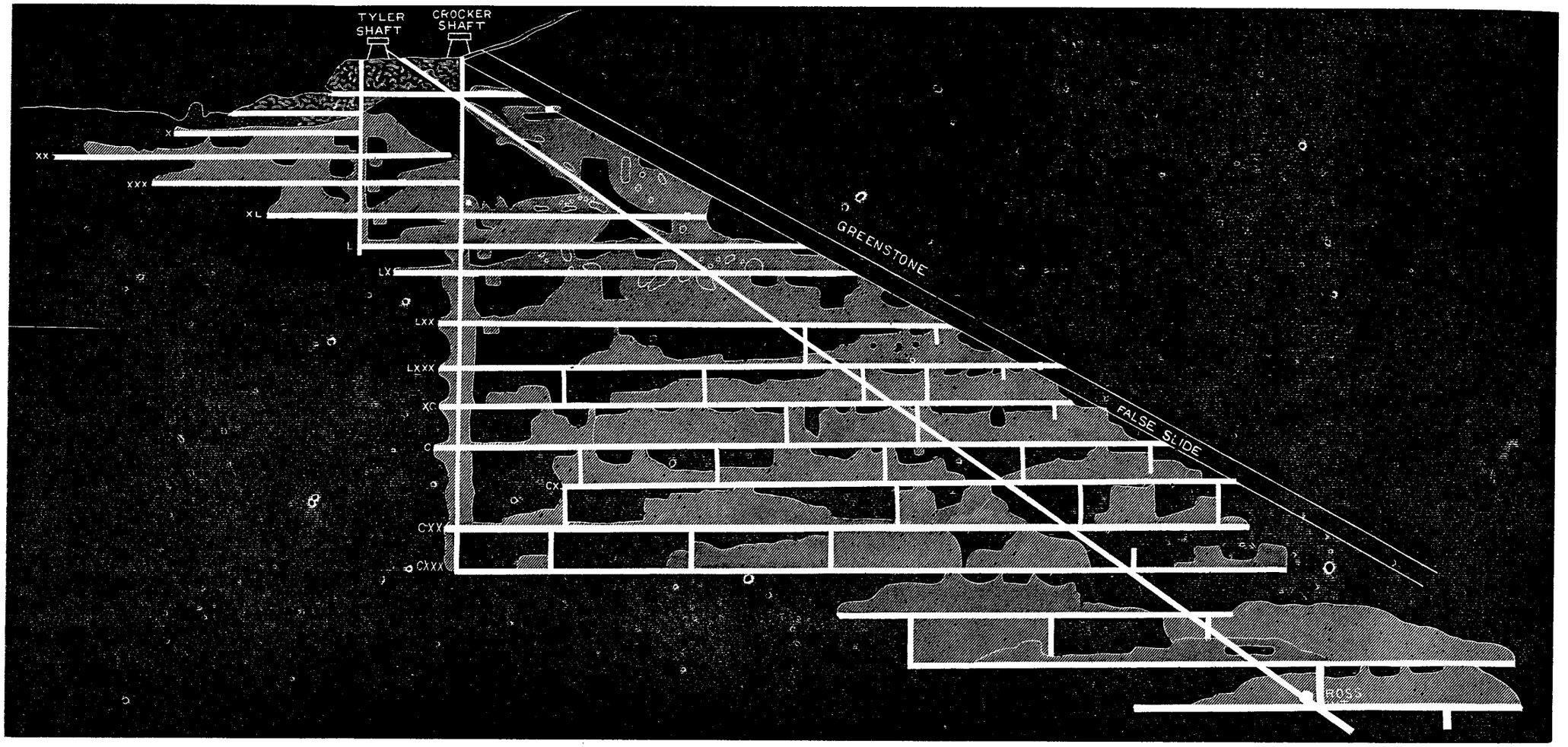
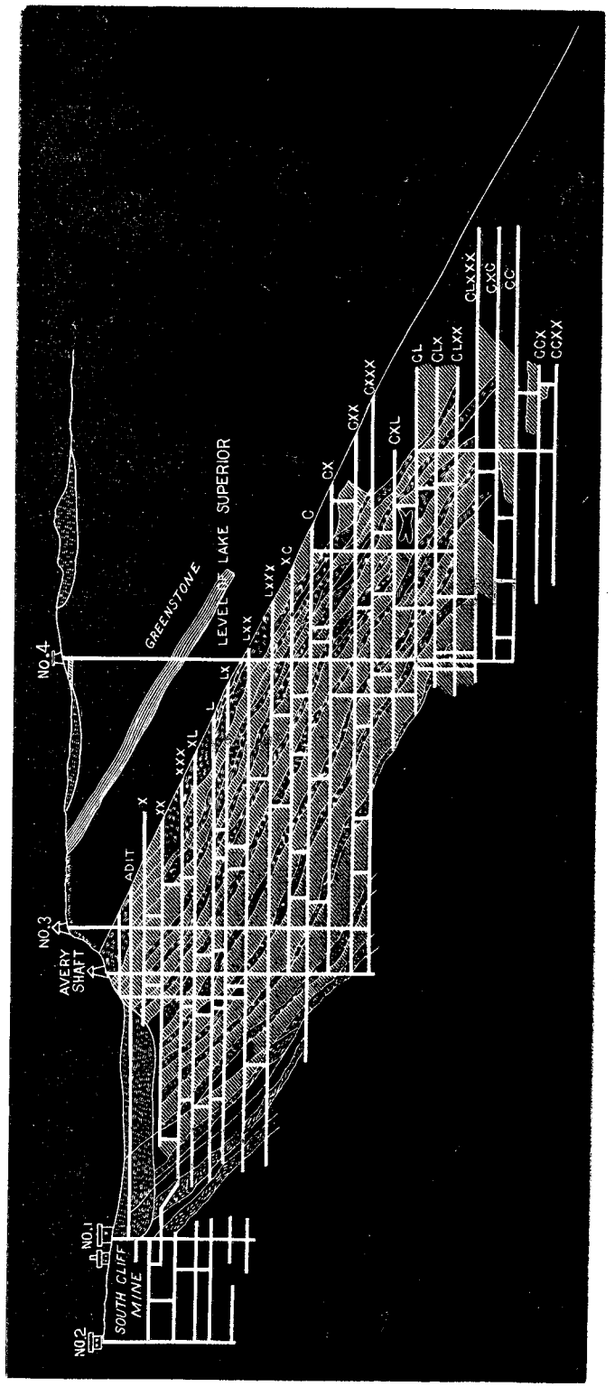
LONGITUDINAL SECTION OF THE PHŒNIX MINE, JAN., 1886.

Scale, 300 ft. to one inch.



LONGITUDINAL SECTION OF THE CLIFF MINE, JAN., 1886.

Scale, 600 ft. to one inch.



Product of the Phœnix mine:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
For years previous to 1855	19	.....	1871	609	1,802
1855	3	.....	1872	364	420
1856	8	.....	1873	260	1,080
1857	17	.....	1874	699	400
1859	28	590	1875	702	276
1860	20	62	1876	698	530
1861	34	790	1877	511	493
1862	31	1,590	1878	150	1,172
1863	72	118	1879	272	1,436
1864	142	187	1880	218	10
1865	202	1,000	1881	204	1,357
1866	206	.....	1882	268	1,177
1867	155	115	1883	256	291
1868	130	.....	1884	310	1,004
1869	398	930	1885	180	1,108
1870	499	1,040			
Total				7,673	738

THE CLIFF COPPER CO.

There is nothing new to record of the Cliff. It is still regarded with a sort of romantic interest as the great bonanza of its time. People will scarcely cease to conjecture as to what might be the result if it were again worked as of old. The Cliff was undoubtedly poor in the bottom when the old company abandoned it, but it is by no no means certain that they had not struck into an extensive bar of poor ground that would in time have given way to better, if the company had had more faith and persistence. Very much poor ground is encountered in all mines, and requires perseverance to push through it until better is found. The history of all the copper mines that have been successful shows this, and it is possible that the Cliff Co. encountered a greater amount of poor ground than is common; and it is also possible that the vein below is as rich as it was found to be above; 1,000 pounds of copper to the fathom of ground, was about the average at the Cliff during its most productive period.

The stockholders only advanced $110,905, and in four years after work was begun they received their first dividend, 1849. The total of dividends paid to the stockholders was $2,627,660. It has been a remarkable mine, and it is but natural that public curiosity in the mining region, should still continue active regarding it.

The property is owned by Mr. W. H. Simpson, of New York, and is still in charge of Mr. D. D. Brockway, Phœnix, Mich.

The following shows the product of the Cliff mine:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
Prior to 1855	3,400	.....	1870	222	381
1855	937	197	1871	71	238
1856	1,110	934	1872	59	386
1857	1,118	850	1873	375	1,208
1858	1,130	433	1874	527	901
1859	707	1,007	1875	581	873
1860	921	1,303	1876	450	146
1861	964	11	1877	80	1,319
1862	1,002	960	1878	207	415
1863	1,050	354	1879	67	336
1864	675	1,334	1880	30	962
1865	747	626	1881	39	1,382
1866	821	428	1882	33	53
1867	560	1,725	1883	5	374
1868	613	746	1884	14	255
1869	362	1,247	1885	4	332
Total tons				19,053	1,301

THE ALLOUEZ

is again working on tribute. Messrs. Watson & Walls, the same parties who formerly worked the mine on a lease from the company, from 1877 to 1880, are now operating it. The Allouez mine is in the well known conglomerate belt that underlies the greenstone of Keweenaw Point, and which has come to be designated as the Allouez conglomerate. I have, heretofore, in previous reports, very fully described the mine and will but mention the additions which have since been made to the plant, etc.; also the map has been marked up to the close of the year. No. 2 shaft is now 1,500 feet deep, measured on the plane of the vein, the angle of the slope being 38° with the horizon. No. 3 shaft is 1,150 feet deep; but the lode there did not prove good, and the work has been discontinued. They are working mostly north of No. 2.

The rock breaks in large blocks, so that while it is harder to stamp than amygdaloid it is cheaper to mine.

A new stamp head was added in 1884, making three Ball heads now in use at the mine. The capacity of the new head is 160 tons in 24 hours. In one month they treated 13,500 tons of rock. Twenty-one Collum washers have been added, making the total number now 56. Six hydraulic separaters, five slime tables; a new locomotive has also been obtained, a thing that was very much needed.

The mine was worked on company account for only five months of the year. Since June 1st, it has been under lease to Messrs. Watson & Wall,

'ORT OF THE

the Cliff mine:

Year.	Tons.	Pounds.
1870	222	381
1871	71	238
1872	59	386
1873	375	1,203
1874	527	901
1875	581	873
1876	450	146
1877	80	1,319
1878	207	415
1879	67	336
1880	30	962
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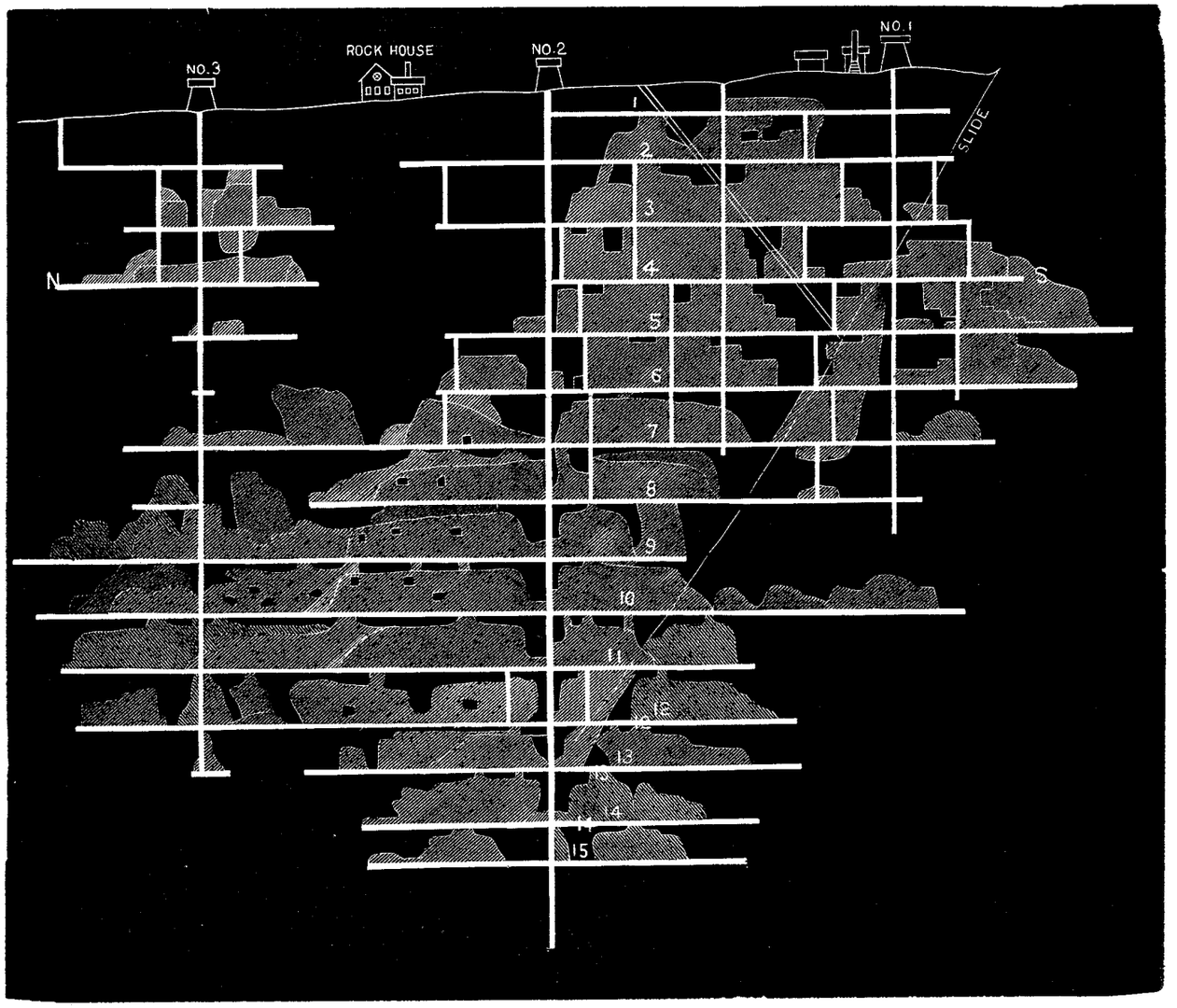
Scale, 300 ft. to one inch.



who now operate it. The following statistics, which are very complete, I was permitted to copy from the books of the company, and they convey a clear idea of the productiveness of the lode and of other matters pertaining to the working of the mine. They cover the first five months of the year 1885:

MINING COST TO COMPANY.

Occupation of Employes.	Average Wages.	Amount.	
Mining Captains	$75 00	$1,132 31	
Timbermen and helpers	38 58	2,135 21	
Miners and block holers	31 19	1,816 73	
Laborers	27 74	918 66	
Trammers (46,809 skips)	37 60	7,801 87	
Machinists	46 38	149 84	
Blacksmith	50 50	40 38	
Carpenter	40 42	110 39	
			$14,105 49

SUPPLIES USED.

550½ cords of wood at $2.90	$1,623 75	
Explosives, powder, candles, etc	2,034 06	
Sundry teaming	202 63	
		3,860 44

POWER DRILLS.

Drill carriers	$33 00	$158 65	
Compressor runner	42 00	463 04	
Machinists	55 87	468 48	
Blacksmith	45 20	514 36	
			3,322 55
Amount of contracts			16,890 65
Total			$39,784 66
Less profit on supplies (mining)		$3,000 00	
Receipts of change house		165 00	
			3,165 00
Total mining cost			$36,619 66

Average monthly force	119¾
Average net wages per month	$41 03
Total hoisting expense—labor account	$2,456 02
Total hoisting supplies	6,874 74
Total	$9,330 76
Average monthly force	13 6-26
Average net wages per month	$37 08
Total number of tons of rock hoisted	67,180
Average hoisting cost per ton	13 9-10 cts.
Total for labor for selecting and breaking rock	$6,894 28
Total for supplies and sundries for selecting and breaking rock	4,486 46
Total cost for selecting and breaking rock	$11,380 74
Average monthly force, selecting and breaking rock	43 12-13 men
Average net wages	$31 39
Total tons of rock treated	67,180
Average cost per ton for selecting and breaking rock	17 cts.

RAILROAD EXPENSE.

Total for labor	$2,380 44
Total for supplies	2,201 11
	$4,581 55
Average monthly force	13½ men.
Average net wages	$35 20
Total number of tons of rock transported	62,500
Average cost per ton for transporting rock	7 33-100 cts.

This transporting cost is high, as it was mostly done in the winter, when the snow was deep. There were 41 men employed in shoveling the snow from track.

Surface Expense.

Total for labor	$1,574 12
Total for supplies	236 23
Total for all purposes	$1,810 44
Average monthly force on surface	9 6-13 men.
Average monthly net wages	$33 22

Stamp Mill Expenses.

Number cords of wood used	5,056¾
Cost—total	$15,689 80
Cost of supplies	851 60
Cost of foundry repairs, etc	2,269 09
Cost in wages	8,246 09
Cost of drainage	200 00
Total running cost—stamp mill	$27,756 58
Total number of men employed	256 4-13
Total tons of rock treated	62,500
Total tons of rock treated, per cord of wood	12 36-100
Pounds of copper produced (mineral)	1,412,015
Per cent of mineral in rock stamped	1.13 per ct.
Cost per ton for stamping and treating the rock	44 41-100 cts.
Average number of men per month	51 7-14
Net monthly wages	$32 17
Total tons of rock treated	67,180
Total tons of rock rejected	4,680
Pounds of ingot in rock hoisted, per ton	15.63
Pounds of ingot in rock treated, per ton	16.80

Division of Cost in Stamping Per Ton of Rock.

	Cents.
Labor, per ton	13.51
Fuel, per ton	25.10
Shoes and castings—mostly shoes for stamps—per ton	4.43
Oil	.55
Supplies	.82
Total	44.41

	Pounds.
Total amount of ingot produced in the five months	1,036,275
From low grade stuff	14,268
	1,050,543
Tribute copper produced in succeeding seven months	1,119,930
Total for the year, of ingot	2,170,503

Total cost of handling mineral, getting it to smelting works, barrelling, etc	$2,802 82
Average on each ton of rock	4.48 cts.
Expense account not otherwise classified	$1,901 44
Average on each ton of rock treated	3 04

General Summary from January 1st to June 1st, 1885.

Mining cost	$36,619 16
Hoisting expense	9,330 76
Selecting and breaking	11,380 74
Railroad expense	4,581 55
Surface	1,810 44
Stamp mill expense	27,756 58
Smelting cost	2,802 85
Expense account, total	1,901 44
Total expense at the mine	$96,183 49
Less credits	1,826 26
Total cost for five months	$94,375 23
Total average of men employed in all departments	253 23-26
Total average net wages paid men per month	$37 72
Total number of tons of rock hoisted	67,180
Total average cost per ton mined	$1 40 4-10
Average cost of rock per ton stamped	$1 51

Mr. Fred Smith, the agent, resides at the mine, and cares for the company's interests.

The following table shows the product of the mine in past years:

Years.	Tons.	Pounds.	Years.	Tons.	Pounds.
1869	1	1,575	1879	715	1,452
1873	10	1,163	1880	658	471
1874	504	130	1881	736	1,007
1875	692	1,574	1882	841	1,557
1876	780	1,785	1883	875	1,377
1877	650	479	1884	964	174
1878	565	1,146	1885	1,085	476
Total				9,084	260

ALLOUEZ MINE REPORT.

New York, March 9, 1886.

The directors make the following report of operations during the year 1885:

In the report made to stockholders a year ago, the directors stated as their belief "that with the present outlook of the copper market, it is for the best interests of stockholders that operations at the mine should be suspended at an early date." In accordance with this policy, it was determined to cease work as soon as consistent with the necessity of working up the larger part of the supplies and fuel on hand, thereby incurring the minimum of loss incident to suspending work in so large an undertaking.

The 1st of June was fixed as the date for suspending work, but shortly prior to that time the directors received from a firm of merchants doing business on the mine location and elsewhere—and who had experience in mining—a proposal to lease the mine, buildings, machinery and tools, and a lease therefor was made to them for a term of three years from June 1, 1885, on a royalty or rental of one-tenth of the copper produced, to be delivered at the smelting works at Hancock, Michigan. In conformity therewith the lessees took possession early in June, and began to make a regular production with the month of July.

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

Production.

By the company, January to May inclusive, 1,050,546 lbs. ingot sold for	$115,855 51
By lessees, 1,119,930 lbs. ingot, of which the company received one-tenth, or 111,930 lbs., sold for	12,330 83
	$128,186 34

Expenditure.

Mining 67,180 tons rock, including hoisting, selecting and breaking, and all surface expenses	$60,602 77	
Railroad transportation of 62,500 tons rock to stamp mill	4,581 55	
Stamp mill reduction and treatment of 62,500 tons rock	27,756 58	
Transportation of mineral to smelting works	2,802 82	
Constructions (additions to machinery)	1,373 65	
Total expenditure at mine to May 31	$97,117 37	
Smelting, freight and marketing expenses on 1,050,546 lbs. copper, including New York office expenses	21,564 95	
Total expenditure to May 31	$118,682 32	
Add expenditure since date of lease, viz.:		
Insurance on mine buildings	$1,160 00	
Other expenses	1,729 26	
	2,889 26	
Total expenditure in 1885		121,571 58
Net gain in 1885		$6,614 76
The balance of assets from 1884 was		41,997 90
Leaving balance of assets, December 31, 1885, as per statement below, of		$48,612 66

ASSETS.

Cash in bank		$3,075 94
Cash in United States Trust Company		20,000 00
Copper on hand, 41,933 lbs. @ 10 7-10 cents, net		4,498 25
Accounts receivable		451 58
AT MINE.		
Cash in bank	$1,576 93	
Supplies and tools (exclusive of power drills and machine tools)	9,382 69	
Standing timber, not on company's lands (mostly sold to lessees, to be paid for as cut by them)	10,045 28	
		21,004 96
		$49,025 67
LIABILITIES.		
Accounts payable	$92 59	
Indebtedness at mine	320 42	
		413 01
Balance of assets, December 31, 1885		$48,612 66

By order of the Directors.
JOHN STANTON, *Treasurer.*

Office, 76 Wall street, New York. The mine is 4 miles north of Calumet and on the south line of Keweenaw county, in the S. ½ Sec 31, T. 57, R. 32.

THE WOLVERINE MINE

is worked on tribute by Messrs. Wilcox and Funkey, who leased in 1883 and have since operated it. As a result there has not been much additional opening made, while the old stopes have been completely exhausted. The map given herewith was made in 1883 and does not show the subsequent underground work.

The Wolverine is a new mine, and for some reason the company does not seem to have met with the success anticipated. The construction account has naturally been heavy and the company has become involved in debt to a serious extent. The lode is epidote that possesses the characteristics of that class of deposits, having some very rich pockets and much poor ground. It is one of those lodes that experience has shown must be extensively opened and worked so as to avail themselves of the good ground and leave the poor. The mine was opened in 1882, producing in that year 12 tons and 1,623 lbs. of copper.

Product:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1883	349	1,622	1885	185	925
1884	400	.....			
Total				948	170

T. W. Edwards, President, Houghton, Mich.

THE

.....		$3,075 94
.....		20,000 00
.....		4,498 25
.....		451 58
.....	$1,576 93	
.....	9,382 69	
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		413 01
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	Tons.	Pounds.
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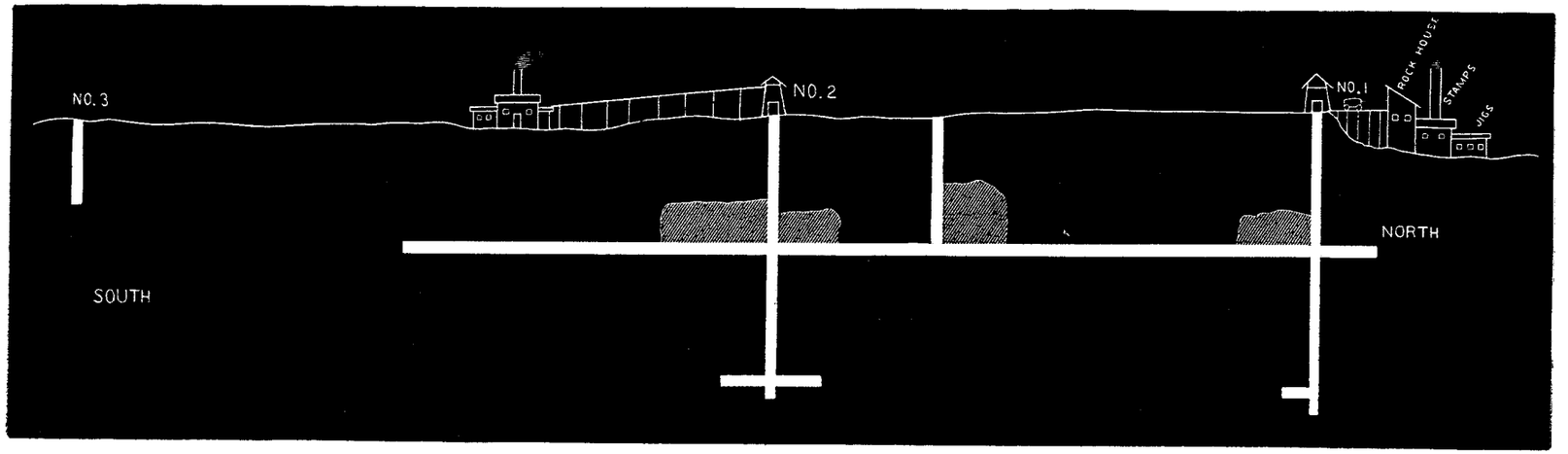
.....	948	170

LONGITUDINAL SECTION OF THE WOLVERINE MINE.

Scale, 120 ft. to one inch.



THE CENTENNIAL MINE

has been idle for two years. The affairs of the company have been involved in the settlement of the estate of Mr. J. Hoyt, deceased. Capt. Josiah Hall, who had charge of the mine and does still, states that the mine is looking well, and if properly worked would be a profitable one. It joins the Calumet on the north.

THE CALUMET AND HECLA

company has for some years been making extensive changes in its mining plant. These modifications include the substitution of heavy and more powerful machinery in place of that which was formerly used. The changes have been going on during a period of six years and are now completed. The numberless powerful engines, pumps, compressors, and the ponderous winding drums that one may see at this mine are indeed a sight worth beholding. Nowhere else on this continent, if indeed in the world, is there so much powerful and costly machinery employed in mining work. The machinery is duplicated throughout. The plan has been to open the mine several years in advance of actual stoping, and by the substitution of heavier machinery, and its duplication to secure a larger output, and to insure against any contingency arising that shall diminish the output. It has been done at the cost of an immense amount of money.

The undertaking of the Tamarack company was a valuable exploration for the Calumet and Hecla; it has strengthened the belief that this marvelously rich copper bearing lode underlies all the great extent of surface which the company here possesses. If it is a fact that this conglomerate deposit, without diminution in richness or in magnitude, continues throughout the Calumet and Hecla lands,—a supposition for which there is every possibility,—the wealth that the company holds is almost limitless. But the mining plant, the arrangements for operating the mine, although designed for meeting the wants for a long period to come, are cumbersome and costly, perhaps unavoidably so, as the conditions were fixed early and the mine has so far outgrown all that could have been formerly anticipated regarding it. Possibly radical and expensive modifications will still be required.

No. 1 Calumet and No. 1 Hecla shafts are down to the 36th level. The other shafts are to the 34th and 35th levels, but there has not been a great deal of stoping done below the 24th and not much in the 23d even. The levels are 60 feet apart perpendicular; some of the upper ones are slightly less than that. The mine has a vertical depth of 2,139 feet maximum, or a depth measured on the plane of the vein of 3,390 feet. The maximum length, leaving out the "Black Hills" mine, is 5,000 feet in round numbers. The latter is adjacent to the Osceola, south of the main mine,and in it only sinking and drifting have been pursued,—no stoping. It is claimed that the rock obtained from the openings has paid all the cost of the work. This Black Hills deposit is wider, but less rich than the vein further north. There is considerable of the lode left in the mine in the shaft pillars and in the floors of the levels. A very large amount of timber is used for stulls to hold up the hanging wall. The two man engines,—one in the Hecla and one in the Calumet mine,—are down to the 28th level, and will be soon completed to the 30th level. It takes about 20 minutes to go the bottom, using the man engine.

They seldom have an accident to anyone on these machines. The shafts are all single skip except No. 5, which is double, but only one is used. The skips are steel and hold 2¼ tons each. The skips travel, in the Calumet shaft, 1,000 feet per minute, using the new engine—Superior.

They work about 1,000 men underground all told, working two shafts. The total force in October was 2,500 men; now—in January—it is 2,200,—men reckoned as so many days' work; they sum up the number of days' work done and divide by 26 to get the number of men. The total number of tons of rock mined and treated during the year was 535,820. The total product of ingot copper obtained was 47,247,990 lbs. All of this was from the stamp rock except about 2%, which was obtained from the "nigger heads," or small copper boulders, which are found in the Conglomerate. Taking out the 2% we have 46,303,030 lbs.; as the yield of the stamp rock we get 4.32% as the average yield of the rock.

At the average price at which copper sold for during the year, this copper brought, probably, $5,250,000. The company paid dividends to the amount of $1,700,000—which leaves $3,550,000 to be absorbed by the expenditures,—assuming the reserve to remain as it had been. The cost of copper was 7.4 cents per pound, which still leaves a margin for reduction, though probably the cost is as low as in any previous year. There has been a pretty heavy construction account the past year, mainly at the stamp mill and building the railroad down to the dock at Lake Linden.

The following table shows the amount of rock mined and stamped each year for 11 years, and the per cent. of yield:

Year.	Tons of Rock Stamped.	Yield Per Cent. Ingot.	Year.	Tons of Rock Stamped.	Yield Per Cent. Ingot.
1875	249,704	4.3	1881	340,080	4.61
1876	259,935	4.37	1882	344,132	4.59
1877	247,935	4.55	1883	372,570	4.45
1878	271,000	4.66	1884	435,352	4.63
1879	284,715	4.61	1885	535,820	4.32
1880	334,343	4.75			

It is estimated that the company owns 80,000,000 feet of standing pine.

A new hoisting engine has been put into the Hecla engine house, 2,500 horse power, the former one has been taken to Lake Linden to duplicate the pumping engine. They are also adding a powerful compressor to the plant in the Hecla mine. This is to use in case of anything happening to the old one. At the stamp mill the railroad has been built down to the dock, giving a grade from the head of the incline to the lake of 190 feet to the mile. They are preparing to do away with the inclines, and hereafter the locomotives will haul the rock cars directly to the bins at the head of the stamps. It is a very singular circumstance that the rock bins should have been set so low as to require the shoveling of the rock under the stamps instead of their being so placed that the rock could be run under the stamps automatically, as is everywhere else the case; in the new arrangements this defect will be remedied. They have been changing the stamps, throwing out

the Ball heads, and putting in the Leavitt. There are seven heads in the Hecla mill, and five in Calumet. The mills are a short distance apart; each head works up about 225 tons in 24 hours,—or the six running stamps in the Hecla mill stamp 1,400 tons of rock per day, and the Calumet mill stamps 800 tons. The rock is stamped down to the fineness of a three-sixteenth" screen. The shoes last five or six days; they are of chilled iron, held in place by dove-tail; do not differ from the shoes used in other mills; their weight is 675 lbs. each. The stamps are fed with water through a three-inch pipe running under 15 lbs. pressure; the force of the blow is 80 to 90 tons; mortar, 10 tons; anvil, 15 tons; shaft, 3,500 lbs.; piston, 1,500 lbs. It takes 6½ tons of coal to each stamp per day.

There are four hydraulic separators, 52 jiggers all told for each head; making—7x52=364 in the Hecla mill. This mill turns out 60 tons of copper per day; the other mill 35 tons. They work 12 hours shift,—75 men and 70 boys in Hecla mill. Both mills have the same arrangements. The one is the duplicate of the other except in size. The slime is conducted through a discharge launder to a building, where it empties into the bottom of a huge wheel, 40 feet in diameter and 12 feet face. The water is taken up by the buckets on the inside of the wheel, which carry it up and empty it at the top into a launder that carries it out on a trestle into the lake. A portion is drawn off to the slime mill. The wheel is cogged on the outside and slowly propelled by a pinion on a shaft; the shaft being moved by a 30" rubber belt. The motion of the wheel is 4½ revolutions per minute. In the building is an engine 24"x48", which at any moment may be connected to run the wheel in case of emergency, but the power that drives it is obtained by wire rope transmission from the main engine-house.

The tail house is an experimental concern where they work up a portion of the tailings obtained from the big wheel. They work up as much of this refuse as two small heads will stamp, and thus save about 30 tons per month of mineral yielding 35% in copper. The company use no slime tables or vanners, or similar machinery other than the jiggers, to save the fine copper. The intention is to use slime tables in the future as soon as the arrangements are perfected. The tail house screens are three-thirty-seconds holes. A new boiler house 85'x210' has just been completed of brick, with slate roof, which will hold all the boilers at the stamp mills,—14 in all—6' diameter each, and 30 feet long. All the machinery in the mills is run from the main engine-house by wire rope transmission. In the same manner are run the incline, the slime discharge wheel, tail house, etc. All possibility of stoppage is provided against by having duplicated engines to run every portion of the machinery at any moment. There are nine shives for transporting the power by wire ropes. The shives are rubber lined; three-fourths-inch wire ropes are used. The shives are seven feet in diameter. The rubber lining is made of grooved sections 2½ feet long. The two engines, each with power for the whole business, are named respectively, the Erie and the Wabeck; the latter was doing the work when I visited the mill.

The great pumping engine that raises all the water for both mills is the Ontario,—its duplicate the Huron; the latter was lying idle. These four great engines in the one room are really an interesting sight. The mills are neat and orderly, and to stand in the Hecla building, watching the ponderous stamps and more quiet, but equally active, jiggers, one looks over a busy

and pleasant scene. All the stamps in the Hecla mill have been changed, and the same is doing in the Calumet mill. This change effects a great increase in the output, as the new heads have a capacity of 225 tons per day, against 160 tons, the work of the old heads. The Hecla mill had originally only three heads, subsequently increased to four; but the building has been enlarged and three additional heads put in the past year, so that there are now seven. In the Calumet mill there are five.

The railroad extension is two miles; they are building a strong, heavy trestle to run the cars to the stamp mills.

Smelting works will be built the coming year on the lake about a mile from the stamp mills.

The changes that have been made at the stamp mills in the past year are certainly great improvements and must result in great saving to the company.

The Calumet & Hecla Company has the reputation of pursuing a very liberal policy with its employés. It pays better wages than any other company. The men are anxious to work for the company and are loth to leave its employ. In some other respects the policy of the company and its methods of work are the subjects of much criticism. The Calumet & Hecla is a great mine now, and it is not likely to be of less magnitude for many years to come. It is scarcely possible that the future of a mine could be better assured than is this. The estate is so large and all the developments go to establish the fact of the continuance of the lode under the whole of it, so that the only question in the remote future, it seems likely, will be how best to reach the copper.

It is a curious fact that the stock which in April last was only at $135, had advanced in Oct. to $220. The total dividends paid to Jan. 1, 1886, is $28,-550,000.

The following table gives the product of the Calumet & Hecla mine for each year:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1867	657	1,173	1877	11,284	468
1868	2,549	375	1878	12,625	1,128
1869	6,157	1,771	1879	13,135	943
1870	7,030	1,584	1880	15,837	1,239
1871	8,111	590	1881	15,680	781
1872	8,081	183	1882	16,026	1,528
1873	9,424	265	1883	16,562	1,045
1874	10,062	1,225	1884	20,236	1,585
1875	10,736	1,954	1885	23,623	1,990
1876	10,845	732			
Total tons				218,689	1,217

The Calumet & Hecla Company, contrary to the custom that prevails among the copper companies of Lake Superior, is not disposed to give any details of the cost of production, etc., neither is the management willing to allow me to examine the map of the mine or to allow a copy of it to be printed in this report, a thing I very much desired to do. Such details as I have given were furnished me by the officers of the company, or deduced from the facts so obtained, and there is very much more of a descriptive character that I might have added, but it has been said before, in the main.

The officers are J. N. Wright, Agt., Calumet, Mich., Chas. W. Seabury, Sec. and Treas., Boston, Mass.

THE TAMARACK MINE

is now a reality; it is no longer a matter of conjecture, a thing of the future, a problemetical shaft, driving downward vertically a half mile into the earth, but it is an accomplished fact.

The Tamarack is now a mine, already producing copper on a large scale, and rapidly stepping to the front, soon to be second only to its great neighbor in the list,—the youngest and among the most vigorous of our mines.

In every particular this great enterprise has been a success; from its conception, from the time the first blow was struck, there has been no deviation, no change and no delay; the work has progressed steadily to its conclusion. All the statements and estimates that were primarially set forth by the promoters of the scheme, are fully verified in the result. The lode was found at the estimated depth and within the time and cost allotted for the work. And now that it is probed, after the long traverse through seemingly impenetrable rock, the deposit is proving to be all that the most sanguine could reasonably hope for. Altogether the Tamarack shaft is one of the boldest and most successful mining enterprises on record, and reflects immeasurable credit upon those who have planned and executed the work.

The Tamarack Mining Co. was organized January 1, 1882, for the purpose of sinking a shaft to the Calumet and Hecla conglomerate, which it was believed existed in the company's property at a depth of one-half a mile and upwards beneath the surface. All that could be certainly known was that the Calumet lode had thus far, in its downward course, proved persistent and there was a reasonable probability that it must continue in its course and its richness, and thus be possessed by the Tamarack people to the extent of that company's domain. But the matter could only be proven by years of labor and great expenditure, to result, if successful, in an abundant reward, and, if the reverse, in corresponding failure and loss. Messrs. Clark, Bigelow and Daniell fortunately possessed the faith and courage to undertake the enterprise and the ability and persistence to carry it through and in the end to see the realization of their strongest hopes.

The work of sinking this remarkable shaft was begun in February, 1881, and on June 20, 1885,—3½ years from the date of the commencement,—the lode was struck. It is an example of the most rapid sinking, in hard rock, that has anywhere been done.

The lowest monthly rate of sinking in 1882 was 42 feet, and the highest, 59.8 feet; the average per month for the year was 41.4 feet. In 1883 the lowest monthly rate of progress was 44 feet, highest 67 feet; average for the year, 59.7 feet. In 1884 the lowest monthly rate of progress was 58 feet, highest, 70 feet; average, 63.4 feet; 1885,—lowest, 60 feet; highest, 68 feet;

average, 64 feet. Total depth from surface to Calumet lode, 2,270 feet. The varying rate of progress is due, it is said, to the character of the rock which was encountered. Thirty-two different beds of rock were met with in the first 1,200 feet, dipping northwesterly about 39° with the horizon. Among these beds was the Allouez conglomerate, which was but two feet in thickness at the point where it was cut, and carried but little copper. An amygdaloid bed that was intercepted proved better,—three tons of copper were obtained in passing through it, and other similar beds were cut, showing more or less favorable indications.

From a depth of 350 feet down very little water settled in the bottom of the shaft; the percolation above, however, is sufficient to keep the timbers thoroughly saturated and to cause some dripping down the shaft,—a good security against fire. The timbers are 10″x14″ in size, and there is not the least particle of evidence of an excess of pressure.

The cost of sinking, all expenses included, was $61 per foot. Rand's little giant drills were used in sinking the first 1,400 feet, and then two of Rand's "sluggers" were introduced; the latter were found very suitable in extremely hard ground. The little giant is admirably well adapted to the work of penetrating rock of ordinary texture. Eighteen to 24 holes were drilled in each 24 hours' time, varying in depth from five feet to seven feet. They worked six days per week.

Giant powder was the explosive used in the early part of the work; later, that made by the Hancock Chemical Co. was used; the per cent. of nitro glycerine varying from 40 to 50, according to the hardness of the rock.

The total expenditures to January 1, 1886, have been, in round numbers, $274,000; the assessments amount to $330,000. The expenditures in December last were $14,060, and against this 125 tons of copper were taken out.

They pay now for sinking $28 per foot. The cross-cuts from the shaft to the lode costs $8 per foot average, and driving in the conglomerate, costs $12 to $15 per foot. The cost of stoping varies from $10 to $14 per cubic fathom. Objection is raised to the great depth of the shaft before the lode is reached; but this seeming obstacle is speedily dissipated into thin air when we consider the perfection of the mechanical appliances for overcoming it. One can go to the bottom of the Tamarack shaft or rise to the surface from its greatest depth in nearly a moment of time and with nearly as much quietness and safety as he may ride in a hotel elevator. The rate of hoisting in the copper mines has usually been not in excess of 400 feet per minute. The Calumet and Hecla with its new machinery hoists 800 to 1,000 feet in this time, but its skips run on rails inclined 39° to the horizon. The Tamarack in its vertical, cage, shaft, operated with the minimum friction, will as easily hoist 1,600 feet to 1,800 feet per minute, the same load, so that they are, in point of time, no deeper, practically, at 2,000 feet down than others limited to the old rate of speed are at 500. The shaft is now (February, 1886,) 2,360 feet deep. The plumb lines, which Mr. Klepetko, the mining engineer, has dropped to the bottom, show it to be perfectly straight and true. It is substantially made, 19x7 feet inside the timbers, divided into three compartments, and every provision is made for safety.

The ropes are new, made of the best steel wire, and possess a strength far in excess of the strain to which they are subjected.

Each cage is provided on either side with automatic, self-acting, safety dogs that instantly clutch the guy posts and stop the cage, if by breakage or other cause the rope slackens.

Two compartments will be used for hoisting; the third one for carrying the men, and for timber, etc.

This latter cage will have an entirely independent plant of machinery designed especially for it; the compartment is not yet in operation, but is rapidly approaching completion. The rock house is joined to the shaft house, the screen dump being but 25 feet from the mouth of the shaft. The capacity of the rock house is equal to 1,000 tons per day; it is one of the best on the lake; is covered with iron to render it fire-proof, and is of ample size, well arranged and provided with every facility to meet all the future work of the shaft. The present shaft house is of wood, but it will soon be displaced by one wholly of iron,—iron frame and iron covering. The engine house is 112 feet southwest from the shaft; it is sheeted with iron inside, and such other precaution taken as to eliminate as far as possible the danger from fire. The two hoisting engines are each 30″x72″. The winding drum is coned at the ends, the central portion being cylindrical; end diameters 14 feet, central diameter 18 feet. The engineer can tell at any moment at what point the cage is in the shaft.

It is possible that the maximum product the company will hoist in this single shaft will be 600 tons per day, but the shaft has, undoubtedly, a capacity of 1,000 tons of rock per day.

By using the two compartments,—doubled-decked cages in each,—1,000 tons can be hoisted per day and cared for in the rock house.

This amount would employ a force of about 350 men; at present the company has, all told, 122 men,—66 drill men working 11 drills, 5 landers, 20 trammers, 12 timbermen, 5 men in engine house, and three men and a boy in the rock house. The average underground wages being $2.00 per day.

They are now hoisting an average of 200 tons of rock per day. The December product was 125 tons of mineral; January, 174 tons, and February, 200 tons—the product for March was 250 tons—obtained from a total of 12,000 tons of rock, thus showing a yield of 4 1-6% of mineral, which yields 76% of copper. In January they stamped 4,310 tons of rock, obtaining 174 tons of mineral, equal to 133 tons of copper, or to a percentage of 3 1-12% ingot. The rock is treated in the Osceola mill, at Torch Lake, 7 miles from the mine, and reached by the Hancock & Calumet Railroad, a line that has been built and equipped from Calumet to Hancock, via the Osceola and the Tamarack mines, with a branch to Lake Linden and a switch to the stamp mill, etc., during the past year by the Tamarack and Osceola Companies.

Of course, the first thing in order is a stamp mill, and one will be built in the near future adjacent to the Osceola mill. It is expected that the earnings of the mine will provide the necessary funds. The mine produced in February 150 tons refined copper, worth 11 cents per pound. The cost is not much above $3 per ton of rock now, and the rock yields 61½ lbs. refined copper to the ton, so that the cost of the copper is not much above 6 cents per pound—a good margin of profit, to accumulate the money to build a mill and for other necessary expenditures.

The mine is looking well; the lode averages about 12 feet wide, and so far as opened is all good ground, that is, all the vein carries copper; not in equal amount, however; some of it is very rich, but the rich rock and the poor are everywhere, in all parts of the lode. If a light is thrown upon a smooth, vertical section of the deposit, it shows the rich and poor rock nicely; the dark, barren portions are strongly contrasted with the segrega-

tions of light colored rock richly impregnated with mineral,—a small amount of rock—5%—is rejected; this comes in part from the hanging, but also, mainly, from a deposit of sandstone that occurs in the vein south of the shaft. It is of variable width, but at no place takes more than five feet of the vein: sometimes against the hanging and again leaving a few feet of rich conglomerate between it and the hanging; in places it is simply a thin seam and wedges out entirely. So far they have no rich shutes of copper, as are found in the Calumet and Hecla, to bring up the average percentage, a difference, however, that is more than compensated for by the comparative diminished cost of production in the Tamarack.

There is nothing non-essential to be seen about the mine. The machinery, etc., is simply what is required for the work. The whole plant and arrangements are snug and compact and economically operated. I deem it altogether probable that the Tamarack may produce copper more cheaply than any mine in the world. The mine itself is airy and comfortable; there is no pleasanter mine to be in, nor one which can be more easily entered or ascended from. It may be remembered that the shaft is in the corner of the company's property, which afforded the shortest distance to the lode, in the S. E. corner of the W. ½, S. E. ¼, Sec. 14, T. 56, R. 33. The whole estate comprises 1,280 acres, all in sections 10, 11, 14 and 15, town and range above given. The shaft is 260 feet from the corner horizontally measured at right angles to the strike of the formation, and the length of vein passing through the shaft from the east line to the south line is 570 feet; that is the triangular portion of the lode embraced between the lines and having its apex at the corner and lying above the shaft, is 570 feet base by 335 altitude. The dip of the lode—39°—gives nearly 100 feet of length of vein for each 60 feet of perpendicular, i. e., of vertical depth.

The ground above the shaft is opened in three levels; the upper being 104 feet, horizontally, from the corner, and the length of the lode between the lines is 224 feet. The second level is 65 feet, vertically, below No. 1, and has a length of lode between the lines of 400 feet. The third level is 57, vertically, below the second, and may be opened a length of 570 feet. At the time of my visit they had sunk the winze and driven the cross-cut for the fourth level. The winze was throughout as rich conglomerate as any I saw in the mine. Of course the mine is not largely opened, as only five months have elapsed since this opening work began. The levels are connected by winzes in the lode, and there are heavy pillars to protect the shaft when it passes through the conglomerate. Otherwise than those the vein will be all taken out, leaving in addition about 40 feet of the deposit standing along the lines of the property.

The shaft will be continued down vertically and the lode reached by cross-cuts from the shaft, driven at suitable intervals, probably at every second level. Of course these cross-cuts lengthen as the shaft deepens, but the matter of driving now is so quickly done and costs so little, comparatively, that it is of minor importance to what it would formerly have been. Aside from the mere question of cost, the vertical shaft possesses advantages that are very great; these are the concentration of work done to the rapidity of hoist; the safety and permanency of the shaft, due to the fact that it is all the way in solid rock, in the foot wall, where nothing can disturb it; also the fact that but little timbering will be necessary; the copper deposit will all be taken out, saving the cost of timbers and of pillars. The obviating

of the necessity of having pillars is a valuable consideration, when we remember that the rock is worth $3.50 per ton standing in the mine, and the further fact of the great cost of timbering that would have to be met if the system of mining adopted should require that the mine be kept intact.

One cage comes up as the other descends, but one drum being necessary; in fact there is the least machinery for the amount of mining done of any mine in the district.

It is planned to sink No. 2 shaft, the location for it has been made, and preliminary steps taken to begin the work of sinking. The shaft will be 731 feet north of No. 1 and will intersect the lode at 325 feet below the horizon in which No. 1 intersects it. The north and south line connecting No. 1 and No. 2—parallel with the east line of the property—forms the hypothenuse of a right angled triangle of which No. 2 is at the angle of the base, No. 1 at the apex, and the perpendicular and base are respectively 416 feet, and 600 feet in length, measured horizontally.

The former distance is the length of the cross-cut from No. 1 at right angles to the formation; the base is the line of the strike of the lode at the point where the shaft will intersect it. The distance from No. 1 at right angles to this line of strike and measured on the plane of the vein, will be 528 feet, that is No. 2, which will be the same distance from the east line of the property as No. 1, will be 731 feet further north from the south line, and also 676 feet from the southeast corner, measured at right angles to the formation. This location of the new shaft was determined with the view of making a proper distribution of the ground to be stoped, and so dividing it as to make the most economical working of the two shafts. It will be 6′x18′ inside the timbers and be divided into three compartments same as No. 1. These two shafts have a capacity of 2,000 tons of rock per day, equal to a daily product of 60 tons of ingot copper, which I venture to predict will be produced, as I before stated, at a lower cost than any equally large amount of copper has been heretofore put on the market. But while restricted to the Osceola mill it is not probable that a greater average monthly product than 350 tons will be reached.

The capital stock of the company is divided into 40,000 shares having a par value of $25 each, but which were worth in April last $33, and at the present time are quoted at $90, at about which figure they have been held since October.

Joseph W. Clark, Prest.; A. S. Bigelow, Sec. and Treas.; John Daniell, Agt.; John B. Quick, Mining Capt.

The following rules for the government of employés are of general interest to mining men, as showing the precautions that are taken:

TAMARACK MINE.—RULES AND REGULATIONS.

1. The officers at the head of the several departments of work shall be on hand every day before the whistle blows.
2. Chief machinist shall see that indicator-points for the guidance of engineers in hoisting are correct every morning. It is his duty to examine ropes and cages and to report their condition weekly. To see that shieves are in good repair and properly oiled.
3. Chief mining captain will be responsible wholly for proper timbering of the mine. He shall ride slowly through the hoisting shafts not less than twice weekly, so that an examination of the guides can be carefully made, and the condition of timbers in sides and ends of shaft noted.
4. The under captain shall be ready with the trammers to go into the mine at 6:50 a. m. Contract miners will be at liberty to go down ten minutes earlier than this, and men on company account must follow the trammers. An officer of the mine must be in the shaft house when men are being lowered, and he shall not be at liberty to change this rule without good reasons. The number of men in the cage at one time shall not exceed ten.

5. On change of shift it shall be the duty of one mine officer or one timberman appointed by the chief captain, to come out of the mine with last cage. This to make sure that all the men are out of the mine, and that no lamps, candles, or fires are left burning underground.
6. The signalling of engineer must be done at surface by the lander. He must ring four bells invariably when men are in the cage. Men must start from lower floor of shaft-house until the captain reports them as all down. Afterward, if it is necessary for anyone to go into the mine, he must start from the landing floor above.
7. The lander shall not signal engineer to stop or reverse engine while he may be hoisting except in cases of extreme urgency.
8. In the time devoted to hoisting nothing shall be sent into the mine that will not go into the car, and so be run on to the cage, without special instructions from the mine captain. Such cases shall be reported by the lander.
9. It is understood that at no time shall all the working officers leave the mine location. The mine captain and surface captain shall make such arrangements as may be necessary to comply with this rule.
10. Every day the chief machinist shall try the fire pump, and test the fire hose at least once a week, oftener in the summer season. It shall be his duty also to know that the mine pump is always in order for forcing water to the roof of the shaft-house.
11. No smoking shall be allowed in engine-house, rock-house, in the shops of the mine, nor in the change-house. For mutual protection employés are requested to assist in enforcing this rule.
12. No admittance is allowed to engine-house without business, and every person is forbidden to hail or talk with engineer while he is on duty. This is deemed very important and must be enforced.
13. Engineers must, on being signalled, make due allowance for hoisting and lowering men, and be sure to know the brake gear is in good order before the commencement of work.
14. It must be understood that an empty cage is not to be sent to surface. When this is absolutely necessary engineer must be signalled by four bells.
15. Miners' supplies will be delivered at shaft-house when orders are left with the supply clerk. The mine captain will order the time of sending same underground. Deliveries will be made twice weekly—Monday and Thursday.
16. Orders from mine captain or timbermen sent from underground to machinist or surface captain for supplies, must be attended to promptly.
17. Employés quitting the service of the company should give a week's notice. In default of this, settlement will not be made until the expiration of that time.
18. Watchman will allow no stranger to enter shaft-house at night.

JOHN DANIELL, *Agent Tamarack Mining Company.*

Dated December, 1885.

THE OSCEOLA MINE

has a valuable history. No company has achieved better results, all things considered, that the Osceola. At no mine has the success which has been attained been more dependent upon the use of modern appliances in mining work and the intelligence and energy of the management.

The lode possesses every degree of irregularity, and there is so much dead ground that the mine has had to be very largely opened in order to secure the product that has annually been made and the work has been done in a most effectual and economical manner. The misfortune in the Osceola mine is that the best ground is in the north end; the levels in this end are constantly shortening as the mine deepens. This is due to the fact that the Calumet and Hecla joins it on the north, and that the line of division of the properties, up to which the workings closely reach, bears north, 39° east, while the dip of the mine averages about 39° northwesterly, thus the boundary cuts diagonally across the lode, shortening it on the Osceola and lengthening it on the C. and H. The reverse is the case at the south end of the property, where the company has plenty of room to extend, but unfortunately the ground has not proved as productive in that direction. However there are signs of improvement; the south end is certainly better in the bottom than it has been heretofore.

The company began the year by making an output of rock of 500 tons per day, which continued until May 20, when the work of removing the mill was begun. It was taken down and reërected at Torch Lake, and on Nov. 17 two heads of stamps were again at work. In December 3 heads, and in January 4. During the time of removing the mill most of the force was employed on the new railroad, which was built to connect the mine with the mill. The underground openings were pushed, so that the mine is extensively opened. The mining cost for the five months when the mill was wholly idle was $46,076.60, which is really an investment to be realized upon the coming year, since it is mainly for opening, etc.

Omitting the expenditure for the five months, from June to October, and the cost of handling the rock was cheaper than ever before.

The No. of tons hoisted while the mill run were	14,515
No. of tons hoisted while the mill was idle	5,095
No. of tons hoisted from west amygdaloid	562
Tons of rock sent to mill were	72,923
Tons of rock rejected	22,310

The proportion discarded was in excess of the usual quantity because the stopes were so long unworked.

	Lbs.
Mineral obtained from the mill	2,104,790
Barrel work from mine	89,868
West amygdaloid	67,440
Total	2,262,098

The yield of ingot was	1,939,169 lbs.
Per cent. of ingot in mineral	85.724 per cent.
The rock hoisted was equivalent to	5,290 fathoms.
The yield in ingot was per cubic fathom	366.57 lbs.
The yield in ingot per fathom in 1884 was	352.57 "
The rock yielded in ingot to the ton hoisted	20.36 "

No. of feet of shafts sunk	965.7
No. of feet of winzes sunk	246.9
No. of feet of levels driven	4,333.3
Total	5,545.9

No. of feet of winzes sunk in west amygdaloid	61.6
No. of feet of levels driven in west amygdaloid	336.9
	697.6
Total feet of openings	6,243.52

	Feet.
No. 1 shaft was sunk 97.5 feet, its total depth from surface is	1,397.1
No. 2 shaft was sunk 261.1 feet, its total depth from surface is	1,626.3
No. 3 shaft was sunk 254.3 feet, its total depth from surface is	1,646.1
No. 4 shaft was sunk 322.7 feet, its total depth from surface is	1,357.6

No. 1 is 18 feet below the 15th level; No. 2 is 8 feet below the 18th level; No. 3 is 25 feet below the 18th level; No. 4 is 8 feet below the 15th level.

The drifting down in the 8th level was 124.5 feet; in the 11th level 267.6 feet; in the 12th level 443.5 feet; in the 13th level 485.7 feet; in the 14th level 530.5 feet; in the 15th 1,068.6 feet; in the 16th 583.3 feet; in the 17th 668.3 feet; in the 18th 151 feet.

There has been no effort to extend south of No. 4 shaft. The shaft has been sunk and the connections made with No. 3. It is intended to open south of No. 4, however, the coming year, and good results are anticipated, based on the apparent tendency of the copper to make from above in that direction. The mine is so variable that there is very little use to conjecture what any opening work will develop. The quality of the ground is very uncertain. Nos. 2 and 3 are connected in the 15th, 16th and 17th levels and the ground is generally good; the 18th is good all the way north of No. 3,—south it is poor. About No. 3 shaft, it is thought that the ground is better than the average of the previous year and that it is better than it was a year ago.

The Conglomerate mine has been drained to the third level during the past year, and a cross-cut 67 feet long in the third level, made to the

Amygdaloid west; drifting south of the cross-cut, 166½ feet, has been done. The opening showed copper nearly all the way, in quantity sufficient to pay for working; but in following the copper ground it brought out into the Conglomerate. A winze is sinking under the second level and is down now 40½ feet in good ground; they are stoping to meet it in the third level. When the connection is made they may get at a better knowledge of the facts. I should regard this west Amygdaloid as very unsatisfactory ground to work, it is so very irregular and very uncertain. It the second level they have opened a length of 520 feet, but it is not as productive as in the third. The product is mainly mass and barrel work, not much stamp rock. In 1884 this mine yielded 150 tons of copper. The Conglomerate (C. and H.), which underlies this west Amygdaloid has in places a remarkably good hanging wall. Where it was worked out 10 years ago in large chambers the roof remains perfect. At other points it was broken up,—where the the hanging is broken and poor the conglomerate is said to have carried copper, but in the portion having a firm hanging, the conglomerate was proportionally barren, and the amygdaloid was good,—giving rise to the theory that the broken rock between the lodes allowed the copper to pass from the amygdaloid into the conglomerate.

The moving of the stamp mill and additions and changes, etc., cost $63,-659.74. The mill is now as good as new, is built on the sandstone ledge; the R. R. track to the rock bins is 75 feet above the lake, and the floor of the tail house 14 feet. Everything about the new mill is convenient and of the most approved and substantial character. A dock and warehouse have been built; the former is 324 feet long, provided with facilities for handling freight. Also there are a new blacksmith shop, cooper shop, and five good dwelling houses,—all at the mill site. The company has three-fourths of a mile frontage on the lake.

A new hoisting plant has been put in at No. 3 in the past year. The shaft is double skip track, and one of them is used for hoisting rock, the other for taking the men up and down. The track for this purpose has been carefully lined up, it is straight as an arrow and laid with steel rails. The car for the men is in the form of stairs on which the men stand in rows on each step. The best steel rope is used and the hoisting machinery is employed for no other purpose. I judge it to be a very excellent arrangement for taking the men in and out of the mine.

The old machinery was removed to No. 4 and suffices for that shaft. The mine is fully equipped for some years to come. They are hoisting in No. 3, 200 skips in 10 hours,—with the old machinery could only hoist 60 skips in same time. The new machinery has many devices that makes it a very desirable plant.

STATISTICS OF COST AND OF WORK.

PERCENTAGE OF WHOLE EXPENSE IN EACH DEPARTMENT OF WORK.

Of rock-house to whole expense	.04856
Of transportation to whole expense	.06432
Of stamping to whole expense	.10701
Of incidental to whole expense	.03005
Of surface to whole expense	.01203
Of office to whole expense	.03045
Of amygaloid mine to whole expense	.63881
Of west amygdaloid to whole expense	.06824
Total	1.0000

COST OF AIR DRILLS.

Miners	$630 50
Smiths, carpenters, machine labor	3,067 36
Steam, fuel	9,918 02
Supplies	2,531 97
Total	$16,147 85

TRANSPORTATION EXPENSES.

Tons of rock transported	72,923	
Amount paid railroad company		$12,557 48
Shoveling snow		719 19
Loading cars		466 55
Total		$13,743 22
Transportation cost per ton of rock		$18 85

STAMP MILL EXPENSES.

Superintendent	$784 80
Engineers	635 76
Firemen	1,014 13
Carpenters	691 05
Watchmen	271 75
Machinists	574 90
Smiths	415 70
Head trammer	510 08
Stamp feeders	2,166 41
Oilers	510 52
Sundry labor	860 77
Tramming	254 45
Overseers of wash-house	496 90
Copper washers	583 35
Laborers on machines	2,137 55
Tail house	565 55
Total	$12,660 12
Cost of fuel	$11,496 00
Illuminating oil	250 80
Lubricating	482 88
Hardware	109 67
Iron and steel	142 21
Tools and machinery	261 00
Waste	58 68
Packing	34 13
All other supplies	247 33
Total supplies	$13,082 60
Labor account brought down	12,660 12
Incidental	253 82
Credits—stamping for Tamarack Co	3,131 00
Total stamping expenses	$22,865 04
Labor account per cent	.5304
Supply account per cent	.4695
Total number of days run	394.33
Total No. of tons of rock stamped	76,054
Total No. of tons stamped per ton of coal used	24 431-1000
Pounds of mineral produced at the mill	2,104,790
Per cent of mineral in rock	1.443
Cost of stamp and washing per ton of rock	31.35 cents.
Barrels and masses	157,308 lbs.
Total lbs.	2,262,098
Total lbs. of ingot	1,939,169
Per cent of ingot	.85724

EXPENSES.

Total incidental expense	$6,421 00
Total office expense	6,612 67
Total surface expense	2,569 81
Total construction expense	22,606 05
	$48,019 44
Total cost of removing the mill	$63,659 78
Cost of ingot per lb	8.843 cents.
Total average No. of men employed	435

OSCEOLA CONSOLIDATED MINING COMPANY.

BOSTON, February 11, 1886.

The following statement of business for 1885 shows that the surplus of the Company has been reduced from $231,530.20, as it stood on January 1, 1885, to $102,281.60 on January 1 of the present year.

The Mineral Range Railroad Company, in years gone by, has transported the rock of this Company from its mines to its stamp mill on Portage Lake, a distance of about twelve miles, but has charged most exorbitant rates for doing the business. There was also reason to expect that the United States Government would interfere with all the stamp mills of Portage Lake at no distant day, and compel them to desist from filling it up with their sands.

It was therefore decided by the Directors, early in the year, that the only way open for the Company to relieve itself of the burdensome railroad charge, and at the same time to anticipate any action which the Government might take, was to move its stamp mill from Portage Lake to Torch Lake, and to participate in the building of a railroad to connect its mines with that point. A most favorable site was found and purchased, and on the 20th day of May last the stamp mill was stopped and the work of removal begun. On the 17th day of November following, the mill resumed work at its new location, with the new railroad, called the Hancock and Calumet Railroad Company, running regular rock trains from the mines; and the Directors can now assure the stockholders that their mine is in a condition of equipment equal to any mine in the district for economical production. During this change the opening work of the mine was prosecuted with all vigor, and almost a year's reserve was added to the visible supply of productive ground. We have also the old mill site left, with its dock and warehouse, carpenter's and blacksmith's shops, barn and five dwelling houses. This property is valuable, and should be in demand.

These remarks explain how the surplus of the Company has been decreased. The work of moving the mill and setting it up on its new site cost, altogether, $63,659.78. This is made up of the following items:

Taking down, freighting and re-erecting old plant, making additions and completing	$41,476 56
Cleaning land, making roads, etc	2,666 79
Dock and warehouse	3,473 55
Adit and pump shaft	2,000 00
New pump	2,142 88
New washers	2,400 00
Constructing dwelling houses, carpenter's and blacksmith's shops	9,500 00
The other construction work which was necessary was new engine and plant at No. 3 shaft, and moving the former engine there to No. 4 shaft, and providing pump house and pump on West Amygdaloid, which has amounted to	22,606 05
And the expense of keeping up the openings in the mine while the mill was being moved, was	46,076 60
Making an aggregate sum of	$132,342 43

Which was taken almost entirely from the surplus. The Directors wish to say that the foregoing summary was taken in the main from the elaborate report of their Superintendent, Captain John Daniell, which is on file at the office of the Company, and open at any time to the inspection of the stockholders. It is impossible to predict as to the future price of copper, but the Directors feel warranted in saying that there is more than a reasonable prospect of the Company's earning a handsome profit the present year with copper at to-day's price.

STATEMENT OF BUSINESS FOR 1885.

For sales of 1,939,169 pounds copper at 10 75-100 cents		$208,558 65
From sales of real estate		3,052 25
From interest receipts		2,852 09
Add balance of assets January 1, 1885		231,530 20
		$445,993 19
Expenses at the mine were	$213,674 08	
Other expenses, such as smelting, transportation, insurance, etc., were	43,771 68	
Expenses of construction were	86,265 83	
Total expenses		$343,711 59
Leaves balance of assets, January 1, 1886		$102,281 60

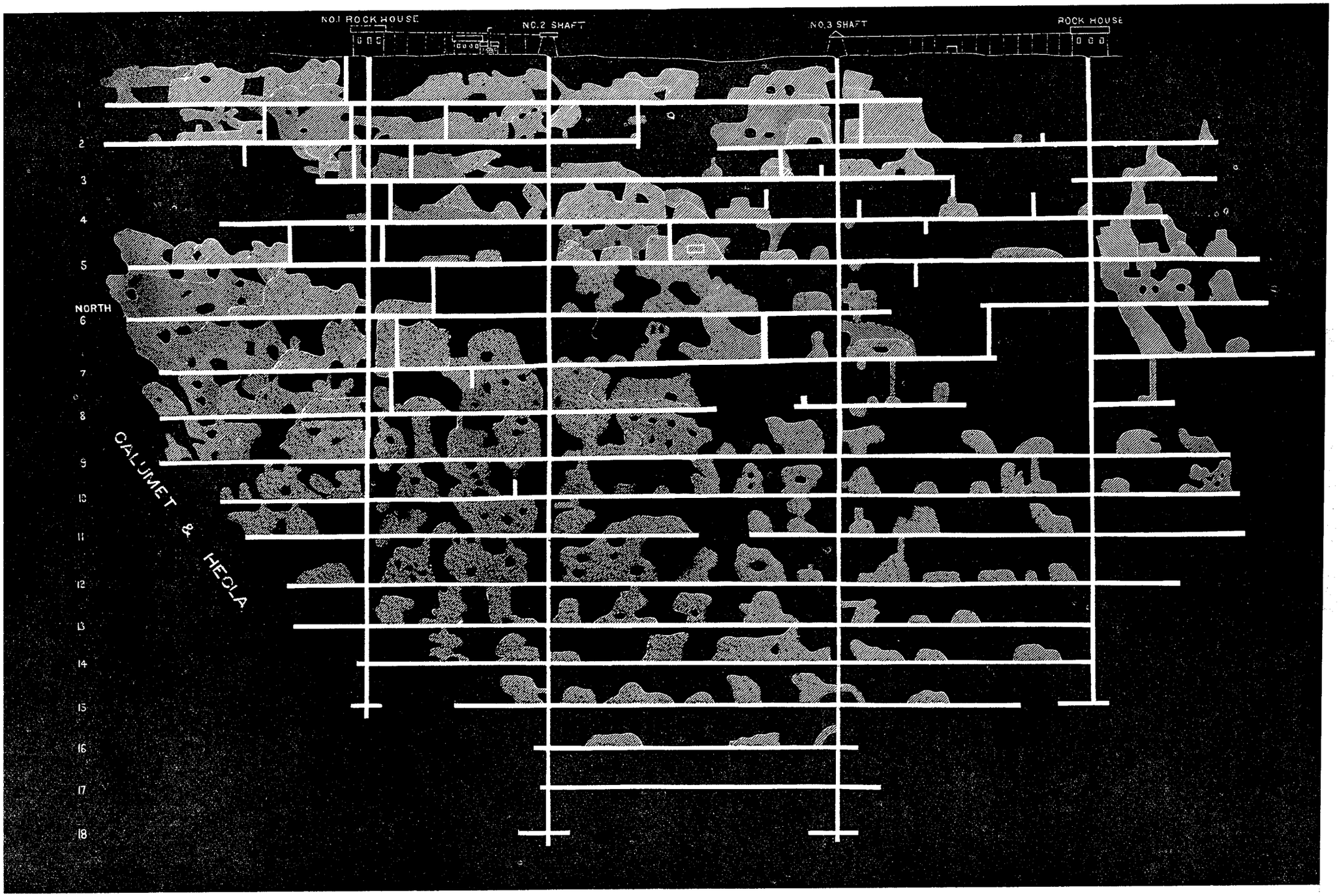
The Osceola has paid in dividends, $1,135,000.

The yearly product has been as follows:

Years.	Tons.	Pounds.	Years.	Tons.	Pounds.
1874	468	.....	1880	1,691	1,387
1875	665	303	1881	2,089	1,876
1876	846	1,737	1882	2,088	782
1877	1,382	777	1883	782	2,128
1878	1,352	1,998	1884	2,123	1,630
1879	1,589	1,387	1885	969	1,169
Total				17,405	1,705

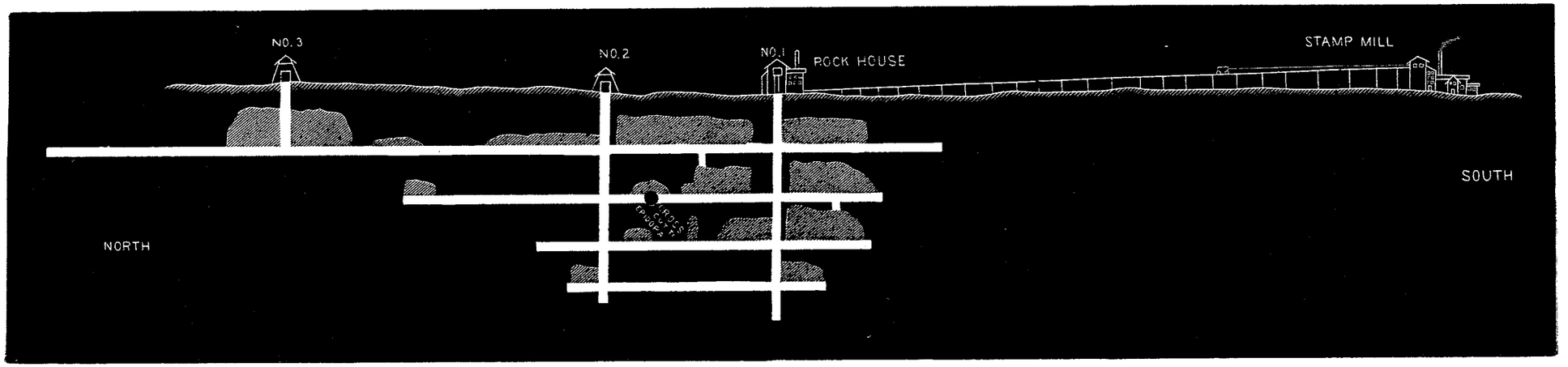
LONGITUDINAL SECTION OF THE OSCOLA MINE, IN THE AMYGDALOID DEPOSIT, JAN., 1886.

Scale' 240 ft. to one inch.



LONGITUDINAL SECTION OF THE PENINSULA MINE, JAN., 1886.

Scale, 240 ft. to one inch.



THE ATLANTIC MINING CO.

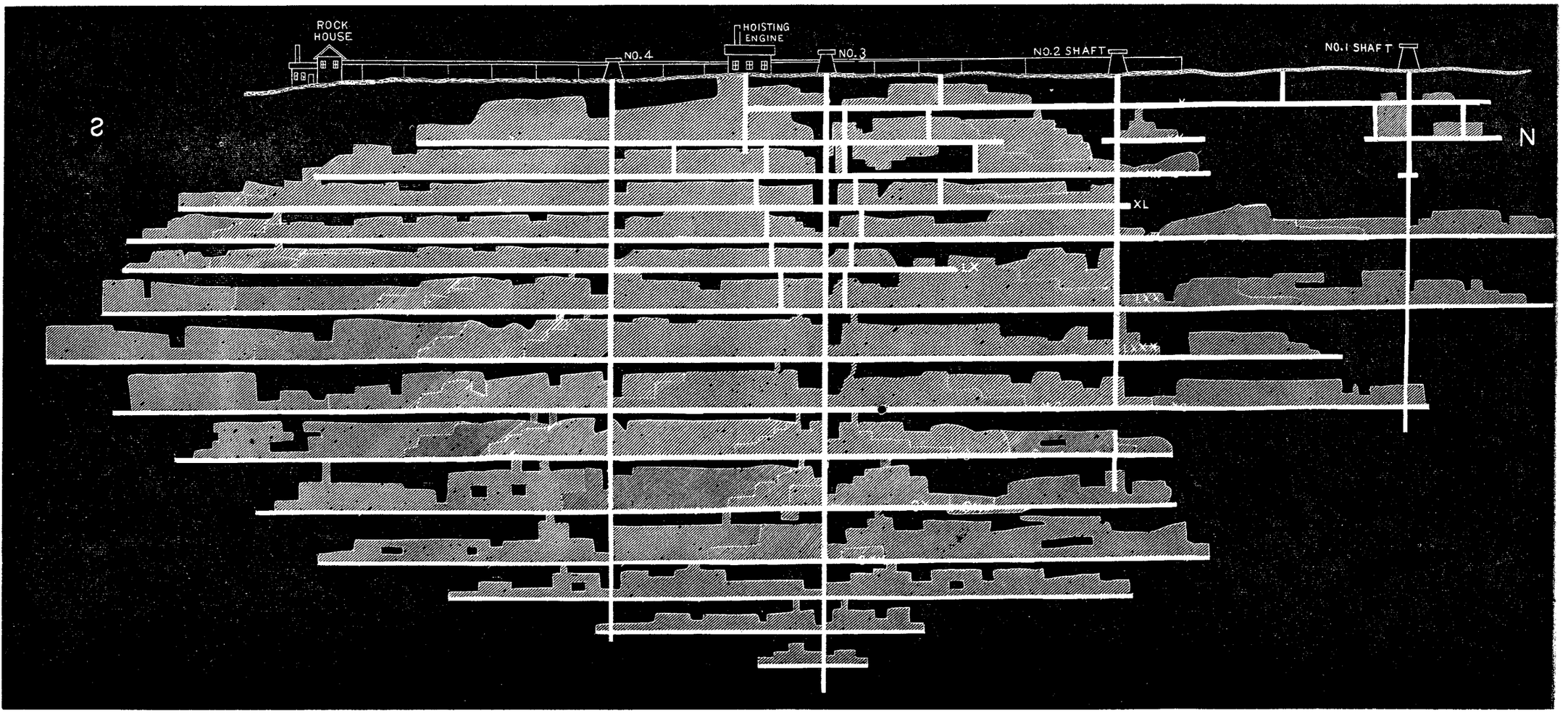
still holds the even tenor of its way and continues to secure the extraordinary low mining cost which has characterized its history and in this particular has placed the mine at the head of the list of mines in this country, and probably of the world. It does not seem possible that rock which affords less than 15 lbs. of copper to the ton, worth in the market $1.65, can be mined and manipulated so cheaply as to enable the company, each year, after paying all expenses, ordinary and extraordinary, to return to the stockholders a dividend of $1.00 to $2.00 per share; yet this has been regularly done, even with copper at a lower price than it has ever before sold for in the history of the country. How this is done I have endeavored to explain in the previous reports.

It is due, in brief, 1st to the deposit itself, which is a comparatively soft amygdaloid, not so soft but what it breaks well under the action of blasts, and dipping at an angle which allows all the dirt to slide freely to the bottom, and which is wide—having an average of 14 feet in width—and uniform, so that it is all stoped out; 2d, to the completeness of all the arrangements and facilities for doing the work economically, and 3d, to the excellent management both at the mine and at the stamp mill. The work in all its details seems to leave nothing to be desired. I have been underground through the mine recently, and I observe no change since three years ago, except in the matter of depth and extent of opening. The method of mining is the same; the contracts are let for the whole lode, $8 per cubic fathom, and in addition the company pays $7 per running foot for a drift 5′x6′; shaft pillars are left and floors to the levels, otherwise the lode is all mined out. Some stull timbers are used to hold up the hanging where it is necessary, and also for a floor in the upper back stopes. No. 3 is the only shaft that is sunk. They drift each way from it to No. 2 and No. 4, and rise up to hold these shafts. Sometimes the hanging wall is troublesome, owing to the occurrence of crossings and slips in the rock. In the fifth level, south of No. 2 shaft, is a block of good ground that is standing on account of the poor hanging. The plan is to take it out and to fill it with rock. The map shows the work done and the ground opened that is to be taken out. The skips hold 1½ tons; larger ones would be used, but the shafts are too small. The shafts are not well distributed; there is too long a tram south of No. 4 shaft. No. 1 has been lowered six levels since 1883—from the xxx to the xc. The lode under No. 1 is harder ground than in the south part of the mine; it looks leaner, but Capt. Tonkin states that the average yield is about the same, though the copper is coarser. The mass copper and barrel work amount to four to eight tons per month, most of which comes from the north end.

The depth of the shafts is, respectively, No. 3, 1,210 feet; No. 4, 1,040 feet to the 13th level; No. 2, 900 feet. They hoist in No. 2 from the ninth level. The maximum length of the mine is 3,560 feet, varying in width from 10 feet to 25 feet, with an average of about 14. A new stamp level has been added at the mill, making five now in use. The launder is two miles long and has an inclination of one-eighth of an inch in 16 feet; its transverse section is 16″x16″. In point of economy the launder is far preferable to pumping the water from the lake. They work 21 air drills and have a new single compressor to be used in case of emergency; same size as the others.

LONGITUDINAL SECTION OF THE ATLANTIC MINE, JAN., 1886.

Scale, 300 ft. to one inch.



They have had two fires at the mine within the year or two past; in October, 1884, the roof of the engine-house was burned off which delayed the work in the mine four days. Candles are generally preferred in the copper mines to lamps. Capt. Tonkin states that he introduced lamps in the mine on trial, and found the relative cost to be $1.00 per day in favor of candles. The trial lasted for a month.

The following table gives the important results of the mine's operations for the p: st 11 years:

	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.
No. of tons of rock stamped	80,000	96,696	105,780	121,709	112,668	169,825	176,555	189,800	195,669	209,510	241,010
Yield of ingot per ton, in pounds	19.58	18.99	19.42	18.50	19.00	14.27	14.36	13.866	13.708	15.1	14.86
No. of fathoms broken in mine	5,628	6,550	7,091	8,299	8,665	9,929	9,240	10,170	11,163	12,210	13,403
Yield of ingot per fathom, lbs.	278	280	290	243	266	244	2,735	259	240	259	267
Cost in cents per ton for stamping and washing	8.796	6.709	5.779	4.885	4.244	3.813	4.254	3.707	3.535	3.995	3.036
Total cost per ton of rock mined, etc.	3.90	3.58	3.08	2.78	2.33	2.25	1.96	1.9082	1.7789	1.71	1.436
Total average cost per pound, ingot	22.12	18.95	16.37	16.83	12.20	15.84	13.68	13.76	12.56	10.87	09.36
Average price per lb. received for copper	.2247	.2135	.1854	.1615	.1630	.1997	.1712	.1756	.1500	.1181	.1116
Dividends paid	------	------	------	20,000	30,000	40,000	80.000	80.000	40,000	20,000	40,000
Net profit per ton of rock		.44	.51	1.01	.87	.5000	.4711	.4958	.2483	.0919	.2205
Per cent of copper in rock	.976	.949	.971	.925	.95	.713	.718	.693	.685	.755	.743
Gross value of products per ton of rock	------	------	------	------	------	------	------	2.40	20.272	1.734	16.565

The total expenditures of the mine down to the close of the year 1885 amounted to the sum of	$5,712,117 83
The capital stock paid in, $17.50 per share	700,000 00
Assessments	280,853 15
The aggregate sales of copper amount to	4,803,229 79
Dividends paid	320,000 00

The following facts were given me by Mr. H. A. Van Tassel, the clerk at the mine, and also in part taken from the Company's Annual Report:

SUMMARY OF RESULTS, 1885.

Ground broken in openings and stopes	13,403 cu. fathoms
Rock stamped	241,010 tons.
Product of mineral	4,913,167 lbs.
Product of refined copper	3,582,256 lbs.
Yield of refined copper per cubic fathom of ground broken	267 lbs.
Yield of rock treated, 14 86-100 lbs. copper per ton, or	743 per cent.
Gross value of product, per ton of rock treated	$1.6565
Cost per ton of mining, selecting and breaking, and all surface expenses, including taxes	.7862
Cost per ton of transportation to mill	.0480
Cost per ton of stamping and separating	.3036
Cost per ton of running expenses at mine	1.1378
Cost per ton of freight, smelting and marketing product, including New York office expenses	.2545
Cost per ton of working expenses	1.3923
Total expenditure per ton of rock treated	1.4360
Net profit per ton of rock treated (exclusive of interest earned)	.2205

STATEMENT OF WORKING EXPENSES AT THE ATLANTIC MINE FOR THE YEAR ENDING DECEMBER 31ST, 1885.

UNDERGROUND EXPENSES.

Sinking 81 feet, average $22		$1,782 00	
Drifting 3,402.1 feet, average $7.38		25,095 20	
Stoping 12,898 130-216 fathoms, average $7.97		102,786 63	
Timbering, tramming and labor		37,306 16	
Timber, materials and supplies		7,388 71	
Pumping and operating air compressors, etc.:			
Labor	$ 3,280 67		
Fuel	12,909 44		
Materials and repairs	2,111 88		
		18,401 99	
		$192,760 69	
Less profit on mining supplies		52,596 78	
			$140,163 91

SURFACE EXPENSES.

Superintendence and labor of all kinds, less sundry credit items	$29,280 37	
Supplies and materials	8,580 79	
Fuel	10,376 17	
Feed for teams, etc	1,066 80	
Fire insurance	300 00	
Taxes	2,928 30	
Canal tolls	366 81	
Expenses	446 76	
	$53,345 00	
Less amount received for rents	4,018 28	
		49,326 72

RAILROAD EXPENSES.

Labor	$5,618 83	
Fuel	3,783 51	
Supplies	2,165 25	
		11,567 59

STAMP MILL EXPENSES.

Labor	$26,183 60	
Fuel	35,002 24	
Supplies	10,679 15	
Insurance	665 00	
Taxes	340 00	
Teaming mineral, etc	302 09	
		73,175 08
Total running expenses		$274,233 30

CONSTRUCTION ACCOUNT.

At Mine.

Fire-box tubular boiler	$1,450 00	
Air compressor, 16½x30 inches	2,200 00	
Masonry, walls, settings and foundations	766 55	
Supplies, materials and new stack	821 66	
Labor	495 00	
Air drill	270 00	
Three dwellings	475 00	

At Mill.

Fire-box tubular boiler	1,500 00	
Materials and supplies	661 89	
Labor, additions to boiler-house, superintendent's house, foundations, etc	474 54	
One dwelling	200 00	

Railroad.

Six rock cars, complete	1,200 00	
		10,514 64
Total expenditures at mine		$284,747 94

The production of mineral was 4,913,167 pounds, which yielded 72 91-100 per cent., or 3,582,256 pounds of refined copper. The shipments to market during the year amounted to 3,566,066 pounds, which realized an average price of 11 16-100 cents per pound.

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

PRODUCTION.

Copper sold and delivered		2,729,588 lbs.	$302,316 72
Copper on hand, sold		836,478 lbs.	95,464 49
		3,566,066 lbs.	$397,781 21
Copper at smelting works, Dec. 31st, '84, 348,791 lbs., valued at 9 cents, net		$31,391 19	
Copper at smelting works, Dec. 31st, '85, 364,981 lbs., valued at 9 cents, net		32,848 29	
			1,457 10
Net value of product of 1885			$399,238 31
Add balance of interest account			3,065 92
			$402,304 23

COSTS.

Working expenses at mine as per clerk's tables		$274,233 30	
Freight	$11,673 40		
Smelting	40,227 54		
Expenses	6,147 58		
Brokerage	1,976 23		
Insurance	1,194 60		
Storage	111 50		
		61,330 85	
			335,564 15
Showing a mining profit in 1885 of			$66,740 08
There has also been expended for addition to plant, as per detailed statement hereafter			10,514 64
Leaving a net gain for the year of			$56,225 44
The surplus from 1884, after disposal of copper on hand and payment of dividend, was			246,471 36
Making the net surplus, Dec. 31st, 1885			$302,696 80

as shown in detail in the annexed statement of assets and liabilities, and out of which a dividend of one dollar per share ($40,000) was paid January 28th, 1886.

ASSETS AND LIABILITIES, ATLANTIC MINING COMPANY, DECEMBER 31ST, 1885.

ASSETS.

Cash		$126,230 49
Copper on hand, 836,478 lbs., sold for		95,464 49
Copper at smelting works, 364,981 lbs., valued at 9 cents, net		32,848 29
		$254,543 27

At Mine.

Cash	$ 2,863 24	
Coal	13,480 80	
Wood	1,887 50	
Supplies	25,375 82	
Merchandise in store	41,536 76	
		85,143 32
Total assets		$339,686 59

LIABILITIES.

Indebtedness at mine	$20,148 44	
Agent's drafts outstanding	6,261 30	
Accounts payable	10,580 05	
		36,989 79
Balance of assets		$302,696 80

(Less dividend payable January 28th, 1886, $40,000.)

The following is Capt. Tonkin's statement regarding the mine:

No. 3 shaft has been sunk to the 15th level, and drifts extended north and south. Some stoping has been done in the back of the level. Drifting and stoping have been carried on in the 14th level, north and south of No. 3 shaft; also in the 13th level north and south of No. 3 shaft. The south drift of this level has been connected with No. 4 shaft.

Considerable work has been done in the 12th level. The north drift and stopes have passed the transverse vein, without encountering barren ground. In all the upper levels the lode has been barren for 50 to 75 feet in length in the immediate vicinity of the transverse.

We have also been working, with fair results, in the 9th, 8th, 7th and 5th levels, north of No. 2 shaft. No. 4 shaft has been extended to the 13th level. South of this shaft we have been drifting and stoping in the 13th, 12th, 11th and 10th levels.

The water in the mine has increased to that extent that it became necessary to replace the 6-inch pump at the 10th level with a 7-inch pump. The larger pump fully supplies the pumps at the upper levels, and thereby lessens the speed of the pumping engine.

The skip roads and pumping machinery are in very good condition for future work.

We shall immediately begin to extend No. 2 shaft to the 11th level, No. 3 shaft to the 16th level, and No. 4 shaft to the 14th level.

You will observe by the map—which is filled up to date—the pillars and arches which have been left for the protection of the mine; also, that but little work is required to connect No 2 shaft with the 11th level, and No. 4 shaft with the 14th level, as the stopes have passed beyond the line of the shafts.

STAMP MILL.

At the stamp mill, the results attained have been very satisfactory. The rock has been treated at a considerable less cost than in any previous year. We found it necessary to add to the mill plant a new tubular boiler, 23.6 feet long by 5 feet diameter, with 83 3-inch flues, and to accommodate it, erected an addition to the boiler-house 72x12 feet, with stone foundation. We also built a copper-shop, 16x18 feet; a log dwelling, 20x26feet, and an addition, 14x15 feet, to the superintendent's house. The machinery is in very fair condition, excepting No. 1 head, which requires a new frame and a mortar, both of which are on hand, and will be put in place at an early date.

RAILROAD.

The railroad has been operated very successfully throughout the year. The road and rolling stock are in very good condition. We have put in the road 1,104 new ties and one-quarter mile of new steel rails, and have built six new rock cars. The locomotive "Atlantic" has been refitted with a new set of flues and four new tires. The present plant is all that is necessary to do the work on the road for some time to come. A large washout occurred last spring, which carried away 100 feet in length by 20 feet in depth of an embankment, and the expense of rebuilding has added somewhat to the running expense of the road.

MACHINERY.

The plant at the mine is in fair condition. The rock-house machinery has ample capacity for years to come. The hoisting machinery for Nos. 3 and 4 shafts has done the work very satisfactorily. We have removed one of the old two-flue boilers, and replaced it with a new tubular boiler 22 feet long and 5 feet diameter, with 84 3-inch flues. To make room for this boiler, a stone addition, 10x66 feet, was built on the boiler-house. The new boiler has reduced the consumption of fuel.

CONSTRUCTION.

The old boiler has been added to the battery at the pump and compressor house, which has been enlarged by a stone addition, 10x60 feet, covered with a slate roof. A sheet-iron stack 50 feet high has also been erected, standing upon a stone base 10 feet square and 15 feet high.

It was necessary to add to the compressor power to give opportunity for repairs to the old compressor, and to assist, when necessary; and we have purchased a new compressor, 16½x30 inches, from Messrs. S. E. Cleaves & Son, Hancock, and set it upon a stone foundation, 32x11 feet and 8 feet high. The new machine works very well.

I notice a change in the screens in the rock-house, which seems to me to be an improvement. The rock now passes over two sets of screens instead of one, as formerly; the one is directly under the other, with the bars at right angles. So that while the upper one discharges to the south, for instance, the lower one inclines to the east. The bars in the upper screen are six inches apart, in the lower one 2 inches. The fine rock is thus separated from the coarse, and there is less handling of it than heretofore.

I have fully described the Atlantic mine in the Commissioner's Report for 1881, and that description will suffice now with very little change, mainly such as the maps themselves show. The Atlantic is the most southerly of what are called the south side mines—south of Portage Lake.

The following table gives the product for each year:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1866	6	1,475	1876	917	1,041
1867		1,760	1877	1,027	304
1868	764	258	1878	1,132	1,592
1869	823	857	1879	1,152	1,822
1870	186	617	1880	1,170	1,195
1871			1881	1,264	9
1872			1882	1,315	1,708
1873	431	1,336	1883	1,341	197
1874	686	403	1884	1,586	1,585
1875	783	1,036	1885	1,791	533
Total				16,378	1,761

John Stanton, Treas., New York; Wm. Tonkin, Agent, Houghton, Mich.

THE HURON COPPER CO.

is to be congratulated on its success with an abandoned mine. The Huron is an old mine; work was begun here in 1855 in the Isle Royal lode. Upwards of $1,000,000 were expended in the vain effort to secure a paying mine. From 1868 to 1871 it was called the Agawam, when its name was changed to the Houghton, and so continued until 1880, when under the present organization the old name was restored.

Messrs. Demmon and Vivian, the gentlemen to whom, I judge, the credit of the success of the Huron is chiefly due, have accomplished an excellent result in many ways, in placing this mine upon a paying basis. It is an illustration of what mining skill, energy and good management will do. It is a valuable experience for the south side mines, and for the mining country generally. So well has it been managed and pushed that if copper were at the price it held a few years ago, the Huron would be in an assured position. The stamp mill has been enlarged and perfected and is, within the limits of its capacity, a first class mill. It contains two Ball stamps,—15″ cylinders. The steam power is in excess of what is at present required at the mill, even though it runs the stamps and pumps the water for the boilers at the mine. Capt. Vivian designs to run the main shaft out to the west 75 feet and erect a third stamp and the necessary washing machinery. An addition to the building will be required for this purpose. Capt. Vivian expresses confidence that there is sufficient water for four heads of stamps and thinks they may ultimately use that number. The walls of the mill are stone, built on the solid ledge. The blows of the stamp heads make no sensible vibration. About 70% of the rock that is broken in the mine goes to the mill and yields 1.18% of ingot copper. The mine is very peculiar; the characteristics of this lode are well understood; it is bunchy,—the prevailing mineral is epidote. There is a great deal of barren trap, with occasional bunches of ground rich in copper. There are two shafts used, No. 6 and No. 8, both of which are down to the 13th level, a depth of about 1,000 feet, measured on the plane of the vein. The length of the mine is 1,620 feet, bearing N. 32° E. and dipping northwesterly. The barren portions of the lode through which opening is made, are left standing, as will be seen by observing the map of the mine herein contained,—the dark portions represent those which are left. All the way from the 70 down, between the shafts, the mine has been poor. During the past year all the stoping has been done to the north of No. 6, and south of No. 8.

The 5th level has been extended north 40 feet, and some stoping done at the end of it; also in the 6th level, north, a small amount of work has been done at two points; but the 8th has been extended 160 feet north and near the end of its former terminus a large quantity of stoping has been done. They have worked out a chamber 80 feet high and in lateral dimensions 60′x 60′. At the extreme south also, in this level, some stoping was done and the level extended 20 feet. In the 9th, in the past year, the extension north has been 70 feet, and three large blocks of ground have been removed to the full height of the level. They are situated from No. 6 shaft, respectively, 200 feet, 400 feet, and 480 feet. Also 500 feet south of No. 8, some work has been done. In the 6th level, 550 feet north of No. 6, a large block was taken 100 feet long and of the full height and width of the vein. This is new ground, reaching beyond the old workings. On an old stope, 160 feet

north of the shaft, the back was taken out to the level above. At the south end, 540 feet from the shaft, some stoping was done, somewhat more than in any level above, showing an improvement in the vein at this point, which was still further manifest in the level below, where as good ground was found as any in the mine. The level was driven south 200 feet, and No. 10 shaft sunk to near the 12th level.

In fact all the work shown in the map at the south end of the mine, in the vicinity of No. 10 shaft and below the 7th level, has been done in the past year. The extension south 220 feet of the 12th level was all in good ground; the driving will be continued 200 feet further, and it is believed that the ground will be equally good, judging from the experience in the level above the 12th. No. 8 was sunk one lift to the 13th. They are now driving south 70 feet from the shaft, in good ground. From the 11th down the shafts have not been connected, the ground is too poor; the distance between them in the bottom is 345 feet. The southwest part of the mine promises well for the coming year. No. 6 is nearly to the 13th, no drifting has been done at the bottom, but in the 12th they have drifted north 250 ft. from the shaft, and at the end have stoped a block of ground 60 feet long and 40′ high. Also in the 11th, at 200 feet north of shaft have taken a block of ground 70 feet long to the full height of the level. The total distance to which the level has been extended is 440 feet north. It is only good at the points where the stoping has been done. The openings in the coming year will be pushed south of No. 8 and north of No. 6 as heretofore, with, so far as present indications go, as good prospects of success as now.

They work 16 power drills. There is evidently all possible economy exercised about the mine.

The following statistics will illustrate the work:

The mining labor cost	$43,251 38
Total number of feet sunk—shafts	278 7-10
—winzes	210 1-10
Average price paid per foot for sinking shafts was	$18 41
winzes	13 32
Total paid for sinking shafts	5,140 37
winzes	2,799 18
Total paid for sinking	7,939 55
Average number of men in this work	10

DRIFTING AND CROSS-CUTTING.

Average number of men engaged in this work	29
Number of feet drifted	1,849
Average price paid per foot for drifting	$10 41
Number of feet of cross-cutting	168
Average price paid per foot	$11 11
Amount paid for drifting	19,243 56
Amount paid for cross-cutting	1,971 73
Total	$21,215 29

STOPING ACCOUNT.

Total number of men employed in this work	72
By air drills (cubic fathoms)	5,591
Average price paid per cubic fathom	$9 77
Total amount paid for stoping	54,659 22
Total mining cost	143,082 03
Number company account men, average	97
Number contract men, average	111
Total number of men employed	208
Total number of tons of rock hoisted to the surface	139,129
Total number of tons of rock dumped in the mine	4,503
Total	139,129
Number of tons rejected	43,653
Number tons sent to mill	95,476
Per cent. of rock rejected	31.37
Average surface force	14½ men
Total wages	$6,746 81

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.....	278 7-10
.....	210 1-10
.....	$18 41
.....	13 32
.....	5,140 37
.....	2,799 18
.....	7,939 55
.....	10
.....	29
.....	1,849
.....	$10 41
.....	168
.....	$11 11
.....	19,243 56
.....	1,971 73
.....	$21,215 29
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.....	5,591
.....	$9 77
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.....	4,503
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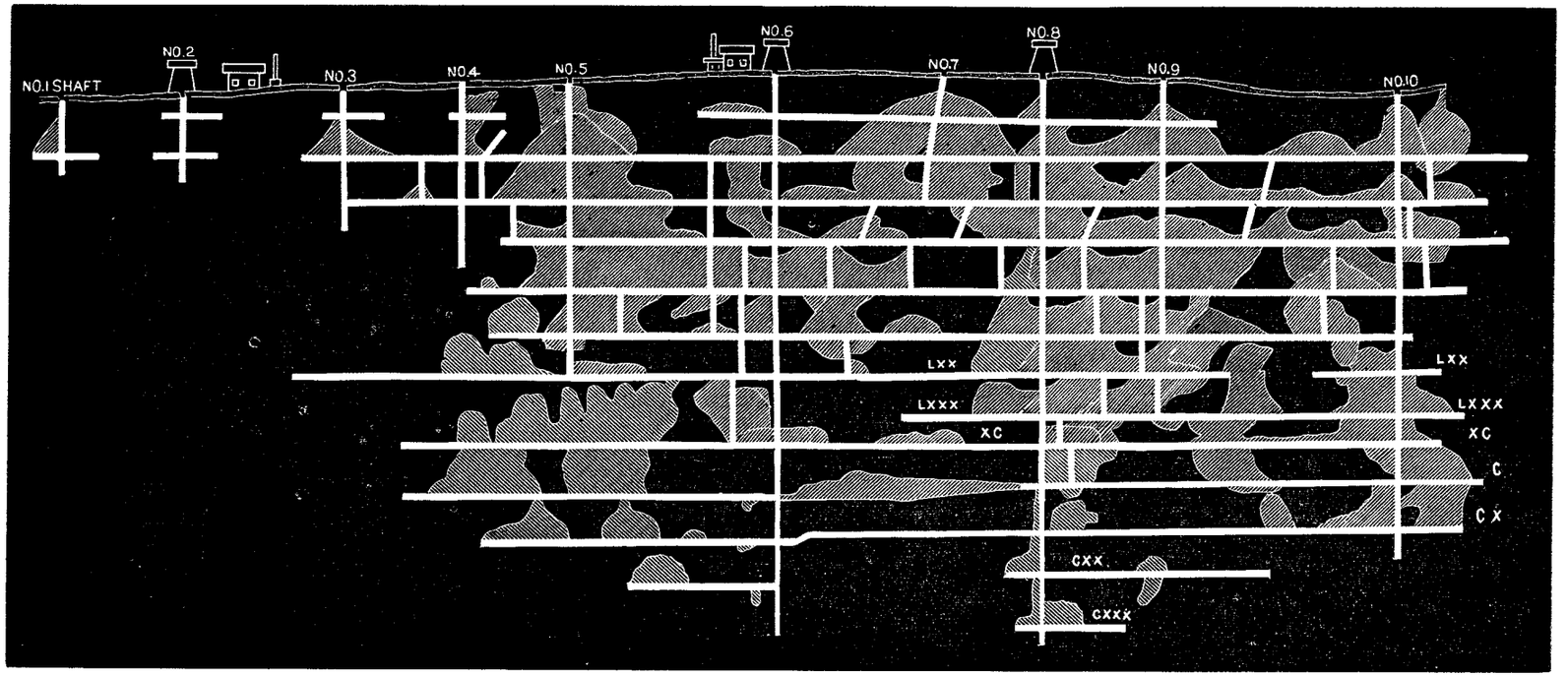
.....	43,653
.....	95,476
.....	31.37
.....	14¼ men
.....	$6,746 81

LONGITUDINAL SECTION OF THE HURON MINE, JAN. 1886.

Scale, 300 ft. to one inch.



STAMP MILL EXPENSES.

Average number of men	33
Cords of wood consumed	7,465
Tons of coal consumed	1,752
Cost of wood	$21,701 39
Cost of coal	6,619 44
Cost of labor	11,906 80
Repairs, etc	3,834 87
Total	$44,063 00
Average cost for stamping, etc, 1 ton of rock	46.15 cts.
Average number tons stamped per cord of wood used	9.87
Pounds of mineral produced	2,757,848
Per cwt	1.44
Pounds of refined copper	2,258,885
Per cent. of copper in metal	82

TRAM ROAD EXPENSE.

Number of men	8
Cost of labor	$3,460 30
Total tram road expense	4,121 34
Cost per ton of rock	4.31 cts.

ROCK HOUSE EXPENSE.

Average force	36 men.
Total labor cost	$13,460 15
Total cost	14,423 94
Cost per ton of rock stamped	15.11 cts.
Average cost of handling one ton of rock hoisted	10.71 cts.
Cost of mineral at smelting works, per lb	8 cts.
Cost of ingot smelting, charges added	9.77 cts.
Average cost per ton of rock hoisted	$1 59
Pounds of ingot per fathom of rock hoisted	292
Pounds of ingot per ton of rock hoisted	16.23
Per cent. of ingot to rock hoisted	.811
Pounds of ingot in ton stamped	23.66
Per cent. of ingot to rock stamped	1.18
Fathoms of rock hoisted	7,729
Tons of rock hoisted	139,129
Total running expenses for the year	$220,729 58
Cost per ton for rock hoisted, less construction account	$1 58
Tons of rock on hand, Jan. 1, 1885	20,000
Tons of rock on hand, Jan. 1, 1886	10,400

The following is taken from the company's published report for the year 1885:

CASH RECEIPTS AND EXPENDITURES OF THE HURON COPPER MINING COMPANY FOR THE YEAR ENDING DECEMBER 31, 2885.

Cash on hand January 1, 1885	$6,293 31
Cash received from sales of copper, 2,299,685 lbs., at 10 920-100 cents	251,139 61
Cash received from sale of silver	315 73
Cash received from interest	105 15
Cash received from loans	431,180 95
	$689,034 75
Contra.	
Cash paid loans	$417,412 73
Cash paid mine agent's drafts	222,214 75
Cash paid smelting, freight, copper charges and brokerage	38,548 73
Cash paid interest, expense, insurance, storage and taxes	10,169 38
Cash on hand December 31, 1885	689 16
	$689,034 75

ASSETS AND LIABILITIES OF THE HURON COPPER MINING COMPANY, JANUARY 1, 1886.

Assets.

Cash on hand	$689 16
306,586 lbs. copper at 11¼ cents	34,490 92
Supplies at mine	49,358 41
Notes receivable	9,090 40
Rock broken in the mine ready for hoisting, say 10,400 tons, valued at	10,000 00
	$103,628 89

Liabilities.

Mine agent's drafts	$19,963 35
Loans and bills payable	135,966 27
Liabilities at mine	28,063 16
Due for smelting and freight	4,881 11
	$188,873 89
Less assets	103,628 89
Balance liabilities December 31, 1885	$85,245 00

To offset which we have, exclusive of the mine, machinery, buildings, etc., valued at $127,202 71.

D. L. DEMMON, *Treasurer.*

March, 1886.

Below we give a detailed statement of expenditures at Lake and Boston for the past year:

Mining expenditures, labor, etc	$43,251 38
Sinking 278 feet shaft and 210 feet winzes	7,939 55
Drifting and cross-cutting 2,017 feet at $11.11	21,215 29
Stoping 5,591 fathoms	54,659 22
Sundry labor, etc	681 76
Supplies and fuel	15,334 83
Surface expense	6,281 65
Stamp mill expense, 95,476 tons at 46 15-100 cents	44,063 11
Tram-road expense, at 4 31-100 cents	4,121 34
Rock-house expense, 95,176 tons	14,423 94
General expense at mine and office	8,757 51
Or a total of	$220,729 58
To which is to be added smelting, freight, insurance, expense, etc., paid in Boston	44,510 65
Or a grand total of	$265,240 23

The total production of mineral for the year was 2,757,848 lbs., which gave a yield of 81 90-100 per cent. refined copper, or 2,258,885 lbs., being a gain over 1884 of 371,510 lbs. mineral, 78-100 per cent. of yield, or 331,225 lbs. refined copper.

The highest price obtained in 1885 was 11½ cents; the lowest price obtained in 1885 was 9 8-10 cents; or an average for the year of 10 920-1000 cents. The average of 1884 was 13 887-1000 cents, making a difference in earnings of 2 967-1000 cents per lb., or a total of $67,021.12 for 1885 at same price as 1884.

The comparison is made only to show that at a reasonable price for copper the mine would have been nearly free from debt at this date, and easily on the way to a paying condition.

The mine and mill have done all that was ever predicted for them, and the only failure has been from the low price obtained for our product. The average price for the year previous was the lowest ever known to that date, *i. e.*, 13 877-1000 cents; but a much lower point was reached in 1885, and our average was but 10 920-1000 cents, or nearly 3 cents per lb. less than 1884, making a difference in our receipts of over $67,000. It will be seen that the mine has made the handsome gain of 371,510 lbs. of mineral, or 331,255 lbs. refined copper over 1884, and our agent expects to give an increase over that amount in 1886.

His report will give full information and figures regarding operations there, and also show that the property in all its belongings is in first-class order and condition, and the fact that the cost of handling and manipulating the rock mined was but $1.59 per ton, tells its own story to every practical mining man.

SURFACE WORK.

Nothing of much importance has been done in this department, except the general running work, and the usual repairs to houses, work-shops, etc., all of which are in good condition.

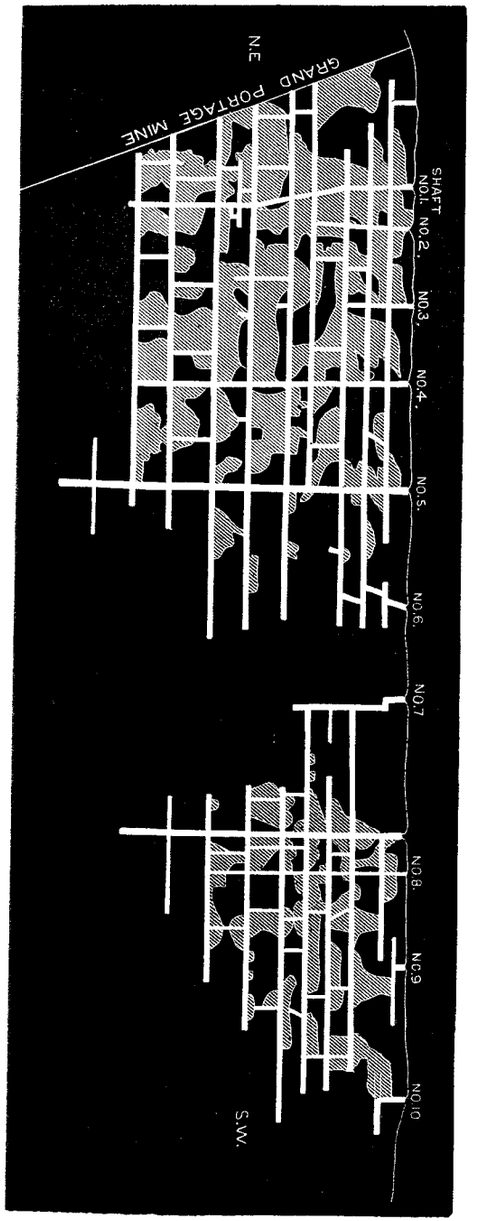
STAMP MILL.

The mill, all things considered, has worked very satisfactorily. The amount of rock treated was 95,476 tons. Everything in this department is in good running order.

MINING WORK.

The openings made are as follows:

	Feet.
Sunk in shafts	278 7-10
Sunk in winzes	210 1-10
Drifted on the lode	1,848 6-10
Drifted in cross-cuts	168 4-10
Total	2,505 8-10



LONGITUDINAL SECTION OF THE ISLE ROYAL MINE, 1886.

Scale, 300 ft. to one inch.

The amount of rock hoisted was 139,129 tons, which cost to manipulate, $1.59 per ton, which is a saving of 69 cents per ton over 1884, or a total for the year of $95,999.01. No. 6 and 8 shafts have been sunk from the twelfth to the thirteenth level, and No. 10 from the ninth to a point 40 feet below.

The lode in No. 6 shaft showed, from time to time, some good stamp work. No. 8 shaft, owing to the copper-bearing portion of the lode being near the hanging wall, is poor, but by cross-cuttings west, at the bottom level, we found some ground that will pay to remove with stopes, and which is still showing quite well in all grades of mineral. We have opened by drifts north of No. 6 shaft, from the fifth to the twelfth level, with about the same success we met with in former years. The bunches of productive ground seem to be regular both in size and value. The eleventh, twelfth and thirteenth levels have been extended south of No. 8 shaft, in the aggregate, 540 feet, and the eleventh level has been opened south of No. 10 shaft 80 feet. At some points in this part of the mine, as well as north of No. 6 shaft, the lode is showing some good stoping ground, while at other places the lode is very lean.

Our openings are well ahead of the stopes, consequently we have no trouble to supply all the rock the mill can treat, and if we had another head of stamps it could be kept running full time on the same class of rock as we are now handling, which would doubtless make a product from 175 to 180 tons per month, and leave, at present price for copper, a good profit.

PROSPECTS FOR 1886.

All things considered the prospects for the ensuing year were never better than they are to-day. If the mine continues to show as it does at this writing, and the machinery works well, as we have every reason to expect it will, a product of from 125 to 130 tons of copper per month can be kept up, which will give us a little profit.

Capt. T. H. Odgers severed his connection with the company in October last. His place has been filled by Capt. Thomas Whittle, who is a thorough, practical miner. His services will doubtless be of great value to the company.

Mr. J. H. Vivian, the clerk, has also left us to take charge of the office at the Osceola mine. His place has been filled by Mr. Alex. Loranger, who, with Capt. Whittle, are attending to the duties of their respective positions, to my entire satisfaction.

I am, yours respectfully,
J. VIVIAN, *Superintendent.*

The Huron mine has yielded as follows:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1855	3		1871	134	1,453
1856	12		1872	276	1,684
1857	35		1873	237	1,883
1858	24		1874	125	1,005
1859	22	1,387	1875	31	1,289
1860	4	1,000	1876	31	1,857
1861	49		1877	41	161
1862	69	1,305	1878	32	1,100
1863	69	206	1879	14	1,760
1864	50	1,745	1880	35	285
1865	238	11	1881	127	515
1866			1882	182	579
1867	683	1,164	1883	360	213
1868	740	80	1884	963	1,660
1869	841	863	1885	1,135	1,163
1870	42	183			
Total				6,616	561

THE ISLE ROYAL MINE

joins the Huron on the north. It is in the same lode. It is the oldest mine in the vicinity of Portage Lake but has not been worked, except by tributers,

for many years. Possibly the success of the Huron may stimulate the owners of the Isle Royal or someone else to again undertake the working of the mine. The company owns an old stamp mill on Portage Lake, which is but a short distance from the mine.

The following table shows that the mine has produced well in the past:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
Previous to 1855	58		1870		
1855	93		1871	90	1,217
1856	232	1,124	1872	125	164
1857	210	117	1873	120	100
1858	178	810	1874	90	876
1859	208	56	1875	48	682
1860	168	198	1876	14	199
1861	458	1,274	1877	15	1,985
1862	448	139	1878	15	1,933
1863	360	1,841	1879	13	880
1864	291	386	1880	80	1,469
1865	344	1,836	1881	23	1,308
1866	308	1,336	1882	17	1,447
1867	381	852	1883		
1868	147	1,033	1884	8	74
1869	75	672	1885	15	164
Total				4,602	71

Graham Pope, Agent, Houghton, Mich.

THE GRAND PORTAGE MINE

was shut down in 1883. The mine was fully described in the report of 1882 and there is nothing to add beyond the fact above given. The mine has produced 1,613 tons 434 lbs. of copper.

Peter Ruppe, Sec. and Treas., Hancock, Mich.

Of the

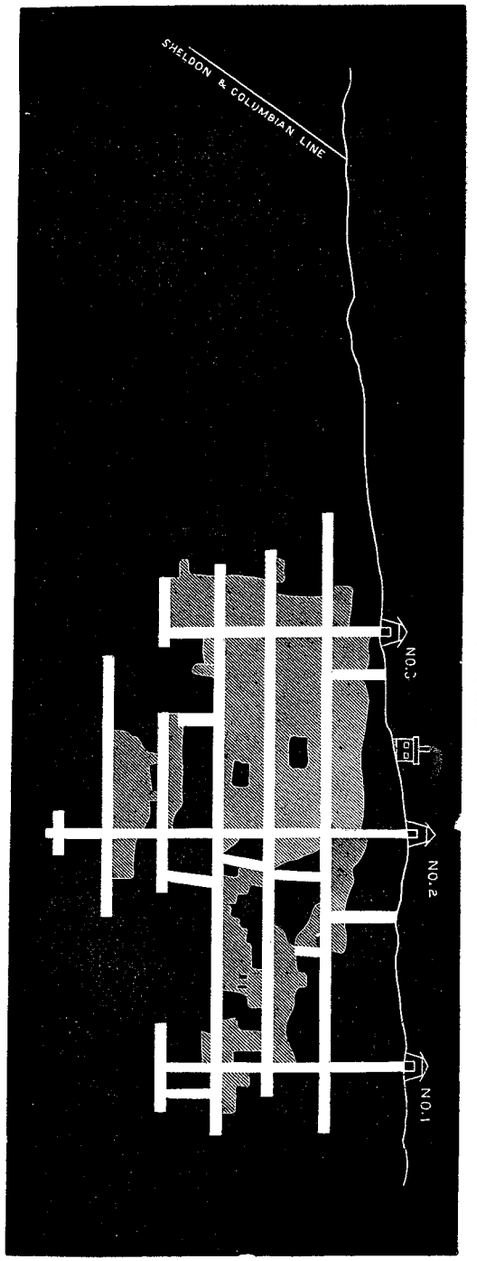
SHELDON, COLUMBIAN,

there is nothing new to be said. In previous reports I have fully described the mine, etc. The aggregate product is 708 tons 548 lbs.

Graham Pope, Agent, Houghton, Mich.

THE QUINCY MINE

is perhaps first in popular regard among the copper mines of the peninsula.

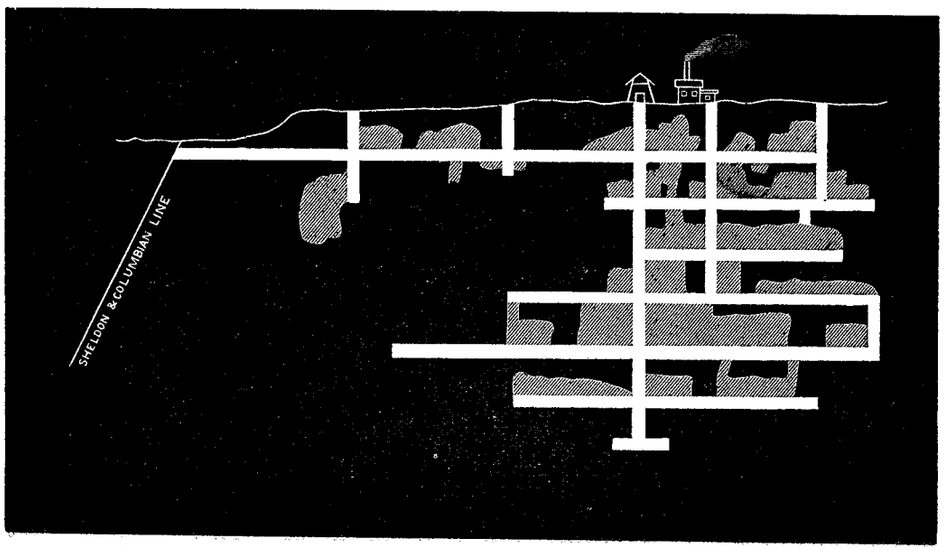


LONGITUDINAL SECTION OF THE GRAND PORTAGE MINE, EAST LODE, JAN., 1886.

Scale, 300 ft. to one inch.

LONGITUDINAL SECTION OF THE GRAND PORTAGE, WEST LODE, JAN., 1886.

Scale, 300 ft. to one inch.



It does not possess the surpassing richness of the Calumet and Hecla, to be sure, but its experience is more in accord with the other mines. It is not so much of an exception. It is in an amygdaloid belt and the same difficulties and irregularities are met with that has been the common lot of all amygdaloid mines. Certainly, the Quincy is exceptionally rich, but that fact only stimulates the hope that others may finally prove equally so. The Quincy always comes up to what is expected of it; no one need ever to have lost money in the Quincy. Copper stocks may depreciate, but the Quincy stock is sure to get back to its maximum figures and the fortunate ones are sure to be those who purchased when the quotations were low. There are many persons in the copper district who have from time to time quietly added to their surplus by judiciously investing in Quincy stock, and there is no reason for any slacking of confidence in the mine. It is likely to be equally good for many years to come. Thus far, about 35 acres have been mined out and the estate comprises three quarter sections, and the mining right under the fractional lots along the lake margin, and also the Quincy lode on the one-fourth section of the Hancock Mining Company. The mine shortens, however, as will be seen from the map, to the north against the Pewabic line. The Pewabic comes in between the Quincy and the Franklin, the south line running east and west shortens the northerly extension of the Quincy levels more and more as greater depth is attained. Still the mine will soon reach the southwest corner of the Pewabic property, after which its levels can extend as far north as the company is pleased to go, since it owns the one-fourth section west of Pewabic.

The Quincy amygdaloid is a broad belt 200 feet wide, through which runs a main, irregular, deposit and east and west of it, within the limits of the belt, is a series of pockets which constitutes what are called the east and west deposits. The most productive is the east branch, reached by borings and cross-cuts in the foot wall; 600 feet of these cross-cuts have been driven in the past year, all to the east into the east branch. Altogether there has been 4,150 feet of drifting done in the past year, mostly in the 22d, 32d, 33d and 34th levels.

The rock treated yielded 3.052% ingot, or taking out the mass and barrel work and estimating only the washed copper, what went under the stamp heads, the yield of rock was 1.915%.

The stamp mill cost per ton of rock tested, including barrel work, was 54.5 cents. The total mining cost per ton of rock mined was $1.50. Tons of rock hoisted, 114,402; mined, 147,626 tons; treated at mill, 108,181; fathoms stoped, 6,755. They reckon 216 cubic feet and 18 tons to the fathom of ground. The following shows the items of the cost per ton of rock:

Cost per ton, total mining expense	$1.506
Cost per ton, sorting and breaking	.112
Cost per ton, stamping	.400
Cost per ton, surface and general expense	.067
Cost per ton, building and construction account	.121
Cost per ton, sundries	.057
Total cost per ton mined	$2.31

The product of 1885 exceeds that of 1884 by	100 tons.
The expenses of 1883 exceed those of 1884	$51,356 35
The expenses of 1884 exceed those of 1885	50,060 93

The cost of copper per pound in 1882 was	$0.096
The cost of copper per pound in 1883 was	.089
The cost of copper per pound in 1884 was	.086
The cost of copper per pound in 1885 was	.075

The average force employed was 400 men,—exclusive of choppers and teamsters. The average price paid the men was $44 per month; most of the men have families and live in comfortable houses; the board is $16 per month. The company charges the men $2.00 per month for rent for a good house. Some of the houses cost the occupants nothing; generally the men have land enough for a garden.

The company now use steel skips holding three tons each and weighing 3,800 lbs. The man engine is down to the 29th level. Both shafts are in rich ground; generally there has been an alternation in this respect, when one was in rich ground the other was in poor, and *vice versa*.

From the 24th level down there has been but little stoping in the east branch. North of No. 2 shaft the east branch has been, and still continues, rich; this is towards the Pewabic.

In No. 4 shaft no stoping has been done in either branch from the 24th down, but the openings and borings show that both branches are good. The cross-cuts into the east branch average about 60 feet in length.

No. 2 shaft is 2,714 feet in length, on the plane of the vein, and No. 4 is one level short of this. The levels are 90 feet apart. The 18th level,—the longest one,—is 3,500 feet in length. Water for the boilers at the mine is raised from the lake 540′; the length of pipe for this purpose is 4,400 feet; use a small Duplex Wellington pump. It requires one cord of wood per day for this purpose.

The Mineral Range R. R. Co. is building a branch to the Franklin and Quincy mines.

The vein bears N. 32° E., and dips N. W. 52° with the horizon. In the mill are 80 stamps,—old style small stamps; 72 in the large and eight in the small mill. The latter is used for treating the barrel work, or "A" copper, as it is called.

The following, from the company's report, will explain all further facts likely to be of interest:

QUINCY MINE ANNUAL REPORT.

The directors submit the following report of the business of the mine for the past year, and statement of the financial condition of the company.

The shipment of the season was 7,091,765 pounds of mineral, which has been smelted at Detroit, and yielded about 82 47-100 per cent., or 5,848,497 pounds of refined copper.

The product of the mine, as prepared for shipment, was 7,091,895 pounds, or 3,545 1805-2000 tons of mineral, of the following description, namely:

Stamp copper	6,604,125 lbs.
Mass copper	487,680 "
Total	7,091,805 lbs.
for which, estimating the product left over at the mine at 82 per cent. yield, and all copper on hand unsold, at 11½ cents per pound, has been realized the gross sum of	$665,575 19
Realized from sale of silver	2,941 25
	$668,516 44

The expenses of the year were as follows:

Running expenses at the mine	$323,414 26
Building and construction account	17,829 67
Smelting, transportation and other expenses	97,377 06
	$438,620 99
which, deducted from gross earnings	668,516 44
leaves as a mining profit	$229,895 45
There has also been realized during the year, from interest on loans	3,258 28
From real estate, "Hancock"	2,500 00
	$235,653 73

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

January 1, 1885		$517,346 68
Add earnings of 1885		235,653 73
		$753,000 41
Deduct dividend of February 16, 1885	$100,000	
Deduct dividend of August 17, 1885	80,000	
		180,000 00
Leaving balance of assets, Jan. 1, 1886		$573,000 41

A dividend of $4 per share, or $160,000, payable February 15, has been declared, which, with dividend of $2 per share, paid August 17 last, makes total from the year's business $240,000.

The usual financial statements are submitted, and also the report of the agent, which states clearly the present condition of our property.

THOMAS F. MASON, *President*.

GENERAL SUMMARY OF RECEIPTS AND EXPENDITURES OF THE QUINCY MINING COMPANY, FROM ITS ORGANIZATION TO DECEMBER 31, 1885.

Receipts.

From capital stock paid in	$200,000 00
Proceeds, copper and silver (82,320,408 lbs. copper)	16,878,489 79
Interest	106,740 07
Profit on sale P. L. & R. Improvement Company stock and other investments	79,637 16
Sales of real estate, Hancock, Mich	56,890 43
	$17,321,757 45
By balance brought down, being receipts over expenditures	$4,743,000 41
Deducting dividends declared, Nos. 1 to 34 inclusive	4,170,000 00
Leaving balance as per statement in detail below	$573,000 41

Expenditures.

For expenditure on location previous to 1856	$42,097 98
Expenditure on Quincy vein, 1858, not now worked	55,000 00
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 same, including dwelling houses, stamp mill, machinery, steam engines, tram road, dock, warehouse, and other buildings and roads	914,946 19
Mining and surface labor, expenses of smelting and marketing copper, and all incidental expenses	11,555,211 87
Balance carried down	4,743,000 41
	$17,321,757 45

STATEMENT OF ASSETS AND LIABILITIES, EXCLUSIVE OF REAL ESTATE, MINE PLANT AND SUPPLIES IN USE, JAN. 1, 1886.

Assets.

Loans on call		$200,000 00
Cash in bank		20,202 96
Cash on hand at mine		2,595 05
Copper on hand—East		261,635 17
Accounts receivable—since paid		27,846 78
		$512,279 96

Liabilities.

Drafts unpaid	$379 32	
Dividends unpaid	686 50	
Accounts payable in New York	18,200 00	
Accounts payable at mine	34,233 84	
		53,499 66
		$458,780 30
Add at mine 521,165 lbs. mineral at 82 per cent., 427,355 lbs. of copper	$49,145 63	
Add at mine supplies per inventory on file	46,299 30	
Farm account (horses, wagons, etc.)	18,579 01	
Accounts receivable	196 17	
		114,220 11
		$573,000 41
Less dividend payable February 15, 1886, $4 per share		160,000 00

SUMMARY FOR YEAR.

Average force employed	400 men.
Average number of miners	132 "
Average wages of miners on contract, per month	$44 00
Yield of mineral per fathom of ground broken	865 lbs.
Yield of refined copper per fathom of ground broken	710 "
Total rock mined	147,626 tons.
Total rock hoisted	111,402 "
Total stamp rock treated	108,181 "
Yield of rock stamped 3.05 per cent	6,604,125 lbs.
Product mineral	7,091,805 "
Product refined copper	5,848,530 "

AGENT'S REPORT.

QUINCY MINE, LAKE SUPERIOR, MICH.
JANUARY 30, 1886.

During the year 1885 the principal openings made by drifting in the northern part of the mine were at the twenty-second level, north, and at the thirty-third and thirty-fourth levels north and south of No. 2 shaft.

In the southern part of the mine the principal drifting was at the thirty-second, thirty-third and thirty-fourth levels north and south of No. 4 shaft.

Other drifting and cross-cutting—mostly of an exploratory nature—was done at different places, and usually with good results. The drifting done in the main levels showed the usual peculiarities of lean stretches and rich deposits of vein at irregular intervals.

No. 2 shaft was sunk from the thirty-third to the thirty-fifth level, the last 20 feet being in a good looking vein carrying a fair percentage of copper.

No. 4 shaft was sunk from the thirty-second to the thirty-fourth level, and connected at the thirty-third level with No. 2 shaft.

The stoping done in the northern part of the mine was at various places between the twenty-second and the thirty-fourth levels. The most productive ground worked was at the thirty-second, thirty-third and thirty-fourth levels, but there are valuable blocks of stoping ground still remaining from the twenty-second to the thirty-fourth level.

Most of the stoping done in the southern part of the mine was at the thirty-first, thirty-second and thirty-third levels north and south of No. 4 shaft.

The thirty-fourth level is now well opened and is showing a good vein, but no stoping of any consequence has yet been done there.

The thirty-second, thirty-third and thirty-fourth levels are opened on what is called the "East vein."

During last February and March a cross-cut at the thirty-third level, near No. 4 shaft, was driven east, and at a distance of about 50 feet from the line of old workings it intersects a wide coppery vein. Cross-cuts to the same vein were subsequently made at the thirty-second and the thirty-fourth levels with like good results.

The diamond drill was used successfully during the year. The work done was at different points in the thirtieth, thirty-second and thirty-third levels north of No. 2 shaft, and in the twenty-ninth, thirtieth, thirty-first, thirty-second and thirty-third levels north and south of No. 4 shaft.

The extension of the man-engine shaft was not taken up until late in the year, but will soon be completed to the twenty-ninth level.

During the summer the old man-engine structure at the surface was removed, a new foundation of masonry built, new iron bobs erected in place of the old wooden ones, and all enclosed with a substantial frame building.

At No. 2 hoisting engine the worn-out friction gear was replaced with a new one of improved construction.

A substantial stone engine-house was built for No. 4 shaft, and a new hoisting drum 18 feet in diameter is being made to take the place of the old one now in use. This work will soon be completed, and will add materially to our hoisting capacity.

The question of tram-road, or railroad facilities for the transportation of coal and other freight between the dock and the mine has been satisfactorily settled by making an agreement with the Mineral Range Railroad Company, who will complete a branch road to the mine early in the coming season.

No extraordinary repairs were made at the stamp mill during the year. The mill did its usual good duty, as shown by the tabulated statements prepared at this office by Mr. Kloeckner.

The following are some of the principal improvements under consideration for the present year:

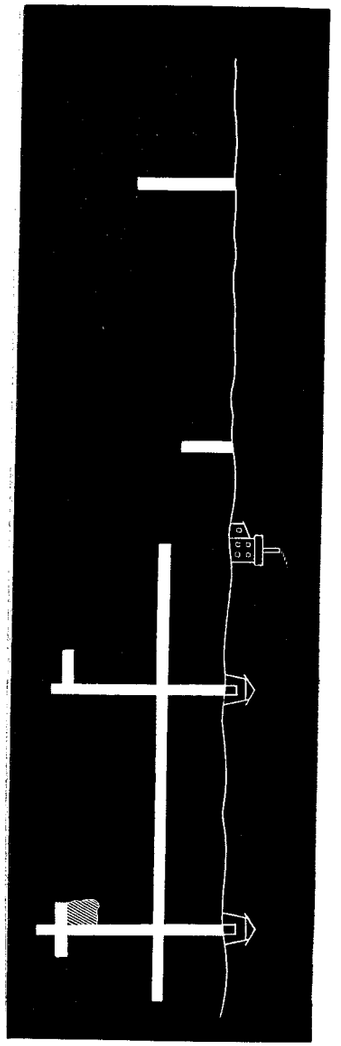
The completion of the hoisting equipment for No. 4 engine-house.

The erection of trestles and coal-sheds for the delivery and storage of coal at the mine boiler-house.

A set of new iron balance bobs for the man-engine at the fourteenth level, to replace the worn-out wooden ones now in use.

A partial extension of the old dock for the purpose of making room for a more economical disposition of a portion of the stamp sand.

S. B. HARRIS, *Agent.*

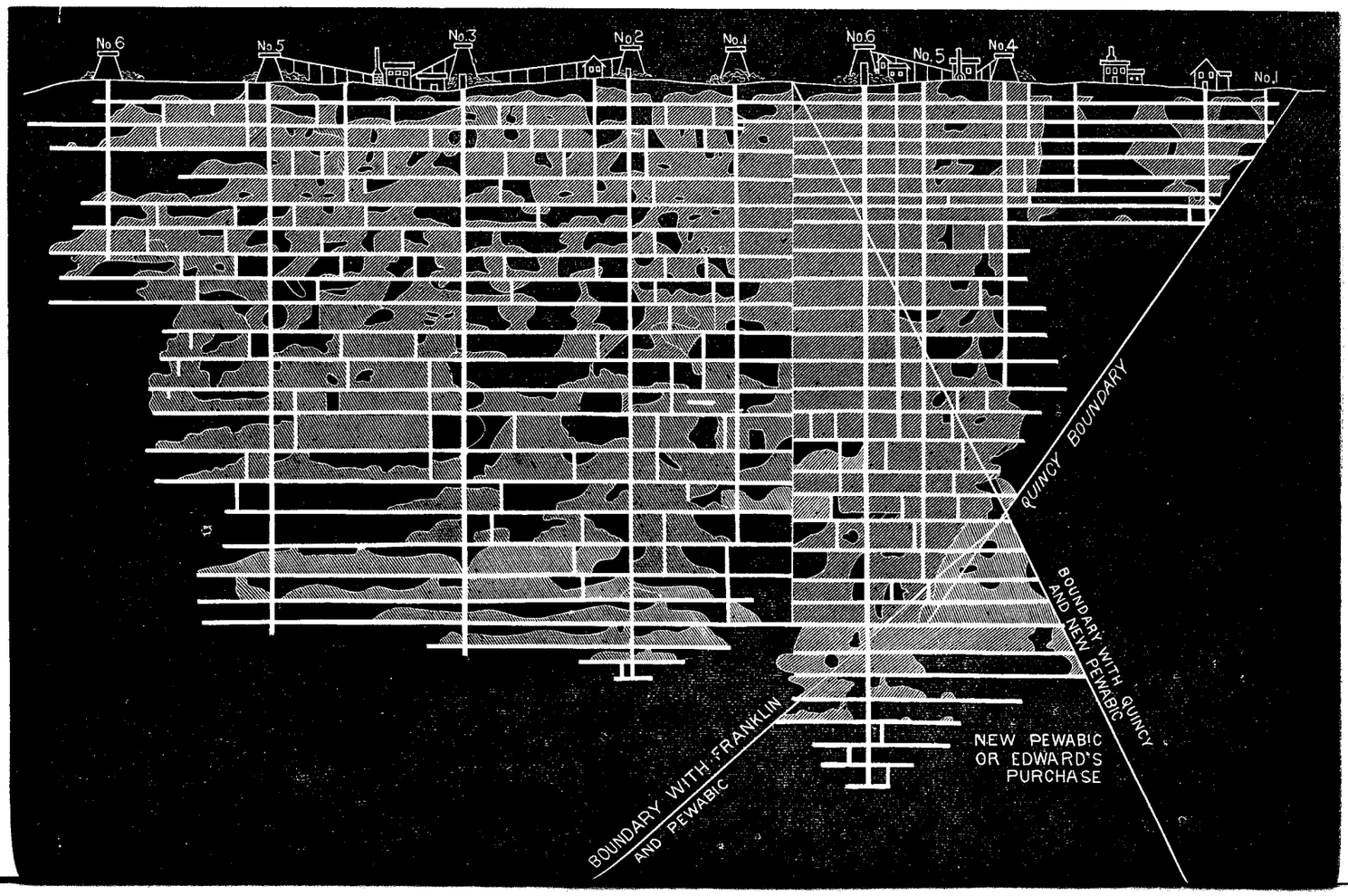


LONGITUDINAL SECTION OF THE MESNARD MINE.

Scale, 150 ft. to one inch.

LONGITUDINAL SECTION OF THE FRANKLIN AND PEWABIC MINES, JAN., 1883.

Scale, 420 ft. to one inch.



The product of the mine for each year is as follows:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1856	6	1,462	1871	1,204	1,501
1857	61	762	1872	1,134	1,134
1858	153	772	1873	1,400	.....
1859	178	1,114	1874	1,525	654
1860	970	414	1875	1,334	281
1861	1,282	852	1876	1,536	1,171
1862	1,153	218	1877	1,427	336
1863	1,115	1,737	1878	1,480	449
1864	1,251	586	1879	1,323	1,458
1865	923	1,500	1880	1,848	263
1866	1,172	1,000	1881	2,753	884
1867	1,013	1,000	1882	2,832	1,796
1868	727	1,000	1883	3,006	239
1869	1,208	1,365	1884	2,825	436
1870	1,248	1,777	1885	2,924	497
Total tons				41,089	622

Capt. S. B. Harris, Agent, Hancock, Mich.

THE PEWABIC MINE

is the subject of legal controversy, the suit now being in the U. S. Supreme Court. Without doubt the ownership of the mine and property will ultimately pass to either the Quincy or to the Franklin companies,—both need it very much, especially the Franklin, to whom the Pewabic would be of great advantage. It is altogether probable that the Pewabic is a valuable mine. It has had very rich ground in the past, and while at present the lower levels are poor, a change is likely to occur and the ground be again found rich as formerly. The mine, pending the litigation, is wholly idle; the Franklin company uses the Pewabic man engine shaft. The Pewabic has produced since 1855 in the aggregate, 13,894 tons, 620 lbs. of copper. It has been very fully described in previous reports, and as no work has been done in the past year I find nothing to add beyond what has been previously written.

Johnson Vivian, Agt.; D. L. Demmon, Sec. and Treas., Boston, Mass.

THE FRANKLIN MINE

is one of the best examples of the results of what faith, energy and good management will accomplish when directed in the proper channel, that the mining region affords. For years, prior to 1874, the mine had been worked

on tribute until it was nearly a complete wreck. The stopes had been entirely exhausted; the machinery worn out, buildings dilapidated, treasury empty, reputation and credit at the lowest ebb. Under these most unfavorable circumstances the owners resumed work with a cash capital of only $16,000, and so well have Messrs. Demmon and Vivian managed the affairs and conducted the work, that without having raised a penny by assessments, the mine has been brought to a dividend paying basis, with a large surplus in the treasury; the mining plant, buildings, etc., put into excellent condition, $40,000 having been spent on the stamp mill alone; in fact $250,000 have been expended in this work of improvement.

The mine is not a rich one; it possesses no extraordinary advantages. The success is due to the fact that capable, energetic men have held the control and were determined to succeed. Their energy and confidence inspired faith in others for themselves and for the mine, and assured them credit, which was the next thing to having the requisite capital. And thus from its ruinous, nearly bankrupt condition, the Franklin mine has been wholly metamorphosed, its affairs placed in sound financial shape, and the company, instead of begging of the stockholders an annual stipend to carry on the work, is returning to them a yearly dividend from the profits of the work. An excellent illustration is thus afforded in the recent history of the Franklin mine of the value of having the right men in the right place.

The accompanying map shows the mine as it was three years ago. Since that time lower levels have been extended north, and the three shafts have been deepened four levels. No. 2 is now to the 27th level. The increase in the depth of the mine in the past 11 years has been 14 levels.

No. 2 shaft is 450 feet north of the Pewabic line, is down to the 27th level, about 2,000 feet on the lap of the formation (54° dip), and is within about one level of the north and south boundary line of the property. No. 3 shaft is to the 26th level; it is 900 feet from the Pewabic line, and is about 1,900 feet deep. No. 4 is 1,380 feet from the Pewabic line. No. 6 is 1,890 feet north of this line, is not used and is only 210 feet deep. The maximum length of the mine is 2,240 feet.

The mine is in the S. W. $\frac{1}{4}$, Sec. 24, T. 55, R. 34 and begins at the south line and runs diagonally N. E. across the $\frac{1}{4}$ section; the dip is to the N. W. toward the west boundary line, and of course must ultimately cease at this limit. No. 2 shaft, at the south end of the mine, as previously stated, has nearly reached its final depth. The portion of the company's property in which the copper deposit is embraced may be designated as a right angle, triangle in which the surface line is the hypothenuse; the west and north line of the property are respectively the base and perpendicular, towards which the deposit inclines and by which the company is limited. The company owns also the one-fourth section adjoining on the north, so that as the formation bears N. 33° E. and thus the lode rapidly widens to the north within the limits of this property, it possesses sufficient working ground for an indefinite period to come. The one-fourth section lying on the west belongs to the Pewabic Co., and is known as the Edwards purchase. The Pewabic mine workings have extended deeper than those of the Franklin and are thus not only deeper but directly under the south end of the Franklin. If the Franklin owned this land with No. 6,—the Pewabic shaft,—it would be in an assured position for product and economic working. The Franklin, Pewabic and Quincy mines are contiguous and in the same lode, long called

"the Pewabic vein." The Pewabic was very rich in the old mine, but is now poor in the bottom. The Quincy has very rich places and the ground stoped averages above 3%. The Franklin has never been so rich in copper, but is good enough to pay well, at least when under the present management.

The following are the details of the work for the past year:

Total number of tons of rock hoisted, 173,616; rejected, 36,340; tons sent to mill, 137,276. Per cent. of rock rejected, 20. Two thousand and four feet of diamond drill boring was done during 1885.

The openings made are as follows:

Sunk in shafts	543 feet
Sunk in winzes	247 "
Drifted	2,924 "
Total	3,714 feet

The fathoms of ground broken, openings included, are 9,751 $\frac{824}{1000}$. The amount of rock hoisted was 173,616 tons, which cost to manipulate $1.95 per ton, which is a saving of 27 cents per ton over 1884, or a total of $46,876.32, for the year. The percentage of ingot copper in a ton of rock hoisted was 1.15.

No. 2 shaft has been sunk from the twenty-sixth to the twenty-seventh level. No. 3 shaft has been sunk from the twenty-fourth to the twenty-sixth level; and No. 5 from the twenty-third to within a few feet of the twenty-fifth level. The lode exposed in these openings seems to show about the same amount of copper as heretofore. The openings by drifts from the above mentioned shafts have been made from the eighteenth to the twenty-seventh level, with the same regularity as in past years, and the general appearance of the lode exposed seems to be as productive as at any time during the past few years.

Number of tons of rock stamped per cord of wood used was 13.69.

There are four Ball stamps in the mill, of the old style; they were procured in 1862.

The percentage of ingot in rock hoisted was	1.15
The percentage of ingot in rock stamped was	1.47
Pounds of ingot in ton of rock hoisted	23.04
Pounds of ingot in ton of rock stamped	27.58
Pounds of rock in fathom of rock hoisted	414
Cost of mineral at smelting works per pound	8.47 cts.
Cost of ingot at smelting works per pound	7.04 cts.
The total force averages 465 men.	
Stamp mill cost 41.44 per cent. of whole expenses.	
Rock-house expenses	$15,094 65
Tram-road expenses	9,059 28

STAMP MILL EXPENSES.

Average number of men	54
Cost for labor	$20,730 53
Average number of surface men	35
Total wages paid them	16,231 31
Total mining expenses	$225,198 69
Total surface expenses	11,548 07
Total stamp mill expenses	60,889 63
Total expenses for the year	$338,995 49

FRANKLIN MINING COMPANY CASH ACCOUNT FOR YEAR ENDING DECEMBER 31ST, 1885.

Cash on hand January 1, 1885	$24,138 79
Cash received from sales of copper, 5,398,327 lbs., at 11 044-1000	595,962 16
Cash received from sale silver	1,511 81
Cash received from sale supplies	189 14
Cash received from interest	795 59
Cash received from loans	57,000 00
	$679,597 49

Contra.

Cash paid dividend July 1, 1885	$40,000 00
Cash paid dividend account, November 11, 1872	2 00
Cash paid loans	102,000 00
Cash paid mine agent's drafts	323,037 91
Cash paid interest	752 26
Cash paid insurance	1,299 53
Cash paid storage	1,635 43
Cash paid smelting	41,537 15
Cash paid freight	10,376 51
Cash paid expenses, brokerage, taxes, etc	9,173 73
Cash on hand December 31st, 1885	149,782 97
	$679,597 49

RECEIPTS AND EXPENDITURES OF THE FRANKLIN MINING COMPANY FOR THE YEAR 1885.

Receipts.

Sales of 3,291,806 lbs. copper sold, averaging 11 044-1000	$363,547 05
707,366 lbs. on hand (sold at 11½ cents)	81,347 09
Sales of silver	1,511 81
Sales of supplies	189 14
Received for interest account	795 59
	$447,390 68

Expenditures.

At mine, as per yearly cost sheet	$338,995 99
All other expenses, smelting, freight, insurance, etc	62,134 12
Profit and loss. *Profit for 1885*	46,260 57
	$447,390 68

Highest price in 1885, 11¼ cents.
Lowest price in 1885, 9 80-100 cents.

D. L. DEMMON, *Treasurer.*

ASSETS AND LIABILITIES OF THE FRANKLIN MINING COMPANY, JANUARY 1, 1886.

Assets.

707,366 lbs. copper sold 11¼ cents	$ 81,347 09	
Cash on hand	149,782 97	
Supplies at mine	78,947 06	
Received sales of silver	1,113 47	
		$311,190 59

Liabilities.

Drafts accepted and in transit	$30,686 39	
Liabilities at mines	28,747 75	
Due for smelting and freight	11,384 21	
		71,818 35
		$239,372 24
From which deduct dividend January 1, 1886		40,000 00
Balance assets January 1, 1886		$199,372 24

D. L. DEMMON, *Treasurer.*

Yield in 1881, 2,667,952 lbs. refined copper.
Yield in 1882, 3,264,120 lbs. refined copper.
Yield in 1883, 3,489,308 lbs. refined copper.
Yield in 1884, 3,748,652 lbs. refined copper.
Yield in 1885, 3,999,172 lbs. refined copper.

FRANKLIN MINE REPORT.

To the Stockholders of the Franklin Mining Company:

Herewith you will find the usual annual reports of your company for the year 1885, including agent's report regarding the workings of the mine, its present condition, and its prospects for the future; also, statements of receipts and expenditures, assets and liabilities, etc. You will observe that, as usual, the mine has increased its yearly production, and that it bids fair to continue to do so.

The openings are more extended, there is more rock broken in the mine ready for hoisting, and the buildings, machinery, etc., are in good order and repair, and all looks well for a successful year, which we are assured of, unless copper should decline lower than the past year, which seems improbable.

It may be a matter of interest to some of the stockholders to know what the mine has produced since its commencement, and to that end we give you the following figures:

Work was commenced in 1857, and carried on by the company 12½ years, say to 1870, during which time the production of ingot copper was	14,565,723 lbs.
The mine was then leased to trustees, who held possession four years and produced	2,206,774 lbs.
The company took possession in July, 1874, and to the present time, say 11½ years, have produced	30,968,327 lbs.
Making a total of	47,740,824 lbs.

The present management producing in 11½ years 14,195,830 lbs. more than the previous workings for 16½ years.

The total amount expended in opening and equipping the mine to December 31, 1885, is $3,992,584.56. This is exclusive of smelting, freight, etc., of course. The dividends paid during same period were $640,000.

The property in all its departments is well equipped, and the underground workings are showing as well, or better, than ever at the present time.

Captain Johnson Vivian is still at his post as agent at the Lake, and has so systematized the various departments that the property is second to none for neatness, order and economy of working, and your directors take pleasure in testifying to that effect.

There is in the mine, broken and ready for hoisting, 25,000 tons of rock, which is not valued as an asset.

During the year 137,276 tons of rock were treated at the mill, a gain over 1884 of 8,394 tons, producing 4,812,565 lbs. of mineral, which gave a yield of 83 13-100 per cent. of refined copper, or 3,999,172 lbs., being a gain over 1884 of 250,520 lbs. of refined copper.

The amount of mineral per ton of rock was 1 75-100, or 3-100 per cent. less than 1884.

The total cost of mining and manipulating per ton of rock hoisted was $1.95, or 27 cents per ton less than 1884.

Total amount of rock hoisted was 173,616 tons, a gain over 1884 of 12,549 tons.

SURFACE WORK.

No. 5 shaft house, being unfit for further use, has been replaced with a new one. Also a new rock bin has been constructed at this point. Owing to the very dilapidated condition of one of our tenement houses, which is located near the barn, it was necessary to remove it and build a new one. All necessary repairs to buildings of all kinds have been made as usual.

MACHINERY.

We have added to this department two boilers, which are located at the hoisting engine, to take the place of three of the old cylinder boilers, which were too expensive to operate. The steam pump that was put up at the Pewabic mill, on joint account, for pumping water from the lake to the mines for feeding boilers, has been taken out and erected at our mill, and is now in successful operation. The distance from the mill to the mine is 7,200 feet. The pressure on the water pistons, to force the water to the mine through a four-inch pipe, is 255 pounds per square inch.

STAMP MILL.

We have done a large amount of extraordinary repairs in this department. The frame of the building in some places was badly decayed, consequently it was necessary to remove a large portion of one end of the mill and rebuild it. The amount of rock treated was 137,276 tons, which is 8,394 tons more than was stamped in 1884.

FUTURE PROSPECTS.

At this writing everything seems to indicate that we shall see another prosperous year, so far as product is concerned, and if the price of ingot remains as it is at present, a good profit will be made.

The following table shows the results of the mining work since the present management took hold. The mine in the meantime has doubled in depth:

COST OF HOISTING AND MANIPULATING ONE TON OF ROCK AND COST OF STAMPING ONE TON.

Year.	Total Cost Per Ton.	Stamping 1 Ton.	Year.	Total Cost Per Ton.	Stamping 1 Ton.
1875	$4 76	$1 02	1881	$2 32	$0 60
1876	3 45	81	1882	2 35	55 1-2
1877	3 03	1 00	1883	2 40	53 34-100
1878	2 71	95	1884	2 22	49 81-100
1879	2 37	52	1885	1 95	44 35-100
1880	2 88	57			

The Franklin mine has produced as follows:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1857	3	699	1872	186	.....
1858	56	1,104	1873	183	.....
1859	116	1,211	1874	283	1,790
1860	157	1,860	1875	583	800
1861	783	43	1876	963	641
1862	733	645	1877	1,169	1,817
1863	639	684	1878	1,299	1,528
1864	605	1,335	1879	1,414	1,703
1865	779	1,481	1880	1,168	466
1866	819	994	1881	1,338	1,932
1867	701	455	1882	1,632	120
1868	737	1,326	1883	1,744	1,308
1869	779	970	1884	1,882	1,697
1870	589	.....	1885	1,999	1,172
1871	300	1,000			
Total				23,650	181

D. L. Demmon, Sec. and Treas.; Johnson Vivian, Supt.

INGOT COPPER.—MONTHLY LOWEST AND HIGHEST PRICES FOR A PERIOD OF TWENTY-SIX YEARS.

Years.	January.		February.		March.		April.		May.		June.		Years.	July.		August.		September.		October.		November.		December.		Years.	Low	High.	Ave'ge.
1860	23½	24	23⅞	24	23	23⅞	23	23½	22½	23¼	21¾	22½	1860	21½	21¾	21½	21½	21¼	22	21½	22	20¼	21½	19⅞	20¼	1860	19⅞	24	22.24
1861	19	20	19	19⅛	19⅜	19¾	19	19¾	18¾	19⅛	18	19	1861	17½	18	17¾	19	19	20¼	20	20¼	20¼	22½	22½	27	1861	17½	27	19.77
1862	27	28	25	28	23	25	21½	23	20¾	21½	20¾	23	1862	22½	24½	24	24½	24¼	27	27	32¾	30½	32¾	30½	31½	1862	20¾	32¾	25.76
1863	31	35	35	37	31	37	30	31	30	30¼	30	30½	1863	29	32	29	31⅛	31	32¼	32¼	34½	34½	39⅛	38½	38⅞	1863	29	39½	32.92
1864	39	41⅜	41⅜	42	41½	42½	42½	44	43¼	44	44	48½	1864	48½	55	50	52½	47½	52½	47	48	47	49	48½	50	1864	39	55	46.23
1865	46	50½	44	46	34	44½	34¼	35	30	34¼	28½	31	1865	28	30½	30⅛	32	30⅞	32¾	32⅜	32¾	32½	45½	39¼	45½	1865	28	50½	36.25
1866	38	42	35½	38	29½	35½	28⅝	30	28⅞	30⅞	30⅞	33⅛	1866	31	33½	29⅞	31	30¾	31½	30¾	31	26¾	30¾	26½	29	1866	26½	42	31.80
1867	27	29¼	27½	27⅝	24	27½	23½	24½	24	24¼	24	24½	1867	24	26	25¾	26⅜	26⅜	27⅛	22¾	26¾	22¾	23	21½	22¾	1867	21½	29¼	25.12
1868	21½	23½	22½	24	23⅛	24	23⅛	24⅜	24	24⅜	23⅛	24	1868	23⅛	24½	24	24¼	23¼	24	23	24	22½	24	23¾	24½	1868	21½	24½	23.62
1869	23¾	26⅜	26	27	24	26¾	23¼	24	23¾	24¼	22	23¾	1869	21⅞	22¼	21⅞	23⅛	22	23	22	22¾	22	22½	21½	22	1869	21½	27	23.40
1870	21	21¾	21½	21¼	19	20½	19	19⅜	19	19⅛	19⅛	20½	1870	20¼	20¼	20	21	20¾	21½	21½	22	22	22½	22¼	22¼	1870	19	22½	20.69
1871	22	22¼	21¾	22	21⅜	21¾	21⅜	21⅝	21⅛	21⅜	21⅛	21¾	1871	21¾	22½	22½	23	23	23¾	23¼	23¾	23¼	25	25	27¼	1871	21⅛	27¼	22.64
1872	27¼	28¼	28¼	28½	28½	37½	37½	45	33	40	32¾	34¼	1872	33	33½	33½	33½	32⅞	33½	31½	32⅞	30⅞	32	31	33½	1872	27¼	45	33.02
1873	33½	35	34¼	35	34	34½	32½	34	29¾	32½	28¾	29¾	1873	26¾	28¾	26⅞	27½	25	27	21⅝	25	20	24¼	24¼	24¾	1873	20	35	28.97
1874	24½	25	24¼	25	24	24¾	24¾	25	24½	25	24	24¾	1874	19¾	24	19	21	21	21¼	21¼	22¼	22¼	23¼	23¼	23¼	1874	19	25	23.21
1875	21½	23¼	21½	22	21½	21½	21½	22½	22½	23	22½	23	1875	22¾	23	23	23½	23¼	23½	23	23¼	23¼	23½	23¼	23½	1875	21½	23½	22.70
1876	22¾	23	22½	22¾	22	22½	22	22¾	21	22	19¼	21	1876	19½	20¼	18¾	19½	19	20¾	20	21	20	20¼	19¼	20½	1876	18¾	23	20.91
1877	19¼	20⅜	19¼	20⅜	19¼	19½	19¼	19¼	19	19¼	19	19¼	1877	18⅞	19	17⅞	18⅞	17⅞	18½	17⅞	18½	17¾	17⅞	17½	17¾	1877	17½	20⅜	18.80
1878	17⅜	17⅝	17	17½	16⅞	17	16⅞	17	16⅜	16¾	16¼	16⅜	1878	16⅛	16¼	16	16⅛	15⅞	16⅛	15½	15⅞	15½	16	15¾	16	1878	15½	17⅝	16.42
1879	15⅜	16	15½	15½	15½	16	15⅞	16	15⅞	16¼	16⅛	16¼	1879	16⅛	16¼	16⅛	16⅜	16¼	18¾	19	21½	21	21¾	21⅛	21½	1879	15⅜	21¾	17.35
1880	21¼	24⅞	23¾	24	22	24	20¾	21¾	18	20½	18	19	1880	18⅝	19	18⅞	19	18¾	19	18⅝	19	18⅝	19	18⅞	19⅛	1880	18	24⅞	20.18
1881	19⅛	19⅜	19¼	19⅜	19	19¼	18¾	19	18	18¾	16¼	18	1881	16	16½	16½	17	17	18¼	18	18¼	18	19⅜	19¼	20¼	1881	16	20¼	18.27
1882	19½	20½	18¾	19½	18½	19¼	17⅞	18½	18⅜	18¼	18⅛	18¼	1882	18⅛	18¼	18⅛	18¼	17⅞	18⅛	18	18⅛	18	18	17⅞	18	1882	17⅞	20½	18.41
1883	17¾	18	17⅝	18	16¼	17⅝	15¾	16	15⅞	16	15	15⅞	1883	15	15¼	15	15¼	15⅛	15¼	15	15¼	14¾	15	14⅞	15	1883	14¾	18	15.85
1884	14¾	15	14¾	14⅞	14⅝	14¾	14	14¾	14⅛	14⅜	13⅞	14¼	1884	13⅞	14	13⅝	13⅞	12⅞	13½	12⅞	13	12	12⅞	10½	12	1884	10½	15	13.72
1885	11	11¼	11	11⅛	10½	11⅛	10⅝	11⅜	11½	11¾	11¼	11⅝	1885	11⅛	11¼	11	11¼	11	11¼	10⅞	11	10⅞	11	11⅛	11½	1885	10½	11¾	11.14

Prices of	1869.		1870.		1871.		1872.		1873.		1874.		1875.		1876.		1877.		1878.		1879.		1808.		1881.		1882.		1883.		1884.		1885.	
Steel Rails.	120	145	98	110	95	106½	104	120¾	118	122½	75⅝	117½	65	71	52	67	40½	49	41	43½	41	67	58	85	60	63	39	58	34½	40	26½	34	25	35
Pig Iron	39½	42	31¼	36¼	30½	37¼	37	53⅜	32½	48⅜	24	32	23½	27	21¼	23¼	18	20¾	16½	18½	17¼	30½	23	41	24	26	25½	26	21	25	18	21	15⅝	17⅝
Chili Bars.	.....		.....		.....		.....		.....		£74½	87	79½	83	71¼	81½	64	73½	55	66	54	68	55	74	57	71	62⅞	71⅞	56¾	67	47	58⅛	38⅝	49¾

Iron Rails, highest $153¾ per ton, Sept. 1864. Steel Rails, highest $174, in 1868; lowest $25, 1885. Pig Iron, highest $73⅝, 1864; lowest, $15⅝, in 1885.

The following are taken from J. G. Martin's B

Lake Superior Copper Mining Co.'s	1882. Lowest and Highest.		1883. Lowest and Highest.		1884. Lowest and Highest.		No. of Shares.
Allouez	193¾	3½	100	260	50c	†1½	80,000
Atlantic	13	19	10	17	6	10	40,000
Calumet and Hecla	*231	255	*230	253	124	240	100,000
Central	20	31	20	25	5	20	20,000
Copper Falls	1½	4¼	1	2	50c	1¾	40,000
Franklin	10	17	9	15¾	5¾	11¾	40,000
Huron	106	4	50c	2	15c	2	40,000
National	1⅜	3⅜	50c	1⅞	15c	50c	40,000
Osceola	*30	*38	17½	33	8	17¼	50,000
Pewabic	6¼	17	1¼	10⅜	50c	2	40,000
Quincy	*40	70	40⅛	63½	26	*48	40,000
Ridge	25c	4¼	62½c	75c	45c	75c	20,000
‡Tamarack	.....		.....		.....		40,000

Lake Superior Copper Mining Cos.	1885. Jan. 2	Jan. 2 to April 1. Low.	High.	1885. Apr. 1	April 1 to July 1. Low.	High.	1885. July 1	t
Allouez	50c	37½c	50c	50c	37½c	60c	60c	
Atlantic	6	6	7½	6½	6½	7½	6½	
Calumet & Hecla	137	*135	163	160	160	182	*172	1
Central	10	.....		7	.....		7	
Copper Falls	50c	.....		50c	.....		50c	
Franklin	6	5¼	7	6	5⅞	9	*6½	
Huron	75c	.....		30c	30c	50c	35c	
National	15c	.....		15c	.....		15c	
Osceola	8	8	10	8½	8	10	9½	
Pewabic	1	.....		75c	.....		50c	
Quincy	26½	26¾	33	28	28	36½	36½	*
Ridge	50c	40c	75c	50c	.....		50c	
‡Tamarack	33	.....		33	33	60	60	

IONTHLY LOWEST AND HIGHEST PRICES FOR A PERIOD OF TWENTY-SIX YEARS.

ı.	April.		May.		June.		Years.	July.		August.		September.		October.		November.		December.		Years.	Low	High.	Ave'ge.
⅞	23	23½	22½	23¼	21¾	22½	1860	21½	21¾	21½	21½	21¼	22	21½	22	20¼	21½	19⅞	20¼	1860	19⅞	24	22.24
¾	19	19¾	18¾	19¼	18	19	1861	17½	18	17¾	19	19	20¼	20	20¼	20¼	22½	22½	27	1861	17½	27	19.77
5	21½	23	20¾	21½	20¾	23	1862	22½	24½	24	24½	24¼	27	27	32¾	30½	32¾	30½	31½	1862	20¾	32¾	25.76
-	30	31	30	30¼	30	30½	1863	29	32	29	31⅛	31	32¼	32¼	34½	34½	39⅛	38½	38⅞	1863	29	39½	32.92
½	42½	44	43¼	44	44	48½	1864	48½	55	50	52½	47½	52½	47	48	47	49	48½	50	1864	39	55	46.23
½	34¼	35	30	34¼	28½	31	1865	28	30⅛	30⅛	32	30⅞	32¾	32⅜	32¾	32½	45½	39¼	45½	1865	28	50½	36.25
½	28⅝	30	28⅞	30⅞	30⅞	33⅛	1866	31	33½	29⅞	31	30¾	31½	30¾	31	26¾	30¾	26½	29	1866	26½	42	31.80
½	23½	24½	24	24¼	24	24½	1867	24	26	25¾	26⅜	26⅜	27½	22¾	26¾	22¾	23	21½	22¾	1867	21½	29¼	25.12
	23½	24⅜	24	24⅜	23½	24	1868	23½	24½	24	24¼	23¾	24	23	24	22½	24	23¾	24½	1868	21½	24½	23.62
¾	23¼	24	23¾	24¼	22	23¾	1869	21⅞	22¼	21⅞	23½	22	23	22	22¾	22	22½	21½	22	1869	21½	27	23.40
½	19	19⅜	19	19½	19½	20½	1870	20¼	20¼	20	21	20¾	21½	21½	22	22	22½	22¼	22¼	1870	19	22½	20.69
¾	21⅜	21⅝	21½	21⅜	21½	21¾	1871	21¾	22½	22½	23	23	23¾	23¼	23¾	23¼	25	25	27¼	1871	21½	27½	22.64
½	37½	45	33	40	32¾	34¼	1872	33	33½	33½	33½	32⅞	33½	31½	32⅞	30⅞	32	31	33½	1872	27¼	45	33.02
	32½	34	29¾	32½	28¾	29¾	1873	26¾	28¾	26⅞	27½	25	27	21⅝	25	20	24¼	24¼	24¾	1873	20	35	28.97
¼	24¾	25	24½	25	24	24¾	1874	19¾	24	19	21	21	21¼	21¼	22¼	22¼	23¼	23¼	23¼	1874	19	25	23.21
⅝	21½	22½	22½	23	22½	23	1875	22¾	23	23	23½	23¼	23½	23	23¼	23¼	23½	23¼	23½	1875	21½	23½	22.70
⅝	22	22¾	21	22	19¼	21	1876	19½	20¼	18¾	19½	19	20¾	20	21	20	20¼	19¼	20½	1876	18¾	23	20.91
½	19¼	19¼	19	19¼	19	19¼	1877	18⅞	19	17⅞	18⅞	17⅞	18½	17⅞	18½	17¾	17⅞	17½	17¾	1877	17½	20⅜	18.80
	16⅞	17	16⅜	16¾	16¼	16⅜	1878	16⅛	16¼	16	16⅛	15⅞	16⅛	15½	15⅞	15½	16	15¾	16	1878	15½	17⅝	16.42
	15⅞	16	15⅞	16¼	16½	16¼	1879	16⅛	16¼	16⅛	16⅜	16¼	18¾	19	21½	21	21¾	21½	21½	1879	15⅜	21¾	17.35
	20¾	21¾	18	20½	18	19	1880	18⅝	19	18⅞	19	18¾	19	18⅝	19	18⅝	19	18⅞	19⅛	1880	18	24⅞	20.18
ı	18¾	19	18	18¾	16¼	18	1881	16	16½	16½	17	17	18¼	18	18¼	18	19⅜	19¼	20¼	1881	16	20¼	18.27
ı	17⅞	18½	18⅛	18¼	18⅛	18¼	1882	18⅛	18¼	18⅛	18¼	17⅞	18⅛	18	18⅛	18	18	17⅞	18	1882	17⅞	20½	18.41
ı	15¾	16	15⅞	16	15	15⅞	1883	15	15¼	15	15¼	15⅛	15¼	15	15¼	14¾	15	14⅞	15	1883	14¾	18	15.85
ı	14	14¾	14⅛	14⅜	13⅞	14¼	1884	13⅞	14	13⅝	13⅞	12⅞	13½	12⅞	13	12	12⅞	10½	12	1884	10½	15	13.72
ı	10⅝	11⅜	11½	11¾	11¼	11⅝	1885	11⅛	11¼	11	11¼	11	11¼	10⅞	11	10⅞	11	11⅛	11½	1885	10½	11¾	11.14

	1872.		1873.		1874.		1875.		1876.		1877.		1878.		1879.		1808.		1881.		1882.		1883.		1884.		1885.	
⅝	104	120¾	118	122½	75⅝	117½	65	71	52	67	40½	49	41	43½	41	67	58	85	60	63	39	58	34½	40	26½	34	25	35
⅝	37	53⅜	32½	48⅜	24	32	23½	27	21¼	23¼	18	20¾	16½	18½	17¼	30½	23	41	24	26	25½	26	21	25	18	21	15⅝	17⅝
-	-------		-------		£74½	87	79½	83	71¼	81½	64	73½	55	66	54	68	55	74	57	71	62⅞	71⅞	56¾	67	47	58⅛	38⅝	49¾

ton, Sept. 1864. Steel Rails, highest $174, in 1868; lowest $25, 1885. Pig Iron, highest $73⅝, 1864; lowest, $15⅝, in 1885.

The following are taken from J. G. Martin's Boston Stock Reporter:

Lake Superior Copper Mining Co.'s	1882. Lowest and Highest.		1883. Lowest and Highest.		1884. Lowest and Highest.		No. of Shares.	Assessed up to Date Per Share Total. Jan. 1885.	Jan. 1886.	Dividends. When Paid. 1885.
Allouez	193¾	3½	100	260	50c	†1½	80,000	$15 75	$15 75	
Atlantic	13	19	10	17	6	10	40,000	-------	-------	50c. Feb. 1885.
Calumet and Hecla	*231	255	*230	253	124	240	100,000	12 00	12 00	$5 Feb. 2; $7 July 13; $5 Nov. 2.
Central	20	31	20	25	5	20	20,000	2 50	2 50	$1.50 Feb. 2, 1885.
Copper Falls	1½	4¼	1	2	50c	1¾	40,000	22 75	25 00	
Franklin	10	17	9	15¾	5¾	11¾	40,000	8 00	8 00	$1 July; $1 Jan. 4, 1886.
Huron	106	4	50c	2	15c	2	40,000	6 00	6 00	
National	1⅜	3⅜	50c	1⅞	15c	50c	40,000	7 00	7 00	
Osceola	*30	*38	17½	33	8	17¼	50,000	17 60	17 60	
Pewabic	6¼	17	1¼	10⅜	50c	2	40,000	14 63	14 63	
Quincy	*40	70	40½	63½	26	*48	40,000	5 20	5 00	$2.50 Feb. 16; $2 Aug. 17; $4 Feb. 15, 1886.
Ridge	25c	4¼	62½c	75c	45c	75c	20,000	20 50	20 50	
‡Tamarack	-------		-------		-------		40,000	10 00	13 00	

Lake Superior Copper Mining Cos.	1885. Jan. 2	Jan. 2 to April 1. Low.	High.	1885. Apr. 1	April 1 to July 1. Low.	High.	1885. July 1	July 1 to October 1. Low.	High.	1885. Oct. 1.	Oct 1 to Dec. 31. Low.	High.	1886. Jan. 2
Allouez	50c	37½c	50c	50c	37½c	60c	60c	55c	60c	60c	60c	$1	1
Atlantic	6	6	7½	6½	6½	7½	6½	6½	8	7½	6½	10¼	9½
Calumet & Hecla	137	*135	163	160	160	182	*172	172	225	214	*205	220	212
Central	10	-------		7	-------		7	-------		7	-------		7
Copper Falls	50c	-------		50c	-------		50c	-------		50c	-------		50c
Franklin	6	5¼	7	6	5⅞	9	*6½	6½	8⅞	7½	7½	13	*11
Huron	75c	-------		30c	30c	50c	35c	-------		50c	35c	2½	2
National	15c	-------		15c	-------		15c	-------		15c	15c	1	1
Osceola	8	8	10	8½	8	10	9½	9¼	13	12¾	12¼	15	14
Pewabic	1	-------		75c	-------		50c	-------		1	1	3½	3
Quincy	26½	26¾	33	28	28	36½	36½	*32½	*39	38½	38	55	53
Ridge	50c	40c	75c	50c	-------		50c	50c	75c	75c	75c	1	90c
‡Tamarack	33	-------		33	33	60	60	46	76	76	74	90	90

LAKE SUPERIOR COPPER MINING COMPANIES.—MONTHLY PRODUCTS.—OFFICIAL.

Calumet and Hecla.

Date.	1883-4.	1884-5.	1885-6.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
May	1,915 1977	4,354 143	2,640 1699
June	1,826 1469	2,178 1391	2,669 1737
July	1,725 1768	2,339 1967	2,684 813
August	1,904 1014	2,360 1213	2,667 466
September	1,747 1651	2,424 1426	2,556 1739
October	1,881 1953	*1,498 1295	2,557 831
Six months	11,003 1832	13,156 1435	15,776 1285
November	1,825 1856	2,126 830	*a*2,366 165
December	1,843 98	2,449 1114	.....
January	1,918 1534	2,489 811	.....
February	1,989 404	2,080 1630	.....
March	2,150 1747	2,498 1534	.....
April	2,224 684	2,489 255	.....
Year	22,956 155	27,290 1609	.....
Per cent	77.13	77.97	.....
Ingot	17,707 07	21,278 154	.....
Ingot lbs	35,414,007	42,556,154	.....

Osceola.

Date.	1883.	1884.	1885.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	201 635	207 1270	192 692
February	204 1485	205 550	169 1617
March	207 365	213 695	177 1097
April	202 845	210 700	192 1900
May	205 1785	210 1040	156 1646
June	205 535	205 445	—(*e*)—
Six months	1,226 1650	1,252 700	889*e* 952
July	205 950	215 921	Mill not running.
August	204 1750	200 20	
September	209 725	207 1885	
October	210 815	221 1880	
November	216 275	203 1975	80 1785
December	212 610	206 595	180 —
Year	2,485 775	2,507 1976	1,150*e* 737
Per cent	85.74	84.73	86.186
Ingot	2,130 1942	2,125 36	991 913
Ingot lbs	4,261,942	2,125,936	1,982,913

Quincy.

Date.	1883.	1884.	1885.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	170 375	180 440	160 1285
February	175 350	200 360	180 810
March	225 520	230 955	210 630
April	250 310	251 590	220 1715
May	261 40	265 560	250 175
June	275 675	281 1570	270 415
Six months	1,357 270	1,409 475	1,292 1,030
July	300 495	300 1155	300 400
August	332 465	334 185	335 915
September	336 170	336 1575	350 1240
October	350 1730	351 1040	370 590
November	451 1055	449 1665	636 465
December	242 1965	260 405	260 1165
Year	3,371 150	3,442 1200	3,545 1805
Per cent	82.30	82.50	.....
Ingot	2,774 790	2,840 290	.....
Ingot lbs	5,548,790	5,680,290	.....

Franklin.

Date.	1883.	1884.	1885.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	132 1530	175 1755	170 580
February	151 240	175 575	183 180
March	160 210	174 1960	184 1735
April	170 1705	172 420	194 450
May	170 25	178 1055	190 635
June	177 825	175 415	189 1440
Six months	962 535	1,052 180	1,112 1020
July	179 1810	175 900	191 1220
August	183 760	175 1805	188 1130
September	187 1020	181 1215	201 1755
October	195 1360	201 65	208 15
November	200 530	288 1695	222 1430
December	242 1995	227 680	280 1985
Year	2,152 10	2,302 540	2,406 555
Per cent	81.15	81.41	83.557
Ingot	1,746 704	1,874 625	2,010 1226
Ingot lbs	3,492,704	3,748,652	4,021,226

Fire in mine October, 1884. (*a*) November, not official. (*e*) Eleven months. (*e*) *Osceola*; mill shut down May 17 to November 17.

LAKE SUPERIOR COPPER MINING COMPANIES.—MONTHLY PRODUCTS.—OFFICIAL.

Allouez.

Date.	1883.	1884.	1855.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	91 775	100 275	147 425
February	80 35	96 475	130 350
March	90 540	100 550	142 575
April	100 640	102 215	142 1070
May	102 985	103 650	143 1495
June	111 1235	100 950	—(*b*)—
Six months	576 210	602 1115	705 1915
July	111 710	100 215	164*b* 055
August	111 510	102 150	120 1095
September	105 530	120 150	120 060
October	100 175	145 1045	125 655
November	100 315	150 10	119 995
December	100 226	150 470	.....
Year	1,204 676	1,371 1155	1,354*d* 860

Copper Falls.

Date.	1883.	1884.	1885.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	39 325	46 1595	63 1045
February	37 1925	35 1255	60 10
March	40 260	24 480	60 410
April	401,615	42 680	63 1760
May	47 1575	47 660	65 796
June	50 430	45 1885	65 1950
Six months	256 130	242 555	378 1935
July	41 1755	49 1185	67 1955
August	39 820	58 1435	67 487
September	37 530	61 600	64 1250
October	43 295	67 1330	63 1200
November	59 345	63 915	68 50
December	59 948	63 1165	.....
Year	535 1820	543 20	710*d* 877

Atlantic.

Date.	1883.	1884.	1885.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	166 1920	163 1003	198 1880
February	153 530	172 03	185 1440
March	164 825	174 1422	194 680
April	152 794	188 978	186 1540
May	162 385	191 1165	215 980
June	158 540	186 1300	212 616
Six months	957 994	1,076 1871	1,193 1136
July	158 660	184 1540	213 355
August	165 1335	181 1400	205 506
September	158 1461	191 1815	213 1634
October	166 540	203 365	227 1040
November	160 1665	180 05	202 1056
December	161 603	681 1930	.....
Year	1,928 1258	2,018 996	2255*d* 1727

Huron.

Date.	1883.	1884.	1885.
	Tons. Lbs.	Tons. Lbs.	Tons. Lbs.
January	14 1760	71 1460	119 100
February	17 131	75 1040	112 500
March	18 1268	75 10	118 1200
April	11 494	66 100	102 696
May	13 1030	70 1595	115 —
June	16 431	108 655	115 790
Six months	91 1114	467 860	682 1278
July	17 1552	116 498	101 100
August	52 1785	118 875	102 400
September	57 631	120 1035	115 210
October	69 1979	125 430	120 630
November	73 160	125 200	126 384
December	70 1885	120 440	135 700
Year	433 1106	1193 338	1382 1710

(*b*) *Allouez*, leased late in June and product carried to July. (*d*) Eleven months.

STATISTICAL TABLE

Showing the Total Number of Net Tons of Refined Copper Produced by the Mines of Michigan. By Ch

NAMES OF COPPER MINING COMPANIES.	*1855.		1855.		1856.		1857.		1858.		1859.		1860.		1861.		1862.		*1863.		1864.		1865.		1866.		*1867.		1868.		1869.		1870.		1871.		187
	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.
[1] Adventure	34		31	34	71	1336	116	1941	57	1678	99	431	21	749	2	676	11	89				1755	3	1491	2	439				1154	1	931	3	391	8	
[2] Ætna																	3	857			3	857	2	131	29	996	31	858	1	1389						
[3] Peninsula (Albany & Boston)																	3	1982			3	1000	159	160	81	1906	31	493	117	536						
[2] Allouez																															1	1,575				
[2] Amygdaloid																	48	1591	69	124	67	1795	209	964	170	568	80	1375	61	694	16	1010	23	1610		
[3] Arcadian																					2	593	2	1816												
[3] Atlantic (South Pewabic)																									6	1475		1760	764	258	823	857	186	617		
[1] Aztec	19		1	1467	25	1139	14	1361	3	251	9	493	3	203									4	700	16		40		36		87	1267	12	1288	6	1153	5
[1] Caledonia (Old Nebraska)			27		2	1500					7	1000	20	400					3	1730	15	1977							13	243	52	1853	43	1508	1	1377	(b)
[3] Calumet & Hecla																											675	1173	2,549	375	6,157	1771	7,030	1584	8,111	590	8,081
[1] Carp Lake													3	428						976	5	546	6	1185													
[2] Central					32	903			71	1011	84	312	125	1370	70	139	133	1972	278	1548	351	1855	546	1700	574	1842	687	795	1,353	1827	903	1801	663	1156	716	662	623
[2] Clark (Pittsburgh & Boston)																																					8
[2] Cliff	3,490		937	197	1,110	934	1,180	850	1,130	433	707	1007	921	1393	964	11	1,002	960	1,050	354	675	1334	747	626	821	928	560	1725	613	1746	362	1247	222	381	71	238	59
[3] Concord																									4	1980	26	20	85	1185			4	1815	61	1626	71
[2] Copper Falls	158		100		104	10	153	1305	151	1852	173	174	255	818	280	11	229	299	159	1348	179	808	235		568	1169	1,128	1485	239	1384	345	1400	386	990	239	883	260
[2] Delaware																					29	700	51	492													81
[3] Douglass													13	1,240									3	809	8	209	32	1877	25	109							
[2] Eagle River		500		1500	1	600	1		3	637	6		4	1651			2	1652								738	4	389								
[1] Evergreen Bluff	1	593	7	100	12	1110	23	942	3	665	19	811	31	1817	49	1187	59	1257	70	1446			187	1213							73	1662	55	1420	22	1048	
[1] Flint Steel River	4	651	2						1	106													108	959	50	1000							15	889	46	500	22
[3] Franklin							3	699	56	1104	116	1211	157	1860	783	43	733	645	639	684	605	1335	779	1481	819	994	701	455	734	1326	779	970	589		300	1000	186
[2] Garden City											2				7				18		5				5	1397											
[3] Grand Portage																			177	1793	244	1104	241	1592					79	1282	36	314					
[2] Hancock (Sumner)															17		42	1325	55	1432	51	1000	37	1000	298	717	427		80		(a)38		(a)203	1731	(a) 29	1710	(a) 27
[1] Hilton (Ohio)	2					705															5	1179	3	411	2	1767							1	1945			
[3] Huron			3		12		35		24		22	1387	4	1000	49		69	1305	69	206	50	1745	238	11			683	1169	740	80	841	863	(a) 42	183	(a)134	1453	(a)276
[1] Belt (International, Bohemian)											1	1903							16	563	11	69	31	1502	34	1823							4	630	9	1482	32
[3] Isle Royal	58		93		232	1124	210	117	178	810	208	56	168	198	458	1274	448	139	360	1841	291	386	344	1836	308	1336	381	852	147	1033	(a) 75	672			(a 90	1217	(a) 125
[4] Island																																					
[1] Knowlton																	11	439	42	1451			98	724							53	977					8
[1] Lake Superior																					1	432		1951	1	18											
[2] Madison (Summit)					2		8																7	881	17												
[1] Mass							8	228	6		26	682									4	1452	6	936	5	112	5	40	9	939	1	1213	1	1408	9	692	
[3] Mesnard																			21	1129	2		7	1600					2	1510							
[1] Minesota	1,510		1,040		1,745	714	1,976		1,901	914	1,672	587	1,340	500	1,508	824	1,260		838	1500	723		201	1000	195	1500	188	500	115	900	113	1500	200	1500	184		126
[4] Minong																																					
[1] National	78	1477	24	1302	88	483	158	957	132	804	244	176	539	609	691	1760	432	1752	280	1179	314	516	348	168	323	1371	330	922	309	1820	128	947	130	660	205	1086	168
[1] Nonesuch																													1	1502	1	1261				257	
[2] North American	450		153	1822	204	252	137	1958	19	919	11	852	(d)																								
[2] Northwestern	72		77	900	40	830	2	1913											2	1920	3	650															
[1] Norwich	167		108		110		58		19	1000											4	1730	26	1330							2	1300					
[1] Ogima																			26	1530	25		70	990	138	1310	84	480	99	1360	9	45			4	1839	
[1] Ohio Trap Rock	1	500							19	685																											
[3] Osceola																																					
[2] Pennsylvania (Northwest)	555		99	80	1	1348	29	543	83	100	74	144	121	97	54	1920					81	1960	189	1369	64	90	163	660									
[2] Ash Bed (Petherick)																	15	1822	66	1183	25	1228	4	1169					6								5
[3] Pewabic			2	301	53	1667	118	254	208	603	514	1949	958	1426	924	1992	785	1281	845	1562	714	1857	865	1394	673	140	823	458	521	1523	480	409	273		222	600	233
[2] Phœnix	19		3		8		17				28	590	20	62	34	790	31	1590	72	118	142	187	202	1000	205		155	115	130		398	630	499	1000	609	1862	364
[3] Quincy					6	1462	61	762	153	772	178	1114	970	414	1,182	852	1,153	218	1,115	1737	1,251	586	923	1500	1,172	1000	1,013	1000	727	1000	1,208	1365	1,248	1777	1,204	1501	1,134
[1] Ridge	30		35	631	36	1874	29	790	39	690											8	917	85	433	71	411	94	1537	86		126	1840	122	1400	175	150	128
[1] Rockland	10		58		146	1000	378	396	311	1140	239	1190	344	1000	388	358	282		172		260	1624	108	1500	60		35	400	49	500	59	1000	47	1000	30		25
[3] Centennial (Schoolcraft)																															(a) 4	290	(a)213	366	(a)371	1228	(a)192
[2] Seneca																																					
[3] Sheldon & Columbia																							36	912	66	1497	309	946	166	1118	93	368					
[4] Saginaw																																					
[5] Star				1000			2	778	4	1107														1760													
[2] St. Clair																							4	815	31	200	43	1723	65	665	23	197					9
[1] Superior										635		1740	5		25	1000	35		33	500	51	788	44	500	33		18	400	28		2	521					
[1] Toltec	50		30		59	401	41	1036			16	186	3	1140											6	670											
[1] Victoria (Forest)	130		36																3	1490				581	4	360			4	1820			1	1570	1	1903	
[1] Windsor			34																																		
[3] Wolverine																																					
Tamarack																																					
Sundry Co.'s and tributers	163																												500		8	1022	84		8		5
Total No. net tons and pounds.	6,992	1727	2,904	1334	4,108	1392	4,765	830	4,579	1916	4,463	1995	6,034	375	7,519	837	6,793	328	6,492	1344	6,245	1965	7,179	583	6,875	63	8,763	1607	10,467	124	13,312	1300	12,311	849	13,373	349	12,266
Total value (New York city)	$3,146,400		$1,586,160		$2,218,320		$2,382,500		$2,129,235		$2,239,591		$2,654,960		$3,487,995		$3,634,255		$4,415,600		$5,870,300		$5,635,515		$4,629,375		$4,442,841		$4,940,424		$6,230,016		$5,096,752		$5,728,485		$7,979,
Highest and lowest price	29½—16		29½—24½		29⅛—24½		30—20		26¾—19¾		24¾—21		24—19⅞		27—17½		32¾—20¾		39—29		55—39		50½—28		42—26½		29¼—21½		24½—21¾		27—21½		22¾—19		27¼—21¾		45—27

[1] Mine in Ontonagon county. [2] Mine in Keweenaw county. [3] Mine in Houghton county. [4] Mine in Isle Royal county. [5] Mine in Houghton and Keweenaw counties. *Previous to 1855. † Now Flint Steel.

a M

STATISTICAL TABLE,

Produced by the Mines of Michigan. By Charles D. Lawton, A. M. C. E., Commissioner of Mineral Statistics.

7.	1868.		1869.		1870.		1871.		1872.		1873.		1874.		1875.		1876.		1877.		1878.		1879.		1880.		1881.		1882.		1883.		1884.		1885.		Totals.		NAMES OF COPPER MINING COMPANIES.
Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	
				1154	1	931	3	391	8	1055	2	1345	3	165	15	470	20	784	32	609	27	115	10	1785	1	951	3	1500		429			2	333	4	436	589	1072	Adventure.
858	1	1389									2	650																											Ætna.
493	117	536									33	200					3	15	5	1998		1746									424	1400	612	1981			1477	1417	Peninsula (Albany & Boston).
			1	1,575							(a) 10	1163	(a)504	134	(a)692	1574	(a,780	1875	(a)650	279	565	1146	715	1452	659	471	736	1007	841	1557	875	1377	964	174	1085	476	9084	260	Allouez.
1375	61	694	16	1010	23	1610					14	250	7	840								1259																	Amygdaloid.
																							12	760															Arcadian.
1760	764	258	823	857	186	617					431	1366	686	406	783	1036	917	1041	1,027	304	1,132	1592	1,153	1822	1,170	1195	1,264	9	1,315	1708	1341	197	1581	1585	1,791	533	16,378	1761	Atlantic (South Pewabic).
	36		87	1267	12	1288	6	1153	5	1550			6	1412	8	252	13	1378	14	1934	11	1392	8	737	2	1757			1	1129							353	863	Aztec.
	13	243	52	1853	43	1508	1	1377	(b)																												188	1588	Caledonia (Old Nebraska).†
1173	2,549	375	6,157	1771	7,030	1584	8,111	590	8,081	1836	9,424	265	10,062	1225	10,736	1954	10,845	737	11,284	468	12,625	1128	13,135	943	15,837	1239	15,680	781	16,026	1528	16,562	1045	20,237	585	23,623	1990	218689	1217	Calumet & Hecla.
																																					15	1135	Carp Lake.
795	1,353	1827	903	1801	663	1156	716	662	623	56	751	1117	870	900	733	952	1,080	1400	997	1610	943	1013	809	1495	1,013	78	709	465	676	1597	634	556	723	747	1078	1408	18241	287	Central.
									8	1749			3	1244	33	1475	19	774	17	813	10	1520		340													93	1915	Clark.
1725	613	1746	362	1247	222	381	71	238	59	386	375	1203	527	901	581	873	450	146	80	1319	207	415	67	336	39	962	39	1382	33	53	5	374	14	255	4	332	19,053	1301	Cliff.
20	85	1185			4	1815	61	1626	71	1792	61	168	11	518		440									5	464	14	849									347	857	Concord.
1485	239	1384	345	1400	386	990	239	883	200	862	643	540	535	359	203	1587	8	1488	5	1950	5	1790			3	615	334	1121	293	1500	402		445	1168	575	538	8,805	1454	Copper Falls.
									81	1161	140	743	40	1271	12	1220	88	1701	16	1417	140	345	70	12	116	1814	193	91	367	249	111	117	599	691	20	1155	2,079	1179	Conglomerate (Delaware).
1877	25	109																	1	1258																	84	1502	Douglass.
389																																					24	1667	Eagle River.
			73	1662	55	1420	22	1048													35	1873	15	405	5	651		968					955		3	736	679	864	Evergreen Bluff.
					15	889	46	500	22	1879	38	698	24	772	16	1054	15	115	13	67	19	356	21	1192	14	80	2	140										415	458	Flint Steel River.
455	734	1326	779	970	589		300	1000	186		183		283	1790	583	800	963	641	1,169	1817	1,299	1528	1,414	1703	1,168	466	1,338	1932	1,632	120	1,744	708	1882	1697	1999	1172	23,650	181	Franklin.
																																					37	1397	Garden City.
	79	1282	36	314																	17	124	17	1423	38	1860	13	264	378	1080	367	1598					1,613	434	Grand Portage.
	80		(a)38		(a)203	1731	(a) 29	1710	(a) 27	366	(a) 44	1132	(a) 30	1365	(a) 14	229							3	1294	1	1032	285	1897	270	575	242	906	281	636	101	1037	2,584	1384	Hancock (Sumner).
					1	1345													1	1555	3	807	1	50											5	342	27	161	Hilton (Ohio).
1169	740	80	841	863	(a) 42	183	(a)134	1453	(a)276	1689	(a)273	1883	(a)125	1005	(a) 31	1289	(a) 31	1857	(a) 41	161	32	1100	14	1760	35	285	127	515	182	579	360	213	963	1660	1335	1163	6,616	561	Huron.
					4	630	9	1482	32	1100	50	845	3	1535	4	762	5	653	8	1703		1488		417					2	1625	8	402	89	351	13	1433	330	286	Belt (International, Bohemian).
852	147	1033	(a) 75	672			(a 90	1217	(a) 125	164	(a) 120	100	(a) 90	876	(a) 48	682	(a) 14	199	(a 15	1985	15	1933	13	880	38	1469	23	1308	17	1447		8	874		15	164	4,602	71	Isle Royal.
																	24	340	44	867																	68	1207	Island.
			53	977					8	1559	35	442	3	215	3	562			2	1975	4	629										10	1368		10	1976	285	317	Knowlton.
													2	1228					1	106				1086													7	921	Lake Superior.
																						1676						1,534									36	91	Madison (Summit).
40	9	939	1	1213	1	1408	9	692		1903	4	265	5	1925	1	1014	40	1952	54	238	206	339	228	294	258	1159	233	1684	368	1440	229	1474	281	718	181	1500	2,279	1607	Mass.
	2	1510									4	1269							3	589																	42	97	Mesnard.
500	115	900	113	1500	200	1500	184		126		74	171	93	338	66	1419	44	954	56	1148	87	1027	46	762	16	33	12	227	5	672	3	226		1144	6	608	17,353	668	Minesota.
															24	344	57	537	52	892	45	596	36	515	13	1407	7	1397	10	1380	1	1582					249	650	Minong.
922	309	1820	128	947	130	660	205	1086	168	770	83	1870	71	52	49	878	83	647	34	737	11	736	8	1506					8	1060	13	6	43	1368	81	252	252	5448	National.
	1	1502	1	1261				257					13	1450	24	1667							15	1973	27	1584	59	1061	23	450			11	1867			180	1072	Nonesuch.
																																					976	1803	North American.
																										916											199	1129	Northwestern.
			2	1300																																	496	1360	Norwich.
480	99	1360	9	45			4	1839													1	800	8	1937	2	1885	8	776	2	207	1	1000		1106	6	291	491	156	Ogima.
																																					20	1185	Ohio Trap Rock.
													468		665	303	846	1737	1,382	777	1,352	1998	1,598	1387	1,691	1537	2,089	1976	2,088	782	2,128	409	2123	1630	969	1169	17405	1,705	Osceola.
660																																					1,517	311	Pennsylvania (Northwest).
	6								5	570	6	1348	86	291	76	946	42	1224	7	633							12	804	36	636				1517			392	1,471	Ash Bed (Petherick).
458	521	1523	480	409	273		222	600	233	1000	286	400	147	607	312	1271	284	995	346	1777	261	1826	168	519	485	509	938	244	741	666	585	1847	115	1543			13,894	620	Pewabic.
115	130		398	630	499	1000	609	1862	364	470	260	1080	699	400	702	276	698	530	511	493	150	1172	271	1426	218	10	204	1357	268	1177	256	291	310	1064	180	1108	7673	738	Phœnix.
1000	727	1000	1,208	1365	1,248	1777	1,204	1501	1,134	1134	1,400		1,525	654	1,399	281	1,536	1171	1,427	336	1,480	449	1,323	1458	1,848	263	2,753	848	2832	1796	3,006	239	2825	1130	2924	497	41,089	622	Quincy.
1537	86		126	1840	122	1400	175	150	128	1910	115	1140	187	113	164	447	145	18	148	815	125	1837	107	1469	111	1353	117	1606	51	936	30	155	37	30	36	1390	2448	1892	Ridge.
400	49	500	59	1000	47	1000	30		25	1000	11	1400	22	1260	5	1440	28	1600	19	700	8	1877		1924													3,105	309	Rockland.
			(a) 4	290	(a)213	366	(a)371	1228	(a)192	242	(a)154	1785	(a) 5	618															41	1554							983	83	Centennial (Schoolcraft).
										1603									3	1810	3	1809															8	1,222	Seneca.
946	166	1118	93	368																		1622			23	931	5	31	1	1299			4	1828			508	552	Sheldon & Columbia.
																				1800			24	1464													25	1264	Saginaw.
										535																		758									8	1938	Star.
1723	65	665	23	197					9	72	40	1867	2	1400											6	1195	62	1493	43	1126	62	1225	69	1407	39	1686	505	1,071	St. Clair.
400	28		2	521													1	1936	2	1870		1965		1476													283	1331	Superior.
																																					206	1433	Toltec.
	4	1820			1	1570	1	1903		1890								752		861	2	52															186	1279	Victoria (Forest).
																																					34		Windsor.
																													12	1623	349	1622	400		185	925	948	170	Wolverine.
																															3	1435			90	1669	94	1104	Tamarack.
	500		8	1022	84		8		5	1220	2	800	16	1120	24		41	1800	27	1000	2	186	7	1527	3	166		884	12	1623				942	19	1504	915	171	Sundry Co.'s and tributers.
1607	10,467	124	13,312	1300	12,311	849	13,373	349	12,266	1523	15,045	1505	17,166	1389	18,019	1497	19,135	997	19,513	671	20,845	1266	21,425	1529	24,869	367	37,270	909	28,577	1980	29,855	404	34,297	591	36,093	114	457161	1559	Total No. net tons and pounds.
41	$4,940,424		$6,230,016		$5,096,752		$5,728,485		$7,979,400		$8,726,100		$8,009,356		$8,180,626		$7,998,430		$7,327,888		$6,920,540		$7,327,350		$9,947,673		$9,971,702		$10,522,416		$8,955,361		.....		.....		.....		Total value (New York city).
1½	24½—21¾		27—21½		22¾—19		27¼—21¼		45—27¾		35—20		25—19		23½—21½		23—18¾		20⅝—17½		17½—15¾		21¾—15		24½—18		20¼—16¼		20½—17⅞		18—14¾		15—10½		11¾—10½		.....		Highest and lowest price.

*Previous to 1855. † Now Flint Steel. *a* May 1st of the following year. *b* Consolidated with the Flint Steel River. *d* Consolidated with Pittsburgh & Boston. *f* Sold to Phœnix. *g* No returns. *h* Since 1855.