59 feet of crosscut work.

For some time exploratory work has been conducted in the Old Colony by trenching, sinking, drifting, cross-cutting and also by diamond drilling and a number of lodes carrying more or less values were discovered. No important disclosures have resulted from this exploration, however, and it has been determined to see if greater depth may prove more successful in finding copper values in paying quantities. It is hoped with additional depth, at least, one lode may be found containing sufficient values to make a profitable mine. Sinking, which was discontinued at a depth of 560 feet, has been taken up again and it is proposed to run the shaft down to a depth of 1,000 feet and form a base for conducting the work. At that depth, drifting and cross-cutting will be carried on and the property thoroughly and systematically explored. People behind Old Colony are of the best made, progressive and up-to-date. They deserve to find something good and lasting.

Oct. 1st, 1907, the treasury account showed $37,780.24 over and above liabilities.

MAYFLOWER MINING COMPANY.

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

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

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

UNION COPPER LAND AND MINING COMPANY.

Office 60 State Street, Boston.

Capital stock, Two Million, Five Hundred Thousand Dollars, in One Hundred Thousand Shares of $25 each. Eighty Thousand Shares issued.

President, H. F. Fay; Secretary and treasurer, Geo. C. Endicott; Directors, H. F. Fay, J. C. Watson, Stephen R. Dow, Walter L. Frost, Geo. C. Endicott, James Chynoweth.

Through the sale of 400 acres of mineral rights in Keweena County, Michigan in December, 1906, a dividend of $2 per share was paid February 1, 1907, and no further sale was made until late in 1907 when the

negotiations covering 240 acres, also in Keweenaw County, and referred to in our last Annual Report, were concluded. Payment for this parcel was made partly in 1907 and partly in January, 1908.

The net cash balance in the Treasury on January 1, 1908, was	$64,368.98
To which should be added the balance due and received on sale of the 240 acres referred to above	24,000.00
Making a total of	$88,368.98

From which a dividend of $40,000 was paid February 10, 1908.

All the lands of your company are on the Mineral Range of the Keweenaw Peninsula of Michigan, which has produced all the great copper mines of that state, and many of the tracts are covered by a heavy growth of timber which increases in value every year.

The lands of the company unsold on January 1, 1908, show as follows:

Lands	5,323 65-100 acres
Mineral rights	1,043 5-100 "
Making a total of lands and mineral rights unsold as of January 1, 1908	6,366 70-100 acres

HOUGHTON COUNTY MINES. SOUTH OF PORTAGE LAKE.

COPPER RANGE CONSOLIDATED COMPANY.

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

Another successful year has been added to the fine record of this company. The company's product of copper was sold for a good price and the year under review proved a profitable one for everybody interested in this enterprise, which is one of the best in the country. The subsidiary properties forming the organization were vigorously operated and substantial progress was made in the several departments of each proposition. Every department is running successfully and doing full duty. The policy outlined and followed by the management has been liberal, progressive and of the kind that bring the best results. Progress has been continuous and the company has had a remarkable growth. Copper Range Consolidated forms one of the solid, substantial copper mining enterprises of the Upper Peninsula of Michigan that will keep on growing in size and material worth for years and years to come. Though a young organization, as age goes, and no more than in a period of youth so to speak, yet it ranks, among the Michigan copper mines, next to Caulmet & Hecla as a producer of copper and money maker. From the start, the property has been managed with decided success and ability in all its working departments. The management is up-to-date, progressive, among the best going and the affairs of the company are transacted with distinct efficiency. In 1907 new power houses were added to the plants, additional equipment was installed, shafts were sunk deeper, new levels were started, established ones were extended further into virgin territory, fresh reserves of ground carrying average values of the Baltic lode were developed and put in shape for economical extraction and the position of the properties strengthened and improved from every practical standpoint. The future prospects of the company are very satisfactory indeed and if the management deems it for the best interest of the stockholders, the rock output and the product of copper an be considerably increased during 1908. The year under review was a profitable one and but for the demoralized condition of the copper market and the money stringency, which set in about mid-summer, the year's work would have witnessed still better results. Dividends paid stockholders during 1907 amounted to $2,305,110 distributed as follows: April, $2.00; July, $2.00 and Oct., $2.00. Total dividends paid by the company to date $7,291,839.

The combined output of rock treated at the Baltic, Champion and Trimountain stampmills was 1,914,331 tons which yielded 41,385,015 pounds of refined copper or 21.66 pounds per ton of rock treated.

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

Baltic	16,704,868	14,397,557	14,384,168	12,177,729
Champion	16,489,336	16,954,986	15,707,426	12,212,954
Trimountain	8,190,711	9,507,933	10,476,472	10,211,230
	41,385,015	40,860,476	40,568,057	34,601,913

While Trimountain has been falling behind Baltic and Champion have been making a substantial increase right along. Deducting Champion's half—8,244,718 pounds, the Copper Range product of copper for 1907 was 33,244,718 pounds, which compares with 32,382,933 for 1906.

Better things are ahead for Trimountain. The recovery may be a little slow but it is practically sure. Baltic and Champion are opened upon practical lines and up-to-date methods with sufficient ground developed ahead to last for at least three or four years. Additional stamping facilities have already been provided and with the other improvements and economics, which are almost completed, the output of rock and product of copper should show steady increase for a long time to come. The Globe property will add very materially to the value of the Copper Range Consolidated, for the South drifts going over in the direction of Globe from the Champion mine continue to show up copper values as good as the average of the lode. Production from this quarter, however, should not be expected for some time, as much drifting and construction work must be done to put this property in condition to send out a product.

The option of the Globe property was secured under an agreement made between the Copper Range Consolidated and John Stanton, dated April 20, 1905. The Globe property comprises 1,280 acres of mineral land, being the entire Sections 1 and 2 in Township 53, North of 35 West, lying directly South of and adjoining the Champion copper Company and is now in process of development. The agreement provides that in event of Copper Range exercising its option and acquiring the property, the vendor should have the option of taking 10,000 shares of Copper Range Consolidated Company's stock in lieu of cash in full payment for the land.

BALANCE SHEET.

Boston, December 31, 1907.

ASSETS.

99,659 shares of the Baltic Mining Company, 99,699 shares of the Copper Range Company and 99,185 shares of the Trimountain Mining Company.....	$36,939,400.00
791 shares of Copper Range Consolidated Company held by the Treasurer for exchange for the outstanding shares of the Baltic Mining Company and the Copper Range Company	79,100.00
Notes receivable, Champion Copper Company	579,808.99
Notes receivable, Baltic Mining Company	535,070.23
Notes receivable, Copper Range Railroad Company.....	35,082.97
Copper Range Railroad Company, bonds at par	615,000.00
Copper Range Railroad Company, stock at par	1,398,600.00
Globe Mine development and options	392,307.20
Copper Range electric plant	41,716.40
A. C. Burrage, account Trimountain majority stock holders' agreement	34,365.93
Accounts receivable	6,000.00
Cash	450,339.01
	$41,106,790.73

LIABILITIES.

Capital stock	$38,418,500.00
Notes payable	1,150,000.00
United Metals Selling Company	600,000.00
Trimountain Mining Company deposit	526,493.52
Copper Range Company deposit	67,604.97
Stock suspense	38.00
Profit and loss	344,154.24
	$41,106,790.73

The Directors present the following Consolidated Statement of the Operating Companies for the year ending December 31, 1907:

41,385,015 lbs. of copper produced and sold at average of 17.28c. per lb.	$7,149,984.54
(35,187,549 lbs. of which were sold to December 31, at average of 18c., and 6,197,466 lbs. sold in 1908 at average of 13c. per pound.)	
Interest	35,829.19
	$7,185,813.73
Mining expenses, including smelting, freight, marketing, etc.	3,805,376.07
	$3,380,437.66
Taxes, Houghton County, Michigan	154,539.48
Total income from mining operations	$3,225,898.18

Copper Range Railroad Company:		
Gross earnings	$860,434.84	
Operating expenses, ... $602,456.21		
Interest on bonds 101,250.00		
Taxes 45,430.12	749,136.33	111,298.51
		$3,337,196.69
Amount received in settlement of the Burrage suit,		549,251.35
		$3,886,448.04
Deduct net balance of general expenses of Copper Range Consolidated Company	$71,119.49	
Deduct one half of net mining profit of Champion Copper Company which belongs to the St. Mary's Mineral Land Company.....	677,878.84	748,998.33
Balance of net income for 1907		$3,137,449.71

BALTIC MINE.

General office, Boston, Mass.; mine office, South Range, Houghton County, Mich.; president, W. A. Paine; secretary-treasurer, Frederic Stanwood; general manager, F. W. Denton; mining captain, John Jolly; clerk, William C. Cole; engineer, Clarence Mason; mining captain, Martin 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 Sections 20 and 21, Town 54, Range 34 and consist of 800 acres. The mine has been in successful operation for about 9 years and developed a fine record.

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

Underground operations are carried on through four active shafts sunk in the lode: Nos. 2, 3, 4 and 5, which are numbered from South to North. The four shafts are practically duplicates, are connected underground with different levels and air circulates freely through the openings. The mine is cool and comparatively comfortable for working in. No. 2 shaft is 1,155 feet deep; No. 3 is 1,568 feet deep; No. 4, 1,488 and No. 5 is 1,178 feet deep. All are three compartment, substantial and in good running order. During 1907 the mine employed 1,023 men and operated 71 power air drills. 806,095 tons of rock were hoisted of which 761,288 tons were treated at the company's stampmill. The product of mineral obtained was 23,856,365 pounds, which yielded 16,739,284 pounds of refined copper or a fraction over 22 pounds to the ton of rock treated. 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:

	1907	1906	1905	1904
	16,704,868	14,397,557	14,384,684	12.177,729
Net profit	$1,157,971.57	$1,369,942	$1,059,165	$494,869

Opening work done during 1907 consisted of shaft sinking 767 feet, drifting on the lode 8,634 feet and crosscutting 266 feet. Total opening work 9,667 feet, or well on to two miles of new openings into virgin ground.

The success achieved in operating the properties during Mr. Denton's administration is of the best and results obtained amply proves his advancement from superintendent to general manager was merited and in order.

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. Recent developments in the lode tributary to No. 2 shows considerable improvement over early disclosure affording much satisfaction for the future in this quarter. Openings extending South in the direction of Trimountain are now showing copper values as good as the average of the mine. When first opened and for some distance down in No. 2 shaft, the lode was poor and unprofitable. This change for the better at greater depth is of much importance to the company and may indicate that practically all the ground extending over to Trimountain boundary, where there is ample room for another shaft, may be as highly enriched with the usual grades of copper as the average of the Baltic lode. Shafts are sinking to greater depths, drifts extending to greater length in the formation and the usual amount of ground is being opened up all through the workings for economical and successful mining. The lode looks first-rate—fully up to the average and the future of the Baltic looks very bright. The management is experimenting with an underground electric haulage for tramming, which will no doubt prove satisfactory, and result in reducing somewhat the costs for this work. During the year, a heap of practical new work has been done all over the property with the result that the position of the mine has been materially improved and strengthened. The mechanical equipment is maintained in a high state of efficiency and in first-class running order. Mechanical equipment is new, powerful, highly efficient and up-to-date in every particular. Shaft and rockhouses are of the combination build and equipped with powerful rock crushers and trip hammers operated on by engines located in the same buildings.

CHAMPION MINE.

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

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

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

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

	1907	1906	1905	1904
Tons of rock treated	708,685	671,785	603,745	442,161
Lbs. copper obtained	16,489,436	16,954,986	15,707,426	12,212,954
Lbs. copper per ton of rock	23.3	25.24	26	27.6

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

the present time the lode looks first-rate and is in the "pink" of physical condition.

All stoping is done on company account. Sinking and drifting on contract. All told, there are 1,225 names on the payroll and an average of 76 machine drills are operated. The mine is opened through four fine shafts located about 1,000 feet apart on the strike line of the lode. Shafts are uniform in dimensions, three-compartment with average depth of over 1,300 feet. Two compartments of each are used for hoisting rock, the third for ladder-way and pipes. All four shafts are connected underground on different levels that keeps the mine ventilated, cool, dry and comfortable for working in. Underground openings are over 6,000 feet in length and hold an enormous amount of ground reserves containing the average values of the Baltic lode. The lode looks well all over and nowhere better than in the latest points penetrated. The product comes from various stopes and openings on different levels, but all tributary to the four shafts, each sending out its allotted quota of rock. Shafts are going down and the usual number of drift stopes are going forward into new ground, developing fresh reserves in accordance with the policy of the management. The "back-caving-filling-in" method is used for taking out the lode and it works admirably. It is comparatively safe for men and requires but little timber. Skips counter-balance in shafts carrying from two to four tons of rock to a trip and dumps automatically on grizzles. Practically all the rock selecting is done underground. Depth of the four shafts are as follows: "B" shaft, 1,327 feet; "C" shaft, 1,318; "D" shaft, 1,428 feet; "E" shaft, 1,471 feet. Opening work done during 1907 includes shaft sinking 666 feet, crosscutting 594 feet and drifting on the lode 9,058 feet. Total opening work, 10,318 feet, or well on towards two miles of fresh openings into virgin territory. In this opening work, an enormous amount of ground was developed, most of which carries average values of the mine and will make fine stoping. Besides, a heap of practical work has been completed all over the property. Two new heads were installed in the stampmill; waterworks extended; rock-houses remodeled and improved; two large, powerful hoists added to the mine equipment, and a great deal of fittings and additions necessary to maintain the mine, and its equipment up to the usual high standard of efficiency.

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.

Richard Trevarrow, mining captain; H. F. Mercer, engineer; W. E. Kruka clerk; F. G. Coggin, mill superintendent.

TRIMOUNTAIN MINE.

Trimountain is a fine mine and a valuable one, although results obtained during the past two or three years fell below expectations and turned out rather disappointing. But there are better things ahead for the property. It has been passing through its trial stage so to speak,—going through a bar of poor ground,—which is nothing particularly unusual with the copper mines of the Lake Superior district. All over our best mines have had similar experiences in times past. The deepest openings in Trimountain are looking well and showing the usual grades of copper belonging to the lode worked.

The property is situated about midway between Baltic and Champion mines and owns 1,120 acres of land located at Section 19, 20 and 30 in Town 54, Range 39, purchased at a cost of $800,000. Capitalization $2,500,000 divided into 100,000 shares. Par value, $25 each. Paid in $20 per share. Of the 100,000 shares issued, Copper Range Consolidated control 98,649.

Main office, 27 State St., Boston, Mass.; mine office, Trimountain, Michigan.

The property is skillfully managed and every department is running successfully and doing first class duty. In 1907 Trimountain people had a prosperous year due largely to the high price of copper. In 1907 the average number of men employed was about 850 with 65 air machine drills in operation. 506,805 tons of rock were hoisted of which 44,317 tons were treated at the mill. 82,488 tons were discarded. Product of mineral obtained was 12,729,445 pounds, which yielded 8,207,586 pounds of refined copper or about 18½ pounds to the ton of rock treated.

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:

	1907	1906	1905	1904
Tons of rock treated	444,317	506,924	570,843	534,640
Products of refined copper ...	8,207,586	9,507,933	10,476,462	10,211,230
Lbs. copper recovered, per ton	18.50	18.76	18.36	19.1

On the 23rd of April Trimountain Company declared a dividend of $5.00 per share, the first one declared since the property passed to the control of the Copper Range Consolidated Company.

Opening work done during 1907 consisted of shaft sinking 818 feet, crosscutting 824 feet and drifting in the lode 6,704 feet. Total opening work 8,346 feet and over a mile and a half into new ground. The mine is opened and developed through four fine shafts of large capacity. Each is 3-compartment, two of which are used for hoisting rock, the third for ladderway, pipes, etc. Shafts are connected underground at different levels, and as the deepst opnings are not very far down, air circulates

freely through the main works, making them comparatively cool and comfortable for working in. The product comes from the 2nd to the 15th levels and practically all over the mine from end to end. During 1908, shaft sinking and level extension will be continued vigorously and fresh ground reserves developed on up-to-date methods and put in shape for economical extraction. The new ground, it is believed, will return substantial values and pay well for mining.

Since passing to the control of the Copper Range, the mine has failed to develop such satisfactory values as the former management succeeded in obtaining. This, however, is due to the lack of equal copper contents contained in the lode at increased depth. When first opened, the mine developed ground carrying mineral values of exceptional richness in mass and barrel copper, which held down to the 7th level, and the praperty was opened up, equipped and put on a dividend basis with record speed. $300,000 were paid in dividends and the price of shares advanced to high figures, though the company had a big floating debt at the time. Between the 7th and 12th levels, there happened to come in a bar of leaner ground carrying values to the extent of about 18 pounds to the ton of rock after careful selecting. In the vicinity of the 12th level, however, the formation begins to show up better again in different grades of copper. The improvement is quite likely to continue and be reflected in the product at the end of the year in hand. And changing in the method of mining for taking out the product of rock may also have had something to do with the falling off in the percentage of copper recovered. The “back-filling-in or caving” system is now used for recovering the product and it answers admirably. It is practically safe for men and convenient for mining. But little timber is used for the work. Waste-rock built into dry walls answers for stulls of timber and lagging. Expense of tramming and hoisting poor rock is nominal. Levels are extended on the drift-stope method continued to the end of the boundary of the mine, or to the end of the copper ground desired to be taken out. Drift-stopes run from 8 to 10 feet high and carry the whole width of the lode. Most of the rock is assorted underground instead of on surface, which saves the cost of tramming and hoisting the waste. All stoping is done on company account, drifting and sinking on contract. The policy of the management is open up large blocks of copper ground ahead that may be drawn upon when needed and in which the miners may be distributed to advantage and get the best results. Average length of openings, 3,500 feet. From end to end, however, the openings reach as much as 4,500 feet in length.

Many improvements were made during 1907 with the result that the physical condition of the property has been strengthened all over. Of special importance were the improvements to the waterworks at the stampmill and the telephone system installed connecting the various departments of the company. Through installations of additions to equipment and repair work, the mechanical plant has been maintained in a high state of efficiency.

Richard Bowdon, mining captain; Benj. S. Noetzel, clerk; H. F. Mercer engineer; F. G. Coggin, mill superintendent.

GLOBE.

The lode will likely be struck in the exploring shaft of this property at a depth of about 900 or 1,000 feet, which depth will be reached before this report is ready for circulation. Indications are that the lode when opened up for investigation will be found carrying profitable values and fully up to expectations in all essential features. The shaft has been a very troublesome one to sink but the most difficult part of the work is now over. Speed downward at the present time is progressing at a very satisfactory rate.

COPPER RANGE RAILROAD COMPANY.

This company was organized in 1899 under the laws of the State of Michigan. Authorized capital, $5,000,000 par value, $100.00. Issued, $3,886,900.

President, William A. Paine; secretary-treasurer, Frederic Stanwood general manager, R. T. McKeever; general: superintendent, C. S. Fales; main office, Boston, Mass; local office, Houghton, Michigan.

The Copper Range Railroad runs from Calumet to Mass City, a distance of 59 miles. It connects with the Chicago, Milwaukee & St. Paul Railroad at Mass for all points southeast and west, runs through the center of the mining district of the South Range and crosses Portage Lake at Houghton and Hancock; extends to Calumet and Laurium and will connect with the Keweenaw Central Railroad, which is building along the North Range to Lac La Belle and Copper Harbor. The Copper Range equipment is of modern type, its engines are of the finest and all passenger trains are made up of Pullman coaches. The road runs through a prosperous country and its business, both passenger and freight, is steadily increasing.

COPPER RANGE COMPANY.

The Copper Range Company was organized in 1899 to construct a railroad in the copper district of Michigan and managed to secure the rights and franchise of the Northern Michigan R. R. Company. It was afterwards reorganized under the title of the Copper Range Railroad Company. The company owned about 10,000 acres of mineral land south of the Baltic mine and furnished one-half of the land forming the Champion mine tract and on which the mine is located. The St. Mary’s Mineral Land Company provided the other half.

The Copper Range Company organized and incorporated the Champion Mining Company, in 1899, and though the company's mine is practically new, it now forms one of the most valuable copper properties in the Lake district.

Included in the Company's assets are 9,360 acres of land, 50,000 shares of the Champion Copper Company's stock and 26,051 shares of the Copper Range Railroad Company.

President, Wm. A. Paine; secretary-treasurer, Frederic Stanwood.

On the 23rd of April the Copper Range Company declared a dividend of $1.50 per share.

ISLE ROYALE CONSOLIDATED MINING COMPANY.

A. S. Bigelow, president; W. J. Ladd, secretary-treasurer; Normall W. Haire, general manager; W. J. Uren, general superintendent; James E. Richards, assistant superintendent; Henry Lukey, clerk; J. T. Reeder, purchasing agent; A. G. Guiberg, superintendent construction and motive power; Edward Colenso, mining captain; J. G. Glanville, stamp mill superintendent; Eastern office, Boston, Mass.; general office, Houghton, Mich.; mine office, Houghton, Mich.

The policy of expansion and a broadening out for bigger and better results for Isle Royale, entered upon by the management a coupe of years ago, is followed up right along and in 1907 a great deal of practical work was dispatched all over the property. Isle Royale mineral lands form a very large tract, over 3,000 acres and carrying the Baltic and all other notable lodes south of the Portage Lake on their strike line for over two miles in length. The lode area of this large acreage is simply enormous, practically beyond computation and it contains copper bearing rock in the form of amygdaloid beds in inexhaustiable quantities. Even if operated on a moderate scale, there is not a man in the world who will live long enough to see the lodes worked out. Only a small portion of these lands have been explored or investigated and no man on earth knows what copper values may lie enfolded within the rock beds below. The more the property is investigated the better it looks. Through recent disclosures made, the present local management has become quite well convinced that Isle Royale can be opened up, broadened out and developed into a great big, successful, profitable mine. The property is splendidly located; is long enough and broad enough for a dozen shafts and the policy of mining such an immense lode through one shaft, or even a couple as formerly, seems a narrow one and all together out of joint with the modern way of doing things. The policy of enlarging the mine,—broadening it out,—that of developing and extracting the lode on a much larger scale and more comprehensively, is a commendable policy and judged by recent disclosures it is the right one to follow. According to reports, what the management is now doing ought to have been done long ago.

For forty years or more to my personal knowledge Isle Royale or the properties now forming the enterprise have been working off and on without returning a penny to stockholders. Operations, however, have been conducted on a narrow gauge policy which resulted in high working costs. Now, if the enterprise is to be made profitable at all it must be operated on a much larger scale so that working costs may be brought down to the minimum. The management recognizes this fact. To this end the present policy has ben planned and it is being carried out in the most practical way. There ought to be going to the stampmill daily 4,000 tons of rock instead of less than 600 tons. With the same number of shafts and extent of openings in the lode together with an equipment of equal efficiency Isle Royale should do fully as well as many of the dividend payers or even a trifle better. Before the close of 1908 the management hopes and expcts to bring the daily rock shipments to stampmill up to about (better say 1,400) tons as against 600 tons, the present outgo. The product of copper will increase at the same ratio and perhaps a little better.

Underground operations are conducted through four active shafts and others will be started in the regular course of developing the property.

The depths of the active shafts on Dec. 31, 1907, were:

No. 2 shaft	2,398.5 feet	No. 5 shaft	163 feet
No. 4 shaft	103 feet	No. 6 shaft	369 feet

Section 12 shaft, exploratory, 812 feet.

Opening work completed during the year 1907 included:

Shaft sinking	872.5 feet
Drifting on Isle Royale lode	7,297.5 feet
Drifting on Baltic lode	448.5 feet
Crosscutting	110 feet
Total opening work	8,728.5 feet

All operations are conducted along practical lines and up-to-date methods. At present, operating costs are heavy, but with the work underway at the mine, it is impossible for them to be otherwise. Better results should come in due time.

COMPARATIVE RESULTS FOR 1906 AND 1907.

	1906.	1907.
Tons rock stamped	192,210	175,450
Pounds mineral obtained	4,076,509	3,614,799
Percentage refined copper in mineral	72.049	73.797
Pounds refined copper per ton of rock stamped	15.3	15.2
Product fine copper	2,937,098 lbs.	2,667,608 lbs.
Cost per pound at mine, excluding construction	10.03c.	13.70c.
Cost per pound construction	0.00c.	1.05c.
Cost per pound of smelting, freights, eastern expenses, commissions, and all other charges	2.19c.	2.34c.
Cost per pound of refined copper	12.22c.	17.09c.
Cost per pound explorations, railroad extension, etc.	2.47c.	3.17c.
Total cost per pound of refined copper	14.69c.	20.26c.
Cost of mining and stamping per ton of rock stamped	$1.53	$2.08
Cost of stamping per ton	27.25 cts.	32.65 cts.

ASSETS AND LIABILITIES.

ASSETS.

Cash and accounts receivable at Boston, and copper not paid for	$542,998.86	
Lake Superior Smelting Co. stock	32,000.00	
Cash and accounts receivable at mine	39,879.06	
Supplies and fuel on hand at mine	47,341.60	
Total assets		$662,219.52

LIABILITIES.

Accounts payable at mine	$76,216.70	
Accounts payable at Boston	84,845.18	
		161,061.88
Balance assets December 31, 1907,		$501,157.64

Isle Royale is described at some length in my former reports.

ATLANTIC MINING COMPANY.

President, Joseph E, Gay; treasurer, John R. Stanton; agent, F. McM. Stanton; superintendent, Theo. Dengler; clerk, A. D. Edwards; mining captain, John Stratton.

Capitalization, $2,500,000 in 100,000 shares, par value $25 each.

Atlantic is among the widest and oldest known copper mines in the Lake Superior copper district and has a very creditable record. No effort has yet been made to re-open the workings on the Ashbed Amygdaloid, which caved in early in May, 1906. Nor has it yet been determined by the management just when the work of opening them up for fresh mining will commence. The work of investigating the Batlic lode in the company's section 16 still continues and substantial headway has been made. During 1907, a force of 40 or 50 men were employed for all purposes in this quarter and two power drills were in operation for sinking and an additional one when cross-cutting. The outcome of developments in this shaft is watched and will continue to be with more than usual interest for disclosures there will mean a great deal for the Atlantic mine as well as a large tract of splendidly situated unexplored land. The concensus of the best mining opinion is that the Baltic lode will be found in the vicinity of this shaft before a much deeper zone has been penetrated, although it may be found necessary to go down somewhat below the 1,000 foot level. Developments in the lode in the deepest levels on the North end of the Baltic mine adjoining Atlantic's section 16 reveals the formation to be undergoing considerable improvement in organization and mineral contents. In this vicinity, the lode in the upper levels of the Baltic has been quite broken up and disturbed, but the deeper openings and going in the direction of the Atlantic, it appears to be settling into concrete form and greater uniformity. This is a significant feature and an encouraging one for Atlantic. Then again, Superior mine adjoining Section 16 on the North, is looking well, which is not without some importance to Atlantic. At this writing, Atlantic's exploring shaft reached a depth of 1,150 feet, which corresponds to the 13th level on the Baltic mine. Drifting is now in progress at the 10th and 13th levels. During 1907, besides sinking 833 feet of shaft, 262 fete of crosscuts and 85 feet of drifting were done. Several nice bunches of coppery ground were encountered in the work, but they happened to be quite irregular and separated by bars of barren rock. Very similar conditions were found in the sixth level northward in the Baltic mine and where the lode was lost for about 75 feet before passing beyond the Baltic territory and entering the Atlantic ground. In the course of a few months and perhaps when quite unexpected, one of the openings, at least, in this exploring shaft may be found well into a profitable section of the Baltic lode.

Atlantic people have been in the copper mining business for many years, knows it thoroughly and how to do it to bring the best results. The Atlantic mine is described at some length in my previous reports.

The Atlantic continues treating the Michigan mine's product and will likely keep on doing it until Michigan's new mill at Keweenaw Bay is ready for service. For this service, the company receives a small revenue, which is put to practical use.

Statement of assets and liabilities for 1907:

Gross income	$ 18,963	
Expense at mine	126,719	
Total cost	$126,719	
Construction expense	10,760	
Surplus	118,516	
Total surplus		$206,843

ASSETS.

Cash in bank	$42,692	
Stock Michigan Smelting	40,000	
Cash and mine supplies	41,214	
Coal on hand	19,164	
Merchandise	72,499	
Total		$215,571

LIABILITIES.

Debt at mine	$7,941	
Accounts payable	787	
Total		$8,728
Balance		$206,843

SUPERIOR COPPER COMPANY.

This property has decided merit and is one of the coming mines of the Lake Superior copper district. It is no longer an exploring proposition nor a prospect, but a mine containing decided values and undergoing systematic development for turning out a product of copper. The property is described at some length in my previous reports and every good thing said in the works referred to touching the enterprise is making good and the very latest reports from there are distinctly encouraging. The average number of men employed is 45, two power drills are used for sinking and six for drifting. The shaft is sinking in the foot-wall at an incline of 53 degrees, which conforms to the dip of the lode, compared with the dip of 72° at the Baltic.

Development of the mine is under the direct supervision of Mr. James MacNaughton, General manager of the Calumet & Hecla Mining Company. The directors are as follows: A. Agassiz, F. W. Hunniwell, Q. A. Shaw, Jr., R. L. Agassiz and James McNaughton. President, Q. A. Shaw, Jr.; Secretary and Treasurer, Geo. A. Flagg.

The Superior Copper Company was organized in 1904 under the laws of the State of Michigan, with capitalization of $2,500,000 in 100,000 shares, par value $25.00 each. The company has 400 acres of land in Section 15, Township 54 North, Range 34 West in Houghton County, Michigan. It is situated just East of Section 16, belonging to the Atlantic mine, which is next, and North of the Baltic Copper Mining Company, belonging to the Copper Range Consolidated group of mines. It has about one mile of the outcrop of the

"Baltic" lode and has about 400 acres of surface with underlay of the lode.

Superior has two shafts, Nos. 1 and 2, although the bulk of development work has been done through and is contributory to No. 1, the first shaft started. At this writing, No. 2 is idle but it will be started up again in the Spring. It is in the neighborhood of 200 feet deep. No. 1 shaft is down to the 8th level and the crosscut is in the lode 25 feet showing the same character of good ground as at the 6th and 7th levels. The shaft is sunk in the footwall side of the formation and it is therefore necessary to drive a crosscut to the lode at each fixed level or station. It is quite likely the shaft will be continued in this relative position to the lode for by following such a course it will always be permanent and not subject to disturbances by extraction of ground or the removal of supporting pillars. Besides, by this method of operations, the whole lode can be broken down and manipulated for making the product. No supporting pillars, which consist of bars of the lode, need be left standing to hold up the ground over the underground workings. After the lode is extracted, the overhanging ground may fall down or stand up for any harm it can work. Opened up and developed ground contributory to this shaft aggregate 4,000 or 5,000 feet, a considerable of which will form fine stopes and turn out well in the different grades of copper peculiar to the Baltic lode, which the mine is developing.

In December 1906, Calumet & Hecla Mining Company exercised an option held on several thousand shares of Superior Copper Company's stock, which gave the Bonanza Company 51 per cent of its capitalization. Before exercising the option, Calumet & Hecla management spent over $40,000 in exploring the property. The mine is a development proposition with a fine future outlook. I have visited the mine on different occasions and have been underground there and looked over the lode opened up and exposed. Thee lode is wide and somewhat bunchy, but upon the whole, it looked first-rate to me. A good deal of the vein rock is remarkably deceptive in appearance. Every piece, or practically so, must be broken freshly in order to know whether it contains copper or not. Often, rocks and big ones, too, that look gray and barren from the outside, when broken, show up splendid values. When underground there, I saw heavy copper jutting out in many places and the formation contained practically all the recognized features that denote permanence and stability of values. Permanence and stability of values indicate a permanent mine. The work of opening up and developing the mine is conducted on scientific principles and in the most practical way for getting economical results. Good headway is made right along and of the kind that counts and result in success. James Biscombe is local superintendent.

ST. MARY'S MINERAL LAND COMPANY.

This is a very interesting company and is recognized far and wide as one of solid merit and of high financial standing. Its business affairs are managed with distinct success and its treasury holdings are steadily appreciating in value. The company's report for 1907 is out and like former ones issued, it makes interesting reading. It can hardly be anything but satisfactory to stockholders for the year has been a successful one all around. Assets consist of cash, broad tracts of mineral and timber lands, a large number of shares of stock of different mining companies and other industrial enterprises. No one can form any conception whatever of the real value of the company's assets as thousands of acres of lands remain unexplored and may contain mineral deposits of immense value. Indeed, it must be very singular if they do not for large tracts happen to be located well within the mineralized zone and a considerable quanaity lies directly within the channel of some of the most successful mined lodes in the Lake copper district. For the past year or two, St. Mary's Company has not sold its lands for cash, preferring to take payment in shares of stocks for the lands purchased. Thus far, this policy has proved very successful and reflects excellent judgment on the part of the management. As a result, the company has built up a treasury of great value and large possibilities.

Following is a copy of the company's report for 1907 somewhat modified. Sales during the year:

40 acres of land, in fee simple, for	$20,000
180 acres of land, mineral rights to which were received	1,800
680 acres wood and timber (burnt land)	2,712
Total sales	$24,512

The real property of the company, Dec. 31, 1907, consisted of 95,158.82 acres, besides which the company owns mineral rights in 14,223.61 additional acres.

Boston—The balance sheet of the St. Mary's Mineral Land Co. compares as follows:

	Dec. 31,1907.	Dec. 31, 1906.
Land unsold, acres	95,158.82	95,378.82
Mineral rights, acres	14,233.61	14,043.61
Champion Copper Co., shares	50,000	50,000
Hancock Consol. Mining Co. shares	20,000	20,000
King Phillip Copper shares	73,767	55,691
LaSalle Copper shares	20,165	20,165
Pacific Copper shares	20,000	20,000
Copper Range Consolidated shares	208	208
Winona Copper shares	842	842
Old Colony Copper shares	80	80
Mayflower Mining shares	25,000	25,000
St. Mary's Mineral Land shares	640	640
Ojibway Mining shares	2,000	2,000
Amphidrome Co., Houghton shares	10	10
Notes receivable	$33,000	$66,000
Cash on deposit	230,391	675,747

In addition the company has the Challenge location.

There are no liabilities outstanding.

President Nathaniel Thayer says: The only sale of importance during the year was a tract of 40 acres to the Ojibway Mining Company for which was received 2,000 shares of Ojibway stock. The Ojibway Mining

Company's property consist of 1,240 acres in Sections 11, 13, 14, 15 and 23, Township 57, Range 32, along the Gratiot river, overlying the outcrop of the Kearsarge amygdaloid bed, in the footwall of which two shafts are now being sunk. A plant capable of operating the shafts for several years is in process of installation. One of the shafts will open the lode by next June.

We have received during the year from the Champion Copper Co., dividends amounting to $500,000.

We have continued our prospecting work at the Challenge Copper Mine. Considerable drifting has been done on the various lodes encountered and the shaft sunk 160 feet.

Touching King Phillip property—On Jan. 16, 1908, George P. Gardner was elected president to succeed the late A. G. Stanwood.

President George P .Gardner says: Of the 30,000 shares unissued at the last annual report, 20,000 shares were sold at $6 per share to provide working capital, leaving 10,000 shares unissued.

The shaft was sunk nearly 400 feet and at points corresponding with the 5th and 6th Winona levels, crosscuts were driven to the lode. At the fifth level, the lode was 28 feet wide, with copper contents fully as good as the values in the Winona mine, and at the sixth level the showing was much better. A second shaft was started early in the Fall, about a mile Southwest of No. 1 and should reach the lode about June 1, 1908. During 1907 the number of men employed were 79 and 3 power drills were operated.

The property is very skillfully managed and operations are conducted on conservative, practical lines and in the best way for the work in hand and bringing it to a successful issue. No. 1 shaft is 611 feet deep and No. 2 shaft is 131.5 feet deep. Dimensions the same as described in my previous report.

Hubbard reports, in part:

Shaft No. 1 was sunk 394 feet, to a point 30 feet below the 7th level; total depth, 611 feet. The fifth and sixth level cross-cuts were driven to the lode, which was found well charged with stamp and barrel copper, the sixth level being rich. At the fifth level, the horizontal distance from the shaft to the lode is 165 feet; at the sixth level, 159 feet. This should seem to indicate that the cross-cuts will grow less with increasing depth, unless the dip of the lode flattens also.

Shaft No. 2, 2,780 feet Southwest of No. 1, on the West side of the Sleeping River, was begun Sept. 5th, and was carried to a total depth of 131.5 feet below the collar (of which 13.5 feet was built up from the ledge) fully timbered and equipped with a temporary shaft-house. The sinking at this shaft was done with a small electric hoist which has just been replaced by a stream hoist of larger capacity. A still larger hoist will be needed here by next autumn. We expect to cross-cut about 60 feet to the lode at a depth of about 300 feet, about June 1.

During the year, the principal construction work was the erection of a compressor plant, on the Sleeping River, at about the center of the property and the erection of ten new dwelling houses. The building for the compressor and boilers is covered in, the smoke stack is partly erected, and the greater part of the 70-drill compressor delivered. A rock crusher for No. 1 shaft was delivered and is being installed in the temporary rock house, so that rock can be shipped to the mill direct from the drifts, as these are driven from the shaft. By June 1st, at least three levels can be operated on each side of the shaft.

CHALLANGE.

At this mine during 1907, 57 men were employed and 5 power drills were in operation doing sinking and drifting work. Opening work completed consisted of sinking 160 feet of shaft and driving 2,859 feet of drifting. Total, 3,019 feet. Operations are conducted on practical lines and up-to-date methods. Progress has been substantial and of the very best kind for bringing the results desired. Dr. Hubbard, who is a scholarly gentleman and a competent manager, said in part:

"In this total are not included any measurements for platt, and engine stations at the 4th level, or for cutting out. At the 3rd level, the East cross-cut has a total length of 558 feet, and the main West cross-cut a total length of 480 feet, ending at a point 55 feet West of No. 1 lode, where the latter occurs on the West side of the fault-plane. At the end of the year this west cross-cut, or about 206 feet from the shaft, cut a lode, which was first thought to be No. 1, the so-called Baltic bed, although the position of this bed was much nearer the shaft than it should be, according to information then in our possession. Subsequently, a slip or fault-plane was recognized passing through this bed near its junction with the cross-cut. This slip has a strike slightly more westerly, as it goes south, than the strike of the beds. The lode, on examination, proved to be No. 2 repeated at this point by faulting. To find No. 1 on the east side of the fault a drift was accordingly run southwesterly along the slip, a total distance of 838 feet (42 feet in 1906). In December, it reached bed No. 1, which is shown to have a displacement of upwards of 100 feet, involving a movement in the country rock equivalent to some 400 feet horizontally. We thought that this bed on the east side of the fault might prove to be better mineralized than on the west side, where it has been given a thorough test from the crosscuts. Thus far, the openings at this point are principally in broken ground and have not proceeded far enough to warrant any definite conclusions as to the character of the bed.

Lode No. 1 where opened has shown some heavy copper in small pockets at rare intervals. Except for occasional occurrences of laumonite, the rock broken from this bed resembles that from the Baltic lode at other localities, and the bed is from 35 to 45 feet wide.

Lode No. 2 is an amygdaloid conglomerate apparently without value.

Lodes No. 3 and No. 4 were not opened, except by the shaft and cross-cut. Each showed a little fine copper. No. 4 lode at the 4th level looks much better, and the rock from it, if in a producing mine, would probably be sent to the stampmill.

Lode No. 5 at the 2nd level was opened extensively, and to a less extent at the 3rd level. A fair amount of stamp copper in the epidote was disclosed.

Lode No. 6 is 25 feet wide. No values disclosed in it.

Lode No. 7 is 18 feet wide and carries a fair quantity of good stamp rock. Its hanging wall is 39 fet from the shaft.

Lode No. 8 is 47 feet wide, and carries some fine copper, but has not yet been thoroughly tested.

WINONA COPPER COMPANY.

Capital stock, One Hundred Thousand Shares, Par $25, $16 per share paid in.

Officers: President, Arthur G. Stanwood; vice-president, Nathaniel H. Stone; secretary-treasurer, Edward B. O'Conner; general manager, Dr. L. L. Hubbard; superintendent, R. R. Seeber. Transfer agent, American Trust Company, 53 State St., Boston, Mass. Office 713 Sears Bdg., Boston Mass.

The annual meeting of the stockholders is held on the last Tuesday in March in every year.

Winona is practically under the control of the St. Mary's Mineral Land Company, one of the best organizations in the country. The property is in excellent hands and is well managed all over. Mine location is situated in Houghton county near the dividing line between Ontonagon and Houghton counties. It adjoins King Phillip on the North and is in the direct channel of the richest lodes mined South of Portage Lake. The company owns 1,568 acres of mineral land with the Winona amygdaloid and other mineral beds running through them for more than a mile and one-half 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 1,046.5 feet deep. No. 4 is 7x18½ feet in dimensions, three compartment and 576 feet deep. Skips operate in balance and lift 2½ tons to a trip. In 1907 the company employed on an average 263 men and operated 15 machine drills for all underground work. 119,643½ tons of rock were hoisted of which 102,100.5 tons were treated at the stampmill. The product of mineral was 2,231,445 pounds, which yielded 1,285,863 pounds of refined copper. The recovery of refined copper was approximately 12.60 pounds per ton of rock treated. Rock shipments to mill from Winona were discontinued last October and it is hardly likely that production will be started up again until the metal market shows considerable improvement and the mine is put in condition to furnish regularly an output of at least 1,000 tons of rock per 24 hours. Opening work done during 1907 included shaft sinking, 505.5 feet, drifting on the lode 1,601.5 feet and crosscutting 126 feet. Total opening work, 2,233 feet. The rock product came from the 3rd to the 10th level in No. 3 shaft. Sinking in both shafts is still underway and drifting is going on in 5 levels developing fresh reserves of ground for future requirements. No part of the mine shows a stronger lode or greater encouragement for the future of the property than the newest openings. Considerable ground has been developed that will make good stopes and yield substantial copper values. Still the lode is not rich. It is medium grade as results obtained clearly indicates. But like most other copper bearing amygdaloids of Lake Superior region, it possesses great stability of values and first-rate general characteristics. During the year under review, many improvements have been made both underground and on surface and as a result the property is now in better physical form than at any former period in its history. The mine is opened and worked on practical mining principles and up-to-date methods. In all departments, substantial progress has been made and of the kind that bring the desired results. The mechanical equipment is of the best, in good running order and doing first class duty. It embraces a 40-drill capacity air compressor, direct hoists with additions and fittings adequate for present requirements. Some time ago, an assessment of $2 per hare was levied payable in two installments of $1.00 each, the first installment payable Nov. 12th, 1907, the second, February 12th, 1908.

Winona's treasury contains a good surplus and the financial position of the company is sound, as may be seen by the following financial statement:

ASSETS.

Cash in bank	$18,971.76	
291,291,187 lbs. refined copper unsold estimated at 13c lb.	37,854.31	
Supplies and cash at mine	74,697.40	$131,523.47

LIABILITIES.

Accounts payable at Boston	$16,024.32	
Accounts payable at the mine	26,592.48	42,616.80
Excess of Assets, December 31, 1907		$88,906.67

WYANDOTTE COPPER COMPANY.

President, Henry Stackpole; secretary-treasurer, Wm. O. Gay; superintendent, F. L, Van Orden; clerk, Wm. Van Orden; mining captain, Louis La Rochelle.

This company was organized and incorporated under the mining laws of the State of Michigan in 1899. Capitalization $2,500,000 divided into 100,000 shares, par value $25 each. The realty holdings of the company consists of 1,040 acres located in Town 52, Range 36. The property adjoins the Winona mine to the northeast

and carries the Winona lode for 1½ miles in length, besides other unidentified beds containing more or less copper values.

Wyandotte is still an exploring proposition with the work well in hand and substantial progress has been made in the way of shaft sinking and driving on the formations under investigation. Operations are skillfully conducted and on lines that should bring the desired results. The property is located well within the channel of the chief lodes of the South Range mineralized beds of importance, and it is certainly worthy of a thorough trial. This, the management is doing and in a conservative, intelligent businesslike way. At the present time, a shaft is being sunk in the amygdaloid vein paralleling the Winona lode, but lying about 1,200 feet East of this lode. It is a reddish formation with Epidote on the foot-wall and 15 feet wide. Shaft is two-compartment, 500 feet deep and sinking. It is now passing through an encouraging looking run of ground quite well charged with copper. When 200 feet deeper to the 700 foot level, drifting will be done on both sides of the shaft. 25 men are employed and two power drills are operated. The shaft working at present is known as "No. 11 Exploration." This shaft was only 300 feet deep when unwatered early last summer. The vein was cut with diamond drill 1,000 ft. N. E. (on the strike) of the shaft and it was found to be well charged with copper and 18 ft. in width. A little drifting done at the 300 ft. level showed a very encouraging amount of copper and now, while sinking, the vein shows good values when encountered in shaft. Unfortunately, the lode lies in the foot of the shaft and the vein can be seen only occasionally. Owing to the unsettled condition of the ground, the management plans to gain depth before drifting. East of the shaft has disclosed several veins by means of diamond drilling and which will be explored by means of a cross-cut later on.

WINONA LODE SHAFT.

Work at this shaft was discontinued last July after a great amount of lateral work was done at the 1,000 ft. level. Before closing same, two diamond drill holes (horizontal) were drilled across the formation, but no vein of importance was located.

The property is well managed and such intelligent effort deserves to be rewarded.

The company levied an assessment of $1.00 per share, 50 cents being payable Nov. 27th, 1907 and 50 cents on May 27th, 1908. The company had not called an assessment on the stock for several years, but the directors favored an assessment at this time, in view of the recent improved showing at the property. On March 30th, 1907, the company had a net surplus on hand of $38,656 compared with $49,408 on March 30th, 1906. The directors on a circular notifying stockholders of the calling of $1.00 assessment say: "It is the general opinion of our most prominent mining men at the Lake that at least one paying lode traverses our property, which covers about two miles across the Copper Range. That we have not, it thus far has not been for want of steady, persistent and intelligent effort and believing that we shall succeed and that our duty to the stockholders precludes us from abandoning the effort to find a paying lode on this property, we have decided to levy this assessment and continue the work. Our equipment for this purpose is complete, so that every dollar can be spent in actual breaking of the ground, no expenditures for equipment of any kind being required."

The company now has a strong treasury.

ELM RIVER MINING COMPANY.

This company was organized and incorporated in the spring of 1899, under the laws of the state of New Jersey, with a capital of $1,200,000 divided into 100,000 shares, par value $12 each, fully paid and issued. The company owns 2,300 acres of mineral land situated in the heart of the mineral range and in the line of the master lodes of the Lake Superior copper district. It is located some distance south of the Champion and north of the Winona mines in Town 52 North, Range 36 West.

The property is an exploration proposition with the work well in hand and conducted along practical, up-to-date methods. Substantial progress has been made and something good may be run into almost any time. It is well located and in the very quarter where copper values should naturally be found. In 1907 the Company employed twenty-three men and operated a power drill with other tools in doing mine work. The shaft was sunk 83 feet and drifting to the amount of 296½ feet was extended. Two shafts have been sunk on what is known as the Winona lode and quite a little exploratory work continued in this formation. Thus far, however, developments have failed to show up anything containing sustained values in sufficient quantity to warrant the management in entering upon a systematic course of mine development. Operations have now been transferred from this formation to another one about 2,000 feet further east and nearer the sandstone. The equipment has been removed to new site where operations have been started in the out-crop of the other lode. This shaft will explore the formation in virgin territory as nothing has ever been done in this quarter by any company. Several years ago when a cross section of the Elm River property was made by the diamond drill a core was taken out that looked quite promising. It happened to be a likely spot for a shaft and one was started there. In going down it passed through a favorable looking run of ground and may develop something worth going after. Shaft has reached a depth of 100 feet and drifting is continued from this point.

The company has a good treasury with ample funds to continue the work for a considerable time at the present rate of expenditures. All work is economically and skillfully performed.

H. F. Fay, president; George C. Endicott, secretary-treasurer; James Chynoweth, superintendent; Samuel Chynoweth, local superintendent.

ERIE-ONTARIO DEVELOPMENT COMPANY.

The following lands are held under option by the Erie-Ontario Development Company:

Southwest quarter 28, 53, 35.

Southeast quarter 30, 53, 35.

Northeast quarter 31, 53, 35.

Northwest quarter 32, 53, 35.

H. F. Fay, president; Geo. C. Endicott, secretary-treasurer; James Chynoweth, superintendent.

This property was idle during 1907.

The company was organized in January, 1905. A limited number of shares were sold and work began on the property in February of the same year. Several amygdaloid lodes were uncovered by trenching and test pits. None of the lodes exposed by this method of operation were of sufficient value to warrant extensive mining on them. This property was operated from January to August in 1906 and 30 men were employed. The shaft was sunk 53 feet and is now 148 feet deep. Besides this, 386 feet of drifting was done in the lode and 47 feet of crosscuts driven. For lack of funds, all work on the property has been suspended.

New developments on the Baltic lode will mean just as much for Erie-Ontario as for other undeveloped propositions.

The mine is equipped with necessary machinery to accomplish the amount of work laid out. Two power drills are at work sinking the shaft which is going down very rapidly.

These lands are well located on the mineral range of what known as the copper bearing territory which is between the eastern and western sandstones.

Undoubtedly the Baltic lode traverses these lands, and also the vast area of unexplored territory in that district, and what is now a virgin forest will at some time in the future become great mining communities where thousands of men will be employed which will add millions of dollars to the wealth of Houghton County.

KEWEENAW COUNTY MINES.

The total number of men employed in and about the mines of Keweenaw County during 1907 was 2,003 as compared with 1,119 employed during 1906.

ALLOUEZ MINING COMPANY.

Capital Stock, Two Million Five Hundred Thousand Dollars in One Hundred Thousand Shares of $25 each; $22.25 per share paid in. President H. F. Fay. Directors: A. Agassiz, F. L. Higginson, F. W. Hunnewell, Quincy A. Shaw, Jr., R. L. Agassiz, H. F. Fay, W. K Frost, Geo. C. Endicott, James MacNaughton of Michigan. Geo. C. Endicott, secretary and treasurer. Transfer office, 60 State St., Boston, Mass.; General manager, James MacNaughton.

In 1907. Allouez had a successful year, its mining profit being $106,344.33. Of this amount, however, nearly $85,000 was put back into the property and spent for betterments. Every penny of this money was used to excellent purpose with result that the position of the property has been strengthened and its value enhanced. The proceeds of the year paid all operating costs including construction and expenses of every kind and left a net profit of $21,527.55. In view of the amount of development and construction work done, the showing is a good one and can be no other than satisfactory to the shareholders.

Allouez has been developed and put on a producing basis at record speed and the work done is of the best and most practical for bringing economical results. Though entered upon a career of production, the mine, in the Kearsarge amygdaloid, is still very young in its infantile stages but without doubt on the way to a fine mining enterprise and a notable future. Accomplished results were obtained from one shaft that penetrated the lode less than two years previous to the date of the company's annual report and even then at a depth of 1,400 feet. The company works the Kearsarge lode of which it owns no outcrop. Allouez's outcrop, so to speak, is 1,400 feet below the surface of the earth and all underground work, including the development ground for making a product, cutting plats, laying tram roads and the multitude of fittings and adjustments incident to starting up production in a new mine, had to be done below this depth. From the start, the mine has been in excellent hands as the success achieved plainly indicates. Before the close of 1908, the mine's No. 2 shaft will be down in the lode and very soon afterwards, the product will show a perceptible increase from month to month. There are plenty of reasons for believing this shaft will come down in a lode fairly uniform in general features and carrying different grades of copper fully up to the average of the formation. In 1907, the number of men employed was 270 and the number of machine drills operated, 24. 227,481 tons of rock were hoisted of

which 214,720 tons were treated at the stamp mill. The product of mineral was 4,616,180 pounds, which yielded 2,934,116 pounds refined copper. The recovery was 13.65 pounds to the ton of rock treated. Following is a comparison of 1906 and 1907 results.

	1907	1906
RECEIPTS.		
From sales of copper	$557,235	$667,582
From interest	.....	873
Total	$557,235	$668,455
PAYMENTS.		
For working expenses	$401,974	$341,241
For smelting, freight, etc.,	48,886	53,554
Total	$450,861	$394,796
Mining profit	$106,374	$273,659
Less cons. and equip. at mine	84,846	82,630
Balance	$21,527	$191,029
Less payment stampmill, etc.,	$337,741	.....
Balance	316,214	.....
Carried forward	277,657	86,628
Total balance	$38,557	$227,657

Chief operating statistics for the year ending Dec. 31, compare as follows:

	1907	1906
Rock hoisted, tons	227,481	192,752
Rock discarded, tons	12,761	14,460
Percentage discarded	.05609	.07501
Rock treated, tons	214,720	178,400
Mineral produced, lbs.	4,616,180	5,531,660
Percentage mineral in rock treated	.1,074	1.55
Refined copper, lbs.	2,134,116	3,486,900
Per cent refined copper in mineral	63.561	63.03
Per cent refined copper in rock treated	.683	.977

The company in 1907 received an average price of 18.99 cents a pounds for its copper compared with 19.1454 cents a pound in 1906.

Summary of opening work for the year:

Sinking No. 1 shaft	271 feet
Sinking No. 2 shaft	898 feet
Crosscutting	147 feet
Drifting in the lode	3,445 feet
Total opening work	4,761 feet

General Manager MacNaughton says: The copper contents of the rock has fallen off as compared with last year, although in the lower levels at No. 1 shaft, a slight improvement has been noted during the past two months.

On January 1, 1908, No. 1 shaft was down to very near the 10th level, a total distance from surface of 2,271 feet. No. 2 shaft was down 1,085½ feet from surface. Sinking is progressing at the rate of 100 feet per month. A crosscut from the 6th level North to No. 1 shaft will intersect No. 2 shaft at a point 1,659 feet from surface. The breast of this crosscut was in 147 feet from the vein. No. 2 shaft will intersect the vein at a depth of 2,382 fete from surface.

Absallom Warn, mining captain; Alonzo Nicholas, clerk.

MINING BUILDING—MICHIGAN COLLEGE OF MINES, HOUGHTON.

AHMEEK MINE.

A. S. Bigelow, president; W. J. Ladd, secretary-treasurer; Norman W. Haire, general manager; W. J. Uren, general superintendent; Russell Smith, assistant supenintendent; Thomas Rapson, mining captain; John G. Bennets, clerk; A. G. Gulberg, superintendent motive power and construction; John T. Reeder, purchasing agent. Eastern office, 199 Washington St., Boston, Mass.; general office, Houghton, Mich.; mine office, Alllouez.

Capital Stock, $1,250,000 in 50,000 shares of $25.00 each.

The good things forecasted for Ahmeek in my previous reports are showing up in tangible, substantial form and the mine is well on the way to notable, profitable career. In 1907 the mine had a good year and but for the demoralized money and copper markets, which set in about mid-summer, the twelve months work would have brought better results still. The property is young and the management is opening up the underground department and developing it on methods that promise to bring the very best results. Its future as well as its present welfare is considered. Modifications are now going on underground that will, it has been pretty well demonstrated, lead to a perceptible reduction in rock handling costs when completed and in operation. The "milling" system or a modification of it, which has proved so successful in the iron districts and elsewhere, is to be given a trial in Ahmeek and there is no apparent reason why it should not work well in a copper mine and result in reducing somewhat the cost of conveying the rock product from the stopes to the shafts. Tramming is done much cheaper in the iron districts than in the Lake Copper Country, and the method is certainly worth giving a fair trial. Of course, there is considerable difference in handling the product of a copper mine with its narrow lode and that of an iron mine with its great, wide deposit of iron ore.

Ahmeek has a record of which any management may be proud for it is certainly one of the best that has come under my observation in an experience of over forty years. From the beginning, the property has been very skillfully operated and managed practically to perfection. Operations yielded a profit of over $118,000, besides opening up the mine with two modern shafts and openings in the lode aggregating 18,759 feet or about 3½ miles, besides equipping the property with a modern plant of great power and efficiency, and establishing it on a paying basis. The mine is opened up and developed through two fine shafts as near fire-proof as it is possible to make them. All through the underground openings, the lode looks first-rate, showing up the usual grades of copper belonging to the formation. From end to end, the workings are in fine physical condition with sufficient ground reserves developed to turn out a substantial product for years to come. Shafts are connected at many points and air circuates freely through the main workings making them comparatively cool and comfortable for all working underground. Operations are conducted on modern and practical lines. Men are distributed through the mine to the best advantage and return the best kind of service. The lode averages about 14 feet wide, is fairly uniform and yields about 17 or 18 pounds of copper to the ton of rock treated. Its two shafts are numbered from South to North, are located 1,434 feet apart and sunk in the lode at an angle of 42° from horizontal. Both are three compartment, 17 ft. 2 in. by 8 ft. inside measurement with double skipways and very substantially constructed. On Dec. 31, No. 1 shaft was 1,204.2 feet deep. No. 2 was 1,334 feet deep. Skips are 7 tons capacity, operate in balance and dump automatically. In 1907 the mine employed 385 men on an average and operated 33 machine air drills. 364,412 tons of rock were hoisted of which 320,733 tons were treated at the stampmill. The mineral product obtained was 7,328,450 pounds, which yielded 5,510,985 pounds of refined copper, or something over 17 pounds to the ton of rock treated. Opening work done during the year consisted of shaft sinking 474 feet and drifting on the lode 6,317 feet. Total opening work 6,791 feet or the equivalent of about a mile and one quarter of openings into virgin ground. In the deepest and main points penetrated, the lode carries copper values fully up to the average of the mine and looks healthy, strong and robust. The company has just issued its first annual report and it is well worth reading.

General manager and vice-president Norman W. Haire states, in part: The following report is issued by the Ahmeek Mining company, covering a period from Aug. 1, 1902 to Dec. 31, 1907:

Copper sold, 8,679,622 lbs., at 17.63 cents	$1,529,912	
*Copper unsold, 1,838,513 lbs., estimated at 13 cents	239,006	
Total 10,518,136 lbs.,		$1,768,919
Other income		25,072
Total		$1,793,991
Expenses at mine	1,111,358	
Other charges	125,551	1,236,909
Gross profit		$ 557,082
Construction		438,807
Net profit		$ 118,211
$5 per share paid in 1904	$250,000	
Surplus July 31, 1902	17,359	267,359
Surplus Dec. 31, 1907		$ 385,571

*Of the above amount there has since been sold up to Jan. 31, 1908, 384,191 pounds at 14 cents per pound.

Balance sheet of Dec. 31, 1907, shows:

ASSETS.

Cash and Accounts, received in Boston and copper not paid for	$418,264	
Cash and Accounts received at mine	10,768	
Supplies and fuel	43,848	
Total assets		$472,881

LIABILITIES.

Accounts payable at mine	74,417	
Accounts payable at Boston	12,892	
Total liabilities		$87,309
Balance of assets		$385,572

Boston—The annual report of the Ahmeek Mining Co., issued this morning covering operations from August 1, 1902 to Dec. 31, 1907,—the first detailed statement ever published,—presents the following operating statistics:

Rock mined, tons	736,065
Rock stamped, tons	582,453
Mineral obtained, pounds	13,998,350
Refined copper produced, pounds	10,518,136
Percentage copper in mineral	75.138
Total openings of all classifications, feet,	18,758

On Dec. 31, 1907, No. 1 shaft had reached to the 9th level and was 1,204 feet deep on the incline. No regular stoping has been done below the 5th level. But little poor ground has been encountered in the mine. The new ground opened in No. 1 for the year 1907 may be designated as fair on the south and good on the north. At the close of 1907 No. 2 shaft was 1,334 feet deep on the incline and sinking was in progress below the 9th level. This shaft is in rich matter. About all of the rock taken from the shaft goes to the stampmill. No stoping has been done below the 7th level. The new openings for 1907 both North and South of this shaft are good. Both shafts are tripple compartment and sunk at a dip of 42°. Openings in the entire mine are well ahead of stoping requirements.

There are on the location 70 dwellings of various sizes for the use of employes. 15 of these were erected in 1907.

It has been the aim to make a plant by means of which a large annual ouput of copper rock may be mined and shipped in the most economical manner.

The Ahmeek mine property embraces 920 acres of mineral land traversed by the Allouez conglomerate,

Kearsarge conglomerate, Osceola amygdaloid and Kearsarge amygdaloid lodes. Ground was broken for the present shafts in 1903 and the first shipment of rock from the mine to the mill was made in May, 1904.

The company's rock has been stamped on contract by the Osceola and Tamarack mills. In the future, it will be necessary to build a stampmill for the company's exclusive use. This can be erected out of a portion of the net earnings, which should be set aside from time to time for that purpose.

Vice-president Haire says: "The outlook at Ahmeek for a large paying mine was never better than today."

Ahmeek is described at some length in my previous reports.

Since writing the foregoing the new method of loading rock into skips at the Ahmeek has had a trial test and found to work practically to perfection. All advantages expected by the management for the innovation were obtained which is very gratifying. Skips were loaded and off to surface in 24 seconds from the time they dropped on the shaft gate. In the test, 7 ton capacity skips were lowered, loaded, hoisted and dumped at the average rate of one in two minutes and delivering better than 200 tons of rock an hour. That is going at a remarkable speed and may be record hoisting for the copper district. With the changes completed and in full swing one hoisting station will serve for lifting the rock product from 6 or 7 levels instead of hoisting from each one as is the present custom. This will obviate the necessity of removing trammers from level to level with their tools which occasions a considerable loss of time and will also do away with running a skip from one level to another to pick up a load of rock. In the fixed station there will always be a ready supply on hand. Rock from contributing stopes and openings will be run into a main bin through an opening at each level. Main bins are built in the backs of shafts and lined up with flat timber.

MOHAWK MINE.

Office, 15 William St., New York.

Capital Stock, $2,500,000 in 100,000 shares of par value $25 each.

Officers: Joseph E. Gay, president; J. R. Stanton, treasurer; J. W. Hardly, secretary; Fred Smith, agent; Will G. Smith, superintendent; Frank Getchell, clerk; John Trevarrow, mining captain; William Hartmann, engineer.

As age goes Mohawk is a young mine with solid merit and steadily improving in physical condition and producing capacity. It still holds the distinction of being the heaviest copper producer and only dividend payer in Keweenaw county. Underground operations are conducted through 5 shafts sunk in the vein, substantially constructed and in first-class running order. Shafts are connected underground at many places, and air circulates freely through the openings, making the mine airy, cool and fairly comfortable for men working below the surface.

I have visited this mine on different occasions, but never without being favorably impressed with its general appearance and the smooth, efficient manner in which each department connected with the mine was running. About every department appears to be going along practically to perfection and doing satisfactory duty. Everywhere, care and efficiency are reflected and nothing whatever seems to be overlooked, no matter what its significance may be. General operations are conducted with a view to getting out the best there is in the property in the most practical way and progress has been steady and substantial. Mine is opened up with enough ground developed to last for years and in shape for taking out a product economically. Its physical condition is of the best and such that the mine can furnish a heavy rock output carrying average values of the lode worked without running the least risk of robbing reserves of lode. From the northern to the southern end, underground openings extend for over 8,000 feet in length. A considerable portion of the developed ground will make good stopes and yield the usual grades of copper for which the Kearsarge amygdaloid is noted. The lode mined is not rich, as actual result obtained plainly show up, but its values are permanent with a tendency to increase slightly with depth. It is hard, but of good width, reachy and blasted holes bringing down big burdens. One level, the third, is 7,050 feet in length for a continuous stretch.

In 1907 the mine employed on a monthly average 850 men and operated 65 machine drills. 744,361 tons of rock were hoisted of which 640,777 tons were treated at the company's stampmill. 103,584 tons were discarded. The product of mineral was 13,164,360 pounds which yielded 10,107,266 pounds of refined copper or 15.77 lbs. to the ton of rock treated. The product comes from all over the mine and is trammed by hand labor. Skips operate in balance and lift four tons to a trip. They dump automatically on rockhouse grizzles, and the fine stuff passing into the bins ready for stamping.

Mohawk's five shafts are numbered from north to south,—No. 1 being the north shaft and No. 5, the southermost one. Respective depths of shafts are, No. 1 1,575; No. 2, 1,575; No. 3, 1,225; No. 4, 1,175 and No. 5, 575 feet. All five shafts are connected with development work going on all over in accordance with the policy of the management. Opening work completed during 1907 combined shaft sinking 620.5 feet; drifting 10,422 feet. Total opening work 11,042.5 feet or over two miles.

Additions to equipment included a new 60-drill capacity air compressor and other improvements costing in all $103,353, and every penny of the money was spent to excellent advantage.

Annual report of the company for 1906 and 1907 compares:

	1907	1906
Sales of copper	$1,583,084	$1,832,765
Account assessments	.....	.....
Interest	2,703	9,557
Total	$1,585,784	$1,842,341
Expense mine, smelt and freight,	$1,084,029	$ 985,165
Mining profit	501,758	857,176
Construction	103,353	93,873
Surplus for year	398,405	763,302
Previous surplus	1,059,417	796,114
Total	$1,457,822	$1,559,416
Dividends	900,000	500,000
Surplus Dec. 31,	$557,822	$1,059,416

Mohawk's costs while increasing did not show a very appreciable gain over the preceding year. A two years' comparison of detailed costs, rock hoisted, treated, etc., follows:

	1907	1906
Rock hoisted, tons	744,361	703,771
Rock stamped, tons	640,777	618,543
Product mineral, pounds	13,164,360	12,723,515
Refined product, pounds	10,107,266	9,352,252
Lbs. copper per ton	15.77	15.12
Per cent. copper in mineral	78.85	75.60
Cost rock hoisted per ton	$1,326	$1,257
Cost rock stamped per ton	1.54	1.43
Cost refined @ 9c per lb.	10.725	10.534
Cost include construction	11.747	11.54

The balance sheets as of Dec. 31, 1907 and 1906, we compare as follows:

ASSETS.

	1907	1906
Cash in bank	$ 26,439	$ 41,403
Cash in trust company	.....	470,000
Copper on hand, sold	599,002	527,894
Cash and supplies at mine	86,907	79,839
Stock in Michigan Smelting Co.,	80,000	80,000
Total	$792,348	$1,199,135

LIABILITIES.

Indebtedness at mine	$146,609	$124,857
Accounts payable	87,918	14,861
Balance assets	557,821	1,059,417
Total	$792,348	$1,199,135

Mohawk is described at some length in my former reports.

GRATIOT MINE.

This is a Keweenaw property and a subsidiary of the Calumet & Hecla Mining Company. Fifty men are employed. It is well located and adjoins the Mohawk mine on the north and Ojibway on the south. Lands owned form a long tract carrying the outcrop of the Kearsarge lode for practically its entire length. Two shafts are going down and there is room enough for a couple more without any crowding. I visited the property last winter and saw some nice looking copper rock hoisted out of the mine. It resembled very strongly the copper rock from No. 1 shaft of the Mohawk mine just a little to the south. It was well charged with mineral such as Kearsarge lode is noted for. Stamp copper showed up quite plainly as well as small horns. Gratiot is a developing proposition with the work well in hand and conducted on scientific principles and up-to-date methods. Shafts are sinking down and the lode reserves are being developed and put in shape for making a product of coppr rock. Work is carried on in the right way to bring practical results and such as count. There is method in everything done. All work is under the direct management of Mr. James MacNaughton, general manager of the Calumet & Hecla Mining Company. Underground work is carried on through two shafts sunk in the Kearsarge lode, which the mine works. Shafts are substantial, three-compartment and modern in every particular. At this writing, No. 1 has reached a depth of 482 feet. No. 2 is 565 feet deep. Both are still sinking. Surface equipment consists principally of a developing outfit in first-class running order and adequate for requirements at the present time. Gratiot has a promising outlook, is ably managed and economically operated.

F. W. Ridley, local superintendent; William Gill, mining captain.

KEWEENAW COPPER COMPANY.

Office, 45 Broadway, New York. Capital stock, $2,000,000. $10.00 per share paid in; $25 per share par value.

Officers: C. A .Wright, president; Thomas Hoatson, second vice-president and mining director; Spencer R. Hill, vice-president; C. A. Wright, Jr., secretary and assistant treasurer.

The property of this company is located in Keweenaw County.

During the year under review, a heap of practical work was patched and substantial progress made both at the mine and with the Keweenaw Central Railroad. All the railroad stock, and it forms a valuable asset, is owned by the Keweenaw Copper Company.

In the mining department, all work or practically so, was confined to the company's Medora shaft. A force of 90 men were employed, on an average and eight machine drills were operated in sinking, drifting and crosscutting work. Opening work embraces sinking the shaft 681 feed during the year, drifting 4,215 feet and crosscutting 305 feet. Total opening work 5,197 feet,—less than 100 feet short of a mile of openings driven into virgin territory. In all, eleven levels are now already extended from shaft and the lode exposed in these openings reveal considerable ground well charged with the different grades of copper characteristic of Lake mineral formations. I was underground there twice during 1907 and on each occasion saw some fine broken down copper rock. Underground developments are conducted through one large shaft, 7x18 feet inside timbers, and 1,005 deep on the 1st of January, 1908. Shaft sinking was again started in February and is still underway. Thus far, skips operate singly and carry 2½ tons of rock to a trip. Operations are conducted on practical lines and results accomplished are on up-to-date methods for economical work. Everything is well planned and the best way for future requirements. All the rock obtained

through this development remains stocked near the shaft and it contains, it is believed, a percentage of copper that will compare favorably with the average of the Lake copper producers. This rock pile will likely be stamped the coming summer and its copper contents turned into money. It will come handy. It is planned to start sinking No. 2 shaft as soon as the weather will permit. The lands owned by the company comprise a vast acreage consisting of upwards of 17,000 acres—approximately 27 miles of territory. Much of this land is well timbered and certain to appreciate in value now that it has a railroad. Moreover, the lands reach from one side of the mineral range to the other and encompass all the copper bearing lodes in the district. The undeveloped possibilities of such a property is prodigious and practically beyond mathematical computation.

Boston, 19—C. A. Wright, president of this company in his report to stockholders says that the company during 1907 bought 1,021 acres of contiguous mineral land and a majority of the outstanding stock of the Washington Copper Co. The company had advanced the Keweenaw R. R., all of whose capital is owned by the mining company, $121,000 for completing its road and acquiring necessary rolling stock. Some unavoidable delays have hindered completion of this line, but before July 1st, it is understood that the entire road will be ready for business from Mandan to Calumet, 26 miles; Lac La Belle branch, seven miles spurr and sidings, two miles; total of 65 miles built at a cost of $20,000 per mile. Considerable diamond drilling was done, mostly on the Empire tract, about three miles east of the company's Medora shaft and results indicate the continuation of all the well known lodes of the district with their usual characteristics through the Empire land and others owned by the company further east. Surface exploration was also undertaken, principally on the Empire lands, but owing to the continued good showing at the Medora shaft, it was decided early in the year to concentrate mining work at this point and to abandon for the present further explorations of the company's large mineral territory. At the Medora shaft, there are extensive openings and while the lode is somewhat narrow, it seems to be well charged with heavy copper, which analysis shows to be of the purest quality. The rock is unusually soft and should be easily treated. The mine will soon be in position to supply several hundred tons rock daily and about the 1st of July, it is understood that shipment will be commenced over Keweenaw Central Railroad and Keweenaw Copper Company will then become a regular producer.

Captain Thomas Hoatson, the mining director, says of last year's operations: No. 1 shaft has been sunk to a depth of 1,005 feet and platts have been cut on all levels from the 3rd to the 11th inclusive. There have been 4,215 feet of drifting and 300 feet of crosscutting done during the year bringing the total up to 4,291 feet of drifting and 300 feet of crosscutting. The pit on the Montreal lode of the Empire property exposed the lode, which showed a width of about 20 feet. The rock is fairly good character, but rather hard and carries only a little copper.

Supt. A. H. Sawyer, says: "No. 1 shaft has been but partly in the lode and partly in the trap, (foot-wall) for nearly its entire distance and has continued to produce first-class stamp rock and small mass. While the drifting done on the lower levels is, of course, less than on the upper levels, I believe that the quality of the lode has improved with depth.

Statement of the Keweenaw Copper Company, Dec. 31, 1907, is as follows:

ASSETS.

Real Estate	$1,290,198.42
Stock, Keweenaw Central Railroad Co.	500,000.00
Other Investments	59,434.29
Material and Supplies	13,183.40
Due from Keweenaw Central Railroad Co.	121,000.00
Accounts Receivable	30,671.11
Cash	97,944.84
Development Account	
Prior to January 1, 1907	301,418.99
	109,495.03

For the year 1907:

Exploration Expense	$ 17,493.74	
Diamond Drilling	10,858.77	
Surface Exploration	6,634.97	
Buildings and Equipment	38,316.12	
Expense at Mine	121,381.26	
Sinking and Drifting	64,530.67	
Compressor and Drill Expense	16,991.80	
Hoisting expense	7,737.98	
Rock House expense	4,501.88	
Surface expense	9,713.92	
Railroad Spur	10,224.09	
Water Supply	7,680.92	
Other Expenses (net) and Taxes	14,732.84	
		$2,413,851.05

LIABILITIES.

Capital Stock	$2,400,000.00
Accounts Payable	13,851.05
	$2,413,851.05

SENECA MINING COMPANY.

Office, Boston, Mass.; Capitalization, $500,000 par value $5 each. Lands are located North of Mohawk and Ahmeek mines. Lands consist of 1,800 acres situated in Keweenaw County and undoubtedly hold important values. This property has been idle for many years, but the management has planned to sink two shafts there during the coming summer. In 1907 a wagon road was completed connecting the property with the county road. A cross-section of the property was also diamond drilled and sites fixed for the new shafts. The property holds the underlay of the Kearsarge lode embracing a large area, and development there will be watched with considerable interest.

A. S. Biglow, president; W. J. Ladd, secretary-treasurer; Norman W. Haire, general manager; W. J. Uren, general superintendent; Russell Smith, assistant superintendent; J. G. Bennets, clerk, A. G. Gullberg, Superintendent motive power and construction; J. T. Reeder, purchasing agent. Eastern office, 199 Washington St., Boston, Mass.; general office, Houghton, Mich.; mine office, Allouez, Mich.

OJIBWAY MINING COMPANY.

Capital stock $2,500,000 in 100,000 shares of $25 each, of which 84,000 has been issued.

President, Dr. L. L. Hubbard, Houghton, Mich.; vice-president and treasurer, Chas. A. Duncan, Duluth, Minn.; secretary, Frederick R. Kennedy, Duluth, Minn.; general manager, Dr. Hubbard; superintendent, Andre Formis; main office, Houghton, Mich.; mine office, Mohawk, Mich.

This is a new company organized in 1907 with mineral rights under 1,240 acres of land located in Keweenaw county. The property adjoins the Gratiot mine of the Calumet & Hecla Mining Company on the north and is about six miles from the town of Calumet. Lode to be worked is the Kearsarge amygdaloid from which a number of rich cores were secured in the company's land by the diamond drill. This formation is quite generally recognized as the "mother lode" of the mineral bearing amygdaloid beds north of the Portage Lake. It is certainly a lode of great strength and persistency and carries substantial copper values characteristic of the Lake Superior district. On its strike line, in different properties, this lode is now under development for a distance of over 10 miles in length. Ojibway is well though of by some of the best people in the Upper Peninsula and recognized as a young mine of much promise and that may pay well to keep in view. Though the diamond drill cores came from the borings 1,200 feet apart, they showed much uniformity in general characteristics and were quite heavily filled in with strong copper. Underground development work is conducted through two shafts known as No. 1 and No. 2. Both are 7x19 feet in the clear, three compartment, four-foot ladderways in north ends. Shafts are sunk 70 feet horizontally in the footwall from the lode. At this writing, No. 1 is 120 feet deep and No. 2 is 240 feet deep. Two machine drills are operated, one in each shaft. When a depth of 350 feet is reached, crosscutting to the lode will be started. This will likely be in June, 1908 at No. 2 shaft. In going down, quite a few fissures were passed through from which a little mass and barrel copper was recovered. This is considered a good indication for the main lode and is viewed with some satisfaction. The average number of men employed during 1907 was 66 or 67 with two power drills in operation for sinking. Work was commenced on the mine plant in July, 1907. It now embraces a 10-drill capacity air compressor with a 150 H. P. boiler installed and in commission, carpenter-shop, machine-shop, smithy, warehouse and other mine buildings. Two direct hoists good for 1,200 feet, a 100 K. W. electric generator and other appliances and fittings required for doing mine work. There are also 24 dwelling houses completed for employees.

I visited the property some time ago and with Supt. Formis looked over its main features. The place looked well and had a prosperous appearance. Everybody was busy and work of all kinds was dispatched energetically and in a business-like way. Good progress was being made all over and the policy outlined for Ojibway is practical,—up-to-date and should bring the right kind of results. Superintendent Formis was chief engineer for the Oliver Iron Mining Company at Ishpeming for six years and knows the mining business thoroughly.

MISKAWABIC MINING COMPANY.

This is a development association formed for the purpose of exploring a large tract of mineral land located in Keweenaw County. The property consists of some 1,000 acres and possesses the Kearsarge lode on its strike for a mile and one-half or more in length and in all probabilities other unidentified mineralized deposits. A shaft was sunk 170 feet deep and drifts extended from both ends for considerable distance without finding anything to warrant continuing the drifting. The Kearsarge lode is a deep level proposition and in places, like a "Will-o'-the-Wisp." From bottom of shaft, a diamond drill was then run down 500 feet deep without encountering the Kearsarge lode. Property is well located and a little persistent search should bring its reward.

It was idle during 1907.

Conglomerate Mining Company, embracing the old Northwest, Pennsylvania, Delaware, Mindola, New Jersey, Maryland and Wyoming properties and the Central Mining Company's property have been absorbed by the Calumet & Hecla Mining Company; the Old Cliff by the Tamarack Mining Company. The Resolute, Mandan, Medora, Phoenix, Washington and a number of other different properties now form a part of the Keweenaw Central.

ARNOLD MINING COMPANY.

Was incorporated under the general mining laws of the State of Michigan in 1864, and capitalized in $2,500,000, divided into 100,000 shares of a par value of $25 each. Issued, 60,000.

The property consists of 3,323 acres of land in Town 58 North, Range 30 West, Keweenaw County, Michigan. Its holdings are divided into two groups known as the Copper Falls mine and the Arnold; Copper Falls having been absorbed in 1898. Copper Falls was extensively worked in former years and produced 12,843 tons, 429 pounds, and paid dividends to the amount of $100,000. The Arnold property was developed on an ashbed amygdaloid of low grade. Has been idle since 1901.

President, C. Howard Weston; Agent, Wesley Clark.

Main office, Boston, Mass.; Mine office, Copper Falls, Mich.

HUMBOLDT COPPER COMPANY.

Lands of this company lie just west of the Arnold and comprise 1,103 acres of mineral land. Capitalization, $1,000,000. Number of shares, 40,000, of par values of $25 each. Mine has been idle since 1901.

President, John C. Watson; secretary-treasurer, John Brooks; superintendent, Wesley Clark.

MEADOW.

The Meadow adjoins the Humboldt and Phoenix properties. Lands 364 acres. Has been slightly prospected.

President, W. F. Fitzgerald, Boston, Mass.; Agent, Wesley Clark, Copper Falls, Mich.

ASHBED MINING COMPANY.

President, C. Howard Watson; secretary-treasurer, John Brooks; superintendent, Wesley Clark.

Main office, 50 State Street, Boston; Mine office, Copper Falls, Mich.

Company was organized under the laws of the State of Michigan in 1880. Capitalization $2,500,000, in 100,000 shares of $25 each.

This company owns 1,143 acres of land carrying the outcrop of the Ashbed amygdaloid lode in which the mine is opened, and various other cupriferous deposits. The lands are well located and possess many interesting features such as are found in association with some of the most successful mines in the region. They may contain important values and are certainly worth investigating. On account of the scarcity of labor and a not too strong a treasury the directors of the Ashbed Mining Company found it necessary to suspend operations early in the year 1907 and there is nothing new to report on the property.

ONTONAGON COUNTY.

The number of men employed in this county during 1907 was 1252 as compared with 1074 for the previous year. Developments in the new belt of the Lake Copper Company's property, supposed by many to be the Baltic lode, have resulted in reviving fresh interest in the Ontonagon district. There are a number of copper bearing lodes in the county that have never been half explored and some of them may, so far as any one knows, contain profitable values and make, in the future, substantial, successful mines. Diamond drill work has been conducted in a vigorous, practical way in the Mass and Adventure properties with the hope of locating a continuation of the new lode, or some other profitable one, recently opened up and now under systematic development in the Lake Copper mine.

Last summer, just after the new find had been uncovered I visited the property and looked over, with some care, as much of the lode as there happened to be in view. It had the appearance of being a strong healthy lode and one that was likely to hold its values with depth and extended development. The whole face of the opening was quite richly mineralized with the different grades of copper characteristic of the Lake copper district. Knobs of copper varying in size could be seen jutting out in many places.

To me the showing looked first-rate and I shall be rather surprised if the lode does not make good for some distance both sides of the discovery on the strike line of the formation. It is sincerely hoped Adventure and Mass people may succeed in finding what they are looking for. It would mean much to Ontonagon County and perhaps to the south end of Houghton County as well. Both companies are enterprising, deserving, have faith in the district and are demonstrating it by spending their good money in the work. This is what counts. Such faithful, persistent efforts usually gets rewarded in the end.

LAKE COPPER COMPANY.

Officers and directors; Reginald C. Pryor, William D. Calverley, B. F. Chynoweth, John H. Rice, R. M. Edwards, Deen Robinson and E. M. Ingram.

The Lake Copper Company was organized in November, 1905, under the mining laws of the State of Michigan and was capitalized for $2,500,000 divided into 100,000 shares of par value of $25 each. The property owned by the Lake Company was formerly the Old Belt of Ontonagon county, but reorganized and incorporated for the purpose of acquiring, exploring, developing and operating this property. The realty holdings of this company consisting of 720 acres, are large and located in the direct line of the principal copper bearing lodes of the Ontonagon district. The Knowlton, Evergreen and other lodes stretch through the lands of the company for over a mile in length and shafts can be sunk on them to great depth and worked on a large scale. These lodes, or portions of them thus far worked, are low grade and can only be made profitable by mining and manipulating a heavy tonnage of rock. During 1907 the company employed from a dozen to 20 men for all purposes. Equipment embraces an air compressor, boiler, hoist and other appliances suitable for exploring and development work. Work done during the year included sinking No. 1 shaft, which is in the Knowlton lode, deeper and drifting some distance in the formation. Good progress was made and the ground opened up showed first-rate copper values. Sales of copper from mass and barrel work recovered in this work brought some thousands of dolllars. A nice rock pile near the shaft will come in handy later on for stamping purposes.

In addition to the work the new found lode, believed by some men to be the Baltic lode, was uncovered and a shaft 8x20 feet in dimensions sunk there to a depth of 160 feet. The work is well in hand and progress downward has been satisfactory. The new lode was located the previous year by the diamond drill and referred to in my last report. Operations are conducted in a practical, conservative way and the showing there is most encouraging. I visited the works last August. The bed was then uncovered and blasted into from foot-wall to hanging-wall side. It was exposed the whole width of the formation which was, I imagine, about 40 feet. The rock was charged with the different grades of copper characteristic of the Baltic and Kearsarge lodes and looked well. The most favorable feature of this lode and not common in the lodes so far opened in Ontonagon county is the quantity of stamp copper it contains and which makes it more like the Baltic and Kearsarge lodes in this particular. The management is firmly convinced that more copper, if sold at 12 cents per pound has been taken out of this shaft to date than necessary to pay expenses while sinking it. The lode seems to be dipping at an angle of 45 degrees from horizontal. Levels will likely be established 120 feet apart and ought to answer first-rate with such a medium angle. I consider the showing a very encouraging one and well worth the cost of proving up right. The formation bears a strong resemblance to the Baltic lode and may be a continuation of it. In this particular, however, there is but little significance. Sample of rock, so strongly resembling the Baltic lode, may be found in any amygdaloid mine in the district, that only experts can tell one from the other. Its mineralization is of far greater importance than any name can be and in this respect, it looks well and strong with good copper values. I shall be surprised if it does not make good with depth and for considerable distance on the strike line of the formation both sides of the shaft. Latest reports from the property are decidedly encouraging. I am officially informed that the lode in the bottom of the shaft will compare favorably with any place thus far exposed. The policy mapped out by the management is to sink the shaft down to substantial depth and prove up the belt in a practical, business-like way. The company is made up mostly of local people who know copper rock and copper mining. Operations will be conducted along practical lines and the best way for getting results. The outlook for the property looks decidedly promising and it will be given a trial on modern methods of mining.

William Wearne, mining captain; R. C. Pryor, manager.

ADVENTURE CONSOLIDATED COPPER COMPANY.

This company was organized under the mining laws of the State of Michigan, October 17, 1898. Capital stock $2,500,000 in 100,000 shares of $25 each.

James L. Bishop, vice president; Wm. R. Todd, secretary-treasurer; W. A. O. Paul, assistant secretary-treasurer; Chas. L. Lawton, general superintendent; C. K. Hitchcock, superintendent. Main office, No. 32 Broadway, New York; mine office, Greenland, Mich.

Adventure Consolidated is one of the oldest mines in the Ontonagon district, and in early days formed quite a factor in the copper district. Mine location is situated at Greenland Mich. in Sections 35 and 36, Town 51 and Range 39, and in Sections 1 and 2, Town 50 and Range 39 and consists of 1,706 acres of mineral land besides a mill-site of 320 acres on which the company has practically a new stamp mill. During 1907 about 250 men were employed. The tonnage of rock treated at the company's stampmill in 1907 is not given. The mineral product of the mine was 1,842,145, which yielded 1,244,874 pounds of refined copper. This compares with 2,452,062 pounds of mineral and 1,552,628 pounds of refined copper for 1906.

Improvements contemplated and completed during 1907 includes an electric haulage system for No. 4 shaft and modifying rock-house for handling rock more economically besides regular repair work.

The average prices received by the company for copper during the year under review was 17.77 cents per pound as compared with 18.85 cents for the previous year. The company's treasury holds a good surplus above liabilities.

Following is a copy of the directors report:

Running expenses at mine	$259,758.58	
Taxes in Michigan	7,932.43	
Smelting, transportation and all other expenses	19,485.27	
Total		$287,176.28
The product of the mine was 1,842,145 pounds of mineral yielding 1,244,874 pounds of refined copper for which has been realized the sum of		220,409.75
Balance		$66,766.53
Construction account		4,731.62
Number 4 Shaft		9,841.05
Diamond drilling		4,699.00
Total		$86,038.20
The statement of assets and liabilities in our last report showed a balance on hand as of date January 1, 1907,...		51,648.88
Add Installment of 50 cents per share, due February 5, 1907,		50,000.00
Add assessment of $1.00 per share, due November 16, 1907,		100,000.00
		$201,648.88
Deduct excess expenditures,		86,038.20
Gives balance of assets January 1, 1908,		$115,610.68

Adventure is described at some length in my previous reports. The mine is developed through three shafts, Nos. 1, 2 and 3 sunk in the Knowlton lode, although the bulk of the 1907 product came from the No. 3 shaft. The property is crossed by a number of mineral bearing

formations, most of which have been investigated from time to time. In recent work, the best results have been obtaind from the Knowlton lode and practically all recent producing work has been carried on in this belt. Lodes running through Adventure are exceptionally bunchy, irregular in character and low grade. Bunches of highly mineralized ground are found, but usually separated by bars of barren rock. To secure the best results, considerable ground must be opened up ahead of immediate requirements. Then choice spots may be extracted and the worthless bars left standing in the mine workings. Since the present management has been in charge of the property, a great many practical improvements have been made in the methods of working the mine. As a result, operating costs have been materially reduced in nearly all, if not all the branches of the enterprise. Underground work underway includes following up for further investigation the copper courses that have turned out the best values in times past. Five machine drills are in operation. A complete cross section of the company's land will be diamond drilled from about 1,000 feet east of the Knowlton lode to the Eastern Sandstone. Investigation of this territory will be complete and thorough. This work may be worth watching. The management is strenuous, knows the mining business,—means business and is determined to find the Lake Copper Mine new lode if it can be done. Adventure people are among the best going, have spent a heap of money on the property, and such faithful, persistent enterprise usually comes to its own, which is a handsome reward. May this be their experience.

General Superintendent Lawton in his annual report says in part:

Last June the question of closing the mine was once again very seriously considered. It was found that since the stampmill had been in prior to 1906, the average contents of refined metal in all the rock that had been stamped at the mill was 12.29 pounds per ton; and that fair grade of rock averaging 18 pounds mineral per ton, was stamped during the year 1906. During the first half of 1907, the average of the rock had gradually fallen lower and lower until it reached 8.7 pounds refined copper per ton of rock stamped.

No. 3 shaft on the Knowlton lode contains a large amount of low grade copper rock. In any case, the best obtained was 11 pounds of Mineral to the ton of rock. Minor changes were made to the end that cost of a ton of rock, which had averaged $3.36 up to the first half of 1906, $2.18 for the year 1906, and an average of $2.19 for the first half of 1907, was reduced until in October, it was $1.43 per ton including mining freight and stampmill expense. The average cost for the last six months was $1.56.

It may be advisable on account of the small stock of coal on hand to cease mining operations until opening of navigation when more coal can be obtained, and meanwhile confine use of what coal we have to developing lower portion of the mine, together with the chutes, that show a better grade of copper rock. Should the mine be opened to a sufficient extent and put on a proper mining basis, then in the future by maintaining the proper amount of percentage of development work to the rock stoped, the mine may possibly be put on a paying basis. On Nov. 1, the mine force was reduced form about 300 men to 150. The method of breaking rock was changed so that from an average during the first half of the year of 422 tons of copper rock per machine per month, the rate was increased to a maximum of 625 tons and an average for the last six months of 159 tons.

The mill property is a valuable one, and although the construction and equipment was weak, faulty and inefficient, necessitating large expenditures for re-construction, it is now an efficient and economical mill and with moderate expense, it can be made as efficient as any at the Lake.

Aside from the mine, the Adventure's large territory contains so large a portion that has never been thoroughly prospected that it is well worth careful attention and further expenditures, more especially so in light of the recent development of the property of the Lake Copper Company, its near neighbor.

THE MASS CONSOLIDATED MINING COMPANY.

Main office, No. 6 Beacon St., Boston, Mass.; Mine office, Mass City, Mich. Capital stock $500,000 in 100,000 shares of par value of $25 each. Capital paid in $1,900,000.

Officers: President, Charles A. Lamb; vice-president, Geo. A. Dodge; secretary-treasurer, Wilfred A. Bancroft; mine superintendent, James M. Wilcox; mining captain, Thomas Hall; clerk, W. H. Brown; engineer, E. F. Douglass.

Lands owned by the company consist of 2,400 acres stretching almost across the entire mineral belt and must, of necessity contain practically every copper bearing lode existing in the Ontonagon district. The company is mining the Knowlton and Evergreen lodes through four substantial shafts known as "A", "B", "C" and "D". These lodes are strong, healthy formations and well defined, but low grade and irregular with the copper values making in pockets separated by bars of lean ground. In some parts of the mine, these pockets of copper are found close together while in other places again they are wide apart.

In 1907 the company employed 350 men and operated an average of 28¾ power drills. 204,299 tons of rock were treated at the stamp-mill, which yielded 2,334,820 pounds of mineral. Amount of mass copper produced was 571,500 pounds. Total mineral output 2,906,320 pounds. From this was recovered 2,078,677 pounds of refined copper. This compares with 185,789 tons of rock stamped in 1906 yielding 2,350,940 pounds of mineral. Mass mineral, 704,235 pounds. Total mineral product 3,035,175 pounds. Refined copper 2,106,739 pounds.

The difference in refined copper products for the two years was 28,060 pounds. Average price received for the copper was 18.26 cents as against 18.95 cents received the previous year.

Mass is opened and developed through three working shafts, "A", “B” and "C". All are three compartment. "A" shaft is 1,757 feet deep. “B” shaft is 1,857 feet deep and "C" shaft is 1,000 feet deep. Skips operate singly, carry two tons to a trip and dump automatically on grizzles. Rockhouses are constructed on practical lines and the rock product is handled there for low costs. Method in vogue for taking out the product vary, but the best one known for doing the work is used.

President Charles A. Lamb says: "The rock product in our mine as last year continues to show a low percentage of mineral. The shutdown caused by the strike last Spring, and delay in changing foundations of the stamps at the mill, had a serious effect on our production and costs. We are still sinking with a diamond drill at Riddle Farm and hope to know whether we have a good lode in that locality, within a very short time.

We are practicing rigid economy in every part of the mine and mill and shall continue to do so."

Superintendent James M. Wilcox says: “New ground was opened up this year in all three shafts. At “A” shaft, drifts were extended on the 16th and 17th levels of the Evergreen lode, which showed fair stamp rock with some mass work. At “B” shaft, openings were mostly on the 10th and 11th levels of the Knowlton lode showing some fair stamp rock. At “C” shaft, extensions were made on the 1st and 6th levels of Butler lode, which showed quite a little good stamp rock with some mass and barrel copper. Openings on the 6th level of the Knowlton lode showed about the same quality of rock as found in the Butler lode, but with a little more mass copper. Crosscuts were made and extended at “C” shaft to the Knowlton lode on the 6th, 7th and 8th levels. The stoping was largely done at “C” shaft on the Butler and Knowlton lodes. On the 3rd level of the Butler lode, we obtained most of our mass copper, although we found some on the Evergreen lode at “A” shaft and on the Butler lode at “B” shaft. In the diamond drill holes, which we have made on our property in relation to the Evergreen formation on which the mine has been opened we passed through at the bottom of No. 3 hole an amygdaloid vein about 15 feet wide showing some good copper. We then started No. 4 hole back a short distance so as to get the cross section at the top of the same vein, close to the surface. The drill core also showed copper, which leads us to believe that we should give this lode further attention. We are in hopes that No. 5 drill will disclose some fine copper carrying veins.

The company's statement of assets and liabilities as of date Dec. 31, 1907, follows:

ASSETS.

Cash	$26,271
Accounts receivable	1,933
Supplies at mine	25,000
Supplies at mill	41,311
Copper on hand (sold)	32,826
Silver	1,064
Total	$128,541

LIABILITIES.

Payrolls	$ 9,268
Unclaimed payments	194
Due acct. imp. assess.	114
Accounts payable	24,708
Balance	94,167
Total	$128,451

In spite of the comparatively high operating costs, the mine is ably and skillfully managed. Capt. Wilcox has done hardly anything but mine copper for the past 35 years to my personal knowledge. He has filled about every position connected with a copper mine and knows the business thoroughly. Operations all over the property are conducted conservatively, practically and in the best way for getting out a product of copper, which is the main thing. If the management succeeds in finding the new lode now under development at the Lake copper mine, it will mean much for the Mass Consolidated Company and also for Ontonagon county. Everyone in the three counties are in hopes that Capt. Wilcox may locate it or something else worth going after.

Mechanical equipment is highly efficient, in good running order and economically operated. Buildings and location are lighted by electricity. The company has a modern two-head stampmill with the latest in concentrating appliances for washing and saving copper. Its daily capacity is 1,100 tons of rock. The mill is located on Keweenaw Bay about 33 miles from the mine.

MICHIGAN COPPER MINING COMPANY.

This company was incorporated under the mining laws of the State of Michigan June 15th, with an authorized capital of $2,500,000 divided into 100,000 shares of a par value of $25 each. The company owns 4,870 acres of mineral and 1,264 acres of timber lands located in Town 50 and Range 39 near Rockland, Ontonagon County, Michigan.

Officers: John Stanton, president; John R. Stanton, treasurer; Samuel Brady, superintendent; Henry Stubansky, clerk; Adolph Prees, mining captain; C. M. Haight, engineer.

Michigan mine still holds the distinction of being the heaviest copper producer in the Ontonagon district and from all accounts, is likely to maintain its relative position for some time to come. Developments in the new lode of the Lake Copper Mine, may however, result in changing the respective values of properties in the course of a year or so. But it is too soon to begin making comparisons. In 1907 the amount of rock hoisted was 183,529 tons, and treated at the stamp-mill,

151,502 tons. The product of mineral was 3,958,690 pounds which yielded 2,665,404 pounds of refined copper. Amount of rock stamped the previous year was 140,720 tons; refined copper recovered, 2,875,341 pounds. The yield of refined copper per ton of rock treated in 1907 was 17.58 pounds as compared with 20.43 for the previous year and 19 pounds for 1905. For the Lake Superior district, this is a very good showing and somewhat better than the general average for the amygdaloid mines. The yield is ahead of those recovered from the Quincy, Mohawk or Osceola, which are rated among the best copper mines in the country. The company is building a modern two-head stampmill on Keweenaw Bay where there is an inexhaustible supply of water for all purposes the year round. It is ready for the installation of machinery with boiler plant completed. The mill will be up-to-date in every particular and equipped with the best machinery known for copper washing. Some time this year, it should be completed and ready to go in commission. Its daily capacity will be about 750 tons rock per head or unit and 1,500 tons for both units. A single unit will require something like 200 tons rock per day more than the present outgo and it is hardly likely that more than one unit will be used for some time to come. The mine is in good physical condition with lots of ground about the average of the mine blocked out and in shape for regular production so that the management will experience no difficulty in furnishing the additional rock tonnage when needed.

Michigan is developed and operated through three shafts, A, B and C, sunk in the Calico lode. About 350 men are employed and 36 power drills are operated. "A" shaft is 7x18 feet within timbers, three compartment and 1,781 feet deep to below the 14th level. "B" shaft is one thousand feet east of "A" shaft, 7x20 feet within timbers, three compartment and the same depth as shaft "A." "C" shaft is 1,375 feet east of "B" shaft with the same dimensions as shafts "A" and "B" and down to the 10th level. The Calico and Branch lodes are mined. The Calico is an amygdaloid of peculiar appearance usually breaking to a face and displaying on the same varying colors. It is a strong, well defined belt, but irregular and bunchy in character. It looks very well, however, and seem to be developing first-rate values in the ground contributory to “C” shaft.

When on a visit t o the mine some time ago, I saw nice mineralized vein rock coming from this formation. The Branch lode will also likely prove one of the chief sources of supply. The lodes mined in the Michigan are described at considerable length in my previous reports. Underground openings are developed on practical lines and operated on modern methods of mining. Shafts are connected on different levels and ventilation is good. In all, 14 levels are extended from shafts. Sanitary conditions are first-rate and the mine is comfortable for working in. The product is recovered by the “overhand stoping” method and it answers first-rate. But little timber is used in the work and that means something. The rock product is taken from practically all over the mine. Tram cars are run by hand labor. Skips operate in balance and carry three tons of rock to a trip and dump automatically on grizzles in the rockhouse. The whole work is done readily, economically and on up-to-date methods. Development work done during 1907, includes shaft sinking 841 feet, drifting 6,362 feet and crosscutting 914 feet. Total opening work, 8,017 feet and over one and one-half miles in length.

Improvements in addition to stampmill embrace a new shaft house for "C" shaft with a gravity trestle 275 feet long connecting shaft-house to a circular rock-bin on the railroad track. All over, the property is in good condition, appears to be prosperous, is well managed and economically operated.

1907 product sold for 15.41 cents per pound as against 19.77 cents received for the 1906 product.

President Joseph E. Gay says: Operations at the mine have made steady progress and surface improvements are practically completed. A larger amount of drifting and sinking was done than in 1906 and sufficient ground may be available for a necessarily larger tonnage needed when the new mill goes into commission.

Mill construction continued until late in October, when it was decided to suspend operations owing to non-arrival of machinery and approach of winter.

We compare balance sheets dated Dec. 31, 1907 and 1906:

ASSETS.

	1907	1906
Cash	$ 20,596	$ 65,309
Copper bills	110,407	*130,167
Cash and supplies at mine	37,323	39,160
Accounts receivable	897	877
Total	$169,223	$235,512

LIABILITIES.

Indebtedness at mine	$ 45,766	$ 36,956
Accounts payable	170,113	10,865
Excess of liabilities	46,657	**187,691

*Copper on hand sold. **Balance of assets.

VICTORIA COPPER MINING COMPANY

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

Officers: Fred H. Williams, president; Chas. D. Hanchette, vice-president; James P. Graves, secretary-treasurer; George Hoopoer, superintendent; George Williams, mining captain; R. C. Everett, clerk Chas. Caddo, mill superintendent; R. S. Schultz, Jr., engineer.

Main office, 53 State St., Room 539, Boston, Mass.; mine office, Victoria, Ontonagon County, Michigan.

Victoria mine is described in my previous reports.

The property is located at the town of Victoria, Ontonagon County, on the top of a hill or plateau and about three miles from the village of Rockland. Lands owned consists of 2,300 acres and are crossed by the

Minnesota and Forest conglomerates, besides several amygdaloid beds and one which the company works supposed to be the Evergreen. This Evergreen belt runs through the property of its strike line for a distance of 3,000 feet in length. In 1907 the amount of rock hoisted was 104,783 tons and treated at the stampmill, 95,035 tons. The mineral product was 2,062,210 pounds, which yielded 1,207,337 pounds of refined copper. The yield of refined copper per ton of rock treated was 12.7 pounds compared with 13.94 pounds for the previous year.

The mine is opened and developed through one shaft, 8x12 feet in dimensions and 2,100 feet deep. In all, 20 levels are extended from shaft and the product is taken from the 7th to the 14th levels inclusive. The method in use for breaking down the vein rock is "breast and back-stoping," and it answers admirably for the formation mined. But little timber is required to hold up the ground while the lode is being blasted out and this counts for a good deal.

Development work done during the year under review in the way of opening up ground consisted of drifting 1,000 feet and crosscutting 1,350 feet, which is 2,350 feet in all. The mine is skillfully and economically managed. One 24x24 in. cylinder was adjusted to the stamp-head during the year and the plant was kept in first-class trim by repair work. A considerable amount of exploring work has been carried on and is still underway. From the south or eastern sandstone, a long tunnel is being driven north with the expectation of tapping some lode carrying profitable copper values. About one dozen belts extend through the property which this cross-cut will intersect. One may be found worth working.

Victoria Mining Company owns one of the most remarkable and unique hydraulic plants in the world. It has been a decided success from the time water was turned on. It is furnishing the mine and stamp mill with all the power used and besides has an excess left of almost two-thirds of its capacity. This excess power can be used for generating electricity that may be sold to neighboring towns and mines for various purposes.

The mechanical equipment is maintained in a high state of efficiency through repair work and the installment, when necessary, of new machinery.

The report of the Victoria Copper Mining Company for the year ended Dec. 31, 1907, gives the following statement of operations:

RECEIPTS.

1,207,237 lbs. copper at 18.08 cents	$218,404
Miscellaneous earnings	10,559

COST.

Working expenses at mine	$166,357
Smelting, freight, cost of marketing copper and office expenses	24,388
Total	$190,744
Leaving a mining profit of	$ 38,219
Less miscellaneous expenses, viz.:	
Construction	12,502
Legal expenses	3,891
Exploration	7,499
Interest	487
Showing a net profit	$ 13,837
Surplus from previous year was	34,829
Balance	$ 48,666
The summary of operations for the year follows:	
Rock hoisted, tons	104,783
Rock stamped, tons	95,035
Product of mineral, pounds	2,062,210
Product of refined copper, lbs.	1,207,337
Yield of rock treated 12.7 lbs. per ton or	.063
Cost per ton of rock stamped	$1.745
Cost per lb. of refined copper at mine, cents	13.778
Cost of smelting, freight and market product and office expense, cents	2.019
Cost per lb. of refined copper, cents	15.707

One of the greatest drawbacks to the profitable operation of the mine, during the past year, was the scarcity of labor, owing to which it was impossible to keep the mill fully supplied with rock and on account of this condition, a careful selection of rock was made and the result was a small percentage of copper in the rock stamped.

The new cylinder, with other improvements, have greatly increased the stamping capacity of the mill and with some additional expense, more than twice the amount of rock stamped a year ago can be handled. The shaft, in operation, is very limited, but every effort has been made to locate and open a new shaft to increase the rock supply and so reduce costs, and extensive exploration is being made and carried on with the same object in review.

The monthly mineral product has gradually increased from 146,346 pounds in January to 224,708 pounds in December, and the monthly product of refined copper has increased from 84,688 pounds in January to 129,810 pounds in December.

COPPER CROWN MINING COMPANY.

This company is capitalized in $2,500,000 divided in 100,000 shares, par value $25 each. 25,000 shares in the treasury.

Main office, St. Louis, Mo.; local office, Matchwood, Mich.

The mine location is situated near Matchwood in towns 48 and 49 and consist of 3,700 acres of land. Property embraces six old mines, and Hamilton, Trap Rock, Essex, Windsor, Norwich and Lafayette.

During 1907 this company employed on an average about 30 men and conducted underground work with four power drills. Operations were confined strictly to development work and crosscutting. There is one shaft 6x12 feet in dimensions and about 450 feet deep. It has

skiproad and ladder-way and is in good condition. A winze was sunk 100 feet in the lode, 572 feet were drifted in the lode also and 147 feet of crosscutting was run across the formation. Opening work was confined principally to the tunnel level, besides the 4th and 5th levels. Two lodes are being investigated,—the Norwich and Trap Rock. Both show up some good copper values. On the Norwich vein, drifting was conducted east and west on the fifth level, and the Trap Rock drifting was continued east and west on the tunnel level. The work has been conducted in a practical, business-like way and progress has been substantial and of the kind that counts. There is considerable ground opened up that looks first-rate and the property is certainly worth a good practical trial. While doing this development work, some thousands of pounds of mass and barrel copper was taken out, and piled up near the works. Bunches of ground carrying good copper values have been opened up and the management feels much encouraged over the future outlook for the company.

Enoch Henderson, superintendent; H. B. Kirkpatrick, clerk; J. T. Finnegan, mining captain.

SMELTING AND COPPER REFINING PLANTS.

The mineral products of the Lake copper mines are refined, melted into bars, ingots and plates and prepared for the market at local refiners. The refineries are conveniently situated on the shores of Portage Lake, Dollar Bay and Lake Linden and are classed among the most modern and complete refining plants in the country. People in charge of them are experienced, expert metallurgists and are sending out the best brands of copper on the market.

As stated in the report of the Calumet & Hecla mine, found elsewhere in this volume, the copper smelters and refineries of the company are located at Hubbell, Houghton County, Mich., on the shore of Torch Lake and at Buffalo, New York. The company's product of mineral is refined, melted into bars and ingots and prepared for the market at these works.

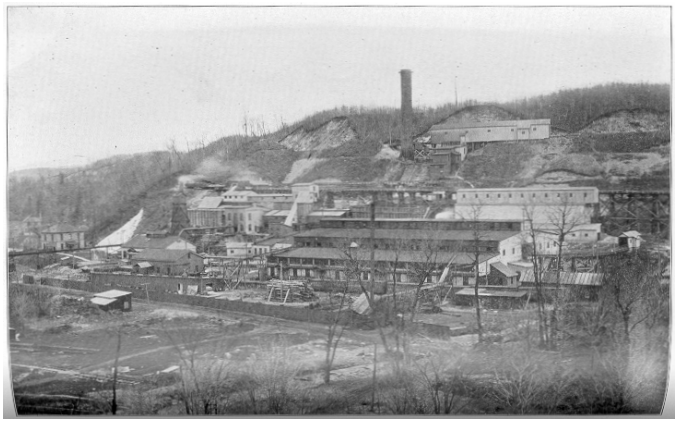
MICHIGAN SMELTING COMPANY.

This company was organized in 1903 under the laws of the State of Michigan. Capital $500,000, par value $25.

President, Wm. A. Paine; secretary-treasurer, Frederic Stanwood; superintendent, Frederick L. Cairns; clerk, W. H. Rowe.

Main office, Boston, Mass; local office, Houghton, Mich.

The smelters and refineries of this company are located about three miles west of Houghton on the shore of Portage Lake. At these works, the mineral product of the Atlantic, Baltic, Champion, Michigan, Mohawk and Wolverine mines are refined and prepared for the market. About 125 men are employed.



MICHIGAN SMELTING COMPANY'S WORKS, (COPPER RANGE CONSOLIDATED COMPANIES) HOUGHTON, MICHIGAN.

QUINCY SMELTING PLANT.

This plant is also referred to in the report on the Quincy mine found elsewhere in this volume. Besides the mineral product of the Quincy, those of Franklin, Centennial, Allouez, Mass and Adventure mines are refined and prepared for the market at these works. Also a little miscellaneous mineral.

Location, Hancock, Mich. Will P. Smith, superintendent.

THE LAKE SUPERIOR SMELTING COMPANY.

The plant of this company is located at Dollar Bay, Houghton County, Michigan. Company refines the mineral products of the Osceola, Tamarack, Isle Royale and Ahmeek mines.

H. D. Conant, superintendent; L. E. Williams, clerk.

Postoffice address, Dollar Bay, Mich.

THE SALT INDUSTRY.

While operations in Michigan were not pushed to the limit of capacity, the number of barrels produced during 1907 was larger than in any previous season. Sales were good and prices sufficiently high to net operators a fair profit. The output for the year was 6,298,463 barrels as compared with 5,644,559 for 1905. Michigan product is, therefore, about ¼ the total production of the United States. Since the establishment of the industry in Michigan the total output in the State has been 129,330,998 barrels.

The salt producing territory is divided into six districts. Saginaw County has 9 blocks, at all of which exhaust steam is used in manufacturing and it has one solar plant besides and $400,000 invested. Bay county has four operating companies with $120,000 invested and with 32 wells ranging in depth from 950 to 1,050 feet. In St. Clair county, where the invested capital is $500,000, there are 8 steam plants, 44 grainers, 6 vacuum pans and 18 wells. A large amount of dairy salt of excellent quality is produced in this district, as well as the coarser grades. The annual capacity is 1,700,000 barrels. Manistee county has 18 wells with an average depth of 2,000 feet; it has 6 steam blocks with 76 grainers and two vacuum pans and an annual capacity of 3,000,000 barrels, $550,000 is invested. The depth of the 8 wells in Mason County ranges from 2,240 to 2,284 feet. The three companies interested have $300,000 invested and have 28 grainers, 4 blocks and 3 vacuum pans. The capacity is 1,650,000 bbls. per annum. All blocks are using exhaust steam and refuse from sawmills. In Wayne county, eight companies are operating 20 wells ranging in depth from 1,100 to 1,600 feet and having an annual capacity of 2,000,000 bbls. There are 22 grainers and 18 vacuum pans. In addition, one shaft is sinking from which rock salt will be mined at a depth of 900 feet; it will go into commission in 1908.

The total annual producing capacity of the State is 10,000,000 bbls., but not much more than 60 per cent of this is being utilized at present. Were it necessary—could a larger and more profitable market be created for the product—the output might easily be expanded.

Just at present, there is in course of construction at Ludington, a salt block that will be the largest in the world. The main structure, 90 feet in height, will be 150x48 feet ground dimensions. The cooperage shop will be 128 feet long and 48 feet wide. The four settling tanks will be 140x44 ft. and 16 ft. deep. The beds and walls will be of concrete. The plant will go into commission some time in 1909, it is expected and cost not far from $500,000.

Following are the manufacturers of Salt in each district of Michigan and the number of barrels produced by each company:

District No. 1, SAGINAW COUNTY.

E. Germain & Co.	16,082
Brand & Harding	17,276
Saginaw Plate Glass Co.	149,562
S. L. Eastman	16,185
Mershon, Schuette, Parker & Co.	32,589
Saginaw Salt Co.	54,742
A. C. White & Co.	14,975
Bliss & VanAuken	19,258
N. Y. Solar Salt Works	7,414
Total	328,083

District No. 2, BAY COUNTY.

Theo. Hine & Co.	10,463
Kern Mfg. Co.	27,403
Mershon, Schuette, Parker & Co.	4,115
North American Chem. Co.	241,431
The Mershon, Bacon Co.	11,791
Total	294,791

District No. 3, ST. CLAIR COUNTY.

Diamond Crystal Salt Co.	370,418
Sicken Salt & Stave Co.	59,112
Davidson & Wonsey	153,050
Michigan Salt Works	244,600
Thompson Bros.	81,888
Port Huron Salt Co.	691,256
Crystal Flake Salt Co.	32,645
Total	1,632,969

District No. 4, MANISTEE COUNTY.

Buckle & Douglass Lumber Co.	611,903
R. G. Peters Salt & Lumber Co.	688,104
Louis Sands Salt & Lumber Co.	302,123
Filer & Sons	66,073
State Lumber Co.	298,132
Total	1,966,335

District No. 5, MASON COUNTY.

Stearns Salt & Lumber Co.	365,336
Stearns Salt & Lumber Co. No. 2	74,613
Anchor Salt Co.	402,918
Butters Salt & Lumber Co.	131,994
Total	974,861

District No. 6, WAYNE COUNTY.

Pennsylvania Salt Co.	361,836
Morton Salt Co.	278,368
Delray Salt Co.	89,905
Peninsular Salt Co.	56,964
Detroit Salt Co. No. 1	201,244
Detroit Salt Co. No. 2	69,062
Hiawatha Salt Co.	44,945
Total	1,101,424

RECAPITULATION FOR 1907.

John W. Clark, Saginaw	328,083
P. F. Gibbons, Bay	294,791
T. J. Wreath, St. Clair	1,632,969
W. H. Abbs, Manistee	1,966,335
Ope Aspland, Mason	974,861
Wm. J. O'Keefe, Wayne	1,101,424
Total	6,298.863

COMPARATIVE TABLES.

Salt manufactured in the State of Michigan prior to the enactment of the state inspection law of 1869:

	Barrels.
1860	4,000
1861	125,000
1862	243,000
1863	466,000
1864	529,073
1865	477,200
1866	407,997
1867	474,721
1868	555,690
Total	3,282,681

Salt inspected in the State of Michigan since the enactment of the state inspection law in 1869:

	Barrels.
1869	561,288
1870	621,352
1871	728,175
1872	724,481
1873	823,346
1874	1,026,970
1875	1,081,856
1876	1,482,729
1877	1,660,997
1878	1,885,884
1879	2,058,040
1880	2,676,588
1881	2,750,299
1882	3,037,317
1883	2,894,672
1884	3,161,806
1885	3,297,403
1886	3,667,257
1887	3,944,309
1888	3,866,228
1889	3,856,979
1890	3,838,637
1891	3,927,671
1892	3,812,054
1893	3,514,485
1894	3,938,941

	Barrels.
1895	3,529,362
1896	3,336,242
1897	3,622,764
1898	4,171,916
1899	4,732,669
1900	4,738,085
1901	5,580,101
1902	4,994,245
1903	4,387,982
1904	5,390,812
1905	5,671,253
1906	5,644,559
1907	6,298,463
Total	126,048,317

The total amount of salt which Michigan has produced to date, 129,330,998.

To Mr. Temple Emery, Salt Inspector for the State, I wish to acknowledge my obligations for much of the information contained in this report on salt.

THE COAL MINING INDUSTRY.

This industry in Michigan had a very successful year in 1907 and as regards the number of men employed and the tonnage of coal produced, all previous records were, I believe, surpassed. Up to the last quarter of the year, all industrial concerns operating in the State were run, practically, to the limit of capacity and doing a rushing business. Consumption of coal was heavy, demand for supplies continuous, prices fair and producing companies had a busy, profitable year. Coal mine managements write this office touching the year's business that they have "no complaints to make. The demand was good and prices fair." This is a very satisfactory condition of affairs and would indicate that producing companies are in a prosperous condition and doing well. The financial depression, however, set in just when the season happens to be at its best for Michigan coal companies and necessitated the closing down of many industrial concerns scattered throughout the State and cut off the demand temporarily. Only for this adverse condition, the coal business in Michigan for 1907 would have been heavier by many thouands of tons than the amount transacted and reported. Owing to local conditions, the development of the coal industry in the State has been an up-hill job, but most of our business people and captains of industry are blessed with indomitable energy as well as good judgment and usually succeed in accomplishing whatever they undertake to do. Although the development of the industry may have been slow, it has been steady and continuous and is without the least doubt in its very infancy and just throwing off its swaddling clothes. Michigan is now a considerable producer of this indispensable product, but I predict the present output will look small if it happens to be compared with the tonnage produced ten years from this time. New shafts are going down, fresh reserves are under development, additional machinery is being installed and coal companies are stretching out for bigger and better things. From figures received direct from operators, I estimate the value of Michigan coal f. o. b. at mines to be about $2 per ton.

General results as regards the number of men employed, wages paid and number of tons of coal produced will compare favorably with those of the previous years. Work was plentiful and men were constantly in demand at good wages. Owing to exhaustion or local conditions, a mine or two went out of commission and were abandoned while others again were worked with unusual vigor and decided success.

The coal industry, like that of Portland cement and others, has been fully written up and described in the "Annual Report of the Michigan Bureau of Labor Statistics." The report was prepared by Hon. Andrew Stephenson, inspector of coal mines. Mr. Stephenson's reports are always complete and cover practically every feature necessary to be made known or in which the

public can feel any particular interest. I may state again, however, that the information here submitted, with one or two exceptions is official, having come to me direct from the managers in charge of the mines. Blanks and letters were mailed to each manager for the necessary data. When products are omitted, unless the mines were idle, managers in charge failed to fill in and return the blanks to this office.

The total number of tons of coal mined in Michigan in 1907, as reported to me by the managers of the operating companies, was 1,931,011 as against 1,424,427 tons for 1906.

Following are the coal mines operated with products made as reported to this office; also names and postoffice address of managers:

Names of Mines	Products in tons	Names of Managers	P. O. Address
Allen & Walker	800	Verne Allen,	Grand Ledge
Bay Coal Mining Co.	24,660	M. L. Davies,	Bay City
Caledonia Mine	28,880	R. J. Eger,	Saginaw
Black Diamond	1,507	B. F. Jones,	Jackson
Eagle Mine	3,900	F. L. Reed,	Grand Ledge
Grand Ledge Coal Co.	1,382	Fargo Boyle,	Grand Ledge
Handy Mine	130,632	Thomas L. Handy,	Bay City
Michigan Coal Co.	24,237	R. M. Randall,	Saginaw
Peak Mine	13,000	Edward Peak,	Corunna
Robert Gage Co.	75,343	Chas. Corryell,	Bay City
Salzbury Mine	11,560	M. J. O'Malley,	Bay City
Wilkinson Mine	450	Wm. Marvin,	Grand Ledge
United Coal Co.	53,045	John Walsh,	Bay City
What Cheer Mine	87,108	E. B. Foss,	Bay City
Winona Coal Co.	97,125	E. B. Foss,	Bay City
Barnard Coal Co.	62,159	R. M. Randall,	Saginaw
Central Coal Co.	27,967	R. M. Randall,	Saginaw
Chappell & Fordney	55,293	R. M. Randall,	Saginaw
Riverside	81,453	R. M. Randall,	Saginaw
Northern Coal Co.	65,468	R. M. Randall,	Saginaw
Pere Marquette	78,159	R. M. Randall,	Saginaw
Standard Coal	30,882	R. M. Randall,	Saginaw
Saginaw	80,210	R. M. Randall,	Saginaw
Shiawassee	121,254	R. M. Randall,	Saginaw
Uncle Henry	39,756	R. M. Randall,	Saginaw
Wolverine No. 2	90,011	R. M. Randall,	Saginaw
Wolverine No. 3	149,898	R. M. Randall,	Saginaw
Somers No. 1	64,782	Chas. Corryell,	Bay City
Somers No. 2	86,035	Chas. Corryell,	Bay City
Somers No. 3	43,772	Chas. Corryell,	Bay City
Auburn Mine	206,713	Chas. Corryell,	Bay City
Wright Mine	2,224	Chas. Corryell,	Bay City
	1,931,011		

CONSOLIDATED COAL COMPANY.

Miners and Shippers of Bituminous Coal.

Walter S. Eddy, president; Robert M. Randall, general manager; Harry T. Wicks, vice-president; George L. Humphrey, secretary-treasurer; Charles W. Stiver, comptroller-purchasing agent.

This company forms the largest and most successful coal producing and shipping organization operating in the State of Michigan. The properties owned and controlled by the company are operated with great vigor and accordng to the latest and most approved methods of modern coal mining. They are opened and worked on up-to-date lines and maintained in a high state of efficiency by continuous development, repair work and the installation of new machinery from time to time whenever needed. In 1907 the company operated 12 substantial shipping mines and had a most successful year. The amount of coal produced was 882,510 as compared with 617,698 for the previous year showing a gain over 1906 of 264,812 tons.

Following are the mines operated: Saginaw Coal Co.; Pere Marquette Coal Co.; Northern Coal and Transportation Co.; Uncle Henry Coal Co.; Wolverine Coal Co.; Cass River Coal Co.; Riverside Coal Co.; Central Coal Minig Co.; Chappell & Fordney Coal Co.; Standard Mining Co.; Shiawassee Coal Co.; Barnard Coal Co.

SAGINAW MINE.

Saginaw Coal Company is located in Beauna Township, Saginaw County, Michigan. 164 men are employed on an average. One shaft is in operation and this is 160 feet deep. Product for 1907 was 80,210 tons. Daily capacity 300 tons. Property is well managed.

Robert M. Randall, general manager, Saginaw, Mich.

PERE MARQUETTE COAL COMPANY.

Pere Marquette is located at Saginaw, W. S., Michigan. The daily average number of men employed is 120 with active pit in operation, which is 200 feet in depth. 78,159 tons of coal was produced in 1907. The mine has a fine equipment and is ably managed.

General manager, R. M. Randall, Saginaw, Mich.

NORTHERN COAL AND TRANSPORTATION COMPANY.

The Northern mine is located in James Township, Saginaw County, Michigan. There are 160 men employed on an average with active pit going, which is 190 feet in depth. 65,468 tons of coal was produced in 1907. Daily capacity 300 tons.

General manager, R. M. Randall, Saginaw, Mich.

UNCLE HENRY MINE.

Uncle Henry mine is located in Bloomfield Township, Saginaw County, Michigan. 90 men are employed on an average. One shaft about 150 feet deep is operated and the property shows much improvement. 39,756 tons of coal was produced in 1907.

R. M. Randall, general manager, Saginaw, Mich.

WOLVERINE COAL COMPANY.

Wolverine Mine No. 2 is located at Monitor Township, Bay County, Michigan. 176 men are employed on an average. 90,011 tons of coal was produce in 1907.

R. M. Randall, general manager, Saginaw, Mich.

WOLVERINE COAL COMPANY.

Wolverine Mine No. 3 is located at Williams Township, Bay County, Michigan. Company employs a daily average of 270 men and operates one shaft, which is 200 feet deep. In 1907 the company produced 149,898 tons of coal.

R. M. Randall, general manager, Saginaw, Mich.

RIVERSIDE COAL COMPANY.

Riverside Coal Mine is located in James Township, Saginaw County, Michigan. Company employs 174 men on an average and operated one coal pit, which is 170 feet in depth. The number of tons of coal produced in 1907 was 81,453.

R. M. Randall, general manager, Saginaw, Mich.

CENTRAL COAL MINING COMPANY.

Central Coal Mine is located at Bay City, Michigan. 90 men are employed on an average and 27,967 tons of coal were produced during 1907.

R. M. Randall, Saginaw, Mich., general manager.

CHAPPEL & FORDNEY COAL COMPANY.

Chappel & Fordney coal mine is located at Saginaw, Michigan, W. S. Daily average number of men employed is 70 and one coal pit is operated at a depth of 230 feet. 55,293 tons of coal was produced in 1907.

R. M. Randall, Saginaw, Mich., general manager.

STANDARD COAL MINING COMPANY.

Standard coal mine is located at Bridgeport Township, Saginaw County, Michigan. Average number of men employed daily is 94. One shaft is operated, which is at a depth of about 200 feet. Product of coal for 1907 was 30,882 tons.

R. M. Randall, Saginaw, Mich., general manager.

SHIAWASSEE COAL COMPANY.

Shiawassee coal mine is located at James Township, Saginaw County, Mich. 242 men are employed on an average daily. One shaft is operated and in fine condition. 121,354 tons of coal were produced during 1907.

R. M. Randall, Saginaw, Mich., general manager.

BARNARD COAL COMPANY.

Barnard coal mine is located at Saginaw, Mich., W. S. The average number of men employed daily is 181 and one active coal pit is operated, which is 190 feet in depth. 62,159 tons of coal were produced during 1907.

R. M. Randall, Saginaw, Mich., general manager.

ALLEN & WALKER COAL MINE.

Allen & Walker mine is located at Grand Ledge, Eaton county. Verne Allen is president and general manager. Property consists of 20 acres. The mine is opened and operated through one drift-shaft about 350 feet deep in a coal seam from 18 to 28 inches thick. About 1,000 tons of coal are opened and held in reserve for future products. Product is broken by hand labor and hauled out of the workings by horse power. Five men are employed on an average. The output in 1907 was 800 tons of coal, which was sold at the mine.

Verne Allen, Grand Ledge, Mich., general manager.

ROBERT GAGE COAL COMPANY.

This company is among the most progressive coal producing organizations operating in the State of Michigan and has a good record. It is composed of progressive people, who know the coal mining business thoroughly and do it right. The company has send considerable sums of money in acquiring new properties and equipping them with powerful, efficient, mechanical plants for taking out and manipulating coal products on up-to-date methods. The properties are vigorously operated and in the best way for getting the best results. During 1907 the Robert Gage Coal Company purchased the J. H. Somers coal mines known as Nos. 1, 2 and 3 and operated these mines in connection with the Robert Gage No. 4 and Auburn Mine No. 5, besides the Saginaw Salt Manufacturing Works. The company had a very successful year in 1907, having produced 476,645 tons of coal and employed in its coal properties, 871 men.

Following are the mines operated: J. H. Somers, No. 1; J. H. Somers, No. 2; J. H. Somers, No. 3; Robert Gage Mine, No. 4 and Auburn Mine, No. 5. As the company purchased the J. H. Somers mines on the 1st of March, the product of coal from these properties is for 10 months only:

Tonnage for No. 1 for 10 months is	64,782
Tonnage for No. 2 for 10 months is	86,035
Tonnage for No. 3 for 10 months is	43,772
Tonnage for No. 4 for 10 months is	75,343
Tonnage for No. 5 for 10 months is	206,713
Total	476,645

These properties are described at some length in my previous reports.

The J. H. Somers mines are located at St. Charles, Mich. In 1907 Somers mine No. 1 employed on an average 207 men. One shaft is operated, which is 200 feet deep and 8x14 feet in dimensions. Area of coal lands consist of 2,800 acres and coal seams run from three to five feet deep. Equipment includes six H. T.

boilers, two dynamos and engines. The product is taken out by both electric appliances and hand labor. Shaking screens and railroad scales were added to the equipment in 1906.

This property has such a large acreage that possibly two more shafts will have to be sunk on the same in order to work out the coal. Operating the mine for eight years, only 200 acres of this vast field has been exhausted and the life of the same can readily be seen at the above acreage. The coal from the above is of the high St, Charles standard. The physical condition of this property is excellent and the future outlook is considered very good.

Somers Mine No. 2 like No. 1 is a fine mine and a successful business enterprise. It is operated on up-to-date methods and progress has been onward toward bigger and better things. Real estate holdings consist of 342 acres with the underlying coal seam about four feet thick. Openings in the coal body run 1,000 feet north, 2,500 feet west and 1,500 feet south. The product of coal is recovered through one working shaft, 8x14 feet in dimensions, substantially timbered and 200 feet deep. There are 220 men employed in this mine. Mechanical equipment embraces, besides supplementary fittings and additions, hoisting engines, locomotives and 12 electric cutting machines. Machinery is operated by both steam and electricity. Since the beginning of operations, the company has produced upwards of 1,000,000 tons of coal.

The Saginaw Salt Company's factory with a daily capacity of from 400 to 500 barrels of salt is also operated by the working plant of this property.

Somers No. 3 is also a profitable mine and a successful enterprise. Operations are conducted the best way for bringing the best results and everything in and about the mine is running smoothly and doing fine service. Real estate owned consists of 442 acres with coal seams running about 3½ feet thick. About 75 acres have been mined out from which it may be seen that the property may continue to be a substantial producer for many years to come. The product is taken out through one large shaft 200 feet deep and 8x14 feet in dimensions. Length of coal body reaches 2,000 feet north, 2,000 feet west and 1,000 feet east. Mechanical equipment includes hoisting engine, three boilers, 100 pit cars, besides supplementary fittings and additions.

ROBERT GAGE COAL MINE, No. 4.

This mine is located at St. Charles, Mich. The daily average number of men employed is 275. Two shafts are operated and they are 180 and 160 feet in depth, 14x7 feet in dimensions and the area of lands owned 2,382 acres. Coal seam is from 3 to 5 feet in depth. Equipment embraces first motion engines, self dumping cages, shaker screens and mule haulage, all in good running order. Product is taken out by hand labor. This is a substantial mine with a fine record.

AUBURN MINE NO. 5.

This is a very substantial mine and a fine producer. It is located at Bay County district and operated with much success. In 1907 the mine employed 275 men on an average.

SALSBURY COAL MINING COMPANY.

This mine is located at Bay City, Mich. Leonard Eichorn, president; M. J. O'Malley, secretary-treasurer and general manager.

In 1907 the company employed about 30 men daily and produced during the year 11,560 tons of coal. The property, however, is nearly worked out. The management expects to have it entirely exhausted within a year. Men are at work pulling the pillars. Since first opened, the property has produced about 182,603 tons of coal.

General manager, M. J. O'Malley, Bay City, Mich.

BAY COAL MINING COMPANY.

The company's property forms a substantial mine and a successful business enterprise. Realty holdings consist of 640 acres centrally located within the coal zone. The mine is developed and operated through one shaft 147 feet deep extending into the coal seam approximately 3½ feet thick with openings as much as 1,700 feet in extent.

The company employs an average daily force of 44 men. Output of coal in 1907 was 24,660 tons. Since the beginning of operations, the mine has produced something like 340,000 tons of good coal and it is good for some time to come. Property is in good running order with equipment adequate for requirements.

General manager, L. M. Davies, Bay City, Mich.

HANDY BROS. MINING COMPANY.

This company controls and operates the Handy mine located about five miles from Bay City between the Michigan Central Railroad and the Midland Rock Road with 600 acres of land. Although practically a new mine, it has been developed into a substantial producer and a fine business enterprise. Operations are conducted on up-to-date methods and progress has been continuous. Property is fully equipped with first motion hoist, automatic dumping cages and fittings of the latest design. The mine is developed and operated through one fine shaft 6x16 feet in dimensions, substantially timbered and 145 feet deep. Underground openings reach as much as 80 feet in length and the coal seam averages five feet thick.

The total number of tons of coal produced at the Monitor mine during the year 1907 was 130,633 and 285 men were employed on an average.

The management has completed another large shaft in Akron Township about eighteen miles east of Bay City and have erected one of the most modern and up-to-date tipples 85 feet in height, equipped with all modern appliances in the way of self dumping cages, shaking screens, together with boilers, first motion hoisting engine, air compressor and all other appliances required for handling an output of 1,000 tons daily.

The shaft is located on the Pere Marquette tracks near Akron and it is expected before the end of this year to have upwards of 250 men employed at that place.

Management writes: "We have no complaints to make in regard to last year's business, as the demand was good during the entire year." Thomas L. Handy, president and manager; Frank S. Handy, secretary; George W. Handy, treasurer, all of Bay City, Mich.

CALEDONIA COAL COMPANY, LTD.

This company is practically a new proposition with a promising future and is located at Saginaw, E. S., with 40 acres of land and has a progressive management. Mine is operated through one shaft 68 feet square in dimensions and 157 feet deep. Openings in the coal body approximately 300 yards with the seam of coal running about 34 inches thick. Roof consists of a good slate material and stands up first-rate. Product is taken out by the "Room and Pillar" method. Daily average number of men employed is 65 and the mine is opened up on modern methods and ably managed. Progress has been substantial and everything in and about the property runs nicely. Improvements have been introduced from time to time that strengthen the position of the mine and keep down costs. Daily capacity of the plant is 350 tons. The output of coal for 1907 was 28,888 tons and the number of men employed was 102 on an average.

Post Office address, Saginaw, Mich. Peter Curan, president; R J. Eger, secretary.

THE MICHIGAN COAL AND MINING COMPANY.

This company operates the Michigan mine, which has been a steady producer for the past ten years and appears to be good for years to come. Mine is opened and developed through one substantial shaft, 6x14 feet in dimensions and 136 feet deep. Area of land consists of 450 acres and the coal seam runs from three to three and one-half feet thick. Underground openings aggregate 5,000 feet in extent. Management has just started to produce from a fresh pocket of coal that promises well for the future of the property. Equipment is in good condition and running smoothly and successfully. Improvements have been added from time to time when needed. 24,237 tons of coal was produced and 63 men employed on an average.

J. Wentworth, president; E. P. Young, secretary-treasurer and general manager. Postoffice address, Bay City, Mich.

FRANK L. REED COMPANY.

This company operates the Eagle mine located at Grand Ledge, Mich., and employed on an average 9 men daily during 1907. Product of coal was about 3,900 tons. At present, there are 14 men on the pay-roll.

Lands owned consist of 40 acres. Length of underground openings approximate 650 feet with coal seam running from 28 to 32 inches in thickness. Property is opened up fairly well ahead and in good working condition. Pick work is used for breaking the product. In 1906, about one thousand dollars was spent for betterments and the position of the company strengthened. The property depends on local consumption for support and none of its product, thus far, has been shipped. Equipment embraces steam hoist haulage with supplementary fittings adequate for immediate requirements.

Frank L. Reed, manager. Postoffice address, Grand Ledge, Mich.

UNITED CITY COAL MANUFACTURING CO.

W. H. Chapman, Bay City, president; John Walsh, general manager.

The daily average number of men employed by this company is 100. One shaft is operated, which is 130 feet deep and 8x16 feet in dimensions. Area of coal lands operated consist of 60 acres. Product is taken out by hand labor and 53,045 tons of coal were produced in 1907. Mine is ably managed.

WINONA COAL AND MINING COMPANY.

This company operates the Winona Beach mine, which is located at Bangor Township, Bay County, Mich. 173 men are employed daily on an average. One active shaft is in operation, which is 135 feet deep and 8x16 feet in dimensions. Area of coal lands consists of 416 acres. Depth of coal seam is 4 feet by 6 inches thick and the length of openings in the coal body is 3,500 feet. 100 acres of coal is opened up and available for production. Product is taken out by hand, air and electricity. Since the beginning of operations, the mine has produced an approximate of 700,000 tons and in 1907, 97,125 tons of coal was produced. The physical condition of this property appears good.

E. B. Foss, general manager.

WHAT CHEER COAL MINING COMPANY.

This mine is located in Merritt Township, Bay County, Mich. Company employs on an average 147 men and produced 87,108 tons of coal during 1907. Total number of tons of coal produced previous to 1907 was 94,515. Property is operated through one shaft, 206 feet deep and 8 ft. 4 in. x 16 ft. 6 in. in dimensions. Area of coal lands is 540 acres with depth of coal seams about 30 inches. Length of openings in coal body, 2,000 feet. Approximate amount of coal opened up and available for production, 80 acres. The product is taken out by electric and hand power appliances. A new slack conveyor is underway or condition of the property is considered good.

E. B. Foss, Bay City, Mich., general manager.

WRIGHT MINE NO. 1.

This mine is located at Grand Ledge, Mich.

Three men are employed on an average and one drift is in operation, which is 40 feet in depth. Area of lands consist of 20 acres. Coal seam is 20 inches and length of openings in coal seam, 350 feet. Approximate amount of coal opened up and available for production, 2,000 tons. Product is hoisted by horse power and drum, and taken out by hand labor. About 224 tons of coal was produced in 1907. The physical condition of the property is said to be good. Coal is sold to local trade and most of it at the mine.

Eben Wright, Grand Ledge, Mich., General manager.

STARK COAL MINING COMPANY.

The Stark mine is located at Eagle Township, Clinton County, Mich. The coal is nearly exhausted, therefore, this mine has been abandoned.

T. M. Jenkins, general manager.

PEAKE COAL MINE.

This property is located at Corunna and from July 26 to the 1st of December, 1907, produced 13,000 tons of coal and employed six miners and three "top hands."

This mine has been worked for country trade and recently sold it to Detroit capitalists for making paving brick, there being a vein of fine clay for brick-making 20 feet thick. The mine contains three feet of coal with a sandrock roof clear from the surface, 30 feet thick. The new company has erected a fine plant grinding room 92 feet long by 50 feet wide, a drier 135 feet long, capacity 35,000 brick and have planned to build 13 kilns, which will be in operation the coming summer. There will be no coal for outside trade, as the company will use all it produces.

Edwin Peake, Corunna, Mich., general manager.

GRAND LEDGE COAL COMPNAY.

This mine is located at Grand Ledge, Mich.

Six men are employed on an average and one drift is operated in a coal seam 18 inches thick. 1,382 tons of coal was produced in 1907.

General manager, Bargo Boyle, Grand Ledge, Mich.

BLISS COAL COMPANY.

This company shipped its first coal in January, so it will come under 1908 business. Capacity to hoist will be about 1,000 tons mine run per day.

Frank Linton, Saginaw, Mich., general manager.

BLACK DIAMOND COAL MINE.

This mine is located at Jackson, Mich., and the number, of tons of coal produced during 1907 was 1,507 tons 887 pounds. 10 men were employed on an average.

B. F. Jones, Jackson, Mich., general manager.

WILKINSON MINE.

This mine is a Grand Ledge property and the number of tons produced during 1907 was 450 and two men employed on an average.

Operations have been discontinued at this mine.

William Marvin, Grand Ledge, Mich., general manager.

CEMENT.

The Portland Cement industry in Michigan had a successful year in 1907, although the number of barrels manufactured was not so great as the output for the previous year. In 1907 the number of barrels manufactured as reported officially to this office was 3,558,727 as compared with 3,923,115 reported for 1906. But for the car famine and the money stringency, which cut off the demand for cement much earlier than usual and necessitated the shutting down of plants all over the country for a time. 1907 would have been the banner year for Michigan in the history of the industry. Prices, however, were satisfactory and upon the whole, Michigan companies had a prosperous year. New uses for this excellent economic mineral are constantly springing up and people doing all kinds of construction work are of the opinion that enormous quantities of the product will be consumed annually in the coming years. For general purposes, the Portland Cement manufactured in Michigan is considered among the best brands made and while orders for consignments come from nearly all over, the bulk of Michigan's product is consumed within the state. As a rule, operating plants are in fine physical condition and up-to-date in most particulars. Mechanical equipments and appliances are among the most modern and best known for bringing the most satisfactory results and they are about as automatic in operation as it seems practical to make them. Progress has been substantial and of the kind that counts for stockholders and for everybody else in any way interested with the industry. Generally speaking, plants are running to perfection and companies are doing well. The people connected with the business know it thoroughly and do it right. There is no guess work. The business is reduced to a mathematical problem and conducted with exacting knowledge and definite results. Annual costs for necessary improvements and betterments run into a considerable sum of money, but expenditures are well placed and the result is that plants are maintained in a high state of efficiency and in good running order.

A very complete and full report on the Cement Industry of Michigan may be found in the Annual Report of the Michigan Bureau of Labor and Industrial Statistics. The report is made under the direction of Hon. Malcolm J. McLeod, Commissioner of Labor, Lansing, Mich. In view of this provision, a lengthy report from me seems unnecessary or unexpected. While my remarks on the industry may be brief, it may not be amiss to state that the information submitted is official in practically every particular, for it came to this office direct from the managers in charge of the works.

PORTLAND CEMENT PLANTS IN OPERATION IN MICHIGAN.

Name of Organization.	Location.	Name of Manager.	Address of Manager.
Aetna Portland Cement Co.	Fenton	E. M. Bruce,	Fenton, Mich.
Alpena Portland Cement Co.	Alpena	Herman Besser,	Alpena, Mich.
Bronson-Kalamazoo Portland Cement Co.	Bronson	J. F. Townsend,	Akron, Ohio
Burt Portland Cement Co.	Bellevue	W. R. Burt,	Saginaw, Mich.
Elk Rapids Portland Cement Co.	Elk Rapids	Homer Sly,	Elk Rapids, Mich.
Egyptian Portland Cement Co.	Fenton	Chas. L. Bussey,	Fenton, Mich.
Great Northern Portland Cement Co.	Marlborough	W. S. Pritchard,	Marlborough, Mich.
Hecla Co.	Bay City	John F. Bush,	Detroit, Mich. 80 Penobscott Bldg.
Newago Portland Cement Co.	Newago	W. J. Bell,	Newago, Mich.
Omega Portland Cement Co	Mosherville	L. W. Sibbald,	Jonesville, Mich.
Peninsula Portland Cement Co.	Cement City	W. F. Cowham,	Cement City, Mich.
Peerless Portland Cement Co.	Union City	J. A. Petterson,	Union City, Mich.
Wolverine No. 1 Cement Co.	Coldwater	L. M. Wing,	Coldwater, Mich.
Wolverine No. 2 Cement Co.	Quincy	L. M. Wing,	Coldwater, Mich.
Wyandotte Portland Cement Co.	Wyandotte	H. J. Paxton,	Wyandotte, Mich.

PORTLAND CEMENT STATISTICS.

Name of Organization.	Number of men employed	No. of bbls. Manufactured.
Aetna Portland Cement Co.	120	210,758
Alpena Portland Cement Co.	160	242,700
Bronson Portland Cement Co.	70—129 days	110,000
Burt Portland Cement Co.	100	124,000
Elk Rapids Portland Cement Co.	100	200,000
Egyptian Portland Cement Co.	112	203,000
Great Northern Portland Cement Co.	135	65,000
The Hecla Portland Cement Co.	150	311,269
Newago Portland Cement Co.	160	318,000
Omego Portland Cement Co.		143,000
Peninsula Portland Cement Co.	140	375,000
Peerless Portland Cement Co.	125	410,000
Wolverine No. 1 Portland Cement Co.	200	320,000
Wolverine No. 2 Portland Cement Co.	160	250,000
Wyandotte Portland Cement Co.	75	276,000
	1,807	3,558,727

THE AETNA PORTLAND CEMENT COMPANY.

This company is manufacturing cement at Fenton, Mich., and has a very complete up-to-date equipment, embracing eight rotaries, 60x6 feet with supplementary appliances and additions. Daily capacity, 1,000 barrels finished cement. Approximate cost of plant, $550,000. Area of land owned, 700 acres. Improvements completed in 1907 includes a new 300 horse-power boiler and additional grinding machinery. On an average, 120 men are employed and the number of barrels of cement manufactured during the year was 210,758. Property is in fine condition and ably managed.

E. M. Bruce, Fenton, Mich., superintendent; J. A. Myers, Detroit, Mich., manager and treasurer; R. D. Evans, Detroit, Mich., president; L. E. Baker, receiver.

ALPENA PORTLAND CEMENT COMPANY.

This company is manufacturing cement at Alpena, Mich. It has a very complete plant, efficiently operated and employs on an average about 160 men. Daily capacity is 1,200 barrels of cement and the approximate cost of the plant was $160,000. Equipment includes six kilns with supplementary fittings. 2,000 acres of land is owned by the company. The number of barrels of cement manufactured in 1907 was 242,700. The output is reduced on account of the fire last January. The property is ably and economically managed, and on up-to-date methods.

Herman Besser, president; George E. Holmes, vice-president; Chas. H. Reynolds, secretary; W. H. Johnson, treasurer, all of Alpena, Mich.

THE BRONSON-KALAMAZOO PORTLAND CEMENT COMPANY.

This company is located at Bronson, Mich. The number of barrels of cement manufactured during 1907 was 110,000 and the average number of men employed was 70 for 129 days. The company has made substantial progress and the plant is quite complete, in good running order and managed with much skill and capability. The plant has a daily capacity of about 1,000 barrels finished cement for which there is a ready market at good prices. The approximate cost of the plant is $750,000. It embraces 10 modern rotaries with supplementary appliances and the necessary buildings, etc.

J. F. Townsend, Akron, Ohio, president and general manager; W. E. Wheeler, Akron, Ohio, secretary and treasurer. Postoffice address, Bronson, Mich.

THE BURT PORTLAND CEMENT COMPANY.

This company is a growing concern with a very promising future. The working plant is located at Bellevue, Mich., with eight modern rotaries in operation. It is skillfully managed and in good running order. There are about 100 names on the payroll and in 1907 the company manufactured 124,000 barrels of cement. The company has made many improvements while making cement.

W. R. Burt, manager. Postoffice address, Saginaw, Mich.

ELK RAPIDS PORTLAND CEMENT COMPANY.

This company is operated and controlled by progressive, practical people, who anticipate future requirements and prepare for them in good time. A general enlargement of the plant was made during 1907. The management is arranging to double the capacity, or practically so, of the works. Two modern rotaries with additional grinding machinery and the usual fittings were added to the works. Good progress is being made. With the completion of the betterments, the capacity of the plant will be increased to 1,000 barrels daily.

The working plant is located at Elk Rapids where the land holdings of the company comprise some 700 acres. In 1907 the company employed a daily average of 100 men, paid out for wages about $40,000 and manufactured about 200,000 barrels of cement. The approximate cost of the plant is $250,000.

Homer Sly, Elk Rapids, Mich., manager; E. M. Sly, Petosky, Mich., secretary-treasurer; C. A. Whyland, Chicago, III., president.

THE EGYPTIAN PORTLAND CEMENT COMPANY.

The re-organization of this company has been completed and the company is now in successful operation. The company's works are located at Fenton, Mich., with realty holdings consisting of 906 acres. In 1907 the company employed a daily average number of 112 men and manufactured 203,000 barrels of cement. The plant is in fine physical condition and running practically to perfection. It embraces nine modern rotaries, grinding machinery and fittings of the best type, eight of which are in commission and doing good service. In 1907 the company added to its mill two tube mills, one ball mill, two Raymond coal grinders and an Ingersoll air compressor. The past year is reported very satisfactory.

Chas. L. Bussey, Fenton, Mich., manager; E. D. Kennedy, secretary-treasurer; C. Tucker, president.

THE GREAT NORTHERN PORTLAND CEMENT

During 1907 this company manufactured about 65,000 barrels of cement, the average number of men employed being about 135. The plant was operated only for about six months from March to July at which time the palnt was shut down by the Receivers. The Michigan Trust Company were appointed Receivers and took charge in November, 1906. The plant could not be successfully operated in its present condition, consequently, the trustees of the mortgage for the bondholders have arranged to sell the plant and the date is fixed as March 3, 1908.

W. S. Pritchard, manager. P. O. address, Marlborough, Mich.

THE HECLA COMPANY, BAY CITY.

This company was organized in December, 1905, for the purpose of taking over the plant and properties of the Hecla Portland Cement & Coal Company. The plant was completely re-organized and re-equipped for the handling of limestone and shale for the manufacture of a high grade rock Portland cement, the Hecla Portland Cement & Coal Company having manufactured from

marl and shale. The daily capacity is 1,200 barrels. Mill closed November 15, 1907 owing to the market condition and has a large stock of cement on hand, but was started up again soon after the first of the year. The works are ably managed and according to the latest approved method of cement manufacture. In 1907 the company manufactured 311,269 barrels of cement and employed on an average 150 men.

John F. Bush, general manager, 80 Penobscot Bldg., Detroit, Mich.

THE NEWAGO PORTLAND CEMENT COMPANY.

This company is located at Newago, Mich., and owns 160 acres of land. Company has an up-to-date equipment embracing 11 modern rotaries 8 of which are operated. Approximate cost of the plant, $1,000,000. In 1907 the company manufactured 318,000 barrels cement and would have manufactured close to 400,000 barrels if the money stringency had not cut off the demand for cement much earlier than usual, which necessitated the shutting down of practically all the cement plants in the country for a time. The plant was shut down the 15th of December and remained so for some time. Company built a new warehouse in 1907 with a capacity of 60,000 barrels, the foundation being of reinforced concrete—the building, a frame one covered with galvanized steel. We have also provided a 75 foot concrete waste-way to carry off flood water from our mill race.

In general, the season has been a successful and satisfactory one and very good prices for cement were received. Company had no trouble in selling all it could make, although the car shortage during the early months of the season and also in September and October lessened output a good many thousand barrels. Number of men employed 160.

The work of this company is very skillfully and successfully operated and the whole plant runs to practical perfection.

P. O. address, Newago, Mich. W. J. Bell, superintendent; D. McCool, Grand Rapids, Mich., president and treasurer; Clay H. Hollister, Grand Rapids, Mich., secretary; J. F. Lockley, Grand Rapids, Mich., sales agent.

THE OMEGO PORTLAND CEMENT COMPANY.

The working plant of this company is located at Mosherville, Mich. It has an up-to-date plant and employs a force of 70 men. Daily capacity of plant is 700 barrels of cement. Equipment embraces five modern rotaries with supplementary fittings and necessary buildings. The works are kept in first-class condition and well managed. Business with this company in 1907 was not quite up to 1906, but very satisfactory prices for products eased off somewhat during the last half of the year owing to depression in building operations. It managed, however, to maintain dividend rate of 10 per cent. The number of barrels manufactured by the company during 1907 was 143,000.

F. M. Stewart, president; Chas. F. Wade, manager; L. W. Sibbald, secretary-treasurer. P. O. address, Jonesville, Mich.

THE PENINSULAR PORTLAND CEMENT CO.

This company is located at Cement City, Mich., and has an approximate daily capacity of 1,500 barrels. In 1907 the number of barrels of cement manufactured was 375,000. About 140 men were employed on an average. The company reports the business for the past year, good, and but for the severe car famine, it would have been a banner year. The plant is kept in first class condition by repairing and substituting new machinery and strengthening the mechanical equipment. Nine rotaries are installed and in successful operation. The property is ably managed and affairs in general runs practically to perfection. During the past year, there was built an additional warehouse of reinforced concrete, equipped with all the necessary machinery for handling cement, which places the company in a position to make a high grade cement at reasonable cost.

W. F. Cowham, president and manager; J. W. Shove, secretary; W. S. Potter, treasurer. P. O. address, Cement City, Mich.'

THE PEERLESS PORTLAND CEMENT

This company, located at Union City, is one of the oldest and best known cement manufacturing companies in Michigan. Approximate cost of plant $1,400,000. The number of barrels of cement manufactured during 1907 was 410,000 and 125 men employed on an average. The management reports having had an exceptionally good year. No radical changes were made in the plant, but installed new cement and goal grinding machinery, which increased its efficiency somewhat. The mechanical equipment has been overhauled and modernized in practically every particular. It is now about automatic in operation and in shape for bringing the best results. Equipment includes nine 70 ft. rotaries with additional grinding machinery necessary for operating the works successfully. The plant is in good physical condition and runs smoothly. It is well and economically managed. Output for 1906 was 430,000 barrels cement.

J. A. Patterson, Union City, Mich., manager; A. W. Wright, Alma, Mich., president; Wm. M. Hatch, Union City, secretary-treasurer.

WOLVERINE No. 2 PORTLAND CEMENT

Company's works are located at Mill No. 1, Coldwater and Mill No. 2, Quincy, Mich. Land owned by both

plants consist of 2,200 acres. Approximate cost of plants, $1,000,000 with daily capacity of 3,500 barrels of cement.

The average number of men emlpoyed at the Coldwater works during 1907 was 200 and the number of barrels of cement manufactured, 320,000. At Mill No. 2, Quincy, 160 men were employed and 250,000 barrels of cement manufactured.

In addition to the ordinary repairs at both of the above plants, the company will install at Coldwater plant a system for weighing the clinker and conveying the same automatically to its Griffin mills, which will be known as the "Clinker Handling System." There is contemplated the installation of automatic weighing and packing machinery at Quincy plant before the commencement of the coming season.

This is one of the successful companies doing business in the State. 28 rotaries are installed and 20 are in operation. Both plants are running with distinct success. Outlook for 1907 is reported good.

L. M. Wing, president and manager; Coldwater, Mich. E. R. Root, secretary-treasurer, Coldwater, Mich.

WYANDOTTE PORTLAND CEMENT COMPANY.

This company is located at Wyandotte, Mich. Approximate cost of plant, $200,000. Daily capacity 800 barrels. In 1907 this company employed 75 men and manufactured 276,000 barrels of cement. Property is operated with distinct efficiency and progress has been substantial. Three rotaries of the latest type are in operation. The parties who compose the above company are building a new cement plant at Alpena, Mich., styled as the Huron Portland Cement Company. Plant will be ready to operate about May 1, 1908. Capacity 3,000 barrels per day.

General office for both companies will be at 1525 Ford Bldg., Detroit, Mich. H. J. Paxton, general manager, Wyandotte, Mich.

MISCELLANEOUS MINERALS.

Graphite is produced at L'Anse, Mich., by the Detroit Graphite-Paint Company. A. A. Boutell, president, Detroit, Mich.; R. C. Williams, agent, L'Anse, Mich.

During 1907 this company mined about 600 tons of graphite ore, equivalent to about 1,000,000 lbs. of refined graphite suitable for paint making. The mine is an open pit proposition located upon a side hill from which the ore is run out by gravity on a tram-way through a cut about 450 feet long to dump. Mine is located in Section 16, Town 49, Range 33 about 4 miles distance from the Taylor switch on the D. S. S. & A. A. Ry. The ore is mined and stock-piled during the summer months and hauled during the sleighing seasons to Taylor where it is loaded on cars and shipped to Detroit as fast as needed. The deposit is about 50 ft. thick and 200 ft. in length as far as developed. Ten men are employed at the mine during the summer months. At the factory in Detroit, they have about 40 men on the pay-roll continually.

The Hathaway Graphite Company's works located at L'Anse are in the hands of receiver and idle. Allen Campbell, Receiver, 610 Moffatt Bldg., Detroit, Mich.

GYPSUM.

Gypsum is found in remarkable abundance and purity at Grand Rapids and Alabaster, and in moderate quantities at various other places. This mineral is very properly classed among the useful products of the state and its production and manufacture forms an important growing industry. While the growth of this industry has been somewhat slow, yet it has been steady, wholesome and continuous. The stratum of Gypsum at Grand Rapids is about 18x20 ft. in thickness and from a foot or two to sixteen feet below the surface, and fully a thousand acres in extent, affording practically an inexhaustible supply to draw upon. The development of the gypsum industry in this state, while in a healthy condition, is practically confined to the city of Grand Rapids where the product is quarried in considerable quantities, ground and prepared as a basis for wall tintings, wall decoration, stucco work, plasters, fertilizers and for other uses. For wall tinting and decorating, Alabastine and allied gypsum products are among the best things made for such purposes. On account of the excellent sanitary properties of the articles and the ease with which the different preparations may be applied, they are becoming popular all over the United States and in many parts of Europe. Calcium gypsum is known as plaster of paris. The finer grades are carefully reground and sold for dental plates, for casts and moulds and also for works of art and architecture. The demand for these products is constantly increasing and the outlook for the gypsum industry is reported promising.

GOLD.

Gold exists in Marquette County about three miles northeast of the city of Ishpeming in Section 29, Town 48, Range 27. I have seen exceedingly rich and beautiful specimens that came from there. The quartz was literally laced and hung together with strings of pure gold. Some specimens are said to have yielded at the rate of $160,000.00 per ton and I don't doubt it for a moment. No companies, however, at the present time, are mining the deposit containing the precious metal. Some years ago, three organizations, the Ropes Gold and Silver Mining Company, Michigan Gold Company and Fire Center Gold Mining Company were formed for the purpose of mining the gold bearing deposit. Each company worked it more or less extensively, but the Ropes people developed their property in the most practical way and succeeded in getting the best results. They opened up quite a rangy mine equipped it with an extensive plant, treated a considerable output of ore and produced gold bullion to the value of several hundred thousand dollars. The mine received a pretty fair trial, but results turned out unprofitable and unsatisfactory. Under the methods of mining practiced, neither company was able to make both ends meet and all work was discontinued.

The Michigan Gold mine is to be given a fresh trial and it is hoped the people behind the proposition may succeed in developing the property into a profitable mine. Power drills have been installed and put into commission. They are to be operated by steam power until Spring. Night and day crews are to be employed in the mine and will extend to the main drift east and west from No. 2 shaft. The vein is 12 feet in width in one end of the drift and 10 in the other. There are about 3,000 tons of quartz ready for stoping, but it will not be mined for the time being. The greater part of the quartz and rock removed from the drifts will be stocked underground until Spring when it will be hoisted and sent direct to the crusher and mills.

Regarding silver, slate, asbestos and marble, there is nothing to be said other than what appeared in my previous report.

SAND STONE INDUSTRY.

Like other industrial enterprises of Michigan, the building stone industry is conducted vigorously and on practical lines and on up-to-date methods. People connected with the business know it thoroughly and do it the best way to get the most satisfactory results.

THE PORTAGE ENTRY QUARRIES CO.

Quarried		
Jacobsville, Mich.,	56,566-10	
Marquette, Mich.,	5,702-3	62,269-1
Shipped from Quarries		
Jacobsville, Mich.,	59,463-10	
Marquette, Mich.,	9,193-5	68,657-3
Average Daily Number of Men Employed at Quarries		
Jacobsville, Mich.,		Leased
Marquette, Mich.,		30
Approximate Amount of Wages paid out in carrying on the work		
Jacobsville, Mich.,		Leased
Marquette, Mich.,		11,019.71

This company sold its Port Wing Quarry December 19th, 1906.

The outlook for the Stone Industry for 1908 is very good. Local office, Calumet, Mich. J. W. Wyckoff, manager.

THE PORTAGE ENTRY REDSTONE CO., LTD.

The following is a report of the stone shipped and sold by this company during 1907: Block Stone, 13,587 ft. 4 in. cubic feet; Sawed Stone 16,228 ft. 7 in. cubic feet; Rubblle Stone, 924 cords. The Block-Stone went mostly to the following cities: St. Paul, Minneapolis, Duluth and Milwaukee. The Sawed Stone and Rubble went chiefly to the Copper Country towns. Sawed Stone was also shipped to Toledo, Ohio, Mitchell, S. D. and Ishpeming Mich. Trade from Buffallo and New York City has been quite good.

J. F. Jackson, president; Z. W. Wright, treasurer; A. D. Edwards, secretary; B. F. Froney, superintendent.