STATE OF MICHIGAN.

MINES

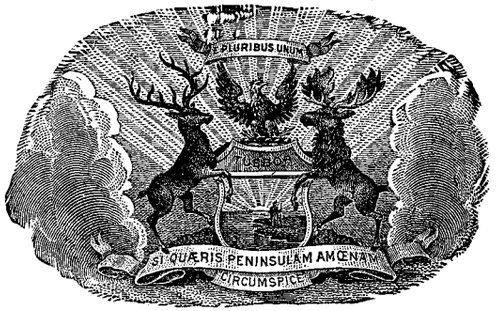
AND

MINERAL STATISTICS

BY

CHAS. D. LAWTON, A. M. C. E.,

COMMISSIONER OF MINERAL STATISTICS.



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STATE OF MICHIGAN,
OFFICE OF THE COMMISSIONER OF MINERAL STATISTICS.
Lawton, Michigan, April 10, 1890.

HON. CYRUS G. LUCE,
Governor 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.

Respectfully your obedient servant,
CHARLES D. LAWTON.
Commissioner of Mineral Statistics.

INTRODUCTION.

At the date of submitting this Report the iron and copper mining interests of the upper peninsula are in a prosperous condition. Every available iron mine that contains any merchantable ore is now worked. The mines are already sending forward the ore to the several ports, ready to be transferred into vessels as soon as they shall arrive. There is far more ore in stock at the mines than ever before; the mines are generally fully opened, every preparation has been made to get out all the ore possible. Sales have been made of the greater portion of all the product at an advance of $1.00 above last year's prices, and there is every assurance that all the additional production will be absorbed. It is now assumed that there will be sent out the present season from the Lake Superior iron mines upwards of 10,000,000 tons of ore; more than ten times as much as was produced in 1873, when I first described the mines in the State Geological Report of that year. The progress has been rapid and the future is likely to be equally prosperous. There are still large areas showing such indications of ore as to make it certain that many other mines will be found to take the places of such as may become exhausted.

The condition of matters in the copper region is equally fortunate: the high market price of copper continues. Stocks that had so greatly advanced in value retain the high prices which they had acquired. Every effort is making to get out the largest possible production.

Laborers are well rewarded for their toil, they find abundant employment at remunerative wages. I have just returned from a trip occupying several weeks, through the several mining districts, and I find the best of feeling existing among all classes—officers and men. So far all is harmonious.

The season of 1890 will be, in all probability, one of the most active and prosperous ever experienced in the mines of Michigan.

I have brought the information given in this volume down to the latest possible moment. The tables of production end with 1889 but in all other particulars the report is nearly as if it had been written in April 1890. I trust it will be found to contain such facts as shall give to all who care for it, the information that they may require.

CHARLES D. LAWTON,
Commissioner.

COPPER.

THE COPPER INDUSTRY.

In speaking of this industry in my report for 1888, it is remarked that the extremes of fortune have been experienced within a brief period. In that year, from a greatly depressed state, the copper interest advanced to a condition of much prosperity. Then the failure of the copper syndicate reversed the status of the industry and brought on renewed misfortune. But now again, at the close of 1889, prosperity has returned to the copper mining industry and its fortunes are in the ascendant.

In point of fact at no time for several years has there been such an assurance of substantial and continued prosperity as now. The improved condition is based upon actual consumption of copper and thus there is a healthy demand for the raw material. The sales are legitimate and the governing price is no longer fictitious but true to the free working of the natural laws governing supply and demand.

The great French syndicate which held the delusion that it could control the world's supply of copper, and which for an indefinite period, gave, briefly, seeming relief to copper producers, suddenly collapsed in utter disaster and in the maelstrom of its destruction were drawn great corporate and individual ruin.

Looking back over its history, it is now seen that the syndicate had really no reason to have existed.

The copper mining industry is no better today that the syndicate was formed. It stimulated production and diminished consumption. The increased price for copper that was fixed by the syndicate, was a powerful incentive to increase its production, while at the same time the arbitrary and unnatural proceeding of thus fixing the prices at which the metal should be sold and maintaining it at such figures solely by the fiat of a corporation, which was neither a producer nor a consumer, called out the utmost antagonism of the manufacturers and caused them as a measure of retaliation to restrict their purchases of copper in the greatest possible degree. The result was a great accumulation of copper in the hands of the syndicate, which should have been consumed or have been in the hands of the manufacturers. The load became, finally, too great to be borne. The strained conditions brought about this natural outcome, the collapse of the entire fabric.

Naturally there was much speculation as to what the result would be *aprs le deluge*. Considerable uneasiness and alarm was felt on the part of those interested in copper mining, that the collapse of the syndicate would occasion great loss to mining companies by causing the price of copper to sink below the cost of production. Fortunately these seemingly well grounded apprehensions were not verified. By concert of action among the larger producers of copper, a wise and conservative policy was adopted. Sales were restricted to the actual demand of manufacturers at a

moderate price that proved satisfactory to consumers. And thus the great surplus that threatened so much disaster to mining interests have gradually absorbed and the current production of the mines, as well, has been required to keep up the demand for the raw material. Thus at the close of the year not only is there, practically, no accumulated surplus, but the out put of the leading mines is all contracted three months in advance and that, too, at a price even greater than the one that was fixed in the contracts with the syndicate. Copper is now sold at 14½ cents, the syndicate price was 13½ with provision for division of any amount accruing above certain given figures. So that, thus without any forced conditions, simply through the normal workings of the forces of supply and demand a far better state of the copper industry, both as regards mining and manufacturing, has been secured, than existed through all the marshalling of the forces of the great syndicate.

It is probable that the present favorable prices will continue, possibly, throughout the year 1890; certainly for a portion of it. There is a great increase in the world's consumption of copper, and the new industries springing up, the new channels opening, which require this metal for their development, bespeak a rapid increase of consumption, that must keep pace with the increase of production.

On the failure of the syndicate, there was a rapid fall of price of copper stocks, while under the stimulus of high price of copper and consequent large dividends, paid and in anticipation, had attained to a large market value. These stocks depreciated to a corresponding low degree and again have enhanced to their former large value, owing to the rise in the price of copper and the assurance of future dividends, made certain by this enhancement of value of the metal.

Naturally, some losses were experienced through the great depreciation of stocks; but those who held their stocks are again all right; the subsequent rise has brought them out of the shoal waters and landed them on dry ground.

And again, persons who purchased a few weeks ago, say in November, have realized a great advance on the stock purchased, and are in luck, which they, no doubt, duly appreciate.

Experience shows that the stocks of the leading Michigan copper mines are a pretty secure investment. They fluctuate in value but within safe limits; and the dividends which they pay give an average fair interest on the average cost of the stocks; they are safe to hold and are a safe property to buy for speculating purposes.

One can nearly always sell out for the cost, and frequently at a greatly increased price, thereby realizing a handsome profit on the investment.

The time is approaching, when the additional shafts, now sinking by the Tamarack, on section 11, and when the Tamarack, Jr. and the downright shaft of the Calumet and Hecla shall be producing; and, probably, the Centennial, also, and there must then be a great increase of production. Whether the world will absorb it all at the present remunerative price, remains to be seen. It is probable that this and all other increase of production will be met by a corresponding increase of consumption. On the whole, the outlook for the copper mining industry, of Lake Superior, was never better than now. Copper is selling at a satisfactory price; the mines are looking well; entire harmony prevails between the owners and the employés; newer methods, improved facilities, serve to increase the product and cheapen the cost. There is, probably, more profit in copper mining on Lake Superior, now, than ever before. The copper is produced at a constantly diminishing cost, on the average.

It is a matter of much congratulation that the fire which a year ago was raging in the Calumet and Hecla mine has been extinguished and that this portion of the mine, in which the fire prevailed, is again producing copper. The effects of this extensive subterranean conflagration are rapidly disappearing and this great mine will soon assume its normal conditions and be yielding copper throughout its entire extent. Important changes in the mine and in the surface are in progress, making it apparent that the Calumet and Hecla management aims to keep pace with the developments that are rapidly making in the progressive Lake Superior copper mining industry.

This wonderful copper-belt,—the Calumet and Hecla conglomerate will within a few years be opened and worked far more extensively than now.

The shafts that are now sinking in the non-producing portion of the belt, between the Hecla and Black Hills mine, will reach producing ground before long when the mine will be opened and productive throughout nearly its entire length, a distance of two miles. The Red Jacket shaft which is descending at a rapid rate, will have penetrated to the lode, 3,400 feet, vertically below the surface.

Of these vertical shafts there are seven which are already down or are descending to the conglomerate and when we consider the remarkable results that have obtained from the completion of the No. 1 Tamarack shaft, the only one that has produced copper—we may realize the vastly increased production that will accrue when the others shall be completed. In addition to the vertical shafts sinking by the Tamarack companies and the Calumet and Hecla, the Centennial is also sinking a deep exploring shaft in this lode, which will be continued to a great depth, if necessary.

In sinking these vertical shafts remarkable progress has been made in the past year, more rapid than was ever before achieved—100 feet per month, in hard rock, is extraordinary work.

Smelting all the copper on Lake Superior is another important advance step. Both the Calumet and Hecla and the Tamarack companies now have their own smelting works on Torch Lake where all the mineral of these corportions is reduced into ingots.

The Copper Rolling Mill recently put into operation at Dollar Bay by the chief owners of the Tamarack, is proving very successful. Copper wire and copper sheeting are manufactured, and the result is all that could be desired.

The Quincy Mining Co. has built a stamp mill at Torch Lake within the past year, which will soon be in operation. The Company has also constructed a railroad from the mine to the mill, and thus the Company is now in shape to somewhat increase its out put of copper.

In Keweenaw and in Ontonagon counties, there is little of additional importance to note. No discoveries have been made of copper deposits and no new developments made in addition to those already known. The mines in Ontonagon county are mainly worked by tributers in a small way; but, I understand, the work is proving profitable to the miners. Some large masses of copper are found.

In truth, there has not been much effort made in the way of new exploration for copper for a number of years; but the range from Ontonagon down to Portage Lake has great possibilities.

The stock of copper now on hand in this country, January 1, 1890, is given at 65,000,000 pounds, and, as previously stated, the product of the mines is all sold up, even to several months ahead, so it is plain to see that the market condition is greatly in favor of the mines. At the close of the year 1888, the amount of copper on hand in this country was reported to be 75,000,000 pounds, and the total in the world at that time was estimated at 180,000 gross tons. The total of the world's supply, visible and invisible, now on hand, is estimated at 127,000 tons, showing plainly that the production of the past year has not equaled the consumption.

There will be more copper produced in 1890 than there was in the previous year. The surplus has been decreased and what surplus there is, is in the hands of those who will hold it so that it will not be used to depress the market.

**Copper production by States.*

	1888.	1889.	
	Pounds.	Pounds.	Long Tons.
Lake Superior	86,584,124	86,000,000	38,393
Arizona	31,497,300	32,000,000	14,286
Montana	97,897,968	105,000,000	46,875
New Mexico	1,631,271	3,400,000	1,518
California	1,570,021	1,700,000	759
Colorado	3,300,000	3,000,000	1,339
Utah	2,131,047	2,400,000	1,071
All other sources	3,241,725	3,000,000	1,339
Domestic production	227,853,456	236,500,000	105,580
From imported ores	5,000,000	5,100,000	2,227
Total production	232,853,456	241,600,000	107,857
Stocks, beginning of year	40,000,000	75,000,000	33,482
Available supply	272,853,456	316,600,000	141,337
Deducts exports in ore, matte, ingots	78,000,000	82,000,000	36,607
Consumption	119,853,456	169,600,000	75,714
Stocks on hand end of year	75,000,000	65,000,000	29,016

*From the Engineering and Mining Journal, N. Y.

**Copper Production of the United States.*

	1882.	1883.	1884.	1885.	1886.	1887.
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
Lake Superior	56,982,765	59,702,404	69,353,202	72,148,172	79,890,798	75,471,890
Arizona	17,984,415	23,874,963	26,734,345	22,706,366	15,657,035	17,720,462
Montana	9,058,284	24,664,346	43,093,054	67,798,864	57,611,621	78,699,677
New Mexico	869,489	823,511	59,450	79,839	558,385	283,664
California	826,695	1,600,862	876,166	496,028	430,210	1,600,000
Colorado	1,494,000	1,152,652	2,013,125	1,146,460	409,306	2,012,027
Utah	605,880	341,885	265,526	166,199	500,000	2,500,000
Wyoming	100,000	962,468				
Nevada	350,000	288,077	100,000	8,871	50,000	
Idaho			46,667	40,381		
Middle States	294,695	324,706	232,114	190,000		
New England	1,555,000	612,124	904,423	211,602	315,719	200,000
Southern States	400,000	395,175	317,711	40,199	29,811	
Lead refiners	125,000	782,880	950,870	910,144	1,282,496	2,432,804
Domestic production	90,646,232	115,526,053	144,946,653	165,875,766	156,735,381	180,920,524
Imported ores	1,000,000	1,625,742	2,858,754	6,056,841	4,500,000	3,750,000
Total production	91,646,232	117,151,795	147,805,407	170,962,607	161,235,381	184,670,524
Stocks, January 1			30,000,000	30,000,000	35,000,000	40,000,000
Available supply			177,805,407	200,962,607	196,235,381	224,670,524

*From the Engineering and Mining Journal, N. Y.

**The Principal Copper Supplies of the World.*

Countries.	1888. Tons.†	Countries.	1888. Tons.†	Countries.	1888. Tons.†
Algiers	50	Italy	2,500	Mason & Barry	‡7,000
Argentine Republic	150	Japan	‡11,000	Sevilla	1,700
Australia	7,450	Mexico :		Portugueza	‡900
Austria	1,010	Boleo Co.	2,566	Other mines	‡7,200
Bolivia—Coro-coro	1,450	Other Mexican	200	U. S. of America :	
Canada	‡2,250	Newfoundland :		Lake Superior	38,772
Chili	31,240	Betts Cove	1,300	Montana	43,973
Cape of Good Hope :		Tilt Cove	750	Arizona	14,821
Cape Copper Co.	5,800	Norway :		Other States	5,562
Namaqua Copper Co.	1,700	Vigsnaes	1,020	Venezuela:	
England	‡1,500	Other Norwegian	550	New Quebrada	4,000
Germany :		Peru	250	Total production	261,852
Mansfield	‡13,380	Russia	4,700		
Other German	‡1,850	Sweden	‡900		
Hungary	858	Spain and Portugal :			
		Rio Tinto	‡32,000		
		Tharsis	‡11,500		

* Compiled by Henry R. Merton & Co., London.
† In English tons of fine copper.
‡ Estimated.
Average of prices on the 1st of each month { Chili Bars, £82 7s. 6d. / G. M. Bs. 76 } £42 3s.

Average Price per pound of Lake Copper at New York.

*Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
1860	23¾	23⅞	23⅜	23¾	22⅞	22⅛	21⅝	21½	21⅝	21¾	20⅞	20	22¼
1861	19½	19¼	19½	19⅜	19½	18⅛	17¾	18⅜	19⅝	20⅛	21⅜	24¾	19⅛
1862	27½	26½	24	22¼	21⅛	21⅞	23½	24¼	25⅝	29⅞	31⅝	31	25¾
1863	33	36	34	30½	30¼	30¼	30½	30	31⅝	33⅜	36¾	38⅝	32⅞
1864	40⅛	41⅝	42	43¼	43½	46½	59¾	51¼	50	47½	48	49¼	46¼
1865	48¼	45	39¼	34½	32	29⅛	29⅛	31⅜	31⅞	32½	39⅛	42⅜	36¼
1866	40	36¾	32½	29¼	29⅞	32½	32¼	30⅝	31⅛	30⅞	28¾	27¾	31¾
1867	28⅛	27½	25¾	24	24⅛	24¼	25	26	26¾	24¾	22⅞	22⅝	2 ⅛
1868	22½	23¼	23½	23¾	24⅛	23⅝	23¾	24⅛	23⅞	23½	23¼	24⅛	23⅜
1869	25	26½	25⅜	23⅜	24	22⅞	22	22½	22½	22⅝	22¼	21¾	23⅜
1870	21⅞	20⅞	19¾	19⅛	19	19¾	20⅜	20½	21⅛	21¾	22¼	22¼	20⅝
1871	22⅛	21⅞	21½	21½	21¼	21⅜	22⅛	22¾	23⅜	23½	24⅛	26⅛	22⅝
1872	27¾	28⅜	33	41¼	36½	33⅛	33¼	33½	33⅛	32⅛	31⅝	32¼	33
1873	34¼	34⅝	34¼	33¼	31⅜	29¼	27¾	27⅛	26	23¼	22⅛	24¼	29
1874	24¾	24⅝	24⅜	24⅞	24¾	24⅜	21⅞	20	21⅛	21¾	2 ¾	23¼	23¼
1875	22⅛	22¼	21½	21½	21½	22¾	22¾	23	23¼	23⅛	23	23⅜	22½
1876	28⅛	2 ⅝	22	22	21⅞	20	19¾	19	20	20¾	20¼	19¾	21
1877	19¼	19¼	19¼	19⅜	19⅛	19⅛	19	18½	18	17⅞	17⅝	17⅝	18⅝
1878	17½	17¼	17	16⅞	16½	16¼	16⅛	16⅛	16	15¾	15⅝	15⅞	16½
1879	15¾	15½	15¾	15⅞	16	16⅛	16	16⅛	16½	19½	21½	21¼	17⅛
1880	23	24⅛	23¼	21¾	19	18⅞	18½	19	18¾	18¾	18¾	19	20⅛
1881	19¼	19¼	19⅛	18⅞	18½	17	16¼	16⅜	17½	18⅛	18½	19¾	18⅛
1882	20¼	19½	19	18⅞	18⅜	18⅛	18⅛	18⅛	18⅛	18⅛	18	18	18½
1883	18	17¾	17¼	15⅞	15⅞	15½	15	15	15⅛	15⅛	15	14⅞	15⅞
1884	14⅞	14⅞	14⅜	14½	14¼	14⅛	14	13⅞	13⅛	13	12¾	11⅝	13⅞
1885	11¼	11⅛	10⅞	11	11½	11⅜	11⅛	11⅛	11⅛	11	11	11¼	11⅛
1886	11⅜	11⅜	11⅜	11⅜	10½	10	10	10	10½	11¾	12	12	11
1887	11⅝	11	10½	10¼	10	10	10⅜	10½	10½	10½	12⅝	17	11¼
1888	16¼	16⅜	16⅛	16⅝	16⅜	16½	16¾	16¾	17¼	16½	16½	16½	16¾
1889	17¼	16⅞	16¼	16½	12¾	12	12	12	11	11	12⅜	14⅜	13¾

* From the Engineering and Mining Journal, N. Y.

Dividends paid by Michigan Copper Mines in 1889 with total to date.

Name of Company.	No. Shar's	1889.	Total.
Calumet and Hecla	100,000	2,000,000	33,350,000
Central	20,000	40,000	1,930,000
Franklin	40,000	80,000	880,000
Osceola	80,000	50,000	1,222,500
Quincy	40,000	280,000	5,250,000
Tamarack	80,000	440,000	1,200,000
Atlantic	40,000	80,000	560,000

FLUCTUATIONS OF PRICES OF MINING STOCKS IN BOSTON, DURING 1889.

Name and Location of Company	Par value.	January. H.	January. L.	February. H.	February. L.	March. H.	March. L.	April. H.	April. L.	May. H.	May. L.	June. H.	June. L.	July. H.	July. L.	August. H.	August. L.	September. H.	September. L.	October. H.	October. L.	November. H.	November. L.	December. H.	December. L.	Sales.
Allouez	25	4.88	3.63	4.10	3.00	3.00	1.00	1.25	.99	1.06	.95	1.00	.90	.90	.63	.75	.70	.70	.63	1.00	.50	1.10	.60	1.63	.90	38,660
Arnold	25	.25		.20														.07	.06	.07	.05					1,800
*Atlantic	25	18.50	13.00	14.75	14.00	13.50	10.00	10.00	9.00	10.25	8.25	9.50	9.00	9.25	9.00	9.75	9.00			8.75	7.50	13.50	10.50	15.00	12.25	13,908
Aztec	25																	.05			.07			.08		2,200
*Cal. & Hec.	25	300.	269.50	283.00	260.00	263.00	214.50	228.00	202.00	220.00	199.	219.00	206.00	215.50	205.00	230.00	215.00	220.00	209.00	225.00	211.00	240.00	224.00	260.00	245.00	12,976
*Central	25	20.00	18.00					10.00																14.00		195
*Franklin	25	17.00	13.25	16.00	13.75	15.00	10.00	11.00	9.00	10.50	8.50	10.00	9.25	9.75	8.75	10.13	9.25	9.88	8.75	11.00	8.75	16.38	11.00	18.00	14.75	2,379
Humboldt	25																					.15	.13	13.		150
Hungarian	25																					.20	.15			400
Huron	25	6.00	4.13	5.25	4.00	3.00	2.00	2.50	2.00			1.25		.75		1.00	.88	.75		.75	.63	2.75	2.00	3.50	3.00	10,400
Kearsarge	25	12.00	8.00	10.50	8.00	8.00	6.88	6.00	5.00	5.58	5.00	5.50	5.00	6.00	5.00	6.00	5.88	5.00	4.25	6.75	4.25	8.60	6.25	10.88	6.50	20,014
Mesnard	25		.43		.30																				.50	1,200
National	25	7.63	4.75	5.38	3.50	4.00	2.00	2.00	1.75	1.50	.75			1.00	.50	1.10	1.13	1.00	.88	1.00	.75	3.00	1.25	3.00	2.00	18,615
*Osceola	25	21.00	16.00	18.50	12.50	15.50	12.50	13.00	9.00	10.00	7.13	10.00	9.50	9.75	8.50	12.00	9.50	11.00	9.50	12.00	10.00	19.00	12.00	24.25	17.00	20,749
Pewabic	25			5.00		5.00		3.25		3.25	2.25							8.00	2.25			5.50	3.63			10,685
Pontiac	25	.40	.30																					.25	.23	1,000
*Quincy	25	85.00	68.80	71.00	66.38	67.00	46.00	50.00	49.00	54.50	47.00	54.00	51.00	57.50	49.00	54.00	51.00	54.00	49.50	54.00	50.00	70.00	55.00	70.00	67.00	4,712
Ridge	25	1.88																				1.25				1,794
South Side	25																							.25	.20	
*Tamarack	25	159.	8.50†	152.00	140.00	144.00	120.00	125.00	105.00	110.00	102.00	107.00	103.00	102.50	96.00	105.00	100.00	108.00	100.00	124.50	104.00	104.00	120.00	155.00	139.00	17,104
Washington	25																					.23				100

* These companies paid dividends in 1889. † Rights. ‡ Cash. Total sales, 856,854.

There is no danger of the menace of a surplus. This much, possibly, may be put to the credit of the syndicate, that it gathered up the surplus copper, where it will be held to the advantage of the producers.

Thus while the market is as of old, the producer selling directly to the consumer, the demand being at least equal to the consumption, there is a natural condition of affairs and the producers are realizing more than they did under the syndicate.

With bar and flat copper at 14½c and ingot at 14c and the consumers willing to make long contracts at the latter rate it is not surprising that copper mining men regard the future with hope and confidence. Every branch of the industry is in a healthy, active condition. There are no clouds portending and no indications of disaster.

THE ALLOUEZ MINE

was in operation at the beginning of the year. As explained in the last report everything about the location had been put into excellent condition. New machinery was added and the equipment thus made adequate to working on a larger scale than had theretofore been done. At the time the company resumed control of the work in the mine there was no advanced opening. The tributes had exhausted all the stopes. The policy of the company was to sink the shafts deeper and extend the drifts and get the mine in shape to produce more rock, hoping to find enough that was good to give better results for mining than had been obtained previously. No conspicuous success, however, has attended the effort.

The rock has proved no richer, on the average than formerly and work for some time has been partially suspended. Recently an assessment of 50c per share has been called to raise money to resume work in full force again.

This assessment is the twenty-second I believe, that has been made and although copper is 14½c per lb., it maybe that this assessment will not be of any more avail than those which preceded it. It is clear that the Allouez is a poor mine. The percentage of copper in the lode, on the average, is too low to be profitably worked except under favorable circumstances. The mine contains some very rich rock. So does the Peninsula and the Conglomerate, all in the same conglomerate belt, and in all of them the general character of the lode is lean and barren. One would think that somewhere it would prove rich enough to be profitable, but so far such a portion of the belt has not been found and unless more good ground can be opened in the Allouez than has ever yet appeared at any one time, I cannot see how it can be expected that it will pay in the future better than it has in the past.

I saw it stated that the Atlantic rock yielded a lower percentage than the Allouez. But it must be remembered that in the Atlantic mine all the rock is taken. There is no selection made, only such pieces of trap, that break down from the hanging wall, are thrown out. This, with the facts that the deposit is of good width, that it dips at a favorable angle, that it is easily broken down in the mine and treated in the stamp mill, that many of the arrangements, especially the railroad and stamp mill are the best, enables the company to operate with a profit, notwithstanding the extraordinary low percentage of copper in the rock. But the Allouez belt, being a conglomerate, is not so easily mined and manipulated. The cost is greater, and if the stamp mill facilities were as good as those of the Atlantic, even then more good rock must be found than has appeared heretofore. The

Allouez conglomerate is not the only copper belt crossing the property underlying it, southeast are the Calumet and Hecla conglomerate and the other important belts, which may, on investigation, prove rich in copper.

These same belts also cross the Kearsarge, Iroquois, Seneca and other properties and will be investigated in time. The Allouez is in good shape, it is now well equipped with machinery and every other essential for extensive work and if the conglomerate were a little richer it could be profitably worked, perhaps even as it is, if copper shall continue to bring as high a price as it does now, with the improved facilities for working, the mine may be carried on with profit. No doubt the policy, which prevails at some of the other mines, of opening the mine extensively, if carried out here would be of great advantage. In fact it is of absolute necessity. On no other basis can success be hoped for, to open the mine extensively and select the ground is the only way that good fortune can be attained. In February, ten drills were at work in the mine, sinking and drifting. The only way is to open the mine largely, not just enough ahead to keep the mill supplied with rock, but far enough ahead to crowd the mill with selected rock, leaving the poor rock standing, as far as possible, in the mine. A limited test was made of the amygdaloid which is 500 feet east of the conglomerate; a test pit 50 ft. deep was sunk but the belt at that point was found to be poor.

The Allouez mine has been operated cheaply enough but not extensively enough. The mining cost, 85 cents per ton, stamp mill, 42 cents, a total manipulating and transportation cost of $1.50 per ton of rock mined is low, certainly. But still the copper costs nearly 13 cents per pound, so that it is evident that there must be a greater production. More rock and better rock, if possible must be mined.

No. 1 shaft is down to the 11th level and will be connected with the 12th by an uprise. No. 2 is to the 18th. It is in contemplation to supply a new compressor, for which they have abundant steam power; and to add some additional machinery to the rock house—a Blake crusher.

In the agent's report it is stated that 131,400 tons of rock were broken, 5,275 tons of which were rejected in the mine, and 9,517 tons were rejected in the rock house, making a total of 14,792 tons rejected, being 11.25 per cent of that mined. This would require more compressor power and drills, and the investment of more capital in extended openings.

Since the copper market has had such an unexpected change for the better, the directors have decided to follow out this course, and they expect that the 50 cents assessment, which has been called, will provide sufficient funds to do this. The stamp mill will, it is expected, start up on the 1st of May, next, by which time sufficient ground will be opened to allow of a regular output of 500 tons daily, which, if it yielded no more than it did before the mine was closed down the last time, would give a monthly product of about 100 tons of refined copper.

The following shows the operations during the past year.

Receipts.

1,762,816 lbs. copper, product of 10 months	$213,019 26
Assessment No. 19 (balance)	158 50
Assessment No. 20	40,000 00
	$253,177 76

Expenditures.

Running expenses at mine for 10 months (Jan. to Oct.), as per detailed statement hereafter	$196,878 23	
Freight	3,799 61	
Smelting	18,512 16	
Brokerage	1,837 03	
Insurance	252 88	
Expenses	4,125 57	
Storage	59 25	
Taxes on copper	120 82	
	$225,585 55	
—Add—		
Expenses for Nov. and Dec.	5,175 41	
Construction account	6,954 96	
Interest on loans	1,075 41	
Total expenditure		$238,791 55
Excess of receipts		$14,386 21
The balance from 1888 was		15,034 28
Leaving balance Dec. 31, 1889		$29,420 49

as shown in detail in the following statement of assets and liabilities:

Assets.

Cash		$8,224 86
Copper on hand		5,540 00
Loans		10,000 00
		$23,764 86

At Mine.

Cash	$38 42	
Supplies and fuel	8,771 73	
Wood and timber (standing)	600 00	
Accounts receivable	975 23	
		10,385 38
Total assets		$34,150 24

Liabilities.

Indebtedness at Mine	$2,548 71	
Accounts payable	2,181 04	
		4,729 75
Balance of assets		$29,420 49

The following summary of the results for the year is, we think, very creditable, indeed, to the mine managers:

Tons of rock mined	131,400
Tons of rock hoisted	126,125
Tons of rock treated at mill	116,608
Refined copper per ton of rock mined	13 41-100 lbs.
Refined copper per ton of rock milled	15 11-100 lbs.
Total yield of mineral	2,546,490 lbs.
Total yield of refined copper	1,762,816 lbs.
Cost of mining, per ton of rock milled	$0.8578
Cost of hoisting, per ton of rock milled	.1318
Cost of selecting and breaking, per ton of rock milled	.1478
Cost of general surface expenses (less rents) per ton of rock milled	.0532
Cost of transportation to mill, per ton of rock milled	.0520
Cost of stamping and separating, per ton of rock milled	.4188
Cost of expenses on mineral, per ton of rock milled	.0270
Total net working expenses, per ton of rock milled	1.6884
Total net working expenses, per ton of rock mined	1.4980
Cost of freight, smelting, and marketing product, including New York office expenses, per ton of rock milled	.2462
Gross value of product, per ton of rock milled	1.8268
Cost of copper marketed and all expenses paid, per pound	.1280

JOHN STANTON, Sec. and Treas.,
New York.

FRED SMITH, Agent,
Allouez, Mich.

Table of Products.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1869	1	1,575	1881	736	1,007
1873	10	1,163	1882	841	1,557
1874	504	130	1883	875	1,337
1875	692	1,574	1884	964	174
1876	780	1,785	1885	1,085	476
1877	650	479	1886	862	1,468
1878	565	1,146	1887	442	1,010
1879	715	1,452	1888	157	198
1880	658	471	1889	881	816
Total				11,427	1,747

THE CENTRAL MINING COMPANY

works in a fissure vein in the south side of the mineral range in Keweenaw county. It is an old mine and has uniformly, from the first year of its working, been a profitable one. I have given the history of this interesting and valuable mine in the earlier reports of this office, and at the present time I know of little to add. The mine is one of the deepest, 2,800 feet vertically down, and is penetrated by a single hoisting shaft, that descends to the 30th level and a main engine shaft that reaches to the 22d level. There is also an inclined shaft that conforms nearly, in inclination, with the dip of the formation and that goes down to the 9th level.

Though deep, the mine is a short one. From the 9th level to the 22d, the length of ground stoped anywhere is scarcly above 300 feet. They have followed down a portion of the vein that has been found to be paying ground, and have not gone much beyond it.

There was a slight angle in the shaft near the top which has been taken out and the shaft straightened, much to the advantage of the subsequent work. The hoisting machinery is of the best. Just now the mine is poor in the bottom, but a change may appear for the better any time.

Table showing Product of Central Mine—refined Copper.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1856	32	403	1873	751	1,117
1857			1874	870	900
1858	71	1,011	1875	733	952
1859	84	312	1876	1,080	1,400
1860	125	1,370	1877	997	1,640
1861	70	139	1878	945	1,013
1862	133	1,972	1879	899	1,495
1863	278	1,548	1880	1,013	78
1864	381	1,855	1881	709	465
1865	346	1,200	1882	676	1,595
1866	574	1,842	1883	634	556
1867	678	745	1884	723	747
1868	1,353	1,827	1885	1,078	1,408
1869	903	1,801	1886	1,256	886
1870	663	1,156	1887	1,099	1,133
1871	716	662	1888	908	717
1872	623	56	1889	635	592
Total				20,355	1,890

John Dunstan, Agent; Samuel Bennett, Mining Captain; J. F. Lobert, Clerk; John Stanton, Secretary and Treasurer, New York.

Central Mine Report.

The directors present the following statement of the operations during the year 1889:

The production of mineral was 803 tons, 1,205 pounds, which yielded about 79 per cent, or 1,270,592 pounds of refined copper, which, at 12.57 cents, gave		$159,704 73
Add interest received		5,815 78
		$165,520 51

Costs.

Working expenses at mine	$143,475 89	
Smelting, freight and all other expenses	24,388 18	
Net running expenses	$167,864 07	
Cost of straightening and repairing No. 2 shaft, new shaft house, guides, skips, etc.	24,232 03	
Making the total expenses		192,096 10
Excess expenditures over receipts		$26,575 59
Surplus from 1888	$225,503 79	
Credit real estate for stumpage	5,588 48	
		231,092 27
Net surplus Dec. 31, 1889		$204,516 68

From this surplus a dividend of $1 per share, or $20,000 was paid Feb. 1, 1890.

The average price obtained for our copper was about 2¼ cents per pound less than in 1888, while the production was nearly one-third less. This diminution in both quantity and price accounts for the reduction in receipts.

For about three months of the year nearly the entire force was engaged in the work of straightening, enlarging and retimbering our main working shaft which had attained a depth of about 2,900 feet. The upper portion of the shaft had—many years ago—been sunk on the dip of the vein, as was customary in those days, and, while not departing from the vertical to any great extent in any place, yet it was too small and crooked to admit of hoisting loads of sufficient size, or with sufficient rapidity to compensate for the increasing depth, and its reconstruction had become indispensable.

To the actual cost of this work and of new shaft house and other appliances should be added the loss sustained by interruption of production for three months, during which time a large part of the usual expenses were running on. An estimate, based upon the average product while working, justifies the directors in assuming that if no interruption had taken place the net earnings would have been about $20,000, and they therefore decided to pay out of the surplus a dividend of $1 per share.

At this time it is more difficult to forecast the future than at any former time at which your directors have been called upon to report. Although the product continues fair in amount, yet the prospects at the bottom of the mine are not encouraging. The vein after passing through a belt of "amygdaloid" in which it became split up and disordered, is entirely cut off on reaching a thick belt of "conglomerate." There is no reason to doubt that the vein exists in the "conglomerate" and in the underlying belts, but the formation seems to have been displaced at the point of contact between the "amygdaloid" and the "conglomerate," carrying the vein with it, and its location has not yet been determined. How soon the vein will be found, or what its value will be, is of course uncertain.

For some months past we have been driving a crosscut from the nineteenth level towards the "Northwestern" vein, approximately 1,640 feet distant from and parallel with the "Central" vein. The drift is now about 560 feet from the objective point, and as the "Northwestern" vein was worked many years ago to a depth of about 400 feet and produced some large masses of copper, we expect to find something of value when we reach it, which we should do before the close of the current year.

While it is not pleasant for your directors to chronicle a check in the uniformly successful career of the past 26 years, yet a full statement of the situation is due to stockholders. There is good reason to believe that the "Central" vein will be recovered, in which event the equipment of the mine is ample to reach a far greater depth than we have attained, and it is probable that the "Northwestern" vein will prove productive

when reached. Work is being energetically pushed, and it is hoped that in a very short time our usual condition of prosperity will be restored.

Joseph E. Gay,
Wm. C. Sturges,
R. Porterfield,
Edwin H. Mead,
A. S. Swords,
John Stanton,
Directors.

New York, March 26, 1890.

Assets and Liabilities.

December 31, 1889.

Exclusive of Real Estate and Mine Plant.

Assets.

Cash		$15,619 78
Loans		117,040 00
Accounts receivable		35,119 22
		$167,779 00

At Mine.

Cash at mine	$3,287 35	
Merchandise in store	23,315 30	
Supplies	35,503 60	
		62,106 25
		$229,885 25

Liabilities.

Agent's drafts	$3,067 35	
Indebtedness at mine	18,181 54	
Accounts payable	4,119 68	
		25,368 57
Balance of assets		$204,516 68

(Less the dividend of Feb. 1, 1890, of $20,000.)

Summary of Receipts and Expenditures of Central Mining Company, from its Organization to December 31, 1889.

Receipts.

Capital stock paid in	$100,000 00
Copper sold, including silver	8,833,199 04
Profit on timber sold	79,011 75
Total receipts	$9,012,210 79

Expenditures.

Net expenditure for mining operations, building and machinery, smelting and marketing copper, and incidental expenses	$6,858,972 07	
Net cost of "Madison," "Northwestern" and "Eagle River" lands	18,722 04	
Total expenditures		6,877,694 11
Balance of receipts		$2,134,516 68
Deduct dividends paid		1,930,000 00
Net surplus December 31, 1889		$204,516 68

(As shown in statement of assets and liabilities.)

Agent's Report.

Central Mine, Keweenaw Co., Mich.,
January 1, 1890.

John Stanton, Esq., Secretary and Treasurer, New York:

Dear Sir—The following report of operations at our mine during the year 1889, is respectfully submitted:

Ground Broken.

Sinking in shafts and winzes, 214 and 8-12 feet, average cost	$17 80
Drifting on vein and crosscuts 193 and 11-12 feet, average cost	7 75
Stoping on vein, 2,350 and 13-36 sup. fathoms, cost	13 25

Stoping on plats, etc., 400 cubic fathoms.

The total amount of ground broken in openings and stopes, exclusive of crosscut to "Northwestern," is 3285 cubic fathoms.

Production.

1,030 bbls. stamp copper, weighing	1,453,715 lbs.
34 hhds. barrels copper, weighing	99,320 "
32 masses copper, weighing	54,170 "
Total	1,607,205 lbs.

Or 803 and 1205-2000 tons.

Average yield of mineral per fathom of ground broken	489 lbs.
Average yield of ingot per fathom of ground broken	387 "

The total expenditures for the year are as follows:

Mining and surface expenses	$130,078 77
Stamp mill expenses	15,197 64
Taxes	2,250 33
Construction account and work on No. 2 shaft	24,232 03
	$171,758 77
Less rents received	4,050 85
Total expenses	$167,707 92

SINKING.

No. 2 shaft has been sunk from the 29th level to 16 feet below the 30th level, and a winze has been sunk from the 29th to the 30th level. In sinking this winze we passed through a very thick belt of amygdaloid. In this belt the vein was so split up that it was impossible to follow the right vein; therefore, when the winze was down to the 30th level we had no vein to follow, and crosscutting will have to be done to find the vein at this level.

DRIFTING.

The 29th level has been extended north 332 and 3-12 feet. About 100 feet of this drift has opened up a good vein, varying from one to four feet thick. This level has also been extended south 181 feet. This drift has been poor throughout.

The 28th level has been extended north 103 and 10-12 feet, and south 138 7-12 feet. These drifts have been very changeable, but altogether have opened up about 300 feet of good stoping ground but have shown no mass copper.

The 27th level south has been extended 147 and 2-12 feet. This level has shown up a good vein producing good stamp rock, barrel work and some small masses.

The 26th level has been driven south 88 feet through poor ground and is discontinued for the present.

At the 30th level but very little drifting has been done, only 48 feet south and 11 and 9-12 feet north, and as this has been done in search of the vein it has not opened up any stoping ground.

A crosscut has been driven from No. 2 shaft east, to connect with winze, a distance of 217 feet; also the crosscut from No. 4 shaft towards the "Northwestern" at the 19th level has been extended 596 feet and is now in 948 feet east from No. 4 shaft. According to surface measurements we have yet to extend this crosscut 692 feet to reach the "Northwestern" vein. I have now to put in an air machine and pipes in this crosscut, and then I intend to work it full time and get it through to the vein as rapidly as possible. From all I can learn we ought to cut a good vein in this portion of the company's property, and which will be quite an addition to the vein we are now working.

CONSTRUCTION.

The past year we have spent considerable time and money in improvements of various kinds. The most expensive and beneficial has been the straightening of No. 2 shaft. This shaft has been made perfectly vertical from the surface to the 30th level.

From the surface to the 5th level we had to make a complete new shaft and a new skip road from the top to the bottom has been put in. Now we are using a cage and a dumping skip, which works splendidly. The skip being double the size of the old one, we can now hoist double the amount of rock that we formerly did in the same given

time. This work of straightening No. 2 shaft occupied a greater part of our force for about three months, and of course while this work was going on not much work could be done in the mine, which will account for the falling off in our product the past year. Should the 30th level prove good we will be in good shape for a long time to come.

JAMES DUNSTAN, *Agent.*

LAC LA BELLE MINING COMPANY

is the successor to the franchises and to the real and personal estate of the Conglomerate Mining Company, which latter corporation has ceased to exist.

There is nothing new to be said about this mine. There is a fine plant of hoisting machinery, compressor, air drills, new stamp mill, railroad, numerous dwellings—good ones—fine new store, office, etc. In fact, from 1881 to 1884, a period of about three years, the company expended very nearly a million of dollars in preparations to mine, and then finding the mine too poor to pay, it was shut down permanently. It is an old location, near the end of Keweenaw Point, in the south slope of the range, that is south of "the greenstone," and there are several fissure veins that have been mined in the years long gone by, with but poor success. In 1880, the company discovered some rich evidences of copper in the conglomerate belt that underlies the greenstone, and therefore began to open a mine in it, and to make the most extensive surface outlay. The company holds a large estate, from which it has been cutting the pine timber since the mine ceased to be operated.

What the future plans are I am unable to state.

Tribute copper to the amount of one ton and 1,728 pounds were obtained in 1889. The aggregate yield of all the mines on this property is 2.624 tons, 1,608 pounds.

A. P. Thomas, Resident Agent, Delaware Mine, Mich.; John Hoskins, Secretary, 308 Walnut St., Philadelphia, Pa.

A meeting of the board of directors is called for May 20, to increase the capital stock of the company to $625,000.

THE COPPER FALLS MINING COMPANY

continues to operate moderately under the supervision of Capt. Moyle. The stamp mill has not been running for some time; but the opening work has been pushed along with a view to stoping later on, and to be in shape to keep the mill supplied with better rock than the average. I have described this mine very fully in past reports and it is not necessary to repeat what has been said heretofore. The mine is in the north slope of the range and was originally a fissure vein mine, opened in what was called the Owl Creek vein. The vein crosses the formation at about right angles and dips vertically. The formation lies very flat; that is, it dips to the north under Lake Superior at an angle of 22° to 28°. The apex of the ridge dividing the northerly and southerly slopes is a coarse crystalline trap—called, through the country here, "the greenstone." The mine was formerly entered by shafts high up on the hill; but later an adit was driven from the north, on the horizon of the 9th level, in the Owl Creek vein.

The adit is about three quarters of a mile in length, and is laid with T-rail, on which the rock-cars are run into and out of the mine, drawn by a small locomotive. The formation is made up of succeeding beds of trap, sandstone, amygdaloid, etc., and it is in one of the latter, called the ash-bed, that the mine has for many years been worked. This ash-bed is a dark

colored, soft amygdaloid bed, about seven feet wide, that carries, disseminated through it, a small percentage of copper, about 7-10 of one per cent of ingot, so that it is very difficult to make it pay to work it. The difficulties, the advantages of the lode and the methods of working are very fully described in former reports.

They are driving the adit south to the greenstone, exploring the Owl Creek vein; nothing of great importance has been discovered.

Table of Product of Copper Falls Mine.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
Previous to 1855	158		1872	260	862
1855	100		1873	643	540
1856	104	10	1874	535	359
1857	153	1,305	1875	203	1,587
1858	151	1,852	1876	8	1,488
1859	173	174	1877	5	1,950
1860	255	818	1878	5	1,790
1861	280	11	1879		
1862	299	299	1880	3	645
1853	159	1,348	1881	334	1,121
1864	179	808	1882	293	1,500
1865	235		1883	402	
1866	568	1,169	1884	445	1,168
1867	1,128	1,485	1885	575	538
1868	239	1,384	1886	689	679
1869	345	1,400	1887	270	
1870	386	990	1888	590	
1871	239	883	1889	434	1,136
Total				10,789	1,269

David Nevins, President, Boston, Mass.; Geo. Brooks, Treasurer; J. H. Moyle, Superintendent, Copper Falls, Mich.

THE ONTONAGON COUNTY MINES

are all, except the National, working on tribute. Ontonagon and Rockland have now railroad connection with the D., S. S. & A. line, but still there is no impetus given to its mining interests.

The mining history of the Ontonagon district has for many years been a record of failure, some of the undertakings have been such conspicuous misfortunes that capital has no doubt become weary of investing there. However, there have been very rich mines at Rockland, and I have faith in the future of some of the locations in that county.

AT THE NATIONAL MINE

all mining work underground except tramming and hoisting rock previously broken ceased before the close of the year 1889. Prior to this, trial was made of the old burrows which it was stated would yield a good percentage of copper.

This was anticipated both of the National and the Minesota rock piles; it also being intended to endeavor to work up the latter. So far, the rock

taken from the mine and also that from the burrow, has proved disappointing. It has yielded less than one per cent of copper. Just at present the mill is idle, some jigs are to be added and repairs made and it is said that it will be run on the burrow rock next summer. One thing is shown pretty conclusively, the amygdaloid belt is not a rich one; it can scarcely pay to work now, or in the future. Twelve men are tributing in the south vein.

The product of the National in 1889 was 258 tons 723 pounds, making an aggregate production of 5,712 tons, 487 pounds.

Wm. E. Parnall, Agent, Rockland, Mich.; D. L. Demmon, Secretary and Treasurer, 19 Congress Street, Boston.

THE MASS MINE

is worked on tribute by B. F. Chynoweth. He has fourteen men employed in the mine under James Chynoweth. They get some masses of copper, one recently that weighed 1,200 pounds. The Mass is a small mine, but it is a very good one. It has yielded an aggregate of 2,476 tons and 1,730 pounds of refined copper.

THE RIDGE COPPER COMPANY

keeps its mine at work on a system of tribute. The results of operations in 1889, are as follows:

Product was 31,969 pounds which realized		$2,921 52
Received from sale of treasury stock		5,000 00
Balance of assets, per last report		5,440 63
		$13,362 15
Mine expenses	$3,547 68	
Smelting and other expenses	2,235 00	
		5,782 68
Balance assets Jan. 1, 1890		$7,579 47
The total expenditures to date have been		$1,175,522 92
Total dividends, etc.		99,784 50
Company's stock held		304 50
Cash on hand		7,260 40
Total receipts to date		$1,486,413 32
Capital stock bid in for property		200,000 00
Assessments		219,988 50
Total receipts from sales of copper		1,044,838 80
Sale of treasury stock		5,000 00
Interest acct., collected Jan. 1, 1890		16,735 92
Total receipts		$1,486,413 32
Per cent of copper in mineral in 1889		76,334 00
Total inventory of mine, etc.		17,051 27

There is an accumulation of stamp rock which it is proposed to stock the mill to work up.

The aggregate production is 2,609 tons, 969 lbs.

Philip Highley, Sec'y and Treas., Boston, Mass.; Alfred Meads, Resident Director, Ontonagon, Mich.

THE ADVENTURE

is one of the oldest mines in the country and work done by tributers during the past year on the Knowlton vein, shows that the property has merit. The vein is marked along on the surface by ancient Indian pits and

where the tributes have opened on it, it is well defined and shows copper in paying quantity—10 men are working. Thomas F. Mason, Pres't., N. Y.

IN THE HILTON MINE

also, 8 tributers are working on the Knowlton vein and are finding copper enough to pay them well, so they say.

THE EVERGREEN BLUFF MINE

was pumped free of water by Capt. Richard Chynoweth and he mined last year 14 tons and 773 lbs. of copper. Six men are working this winter.

THE KNOWLTON MINE

is also being tributed by Richard Chynoweth & Son. It is reported that an 8 ton mass of pure copper has been found. The Knowlton vein is one of the best on the lake.

THE ISLE ROYAL LAND CORPORATION (LIMITED)

is a company organized to hold a large body of lands in Isle Royal. The island contains, it is said, 110,000 acres of land, of which this new company holds 84,000. They have been prospecting all summer for copper; but aside from the primary object of producing copper, building stone, etc., there is an ulterior purpose of making of the island a great pleasure resort, for which the situation is in many particulars admirably adapted, and for which purpose there is no doubt but it will be, in some degree, ultimately used.

The company is an English one, S. S. Robinson, general manager. Mr. Jacob Houghton, of Detroit, was one of the promoters of the scheme and has much to do with the conduct of the exploration. The island is traversed by the Keweenaw series and contains numerous veins and copper bearing belts in which much ancient mining was done. The mining companies that have operated there were not successful; but there are abundant indications of copper—fissure veins, amygdaloid and conglomerate beds, and it is quite possible that discoveries may be made that will cause Isle Royal to become an active mining district.

THE CALUMET AND HECLA

mine is rapidly recovering from the effects of the fires, which continued so long and destructively.

The entire mine, including the portions where the fire prevailed, will soon be producing copper again.

There is, perhaps, no mining property in which the mineral value is so little a matter of conjecture as this. The territory is so large and has been explored so far in advance of the present opening of the mine, that a reasonable estimate of the great value of the mine can be made.

The deposit is not all equally rich; but its productiveness is found to be the same at the greatest depth that has been reached, that it is nearer the surface, and there is every reason to suppose that this condition of things

will continue indefinitely; at least, to as great a depth as can be reached during many years to come.

The thickness of the belt is from eight to twenty-five feet, probably averaging about twelve feet, of productive material.

This would give 2,400 cubic fathoms to the acre; and, since the yield of ingot copper to the cubic fathom is about 1,300 pounds, worth in the market, today, 14½ cents per pound, it is easy to estimate the enormous wealth which the company possesses in its estate of 1,300 acres. The portion of the mine which yields the lowest percentage of copper is the south end, called the South Hecla, or "Black Hills;" but at the same time the deposit here is much thicker than elsewhere, so that, probably, as much copper is obtained from the same superficial arc as elsewhere in richer portions of the mine.

For the benefit of those who are not familiar with the matter, it may be well to give a brief description of the situation. The mine is in sections 14, 15 and 23, T. 56 N., R. 33 W. Here are the villages of Red Jacket and Calumet (practically one village), which contain the mining population, etc. The deposit is one of the regular belts that make up the formation of the country. It is a conglomerate, through the mass of which the copper is disseminated in native form but seldom in large masses. Occasionally, the round boulders, which are contained in the conglomerate, or part of it, are found to be nearly pure copper. One can find round, smooth masses, which appear to the eye to be cobble-stones, but, taken in the hand, the impression is quite different. There has been a change of the material structure, copper taking the place of the rock material.

The bearing of the formation is about N. 33° E., and the northwesterly dip is 37½° with the horizon. There are 13 shafts, 5 in the north, or Calumet portion of the mine, 4 in the Hecla, and 4 in the South Hecla, all sunk in the conglomerate and thus going down on the incline of the formation. Two of these shafts between the Hecla and the extreme South Hecla shafts are new ones, and have but lately reached paying ground. The main shafts in the Calumet and in the Hecla mines are sunk to the 39th level, 3,750 feet from the surface, measured along the inclination, or a vertical depth of 2,280 feet.

The elevation above Lake Superior is 640 feet.

The conglomerate is all stamp rock and goes to the stamp mills situated at Lake Linden, five miles distant. The mine and mills are connected by a railroad, 4-ft. gauge, owned by the company.

Also contiguous with the stamp mills are the smelting works, which is practically a Calumet and Hecla concern. The capacity is sufficient to smelt all the copper produced by the mine.

The opinion was formerly entertained that the Calumet and Hecla company, in its mining operations, did not keep pace with the times; that many of its methods were obsolete, and that there was less enterprise and economy exercised than were shown by other leading companies. But this charge cannot be properly entertained now. Many and important improvements have been recently made and are still in progress that should place the Calumet and Hecla in the front rank of mining companies as well for the practical character of its equipment and its application of progressive methods, as for the great richness of the mine.

Great improvements have been made in the stamp mill, which have brought the manipulations of the rock to a high degree of perfection. The stamps are all now the Leavitt heads, a machine of great power and effect-

iveness. Much saving of copper at the mill has been secured by the more careful treatment of the slimes. A great number of slime tables are now employed in the mills. At the stamp mills of other companies the slime table has been a main dependence for many years ; it is equally so now at the Calumet and Hecla mills. Also the mineral is only "dressed" to about 65% purity instead of 76% as formerly. The "mineral" thus goes to the smelters containing more impurities than formerly, but it has been subjected to less loss of copper.

The average number of tons of rock now daily treated in mills is about 3,000.

Among the things added at the mill, is the great wheel for elevating the refuse water and sand discharged from the mill. There has been one in use many years, which is 43 feet in diameter, the new one, which is in addition to the former, is 54 feet in diameter, its estimated weight is 200 tons. In 24 hours it will elevate water and sand sufficient to cover an acre of land, one foot deep. On the rim are 432 teeth, 4.71 inches pitch and 18 inches face. The material is of the best gun metal, and the finish is the most perfect. The teeth are polished as smooth as glass.

The wheel is driven by a pinion having 33 teeth and a speed of 600 revolutions per minute. The shaft is also of the best steel, 30 inches diameter, the journals being 22 inches diameter, 3' 4" long. The steel buckets, 448 in number, are 4' 5½" long and 21" deep. The combined capacity, is 3,000,000 gallons of water and 2000 tons of sand every 24 hours. The cost is about $100,000. The purpose of this wheel is to elevate the "tailings" from 11 stamp heads and to discharge them into launders that extend out into the lake, away from the shore. This wheel is illustrative of the magnitude of operations at the Calumet and Hecla—everything is on a stupenduous scale, as it must be, in a measure, to meet the requirements of so great a mine.

At the mine there are many notable matters in progress, the chief of which is the Red Jacket, or the new vertical shaft, that is sinking to the conglomerate. It is now, at this writing, March, 1400 feet deep and descending at the rate of three feet per day.

The rock, passed through, consists of alternating beds of trap approximating to amygdaloid, at intervals. A maximum thickness of 17 feet is all that has been, thus far, encountered.

According to estimate, its depth will be, when the conglomerate is reached, 3,400 feet to the 60th level, and about two years will yet be required to consummate the work. It will be 2,100 feet to the 36th level, and they are driving a crosscut from the mine in this horizon, west, to meet the shaft. The crosscut starts from No. 4 shaft and will be 1,700 feet long.

The plan is to use this crosscut for a tram-way from the mine to the shaft and to begin to use it as soon as they are connected. The shaft is 15½x25 feet, and divided into six compartments, four of them for balance cages, two for timber-way and pump pipes, etc. When the shaft is down to the 36th level, and the crosscut driven to connect with it, four of the compartments will be fitted up with cages, two of them used for hoisting rock, without interfering with the work of sinking the shaft. This shaft will reach the lode at the 60th level, 21 levels below the present bottom of the mine, so that there will be a vast amount of stoping ground above this line of intersection. In point of fact, the mine has not been much stoped, anywhere, below the 28th level, and that in the stretch from

No. 4 Calumet to No. 3 Hecla. Thus there will be not only the levels yet untouched but the pillars of conglomerate yet standing in all the levels up to the surface. These pillars, it seems to me, can be attacked by commencing at the top and removing them in succession, running the copper rock down and out through the crosscut to the vertical shaft. The copper can thus be substantially all removed, and the roof of conglomerate let to fall in.

They are hoisting now, March 1, from seven shafts: 4 and 5, Calumet, 3, Hecla, and 9, 10, 11, 12. No. 6 is now "holed" to the 25th level, is in good copper ground, and will soon be producing. They are repairing No. 2, Hecla, and No. 3, Calumet; but will not restore the man engines, both of which were destroyed by the fires; but they will use seven cars to carry the men. One is now used in the No. 8 shaft, and there are six more. They will be operated by separate machinery than that used in hoisting. These independent hoisting plants are already in readiness to use. At present, the men ride in the skips to considerable extent. The fires did so much damage that there is a world of work to repair the shafts. They did not see the bottom for two years; and, even yet, the water fills the deepest part of the mine.

In the Black Hills mine, No. 12 is to the 16th level, the others to the 18th. 9 and 10 constitute nearly a single shaft. From Nos. 3 to 6, Hecla, the distance is 1,100 feet, and the two short shafts that have been started in this space, Nos. 4 and 5, will be abandoned. It is also 1,100 ft. between Nos. 4 and 5, Calumet, but the good ground in the latter, did not begin until the 33d level was reached, so that no shaft will be sunk between. They are walling up, in masonry, all the levels at the shafts, to prevent any one going through them and to prevent fires. This work of sealing up the levels is proceeding rapidly, already the South Hecla levels are stopped. No. 3, Hecla, is nearest to the Tamarack No. 1. It is to the 34th level and in two levels more will be to the horizon of the upper point of the Tamarack. The 39th level, the deepest opening in the Calumet and Hecla, corresponds in depth with the 5th level of the Tamarack.

In sinking the new vertical shaft, rapid progress is made. In September, 109 feet were sunk. The greatest number of feet made in one month was 126, the timber used in the shaft, is southern yellow pine.

The new hoisting plant that they have been for two years past erecting will operate 2, 3 and 6, Hecla, shafts. The drums are coned 14' and 26' end diameters. This plant in appearance, is by far the finest on the lake. It is said to have cost $750,000, however this may be I do not know. The drums, etc., are named, respectively, Gratiot, Houghton and Seneca.

In extinguishing the fire all sorts of plans were resorted to, among others the surface was kept frozen to stop the leaks, etc. The hot gas was conducted from No. 3 in sheet iron pipes that were kept covered with snow which reduced the temperature to 30° to 40° when it was discharged again as far down in the mine as possible. The fire burned more or less to the 23d level. No trace has been discovered of the bodies of the men who were lost. They were probably utterly destroyed in the man engine shaft.

It has been in contemplation to erect a large rock house at the mine at which the rock from the shaft should be concentrated preparatory to being sent to the stamp mill, but this scheme has been abandoned and I was informed that it is the intention to crush the rock at each shaft.

Some very crude newspaper comment has been indulged in lately regarding the percentage of copper obtained from the Calumet & Hecla mineral,

attributing this fact to the falling off in richness of the lode. In fact the mineral is the stamp mill product, the ingot, the smelting mill result. The purity of mineral depends largely on the extent of the manipulation which, if carried too far, results in loss of copper. It has been understood that the loss of copper in the tailings at the mill, has been in the past very considerable, 1½ % and upwards. This reduction of the richness of the mineral is an effort to save copper. A test to find if this result is accomplished will be the percentage of copper obtained from the rock treated. But even this test is not fairly applicable just at present since, that for three years past, so large a portion of the rock treated has come from the south end mine, a leaner portion of the lode. When all the mine is producing, the work at the stamp mill will be fairly determined.

The following shows the per cent of copper obtained for all the years given:

Year.	Tons of rock stamped.	Yield per cent of ingot copper.	Year.	Tons of rock stamped.	Yield per cent of ingot copper.
1875	249,704	4.3	1883	372,570	4.45
1876	259,935	4.37	1884	435,352	4.63
1877	247,935	4.55	1885	535,820	4.32
1878	271,000	4.66	1886	598,522	4.22
1879	284,715	4.61	1887	654,055	3.52
1880	334,343	4.75	1888	763,728	3.28½
1881	340,080	4.61	1889	807,918	3.012
1882	344,132	4.59			

Table of product of Calumet and Hecla mine.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1867	657	1,173	1879	13,135	943
1868	2,549	375	1880	15,837	1,239
1869	6,157	1,771	1881	15,680	781
1870	7,930	1,584	1882	16,026	1,528
1871	8,111	590	1883	16,562	1,045
1872	8,081	183	1884	20,236	1,585
1873	9,424	265	1885	23,623	1,990
1874	10,062	1,225	1886	25,259	220
1875	10,736	1,954	1887	23,008	123
1876	10,845	732	1888	25,147	1,721
1877	11,284	468	1889	24,334	296
1878	12,626	1,128			
Total				301,538	1,577

Number of shares of the company, 100,000; par value per share, $25; market value now $261; dividends paid in 1889, $2,000,000. Total dividends to date, $33,350,000.

LONGITUDINAL SECT
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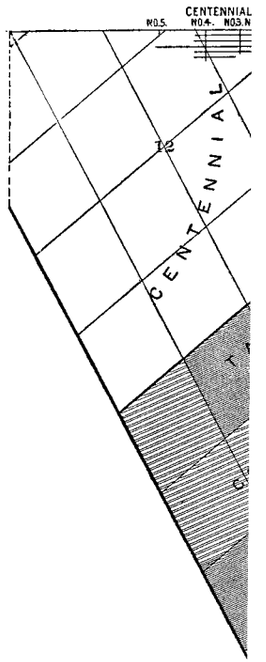
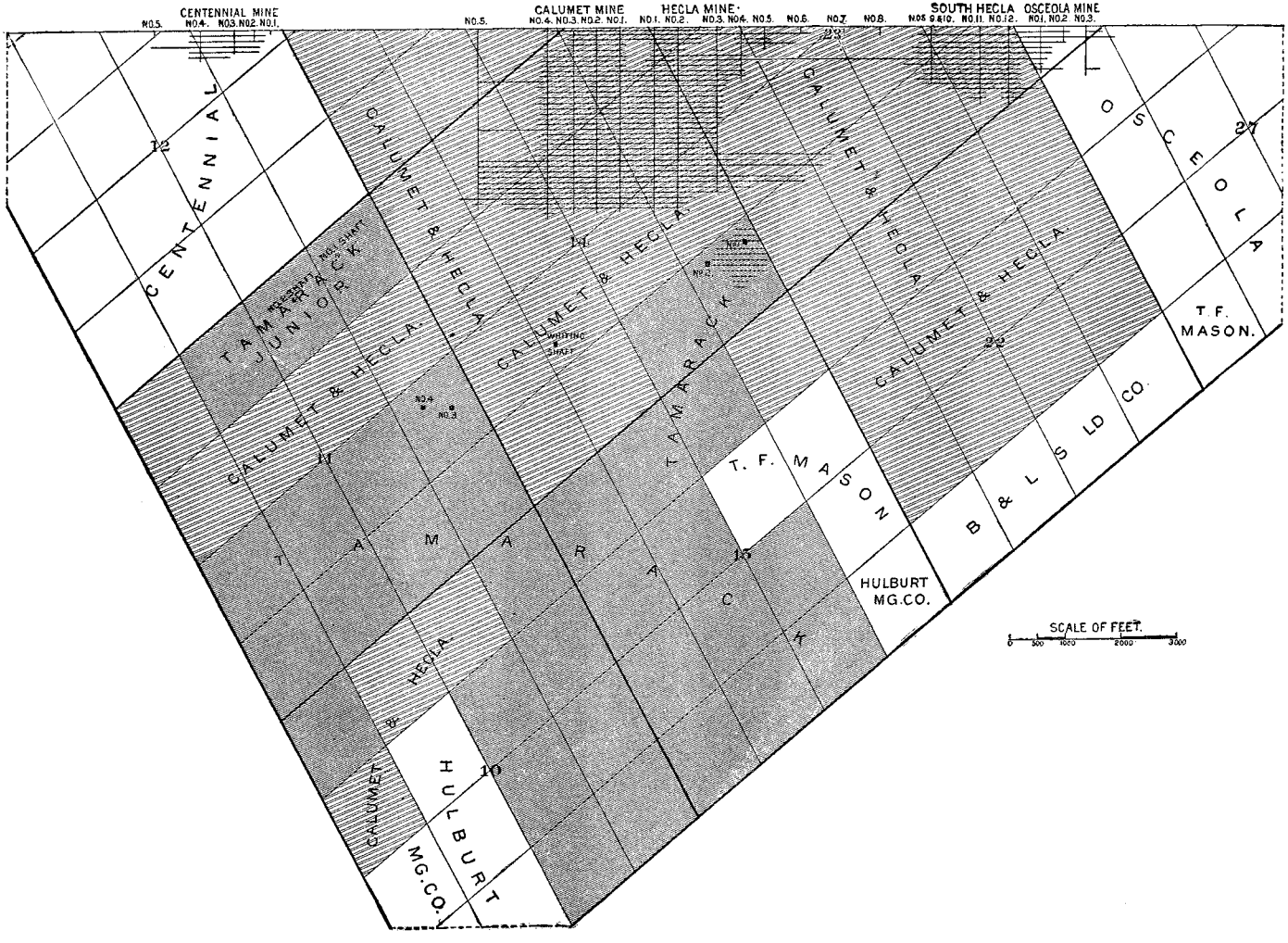


LONGITUDINAL SECTION OF A PORTION OF LANDS EMBRACING THE CALUMET AND HECLA CONGLOMERATE, SHOWING THE POSITION OF ALL THE SHAFTS THAT ARE LOCATED IN THIS CONGLOMERATE, JULY 1, 1890.



The monthly statements of results are as follows:

No. of tons stamped each month of year 1889.			No. tons mineral produced in each month of year 1889.		
Month.	Tons.	Pounds.	Month.	Tons.	Pounds.
January	64,889	425	January	2,599	1,030
February	58,351	1,300	February	2,397	755
March	64,947	450	March	2,793	65
April	62,733	1,650	April	2,583	1,500
May	65,161	850	May	2,884	1,060
June	61,560	375	June	2,593	300
July	67,517	1,250	July	2,657	65
August	65,571	975	August	2,755	860
September	65,218	1,000	September	2,932	1,410
October	76,698		October	3,385	1,395
November	78,916	1,000	November	3,266	1,135
December	76,352	140	December	3,262	205
Totals	807,917	1,415	Totals	34,110	1,780

The percentage of copper obtained from the mineral in 1887 was 77.10%, 1888, 73.42%, 1889, 66.00%.

The average force employed is 3,000 men ; at the present time the number on the pay roll is 2,700.

The following are officers of the Co.: Alexander Agassiz, President, Boston, Mass.; Chas. W. Seabury, Treasurer, Boston, Mass.; S. B. Whiting, General Manager; J. N. Wright, Superintendent; John Duncan, Assistant Superintendent; John Heebner, Assistant Treasurer and Purchasing Agent; H. Messimer, Superintendent of Motive Power; J. D. Ramsay, Ass't Supt. Motive Power; F. G. Coggin, Supt. Stamp Mills; W. A. Childs, Supt. H. & T. L. R. R.; Thomas Hoatson, Chief Mining Capt.; P. C. F. West, Chief Mining Engineer; James N. Cox, Chief Clerk; M. B. Patch, Supt. Smelting Works.

THE TAMARACK MINE

is the Calumet and Hecla's only rival ; but only such in the sense of richness, productiveness and value. Thus far the Tamarack has had only one shaft and a small amount of ground opened, but ere long there will be four shafts from which copper will be hoisted, and when such is the situation the Tamarack will rival its great neighbor in the amount of its product.

The Tamarack has an extraordinary record; it was started on a mere probability. Those who inaugurated the enterprise had faith, certainly, but there were many who did not. I was on the ground when the first blow was struck, and assuredly it did seem a vast undertaking to sink to the depth of nearly half a mile before the copper belt sought could be reached. But the great work was pushed steadily forward to its successful termination and all the scoffers were forced to become believers. Through this single shaft has been elevated to the surface, from the seemingly impenetrable depth which it reached, copper enough already to far more than pay for all outlay of the company in sinking to the copper and equipping the mine to the productive point. The mine immediately became a self sustaining institution when the conglomerate was reached. A second shaft has been added to the first. This, No. 2 shaft, was begun in March, 1886, and reached the Calumet and Hecla conglomerate at a depth of 2,575

feet. It is now to the 12th level, 2,818 feet below the surface, and is still descending.

The crosscut to the shaft at the 12th level is 685 feet long.

The two shafts were connected by a crosscut 720 feet long from the 2d level in No. 1, being 2,215 feet from the surface. The shaft is 7′x9′ inside the timbers and is divided like No. 1 into three compartments, two for hoisting and one for the men. The air goes down No. 2 and up No. 1. The engine house for No. 2 is 65′x45′, placed at 125 feet distant from the shaft. The machinery, which has been two years building, was made by E. P. Allis & Co., of Milwaukee, and comprises two Corliss engines each 42″x64″, the drum 30½ feet diameter, 11 feet face. It is estimated that it will raise 4 tons of rock, 2,500 feet per minute.

There are three Reynolds boilers, upright, same as used at No. 2, Tamarack, Jr.

The shaft house, as at No. 1, combines, also, a rock house, and is 110 feet in height. The rock breakers are three in number, 18″ x24″, 13″x20″ and 8″x14″, with steam hammer. The sinking of the shaft proceeded somewhat slowly until the beginning of 1888, since which time the work has proceeded rapidly. The greatest number of feet attained in one month being in July, 97.3 feet. Among other additions at the mine, is a brick office, supplied with all modern conveniences.

The new shaft house at No. 2, is the best in the upper peninsula.

The engines and drum occupy a floor space of 35x62 feet, and are operated from an elevated platform by four levers, viz.: throttle, cut-off, reverse and steam brake.

Overwinding is made impossible by a device that shuts off steam and applies steam-brake automatically.

I was down through the mine recently (February), and found it as usual. There is a portion of barren ground in the mine; some, very rich, and still much more that is only medium, rock that carries a low percentage of copper. The barren ground is sandstone, and there is quite a stretch of it in the 10th level, becoming less in the 11th. The sandstone appears as bunches in the conglomerate.

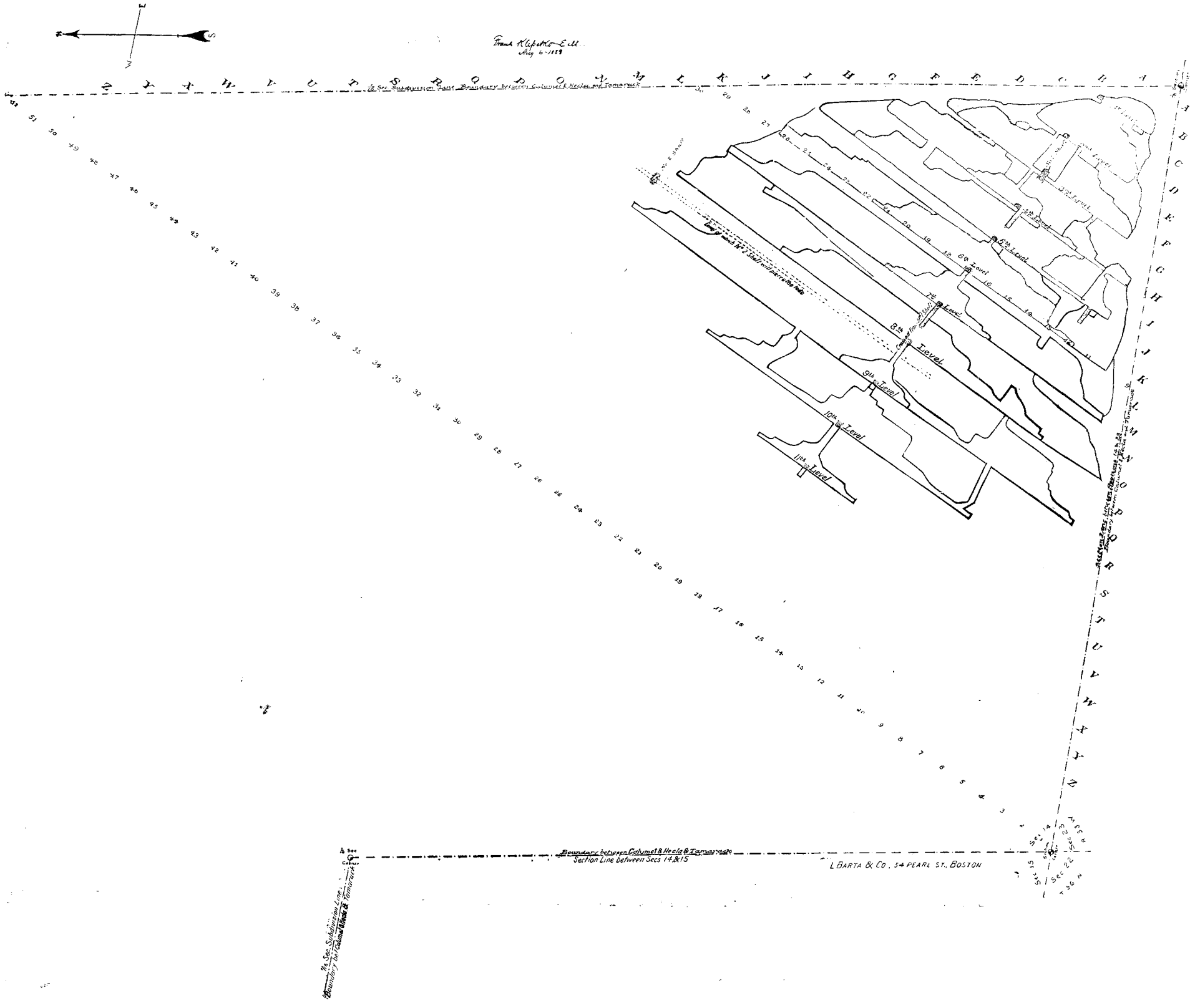
There is a "crossing" south of the crosscuts, where the formation is faulted. North of this and near it, the conglomerate is narrow and poor, but directly south of it the lode is 16 feet wide and rich, this is true in all the levels.

Now that No. 2 shaft is down and the machinery ready to run, it could be used immediately for hoisting copper rock, but Capt. Daniell wishes to do more opening work first. It must be borne in mind that the stoping has been pushed along as rapidly as the mine was opened. Now they will have much greater length of levels, 2,200 feet in the 13th level, so that if they push down to the 14th first, they will be able to produce copper cheaper and more rapidly than if they crowd the stoping now. The hanging wall is about as bad as it can be. It takes a forest of timber to hold it up. Blocks of trap drop out if not held in place by stulls. In going through the crosscuts the drifts in the foot wall from the shaft to the lode, one sees how the foot wall cracks and disintegrates when the pressure is removed.

The Tamarack Company has a model stamp mill. They have now three heads of stamps and the fourth one is ordered. Each stamp will crush 300 tons per day if necessary. The fourth head will be used on the Kearsarge mine rock.

LONGITUDINAL SECTION OF THE TAMARACK MINE, JULY 1, 1889.

Scale: 240 feet to an inch.



No. 1 head, with its solid iron bottom, now after nearly two years' service is working just as well as on the day it started. The day of spring timbers has gone.

Nos. 3 and 4 shafts, now sinking in Sec. 11, are down to a depth of 300 feet. These shafts have machinery, etc., that was at first employed at Tamarack, Jr., and will suffice until a larger plant is required, which will be when a depth of 700 feet or upwards is reached. Within the coming year the Osceola amygdaloid will be reached in Nos. 1 and 2 shafts. If it prove good it will add to the value and resources of the mine. It will also be of scientific and practical interest otherwise, as determining to some extent whether amygdaloid belts hold copper equally well at great depth.

The Company has built a good many dwelling houses for employés, both at the mine and especially at the stamp mill.

The Company's fiscal year closes June 30, so in copying the following from its report I do not bring the statistics down to the close of the year 1889 :

The production of mineral was 14,675,856 pounds, which, at 75.20 per cent, gave 11,036,469 pounds of refined copper, from which has been realized the gross sum of		$1,423,332 98
Interest receipts		6,785 59
		$1,430,118 57
The costs have been:—Running expenses at mine	$508,667 91	
Smelting, transportation and all other expenses of handling copper	180,672 41	
Total running expenses		689,340 32
Showing a mining profit of		$740,778 25
Add balance of assets June 30, 1888	$606,164 12	
Add amount received from sale of treasury stock	400,000 00	
Add balance receivable from sale of treasury stock	600,000 00	1,606,164 12
		$2,346,942 37
Deduct dividends Nos. 2, 3, 4 and 5	$720,000 00	
Deduct amount expended in mine plant during the year	161,178 44	881,178 44
Making the balance of assets		$1,465,763 93

ASSETS AND LIABILITIES.

Assets.

Cash on hand at mine	$309 81
Accounts receivable at Boston	2,366 30
250 shares H. & C. R. R. stock	25,000 00
Accounts receivable at mine	33,202 67
Supplies on hand at mine	47,144 27
Hancock & Calumet R. R. Co. 6 per cent bonds	55,000 00
Wood and timber land, about 30,000 acres	153,844 64
Bills receivable	165,701 32
Copper on hand	227,110 32
Cash in bank at Boston	348,343 17
Treasury stock	623,120 00
Total cash assets	$1,681,143 50

Liabilities.

Unpaid dividends	$348 00	
Drafts outstanding	31,847 54	
Accounts payable at mine	66,417 85	
Accounts payable at Boston	116,766 18	
Total liabilities		215,379 57
Balance of assets July 1, 1889		$1,465,763 93

STATEMENT OF RECEIPTS AND EXPENDITURES OF ALL KINDS, 1882 TO JULY 1, 1889.

Receipts.

From capital stock, 50,000 shares, $13.00 a share, paid in		$650,000 00
Of which 10,000 shares were placed in the treasury and have been sold as follows:		
$20 per share paid Feb. 1, 1889	$200,000 00	
$20 per share paid June 1, 1889	200,000 00	
$20 per share due Oct. 1, 1889	200,000 00	
$20 per share due Feb. 1. 1890	200,000 00	
$20 per share due June 1, 1890	200,000 00	
	$1,000,000 00	
Less $13 per share credited to capital stock in above amount of $650,000.00	130,000 00	
		870,000 00
From 363 lbs. copper, 1882, at $18.00	$65 34	
From 7,435 lbs. copper, 1883, at $14.71	1,093 37	
From 1,979,400 lbs. copper 1885-6, at $10.05	198,944 56	
From 4,636,521 lbs. copper, 1886-7, at $10.24	474,614 68	
From 10,389,867 lbs. copper, 1887-8 at $13.95	1,448,943 88	
From 11,036,469 lbs. copper, 1888-9, at $12.90	1,423,332 98	
From 28,050,055 lbs. copper, total, at $12.65		3,546,994 81
From interest receipts		12,955 09
From 350 shares Hancock & Calumet R. R. Co.'s stock sold and paid for		35,000 00
250 shares Hancock & Calumet R. R. Co.'s stock on hand		25,000 00
Total receipts		$5,139,949 90

Expenditures.

Running expenses prior to July 1, 1888	$1,285,860 84		
Running expenses during 1888-9	689,340 32		
		$1,975,201 16	
Construction expense to July 1, 1888	$433,080 97		
Construction expense during 1888-9	85,489 65		
No. 2 shaft	118,844 84		
No. 3 and No. 4 shafts and expenditures on section 11	21,569 35		
		658,984 81	
Dividends Nos. 1 to 5, inclusive		840,000 00	
Real estate		200,000 00	
Total expenditures			$3,674,185 97
Balance of receipts July 1, 1889			$1,465,763 93

DETAILS OF MINING EXPENSE.

Underground Expense.

Shaft-sinking, 145.80 feet at $19.39	$2,828 00	
Winze-sinking, 681.85 feet at $11.96	8,156 85	
Drifts, 3,433.03 feet at $9.55	32,776 00	
Stoping, 6,811.46 fathoms at $10.56	71,925 82	
Tramming	40,661 50	
Timbering, labor, materials and supplies	73,768 74	
Extra work	8,151 85	
Supplies, labor, fuel, etc., for air drills	34,957 63	
Supplies, fuel and labor for engines	56,173 89	
Mining superintendence and Co. acct. labor	33,321 53	
Blacksmith, machinist and carpentar labor	6,378 61	
	$369,100 42	
Less profit on supplies, etc.	20,246 50	
		$348,853 92

Other Expenses.

Rock house	$25,580 39	
Surface lobor, supplies, etc.	6,230 61	
Office labor, supplies, etc.	8,071 83	
Transportation	27,863 16	
Stamping	80,378 50	
Incidental expenses	1,436 66	
Taxes less rents collected	10,255 84	
		159,813 99
Total running expense		$508,667 91

Construction Costs.

No. 2 engine and shaft equipment	$18,823 84	
No. 2 rock and shaft house	4,719 60	
Dwelling houses	15,180 40	
Machine shop	2,345 66	
Schoolhouses	1,621 18	
Blacksmith shop	940 90	
Carpenter shop	299 94	
Fire engine	2,930 59	
No. 1 engine and shaft equipment	12,830 86	
Stamp mill, dwellings, etc.	24,284 41	
No. 2 boiler	84 90	
New office	465 32	
New barn	1,012 05	
No. 2 shaft	54,119 44	

Expenditures of Section 11.

Dwelling houses	$7,651 23	
No. 3 shaft	3,424 20	
No. 3 engine and shaft equipment	8,129 27	
No. 4 shaft	887 54	
No. 4 engine and shaft equipment	603 28	
Railroad extension	595 82	
Change house	278 01	
	$21,569 35	
		$161,178 44
Total expended at mine		$669,846 35

Summary.

Rock stamped	169,250 tons.
Product of mineral	14,675,856 lbs.
Product of refined copper	11,036,469 lbs.
Yield of refined copper per cubic fathom of ground broken	1,111 lbs.
Yield of refined copper per ton of stamped rock	65.21 lbs.
Yield of mineral per cubic fathom of ground broken	1,477 lbs.
Percentage of mineral in stamped rock	4.34 per cent.
Percentage of refined copper in stamped rock	3.26 per cent.
Refined copper, cost per pound at mine	4.61 cents.
Cost of smelting, freight, commission and Boston expense	1.64 cents.
Total cost per pound of refined copper laid down in New York and sold	6.25 cents.

Opening work foots up as follows :

No. 1 shaft sunk	145.8 feet.	
No. 2 shaft sunk	1,000.4 "	
		1,1462 feet.
Winzes, conglomerate	512.0 feet.	
Winzes, country rock	169.9 "	
		681.9 feet.
Levels, conglomerate		2,222.1 "
Crosscuts		1,210.9 "
Total		5,261.1 "

Conglomerate rock broken afforded 1,111 lbs. ingot for each cubic fathom, 117 lbs. less than the previous year.

Cost of stamping for the year was 47.49 cents per ton. Each head stamped 228 tons per day, of running time, without being crowded to its full capacity.

Total mining cost per ton of rock, $3.00.

Rock handled for the year was 196,707 tons; 178,859 tons passed through the rock-house; 9,609 tons were discarded and 169,250 tons sent to the stamps; 17,848 tons were stowed underground, in 4th and 5th levels chiefly. Rock hoisted from conglomerate workings is equal to 9,937 fathoms of ground broken. Mineral produced, 14,675,856 lbs.; of this, 298,346 lbs. were boulders. Ingot obtained, 11,036,469 lbs., the percentage of ingot in mineral being 75.2 per cent. Ingot in stamp rock was equal to 3.26 per cent.

It will be seen that, while the Tamarack mine is in the Black Hills shoot of copper, the percentage is greater than was the Calumet and Hecla last

year. This is due, I think, to the fact that the Tamarack Co. takes greater pains in selecting rock than is exercised at the South Hecla. At the latter the rock all goes to the mill, while at the Tamarack it is picked over and a percentage is rejected.

J. W Clark, Pres't. A. S. Bigelow, Sec. and Treas., Boston. John Daniell, Agent, Opechee Mine.

Tamarack has produced as follows:

1885	90 tons,	1,669 lbs.
1886	1,823 "	517 "
1887	3,702 "	1,606 "
1888	5,704 "	1,217 "
1889	5,302 "	1,451 "
Totals	16,624 tons,	460 lbs.

On April 21, 1889, the engine house at No. 1 Shaft was burned. No damage further than the value of the building, injury to machinery and the delay in hoisting. I doubt if the latter will prove a loss, since the opening work can now be pushed and in the end the production will be as great as if the fire had not occured.

THE TAMARACK JR. MINING COMPANY.

The out-come of this exploration is still a matter of much speculation. The Company owns the E. ½ of the E. ½, except the N. E. ¼ of N. E. ¼ of Sec. 11, T. 56, N. 33, three forties, 120 acres joining the Centennial. The remainder of the half section, five forties, is owned by the Calumet and Hecla Co. Nos. 3 and 4 shafts of the Tamarack Co. are directly west half a mile from those of the Tamarack, Jr. While it is nearly certain that these Tamarack shafts will intercept the main "shoot of copper" of the Calumet and Hecla mine, it is by no means an equally assured fact that the shafts of the Tamarack, Jr., will strike a rich portion of the conglomerate belt. There are important indications, however, that are very favorable. No. 5 shaft of the Calumet and Hecla is 1,100 feet north of No. 4, and for nearly all this distance the lode was poor down to the 33d level in No. 5, where it became rich and continues so; they are now to the 36th, and are north of the shaft 250 feet, the belt holding good. No. 5 shaft is about 3,500 feet south of the south line of the Tamarack, Jr., and this ground between has not been explored even along in the outcrop; thus it is quite possible that there is a good shoot of copper in this intervening space, which will be found at greater depth on the Centennial and Tamarack, Jr., lands. In any event it is more than probable that they will have the copper ground found in the Calumet No. 5 shaft. The shafts are located in about the center of each 40, so that if the lode does prove good, the situation will be excellent for taking out copper very rapidly.

No. 1 shaft is about 1,800 feet deep, No. 2, 1,200 feet. At about 2,400 feet in depth the lode should be reached. As they have already attained 1,700 feet and are descending at the rate of about 100 feet per month, it follows that long before the close of the year the problem will be solved. At least the lode will be reached and we shall know its character near the points of intersection. If it prove favorable, steps will be immediately taken to build a stamp mill, probably on Lake Superior, and to make the other suitable preparations for actively producing copper.

The officers of the company are: J. W. Clark, President, Boston, Mass.; A. S. Bigelow, Sec. and Treas., Boston, Mass.; John Daniell, Supt., Opechee.

THE CENTENNIAL MINE.

This mine joining the Calumet and Hecla and the Tamarack, Jr., is another important mining enterprise to which great interest attaches. What I have said in describing the Tamarack, Jr., applies to the Centennial also. They are sinking a deep shaft in the lode to explore it at greater depth, hoping that a "shoot of copper" will be found.

The Centennial is in the northerly extension of the Calumet and Hecla conglomerate. The mine was worked many years ago, but the conglomerate was too poor to pay. At greater depth they hope to find it richer. This new exploratory work was begun a year ago and good progress has been made. They have sunk both No. 3 and No. 4 shafts, the former is now 1,300 feet deep—Feb. 26—on the incline, and is the one that will be continued down. The No. 4 is 900 feet deep, to the 9th level. The strike of the formation is about N. 33° E., and the dip north-westerly 37½°, so that the vertical plane through the south line cuts the lode in such a manner that there must be a continual lengthening of the levels south in the Centennial as they go down. This southerly extension amounts to about 1 in 5, or 20 feet each 100'.

No. 3 has been sunk 812 feet since May, sunk 100 feet in Nov., 90 feet in Dec. The average, per month, has been 81 feet. The mine was 485 feet when the new work was begun.

In the 9th level they are drifting south to connect Nos. 3 and 4 shafts, and to prove the ground. The whole distance is 606 feet, 231 feet of which is already accomplished, and they have drifted north of No. 4, 60 feet.

There is a shoot of copper ground, not rich, that continued all the way down between these shafts as far as the old company worked. It is hoped that at the 9th level this ground will be found richer than it was above. They are already finding fair stamp rock. No. 4 will not be sunk further at present.

The matter that awakens the greatest interest is a new pit started at 1,500 feet north of No. 4, in the continuation of the surface line of the deposit. Capt. Vivian located it and found that immediately on getting through the sand and finding the conglomerate, it proved rich, that is, part of it did. They are now about 40 feet deep, the belt is 8 feet wide and part of it very rich, about 2 feet in width of it, along the foot-wall. They are certainly finding as rich rock in this north shaft as can be obtained anywhere in the Calumet and Hecla lode. Even "nigger heads," small boulders of copper, appear, and these are ever esteemed the best of indications. Thus it certainly looks as if the Centennial Co. were to have a rich mine to reward them, finally, for their perseverance. The old company expended about $865,000.

The financial statement made by the officers one year ago, showed a balance in the treasury of $298,300.07.

The directors are: H. J. Stevens, president; D. L. Demmon, Treasurer and Secretary; S. L. Smith, William J. Rainey and F. E. Robson. The Boston office is at 19 Congress street, and the place of registration the Howard National Bank of Boston.

No. of shares 80,000, of which 40,000 were sold on a basis of $12.50 per share, to obtain the funds to prosecute the work now in progress. The estate is Sec. 12, 56, 33, and the C. and H. conglomerate belt has a mile in length on the property, besides which there are the Osceola amygdaloid and other important lodes.

Capt. Johnson Vivian, the agent and superintendent of the work, is very hopeful of the future. He was the agent here many years ago in the days of the Schoolcraft Co., when the record was failure and ruin. Now, if from that history of disaster he can redeem the property and lead to an abounding success, it will surely be a matter of great gratification to him.

Undoubtedly he has found in this north shaft a new shoot of copper, one that is not found in the lands to the south.

The above was written in March. I now find, a month later, that the shaft, No. 6, has been sunk 120 feet, and a drift north is in 15 feet. The lode in the drift is 7½′ wide and is nearly all stamp rock, so that the theory of their having thus a newly found shoot of copper is greatly strengthened as the work progresses.

THE KEARSARGE MINING CO.

owns the next land on the north crossed by the Calumet and Hecla conglomerate, and in view of the favorable outlook at the Centennial in the new north shaft, it is but natural that the Kearsarge people should be also somewhat elated at such a bright prospect of good fortune approaching their own borders. Exploration was made to a limited extent some years ago in the Calumet and Hecla conglomerate belt on the Kearsarge property but at the point where it was explored it was found to be poor. As soon as the spring opens it is the intention of Capt. Daniell to supplement this work with more thorough exploration.

The present Kearsarge mine is still a somewhat extended exploration in an amygdaloid belt, known as the Kearsarge amygdaloid. It has two shafts—No. 2 to the 10th level, 1,000 feet down on the incline, and No. 1 to the 6th level, 600 feet deep. The mine has been very poor from the 4th level down. Now in the 9th they are finding some good ground and the shaft below the 10th is now in exceptionally good ground. It is thought that the mine is changing for the better. The formation is less disturbed below. There is still considerable stoping ground above the 4th level that pays well. The mine is making money. The copper has much more than paid for all outgoes. The stamping is done now at the Tamarack mill.

The following are from the books of the Co.:

Mining expense	$86,457 94	per cent of whole cost	.61962
Rock house expense	5,005 76	" " " "	.035589
Transportation expense	11,705 40	" " " "	.08402
Stamping expense	32,395 70	" " " "	.23233
Office and incidentals expense	3,586 91	" " " "	.00250
Surface expense	351 73	" " " "	.02564
Total running expense	$139,503 44	" " " "	1.0000
Constructing account	6,000 00		
Total expenditures	$145,503 83		
Number of fathoms of ground broken			3,513.99
" of tons of rock hoisted			76,541
" " " " " stamped			56,104
" of pounds of mineral produced			2,233,810
" of pounds of mass produced			4,553
Total product			2,238,363
Number of pounds ingot			1,918,849
Rock hoisted, cost per ton			$1 89.694
Rock stamped, cost per ton			$2 48.651
Ingot copper, cost per lb.			$0 07.27
Per cent of mineral in rock hoisted			.07629
Per cent of mineral in rock stamped			.1988
Per cent of mass in rock hoisted			.0309

Per cent ingot copper in rock hoisted	$0 .1304
Per cent ingot copper in rock stamped	.171
Per cent of ingot copper in mineral smelted	.8622
Number men, 124¾.	
Number feet shaft sunk—No. 2	229.2
Number feet winzes sunk	486.7
Number feet levels driven	2,193.2
Number feet crosscut	78.2
Number fathoms stoped	3,513.99
Cost of sinking shaft per foot	$13,755 00
Cost of sinking winzes per foot	9 80
Cost of driving levels, etc., per foot	6 95
Cost of stoping per fathom	10 89
Amount paid for shafts	3,142 70
Amount paid for winzes	4,310 40
Amount paid for drifts	15,765 32
Amount paid for stopes	38,284 52
Amount paid for extra work	812 91
Total	$62,315 85
Less supplies	31,663 18
Net amount paid miners	$30,652 67
Amount paid on contract	$62,315 85
Amount paid for tramming	10,704 13
Amount paid for timbering	2,192 54
Amount paid captains	1,600 06
All other accounts—labor	5,853 55
Carpenter, smith, machinist	1,586 20
Hoisting, pumping	4,943 96
Compressor	9,182 03
Supplies and fuel	2,965 39
Total	$101,343 71
Credits	14,885 77
Net total	$86,457 94
Number days credit	1,553
Number of men on contract	59

Rock House Expense.

Number days	1,860
Laborers	$2,719 81
Smith, carpenter	408 39
Steam power	1,438 09
Supplies	439 47
Total	$5,005 76
Tons of rock crushed	74,141
Cost of treatment per ton	.06752

Cost of Air Drills.

Smith, carpenter, machinist	$1,195 02
Steam power	5,309 40
Supplies	2,342 48
Pipe, etc.	335 13
Total	$9,182 03
Days	58

Transportation Cost.

Tons or rock transported	56,304
Paid R. R. Co. 20c per ton	$11,260 80
Loading cars	444 60
Total	$11,705 40
Cost per ton, transportation	.2079

Office Expense.

Agent	$1,000 03
Clerk	899 86
Stationery, etc.	64 18
Postage	1 25
Fuel, oil	22 47
Express, etc.	16 66
Taxes	800 00
Retainer	150 00

Traveling expenses		$65 00
Sundries		390 77
Freight on mineral		331 17
Total		$3,691 39
Total surface expenses		$2,579 38
Credit for rent of houses		$430 50
Sundry credits		1,737 15
Total credits		$2,227 65
Total net surface expense		351 73
Supply account		41,654 03
Fuel		7,222 83
Treasurer		149,478 27
Sundry		210 97
Total receipts		150,251 94
Treasurer		321,511 65
The product of mineral was 2,235,613 pounds, which at 86.22 per cent, gave 1,918,849 pounds of refined copper, for which was realized the gross sum of	$241,461 36	
From the sales of silver	400 77	
From interest receipts	605 24	
Balance assets Jan. 1, 1889	94,240 10	
Total receipts		$336,707 47
Running expenses at mine	$139,503 44	
Smelting, transportation and other expenses	37,264 02	
Expended in mine plant	6,000 39	
Total expenses		182,767 85
Balance assets Jan. 1, 1890		$153,939 62

The balance sheet on Jan 1, 1890, shows as follows:

Assets.

Cash in bank at Boston	$87,924 86	
Cash on hand at mine	184 55	
Supplies at mine	2,477 44	
Bills receivable at mine	25,514 18	
250 shares Hancock & Calumet R. R. stock	25,000 00	
Copper on hand, 227,048 pounds	30,629 53	
Accounts receivable at mine	1,206 40	
Total assets		172,886 96

Liabilities.

Drafts outstanding	$4,984 66	
Accounts payable at mine	13,962 68	
		18,947 34
Balance assets Jan. 1, 1890		$153,939 62

A dividend of $2 per share, calling for $80,000, was paid in January from assets as above, which will be included in the 1890 accounts. The amount of rock stamped during the year was 56,104 tons; yield of refined copper per ton of stamp rock was 34.2 pounds; percentage of mineral in stamp rock, 1.99: percentage refined copper in stamp rock, 1.71; cost per ton of rock hoisted, $1.90; cost per ton of rock stamped, $2.49; refined copper cost per pound at mine, 7.27 cents; cost of smelting, freight and all other expenses per lb., 1.94 cents; total cost per lb. of refined copper laid down in New York, 9.21 cents. As this is the first report for a full year of production, full comparisons cannot be made; but, as a matter of interest, these statistics may be given for three years:

	1889.	1888.	1887.
Fine copper, pounds	1,918,849	829,175	21,237
Per cent copper in material	85.22	86.64	21.237
Received per pound, cents	12.58	16.60	16.05
Cost per pound, cents	9.21	10.03	22.84
Profit per pound, cents	3.37	6.57	

This summary may be given of results in the three years:

	1889.	1888.	1887.
Gross receipts	$242,467	$139,068	$45,960
All expenses	182,768	101,308	63,108
Net income, or year's increase of assets	$58,699	$37,760	* $17,148
Balance of assets Jan. 1, succeeding year	153,940	94,240	56,480

* Reduction in balance of assets. In 1887, $40,000 was received from assessment No. 3, and is included in gross receipts above.

THE OSCEOLA CONSOLIDATED MINING CO.

is a corporation that has, ever since it has been under the local management of Capt. Daniell, shown a great deal of enterprise. There have been times when the appearance of the mine was anything but favorable. The mine was first opened on the Calumet and Hecla conglomerate, which belt extends southerly across the Osceola lands. But subsequent work developed the fact that the conglomerate only contained copper for a limited space joining the north line. Fortunately, at this juncture, the amygdaloid belt was found and a new mine was opened and so vigorously worked, that though the belt was not rich, the mine has been made a profitable one. But here again appeared the shadow of misfortune. The amygdaloid belt was found to be best adjoining the Calumet and Hecla line, and as this line cuts under to the south, as explained in the Centennial mine, the levels in the Osceola shortened rapidly and the best "shoot of copper" in the mine became lost to the company.

And here we have another illustration of the value and importance of "push," energy, extensive exploration, properly directed, in operating a mine. They could go no further north, the only hope was to the south where they had abundant length of deposit. It was only to be determined if it is paying ground; fortunately for their interests the usual energy and foresight were applied to the solution of this vital question and happily good fortune has attended the effort. The south end of the belt on the property had been explored heretofore, but not to any great depth; also the mine itself was comparatively poor in that direction. Now, however, that they have sunk deeper in the extreme southerly shaft and that the mine is opened lower down, this south ground is found to be good, paying amygdaloid for a great length. Thus the mine is now nearly sure to be a greater producer than it ever was before. Nearly all the levels going south show improvement in the quality of the rock. There are four shafts, numbered from the north ; but a fifth one, the Opechee shaft, was started some years ago at a distance of 1,450 feet southerly from No. 4. The ground proved to be poor, as before stated, and the shaft was abandoned, but under the stress of the necessity to further explore the ground, work in this shaft was resumed and it is now (March 1) to the 16th level, and is proceeding downward at a rapid rate—double skip shaft. The 12th level has been driven all the way through this intervening space and others are well started in the same direction. Thus the ground has been pretty well shown up and there is a good deal of it—all new ground, and sufficient for several years to come. In all, the surface length of the lode from No. 4 to the south line is 2,200 feet.

The Osceola will be more largely opened than ever before and will have a greater amount of paying ground to draw from. It cannot fail to pro-

duce more copper and produce it cheaper than at any time heretofore. The product of 1889 was the largest in its history, but it now seems that the past year was but the opening of a new chapter that will record increasing prosperity.

No. tons of rock hoisted during the year		208,299
No. tons of rock discarded during the year		32,712
No. tons of rock sent to mill during the year		75,587
No. lbs. ingot copper obtained		4,534,127
Rock reduced to cubic fathoms		11,572
No. lbs. of copper per cubic fathom		392
Total cost per ton of rock		$2 21
Total cost exclusive of ex. at Opechee slope		$1 74
Total cost per ton of rock stamped		$2 06
No. feet shaft sunk		1,090½
No. feet winzes sunk		711.4
No. feet levels driven		6,103.7
Extra sinking, not included in above		630.9
No. 1 is to 15 level	1,387 feet	below surface
No. 2 is to 23 level	2,073 "	" "
No. 3 is to 24 level	2,162 "	" "
No. 4 is to 22 level	1,973 "	" "
No. 5 is to 16 level	1,480 "	" "

No. 4 shaft has been provided with a pair of hoisting engines with drum, and a pair of the same engines will be put at No. 5, in May next. Additions to boiler capacity, compressor power, etc., have been made in the past year. The intention is to keep all four of the heads at the stamp mill at work on Osceola rock.

The number of pounds of mineral produced was 5,262,997, which yielded 86.15% copper.

Amount received from sales of copper		$541,512 15
Amount received from sales of silver		827 91
Interest		650 68
Running expenses at the mine		$542,990 74
Smelting, transportation, etc.		388,307 59
		67,476 42
Mining profit		$455,784 01
Balance of assets, Jan. 1, 1889		87,206 73
Amount expended in plant during year	$204,685 15	
Deduct dividends, March 1, last	32,145 66	
	50,000 00	
	$82,145 66	
Balance assets, January 1, 1890	122,539 49	
	209,746 22	

STATEMENT OF RECEIPTS AND EXPENSES OF ALL KINDS, FROM SEPTEMBER 25, 1873, TO JANUARY 1, 1890.

Receipts.

From capital stock, 50,000 shares, $25 a share full paid			$1,250,000 00
" 936,002 lbs copper, 1874 at 23 37-100			218,736 92
" 1,330,313 " 1875 at 22 77-100			302,862 96
" 1,693,737 " 1876 at 20 57-100			348,333 25
" 2,774,777 " 1877 at 18 19-100			504,686 93
" 2,705,998 " 1878 at 15 53-100			420,340 14
" 3,197,387 " 1879 at 17 79-100			568,689 89
" 3,381,061 " 1880 at 19 15-100			647,487 19
" 4,176,976 " 1881 at 17 77-100			742,585 84
" 4,179,782 " 1882 at 17 70-100			739,458 26
" 4,256,409 " 1883 at 14 96-100			636,846 83
" 4,247,630 " 1884 at 12 82-100			544,651 02
" 1,939,169 " 1885 at 10 75-100			208,558 65
" 3,560,786 " 1886 at 10 51-100			374,144 13
" 3,583,723 " 1887 at 11 86-100			424,936 85
" 4,134,320 " 1888 at 15 3-100			621,275 14
" 4,534,127 " 1889 at 11 94-100			541,512 15
" 50,632,197 " total at 15 49-100			$7,845,056 15
" sales of silver to date			38,266 95
" interest receipts to date			37,546 72
" 360 shares Hancock & Calumet R. R. stock sold			96,000 00
" 250 shares Hancock & Calumet R. R. stock on hand			25,000 00
Total receipts			$9,226,869 82

Expenses.

Running expenses prior to 1889	$5,964,946 09	
Running expenses during 1889	455,784 01	
	$6,420,730 10	
Construction expense prior to 1889	737,444 33	
Construction expense during 1889	32,145 66	
	$769,589 99	
Real estate	588,836 70	
Dividends prior to 1889	1,172,500 00	
Dividends during 1889	50,000 00	
	$1,222,500 00	
Exploratory work	15,466 81	
Total expenses		$9,017,123 60
Balance of receipts January 1, 1890		$209,746 22

Details of Mining Expense.

Shaft sinking, 1,091.6 feet at $9 66	$10,541 85	
Winze sinking, 711.4 feet at $10 34	7,357 50	
Drifts, 4,931.6 feet at $6 76	33,356 06	
Stoping 10,686.54 fms. at $11 62	124,150 91	
Tramming	39,274 55	
Supplies, fuel, and labor for engines	37,110 30	
Supplies, labor, fuel, etc., for air drills	29,782 11	
Mining superintendence and Co. account labor	25,098 37	
Timbering, labor materials, and supplies	10,938 75	
Blacksmith, machinist and carpenter labor	3,829 81	
Extra work	1,860 34	
	$323,300 58	
Less profit on supplies	41,671 00	
		281,629 58

Other Expenses.

Stamping	$47,581 23	
Transportation	27,521 78	
Rockhouse	16,994 63	
Office labor, supplies, etc.	5,737 49	
Incidental expenses, including taxes	5,609 59	
Surface, labor, supplies, etc.	533 29	
	106,678 01	
Total running expenses		388,307 59

Construction Costs.

New engine at No. 4 shaft	$22,613 21	
New compressor and building	3,982 62	
Dwelling houses at mine	2,882 64	
Stamp mill construction	1,377 96	
New engine and boiler house at Opechee	714 23	
No. 1 pump	575 00	
Total construction costs		32,145 66
Total expended at mine		$420,453 25

Summary.

Rock stamped	175,587 tons.
Product of mineral	5,262,997 lbs.
Product of refined copper	4,534,127 lbs.
Yield of refined copper per ton of stamp rock	25.82 lbs.
Yield of refined copper per cubic fathom of ground broken	392 lbs.
Yield of mineral per cubic fathom of ground broken	455 lbs.
Percentage of mineral in stamp rock	1.50 per cent.
Percentage of refined copper in stamp rock	1.29 per cent.
Cost per ton of rock hoisted	$1 86
Cost per ton of rock stamped	$2 21
Refined copper, cost per pound at mine	8.56 cents.
Cost of smelting, freight and all other expenses	1.49 cents.
Total cost per pound of refined copper laid down in New York	10.05 cents.

Percentage of cost in each department.

Opechee shaft	.06516
Amygdaloid	.66011
Rock house	.05072
Transportation	.07088

Stamping	.02253
Incidentals	.01445
Surface	.00137
Office	.01478
Whole number of men	.475

Details of stamp mill cost.

Superintendent		$1,016 63
Engineers		1,404 10
Firemen		3,428 85
Cooper and carpenter		1,271 30
Watchmen		305 40
Machinist		1,452 10
Smith		685 20
Head runners		1,132 90
Head feeders		4,153 15
Oilers		1,003 90
Sundry labor		1,563 05
Teaming		4,618 45
Overseer of w. house		324 00
Copper washers		1,297 90
Laborers and mechanics		5,670 10
Silver pickers		404 40
Grater		51 25
Total		$29,782 69
Cords of wood	$10,722	
Tons of coal	4,101	
Cost of fuel		$43,204 19
Illuminating oil		141 00
Lubricating oil		1,234 75
Stamp shoes		640 00
Hardware		267 11
Iron and steel		624 90
Tools, machinery, castings		1,163 19
Waste		155 37
Packing and belting		267 49
All other supplies		2,374 25
Total supplies		$6,918 38
Labor account brought down		$29,782 68
Total		79,976 93
Received stamping Kearsarge rock		32,395 70
Total expenses		$47,581 23

Annual products of the Osceola mine are given in the following table:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1874	468		1882	2,088	782
1875	665	303	1883	782	2,128
1876	846	1,737	1884	2,123	1,630
1877	1,382	777	1885	969	1,169
1878	1,352	1,998	1886	1,780	786
1879	1,589	1,387	1887	1,791	1,723
1880	1,691	1,387	1888	2,067	320
1881	2,089	1,876	1889	2,267	127
Total				25,312	661

J. W. Clark, President, Boston, Mass.; A. S. Bigelow, Sec'y and Treas., Boston, Mass.; John Daniell, Agent, Opechee, Mich.

THE PENINSULA MINING COMPANY,

the successor of an old company (the Albany and Boston), is operating, in a small way, the original mine.

This mine is in a wide belt of coarse conglomerate, identical with that at the Allouez mine, undoubtedly the same belt. It has the same characteristics: comparatively small portions of it are found well charged with copper; but the average of the rock gives a very low percentage of mineral. The whole financial record of the operations of this mine is one of failure. A great deal of money has been expended in the vain effort to secure a paying mine.

In the light of experience, it is perfectly apparent that this result cannot be accomplished, except the mine be opened extensively and operated on a large scale; by so doing, the best ground may be selected and stoped, and the worthless portions of the lode left unmolested. We have learned that some very low deposits may be worked profitably if only worked extensively enough. In copper mining, in low grade rock, it is as it is in wholesale trade or manufacture, the larger the business, other things corresponding, the less the per cent of profit necessary in order to secure a successful enterprise. There is certainly good stoping ground in the Peninsula mine, and there is enough to indicate that if the mine were operated in the manner that its neighbor, the Osceola, for instance, is worked, it would pay. I should say that it is, at least, a good 12 cent mine, that is, a mine in which copper could be made for at least 12 cents per pound. And thus, at the present price of the metal, there should be a profit.

The mine is 600 feet deep; two shafts are at that depth, Nos. 1 and 2, both to 8th level. A much greater percentage of the ground opened has been stoped away than is customary, except in rich mines. The good and poor ground have, evidently, alike been broken. Third, 4th, 5th and 6th levels have been worked south of the shaft, No. 1, 800 feet, thus making a long, and hence expensive, tram of the rock. To obviate this, Capt. Dunn began to sink a shaft, 800 feet to the south; but the Company decided to arrest its progress. The crosscut, driving east from the 4th level, to explore the formation and to reach, ultimately, the Calumet and Hecla conglomerate, is now 1,200 feet in length; it is estimated that it will require 350 feet more to intersect the belt in question.

The policy of the Company is to expend only what the mine will yield. The directors do not propose to advance any money, but let the mine pay its own way. They are stamping 350 tons of rock per day, working the two heads of stamps. They reject 15% of the rock broken and get about 1% of mineral, 72% ingot from the rock treated, a very low perecntage to support an industry on. A new compressor has lately been added—Ingersoll—using now seventeen drills. Work 175 men.

W. A. Dunn, Supt.; A. S. Spendlow, Sec'y and Treas.; H. L. Terrel, Pres., New York, 36 Wall St.

The product in 1889 was 368 tons, 507 pounds, making an aggregate of production of 1,911 tons, 1,578 pounds. More recently, the Pewabic lode has been intersected in the crosscut, 475 feet west, and, while I have not seen it, I am informed that it is found to contain a good percentage of copper, showing both stamp rock and coarse copper—"barrel-work."

PONTIAC, MESNARD, ETC., MINES.

From the Osceola to the Franklin, a distance of about 10 miles southerly along the mineral range, there are many old mining locations all of which have been long since abandoned except the Peninsula. The work at these mines consists mainly of explorations along in the Pewabic lode which proved to be narrow and poor so far as it was proved. But what has thus been done by no means settles difinitely the character of the lode or determines what the other well known copper bearing belts may contain. The amygdaloids are notoriously "bunchy" and even if lean at the surface may be rich at great depth; as witness the Osceola in the south end and even the Quincy which has been richer in the lower levels than at the surface. This stretch of the mineral range to which I have referred has great possibilities and may in the future be found to contain very rich deposits of copper.

THE FRANKLIN MINING CO.

This Company continues to sustain its excellent record. There is no better example of success than that of the Franklin, under the present management. I have heretofore given a full history of this matter and will not dwell upon it now. It really is always pleasant to visit the Franklin mine and to go about with Capt. Vivian, and to observe how well everything is done; how neat and ship-shape everything is; what economy is practiced. There is everywhere the evidence of skill and intelligence. It is the same old mine; the same old shops and shaft houses; same old stamp mill; same old engines and hoisting machinery that a few years ago were dilapidated, out of repair, antiquated and inadequate. Everything is in good shape now and the ultimate result shows that whether the machinery is old or new the desired end is reached; the mining is cheaply done and there is, to the stockholders, a gratifying profit on the work. The Franklin mine has been pushed, but it has been cautiously and economically done. There has not much been added but the old machinery has been altered and improved and everything brought up to the requirements of the times. Capt. Vivian has been a miner all his life, and for many years prior to undertaking to revive the Franklin, he had been in the employment of poor companies, working at poor mines where the practice of the greatest economy was a necessity of existence. This atmosphere of economy animating all operations at the Franklin, permeated with superior intelligence, energy and mining skill has prevailed at the Franklin and prosperity has ensued.

Apparently the future of the Franklin depends a good deal on the outcome of the controversy over the possession of the Pewabic. The latter mine lies between the Franklin and the Quincy. All three of the mines are worked close to the boundary lines, both are deeper than the Pewabic, and both being good in the bottom indicates that the Pewabic ground is good also. It so happens that the boundary lines of the Pewabic lands cut off both the Franklin and Quincy mines. The Pewabic gets the lode and they lose it. In the Franklin mine the two southerly shafts have reached, in their descent the Pewabic boundary and of course cannot be sunk further. In the Quincy the levels in the north constantly are shortened as the mine descends. So that the possession of the Pewabic mine, which is to be sold by decision of the court, is a matter of about equal importance

to the two companies. The ownership of the Pewabic would make the Franklin a profitable mine for many years to come. In the meantime the stockholders are receiving good dividends from the earnings of the mine, as it is. The mill stamps about 500 tons per day and the reduction of the cost of mining 5 cents per ton in 1889, was an important gain. Total number of men employed 384½ at an average cost each of $70.51 per month.

No. 3 shaft is to the 32d level.

Receipts.

Copper sold, 3,300,667 pounds at 12.055 cents		$397,896 29
Copper on hand, 1,045,395 @ 14c		146,355 30
Interest received		3,149 21
Silver sold		3,143 10
Total		$548,743 90
(Net income during the year	$139,577 52)	

Expenditures.

Total mining expense	$223,632 25
surface expense	11,615 55
stamp mill expense	64,574 07
tram road expense	8,102 54
rock house expense	15,566 46
general expense	10,575 64
office expense	2,660 65
construction expense	2,679 43
Total	$345,405 99
Other expenses	63,760 39
Total expenditures	$409,166 38

Total expense 1874	$74,449 02
1875	259,921 78
1876	355,611 82
1877	372,990 31
1878	329,874 74
1879	336,934 51
1880	380,566 77
1881	339,623 96
1882	350,350 13
1883	363,544 39
1884	357,594 04
1885	338,995 99
1886	333,162 19
1887	325,107 71
1888	342,377 22
1889	345,405 99
Total	$4,866,104 58

Cash	$181 11
Supply account	17,043 27
Mine wood account	30,600 53
Mill wood account	14,725 72
New machinery account	61,422 56
Balance due company	5,240 68
Stampage account	3,520 00
Coal	5,189 16
Treasurer	5,320,112 20
Balance due merchants	14,517 69
Balance due men	14,812 91
Total	$5,349,442 80

Tons of rock hoisted	186,440
Cost per ton	$11 84
Pounds of mineral per ton hoisted	28.26
Pounds of ingot per ton hoisted	23.27
Per cent of mineral in rock hoisted	1.413
Per cent of ingot in rock hoisted	1.163
Tons of rock stamped	141,579
Cost per ton	0.4560
Tons of rock stamped per cord of wood consumed	12.40
Per cent of mineral in rock stamped	1.306
Pounds of mineral in ton of rock stamped	37.34
Pounds of ingot in ton of rock stamped	30.68

Per cent of mineral in rock stamped	1.867
Per cent of ingot in rock stamped	1.534
Cost of mineral per pound at smelting works	6.54 cents.
Cost of ingot per pound at smelting works	7.94 cents.
Per cent of copper in the mineral	80.312

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1857	3	699	1874	23	1,790
1858	56	1,104	1875	583	800
1859	116	1,211	1876	963	641
1860	157	1,860	1877	1,169	1,817
1861	783	43	1878	1,299	1,528
1862	733	645	1879	1,414	1,703
1863	639	684	1880	1,168	466
1864	605	1,335	1881	1,388	1,932
1865	779	1,481	1882	1,632	120
1866	819	994	1883	1,744	1,308
1867	701	455	1884	1,882	1,697
1868	737	1,326	1885	1,999	1,172
1869	779	970	1886	2,132	297
1870	589		1887	1,975	1,882
1871	300	1,000	1888	1,827	1,751
1872	186		1889	2,173	62
1873	183				
Total				31,741	128

No. shares 40,000; par value $25. Location of mine, Section 24, T. 55, R. 33. Mine office, Hancock, Mich. Boston office, 19 Congress street.

Officers of company: H. J. Stevens, President; D. L. Demmon, Secretary and Treasurer; Johnson Vivian, Superintendent; Thomas Dennis, Mining Captain; Arno Jaehnig, Clerk.

QUINCY MINING CO.

This company has made important changes during the past year that will greatly facilitate its mining operations and enable it to increase its production. No. 4 shaft has been straightened so that the movement of the skips in hoisting can be accelerated. It has also been made a double skip shaft and soon will be in readiness to be so used. The skips will be made to balance one another, the empty one going down as the full one ascends. Skips hold 2½ tons each. The angle of the shaft is now 54° with the horizon down to the 20th level; thence, after, the angle is 51°. The shaft has been sunk to the 39th level, being now 3,070 feet deep on the incline—2,300′ vertically. The new level opened continues to show the usual phenomenal excellence of the deposit and there is very much of the deposit yet standing throughout the mine that is rich enough to pay well to remove; still it may be doubted if the facts regarding all the standing ground in the mine are so well known that it can be said just what is rich and what is poor. A great deal of the lode left in the levels will be mined out, no doubt, but the work of getting it will in a measure partake of the character of a new exploration. Thus far but very little timber has been used in the mine. The method of leaving pillars suffices to hold the hanging in place. Now that the company has the new stamp mill and the railroad built to it from the mine, it will of course be economy to make the greatest production possible; for the expense of operating the road will be nearly as great for a small output as for a large one.

The Quincy has a conspicuous advantage over other amygdaloid mines in the fact that it yields a larger amount of mass and barrel work; that is, perhaps, the most profitable form in which copper occurs. As found in the Quincy, this form of copper requires neither cutting nor stamping; it is ready for the smelter as soon as it comes from the mine; 37½% of the product is A copper.

The new mill is on the margin of Torch Lake, on lot 3, sec. 23. As would of course be expected, the mill and everything pertaining to it are of the best. It is intended to be as well appointed as a mill can be. The mill proper is 198x120 feet, and contains two heads of stamps like those in the Tamarack mill, and there is place for a third head. There are 56 jigs and 8 double locked slime tables. The iron mortar plates weigh 75 tons and rest on heavy oak timbers. The timbers are bedded in cement and are built from the ledge up eight tiers deep, laid crosswise, in cement. The weight of the mortars is 16 tons each. In round numbers each stamp, with mortar plates, weighs 125 tons.

The pump and boiler house stands on the opposite side of the road from the mill on lower ground, nearer the lake. This pump house is connected with the mill by a covered way that inclines up, spanning the highway.

The lower building is of stone, 154′x56′ divided into pump and boiler house—in the latter are six boilers with room for two more. The pump is a high duty Worthington, having a capacity of 8,000,000 gallons of water per twenty-four hours. The water is brought to the pump through an adit from the lake. The pipes, etc., pass from the pump house to the mill through the covered way referred to above. Above the mill are two small streams of water that will be used to help supply the stamps or boilers; enough for both, I am told, at certain seasons of the year. There are convenient arrangements for handling coal, etc., at the dock; and, also, the approaches to the mill for bringing the rock are excellent, being after the plan of those at the Tamarack mill.

The product of the mine was 7,820,010 pounds, or 3,910 10-2000 tons of mineral, yielding about 81 9-10 per cent, or 6,405,686 pounds of refined copper, for which has been realized the gross sum of		$766,244 36
Realized from sale of silver		2,195 87
		$768,440 23

The expenses of the year are as follows:

Running expenses at mine	$337,740 72	
Building and construction account	87,667 80	
Quincy and Torch Lake railroad	71,882 63	
Smelting, transportation and all other expenses	102,856 87	
		600,148 02
Leaving as a mining profit		$168,292 21
There has also been realized during the year, from interest on loans		12,508 93
Received from real estate, Hancock		1,800 00
Making the income of the year		$182,601 14

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

January 1, 1889		$562,766 41
Add earnings of 1889		182,601 14
		$745,367 55
Deduct dividend of February 15, 1889	$200,000 00	
Deduct dividend of August 15, 1889	80,000 00	
		280,000 00
Leaving balance of assets Jan. 1, 1890		$465,367 55

A dividend of $3.00 per share, or $120,000, payable February 17, has been declared, which, with dividend of $2.00 per share, paid August 15, last, makes a total for the year, $200,000.

GENERAL SUMMARY OF RECEIPTS AND EXPENDITURES OF THE QUINCY MINING COMPANY, FROM ITS ORGANIZATION TO DECEMBER 31, 1889.

Receipts.

From capital stock paid in	$200,000 00
From proceeds copper and silver (106,627,134 lbs. copper)	19,971,215 06
From interest	149,021 24
From profit on sale P. L. & R. Improvement Company stock, and other investments	79,637 16
From sales of real estate, Hancock, Mich.	60,250 43
	$20,460,123 89

Expenditures.

For expenditure on location previous to 1856	$42,097 98
For expenditure Quincy vein, 1858, not now worked	55,000 00
For openings and explorations on 3,800 feet "east" or Pewabic vein, extending to Portage Lake, preparatory to future work	11,500 00
Real estate and permanent improvements on the same, including dwelling houses, stamp mill, machinery, steam engines, railroad, dock warehouse, and other buildings and roads	1,353,248 48
Mining and surface labor, expenses of smelting and marketing copper, and all incidental expenses	13,282,909 88
Balance carried down	5,715,367 55
	$20,460,123 89

Balance brought down, being receipts over expenditures	$5,715,367 55
Deducting dividends declared, Nos. 1 to 2 inclusive	5,250,000 00
Leaving balance as per statement on next page	$465,367 55

STATEMENT OF ASSETS AND LIABILITIES, EXCLUSIVE OF REAL ESTATE, MINE PLANT AND SUPPLIES IN USE, JANUARY 1, 1890.

Assets.

Cash in New York office, and copper	$361,132 42
Cash on hand at mine	6,231 92
Accounts receivable, since paid	45,533 62
	$412,897 96

Liabilities.

Drafts unpaid	$165 00	
Dividends unpaid	599 00	
Accounts payable in New York	20,529 35	
Accounts payable at mine	38,771 41	60,064 76
		$352,833 20
Add at mine, viz:		
Supplies per inventory on file	$68,851 10	
Farm account (horses, wagons, etc.)	5,094 00	
Accounts receivable	38,589 25	112,534 35
		$465,367 55

Less dividend payable February 17, 1890, $3.00 per share, $120,000.

Summary for Year.

Average force employed	485 men
" number of miners	145 "
" wages of miners on contract, per month	$49 15
Yield of mineral per fathom of ground broken	842 lbs.
" of refined copper per fathom of ground broken	690 "
Total rock mined	167,077 tons
" " hoisted	123,998 "
" stamp-rock treated	117,785 "
Yield of rock stamped	2.82 per cent. mineral
Product stamped mineral	6,641,785 lbs.
" masses	1,178,225 "
" refined copper	6,405,686 "

AGENT'S REPORT.

QUINCY MINE, LAKE SUPERIOR, MICH.,
January 31, 1890.

The following report of the Quincy mine for the past year is respectfully submitted:

During the year No. 2 shaft was sunk from the thirty-eight to the thirty-ninth level.

The drifting done from this shaft was at the thirty-sixth, thirty-seventh, and thirty-eighth levels north. The thirty-ninth level was drifted north and south of shaft a few feet only. The vein, for the most part, as shown in those drifts, is of good width and full average quality.

At the twenty-fifth level about one hundred and fifty feet south of this shaft a crosscut was driven east fifty-five feet, intersecting at that point a low grade stamp vein.

The stoping done in this part of the mine was at the thirty-eighth and thirty-seventh levels north and south of shaft; at the thirty-sixth, thirty-fifth, thirty-fourth, and thirty-third levels north, and at the the thirty-second, thirty-first, thirtieth, and twenty-ninth levels north and south of shaft. A little profitable stoping was also done at the twenty-eighth level north and at the twenty-fifth level south of shaft.

No. 4 shaft was sunk from the thirty-eight to the thirty-ninth level.

The drifting done from this shaft was at the thirty-ninth and thirty-eight levels, north and south of shaft. At the thirty-seventh, thirty-sixth, and thirty-first levels south, and at the sixteenth level north and south of shaft.

The drifting done at the thirty-ninth level was mostly in low grade stamp vien,—though south of shaft it showed a few bunches of good copper ground. North of shaft, in this level, a crosscut was driven east forty feet, when it intersected an ordinary looking vein, narrow, and carrying only just a little stamp copper.

Drifting at the thirty-eight level, north, was on an east branch of low quality. Drifting south in this level was on the main vien. Much of it was low grade, but several short stretches of rich vein were exposed. The thirty-seventh level opened up some fair stoping ground. The thirty-sixth level was mostly in narrow, low grade vein. At the thirty-first level two hundred and thirty-three feet south of shaft, a crosscut was driven east sixty feet, intersecting a wide good-looking stamp vein, in which a drift was extended south one hundred and fifty feet. Drifting at the sixteenth level exposed some good stoping ground. About one hundred feet north of shaft in this level, a crosscut was driven east sixty feet, exposing a body of fair looking stamp vein.

The stoping done in this part of the mine was at the thirty-seventh level south, at the thirty-sixth, thirty-fifth, and thirty-fourth levels north and south; at the thirty-third, thirty-second, and thirty-first levels south; at the twenty-seventh level north and south; at the twenty-fifth level south, and at the sixteenth level north and south of shaft.

The straightening of No. 4 shaft from the sixth to the eighteenth level was completed in the early part of the year. Later on, in view of the prospective increased demand for stamp rock, it was thought advisable to prepare the shaft for a double skid track. This improvement was accordingly taken up, and all the work necessary, except the timbering, has been nearly finished. To carry out this plan for increased production, it will be necessary to make an addition to No. 4 engine house, and to place another hoisting drum therein. All this will be carried out in due time.

The usual repairs to machinery, dwelling houses, and other buildings were made and everything in and about the mine kept in good working condition.

Work at the new stamp mill site was resumed in May last, though there was not much of importance done until the month following.

In addition to the mill building, pump and boiler house, there were six substantial frame dwelling houses erected for employees, and a small ware house built at the dock. A small stone building was also put up for the storage of oil.

For the unloading of coal from vessels a convenient hoisting apparatus was erected, and an elevated tram railroad built from the dock to the boiler house. By this contrivance coal can be rapidly and cheaply unloaded and taken directly to boiler house or dumped outside.

To utilize the water from the two little creeks near the mill, a run of launders, some eighteen hundred feet in length, altogether, was laid from the creeks to a tank in the mill. The water thus obtained will always be enough to feed the boilers, and during the spring and fall there will probably be sufficient to supply one, if not two heads of stamps. The boilers, pumping engine, pipes and most of the mill machinery are now in working order and we expect to have the mill ready for active service by March 1, next.

The Quincy and Torch Lake railroad was practically finished in October last a small gap only being necessarily left open at the mine end. This road throughout is well

built, and is fully equipped to meet all probable requirements for many years to come. At the mine end of the road a substantial stone locomotive engine house thirty-eight by sixty-four feet was built, and a fifty foot iron turn-table set in masonry near by. At the stamp mill end of road a similar turn-table was placed and a small frame building erected there. This building serves as a depot and also to cover a three thousand gallon water tank.

Maps of the mine, and tabulated statements of work and expense in the different departments have as usual been sent from this office.

S. B. HARRIS, *Agent.*

Table showing yearly product of Quincy mine.

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1856	6	1,462	1873	1,400	
1857	61	762	1874	1,525	654
1858	153	772	1875	1,334	281
1859	178	1,114	1876	1,536	1,171
1860	970	414	1877	1,427	336
1861	1,218	852	1878	1,480	449
1862	1,153	218	1879	1,323	1,458
1863	1,115	1,737	1880	1,848	263
1864	1,251	586	1881	2,753	884
1865	923	1,500	1882	2,832	1,796
1866	1,172	1,000	1883	3,006	239
1867	1,013	1,000	1884	2,825	436
1868	727	1,000	1885	2,924	497
1869	1,208	1,365	1886	2,961	1,529
1870	1,248	1,777	1887	2,804	1,762
1871	1,204	1,501	1888	3,183	1,889
1872	1,334	1,134	1889	3,202	1,686
Total				53,250	1,388

Thomas F. Mason, President; Wm. R. Todd, Treasurer, 52 Broadway, N. Y.

The quality of the rock that is stamped varies but little in richness. This is shown by the percentage of copper obtained, as given in the following table:

Year.	Per Cent.	Year.	Per Cent.	Year.	Per Cent.
1861	2.55	1871	2.29	1881	2.88
1862	2.03	1872	2.17	1882	2.80
1863	2.75	1873	2.60	1883	2.85
1864	2.96	1874	2.61	1884	
1865	2.60	1875	2.44	1885	2.70
1866	2.63	1876	2.38	1886	2.70
1867	2.74	1877	2.11	1887	2.97
1868	2.25	1878	1.76	1888	2.70
1869	2.48	1879	1.80	1889	2.72
1870	2.61	1880	2.50		

PEWABIC MINE.

I have heretofore in this report, in describing the Franklin, referred to the Pewabic. A recent decision has been rendered in this important case by the supreme court of the U. S., requiring that the mine be sold. Both the Quincy and Franklin companies desire to own it. It would be very

valuable to either and could be so divided as to be of equal advantage to both.

THE HURON COPPER CO.

I think that the Huron would be a paying mine if it could be more extensively worked; that is if more rock were mined, a greater extent of openings made and a third stamp head kept running. It is not a rich mine, but then for about the same amount of opening there is a regular supply of copper. The work is done cheaply enough and even as it is the company would have been on a firm basis if it had not been for the great amount of bad luck that has been met with. The Huron is doing well now and it is probable that the company will clear up its indebtedness within the year. Considering the scale of its operations no mine could be better managed. There has been no change about the mine, or in it, except that it is deeper. Matters remain the same.

Tons of rock hoisted	159,333
Cost per ton of rock	$1 69
Tons of rock stamped	112,723
Cost of stamping on ton rock	$0.4722
Number pounds mineral in one ton of rock hoisted	17.37
Number pounds ingot in one ton of rock hoisted	13.92
Number pounds mineral in one ton of rock stamped	24.56
Number pounds ingot in one ton of rock stamped	19.96
Per cent mineral in rock hoisted	.00869
Per cent ingot in rock hoisted	.00696
Per cent mineral in rock stamped	.0123
Per cent ingot in rock stamped	.009845
Number tons stamped per cord of wood	8.57

Memoranda.

Total expenditures	$270,525 07
Pounds of mineral produced	2,768,470
Per cent of ingot in mineral	80.18
Pounds of ingot	2,219,473
Cost of mineral per pound at smelting works	$0.0926
Cost of ingot per pound at smelting works	$0.1218

Expense Account.

Mining expense	$178,391 19
Surface expense	9,239 81
Stamp mill expense	53,227 98
Rock house	15,355 26
Tram road	2,851 81
General expense	9,445 43
Office expense	1,021 24
Construction expense	907 52
Extra pumping expense	84 83
Total	$270,525 07

Total number of men	209
Tram road cost per ton	0.253
Per cent of rock rejected	28.25
Cost of selecting, breaking and delivering one ton of rock to cars	$.0963
Number fathoms of ground broken	8,852
Number feet shafts sunk, 137.8; cost per foot, sinking	$15 36
Number feet winzes sunk, 140; cost per foot, sinking	$11 60
Number miners employed	116
Number feet drifted, 3,339.7; cost per foot	$7 96
Number feet crosscut, 91.2; cost per foot	$8 74
Number fathoms stoped, 75,563.5; cost per fathom	$8 94

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1855	3		1873	237	1,883
1856	12		1874	125	1,005
1857	35		1875	31	1,289
1858	24		1876	31	1,857
1859	22	1,387	1877	41	161
1860	4	1,000	1878	32	1,100
1861	49		1879	14	1,760
1862	69	1,305	1880	35	285
1863	69	206	1881	127	515
1864	50	1,745	1882	182	579
1865	238	11	1883	360	213
1866			1884	963	1,660
1867	683	1,164	1885	1,135	1,163
1868	740	80	1886	996	995
1869	841	863	1887	742	103
1870	42	183	1888	1,187	1,147
1871	134	1,453	1889	1,109	1,473
1872	276	1,684			
Total				10,652	279

D. L. Demmon, Secretary and Treasurer, 19 Congress street, Boston, Mass.; Johnson Vivian, Superintendent, Hancock, Mich.; Alex. Loranger, Clerk.

THE ISLE ROYAL, GRAND PORTAGE, ETC.,

mines, lying north of the Huron, between it and the lake, remain idle. The owners hold them for sale and sometime, no doubt, they will be again worked with better results than formerly. In this stretch of ground would certainly be a good mine.

Graham Pope, Agent, Houghton, Mich.

THE ATLANTIC MINING CO.

The Atlantic Mining Company continues its record of excellent results. There has been a change in the local management, Mr. Frank Mc M. Stanton, M. E., having assumed the office of agent and discharged its duties. The Atlantic is the best example we have of a mine in very low grade rock operating through a series of years at an annual profit. The Atlantic belt bears N. 50½° E., having a northeasterly dip of 45°. It is remarkably uniform in strike, dip, width and composition. It is a soft, dark brown amygdaloid, about 14 feet in width, through which the copper is so generally disseminated that all the deposit is taken and treated at the stamp mill. The latter is on the south side of Portage Lake, 2½ miles from the mine, with which it is connected by a railroad. The mill is supplied with water from sources above, the water being brought in a launder. There are 5 Ball stamps and the mill is well appointed and well conducted. There are four shafts in the mine, numbered from the north. The rock from all of them is run on an elevated trestle, by winding machinery, to the rock house, which is situated a short distance south of No. 4 shaft. Thence on the railroad the rock is taken to the stamp mill, thence the "mineral" copper goes to the smelting works, a mile distant. The Atlantic is ever designated as a poor mine, and it is so as to the percentage of copper obtained; but

from the above brief statement, it will be seen that it possesses important advantages, which under the exceeding good management which it has fortunately had, account for the success achieved. These are the width of the lode, its angle of dip, its comparative softness and uniform character, and the relief from cost of pumping at the mill. Still there are changes necessary, some are now making, which should still further reduce the cost of production. For instance, I recently watched the ascent of the skip at No. 3 shaft. The movement was so slow that I inquired as to the cause, of Mr. Stanton, who informed me that it was moving at its accustomed rate, that it took 4½ minutes for the skip to come up from the bottom, bringing 1½ tons of rock. One can understand that there is no economy in this. The machinery is so inadequate that were it not for the counter weight car it would not bring up the skip at all. They have a new hoisting plant for this shaft that will soon be in operation. It consists of double Corliss engine 22″x60″ double, coned drum, 12′ diameter at ends and 21′ in center. It is necessary to explain that a new shaft has been made 30 feet north of No. 3, through the old openings. It is north of the shaft pillars, is 9′x16′, and thus large enough for two skip roads. The new machinery will operate both this and the old shaft, the new one to be used to hoist the rock in and the old one for car for men to ride in and to send down timber in and for pump rod, etc., three ton skips will be used, weight 5,000 lbs., buffers are added to take up the "chuck" due to inequalities of the track. The new engine house is built of Portage Entry sandstone; it is 49 x55′, iron roof; light admitted from above. A new 100 horse-power steel boiler has been added to No. 3 steam plant, to suffice for increased demands. Also new half of duplex compressor has been procured. New machinery built by M. Bullock & Co.

It is contemplated to build a new shaft house at No. 2, and to include in the structure a rock house, to take the rock from No. 1 and No. 2 shafts. Rock houses will be put at No. 3 and at No. 4 shafts first. No. 4 shaft house is so old that it must give way to a new one and the rock house will be included. The shafts have all been sunk one level in the past year, and No. 3 is now to the 19th; 1,800 feet in length. No. 4 is to the 17th level, No. 2 to the 13th; 1,275 feet deep, and No. 1 900 feet. The extreme length underground is upwards of 4,000 feet, and nearly 2,000 feet from No. 1 to No. 4 shaft.

The company has purchased 200 acres of land, the northwest corner of which is about 300 feet east of No. 2 shaft.

ANNUAL REPORT OF THE ATLANTIC MINING COMPANY.

The directors present the following report of operations during the year 1889:

The production of mineral was 5,099,504 pounds which yielded 73 83-100 per cent, or 3,698,837 pounds of refined copper, which realized and average price of about 11.09 cents per pound.

The following is a summary of the year's business:

Production.

3,698,837 lbs. copper at 12.09	$447,291 25
Add balance of interest account	6,022 42
Add dividend received on estate of Thos. J. Pope & Bro.	502 40
	$453,816 07

Costs.

Working expenses at mine, as per clerk's tables		$33,120 17	
Freight	$9,364 97		
Smelting	36,510 55		
Expenses	7,203 78		
Brokerage	2,047 36		
Insurance	867 15		
Storage	106 25		
Taxes (City and State of New York)	246 67		
		56,346 73	
			$389,466 90
Showing a mining profit of			$64,349 17
There has been expended for additions to plant, as per detailed statement hereafter			37,669 56
Leaving a net gain for the year of			$26,679 61
The surplus from 1888, after payment of dividend, was		$302,564 80	
Less allowance on inventories of supplies at mine		6,223 48	
			296,341 32
Making the net surplus, Dec. 31, 1889			$323,020 93

as shown in detail in the annexed statement of assets and liabilities, and out of which a dividend of one dollar and fifty cents per share ($60,000 was paid Feb. 1, 1890).

ASSETS AND LIABILITIES, ATLANTIC MINING COMPANY, DECEMBER 31, 1889.

Assets.

Cash			$53,037 95
Accounts receivable			7,957 33
Loans			120,244 38
Copper on hand, sold			60,874 17

At Mine.

Cash		$1,677 16	
Coal		14,167 88	
Wood		18,380 60	
Supplies		39,036 48	
Merchandis ein store		38,820 63	
			112,082 75
Total assets			$354,196 58

Liabilities.

Indebtedness at mine		$21,600 50	
Agent's drafts outstanding		2,000 00	
Accounts payable		7,575 15	
			31,175 65
Balance of assets			$323,020 93
(Less dividend payable February 1, 1890		$60,000.)	

SUMMARY OF RECEIPTS AND EXPENDITURES OF ATLANTIC MINING COMPANY, FROM DATE OF ORGANIZATION TO DECEMBER 31, 1889.

Receipts.

Capital stock paid by consolidation		$700,000 00	
Capital stock paid by assessments		280,000 00	
			$980,000 00
Sales of copper			6,704,076 49
Other sources			853 15
			$7,684,929 64

Expenditure.

Real estate ("South Pewabic" and "Adams" mines, buildings, railroad, stamps, etc., as valued at consolidation)		$659,642 11	
Real estate (lands since purchased)		33,464 41	
		$693,106 52	
Net expenditure for additional equipment, mining operations, smelting and marketing copper, taxes and incidentals		6,108,802 19	
			6,801,908 71
Balance of receipts, being net profit to date			$883,020 93
Deduct dividends paid			560,000 00
Net surplus December 31, 1889			$323,020 93

(As shown in detail in preceding statement.)

STATEMENT OF WORKING EXPENSES AT THE ATLANTIC MINE FOR THE YEAR ENDING DECEMBER 31, 1889.

Underground Expenses.

Sinking 94 feet, average $24.20 net		$2,282 50	
Drifting 3,623.8 feet, average $5.53 net		20,044 41	
Stoping 14,487.5 fathoms, average $4.49 net		65,049 14	
Timbering, tramming and labor		67,741 91	
Timber, materials and supplies		8,644 10	
Pumping and operating air compressors:			
Labor	$8,577 86		
Fuel	17,310 10		
Supplies and materials	4,888 37		
		30,776 33	
			$194,538 39

Surface Expenses.

Superintendence, and labor of all kinds, less sundry credit items		$25,437 18	
Supplies and materials		6,854 32	
Fuel		15,324 40	
Feed for teams, etc.		1,096 77	
Fire insurance		446 00	
Taxes		2,887 30	
Canal tolls on copper		327 93	
Expenses and sundry repairs		1,987 76	
		$54,361 66	
Less amount received for rents		4,015 16	
			50,346 47

Railroad Expenses.

Labor		$5,917 43	
Fuel		2,649 15	
Supplies		2,462 41	
		$11,029 02	
Less received for transportation		213 00	
			10,816 02

Stamp Mill Expenses.

Labor		$28,128 61	
Fuel		35,782 95	
Supplies		11,658 49	
Fire insurance		950 00	
Teaming, mineral, etc.		1,112 24	
		$77,632 29	
Less received for dockage		213 00	
			77,419 29
Total working expenses			$333,120 17

CONSTRUCTION ACCOUNT.

At Mine.

Hand fire engine and hose cart	$690 75		
800 feet fire hose	510 26		
Labor on engine house	450 80		
Supplies and materials	671 69		
		$2,323 28	
Labor on wind mill, cistern, piping, etc.	$401 64		
Wind mill, pipes, and fixtures	736 01		
Teaming	33 75		
		1,171 40	
Fixtures for heating store with steam and setting same	$344 60		
Fixtures for heating agent's house with steam, and labor	165 01		
Fixtures for heating "dry house" with exhaust steam, piping and labor	637 75		
		1,777 33	
Labor on new shaft	$4,946 66		
Rails and other supplies for same	2,705 92		
		7,652 58	
Building stone engine house, labor, supplies, etc.		4,865 44	
M. C. Bullock Mf'g. Co. on account of hoisting engines		9,000 00	
1 single frame house	$275 00		
1 two-story double house	612 84		
1 one and one-half story single house	550 00		
1 two-story double house	1,362 57		
1 double log house	330 29		
		3,131 70	
			29,357 76

At Mine.

Materials for 1,600 feet sand launders	$1,756 34		
Labor and teaming on same	510 63		
Centrifugal sand pump and engine		$2,266 97	
Addition to mill building for same	$609 00		
	41 10		
		650 10	
			$2,917 07

At Dock.

Contract for building new dock	$1,948 71		
Timber, supplies and teaming	2,749 50		
Labor moving and repairing ware-house		$4,698 21	
Lumber and other supplies	$356 23		
	346 29		
		702 52	
			5,400 79
Total expenditure			$370,789 73

Summary of Results.

Ground broken in openings and stopes	16,155.9 cubic fathoms.
Rock stamped	278,680 tons.
Product of mineral	5,099,504 lbs.
Product of refined copper	3,698,837 lbs.
Yield of refined copper per cubic fathom of ground broken	28.9 lbs.
Yield of rock treated, 13 272-1000 lbs. copper per ton, or	0.663 per cent.
Gross value of product, per ton of rock treated	$1.6050
Cost per ton of mining, selecting and breaking, and all surface expenses, including taxes	.8787
Cost per ton of transportation to mill	.0388
Cost per ton of stamping and separating	.2778
Cost per ton of working expenses at mine	1.1953
Cost per ton of freight, smelting and marketing product, including New York office expenses	.2022
Cost per ton of running expenses	1.3975
Total expenditure per ton of rock treated	1.5327

The agent says: "During the first quarter of the year we treated 960 tons of rock per day, with an average yield of 12,938 lbs. of copper per ton of rock, being lower than has ever been experienced at this mine. This and other results led us to believe that we were crowding the mill and in April the amount of rock treated was reduced to about 875 tons per day. Since that time the average yield has been 13,397 lbs. per ton, giving an average yield for the year of 13,272 lbs., against 13,336 in 1888. There has been no perceptible change in the character of the rock, with the exception of a poor streak in the 19th level, which we are drifting through, and the ground is apparantly improving as the work progresses."

The following table gives the product each year:

Years.	Tons.	Pounds.	Years.	Tons.	Pounds.
1866	6	1,475	1878	1,132	1,592
1867		1,760	1879	1,152	1,822
1868	764	258	1880	1,170	1,195
1869	823	857	1881	1,264	9
1870	186	617	1882	1,315	1,708
1871			1883	1,341	197
1872			1884	1,586	1,585
1873	431	1,336	1885	1,791	533
1874	686	403	1886	1,751	1,670
1875	783	1,036	1887	1,820	1,865
1876	917	1,041	1888	1,987	972
1877	1,027	304	1889	1,849	837
Total				23,788	1,105

Office, 76 Wall street, N. Y. John Stanton, Secretary and Treasurer; Frank McM. Stanton, Agent. No. shares, 40,000; par value, $25. Dividend paid, 1889, $80,000; total dividends paid, $560,000.

STONE.

LAKE SUPERIOR SANDSTONES.

Lake Superior sandstones continue to meet with general favor wherever they are used. The business of quarrying is increasing and a good deal of attention is given to the discovery of workable deposits of this stone. The largest producers are still Furst & Jacobs, of Marquette, and the Portage Red Sandstone Co. The former produced in 1889 372,469 cubic feet of block stone, footing stone, 10,058 cubic feet, rubble stone 823 cubic feet.

This firm has produced at Marquette and Portage Entry in

1886	150,000 cubic feet.
1887	200,000 "
1888	360,000 "
1889	383,348 "

The Portage Entry Red Sandstone Co. produced in

1888	250,000 cubic feet
1889	330,000 "

The companies pay a royalty to the owners of the fee of the lands from four to eight cents per cubic foot of stone produced.

Preparations are making to increase the business the coming year by the further introduction of machinery in the old quarries and the working of new ones. The stone sells from sixty cents to one dollar and twenty-five cents per cubic foot, and the beautiful brown stone at Marquette at even a higher figure.

The stone improves with age; it is quite soft when freshly mined, but becomes hard and impervious with time.

The Portage Entry Red Sandstone Co. have now one hundred men at work stripping. The superintendent is P. B. Parker, P. O. Jacobville, Mich.

THE BARAGA GRAPHITE CO.

The Baraga Graphite Company has been engaged in quarrying so-called graphite, near L'Anse, and a quantity has been sent to Detroit for trial. It is to be hoped that a paying industry will develop. A sample that I saw was soft, carbonaceous material that while not, apparently, graphite would still answer some useful purpose. Thus far it is in the experimental stage. Henry Kiesling, Sec'y, Detroit. More recently work has been wholly suspended.

THE MICHIGAN SLATE CO.

at Arvon continues to operate in an exploratory way. There are no other companies working.

C. M. Turner, Supt. of the Mich. Co., Arvon, Mich.

KAOLIN.

The following analysis was made of a sample of a large deposit of clay near Marquette:

Iron oxide	2.00
Silica	54.62
Alumina	12.82
Lime	13.68
Magnesia	4.25
CO^2 and waste	12.01

LAKE SUPERIOR GRANITE CO.

This company is an organization made by F. O. Clark, J. R. Devereaux, and other Marquette gentlemen, to investigate what appears to be a very valuable granite formation. They propose to explore it further and if it proves, on complete investigation, to be as valuable as it now seems, they will quarry the rock systematically. There are several varieties of the stone, some of which cannot be excelled for beauty or texture. It remains to be seen if it can be quarried in large blocks.

SERPENTINE, MARBLE.

I am told that Mr. J. M. Case, of Marquette, who controls large marble deposits which he has explored, has effected an organization of capitalists in London, England, to work the deposits.

The plan is to manufacture the crude material into finished forms, at Marquette, utilizing the water power in that city for the purpose.

Twelve miles east from Trout Lake station and two and one-half miles south, is a bluff of marble, which rises to an extreme height of seventy feet. In fact, there is an extensive deposit of this mineral in that vicinity. It is believed to be valuable.

But the Ishpeming Serpentine at the Ropes mine, and in that range, are certainly very fine. Experts in marble pronounce it to be equal to any other.

GOLD.

GOLD EXPLORATIONS.

Gold explorations continue, and, on the whole, the outlook for this mining industry on Lake Superior has improved within the year. Some definite results have been obtained and are favorable. I think that gold mining has come to stay; that, though it may not become a large industry, it will be a permanent one. There is evidently gold enough in the rock to pay for mining it and the veins are persistent.

THE MICHIGAN GOLD COMPANY.

This company having won the suit establishing its claim to the lease of the land, immediately began more definite mining operations. A Huntington mill was procured and the work of treating the accumulated rock was begun. From the first run of twenty-eight tons of rock $8,400 worth of bullion was obtained, an average of $293 to the ton of rock treated. Previous to this, in December, about $3,000 of the metal was derived from several hundred tons of quartz, rich in free gold, by hand manipulation. There are still in the Cleveland office about two tons of exceedingly rich rock, estimated to be worth many thousands of dollars.

The main shaft is now, February 27, 105 feet deep and the vein 8 feet wide in the bottom. However, the best description is the result, and the following is to the point:

ISHPEMING, Mich., March 7, 1890.

Mr. F. P. Mills, Agent Michigan Gold Company:

DEAR SIR—February run of 150 tons of quartz yielded of gold bullion	$3,581 90
Silver	30 60
Total	$3,612 52

This makes a value per ton recovered of $24.08.

Loss in tailings per ton in gold	$3 40
Loss in tailings per ton in silver	12
Total	$3 52
Making total value per ton of rock treated	$27 60

Days of 24 hours each run by mill is 20, and average tons treated per day 7½.

The loss in tailings seems high. I account for it from the fact that the "deep shaft" rock carries its gold and the mineral (antimonial galena) so very fine, and the fine gold being so intimately associated with it, that it does not all amalgamate. It would concentrate more closely in vanners.

Yours truly,

J. ROPES, *Supt. of Mill.*

Approved:

R. A. TREVARTHEN. *Supt. of Mine.*

There is one thing about the Michigan gold mine, it is self sustaining. They have money in the treasury from the earnings so far.

The mine has yielded more than has been paid out.

The owners, I think, have faith in it and say that the mine will be fully worked for all that it warrants. Its management is in good hands.

The following shows the operation of mill, receipts from specimens sold and amount due us for treating outside quartz, all for the month of March, 1890:

10½ days milling Michigan rock at 7.33 tons per day	75 tons.
Melted pullion obtained	3.562 lbs. adv.
Which assays:	
Gold	82.91 per cent
Silver	17.09 per cent
and gives a value of	
Gold	$800 85
Silver	8 14
Making 75 tons yield $11.96 per ton or $896.99 in all.	
Loss in tailings by assay:	
Gold	$1 00
Silver	04
	$1 04
Making actual value of rock $13.00 per ton.	
Receipt from bullion	$896 99
For specimens sold	265 50
For treating 60 tons of Gold Lake quartz at $5.00	300 00
Total	$1,462 49

Yours truly,

J. ROPES, *Supt. of Mine.*

Approved:

R. A. TREVARTHEN, *Supt. of Mine.*

AT THE GRAYLING

they have been exploring with the diamond drill and the results that are given establish the fact that the vein holds its size and richness down to the depth to which the drill penetrated.

THE GOLD LAKE MINING CO.

This is the name now given to the Lake Superior property joining the Michigan. It was in this property, near the Michigan mine line, where the first extraordinary rich pocket was found. The earliest quartz specimens that started the gold excitement, were found in this shaft. The L. S. Iron Co. owns the land and first explored it quite systematically and afterwards concluded to lease it. The shaft is 87 feet deep, and they are drifting to find the vein which was not followed in sinking the shaft. An average of the rock taken from all parts of the mine is stated to give more than $20 per ton.

W. L. Jones, Supt.

THE PENINSULA.

The Peninsula, which joins the Grayling, has not been much explored during the year.

R. A. Trevarthen, Supt.

THE ROPES.

As the Ropes gold mine has been systematically worked for years and still continues to be so, it is natural that the results obtained at it should be scanned with much interest and should afford an excellent criterion to judge of the future of this industry. Fortunately the company publishes an annual report which gives all the information that is requisite.

March 10, 1890.

To the Stockholders of the Ropes Gold and Silver Co.:

GENTLEMEN:—I submit the following report relative to the operation of mine and mill for the year ending February 28, 1890.

The main shaft has been sunk 110 feet, making present depth of shaft 551 feet, the 11th level. The last 94 feet was in barren rock, the vein having pitched to the north or foot wall side. The skip road is laid to the 10th level.

On the first and second levels no work has been done the past year.

On the third level we have drifted 60 feet to the west, at this point a connection was made with second level by a raise winze of 35 feet, developing a fine body of pay ore, to the east no work has been done the past year, here a large body of pay rock extends to the surface.

The fourth level has been extended 32 feet to the west in low grade rock; to the east nothing but stoping has been done.

On the fifth level, 150 feet west of shaft, a raise winze was made to the fourth level, opening up a good body of ore; to the east nothing but stoping has been done. Here is a body of very good ore.

The sixth level has been extended 88 feet to the west, all in good ore; no drifting has been done to the east.

On the seventh level to the west a raise winze to the sixth level opened a good body of pay rock; sixty feet to the east of shaft a raise of 52 feet shows fine ore; 84 feet further to the east a large body of good ore stands.

On the eighth level the drift has been extended 50 feet to the west, all in good ore. the vien having on average width of about 12 feet. To the east of the shaft the drift has been extended 80 feet, about 20 feet of this in fair ore, at the end of drift a winze was raised to the seventh level; at this point the good ore is 15 to 20 feet in width.

The ninth level has been extended 75 feet to the west, following the same body of ore as in the level above; this has been connected with eighth level by a winze. To the east 94 feet has been drifted all in low grade ore, this can be profitably worked.

On the tenth level the drift of 96 feet to the west is still in the barren rock through which the shaft was sunk, indications lead us to expect good ore in a few more feet; a crosscut from shaft to the north shows 9 feet of good ore.

On the eleventh level a drift has been started to the north to reach the ore body showing on the tenth level.

The surface improvements during the year consist of the addition of two heads of stamps, four Frue vanners, which were placed in the mill building erected in 1888, and were started August 20.

Half of an 18x30 Rand air compressor, the foundation for which was built for a Duplex machine, so that the other half can be added at any time.

A building for compressor and hoisting machinery was erected 26x30 feet with a wing 20x40 feet, a dry house 16x26 feet, a two-story dwelling for superintendent.

The cost of these improvements was $20,113.02. The present hoisting drum being inadequate for greater depth of shaft, we have ordered a six foot Lane band friction drum, to be operated by the 16x30 engine, which formerly furnished power for the first mill.

The number of tons of rock treated during the year was 31,365, the average yield $3.18 per ton. Numerous experiments have been made to treat the concentrates at the mine, but so far without success.

A careful survey of the mine gives the management every assurance of a prosperous future for the property.

J. ROPES, President.

ISHPEMING, MICH., *March 8, 1890.*

SECRETARY'S REPORT FOR YEAR ENDING MARCH 1, 1890, ROPES GOLD AND SILVER CO.

On hand March 1, 1889	$4,793 69	
Received for small engine	100 00	
" " treating 7¼ tons quartz for Michigan Gold Co.	351 25	
" " Bullion 12 mos.	75,927 69	
" " concentrates to Feb. 1, 1890	9,540 96	
" " supplies	91 27	
" " rents	313 25	
	$91,118 11	

Contra.

Paid out for insurance and taxes		$2,941 31
" for labor		38,996 12
" " supplies		7,602 10
" " general expenses		3,286 43
" " wood and coal		10,446 52
" " office expenses		654 75
" " new machinery and new buildings		20,113 02
" " freight		738 39
" " machinery repairs		621 38
" " cost of assay office		1,058 95
Cash on hand		4,659 15
	$91,118 11	$91,118 11

Assets—Available.

Cash	$4,659 14	
Supplies at mine	3,779 14	
Horses, sleighs, etc.	1,300 00	
1,544 cords of wood at $2.00	3,088 00	
Accounts receivable	899 00	
Laboratory supplies	434 00	
Office supplies	185 00	
Coal 125 tons at $3.50	437 50	
Concentrates at mine and works	4,628 00	
	$19,409 78	$19,409 78

Unavailable Assets.

Mill machinery and buildings	$95,496 75	
Water works	4,000 00	
Crusher and shaft house	6,000 00	
Dwelling houses and shops and barns	5,300 00	
Supplies in use	7,439 92	
		118,236 67
Total assets exclusive of mine		$137,646 45

Liabilities.

Notes not acceptances not due	$1,831 29	
Accounts payable	5,184 72	
Fuel account, wood not due	1,878 96	
February pay roll	3,883 98	
		$12,778 95
Number tons quartz treated for year		31,365
Average yield per ton		$3 18

Ropes Gold and Silver Co.—Statement of Concentrates for Year Ending Feb. 1, 1890:

Date.	Amount gold.	Amount silver.	Freight and w'k'g charges.	Net proceeds.
From March 1, 1889, to Feb. 1, 1890	$17,218 86	$6,309 48	$13,987 38	$9,549 96

Statement of Bullion for Year ending March 1, 1890.

Date.	Amount gold.	Amount silver.	Mint charges.	Net proceeds.
March, 1889, to March 7, 1890	$72,841 54	$3,345 57	$259 42	$75,927 69
Concentrates	17,218 86	6,309 48	13,987 38	9,540 96
Total	$90,060 40	$9,655 05	$14,246 80	$85,468 65

Recapitulation.

	Amount gold.	Amount silver.	Net proceeds.
Product to March 1, 1890	$152,644 61	$16,135 35	$145,245 17
Product for year to March 1, 1890	90,060 40	9,655 05	85,468 65
Total product	$242,705 01	$25,790 40	$230,713 82

Gross gold	$242,705 01
Gross silver	25,790 40
Total	$268,495 41

J. Ropes, President; C. R. Ely, Secretary; E. W. Hebard, Treasurer; W. H. Rood, General Manager.

The Ropes Co. owns its land in fee—80 acres.

The number of shares is 80,000.

Since the annual meeting a Huntington mill has been ordered, to cost $3,600. It is estimated that it will work up 15 tons of rock per day.