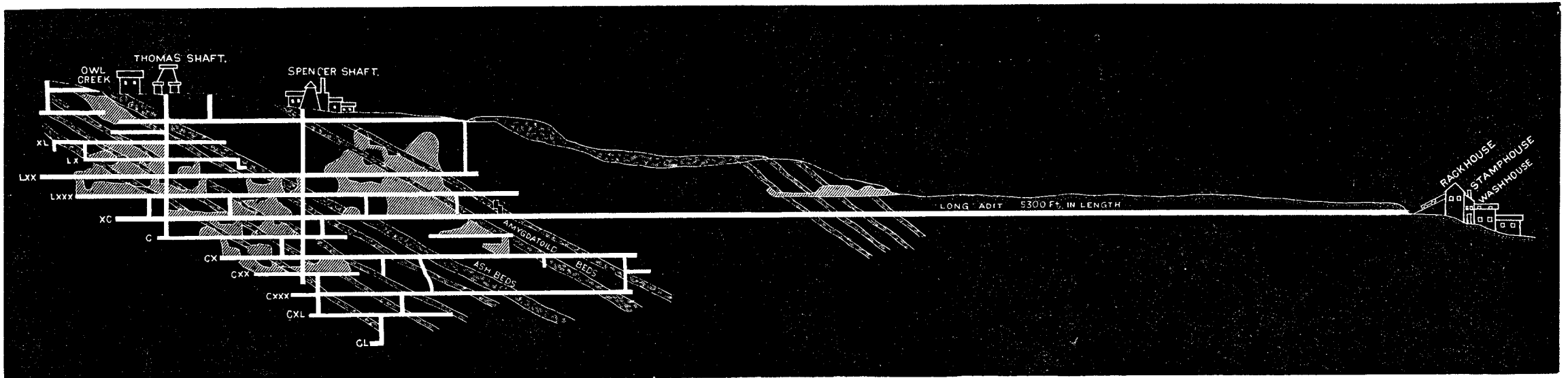
LONGITUDINAL SECTION OF THE COPPER FALLS MINE THROUGH THE OWL CREEK VEIN, JAN., 1867.

Scale, 500 ft. to one inch.



Moyle thinks he can furnish equally good rock in quantity sufficient for the four heads.

The former agent, Mr. B. F. Emerson, long and favorably known in the copper region, met with a fatal injury at the mine in August last, and he has been succeeded by Capt. J. H. Moyle, who has been in charge since October, 1886. Capt. Moyle was mining captain at the Copper Falls ten years ago, so tnat he is only returning to familiar ground.

The total expenditures to date have been	$3,047,823
The total mining expenses for the year 1886 were	113,534 73
The total number of tons of rock stamped were 122,410; the total stamp mill expenses were	38,979 23
Making the stamp mill cost per ton of rock	3 18

This is certainly very low, considering that the water has all to be pumped, the cost of which work is five cents per ton.

Since I visited the mine it has been decided to shut down the mill, and the company is only doing opening work in the mine.

The officers of the company are the same as heretofore, with the exception of the local agent, who is now J. H. Moyle.

President, David Nevins, 19 Exchange Place, Boston.

The mind has yielded as follows:

Years.	Tons.	Pounds.	Years.	Tons.	Pounds.
Previous to 1855	158				
1855	100		1871	239	883
1856	104	10	1872	260	862
1857	153	1,305	1873	643	540
1858	151	1,852	1874	535	359
1859	173	174	1875	203	1,587
1860	255	818	1876	8	1,488
1861	280	11	1877	5	1,950
1862	299	299	1878	5	1,790
1863	159	1,348	1879		
1864	179	808	1880	3	645
1865	235		1881	334	1,121
1866	568	1,169	1882	293	1,500
1867	1,128	1,485	1883	402	
1868	239	1,384	1884	445	1,168
1869	345	1,400	1885	575	538
1870	386	990	1886	689	679
Total				9,495	133

THE PHŒNIX COPPER COMPANY

has ceased to operate. The mine has passed to the ownership of the bondholders. Mr. J. H. Chandler, of Houghton, Michigan, is the agent of the present owners. There is no reason to rate the property any lower now than heretofore. It has undoubtedly been unfortunately managed.

The mine has not been worked for a year on company account. Some copper is obtained by tributers. In previous reports I have fully described the mine and all matters pertaining to its previous record. No doubt the mine will at some time be again in a prosperous condition.

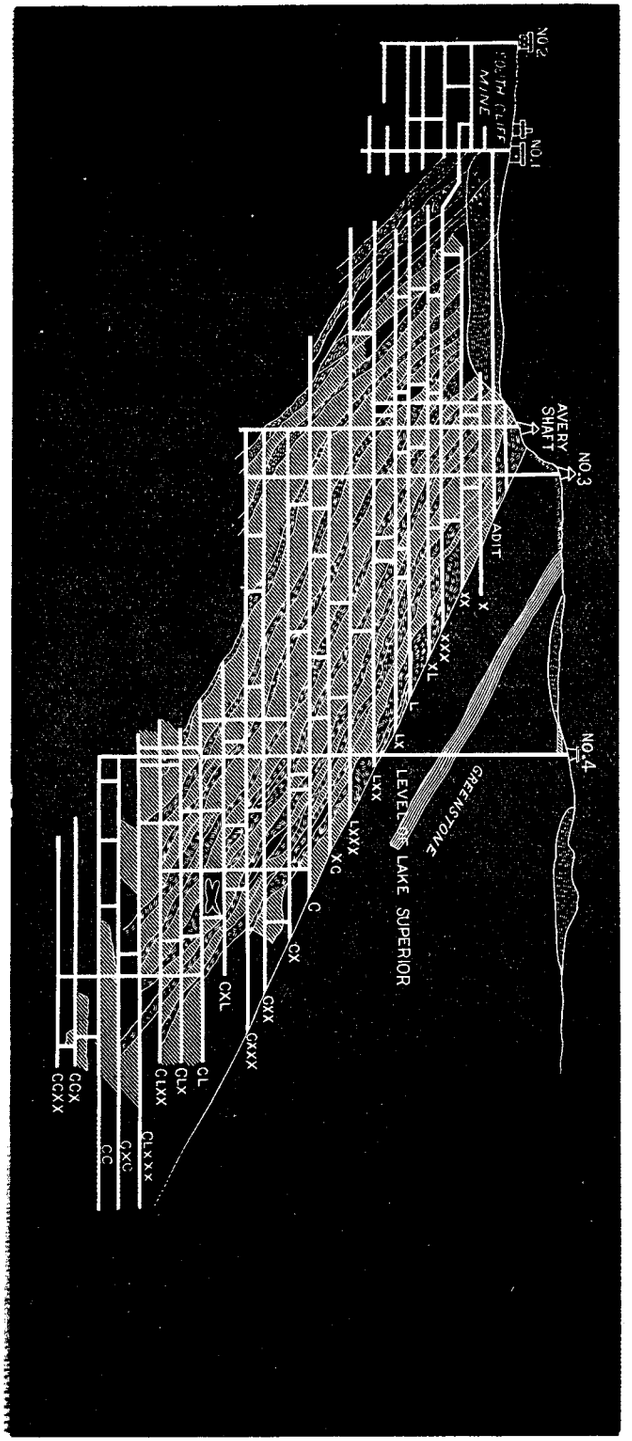
The following table shows the product:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
Previous to 1855	19		1871	609	1,80
1855	3		1872	364	4
1856	8		1873	260	1,0
1857	17		1874	6[illegible]9	
1858			1875	702	
1859	28	590	1876	698	
1860	20	62	1877	511	
1861	34	790	1878	150	
1862	31	1,590	1879	272	
1863	72	118	1880	218	
1864	142	187	1881	204	1,357
1865	202	1,000	1882	268	1,177
1866	206		1883	256	291
1867	155	115	1884	310	1,004
1868	130		1885	180	1,108
1869	398	930	1886	50	1,804
1870	499	1,040			
Total				7,724	542

THE CLIFF COPPER MINING CO.

The mine is not worked, but a couple of gentlemen who are familiar with the situation have secured a quantity of wood with the intention of running the stamp mill and washers on the waste sands at the mine. They have found by testing the matter that these tailings hold a sufficient amount of copper to pay for re-washing.

But owing to the continued low price of copper this plan has not been pursued and the mine is idle.

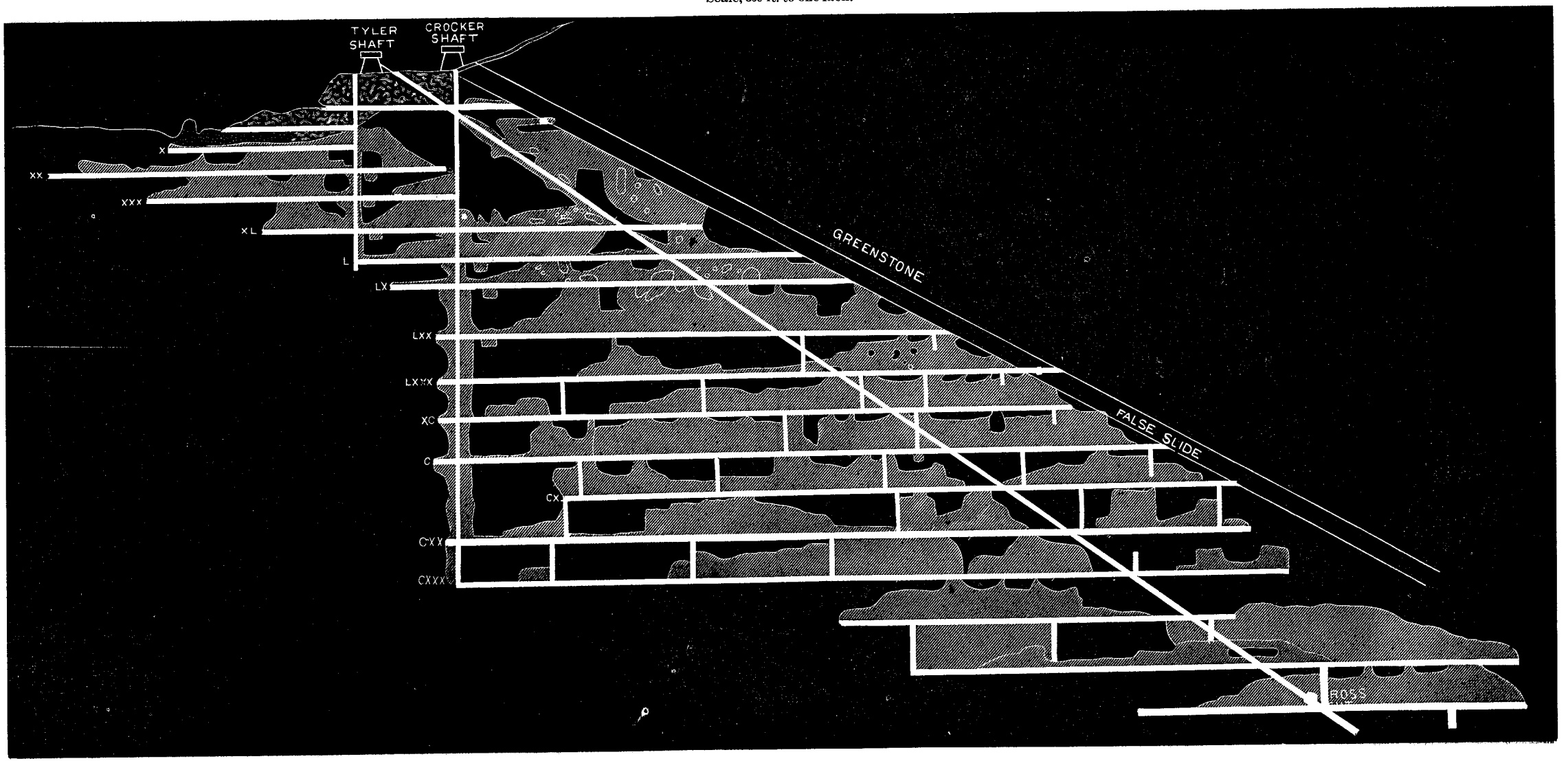


LONGITUDINAL SECTION OF THE CLIFF MINE, 1887.

Scale, 600 ft. to one inch.

LONGITUDINAL SECTION OF THE PHŒNIX MINE, 1887.

Scale, 300 ft. to one inch.



The Cliff has produced as follows:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
Prior to 1855	3,400				
1855	937	197	1871	71	238
1856	1,110	934	1872	59	386
1857	1,118	850	1873	357	1,203
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
1870	222	381	1886	11	342
Total				19,064	1,643

D. D. Brockway, Agt., Phœnix, Mich.

THE ALLOUEZ MINE

is still worked on tribute by Messrs. Watson & Wall, though they do not find the profit sufficiently great to induce them to push things very much. On the contrary the tendency is to circumscribe the operations. They have recently ceased to hoist in No. 1 and in No. 3 shafts, and in the ensuing year they will only stope in the vicinity of No. 2. shaft.

Last summer the stock took a slight boom, owing to the finding of some rich ground in the 16th level, 250 feet from No. 2 shaft. It was rumored that they had found the Calumet and Hecla lode. The ground did not hold rich going up, but the indications seem to afford assurance that this rich "shoot of copper" will continue on down.

Mr. Fred Smith, the company's gentlemanly and efficient agent, continues to reside at the mine and superintend the affairs of the corporation.

The force employed consists of 36 miners, 36 trammers, 8 block holers, 3 timbermen and 3 helpers; 9 power drills are operated. The mine has been fully described in previous reports.

Allouez Mine Report.

The directors present the following summary of the operations at the mine, and of the business of the company during the year 1886.

The lessees of the mines stamped 116,612 tons of rock, which yielded 1,725,463 pounds refined copper, or an average yield of 14 3-10 pounds per ton of rock stamped. The royalty received by the company was one-tenth of the copper produced, or 172,545 pounds ingot copper, and the following statement shows the receipts and expenditures for the year:

Receipts.

Copper sold	125,973 lbs. average 10.93 cents		$13,776 74
Copper in New York and at smelting works	46,572 lbs. valued at 10c. net		4,667 20
	172,545 lbs.		$18,433 94
Interest account			464 65
			$18,898 59

Expenditure.

At Mine.

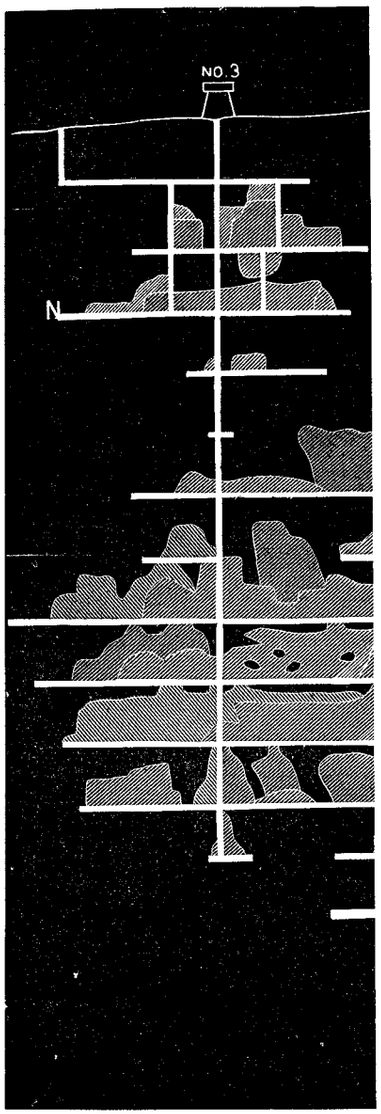
Taxes on personal property	$273 83	
Insurance on buildings and machinery	1,447 50	
Surveying mine	31 00	
Canal tolls on copper	12 48	
Copper barrels	268 80	
Legal expenses	150 00	
Agent's salary and other expenses	1,706 10	
		$3,889 71

In New York.

Freight and other charges on copper	$704 18	
New York State tax	12 00	
Office and other expenses	1,150 68	
		1,866 86
Total running expenses		$5,756 57

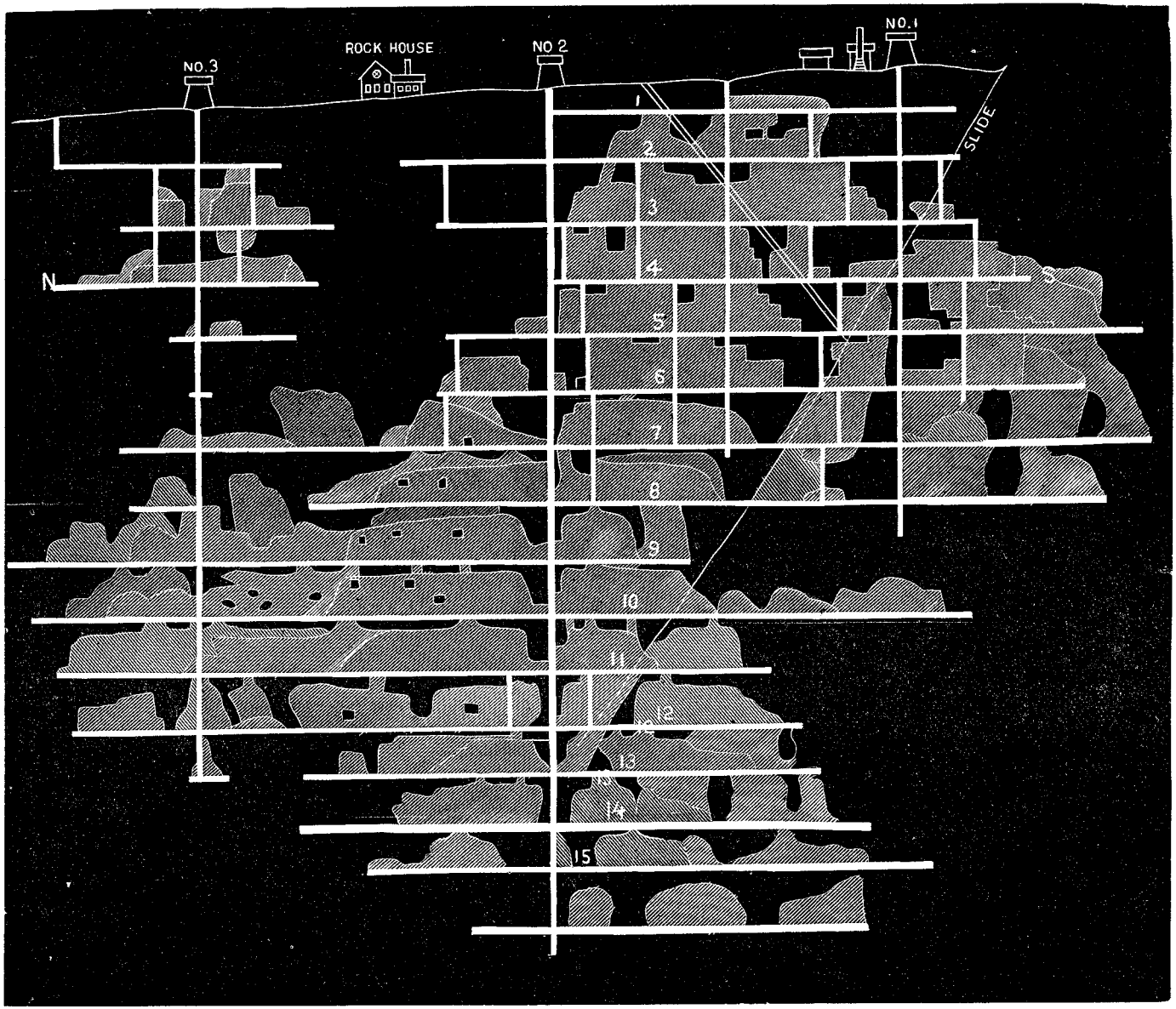
Add other payments, viz.:

State of Michigan, tax on copper of 1885, due July, 1886	393 95
St. Mary's Mineral Land Co., in final settlement of claim for trespass pending for several years	849 84
Machinery account, paid for Knowles' pump	375 00
Rent of water privileges for 1885	265 00
	$7,640 36
Net gain in 1886	$11,258 23
Add balance of assets, December 31, 1885	48,612 66
Net surplus, December 31, 1886	$59,870 8



LONGITUDINAL SECTION OF THE ALLOUEZ MINE, JAN., 1887.

Scale, 300 ft. to one inch.



STATEMENT OF ASSETS AND LIABILITIES, DECEMBER 31, 1886.

Assets.

Cash in bank		$6,337 64
Deposits in trust companies		30,000 00
Copper on hand, 46,572 lbs., at 10 cents net		4,657 20
Accounts receivable		916 23
		$41,911 07

At Mine.

Cash in bank	$1,090 75	
Supplies	9,192 81	
Standing wood and timber, not on company's lands	7,602 68	
Accounts receivable	166 07	
		18,054 41
		$59,963 48

Liabilities.

Accounts payable	92 59
Net surplus	$59,870 89

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

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1869	1	1,575	1880	658	471
1873	10	1,163	1881	736	1,007
1874	504	130	1882	841	1,557
1875	692	1,574	1883	875	1,337
1876	780	1,785	1884	964	174
1877	650	479	1885	1,085	476
1878	565	1,146	1886	862	1,468
1879	715	1,452			
Total				9,946	1,723

KEARSARGE MINING COMPANY.

The company has existed for some years, but until the past year has never done much work. A few years ago some parties had the mine on option, but finally gave it up after working a while. The mine is just north of the Wolverine, in the S. ½ Sec. 6, T. 56 N., Range 32. In point of fact, the company owns here a rectangular area, consisting of 520 acres, 1¾ miles east and west, and one half mile north and south.

The Kearsarge amygdaloid, in which the exploring is done, is an irregular, pockety, epidote lode. There are two shafts, 400 feet apart, which have been sunk to the third level, and are connected in the second. No. 1 shaft is now, March 1, 350 feet deep, and No. 2 shaft is 300 feet.

The levels are 100 feet apart, after the first one, which is, at No. 1 shaft, 150 feet below the surface, and at No. 2 shaft 100 feet, there being fifty feet difference in surface level at the shafts.

The stock is divided into 50,000 shares, par value $25.

The work done in past year is shown by following financial statement:

Sunk No. 1 shaft 220 feet, at cost of $11.65		$2,563 85
Sunk No. 2 shaft 191 at cost of $12.64		2,356 15
Total		$4,920 00
Total amount drifting 216 feet, cost		1,621 20
Total amount forks cut, cost		179 00
Total		$6,720 25
No. of days worked, 2,137; average No. of men, 12.		
Sinking 41′ shaft, cost		$11.71 per foot.
Drifting 231 1-10 feet, cost		7.00 per foot.
Total days, 5,417; average men per month, 26.		
Overseer	$248 00	
Surveyor	208 45	
Smith, machinist, carpenters	824 86	
Engineers	987 15	
Timbermen	1,091 27	
Landers, laborers, teamsters, etc.	1,957 78	
		$5,319 51
No. days worked, 3,280.		
Supplies		4 452 03
Total		$16,267 69
Less sundry credits		29 50
Making net total		16,462 79
Surface expenses, net total		2,721 29
Total No. of days 1,037; average No. men per month, 5.		
Incidental expenses, total		745 12
Total number of days' work, 208; average number of men, 1.		
Construction account, total cost		13,902 21
Total days, 2,010; average No. men per month, 10.		
Total running expenses—mining and construction. Mining expense, days, 5,417		$16,462 79
Surface expense, days, 1,037		27,212 29
Incidental expense, days, 208		745 12
Construction, days, 2,010		13,902 21
Total		$33,831 41
No. of days, 8,672; average No. men per month, 39.		
Supply account: Purchased		16,290 04
Labor		83 42
Credits		13,836 61
Balance		2,336 85
Fuel		1,999 49
Treasurer's account: By drafts		29,866 27
Received from treasurer		29,866 27
Received from other sources		1,718 58
		$31,564 85

Mr. Frank Klepteko, the company's engineer, tells me that the distance from No. 3 pit, measured at right angles to the Kearsarge lode, to the Calumet and Hecla Conglomorate, is 2,850 feet west.

J. W. Clark, President; John Daniel, Agent; Capt. Haskins, Supt.

THE WOLVERINE MINING CO.

The Wolverine mine was worked on tribute for two years after the failure of the company by Messrs. Funkey & Wilcox. At present, however, the mine is wholy idle. The question of the title to the land is in dispute and the legal ownership is yet to be determined.

John Wall, Allouez, Mich., now exercises control of the property.

The mine was opened in 1883 and has yielded a total of 989 tons, 1,378 lbs.

THE CENTENNIAL MINING CO.

The Centennial mine, although idle, is a property regarded with considerable interest because of its situation. It joins the Calumet & Hecla on the north and the ground in the bottom of the Calumet shaft nearest to the boundary is proving rich in copper, suggesting the possibility that the same "shoot," or others north of it, may be found under the surface at the Centennial. The company owns in fee the S. ½ of Sec. 12, 56, 33, and has an option for the purchase of the N. ½, thus making a mile square. The property is crossed by all the prominent lodes in the country and there is pretty good evidence to assume that they here possess richness enough to at least pay well for working. Provided with the facilities that other larger mines now have and worked on the same extensive plan, the Centennial would show favorable results.

The original company was organized in 1863 and opened in the Calumet & Hecla conglomerate. Several shafts were sunk, No. 2 to 2d level, No. 3 shaft to the 4th level, No. 5 to 4th level and No. 1 only to the ledge.

The ground between Nos. 3 and 4 shafts was nearly all stoped out, and in the second level, 400 feet N. of No. 4 shaft, good copper ground was found, it is said. These shafts are 650 feet apart, No. 4 being north of the others.

Judging from the map there appears to be a shoot of copper starting at No. 3 shaft, near the top, and at the bottom is 200 feet north of the shaft. The shoot has a lateral dimension in the direction of the strike of the lode of 300 feet, No. 3 shaft is 430 feet deep and No. 4 500. The rock at the burrows shows the character of the conglomerate of which more is known now than when the Schoolscraft was worked 20 years ago. A test pit was sunk 350 feet north of No. 4 shaft, into the ground. It is said a good showing of copper was found, but they were driven out by the excess of water. Also the drift in the second level from No. 4 shaft goes under this and the ground was found to be good.

Capt. Hall's plan is to sink No. 3 shaft to an indefinite depth and explore the ground. The hope would be to cut some shoots or pockets of conglomerate that are rich in copper.

More recently some work was done in the Osceola amygdaloid, two shafts were sunk 650 ft. apart and No. 1, the north shaft, 200 feet to the second level. No. 2 was sunk 500 feet to the fifth level. The shafts were connected in the second level.

In the third level they drifted north 300 feet and south 200 feet. In the fourth level in No. 2 the drift north is 150 feet and south 100 feet. The best ground was found in the vicinity of No. 1.

I saw this ground when they were working in it in 1881 and thought it as good as the Osceola.

The Osceola amygdaloid is 802 feet east of the conglomerate, surface measurement. At the Osceola mine the distance between the belts is 760 feet. Distance between the Allouez and the Calumet and Hecla Conglomerates is 2,125 to 2,140 feet varying at different points.

At the mine is good machinery, hoisting engines, etc., also a Rand's duplex compressor of same size as in use at Osceola. The company has all the machinery requisite for a thorough exploration of the property.

President, S. L. Smith, Lansing, Mich; Josiah Hall, Supt., Calumet, Mich.

THE CALUMET & HECLA CO.

is constantly increasing its facilities for enlarging its out-put of copper. At present more is doing in this direction than at any period heretofore. The company is prepared to hoist far more rock than formerly and the capacity of the stamp mills has been increased in the requisite degree to dispose of the additional rock. The stamps are all now Leavitt heads, seven in the Hecla mill and five in the Calumet; three more are to be added in 1887, which will make 15 in all. The gravity incline at the stamp mills has been done away with and the railroad tracks run now to the rock bins. The bins have been sufficiently elevated to secure automatic feed to the stamps. The grade from the mill up is 185 feet to the mile. The line describes a letter S. Two additional locomotives have been supplied to work on this grade, they weigh respectively 55 and 60 tons on the driving wheels, 90 tons including tender. The boilers—new steel boilers—to supply the steam for all the machinery at the stamp mills are all in the new stone boiler house.

The smelting works, situated about a mile from the stamp mills, are nearly completed. The buildings are of stone, brick and iron as well as wood, and are of the most substantial character. The arrangements are admirable for doing the smelting work economically and expeditiously. There is nothing of the kind in the country better for such work than the facilities they have for storing and unloading coal. The coal is elevated from the holds of the vessels up to

the cars on the tracks that extend into the building. The cars work automatically; in fact it is known as Hunt's automatic railway—Hunt's automatic system for unloading coal vessels. These smelting works are designed to be equal to the present product of the mine and more furnaces will be added as occasion requires.

At the mine the company has been trimming and enlarging the shafts with the view of using larger skips. At the time of my visit to the mine these new skips had already arrived; they hold six tons of rock each, when trimmed. They will not dump at the shaft but will be run to the rock house before discharging the contents. A new rock house will be built the coming year. At the Hecla mine two of the shafts will soon be provided, each with a separate hoisting plant that will bring the skips from the bottom at greater speed than is now done.

The Hecla hoisting engine will be used in driving air compressors. It is contemplated that possibly the plan of erecting a separate hoisting plant at each shaft may be adopted for all the shafts of the mine; in which case the "Superior"—the great hoisting engine on the Calumet side, will be used to drive air compressors. It will not be removed from its present location.

They are hoisting now from 11 shafts, the two deepest of which are to the 38th level; the others are at from the 33d to the 37th, except the two South Hecla shafts, which are down one to the 11th and the other to the 12th level. No. 12 shaft—a new one—is at the 9th level.

They now leave pillars on each side of the shafts in each level 50 feet long. Capt. Hoatson is of the opinion that the shaft pillars heretofore left, of 25 feet long, are insufficient; as the ground settles, the shafts grow smaller and have to be trimmed.

The lode is from six feet to 18 feet wide and has a bad hanging wall, much of it, and has to be kept in place with timbers. They are now using short sets instead of long round stall timbers. The former are more easily handled.

The company employs underground an average of 1,100 men and a total force of 2,600.

The No. of tons of rock stamped in 1886 was 598,522 tons.

No. of tons of barrel work, i. e., of copper not run through the stamps, 602¼ tons.

In this connection the following table is of interest:

Year.	Tons of Rock Stamped.	Yield Per Cent. of Ingot Copper.	Year.	Tons of Rock Stamped.	Yields Per Cent of Ingot Copper.
1875	249,704	4.3	1881	340,080	4.61
1876	259,925	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	1886	598,522	4.22

The company returned to the shareholders in 1886 $15 per share, making a total to date of $30,050,000.

Table of product of Calumet & Hecla mine:

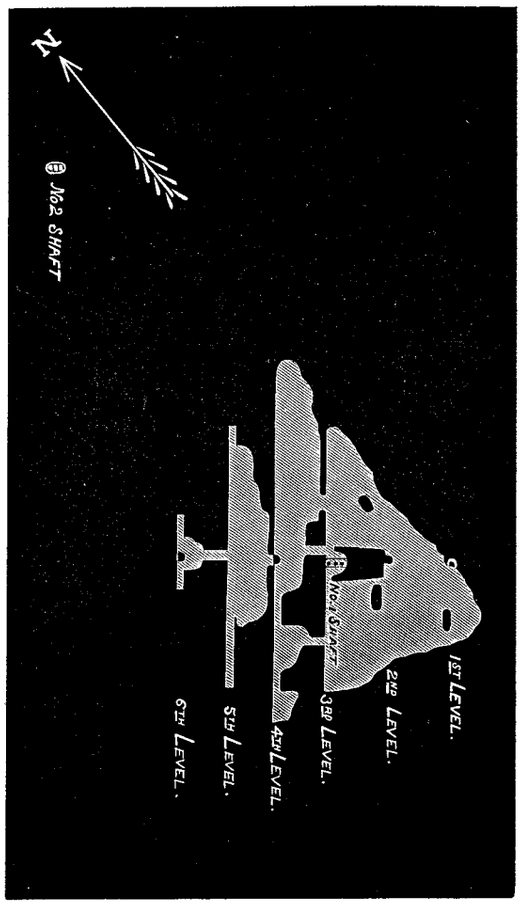
Year.	Tons.	Pounds	Year.	Tons.	Pounds.
1867	657	1,173	1877	11,284	468
1868	2,549	375	1878	12,625	1,128
1869	6,157	1,771	1879	13,135	943
1870	7,030	1,584	1880	15,837	1,239
1871	8,111	590	1881	15,680	781
1872	8,081	183	1882	16,026	1,528
1873	9,424	265	1883	16,562	1,045
1874	10,062	1,225	1884	20,236	1,585
1875	10,736	1,954	1885	23,623	1,990
1876	10,845	732	1886	25,259	220
Total				243,948	1,437

Mr. J. N. Wright, General Superintendent, Calumet, Mich.; Alex. Agassiz, President, Boston, Mass.

THE TAMARACK MINING COMPANY

gives continued evidence of progressive mining spirit. The No. 2 shaft has been located and is already several hundred feet in depth on its way down into the earth. The third section of No. 1 shaft has been completed, provided with a cage that goes to the bottom, and with a separate hoisting plant to operate it, which is placed in a brick building, standing at some distance from the other engine house. It is called the emigrant cage, and is used exclusively for men and for timber.

The railroad is fully completed and operated, and the new stamp mill is also finished and ready to operate. It is not far from the Osceola mill, and is, as would be naturally inferred, one of the best in the region.



LONGITUDINAL SECTION OF THE TAMARACK MINE, JAN., 1887.

Scale 300 ft. to one inch.

There are two heads of stamps now, with place for the third. They are similar to the new heads at Copper Falls mine, and cost each in Milwaukee, $5,600. The two have a capacity of 450 tons of rock per day; 18″ cylinders. Outside, the foundations are laid for two more heads, five in all, when the mine is sufficiently opened to furnish the rock, 1,000 tons per day.

In the Tamarack mill, as also in the Osceola, the railroad track passes through, and is connected with the main line both ways. There is sand room in the lake, it is estimated, sufficient for 14 years, 1,000 tons per day.

More recently the company, or the same gentlemen who control the Tamarack and Osceola companies, have begun the task of erecting smelting works, also on Torch Lake, not far from the stamp mills.

The mine underground is shown on the accompanying plan. In going through it I find it dry and airy. There is a no more comfortable mine in the country to work in than the Tamarack. There are no evidences of "shoots." There is good ground and poor all through the mine; but very little if any, however, that would be designated as valueless. Some portions of rock are rejected in the rock house, and some sandstone, also, occurring in the deposit, is broken down with the good rock, but is sorted out and left in the mine.

The dip is about 38°. No. 1 shaft is now, April 1, 2,495 feet deep, and No. 2 is 490 feet. The levels are not the same distance apart, but average 82 feet on the lay of the deposit. The collar of No. 1 is 640 feet above Lake Superior. From the bottom of the shaft to the seventh level is 333 feet, and the vertical distance is 205 feet, giving for the angle a dip of 37½°. No. 2 will intersect the lode at about the eighth level, when they will have a working length of lode of 1,340 feet. The first level is 215 feet long; second, 210 feet; third, 575 feet; fourth, 725 feet; fifth, 865 feet; sixth, 1,020 feet; seventh, 1,170 feet.

They operate 17 to 19 drills now. The compressor has a capacity of 30. The machinery for No. 3 cage is a Corliss engine, conical drum, 10 feet diameter at small end, and 18′ diameter at large end; holds 350 feet of rope.

The following is from the Director's report:

We have proved that our lode is identical with the Calumet and Hecla, in all respects, and on the whole, as rich.

We have demonstrated the fact that depth is no hindrance to cheap mining. On the contrary, we have shown from the result of steady work day in and day out for months, that more than five times the amount of rock can be hoisted through a vertical shaft than through one of like dimensions sunk on the plane of a lode, as is the custom of copper mining elsewhere on Lake Superior. This result would not have been accomplished had not our machinery and appliances been of the very best.

Our openings on the lode are still very limited, and can be extended to meet our wants only by almost unlimited patience and energy, for it will be readily seen that our opportunities for the speedy opening up and development of the lode are necessarily

restricted, for the reason of having but one shaft from which to run our levels and cross-cuts.

It will be remembered that the *surface* of our productive property is over 2,200 feet in the bowels of the earth, with only a single opening to the light of day.

Proving the productiveness of the Calumet and Hecla lode to this great depth, gives it a value almost beyond computation, contingent only, it would seem, on the future value of copper. On this point we shall have no misgivings while the present extended use and consequent increased consumption all over the world continue. It will not be forgotten or overlooked by our stockholders that this vast inheritance falls ultimately into the possession of Tamarack, for surely and legitimately every one of the eleven northern shafts of the Calumet and Hecla mine falls by its natural inclination or "dip" into our property, and it is a well known geological fact that every lode or bed, whether conglomerate amygdaloid, or anything else, follows this universal law of "dip." We have met a good deal of hostility, and have overcome obstacles which have cost considerable money and delay, but perhaps not more than was to be expected in an enterprise which, if successfully accomplished, could not fail to have an important influence and bearing on the future of our neighbors.

On reviewing our work from the start, it would be difficult to point out serious error in judgment. We believe our work has been accomplished as expeditiously as due regard to economy would warrant. The treasurer's account will show our financial condition.

It would probably have been wiser to have called an assessment last autumn, thus adding, say $200,000, to our active capital. That this sum, and more, would be needed to cover the cost of the new mill with the heavy machinery and mining equipment to put it in operation, was as well known then as it is to-day. To re-imburse for these heavy outlays from current production of copper at present reduced prices, was a trial of strenghth never before put upon any similar enterprise on the lake, or elsewhere, as far as we have been informed.

A considerable advance in ingot copper was anticipated, but instead of this we have had to meet the most serious decline that has been known for many years, reducing the price both here and in Europe to less than ten cents a pound, the lowest quotations ever recorded in the history of copper mining. Still, we are firmly of the opinion that the results of this radical change will not prove wholly disastrous in the future. The price of copper, like coffee or other merchandise, will be governed by quotations from the leading markets of the world, and as soon as we, in the United States, become the largest consumers, as we are already the greatest producers, then by fair reasoning we may expect that New York, and not London, will lead in giving quotations for the various markets of the world. Under our heavy tariff of four cents a pound, we have made our domestic consumer pay two or three cents more than his foreign competitor. The effect and influence of our tariff will not be so largely felt in the future while we continue to be large exporters and not importers. Lake Superior, it is well known, is the best copper produced. It is worth, to-day, in Liverpool or in France, fully four pounds sterling a ton more than Chile bars, which are the recognized standard for quotations.

ASSETS AND LIABILITIES.

Cash in bank at Boston	$3,977 02
Suspense account—stamp mill site	833 80
Hancock & Calumet R. R. Co. 6 per cent bonds	57,000 00
Assessment No. 1	108 00
Supplies on hand at mine	28,883 87

Cash on hand at mine	169 23	
Accounts receivable at mine	564 17	
Wood and timber land	14,832 00	
Balance due on 350 shares H. & C. R. R. stock	28,000 00	
Copper on hand, 1,900,571 pounds, at 10 cents	190,217 10	
Total cash assets		$324,584 19

Liabilities.

Drafts outstanding	$28,427 70	
Accounts payable at mine	52,356 95	
Bills payable	108,200 00	
Loan account	35,000 00	
Total liabilities		223,984 65
Balance of cash assets July 1, 1886		$100,599 54

STATEMENT OF RECEIPTS AND EXPENSES OF ALL KINDS, 1882 TO JULY 1, 1886.

Receipts.

From capital stock, 50,000 shares, $13 a share paid in		$650,000 00
" 363 lbs. copper produced 1882, at 18	$65 34	
" 7,435 " " " 1883, at 14.71	1,093 37	
" 1,979,400 " " " 1885-6, at 10.05	1,98,944 56	
From 1,987,198 lbs. copper produced at mine		200,103 27
From interest receipts, 1882	$832 83	
" " " 1883	592 44	
" " " 1884	1,656 19	
" " " 1885 (6 months)	506 92	
" " " 1885-6	2,581 12	
		6,169 50
From 350 shares Calumet R. R. Co.'s stock		35,000 00
Total receipts		$851,272 77

Expenses.

Running expenses prior to July 1, 1885	$147,574 62		
Running expenses during 1885-6	160,464 94		
		$308,039 56	
Construction expenses prior to July 1, 1885	56,761 03		
Construction expenses during 1885-6	95,872 64	152,633 67	
Real estate		330,000 00	
Total expenses			790,673 23
Balance of receipts July 1, 1886			$100,599 54

DETAILS OF MINING EXPENSE.

Underground Expense

Shaft sinking, 85.10 feet at $45.67	$3,887 09	
Winze sinking, 404.20 feet at $12.90	5,217 70	
Drifts, 976.14 feet at $10.33	10,090 06	
Cross-cuts, 237.20 feet at $8.23	1,953 12	
Stoping, 1,822.46 feet at $13.32	24,372 95	
Tramming	7,022 86	
Timbering, labor, materials and supplies	14,074 13	
Extra work	2,259 51	
Supplies, labor, fuel, etc., for air drills	10,499 62	
Supplies, fuel, and labor for engines	12,972 64	
Mining superintendence and company account labor	8,077 27	
Blacksmith, machinist, and carpenter labor	2,831 64	
	$103,258 59	
Less profit on supplies	7,257 90	$96,000 69

Other Expenses.

Rock-house	$3,300 08	
Surface labor, supplies, etc	1,602 32	
Office labor, supplies, etc	7,107 76	
Transportation	7,387 32	
Stamping	28,903 20	$48,300 68
Total running expense		$144,301 37

Construction Costs.

Number 1 auxiliary engine	$1,953 89	
Number 2 shaft and equipment	7,964 23	
Electric light plant	3,291 93	
Rock-house	13,113 77	
Change or dry-house	2,003 91	
Dwellings	13,884 28	
Compressor	10,375 75	
Machine shop	5,017 80	
Carpenter shop	371 46	
Blacksmith shop	329 10	
Office	1,086 51	
Number 1 engine and shaft equipment	28,896 22	
Third compartment, Number 1 shaft	3,318 04	
Stamp mill, dwellings, etc	4,265 75	
Total construction costs		95,872 46
Total expended at mine		$240,174 01

Summary.

Rock stamped		36,129 tons.
Product of mineral		2,638,020 lbs.
Product of refined copper		1,979,400 lbs.
Yield of refined copper per cubic fathom of ground broken		923 lbs.
Yield of mineral per cubic fathom of ground broken		1,230 lbs.
Percentage of mineral in stamp rock	3.650	
Percentage of refined copper in stamp rock	2.738	
Refined copper, cost per pound at mine		5.895 cts.
Cost of smelting, freight, commission, and Boston expense		1.599 cts.
Total cost per pound of refined copper laid down in New York and sold		7.494 cts.

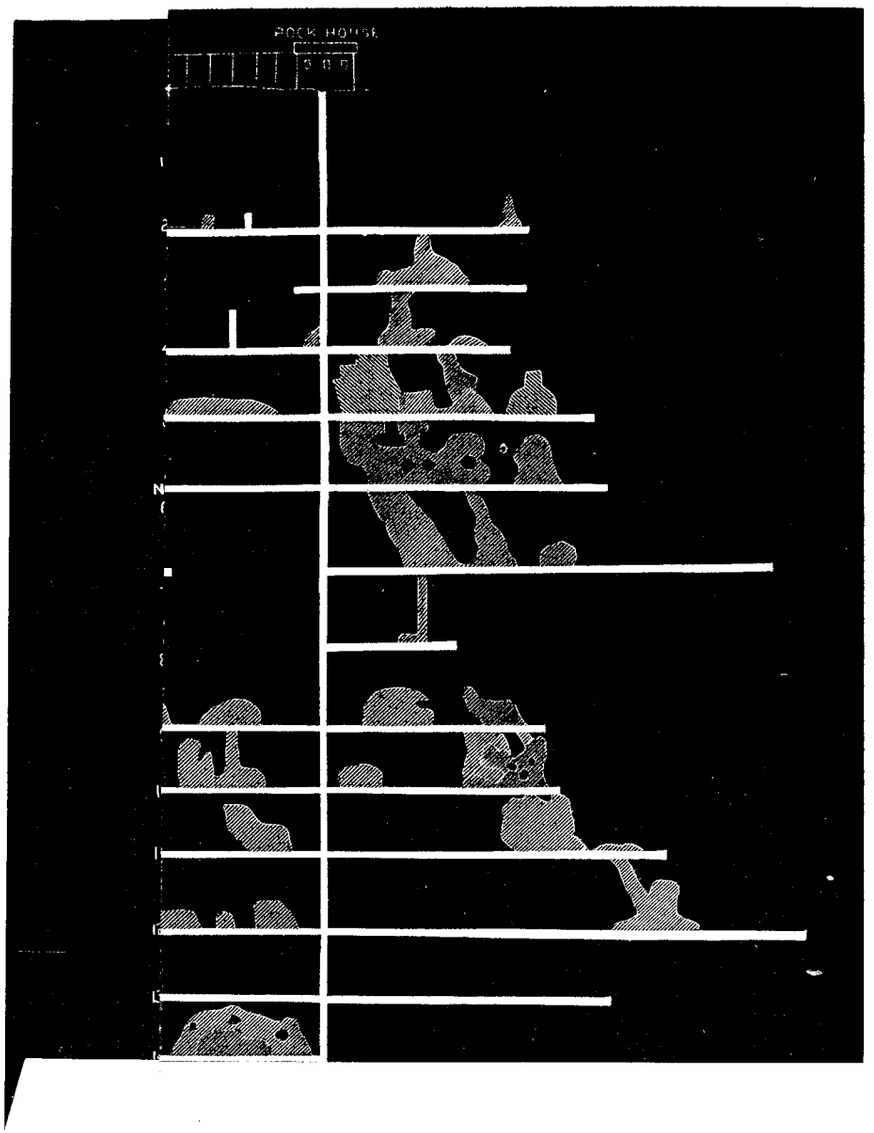
I have given in previous reports full details of the sinking of the Tamarack shaft and of other matters pertaining to the mine. So far the per cent. of copper in the rock is less than obtained in the same lode by the Calumet & Hecla, but probably it will in time afford an equal yield.

J. W. Clark, Prest., Boston; A. S. Bigelow, Sec. and Treas., Boston; John Danville, Agt.; J. B. Quick, Mining Captain.

THE OSCEOLA MINING CO.

The Osceola is on her feet again and is pursuing the even tenor of her way as of old, with equally good results.

It now has the stamp mill again all to itself, two of the stamps having been used by the Tamarack until now. Since that mine began to produce copper. It will be seen by examining the map printed herewith that the mine is extensively opened.



They push the work at the Osceola and keep the mine well in advance of all demands that can be made upon it.

There is no better place to study good mining work than at the Osceola. It is noted for clear headed, progressive, energetic management.

The stock of the Osceola took an astonishing rise in the summer of 1886, going up from about $14 per share to $32, and remaining at about $28 to $30, which price it still holds now with copper at 10c. per lb.

This rise is due to a possible result in the conglomerate. It was found that in the South Hecla—Black Hills—mine the drifts south in the direction of the Osceola were proving rich in copper. This is below the depth at which the conglomerate was worked in the Osceola mine.

To determine whether the Osceola holds any further mineral wealth in the Calumet and Hecla conglomerate a drift has been started to intersect it from the amygdaloid mine.

The location of this drift is from the 16th level, south of No. 2 shaft, 1,450 feet below the surface on the lay of the formation, or 525 feet below the deepest point in the old workings. Its length will be 775 feet.

The distance from the point where this cross-cut will cut the conglomerate to No. 3 conglomerate shaft is 550 feet.

In the old conglomerate mine, the first mine worked in the Osceola, are three shafts, intact.

No. 12 shaft of the Calumet & Hecla is down to the 11th level and they have gone south to within a few hundred feet of the Osceola boundary. The copper holds good so that it is deemed to be strongly probable that this copper ground continues into the Osceola. The cross-cut will be completed in August of the present year.

I have described the mine so fully in previous reports that it could not be otherwise than repetition to enter into a more lengthy statement here. Capt. Daniell kindly gavs me leave of copying from the company's report all the items I wished, and I have availed myself so far of the privilege as to extract all that is not embraced in the company's printed report.

Osceola Mine Report.

The directors present the following report of the operations for the past year, and statement of the financial condition of the company:

The product of mineral was 4,133,345 pounds, which at 86.14 per cent, gave 3,560,786 pounds of refined copper, for which has been realized the gross sum of	$374,144 13
From interest receipts	206 01
From sale of building lots at Hancock	240 00
From sales of silver	1,308 93
	$375,899 07

The costs have been:—

Running expenses at mine	$262,068 44	
Smelting, transportation, and all other expenses	46,598 19	
		$308,666 63
Showing a mining profit of		$67,232 44
There has also been realized from 360 shares of Hancock & Calumet R. R. stock		36,000 00
The balance of assets January 1, 1886 was	$102,281 60	
Add 250 shares Hancock & Calumet R. R. stock	25,000 00	
	$127,281 60	
There has been expended in mine plant during the year	4,772 05	
		122,509 55
Making the balance of assets January 1, 1887		$225,741 99

A dividend of $1 per share, or $50,000, payable February 15, has been declared from the earnings of the past year.

The superintendent's report, herewith submitted, is regarded by the directors as highly promising. Although the developments during the year show nothing of striking character, a gradual but decided improvement is observed as the shafts and levels are extended and opened up in depth and in the south. While we do not anticipate such results as have been realized in the neighboring conglomerate lodes, we feel assured that there are well grounded reasons for hoping and expecting a better outcome than we have seen in the past few years. Our territory is extensive on the south, and as the best results are realized in that direction, we see no good reason why we may not look for reasonable returns in dividends from the amygdaloid lode, just as it is, with its regular and legitimate extension south and in depth. The mine is more extensively opened and is stronger and richer in its resources than at any former period of its history. The amount of money actually invested in underground openings, while the mill was in process of rebuilding, aggregates nearly $50,000, and all of it was taken from our surplus fund.

There is little doubt that this is a better investment than if we had the money to our credit in bank to-day.

There was quite a boom on the street in our stock a few months back, growing out of the developments in the neighboring mine, and great results were predicted in the early future. It is to be hoped that these expectations may be realized, but it is obvious that they were largely based on speculation. Reference by Capt. Daniell to this matter in his report will be noticed. The cross-cut from the amygdaloid at 16th level, which is between 700 and 800 feet west of the conglomerate, will reach that lode in about six months, and will expose a section of it some 600 feet greater in depth than has ever been seen on our property, which joins the Calumet and Hecla location, without a break in the conglomerate lode. When it is remembered that we have this lode outcropping for a length of over a mile, without surface indications to show that there may be in the depths below vast deposits and stores of copper waiting to be brought to light by the hand of industry, and when it is considered further that the character of this conglomerate lode is so unique, and has in reality been so comparatively little examined and studied, in the light of more modern science, the possibility of the future can hardly be over estimated.

The directors have never for a moment lost sight of the purpose and object of this exploration by cross-cut. As soon as the mine should attain sufficient depth to promise the best results in time and money, whatever the outcome may be, they would not be justified in longer delaying the work.

We have a most extensive mine, thoroughly and economically opened on the best

scientific mining principles, and, although it must be classed as a lean or low grade mine, it ought to give, and in the long run it is not doubted that it will give, satisfactory returns in dividends, on a valuation of its stock at higher figures than we have seen in the past half dozen years. All this is predicted upon a fair price for ingot copper.

The management may justly take pride in comparing their work with any of their neighboring mines on Lake Superior or elsewhere in this country or abroad.

Our smelting arrangements are not satisfactory. The directors have under consideration a plan by which we ought to be placed in better shape for handling and marketing our product. This subject is regarded by the directors as of the highest importance to the future well-being of the mine.

Assets and Liabilities.

Cash in bank at Boston	$26,133 69	
Cash on hand at mine	1,253 02	
Supplies on hand at mine	26,605 15	
Fuel on hand at mine and stamp mill	33,094 53	
Accounts receivable at mine	14,599 79	
Bills receivable at Boston	20,616 10	
1,700 acres of land at Dollar Bay, Michigan	15,536 87	
Hancock & Calumet R. R. Co. 6 per cent bonds	38,000 00	
Balance due on 360 shares Hancock and Calumet R. R. stock	14,400 00	
250 shares Hancock and Calumet R. R. stock	25,000 00	
Copper on hand, 1,187,719 lbs., at 10½ cents	124,710 50	
Total assets		$339,949 65

Liabilities.

Drafts outstanding	$34,949 85	
Accounts payable at mine	30,213 43	
Bills payable at Boston	45,059 97	
Due Laurium Mining Company	3,874 16	
Dividends uncalled for	110 25	
Total liabilities		$114,207 66
Balance of assets January 1, 1887		$225,741 99

STATEMENT OF RECEIPTS AND EXPENSES OF ALL KINDS FROM SEPTEMBER 25, 1873, TO JANUARY 1, 1887.

Receipts.

From capital stock, 50,000 shares, $25 a share full paid		$1,250,000 00
From 936,002 pounds copper, 1874, at 23.37c	$218,736 92	
From 1,330,313 pounds copper, 1875, at 22.77c	302,862 96	
From 1,693,737 pounds copper, 1876, at 20.57c	348,333 25	
From 2,774,777 pounds copper, 1877, at 18.19c	504,636 93	
From 2,705,998 pounds copper, 1878, at 15.53c	420,340 14	
From 3,197,387 pounds copper, 1879, at 17.79c	568,689 89	
From 3,381,061 pounds copper, 1880, at 19.15c	647,487 19	
From 4,176,976 pounds copper, 1881, at 17.77c	742,585 84	
From 4,179,782 pounds copper, 1882, at 17.70c	739,458 26	
From 4,256,409 pounds copper, 1883, at 14.96c	636,846 83	
From 4,247,630 pounds copper, 1884, at 12.82c	544,651 02	
From 1,939,169 pounds copper, 1885, at 10.75c	208,558 65	
From 3,560,786 pounds copper, 1886, at 10.51c	374,144 13	
Total, 38,380,027 lbs., at 16.30c		$6,257,332 01
From sales of silver to date		32,439 04
From interest receipts to date		36,220 87
From 360 shares Hancock & Calumet R. R. stock		36,000 00
Total receipts		$7,611,991 92

Expenses.

Running expenses prior to 1886	$4,823,259 10		
Running expenses during 1886	308,666 63		
		$5,130,925 73	
Construction expense prior to 1886	$705,062 17		
Construction expense during 1886	4,772 05		
		$709,834 22	
Real estate		589,036 20	
Dividends prior to 1886		972,500 00	
Exploratory work		8,953 78	
Total expenses			$7,411,249 93
Balance of receipts January 1, 1887			260,741 99
Add 250 shares Hancock & Calumet R. R. stock			25,000 00
Balance of assets January 1, 1887			$225,741 99

Details of Mining Expense.

Shaft sinking, 418.10 feet, at 12.49	$5,220 84	
Winze sinking, 284.70 feet at 10.37	2,951 90	
Drifts, 4,471.55 feet, at 6.55	29,269 44	
Cross-cuts, 21.30 feet at $7.50	159 75	
Stoping, 8,996.05 fathoms at $9.42	84,764 10	
Tramming	22,065 38	
Timbering, labor, materials and supplies	7,021 10	
Extra work	832 72	
Supplies, labor, fuel, etc., for air drills	23,814 02	
Supples, fuel and labor for engines	29,668 71	
Mining superintendence and company account labor	17,083 57	
Blacksmith, machinist and carpenter labor	2,557 71	
	$225,409 24	
Less profit on supplies	29,924 08	195,485 16

Other Expenses.

Rock-house	$18,391 49	
Surface, labor, supplies, etc.	1,481 32	
Incidental expenses, including taxes	5,214 94	
Office labor, supplies, etc.	5,561 63	
Transportation	21,410 50	
Stamping	14,523 40	$66,583 28
Total running expenses		$262,068 44

Construction Costs.

No. 3 engine plant	$1,356 73	
Fire boxes at mine	1,690 55	
Dwelling houses at stamp mill	307 77	
Compressor, boiler house, etc.	857 05	
Houses from John Bagley	1,522 15	
School-house at mine	4,705 38	
Rock-bin at stamp mill	347 99	
Dock at stamp mill	392 41	
Transfer of engine from No. 3 to No. 4 shaft	75 03	
Stamp mill construction	3,756 99	
Total construction cost	$15,012 05	

Credit.

By rock cars sold	10,240 00	4,772 05
Total expended at mine		$266,840 49

Summary.

Rock stamped	137,725 tons	
Product of mineral	4,133,545 lbs.	
Product of refined copper	3,560,786 lbs.	
Yield of refined copper per ton of stamped rock	25.85 lbs.	
Yield of refined copper per cubic fathom ground broken	396 lbs.	
Yield of mineral per cubic fathom of ground broken	459 lbs.	
Percentage of mineral in stamp rock	1.50 per cent.	
Per centage of refined copper in stamp rock	1.29 per cent.	
Cost per ton of rock hoisted	$1 62	
Cost per ton of rock stamped	1 90	
Refined copper, cost per pound at mine		7.36 cts.
Cost of smelting, freight, and all other expenses		1.31 cts.
Total cost per pound of refined copper laid down in New York		8.67

SUPERINTENDENT'S REPORT.

OPECHEE, *February 1, 1887.*

To the President and Directors Osceola Consolidated Mining Company:

GENTLEMEN:—The following report of our operations for the year past, and present conditions of the mine is respectfully submitted.

Work has gone on with much regularity. Stamping for Tamarack mine has restricted our output to some extent, but this cannot be regarded as a disadvantage in any way. The cost of stamping has been reduced on account of keeping the mill fully employed. A profit has been made on the stamping for Tamarack, and we have been enabled to more closely select ground for working.

Rock hoisted from the mine was 161,929 tons, the equivalent of 8,996.05 fathoms of ground; this afforded in all 4,133,545 lbs. of mineral, which, at 86.14 per cent, gave 3,560,786 lbs. of ingot copper.

The mill product was	3,808,400 lbs.
Barrel work was	326,055 lbs.
	4,133,545 lbs.

Yield of ingot per fathom of ground treated, equals 395.83 lbs., which is 29 lbs. in excess of the previous year. Each ton of rock hoisted afforded 22 lbs. of ingot copper.

The underground operations foot up as follows:

Shafts		418.1 feet
Winzes and rises		210.2 "
Levels and cross-cuts		1,461.8 "
		5,090.1 feet
West amygdaloid winzes	74.5	
Levels	31.0	105.5 feet
Total		5,195.6 feet

The sinking in each shaft and present depths, can be gathered from the following:

Shaft.	Sunk.	Depth from Surface.
No. 1.		1,387.1 feet 18 feet under 15th level
" 2.	88.2 feet	1,714.5 " 8 " " 19th "
" 3.	154.1 "	1,798.2 " " 20th "
" 4.	175.8 "	1,535.4 " 7 " " 17th "

As intimated in the preceding annual report, we have given more attention to the development of the south part of the mine, the ground between Nos. 3 and 4 shafts and south of No. 4 absorbing much of the year's openings. It is satisfactory to note

that better ground has been found in this part of the mine than before, the average being equal, both in length and quality, to what has prevailed in the northern ground. If it has not been proved that the copper ground has a decidedly southern trend, there can be no question as to its improving and lengthening in that direction, as the mine deepens.

The extension of the several levels, for the year, foots up as follows:

4th	level,	112.9 feet	16th	level,	667.7 feet
11th	"	155.1 "	17th	"	712.1 "
12th	"	501.9 "	18th	"	924.5 "
13th	"	383.0 "	19th	"	701.4 "
15th	"	264.9 "	20th	"	17.1 "
16th	"	Cross-cut west.			21.3 "

The sinking of No. 2 shaft has been in the foot wall part of the lode. No copper of consequence was noted until near the 19th level; at and under that level good ground was encountered, and the prospects for deeper sinking are extremely good. In cutting 19thl evel plat the width of lode exposed was fully 16 feet, and this good copper ground. As no stoping has been done, for the present this width is regarded as exceptional.

The 19th level north of No. 2 shaft, 163.6 feet has opened good stoping ground for the whole length. The 18th level north of No. 2 shaft also proved good for all the distance driven, 150.4 feet. The 17th level has been drifted north of No. 2 shaft 238 feet, the last 175 feet in stoping ground, but so far has proved rather under average.

The 19th level south of No. 2 shaft, drifted 218.9 feet, shows good copper ground for 150 feet from shaft, much longer than was expected, because 18th level, over, was poor for fully 200 feet south of the same shaft, except that in places we found some isolated patches of barrel work.

No. 3 shaft, sunk to the 20th level, has continued in the hanging wall trap. In sinking, the lode has occasionally been pricked into, and has invariably shown good copper ground. The 20th level, opened 17 feet in all, shows a good lode in the north opening, but going south has not yet been seen to any extent.

The 19th level north of No. 3 shaft has been driven 186.6 feet. The first 80 feet shows ground of average quality; later we find harder ground, generally lean, but showing an occasional piece of barrel work. Looks like the ground nearer No. 2 shaft at 18th level, before referred to.

The 18th level, for fully 300 feet north of No. 3 shaft, afforded good stoping ground.

The 19th level south of No. 3 shaft is advanced 132.8 feet; the lode has been somewhat irregular in productiveness, but of very good character. Expect it to afford average quality ground for copper.

The 18th level south af No. 3 shaft extended 278.8 feet; the whole drivage here shows stoping ground, some of it quite rich, and altogether of better than average for copper. The 17th level has been holed between Nos. 3 and 4 shafts. No ground opened in the mine has proved more continuously productive than what is exposed here; some of it is quite good, and much of it above average. The 16th and 15th levels between Nos. 3 and 4 shafts have been communicated also.

Extensive stoping has been done near No. 4 shaft in the back of 15th level, and for 200 feet in length the lode has been about 12 feet wide and of full average quality. The 16th level between the shafts, it is expected, will prove better than the 15th, but comparatively little stoping has been done as yet.

In sinking No. 4 shaft from 15th to 16th level, a very good lode was exposed. From 16th to 17th level the shaft passed into the hanging wall trap, and of course shows nothing of value.

The 16th level south of No. 4 shaft has been drifted 123.6 feet wholly in stoping ground. The 15th level south of same shaft has been opened for 215 feet. No stoping has been attempted, but the lode for the whole length indicates better than average quality ground. The 13th level south of No. 4 shaft, drifted 383 feet, gave nothing of special value for 150 feet; the lode then improved and 100 feet in length of good ground was drifted through. Latterly the lode has been bunchy, but stoping ground will probably be found when it is thoroughly tested.

The 12th level south of No. 4 shaft has been drifted 501.9 feet. About 350 feet from shaft good ground was found, and this continued for nearly 150 feet. In stoping the lode has afforded considerable barrel work. Nearer the end of the drivage the lode has been bunchy, but of good character. This opening will be pushed ahead, expecting more ground of value in advance of us.

The 11th level south of No. 4 shaft has been drifted 155.1 feet, and opened copper ground of low quality nearly all the length. The 4th level south of No. 4 shaft has been drifted 112.9 feet. Lode here is of good character, but not good enough to remove at present.

The openings for the year have afforded as much length of copper ground, proportionately, and of as good quality, as in any like period. There is good reason to conclude that the lode in the deeper levels going south will prove as productive as elsewhere in the mine. The intention is to develop in that direction to determine the limits of the copper ground, and the advisability of sinking one of the Opechee shafts.

The sinking of No. 2 shaft under the poor bar, and into a good coppery lode, is important. Fully 300 feet of continuous stoping ground has been opened at 19th level in the vicinity of this shaft. The pitch of this ground is south, gaining quite rapidly in that direction.

It would be more satisfactory if your attention could be directed to the expectation of a higher grade of rock in future. Though this is not impossible, yet in such a bunchy mine it would not be wise to do so. This, however, can safely be said,—the mine has never in its history looked more promising for a continuance than at this time, and if our expectations are met, going south of No. 4 shaft, more extensive operations must follow in due course.

Our work on the West Amygdaloid has not encouraged us to develop it on a more extensive scale. We got from it 1,150 tons of stamp rock, rich in copper, and 62½ tons of barrel work. As we leave seven-eights of the rock we break underground, in the conglomerate workings, the copper obtained left us a margin of profit. Under the circumstances we shall continue the work, hoping to find a rich bunch that is extensive enough to be important.

As you are aware, it had been settled for some time that a cross-cut should be driven from one of our deep levels to the conglomerate. Developments in the neighboring mine on that lode indicate the possibility of copper ground being prolonged south into our property. To prove this, the cross-cut was started at 16th level. As we expect to drive not less than 80 feet monthly, the conglomerate will probably be reached next September. The lode will be seen 600 feet deeper than it has been proved on our property. The result may be regarded as purely speculative, but I think the expenditure a most judicious one. The importance to us of finding only a moderate good conglomerate can scarcely be estimated.

Rock house expenditures are much the same as in previous years. Of the rock hoisted, 161,929 tons, there were discarded 24,204 tons, and 137,725 tons were sent to mill.

Transportation and filling of rock cars cost us 15 55-100 cts per ton, railroad company keeping tracks clear of snow, and affording every facilty for dispatch of work.

Stamping was done, after the whole mill was complete in January, with great regularity. Osceola rock amounted to 137,725 tons, Tamarack 71,889 tons, or a total of 209,615 tons stamped, cost of stamping being 34 52-100 cents per ton. Considering that 39 per cent. was conglomerate rock, there is every reason for being satisfied with the duty of the mill.

The heavy items of construction account were for completion of the stamp mill and surroundings, and for new school-house at the mine. Unless we make preparations for the rapid development of our south ground, which will be determined later, there will be no call for any important extra expenditures for the year.

Plans of the mine have been prepared by Mr. Klepetko, our engineer. Also a detailed summary of the year's accounts, by Mr. J. H. Vivian, clerk, to be submitted to you.

The staff of officers continue the same, and to them my thanks are due for continued regularity with which work progresses. Very respectfully,

JOHN DANIELI, *Superintendent.*

PERCENTAGE OF COST IN EACH DEPARTMENT IN 1886.

West vein		.04439
Amygdaloid		.70155
Rock-house		.07018
Transportation		.08169
Stamping		.05542
Incidental		.01990
Surface		.00565
Office		.02122
Whole number of men		364
Total expenditures		$262,063 44
Fathoms of ground broken		9,228
Tons of rock hoisted		161,929
Tons of rock discarded		24,204
Tons of rock stamped		137,725
Pounds of mineral produced		3,808,490
" " masses "		325,055
" " mineral "		4,133,545
" " ingot "		3,560,918
Cost per ton of rock hoisted	$1.6184	
Cost per ton of rock stamped	1.9028	
Cost per ingot copper per lb	.0736	
Percentage of stamp rock in rock hoisted	.85 5-100	
" " mineral in rock hoisted	.01176 lbs to the ton,	23.52
" " " " " stamped	.01363 " " " "	27.66
" " masses " " hoisted	.001 " " " "	2
" " " " " stamped	.00118 " " " "	2.36
" " " " total product	.0786 " " " "	157.20
" " mineral product in rock hoisted	.01276 " " " "	25.52
" " " " " " stamped	.015007 " " " "	30.01
" " ingot copper " " hoisted	.01099 " " " "	21.98
" " " " " " stamped	.01293 " " " "	25.86
" " " " " mineral product	.8615	
Pounds of ingot copper in each ton of mineral		1,723
Total cost of working air drills		$23,814 02
Number of drills worked		21
Average number of men working drills		78.54
Transportation cost per ton of rock, including the loading of cars		15.55 cents.

STAMP MILL ITEMS.

Total number of days run	288.13
Tons of Osceola rock stamped	137,725
Tons of Tamarack rock stamped	71,889
Total rock stamped	209,614
Tons of rock stamped per ton of coal or unit of fuel	22.47
Average per cent of mineral in rock	.01383
Cost of stamping per ton, including Tamarack	.3452

STAMPING EXPENSE 1886.

1886.	Amount.	1886.	Amount.
Superintendent	$16 80	Cost of fuel	$31,535 00
Engineers	1,351 50	Illuminating oil	130 60
Firemen	2,948 70	Lubricating oil	1,035 37
Coopers and carpenters	1,543 56	Stamp shoes	2,615 27
Watchmen	539 70	Hardware	528 97
Machinists	1,704 58	Iron and steel	2,696 49
Smiths	868 39	Tools and machinery	
Head runners	1,154 35	Waste	125 73
Head feeders	3,717 25	Packing and belting	235 08
Oilers	1,029 35	All other supplies	2,851 38
Sundry labor	4,701 03	Total supplies	41,753 89
Tramming	465 65	Amount of labor brought down	30,568 73
Overseers of work-house	860 00	Incidental	36 90
Copper washers	1,194 55	Stamping Tamarack rock	57,836 12
Laborers and machinists	6,433 70		
Silver pickers	225 40	Total expense, not including Tamarack stamping, i. e., cost of stamping Osceola rock	14,523 40
Assaying	61 02		
Total	30,568 73		

Wood supplies, per cent	57.76
Labor lost, per cent	52.24

Table of product of Osceola mine:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1874	463		1881	2,089	1,876
1875	665	303	1882	2,088	782
1876	846	1,737	1883	782	2,128
1877	1,382	777	1884	2,123	1,630
1878	1,352	1,998	1885	969	1,169
1879	1,589	1,387	1886	1,780	786
1880	1,691	1,387			
Total				19,186	491

THE PENINSULAR MINING CO.

did a small amount of work of an exploratory kind in the last year but finally closed down again.

There is no likelihood of the resumption of mining work in the near future. There is nothing to describe beyond what is given in previous reports.

S. D. North, Prest., Hancock, Mich.

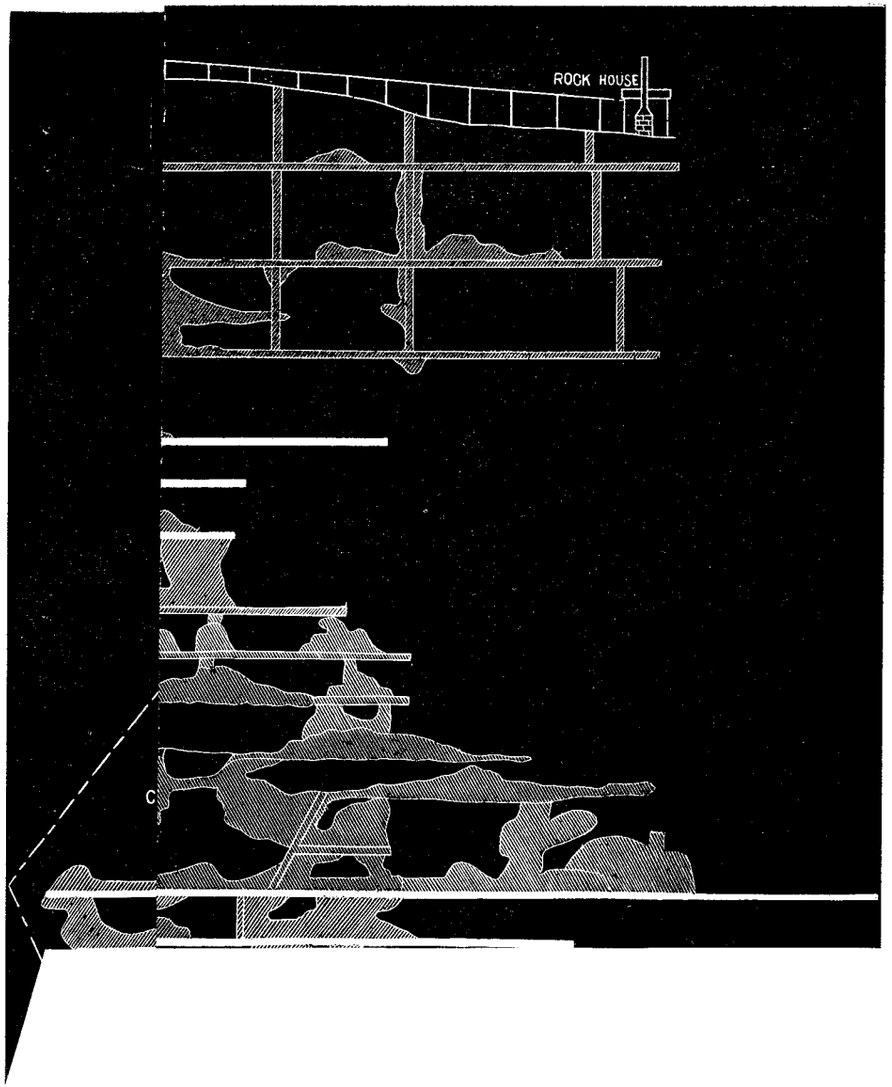
THF QUINCY MINING CO.

The Quincy is the richest amygdaloid mine in the State. In the per cent. of yield of mineral of the rock, in the aggregate of production, in the annual profits of its work, it ranks only second to the Calumet and Hecla.

This position it has held for years and there is no diminution in the richness of the mine. It was never better than it is now, though of course it is each year getting deeper. The Quincy has a large territory, so that it can never be circumscribed for the want of ground to extend its opening into, but it is possible that the deposit may become leaner. They may not always have the rich ground that has held for so many years in the mine.

In this respect the Calumet and Hecla enjoys an advantage. That mine is proved far ahead of present working. The Quincy is not; a few years of stoping in poor ground would lessen the product and cripple its resources. There is no reason to apprehend any such occurrence, only the experience in all amygdaloid belts —and in conglomerate, too, as to that matter—shows that good ground is likely to be succeeded by poor.

The Pewabic was once as rich as the Quincy and continued to be so for years, or until the deposit in the old mine was all exhausted; but when the advance was made into the new ground—the Edwards and Uren purchase—the mine became poor and did not pay to work. It is possible that a similar experience may await the Quincy, and to avoid possible, serious future embarrassment, it would seem to be the part of wisdom to prove the ground far in advance of the present stoping. It must be remarked that the map scarcely indicates the full extent of the stoping ground opened, without an accompanying ground plan. The mine is in two deposits, so designated, east and west deposits, which open into each other by cross-drifts, either through rock or in amygdaloid connections, so that it is a wide mine and a very irregular one. It must be borne in mind also that much of the ground standing in the mine—and it will be seen from the map that there is very much of it—is good paying amygdaloid that will be mined and crushed as occasion requires. This is the mine's reserve, and there is enough of it to tide over a long period of occurrence of poor ground in the bottom. The Quincy is a conservative, well managed corporation and well



sustains its share of the credit of our mining interests and makes its pecuniary returns to its stockholders of such magnitude and with such regularity, that its shares are ever esteemed as among the safest and most profitable investment.

For the second time in recent years the Quincy has met with the loss of its rock house by fire. Early in June, 1887, the rock house was struck by lightning, occasioning its total loss. Steps were immediately taken for its rebuilding, and the delay will be of short duration.

The following statements by the company cover all the further information that is essential:

QUINCY MINE 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 6,974,300 pounds of mineral, which has been smelted and yielded about 82 48-100 per cent, or 5,752,816 pounds of refined copper.

The product of the mine, as prepared for shipment, was 7,153,500 pounds, or 3,576 1800-2000 tons of mineral, of the following description, namely:

Stamp copper	6,748,785 lbs
Mass "	404,715 "
	7,153,500

For which, estimating copper on hand, unsold, at 11 cents per pound, has been realized

The gross sum of	$640,292 17
Realized from sale of silver	3,349 39
	$643,641 56

The expenses of the year are as follows:

Running expenses at mine	$311,369 30
Building and construction account	27,614 75
Smelting, transportation and all other expenses	99,425 43
	$438,409 48
Which, deducted from gross earnings	643,641 56
Leaves as mining profit	$205,232 08
There has also been realized during the year, from interest on loans	9,488 97
From real estate, "Hancock,"	1,060 00
	$215,781 05

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

January 1, 1886		$573,000 41
Add earnings of 1886		215,781 05
		$788,781 46
Deduct dividend of February 15, 1886	$160,000	
" " " August 16, 1886	80,000	$240,000 00
Leaving balance of assets, January 1, 1887		$548,781 46

A dividend of $4.00 per share, or $160,000, payable February 15, has been declared which, with dividend of $2.00 per share, paid August 16 last, makes a total for the year $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.*

New York, February 12, 1887.

GENERAL SUMMARY OF RECEIPTS AND EXPENDITURES OF THE QUINCY MINING COMPANY, FROM ITS ORGANIZATION TO DECEMBER 31, 1886.

Expenditures.

For expenditure on location previous to 1886	$42,097 98
" " " Quincy vein, 1858, not now worked	55,000 00
For openings and explorations on 3,800 feet "east" or Pewabic vein, extending to Portage Lake, preparatory to future work	11,500 00
For real estate and permanent improvements on same, including dwelling houses, stamp mill, machinery, steam engines, tram road, dock, warehouses and other buildings and roads	942,560 94
For mining and surface labor, expenses of smelting and marketing copper, and all incidental expenses	11,966,007 60
Balance carried down	4,958,781 46
	$17,975,947 98

Receipts.

From capital stock paid in	$200,000 00
From proceeds, copper and silver (88,243,927 lbs. copper)	17,522,131 35
From interest	116,229 04
From profit on sale P. L. & R. Improvement Company stock, and other investments	79,637 16
From sales of real estate, Hancock, Michigan	57,950 43
	$17,975,947 98
By balance brought down, being receipts over expenditures	$4,958,781 46
Deducting dividends declared, Nos. 1 to 36 inclusive	4,410,000 00
Leaving balance as per statement in detail on next page	$548,781 46

STATEMENT OF ASSETS AND LIABILITIES, EXCLUSIVE OF REAL ESTATE, MINE PLANT AND SUPPLIES IN USE, JANUARY 1, 1887.

Assets.

Loans on call	$300,000 00
Cash in bank	20,641 24
Cash on hand at mine	8,489 86
Copper on hand	202,196 57
Accounts receivable—since paid	15,066 00
	$546,393 67

Liabilities.

Drafts unpaid	$1,311 30	
Dividends unpaid	788 00	
Accounts payable in New York	16,700 00	
" " at mine	33,767 51	52,566 81
		$493,826 86
Add at mine, viz:		
Supplies per inventory on file	$47,055 69	
Farm accounts (horses, wagons, etc.)	7,756 81	
Accounts receivable	142 10	54,954 60
		$548,781 46

Less dividend payable February 15, 1887, $4 per share, $160,000.

Summary for Year.

Average force employed	415 men
" number of miners	140 "
" wages of miners on contract, per month	$45 80
Yield of mineral per fathom of ground broken	777 lbs
" " refined copper per fathom of ground broken	638 "
Total rock mined	165,618 tons
" " hoisted	115,603 "
" stamp rock treated	109,702 "
Yield of rock stamped 3.08 per cent	6,748,785 lbs
Product mineral	7,153,500 "
" refined copper	5,923,519 "

AGENT'S REPORT.

Quincy Mine, Lake Superior, Mich., January 31st, 1887.

The results of our operations at the mine for the past year have fully realized our anticipations, and I herewith submit the following report.

In the northern part of the mine the openings made by drifting on the vein, by cross cutting and by winzes, were at the twenty-second, twenty-fourth, thirty-first, thirty-second, thirty-third and thirty-fourth and thirty-fifth levels north and south of No. 2 shaft.

The openings made in the southern part of the mine by drifting, etc., were at the twenty-second, thirty-second and thirty-third levels, south, and the thirty-fourth and thirty-fifth levels north and south of No. 4 shaft. All those levels are now connected with both shafts.

No. 4 shaft was sunk from the thirty-fourth level to a point fifty feet below the thirty-fifth level; but No. 2 shaft was not sunk below the thirty-fifth level during the year.

The stoping done was at various places between the twenty-second and the thirty-fifth levels north and south of No. 2 shaft, and between the twenty-second and the thirty-fourth levels north and south of No. 4 shaft.

The most productive ground worked was at the thirty-second, thirty-third and thirty-fourth levels north and south of No. 4 shaft and at the thirty-second, thirty-third, thirty-fourth and thirty-fifth levels north and south of No. 2 shaft.

The diamond drill work was limited during the year. The total number of holes bored was only some eighteen or twenty, and the aggregate depth of drilling about 2,000 feet.

Those explorations were at different points in the twenty-second, twenty-fourth, thirtieth and thirty-fifth levels, and for the most part developed nothing of an unusual character.

The man-engine shaft in course of extension below the twenty-seventh level, at the end of last year, was completed to the twenty-ninth level, and a further extension will probably be made during the present year.

Of the principal improvements by way of construction account, under consideration at the last annual report, the following have been carried out, viz: At No. 2 shaft some additional changes and improvements were made to the hoisting plant.

At No. 4 shaft the new drum was put in operation in July. Previous to this the shaft had been straightened and retimbered for two levels below the surface, and the dump in the shaft house lowered and changed.

The mine pump bob pits and bobs at the surface were entirely rebuilt and enclosed with small, substantial frame buildings.

Several of the tenement houses received necessary repairs, and two other dwelling houses were purchased from parties who had built them at their own expense on the company's land.

At the man-engine shaft a set of iron "angle" or balance bobs was placed at the fourteenth level, and a set of iron "V" bobs was placed at the thirteenth level. This improvement was rather an expensive undertaking, but nothing better could be devised, and the bobs admirably answer the purposes for which they were designed.

During the summer the Mineral Range railroad company constructed a branch line to connect with our mine boiler-house, which makes it more convenient for the transportation of coal, wood, or other freight from the dock to the mine.

A coal yard was made at the mine boiler-house, and the coal bin at the dock was removed to a more favorable position for receiving and discharging coal.

The mine office building, and the mine supply building, which had become extremely dilapidated, were thoroughly overhauled and repaired, making them practically as good as new.

A new fire plant for the mine, consisting of a size "E" Worthington pump, with some twenty-three hundred feet of four-inch pipe, and suitable hydrants, was purchased, and partially laid; but owing to some unaccountable delay in shipping them, the pipes were not received in time to complete the work before winter set in.

At the stamp mill a small addition was made to what is called the "Little Mill Building," for the purpose of furnishing storage for iron, and for such pieces of machinery under repairs as heretofore have been crowded into the mill machine shop.

The dock extension, spoken of in the last annual report, was also mads. The expense of this, together with the improvements already mentioned, make the construction account for the present year a total of $\$27,614\frac{75}{100}$.

During the present year it will be necessary to rebuild the "tram road," or "incline," as it is called, from the "drum house," to the stamp mill, and to procure a new dump scow of larger size than the old one now in use, for the removal of waste stamp sand.

The mine maps enclosed, which are filled us as usual to the end of the year, will show the diamond drill borings, and, as near as may be, the extent of openings made, and the ground in reserve available for stoping.

The general appearance of the mine is altogether encouraging.

There is a decided improvement of the vein in the lower levels, particularly so in the vicinity and south of No. 4 shaft, while at No. 2 shaft, and north of it, the vein holds its own remarkably well.

For the successful accomplishment of the year's work I am under renewed obligations to the several officers of the mine, all of whom have been in hearty coöperation, and have labored faithfully and well.

S. B. HARRIS, *Agent.*

Table showing yearly product of Quincy mine:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1856	6	1,462	1872	1,134	1,134
1857	61	762	1873	1,400	----------
1858	153	772	1874	1,525	654
1859	178	1,114	1875	1,334	281
1860	970	414	1876	1,536	1,171
1861	1,218	852	1877	1,427	336
1862	1,153	218	1878	1,480	449
1863	1,115	1,737	1879	1,323	1,458
1864	1,251	586	1880	1,848	263
1865	923	1,500	1881	2,753	884
1866	1,172	1,000	1882	2,832	1,796
1867	1,013	1,000	1883	3,006	239
1868	727	1,000	1884	2,825	436
1869	1,208	1,365	1885	2,924	497
1870	1,248	1,777	1886	2,961	1,529
1871	1,204	1,501			
Total				44,059	151

THE PEWABIC MINE

is still idle and matters regarding it remain as stated in last report.

THE FRANKLIN MINE

affords continued evidence of the effects of good management. The mine is in a prosperous condition, a dividend-paying mine, notwithstanding the low price of copper; whereas, years ago, before Capt. Vivian took charge of the mine, it did not pay expenses. And this, too, with copper at double its present price, and with the same machinery and outfit as are still used at the mine. A few years ago, after the mine had been worked on tribute until the stopes were all exhausted, and the machinery, railroad, buildings, stamp mill, etc., were all out of repair, the company resumed work, with an empty treasury; and without calling upon the stockholders for a penny of assessment, the mine has been brought to a prosperous, independent position. All the requisite funds have been ultimately derived from the sales of the copper produced.

Of course, money had to be used before copper could be mined and sold. To obtain these necessary early advances, Messrs. Demmon and Vivian pledged their personal credit to an extent that their private estates were completely identified with the success of the mine.

They demonstrated the value of the Franklin mine, and their eminent ability to manage it successfully.

There is not much to be said that is new. The shaft houses have all been built over new. This was accomplished without delaying the hoisting. In going over the location one sees many small changes that are excellent, alteration of boilers, of machinery, etc., that are both economical and effective. One sees the evidence of a management that looks after every detail, and makes machinery, etc., do effective duty that some managers would think it necessary to discard as obsolete, worn out, and worthless.

The following is the complete financial statement, etc., of the company:

MINING EXPENSES.

Number of men	126
Mining captains, timbermen	$12,331 29
Miners on day account	1,523 97
Machinists, engineers, firemen	12,019 10
Blacksmiths, carpenters	3,328 32
Trammers, laborers	32,272 96
Total	$61,473 73

STATEMENT OF SHAFTS AND WINZES SUNK AND COST OF THE SAME.

Number of men	9
Number of feet of shaft sunk	489
Average price per foot for sinking shafts	$14 84
Total amount paid for sinking shafts	$7,390 48

Statement of Drifting and Cross-Cuts Made and Cost of Same.

Number of men	30
Number of feet drifted	2576 3-10
Average price paid per foot for drifting	$9 81
Total amount paid for drifting	$25,188 04

Mining Expenses.

Special contracts	$52 50
Extras	1,240 14
Main engine, wood supply and royalty	4,644 10
Diamond drill	842 08
Survey in mine	199 00
Total	$6,977 82

Statement of Stoping and Cost of Same.

Number of men	112
Number of fathoms stoped by air drills	9174 302-1000
" " " " " hand drills	0
Average price paid for stoping with air drills	$9 97
Total amount paid for stoping	$91,541 94

Statement of Supplies, Fuel, etc., and Cost of Same.

Supplies	$12,139 36
Wood, coal and iron	30,722 69
Total	$42,862 05
Less profit on miners' supplies	18,504 40
Total	$24,357 65

Recapitulation of Mining Expenses.

Company account labor	$61,473 73
Sinking shafts and winzes	7,390 48
Drifting and cross-cutting	25,188 04
Stoping	91,541 94
Sundry labor	6,977 82
Supplies, fuel	24,357 65
Total	$216,929 66
Number of men on company account	126
" " " " contract	150½
Total	276½
Number of tons of rock hoisted to surface	175,130
" " " " " rejected	36,745
" " " " " sent to mill	138,385
Per cent of rock rejected	20.98
Total number of feet drifted	2576.30
" " " fathoms stoped	9174.302
" " " feet sunk	498

Surface Expenses.

Number of men	34
Total amount of wages paid	$16,198 64
Teaming and supplies	5,540 95
Wagons, sleighs, harness, repairs, etc	443 95
Total	$22,093 54
Less house rent and other charges	7,929 22
Net total	$14,154 26

Stamp Mill Expenses.

Number of men	56
Number of cords of wood	11,777.50
Cost of wood	$33,398 83
Foundry expenses	3,767 03
Cost of other supplies	4,701 34
Cost of labor	21,728 39
Total	$63,595 59

Statement Showing Results of Stamping.

Number of days run	240
Number of tons stamped	138,385
Per cent per ton	1.29
Number of pounds of copper produced	3,572,064
Number of tons of rock stamped per cord of wood used	11.75
Cost of stamping one ton of rock	$0.4595

No. 2 shaft sunk 210 feet below the 27th level
" 3 " " 110 " " " 26th "
" 5 " " 178 " " " 24th "

Tram Road Expenses.

Number of men	15
Cost of labor	$6,774 99
Cost of supplies	1,582 95
Total cost	$8,357 94
Number of tons of rock run over the road	138,385
Cost per ton to transport	$0.603
Insurance, etc	9,307 28

Rock House Expenses.

Number of men employed	36
Cost of labor	$14,310 28
Cost of supplies	865 14
Total cost	$15,175 42
Number of tons of rock passed through breakers, etc	138,385
Cost per ton for breaking and delivering	$0.10.96
Cost of hauling one ton of rock hoisted	0.0866
Office expense, clerks, etc	2,505 97

Construction and Repairs, etc.

Repairing houses	$620 71
New dock and bulk head	2,088 66
Building fence	29 60
Addition to house—mining captain	179 46
Moving warehouse	217 63

Summary of Expenditures.

Number of men	422
Mining expenses	$216,929 66
Surface expenses	14,154 26
Stamp mill expenses	63,595 59
Tram road expenses	8,357 94
Rock house expenses	15,175 42
General expenses	9,807 29
Office expenses	2,505 97
Construction account and repairs	3,136 06
Total	$333,162 19
Total number of pounds of mineral produced	5,224,794

Per cent ingot to mineral	81.61
Total number of pounds of refined copper produced	4,264,297
Cost of the mineral per pound at smelting works	$0.0637
" " " ingot " " " " "	0.0781
Number of fathoms of rock hoisted	9729
" " tons " " "	175,120
Cost of rock per ton	$1 90
Number of pounds of mineral in each fathom of ground	537
" " " " ingot " " " " "	438
" " " " mineral " " ton of rock hoisted	29.83
" " " " ingot " " " " "	24.34
Per cent of mineral in ton of rock hoisted	1.49
" " " ingot " " " " "	1.21
Pounds of mineral in each ton of rock stamped	37.75
" " ingot " " " " "	30.81
Per cent of mineral in tons of rock stamped	1.88
" " " ingot " " " " "	1.54
Total running expenses for the year	$333,162 19
Tons of rock on hand January 1st, 1886	25,008
" " " mined during year	177,640
" " " hoisted " "	175,130
" " " on hand January 1st, 1887	27,518

MEMORANDA.

Pounds of mineral in fathoms of rock hoisted	537
" " ingot " " " " "	438
" " mineral " ton " " "	29.83
" " ingot " " " " "	24.34
" " mineral " " " " stamped	37.75
" " ingot " " " " "	30.81
Per cent of mineral in rock stamped	1.88
" " " ingot " " "	1.54
" " " mineral " " hoisted	1.41
" " " ingot " " "	1.21
Cost of mineral at smelting works	$0.0637
" " ingot " " "	.0781

INVENTORY.

Machinery at Mine.

1 hoisting engine and 9 boilers.
1 pumping engine and 1 boiler.
1 pumping engine in machine house.
1 pumping engine in carpenter shop.
3 underground pumping engines.
3 underground hoisting engines.
1 saw mill.
1 fire pump in compressor house.
1 fire pump in hoisting engine house.
1 fire pump in locomotive engine house.
2 Burleigh compressors.
1 Double Allison compressor.
1 air receiver.
1 boiler in compressor house.
2 heaters in compressor house.
34 Rand air drills.
3 rock breakers.
1 spare engine 14" x 24" in ware-house.
9,000 feet water works pipe from mill to mine.
1 small engine and boiler.

Stamp Mill Machinery.

1 Corliss engine and 4 boilers.
1 pumping engine.
1 pumping engine.
1 pumping engine, old one.
4 heads Ball stamps.
48 Collum washers, shafting, belting, etc.
4 sheive tables.
2 percussion tables.
2 20" lifting pumps.
1 Worthington pump.
1 engine for hoisting coal.
1 10x44x10 Worthington pump for the water works.

Tram Road.

2 locomotives. 50 rock cars. Road from mine to mill, gauge 3' 3", laid with T rail; renewed in 1884.

The following is the company's published statement of the year's business:

FRANKLIN MINE REPORT.

To the Stockholders of the Franklin Mining Company:

Annexed we hand you the usual annual statement of the affairs and doings of your company for the year 1886, with our agent's reports of the workings for that year, of the condition of the mine January 1, 1887, and its probable prospects for the future, which certainly seem as fair as a year ago.

The entire plant is in better condition, there is more rock broken in the mine and ready for hoisting, the openings are fully as large as they were January 1, 1886, the machinery in all its details is in first-class order, and all seems to promise as well for 1887 as could reasonably be expected. The price of copper, seemingly, being the only question for at least as successful a year as 1886. The present position, however, if we may judge by statistics, is in favor of an advance in price of the article.

Captain Johnson Vivian still has charge of our property at the Lake, and the result of the year's doings gives the facts as to his fitness for the situation.

There is in the mine, broken and ready for hoisting, 27,518 tons of rock, which is not valued as an asset.

During the year, 138,385 tons of rock were treated at the mill, a gain over 1885 of 1,109 tons, producing 5,228,400 lbs. of mineral, which gave a yield of 81 623-1000 per cent. of refined copper, or 4,264,297 lbs., being a gain over 1885 of 265,125 lbs. of refined copper.

The amount of mineral per ton of rock stamped was 1 88-100, or 13-100 per cent. more than 1885.

The percentage of copper in a ton of rock hoisted was 1 21-100, which is an increase of 8-100 over 1885.

The total cost of mining and manipulating per ton of rock hoisted was $1.90, or five cents per ton less than 1885.

Total amount of rock hoisted was 175,130 tons, a gain over 1885 of 1,514 tons.

Respectfully submitted, for the directors,

D. L. DEMMON, *Treasurer.*

AGENT'S REPORT.

Hancock, Mich., Jan. 20, 1887.

D. L. DEMMON, ESQ., *Treasurer.*

Dear Sir :—I beg leave to submit the following report of the work performed for the year ending December 31, 1886, with map of the mine showing the extent of the openings, stopes, etc., together with inventory of supplies, tools and machinery. Also tabular statements which have been very carefully and neatly compiled by the clerk, Mr. Arno Jaehnig, giving in detail the cost of each department of our business, etc.

SURFACE.

In this department we have for many years paid considerable attention to repairs and improvements which have put it into such good condition that little remained to be done in the year just closed. The improvement of importance was a dock built at the Lake for landing general merchandise on, and one for receiving coal. Both have been constructed in a very substantial manner, and will last for a great many years.

MACHINERY.

We have not added anything of importance to the machinery during the past year. All repairs necessary have had prompt attention, and nothing of a serious nature has happened to anything connected with it causing any hindrance over a few hours, and all at this time is in good condition and running smoothly and regularly.

STAMP MILL.

We have treated 138,385 tons of rock, which is in excess of 1885 1,109 tons. For a mill that is so old as this, it is in very fair condition, and will not require any very heavy repairs for the ensuing year. We shall put in six new washing machines at an early day to take the place of the same number that are too badly decayed for further use, the extra cost of which will not exceed two hundred and fifty dollars.

MINING WORK.

The following openings have been made :

Shafts sunk	498 feet.
Drifting	2,576 feet.

The total amount of ground broken was 9,868 918-1000 fathoms, or 177,640 tons of rock, of which 175,130 tons were hoisted to the surface. The amount of rock rejected was 36,745 tons, at 20 98-100 per cent. of the amount taken out of the mine. The quantity of rock on hand

January 1, 1886 was	25,008 tons.
Broken during the year	177,640 tons.
	202,648 tons.
Hoisted as above stated	175,130 tons.
Leaving on hand Jan. 1, 1887	27,518 tons.

The cost of manipulating a ton of rock, and delivering the mineral to smelting works,

was 1 30-100, which is a saving of five cents per ton over 1885, or a total for the year of $8,680 80-100. The percentage of copper in a ton of rock hoisted was 1 21-100, which is an increase of 6-100 over 1885.

The shafts have been sunk as follows : No. 2 from the twenty-eighth to the twenty-ninth level ; No. 3 from the twenty-sixth to the twenty-seventh level ; and No. 5, from a point 30 feet above the twenty-fifth, to the twenty-sixth level. Openings, by drifts, have been regularly made from the above méntioned shafts, from the twenty-third to the twenty-eighth level. The appearance of the lode exposed in these openings seems to be, on the whole, a fair average of what we have had for the last two or three years. The depths of our shafts are as follows : No. 2, 2,350 feet ; No. 3, 2,125 feet ; No. 5, 2,000 feet.

PROSPECTS FOR 1887.

After a careful survey of the ground now available for stoping, and what we can reasonably expect to open, we are satisfied that, at least, 2,400 tons of mineral can be produced for 1887. As there is nothing in the shape of new machinery or other improvements required, the expenses for the ensuing year will not be materially increased over the past, if any.

I again take pleasure in saying that my assistants, Capt. Thomas Dennis, Mr. Arno Jaehnig, the clerk, and Mr. James Moore, the engineer, continue to promote the best interest of the company.

I am, yours respectfully,

J. VIVIAN, *Supt.*

FRANKLIN MINING COMPANY, CASH ACCOUNT, FOR THE YEAR ENDING DECEMBER 31, 1886.

Cash on hand January 1, 1886	$149,782 97
Cash received from sales of copper, 3,651,160 lbs,, at 10 373-1,000c	396,975 13
Cash received from sale silver	1,113 47
Cash received from interest	850 39
	$548,721 96
Contra.	
Cash paid dividend, January 1, 1886	$40,000 00
Cash paid dividend July 1, 1886	40,000 00
Cash paid Mine Agent's drafts	348,609 15
Cash paid insurance	923 00
Cash paid storage	107 34
Cash paid smelting	41,708 29
Cash paid freight	16,384 93
Cash paid expense, brokerage, taxes, legal expenses, etc.	8,658 55
Cash paid loans	30,000 00
Cash on hand December 31, 1886	22,330 70
	$548,721 96

FRANKLIN MINING COMPANY, PROFIT AND LOSS ACCOUNT, FOR THE YEAR 1886.

Receipts.	
2,943,794 lbs. copper sold at 10 707-1,000c	$315,185 10
1,321,625 lbs. of copper on hand at 10½c	138,766 62
Silver sold	2,001 20
Received for interest	850 39
	$456,807 31
Expenditures.	
At mine, as per yearly cost sheet	$333,162 19
All other expenses, including smelting, freight, insurance, etc., etc.	65,190 65
Profit and loss. Profit for 1886	58,454 47
	$456,807 31

Highest price in 1886, 12 cents.
Lowest price in 1886, 9 75-100 cents.

FRANKLIN MINING COMPANY, ASSETS AND LIABILITIES DECEMBER 31, 1886.

Assets.

Cash on hand	$22,330 70
Copper on hand, 1,321,625 lbs. at 10½c	138,770 62
1886, silver (sold)	2,001 20
Supplies at mine	76,174 95
Notes receivable	30,000 00
	$269,277 47

Liabilities.

Drafts accepted and in transit	$15,289 11	
Liabilities at mine	28,403 32	
Due for smelting and freight	9,901 83	
		53,594 26
Surplus December 31, 1886		$215,683 21

From which a dividend of one dollar per share, or $40,000, was paid January 1, 1887.

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.
Yield in 1886, 4,264,207 lbs refined copper.

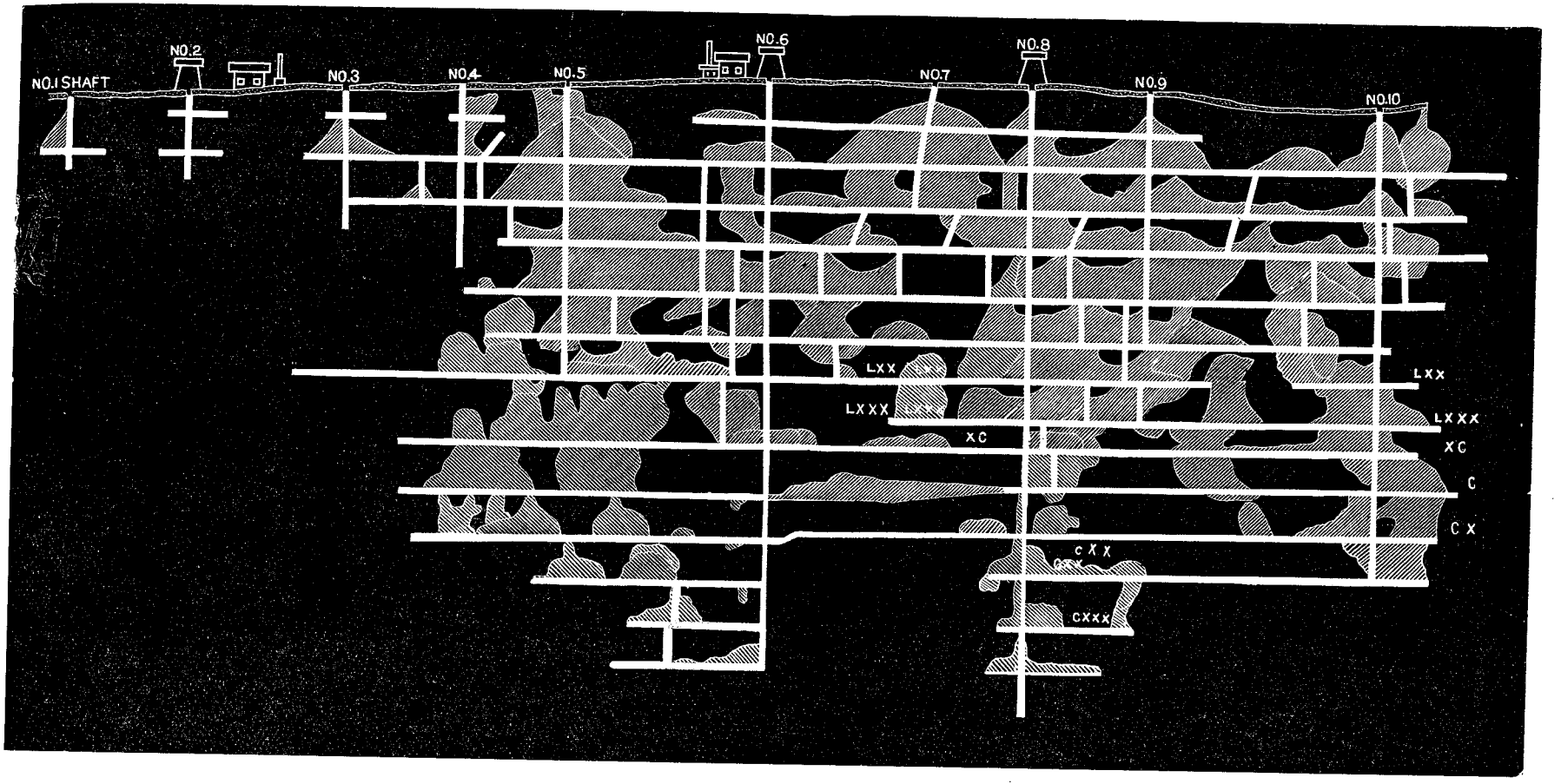
The Franklin mine has produced as follows:

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	1886	2,132	297
Total				25,782	478

D. L. Demmon, Sec. and Treas., Boston, Mass.

LONGITUDINAL SECTION OF THE HURON MINE, JAN., 1887.

Scale, 300 ft. to one inch.



HURON COPPER COMPANY.

It is surprising how well the Huron mine sustains itself, considering the price of copper and the somewhat restricted scale on which it is worked. A few years ago and the Huron was an abandoned mine, while now, without much additional outlay, it is, considering the circumstances, a large producer of copper, and is producing it, too, at a margin of profit. This much has been demonstrated regarding the Huron: if it were provided with machinery and stamp mill facilities equal to those found at the other important mines in the district, it would undoubtedly produce as much copper, and produce it as cheaply as the others. That is, it would be an entirely self-supporting and dividend-paying mine. Open it as extensively, and work it as largely as other mines are penetrated and worked, and it is reasonable to conclude, from the facts already determined, that it would be as successful. The so-called Isle Royal lode, in which the Huron belongs, is like most other amygdaloid belts, irregular and pockety, rich and poor in places. It must be extensively opened and worked to give any profit. In this way enough good ground will be developed to afford all necessary stopes, and the poor may be left standing. It is well understood now, that copper mining in Michigan cannot be conducted successfully on a small scale. The only way that the depression in price has been met by the companies that continued to operate, is by pushing the work more vigorously, opening the mine more largely, and increasing the output. They lessen the cost by increasing the magnitude of the operations.

The Huron, if it is to continue to work, needs a considerable outlay of money to provide all the facilities for working the mine as the other mines in the vicinity of Portage Lake are worked. There is no mine under better management, none where more has been accomplished under such adverse conditions. Capt. Vivian has put a world of energy in the work of rehabilitating this old mine. He knows perfectly well what is necessary to render it a success, and knows that what he is able to do is far from adequate to accomplish such a result Still, he does not relax any effort. In fact, it requires the greatest watchfulness, the best management—and no management could be better than his—to hold to the position already achieved. He illustrates that Johnny Bull perseverance and tenacity of purpose that in so many ways have done so much for the world's advancement.

There are a number of mining men in the copper district, and Capt. Vivian is of the list, who are very valuable men. They combine thorough practical mining experience and energy of character with the best of executive ability. They are equal to any department of the work.

Some accidents, serious ones, to the stamp mill have occurred lately, to add to the perplexity. The first was the explosion of one of the boilers, and lastly,

the total destruction of the mill by fire. It was generally supposed that this latter catastrophe would cause the total suspension of work of the mine, but, on the contrary, the mill was speedily rebuilt, and is again in operation.

HURON MINE REPORT.

Boston, Mass., March, 1887.

To the Stockholders of the Huron Copper Mining Company:

Herewith we hand you the usual statements of the doings of your company for the year 1886, including our agent's report of the condition of the mine and its prospects for the future.

The ruling or average price of copper for the year (10 989-1000 cents per lb.) was a much lower price than we had reason to expect, and that, together with our limited amount of openings to produce rock from, are the principal causes for an unsuccessful year.

The property of the company, or rather the vein we are working, is one of the master lodes of the copper country, and for permanency and uniformity of show of copper, no other vein has exhibited stronger characteristics for so great a distance, and at all points opened, extending as it does from quite a distance on the north shore of Portage Lake to Evergreen Bluff, and beyond in Ontonagon county, some thirty or forty miles, and somewhere in this lode a very large development is to be expected. At the Huron, the vein has improved as depth was attained, the bunches of good ground have been larger, more frequent and richer, and no one familiar with the characteristics of the lode can doubt that more extensive openings and larger mill and hoisting facilities would soon put the mine in a strong position as a permanent and paying institution. Our length on this vein being amply sufficient, if fully opened, to supply eight to ten heads of stamps, or four or five times our present capacity, and it is believed by those fully posted in the matter, that your mine worked on as large a scale as its nearest neighbor, the Atlantic, would surely pay as well as that mine, even with copper at ten cents per pound.

In brief, the mine has an abundance of good copper ground, and will pay a good profit to work, if proper development and equipments are provided, and a reasonable price can be had for our product.

The situation of copper seems to be such that the price can hardly go lower, but that it should advance somewhat in price.

Captain Johnson Vivian still has charge of the mine, and has done all possible things to promote the best interests of the company. For the directors,

D. L. DEMMON, *Treasurer.*

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

Mining expenditures, labor, etc.	$42,024 82
Sinking 312 1-10 feet shafts, and 216 1-10 feet winzes	9,181 11
Drifting and cross-cutting 1,381 5-10 feet at $11.53	15,283 43
Stoping 5,427 fathoms	55,433 12
Sundry labor, etc.	249 00
Supplies and fuel	16,798 76

Surface expense	8,439 25
Stamp mill expense, 90,130 tons at 52 70-100c	47,503 16
Tram road expense, 90,130 tons at 2 90-100c	2,616 38
Rock house expense, 90,130 tons at 10 43-100c	13,465 58
General expense at mine and office	8,591 50
Or a total of	$219,586 11
To which is to be added smelting, freight, insurance, expense, etc., paid in Boston	51,256 20
Or a grand total of	$270,842 31

The total production of mineral for the year was 2,512,675 lbs., which gave a yield of 79 707-1000 per cent. refined copper, or 1,992,695 lbs. The highest price obtained during the year was 12 cents. Lowest, 9¾ cents. The average price was 10 989-1000 cents per lb.

HURON COPPER MINING COMPANY, CASH ACCOUNT FOR THE YEAR ENDING DECEMBER 31, 1886.

Cash on hand January 1, 1886	$689 16
Cash received from sales of copper, 5,059,206 lbs. at 10 989-1,000c	226,281 85
Cash received from sale silver	200 0
Cash received from interest	28 65
Cash received from loans	511,270 40
	$738,470 06

Contra.

Cash paid loans	$463,283 36
Cash paid drafts	224,603 38
Cash paid smelting, freight, copper charges, brokerage	38,043 21
Cash paid interest, expense, insurance, storage	11,380 42
Cash on hand December 31, 1886	1,159 69
	$738,470 06

HURON COPPER MINING COMPANY, ASSETS AND LIABILITIES, DECEMBER 31, 1886.

Assets.

Cash on hand	$1,159 69
Copper on hand, 238,423 lbs. at 10½c	25,034 41
Supplies at mine	28,085 20
Notes receivable	8,090 40
1886, silver (sold)	160 10
Rock broken in mine ready for hoisting, say 10,400 tons valued at	10,000 10
	$72,529 80

Liabilities.

Drafts accepted and in transit	$19,790 02
Loans and bills payable	181,028 06
Liabilities at mine	26,939 29
Due for smelting and freight	4,727 46
	$233,484 83
Less assets	72,529 80
Balance liabilities December 31, 1886	$159,955 03

To offset which we have machinery, buildings, etc., (exclusive of the mine) valued at $151,852.71.

AGENT'S REPORT.

HURON COPPER MINING COMPANY, HOUGHTON COUNTY, MICH.
Houghton, Mich., January 25, 1887.

D. L. DEMMON, ESQ., *Treasurer.*

Dear Sir :—As the time for making the annual report of the operations and expenditures of this mine has arrived, I beg leave to submit the following, with inventory of supplies, tools, and machinery. Also tabular statements, showing in detail the cost of each department of our work, together with map of the mine, which has been carefully surveyed and plotted, for the year ending December 31, 1886.

SURFACE WORK.

On account of the unprecedented low price of copper that ruled during the summer months, nothing in the shape of improvements has been done in this department. All repairs required have had proper attention, which has kept everything connected with it in good condition.

MACHINERY.

We have not added anything to our plant for the past year ; but it will be necessary for more economical working, to remove at least two of the old "hog nose" boilers at the hoisting engine next spring, and substitute therefor one large fire-box boiler. The cost of making the change will soon be paid for in the saving that will be made in fuel.

STAMP MILL.

We have treated 90,130 tons of rock, which is a falling off of 5,346 tons from the amount treated in 1885 ; which was on account of the breaking of two stamp-shafts and the explosion of one of the boilers, etc. At this writing the mill is in good condition, running regular and doing better duty than at any time for the last six months.

The following openings have been made :

Sunk in shafts	312 1-10 feet.
Sunk in winzes	216 1-10 "
Drifting	1,381 5-10 "

The total amount of ground broken was 7,170 644-1000 fathoms, or 120,073 tons of rock. The amount of rock hoisted was 129,437 tons, of which 38,943 tons was rejected, or 30 10-100 per cent. of the amount taken out of the mine. The total cost of manipulating a ton of rock hoisted was 1 70-100 dollars.

No. 6 shaft has been sunk from the thirteenth to the fourteenth level. With the exception of a few feet just below the former level the lode in this opening is showing copper in paying quantities. The fourteenth level has been opened fifteen feet south and twenty feet north of the shaft. The lode, at this point, is large and well filled with all grades of mineral. There seems to be a large and good block of ground between this and the thirteenth level which will pay well to remove by stopes. The twelfth and thirteenth levels, north of this shaft, have exposed some good stoping ground. In the latter, for a distance of about one hundred and twent-five feet, the lode is from thirty to thirty-six feet in width, and carrying some copper throughout. In a winze sinking below the thirteenth level, in this run of productive ground, the lode is showing some good stamp rock and a fair amount of barrel copper. No. 8 shaft has been sunk from

the thirteenth to a point thirty feet below the fourteenth level. For the whole distance the lode is large, and in some places quite rich in stamp rock. The fourteenth level has been opened south one hundred and twenty feet, the greater part of which will pay to stope. The ground north of this shaft is not showing anything of value. Owing to some of the stopes not producing as well as we had reason to believe they would at the date of our last annual report, and the suspension of the openings last spring on account of the low price of copper, etc., we have not done as well in way of product as we expected. But at this writing everything seems to show, and especially the openings at the bottom levels, that there is something better in store for us. This lode, like all other amygdaloids that have bean extensively worked on Lake Superior, will doubtless improve as depth is attained. And all that is necessary to place the Huron on the dividend list is more extensive openings, additional machinery, and a larger output.

Captain T. Whittle and Mr. Alex. Loranger, the clerk, are still with us, and I take pleasure in saying that they have worked earnestly to promote the best interest of the company.

I am, yours respectfully,

J. VIVIAN, *Supt.*

Table of product of Huron mine :

Year.	Tons.	Pounds	Year.	Pounds.	Tons.
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	236	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	1886	996	995
Total				7,612	1,556

D. L. Demmon, Sec. & Treas., 19 Congress street, Boston, Mass.; Johnson Vivian, Superintendent, Hancock, Mich.

THE ISLE ROYAL

mine, north of the Huron, remains without change, as does also

THE GRANDE PORTAGE.

I have been through the latter several times and have examined it carefully. I felt satisfied that, opened and worked largely, the mine could be safely operated. That is, it would be sure to pay expenses. Both are in the same lode with the Huron.

THE ATLANTIC MINING CO.

I have written very fully regarding the Atlantic in previous reports, and, as I find nothing new at the mine, all that I can say must be, in the main, a repetition of what I have heretofore stated.

The Atlantic rock yields the lowest percentage of copper of any mine worked in the State. And yet it is operated at a profit—annually returning to the shareholders a dividend. It will be seen by referring to the statement that the average yield of rock for the year was less than 14¼ lbs. to the ton, with an average gross value of $1.53, but it is so mined and manipulated as to leave a profit of 15.3 cents on each ton of rock. The stamp mill expense of 26½ cents per ton is astonishingly low. There is not much of a margin for extravagance and mismanagement in a total cost, mining and stamping, etc., per ton of rock of $1.38. This includes mining the rock, raising it from 1,000 to 1,300 feet to the surface, tramming to the rock house, breaking it, transporting it 3½ miles by railroad to the lake, stamping and working, taking to smelting mill, smelting, etc.

An examination of the map and the accompanying figures will lead to a clearer understanding of the problem.

ATLANTIC MINE REPORT.

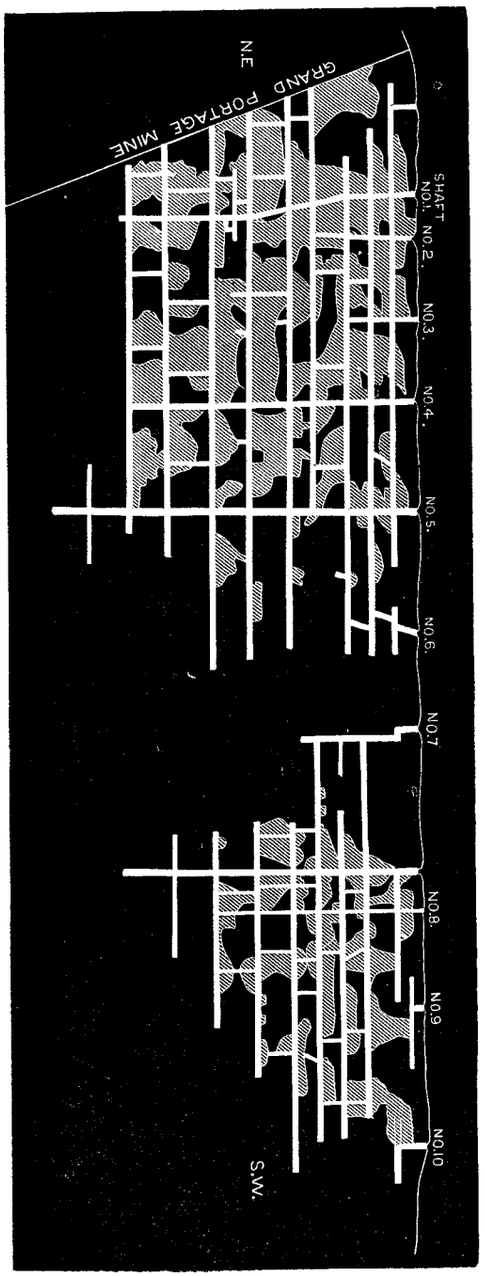
The directors present the following report of operations during the year 1886.

The production of mineral was 4,850,179 pounds, which yielded 72½ per cent., or 3,503,670 pounds of refined copper. The shipments to market during the year amounted to 3,488,790 pounds, for which,—estimating the copper unsold at the close of the year at 10½ cents per pound,—has been realized an average price of 10 92-100 cents per pound.

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

PRODUCTION.

Copper sold	2,922,996 lbs., av. 11 c		$321,754 98
" on hand	565,794 " at 10½c		59,408 37
	3,488,790 lbs., averaging 10 92-100 c.		$381,163 35
Copper at smelting works Dec. 31st, 1885, 364,981 lbs., valued at 9 cents, net		$32,848 29	
" " " " " " 1886, 379,861 " " " 8 " "		30,388 88	
			2,459 41
Net value of product of 1885			$378,703 94
Add balance of interest account			3,640 47
			$382,344 41



LONGITUDINAL SECTION OF THE ISLE ROYAL MINE, 1887.
Scale, 300 ft. to one inch.

COSTS.

Working expenses at mine as per clerk's tables		$273,942 04	
Freight	$13,967 90		
Smelting	36,873 97		
Expenses	6,451 23		
Brokerage	1,609 54		
Insurance	993 95		
Storage	8 00		
		59,904 59	
			333,846 63
Showing a mining profit in 1886 of			$48,497 78
There has also been expended for addition to plant, as per detailed statement hereinafter		$2,294 49	
And for 160 acres of land controlling part of watercourse which supplies the stamp mill with water		4,800 00	
			7,094 49
Leaving a net gain for the year			$41,403 29
The surplus from 1885, after payment of dividend, was			262,696 80
Making the net surplus December 31st, 1886			$304,100 69

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, 1887.

For details of the work performed, and its cost, we refer to the subjoined tables and summary of results. The usual financial statement and report of agent at the mine are also submitted.

JOSEPH E. GRAY,
JOHN J. CRANE,
GEO A. HOYT,
JOHN STANTON,
J. R. STANTON,
Directors.

ASSETS AND LIABILITIES, ATLANTIC MINING COMPANY, DECEMBER 31ST, 1886.

Assets.

Cash		$18,208 50
Loans		100,000 00
Accounts receivable		9,075 52
Copper on hand, sold, 351,807 lbs		40,011 27
" " " unsold, 565,794 lbs at 10½ cents		59,408 37
" at smelting works, 379,861 lbs at 8 cents net		30,388 88
		$257,092 54

At Mine.

Cash	$2,845 25	
Coal	7,201 94	
Wood	12,702 65	
Supplies	26,461 32	
Merchandise in store	35,370 66	
		84,581 82
Total assets		$341,674 35

Liabilities.

Indebtedness at mine	$13,268 44	
Agent's drafts outstanding	11,774 03	
Accounts payable	12,531 80	
		37,574 27
Balance of assets		$304,100 00

Less dividend payable January 28th, 1887, $40,000.)

STATEMENT OF WORKING EXPENSES AT THE ATLANTIC MINE FOR THE YEAR ENDING DECEMBER 31st, 1886.

Underground Expenses.

Sinking 97 feet, averaging $22.94 net	$2,225 00	
Drifting 3,623.1 feet, average $4.28 net	15,507 17	
Stoping 14,186 92-216 fathoms, averaging $4.74 net	67,260 51	
Timbering, tramming and labor	50,282 96	
Timber, materials and supplies	8,519 95	
		$143,795 59

Surface Expenses.

Superintendence, and labor of all kinds, less sundry credit items	$27,623 95	
Supplies and materials	4,614 60	
Fuel	22,998 55	
Feed for teams, etc	1,138 17	
Fire insurance	460 00	
Taxes	2,676 39	
Canal tolls	279 24	
Expenses	367 59	
	$60,158 49	
Less amount received for rents	4,153 25	
		56,005 24

Railroad Expenses.

Labor	$5,333 75	
Fuel	2,406 50	
Supplies	1,282 50	
	$9,022 75	
Less received for hauling 320 tons freight	410 00	
		8,612 75

Stamp Mill Expenses.

Labor	$26,847 45	
Fuel	26,329 75	
Supplies	10,637 79	
Insurance	662 50	
Taxes	652 00	
Teaming, mineral, etc	398 97	
		65,528 46
Total running expenses		$273,942 04

CONSTRUCTION ACCOUNT.

At Mine.

Four dwellings	$549 40	

At Mill.

Five slime tables	$1,000 00		
Four iron body jigs	420 00		
Addition to house	200 00		
Log house	125 00		
		1,745 00	
			2,294 49
Total expenditures			$276,236 53

SUMMARY OF RESULTS.

Ground broken in openings and stopes	14,724 cubic fathoms
Rock stamped	247,035 tons
Product of mineral	4,850,179 lbs
Product of refined copper	3,503,670 "

Yield of refined copper per cubic fathom of ground broken	238 lbs
Yield of rock treated, 14 18-100 lbs. copper per ton, or	709 per cent
Gross value of product, per ton of rock treated	$1.5330
Cost per ton of mining, selecting and breaking, and all surface expenses, including taxes,	.8088
Cost per ton of transportation to mill	.0348
Cost per ton of stamping and separating	1.1089
Cost per ton of freight, smelting and marketing product, including New York office expenses	.2425
Cost per ton of working expenses	1.3514
Total expenditures per ton of rock treated	1.3801
Net profit per ton of rock treated (exclusive of interest earned)	.1529

AGENT'S REPORT.

Atlantic Mine, L. S., Mich., January 1, 1887.

JOHN STANTON, ESQ., *Treasurer Atlantic Mining Co., New York:*

Dear Sir:—The following report of operations at the Atlantic mine for the year 1886 is respectfully submitted:

No. 2 shaft has been extended from the 9th to the 11th level, and put in running order to that point. The 3d, 8th and 10th levels, north of this shaft, have been operated with fair results.

The 5th, 7th and 9th levels have been extended north of No. 1 shaft, and rising stopes have been carried to the line of the shaft. With very little expense this shaft can be put in running order to the 9th level.

No. 3 shaft has been sunk to the 16th level. Drifting and stoping has been done in the 12th, 13th, 14th, 15th and 16th levels north, and the 15th and 16th levels south of the shaft.

No. 4 shaft has been put in running order from the 13th to the 14th level. Drifting and stoping has been done in the 10th, 11th, 12th, 13th and 14th levels south of this shaft. As we extend 1,000 feet south of this shaft, the lode seems to get leaner, and will not pay to operate.

The shafts and pumping machinery are in very good working order.

The map shows the extensions of the workings to date. You will notice that the 12th and 13th levels have passed the line of No. 2 shaft, and it is necessary to operate these levels through this shaft, and also the 3d, 5th and 7th levels through No. 1 shaft in order to save the expense of tramming the rock so great a distance through these long levels.

STAMP MILL.

The stamp mill has been operated very successfully. The rock has been treated cheaper than in any previous year.

Considerable repairs and additions to the dressing machinery have been made during the year. Some of the old wooden jigs have been removed and replaced with new iron ones, and four new iron ones added. Ten of the slime tables, which have worked for years and become unfit for use, were taken out and replaced with ten new double tables, having about double the capacity of those removed. A launder 1,000 feet long and twenty inches wide has been laid to convey the waste sands towards Cole's creek, and prevent the sand running so far out in the old channel.

The mill is in very good condition and capable of treating more rock than we can possibly give it with our present hoisting capacity.

RAILROAD.

The railroad has been operated very successfully. The cost of transporting the rock to the mill was only 3.48 cents per ton. The road and rolling stock is in fair condition. There were 1,830 new ties put in during the last season.

MACHINERY.

The plant at the mine has done the work very satisfactorily. It has become necessary to operate No. 1 shaft, and to do so we shall have to extend the trestle road from No. 2 to No. 1 shaft, about 800 feet. This road will then convey the rock from these two shafts to the rock-house. The trestle-road will also have to be extended about 600 feet, connecting No. 3 with No. 4 shaft, and this road will take the rock from these shafts to the rock-house.

I would refer you to the tables made by Mr. Van Tassel, which show the cost in every department, and also the map filled out to date.

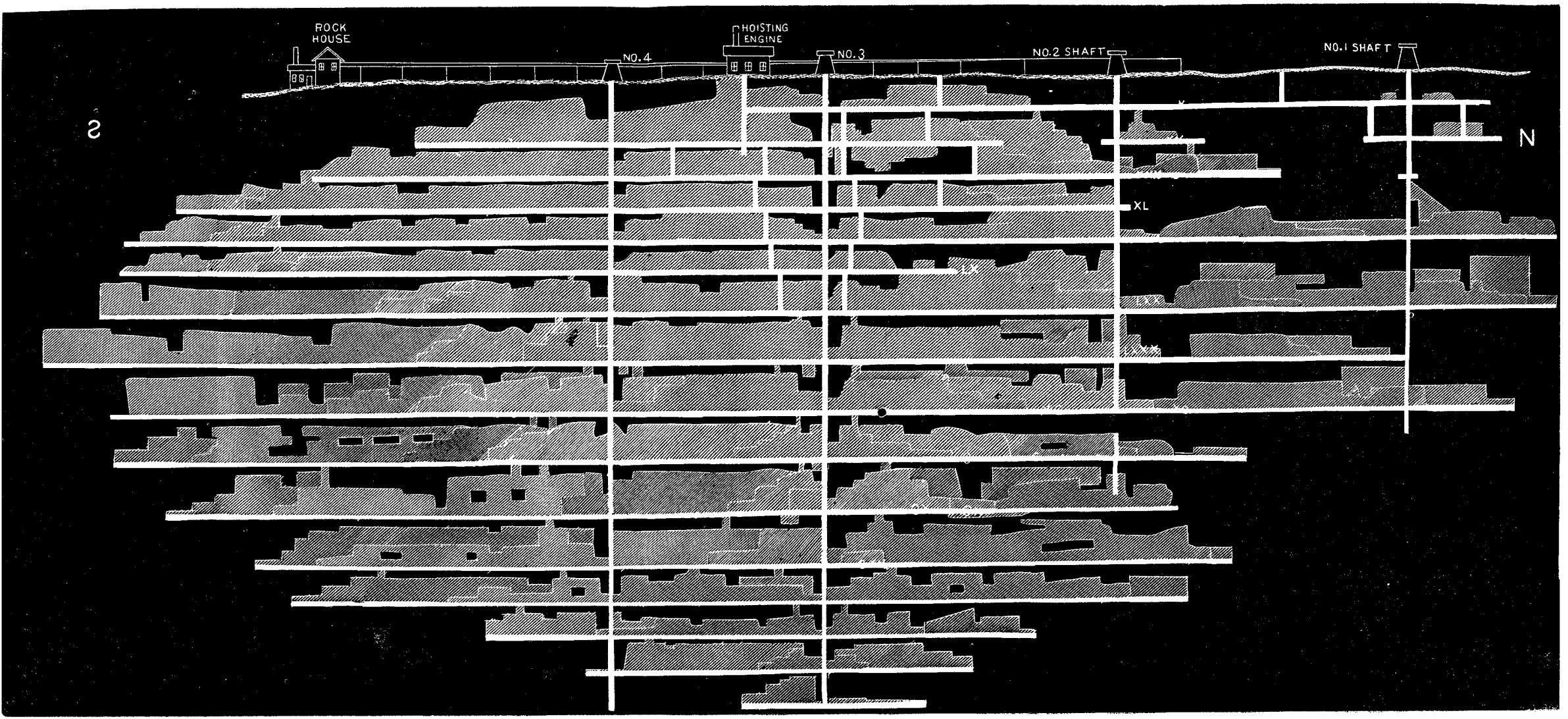
Allow me to recommend to your favor the different officers who have labored faithfully for the best interests of the company.

Yours truly,

WM. TONKIN, *Agent.*

LONGITUDINAL SECTION OF THE ATLANTIC MINE, JAN., 1887.

Scale, 300 ft. to one inch.



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

	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
Number 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	247,035
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	14.18
Number 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	14,724
Yield of ingot per fathom, pounds	278	280	290	243	266	244	2,735	259	240	259	267	238
Cost in cents per ton for stamping and washing	87.96	67.09	57.79	48.85	42.44	38.13	42.54	37.07	35.35	39.95	30.36	26.53
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	$1.3801
Total average cost per pound, ingot	$0.2212	$0.1895	$0.1637	$0.1683	$0.1220	$0.1584	$0.1368	$0.1375	$0.1256	$0.1087	$0.936	$0.0908
Average price per pound received for copper	.2247	.2135	.1854	.1615	.1630	.1997	.1712	.1756	.1500	.1181	.1116	.1092
Dividends paid				20,000	30,000	40,000	80,000	80,000	40,000	20,000	40,000	40,000
Net profit per ton of rock		.44	.51	1.01	.87	.5000	.4711	.4958	.2483	.0919	.2205	.1529
Per cent of copper in rock	.976	.949	.971	.925	.95	.713	.718	.693	.685	.755	.743	.709

The following table gives the product for each year:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1866	6	1,475	1877	1,027	304
1867		1,760	1878	1,132	1,592
1868	764	258	1879	1,152	1,822
1869	823	857	1880	1,170	1,195
1870	186	617	1881	1,264	9
1871			1882	1,315	1,708
1872			1883	1,341	197
1873	431	1,336	1884	1,586	1,585
1874	686	403	1885	1,791	533
1875	783	1,036	1886	1,751	1,670
1876	917	1,041			
Total				18,130	1,431

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

THE ONTONAGON DISTRICT

presents little that is new to record. I have written very fully of this section of the copper region heretofore, and have taken occasion to express myself very favorably regarding it. I see no reason to retract, or to in any way modify what I have formerly said as to my belief in its metallic richness. Sometime, when the country is more accessible, when there is greater interest in copper discoveries, Ontonagon county will again come to the front as an important mining district.

Just now, also, some interest is taking in the Iron River Silver District, which ten years ago was very active. All work was suddenly abandoned in about 1877, and nothing has since been done. These silver deposits were described in the Commissioner's Report for 1877–78. A few tons of the rock have been sent to Chicago to be treated, and the result is awaited by the parties interested. The Gogebic Iron Range was formerly embraced in Ontonagon county, but was recently detached by the last Legislature to form the new county of Gogebic.

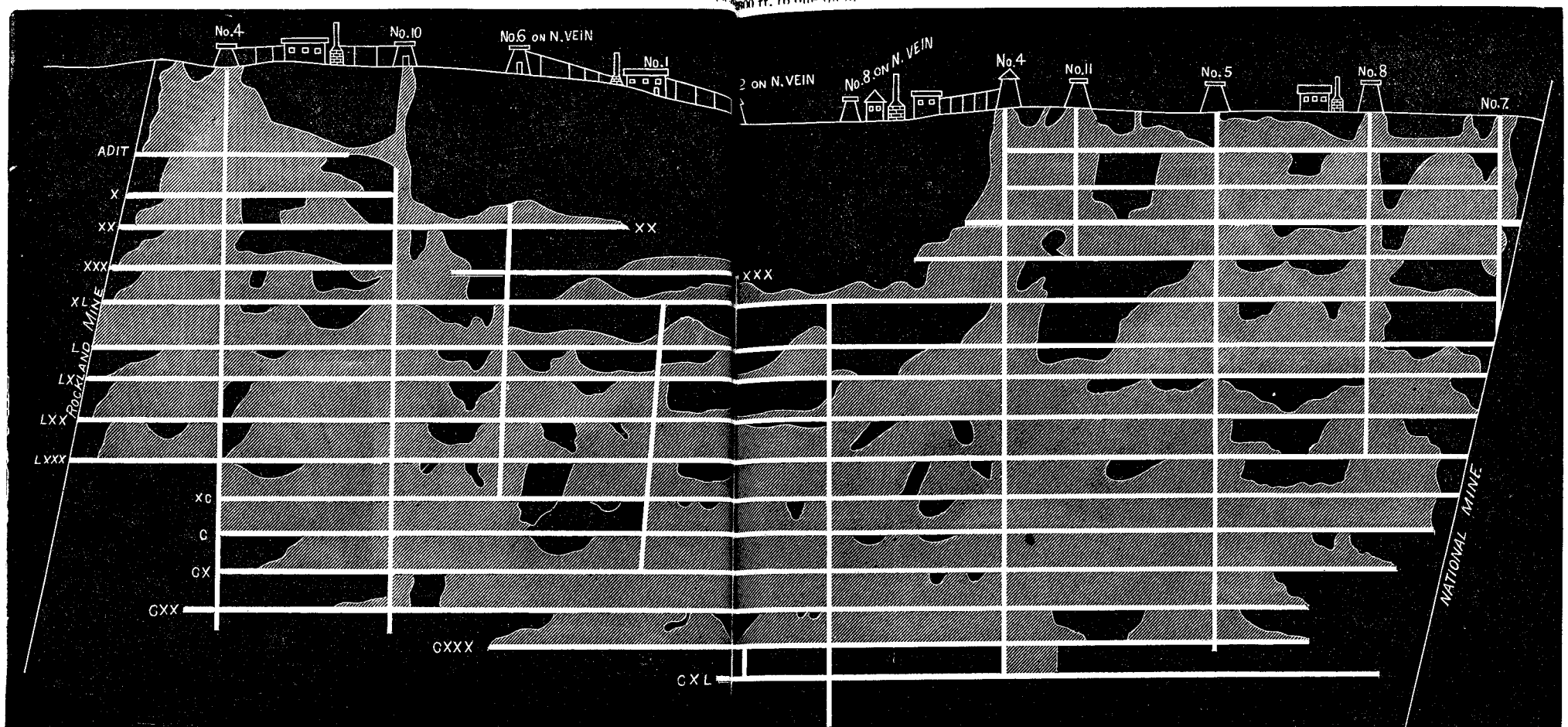
The most important of the Ontonagon mines is

THE NATIONAL,

which now includes the once famous Minesota, also. They are contiguous mines, the openings, even, intersecting one another. The National company has been engaged during the past year in driving an adit from the Ontonagon

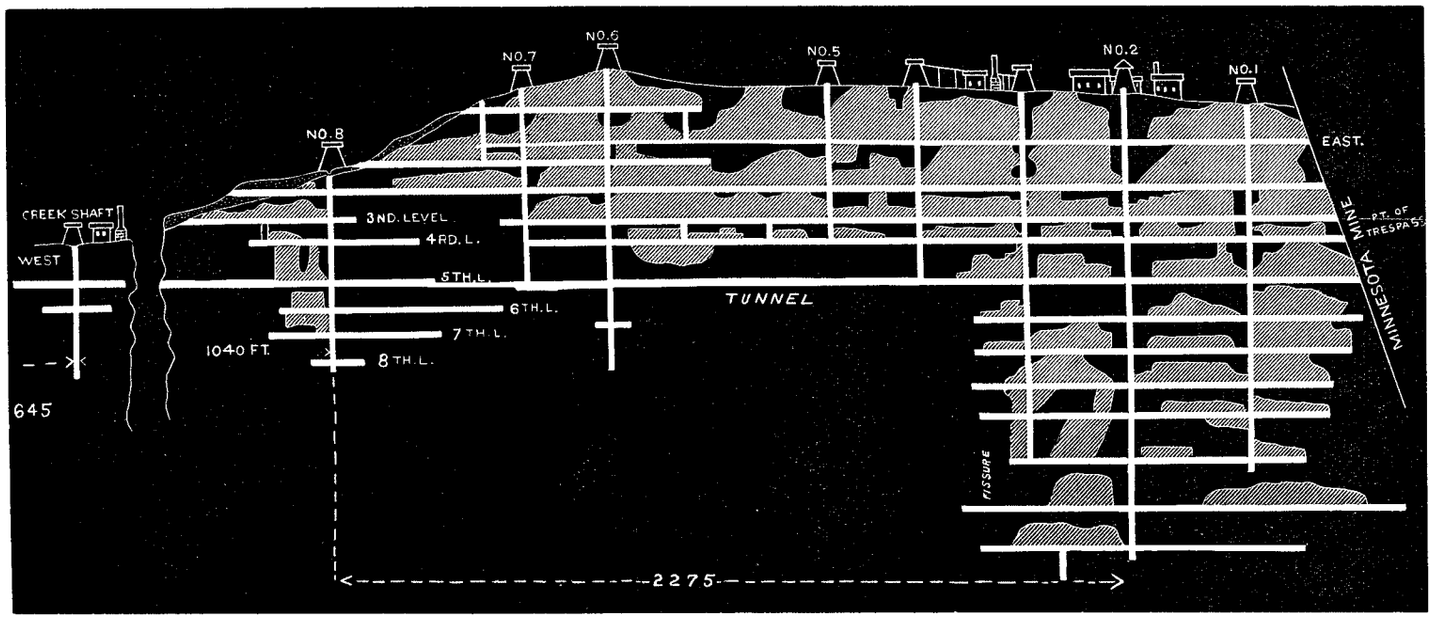
LONGITUDINAL SECTION OF THE MINESOTA MINE, 1887.

Scale 200 ft. to one inch.



LONGITUDINAL SECTION OF THE NATIONAL MINE, JAN., 1887.

Scale, 100 ft. to one inch.



river through the mine. The purpose and location of this tunnel is fully explained in my last report. It is now about completed. The greatest difficulty has been experienced in making the final connection between the entrance portion and the creek shaft. Instead of its being rock, which would have given little trouble, the ground is sand, gravel, boulders, and quicksand. Sometimes it would run clear to the surface, letting in the water of the creek and everything else upon the men and work. This trouble happened several times through the effects of blasts.

The rate of driving has been rapid. It may be briefly stated as follows: Commencing June 1, 1886, since which time hoisting and pumping machinery have been set up at the creek, and at No. 8 shafts, and both shafts have been freed of water and repaired, and 500 feet of skip road put in No. 8, and 3,900 feet of tunnel completed May 1, 1887. The whole length of tunnel from the western extremity easterly to No. 2 shaft, is 3,950 feet. With the exception of the west 640 feet, it is driven in the conglomerate vein, starting in the face of the bluff 188 feet above the river, and about three-fourths of a mile distant from it.

It is, of course, on a uniform grade. The rock driving was done with power drills, of which six were used until some of the connections were made. The compressor is in the stone building near No. 2 shaft, and the air was carried in the pipes from there to the point of attack. The main pipe from the compressor is 3″ diameter, and is placed along the surface to creek shaft; thence the pipe used is 1½″ diameter. The expansion points are put in at intervals of 500 feet, and notwithstanding they had nearly a mile in length of pipe along the surface, with offsets at every point, aggregating, before they finished much more than the extent of surface pipe, there was not at any time any delay, at any point, by reason of interruption of the flow of air. Four blowers, driven by steam, were used to aid in ventilation, in the long drifts.

The average number of men employed was 52, all told. No stoping was done on the line of the tunnel, though some apparently good ground was cut through. About 15 tons of copper were obtained in the work. The average dimensions of the transverse section of the tunnel are eight feet high and seven feet wide.

The work now will be to cross-cut the ground between the adit and the amygdaloid belt described in previous reports. Capt. Parnell is now, May, driving a cross-cut, starting from the adit near old No. 6 shaft, and another between it and No. 2 shaft. When the cross-cuts are completed, the amygdaloid will be driven in east and west 1,200 feet, in the same horizon as the adit.

The amygdaloid is a stamp lode, and so far as it has been proved, is a good

one. If it continues to show up favorably, as it probably will, the future of the National will be assured. A stamp mill of the modern class will be required, and the National will again merge into the ranks of first-class mines.

I believe that there is still a prosperous future in store for the National. The plan of the management, as now carried out, is to prove the mine, to make sure that there is plenty of good milling rock in the mine before going to any larger expenditure in plant.

The adit gives a "back" of over 500 feet for a length of 2,600 feet. All the material will find an outlet through the adit to the river, where the mill will be built. There is no doubt that if copper were at the price it usually holds, it would be safe to predict the work for the coming year; but, certainly, there is not much encouragement to push things at a copper mine when the circumstances are as at the National.

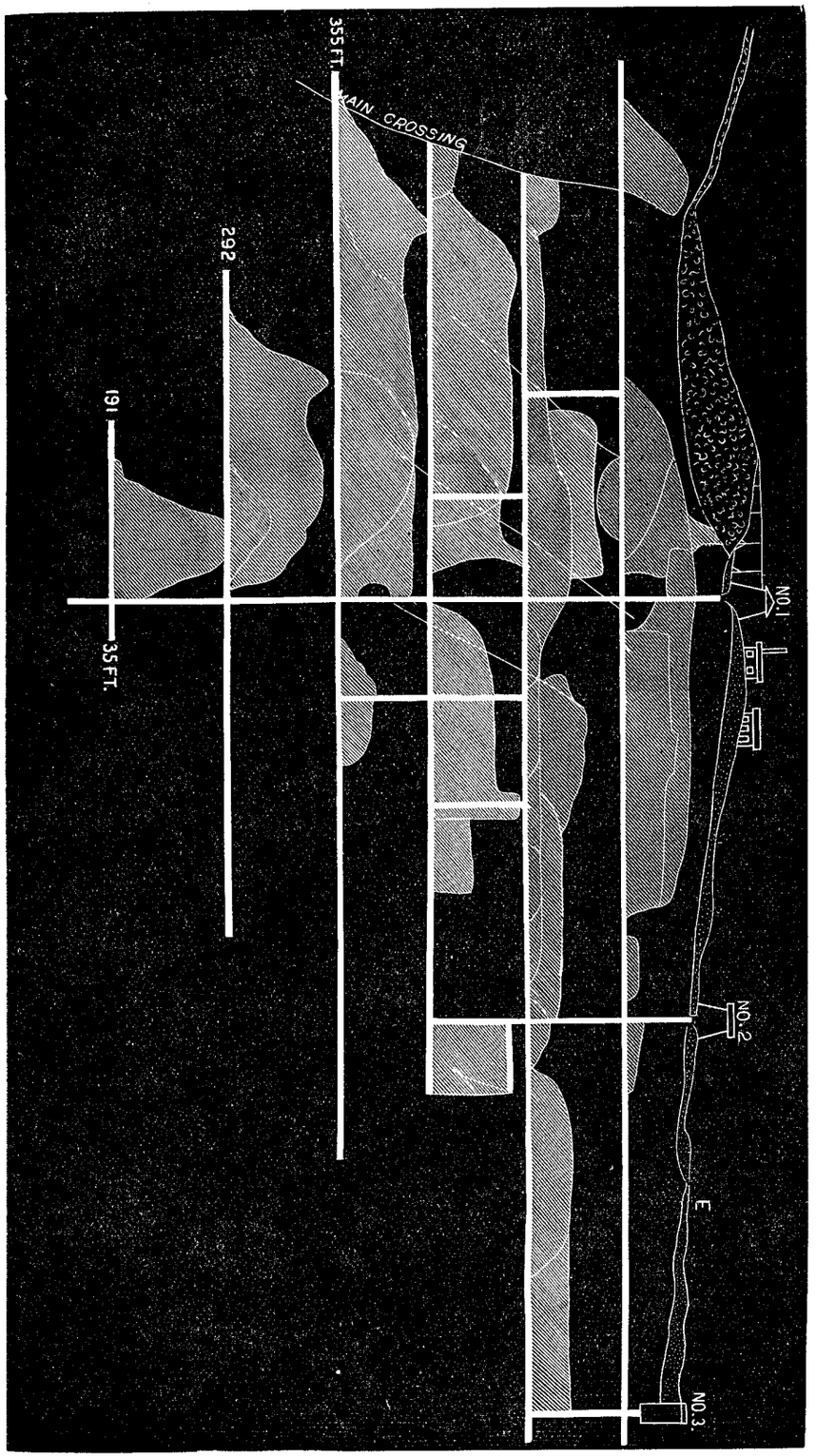
Capt. Wm. E. Parnell, who took charge of affairs on the resumption of work six years ago, still continues Superintendent. D. L. Demmon, Secretary and Treasurer.

The National has produced, in the aggregate, 5,449 tons 1871 lbs. of refined copper.

THE MASS MINING COMPANY

continued to operate its mine on company account, until September, 1884, when it was leased by Mr. Benj. F. Claymouth *et. al.*, who worked it under the title of the Mass Tribute Company, until the spring of 1887, when they shut down and ceased work altogether. They could not make any money with copper at 10 cents a pound. The Mass has of late years been well managed, having been of late years in the hands of one of the most intelligent and experienced miners in the country. But it is too small a mine, and worked on too limited a scale, to achieve any great success. It should be combined with the Knowlton and with the Ogima. I explained all this very fully in my last report, and it is not necessary to reiterate here my former statements.

The work at the Mass has demonstrated the great value and the characteristics of one of the important copper-bearing belts of the Evergreen Range, the knowlton vein, and the experience thus here obtained, will be of great value in other mines in all future working.

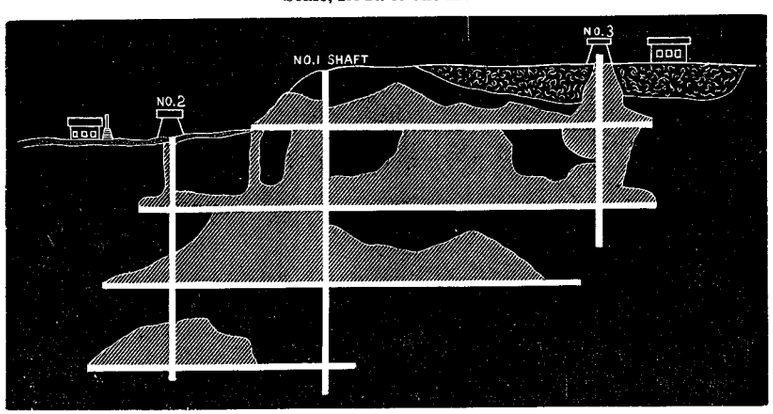


LONGITUDINAL SECTION OF THE MASS MINE, JAN., 1887.

Scale, 100 ft. to one inch.

LONGITUDINAL SECTION OF THE KNOWLTON MINE, 1887.

Scale, 180 ft. to one inch.



LONGITUDINAL SECTION OF THE EVERGREEN BLUFF MINE, 1887.

Scale, 250 ft. to one inch.

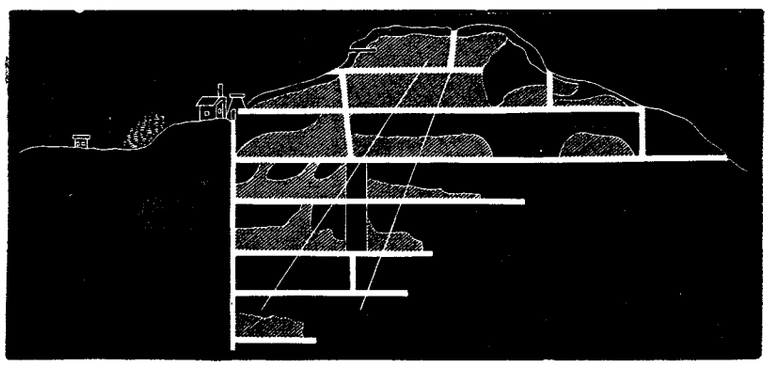


Table of product of Mass mine:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1857	8	228	1872		1,403
1858	6		1873	4	265
1859	26	682	1874	5	1,925
1860			1875	1	1,014
1861			1876	40	1,952
1862			1877	54	238
1863			1878	206	339
1864	4	1,452	1879	228	294
1865	6	936	1880	258	1,159
1866	5	112	1881	233	1,684
1867	5	40	1882	368	1,446
1868	9	939	1883	329	1,474
1869	1	1,213	1884	281	718
1870	1	1,408	1885	181	1,500
1871	9	692	1886	123	1,179
Total				2,403	786

In the

KNOWLTON

and other of the Evergreen Range mines, the usual amount of tributing has been done, with the customary results.

THE RIDGE COPPER COMPANY.

The year's work at the Ridge is set forth in the following report. The description of the mine, etc., I have given as fully as necessary in former reports.

Table of product of the Ridge mine:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
1855	30		1871	175	150
1856	35	631	1872		
1857	36	1,874	1873		
1858	29	790	1874		
1859	39	690	1875		
1860			1876		
1861			1877		
1862			1878		
1863			1879		
1864	8	917	1880		
1865	85	433	1881		
1866	71	711	1882		
1867	94	1,537	1883		
1868	86		1884		
1869	126	1,840	1885		
1870	122	1,700	1886		

Ridge Mine Report.

The product of the mine for the year 1886 has been:

Barrel copper	147,413 lbs.	
Mass copper	64,902 lbs.	
	212,315 lbs., or 106 315-2,000 tons.	
Which has realized		$17,188 75

The expenditures for the year have been:

Mine expenses	$14,471 65	
Other expenses as per treasurer's account	4,928 72	
		$19,400 37
From which deduct total receipts		17,188 75
Loss on business of the year		$2,211 62
The statement of assets and liabilities in last report showed a balance of	$7,419 05	
Assessment called	9,938 50	
		$17,357 55
Deduct loss on business of 1886		2,211 62
Balance on January 1, 1887, as per statement		$15,145 93

Balance Sheet from the Books of the Ridge Copper Company, January 1, 1887.

Expenditures.

Real estate—cost of property	$203,541 00
Expenditures as per published statement to January 1, 1886	1,123,574 81

1886.

Mining account	$13,531 11	
Smelting	1,539 27	
Expenses, taxes and copper charges	2,486 24	
Transportation	903 21	
		18,459 83

Dividend account:		
Paid February 24, 1873	$50,000 00	
Paid February 23, 1874	20,000 00	
Paid February 8, 1875	20,000 00	
Paid February 10, 1880	9,784 50	
		99,784 50
Company's stock, costing		304 40
Treasurer's account—cash on hand		15,460 00
		$1,461,124 54

Receipts.

Capital stock:		
Paid in for property	$200,000 00	
Assessments	219,938 50	
		$419,938 50
Copper account:		
Sales to January 1, 1886	$1,007,361,37	
Sales in 1886	17,188 75	
		1,024,550 12
Interest account:		
Collected to January 1, 1886		16,635 92
		$1,461,124 54

Shipments in 1886	212,315 lbs.
Yield	74.551 per cent.
Ingots	158,272 lbs.

Statement of Liabilities of the Ridge Copper Company, and of Available Assets, January 1, 1887.

Liabilities.

Dividends unpaid	$215 50
Drafts outstanding	1,416 04
Balance	15,145 93
	$16,777,47

Assets.

Treasurer's account	$15,460 00
Cash on hand at mine	72 01
Supplies at mine	1,245 46
	$16,777 47
Balance of available assets over liabilities	15,145 93

Agent's Report.

Ridge Mine, Feb. 1, 1887.

Philip Highley, Esq., Secretary and Treasurer.

Dear Sir:—Herewith I submit a report of operations at the mine for 1886, with statement of accounts, inventory of supplies, tools, machinery, etc.

Tribute work has been continued during the year with satisfactory results. The production has been 106 tons of copper, all of which has been shipped to the Detroit smelting works, and consisted of one hundred and forty-three (143) barrels and eighty-nine (89) masses of copper.

On May 1 the tributers hoisted their copper, cleaned it and weighed it in to the company. I purchased from them one hundred and one thousand four hundred fifty-nine (101,459) pounds copper at a cost of $4,928.67.

Most of the miners went to work again on tribute until October 1, when their copper was again hoisted, cleaned and weighed, and they delivered to me 110,856 lbs. at a cost of $5,507.05. The total amount purchased of the tributors for the year was 212,315 lbs., of this amount 176,304 lbs. cost 5 cents per lb.—$8,815.20, and 36,011 lbs. at 4½ cents—$1,620.50, or a total of $10,435.72.

On November 1 I again let tribute for the winter months at 4½ cents per lb. upon conditions, however, that if the copper they produced sold for 12 cents per lb. they should receive 5 cents per lb., the former tribute price.

We have now 16 miners at work on tribute, and I estimate that they have taken out about 18 tons of copper so far this winter, and I estimate we shall have between 40 and 50 tons to ship in May.

The great bulk of the copper taken out by tributers the past two years, has been taken from the old abandoned ground at and above the thirty fathom level, in ground long since abandoned by the former manager of the mine. It has also come almost exclusively from the west end of the mine. This would seem to prove beyond a shadow of doubt that there is a rich shoot of copper ground from the surface downward.

It would seem that one of the first efforts of the company should be to sink the No. 1 shaft from its present bottom in the 10 level to the 50 level at least, and extend the 20, 30, 40 and 50 levels in the western boundary line to the Evergreen Bluff mine. As near as I can estimate these levels can be driven yet from 150 to 250 feet to reach the boundary line. The shaft could be sunk very rapidly by sinking and rising from the different levels, and very cheaply, too, as the ground is of such a nature as to permit of being drifted and blasted easily. The sinking of this shaft would unable us to open a large body of ground, keep a moderate force of miners at work several years, and produce many hundreds of tons of copper.

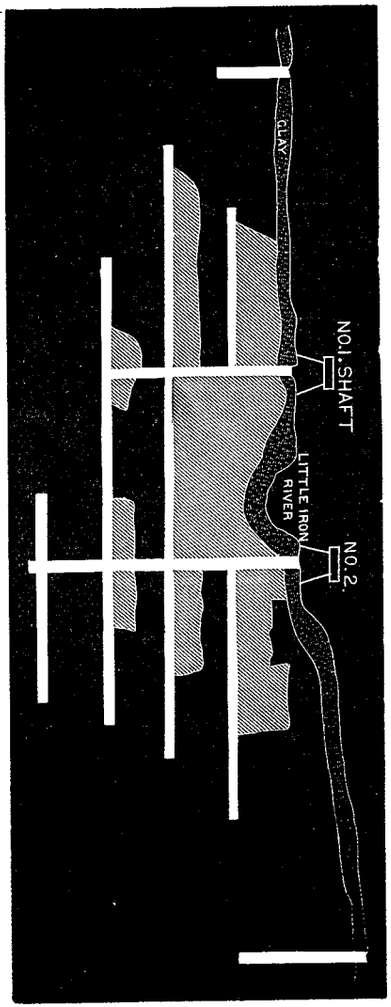
Great care has been taken during this tribute work to see that no injury has been done to the mine, its shafts, or the accumulation of rock in any of the drifts.

During the year considerable work has had to be done in replacing old and decayed timber in the shafts, drifts and stulls. It was also found advisable to make new gutters in the adit level, and clean away considerable dirt and rock so as not to prevent the drainage of the mine, and stop any water flowing into the mine from the surface. The cost of the work was $250.

During the summer I made a thorough exploration of the property so as to locate the five veins supposed to cross it. The five veins are known as the Evergreen, Ogima, Butler or Champion, Mass and Knowlton veins; they were all found, located and opened on. The exploration was confined to the western portion of the bluff where our present mine is opened.

The Evergreen vein is the one on which our present mine is opened on, and has been wonderfully productive of mass and barrel copper wherever worked. The distance from this vein, north, to the Ogima vein is 260 feet; from the Ogima to the Champion or Butler vein is 100 feet; from the Champion to the Mass vein 300 feet; from the Mass to the Knowlton vein is 140 feet. Thus we find we have on the property, within the space of 800 feet, five distinct copper bearing veins, all of them locally known to be rich in copper, and all of them could be reached and worked through the present mine by driving a cross-cut north from one of the lower levels, which I have no doubt will eventually be done. The cost of the exploratory work was $178.30.

Owing to the improved outlook of the copper market and the advance in the price of copper last fall, I started to unwater the mine. From the start we were beset with



LONGITUDINAL SECTION OF THE NONESUCH MINE, 1887.

Scale, 200 ft. to one inch.

many drawbacks, delays and obstacles, the facilities for the work were not at hand, the machinery was out of order ; but we finally got to work, the mine is now unwatered below the 50 level in the No. 2 shaft, but owing to a difference in the level (of which I was not aware) between the No. 2 and 3 shaft the drainage is west of No. 2 instead of east, as it is in all the levels above, so that there is water in 50 level west of the No. 2 shaft, but it will take but a few days in the spring to take it out. If thought advisable the water then can soon be taken out of the 60 and 70 levels through the No. 3 shaft. We have sufficient dry wood left over for the work, and everything is ready. The cost of this work, repairs to machinery, wood, etc., was $730.10 ; this includes, however, about 40 cords of dry wood at the engine house.

In December the east side of No. 2 shaft between the 10 and 20 levels came in and put a stop to our work of unwatering the mine. The timbers used were hemlock and were completely rotted, and the only wonder was that they lasted so long. Considerable difficulty was experienced in clearing and keeping away the rock, but heavy cedar timbers were put in and a good substantial job done. The cost of this work was $181.

I would advise the continuance of tribute work, for the reasons before given, that it helps to keep the mine open. The mining captain is continually underground, and much of the time is employed in keeping everything in repair and good shape.

If, however, the condition of the copper market should improve, and promise a reasonable price for copper, I renew my advice to prepare ourselves for it by equipping the mine with modern machinery, power drills and other appliances to enable us to mine readily and cheaply procure copper.

In the meantime it will be my aim to keep the mine, and everything on the surface in good repair and condition, ready to commence work at any time.

Very respectfully,

ALFRED MEADS, *Superintendent.*

THE BELT COPPER COMPANY, LIMITED.

There is nothing new to record regarding the Belt. The mine and property are in charge of Hon. James Mercer, agent and resident director, Ontonagon, Mich.

This mine was the subject of much interest a few years ago from several causes, prominent among which was the high standing of the gentlemen who inaugurated the new enterprise. The parties who organized the company are Englishmen, and the general office is in London.

For upwards of a year past the mine has not been worked. The company paid for the mine in 1882, in cash, $121,500; in fully paid up shares $680,400 —$801,000. Since which time there has been expended upwards of $400,000.

The amount of copper produced is as follows:

Year.	Tons.	Pounds.	Year.	Tons.	Pounds.
Prior to 1882	216	475	1884	89	351
1882	2	1,624	1885	13	1,433
1883	8	402	1886	3	1,486
Total				333	1,772

THE JOHN DUNCAN LAND AND MINING CO.

has a large body of mineral lands that are esteemed valuable. These lands are mostly in Ontonagon county, in the Gogebic range. They are offered for sale or to lease.

Daniel Kloeckner, Secretary, Hancock, Mich.

COPPER PRODUCTION OF THE WORLD.

The following figures are taken from a recent publication by Henry R. Merton & Co., London, Eng.

They give as the record of the output of the world for the last eight years, taking alone the three greatest producing countries.

The figures are in gross tons:

	United States.	Chili.	Spain and Portugal.
1879	23,000	49,318	33,361
1880	27,009	42,916	36,313
1881	32,000	37,989	39,258
1882	40,467	42,909	39,560
1883	51,547	41,099	44,607
1884	63,555	41,648	46,515
1885	74,053	38,500	47,873
1886	69,809	35,025	49,653

Since 1883 the United States occupy the position, undisputed, of being the greatest copper producing country of the world. Since 1879 the output has tripled, while that of Spain has increased only 50 per cent., and the make of Chili has considerably declined.

For the last three years the output of the different countries of the world has been as follows, the figures for 1884 and 1885 being those of Henry Merton & Co., modified by the United States geological survey, and those of 1886 being the data collected by the former:

Countries.	1886.	1885.	1884.
EUROPE.			
Great Britain	2,500	2,773	3,350
Spain and Portugal—			
Rio Tinto	24,700	23,484	21,564
Tharsis	11,000	11,509	10,800
Mason & Barry	7,000	7,000	7,500
Sevilla	2,135	1,800	2,000
Portugueza	1,258	1,635	2,300
Other mines	3,500	2,424	2,251
Germany.			
Mansfield	12,595	12,450	12,582
Other German	1,870	2,800	2,200
Austria	550	585	670
Hungary	700	800	800
Sweden	600	775	662
Norway	2,220	2,560	2,706
Italy	900	835	1,325
Russia	4,875	5,100	4,700
Total Europe	79,463	76,551	75,410
NORTH AMERICA.			
United States	69,805	74,053	63,555
Canada	2,000	2,500	2,236
Newfoundland	1,125	778	668
Mexico	850	375	291
Total North America	73,780	77,706	66,750
SOUTH AMERICA.			
Chili	35,024	38,500	41,648
Bolivia	1,100	1,500	1,500
Peru	75	229	362
Venezuela	3,708	4,111	4,600
Argentine Republic	180	233	259
Total South America	40,088	44,573	48,269
AFRICA, ASIA AND AUSTRALIA.			
Algiers	110	250	260
Cape of Good Hope	6,015	5,450	5,000
Japan	10,000	10,000	10,000
Australia	9,700	11,400	14,100
Grand total	216,156	225,930	219,785

GOLD.

GOLD.

A great impetus has been given to the explorations for gold by the development at the Lake Superior find in section 35, N. W. ¼ of T. 48, R. 28. Some very rich rock was found here two years ago that created no little excitement. Recently again some further work has developed still better results.

Mr. Julius Ropes, of Ishpeming, makes the following report regarding an examination by himself of some of this rock:

C. H. HALL.

Dear Sir:—I have completed the examination and assay of the average sample (12 oz.) of the rich gold quartz we selected at the company's office the 7th inst. and herewith give the result:

The 12 oz. were pulverized and an average taken out for assay, and the gold pounded out of the balance.

The assay gave 2,446.99 troy bullion per ton of ore. The bullion is 863 fine, gold, 137 fine, silver. This gives 2,112.35 oz. gold per ton, silver 334.64.

Value of gold at $20.67 per oz	$43,662 27
" " silver " .95 " "	317 90
Total value per ton ore	$43,980 17
Value of bullion per troy oz. gold	$ 17 83
" " " " " " silver	14
	$ 17 97

The gold from the portion assayed added to the amount pounded out (less 12 grains chipped off for assay) gives button of bullion herewith enclosed weighing 346 grains, 301 grains gold and 45 grains silver.

Value of gold in button	$12 96
Value of silver in button	10
Total value of button	$13 06

Very respectfully,
J. ROPES.

This rock is obtained in a fissure vein at a depth 22 feet from the surface. The vein matter has a width of about 3½ feet which includes the slaty incasings of the quarter.

The land is owned by the Lake Superior Iron Co.

C. H. HALL, *Agt.*

THE ROPES GOLD MINE.

I went underground through the Ropes mine about the middle of April and it impressed me very favorably. The quartz vein is well defined and persistent. Certainly the mine could furnish far more rock if there were facilities for working it up.

The mine is to the 7th level 380 feet deep. First level has been opened 76 feet W. and 145 E. of shaft, 2d level 54′ W. 135 E., 3d level 87′ W. 133 E., 4th level 25 feet W. 195 E., 5th level 96 W. 168 E., 6th level 15 W. 96 E., 7th about 10 feet each way from the shaft and 7 feet wide. The richest pocket found was in the 1st level, which showed considerable free gold. I extract from the last annual report of the superintendent, S. S. Curry. The entire report is of interest, but I omit all but the most essential facts.

A peculiarity of the ore bodies on the several levels, is their continuance on the foot wall 40 to 80 feet east, terminating in slate, then shifting to the south contact where there are uniformly reached by a cross-cut from 12 to 18 feet, the intervening ground of slate and quartz being a good milling ore. A reference to the vertical and horizontal plan of the mine by the captain, *herewith shown*, clearly indicates their position.

It is estimated that not to exceed one-third of the ground opened up has been stoped out on the series of lenses thus far worked upon, and that there stands in sight that cheaply and safely mined, as estimated by Capt. Trevarthen, above the 5th level, 38,000 tons.

While but little work or exploration has been done to prove the extent of paying ore bodies both north and south of the present workings, indications show their existence in considerable quantities all through the mine. A cross-cut was driven south from the vein 133 feet east of the shaft on the 3d level (shown on the plan), 43 feet through slate and quartz, the former assaying $10 to $15 in gold, the latter showing coarse free gold running very high. If this condition exists on ore level, it is reasonable to expect that the same horizon on the others will give as good results. The shaft has been sunk 92 feet since the date of last report.

The number of feet of winzes sunk between the several levels is 50. Number of feet of drifting, including cross-cutting, 747.

The only explorations done on the surface was the sinking of two pits in the swamp, 800 feet east of the Curry shaft on the strike of the lode. Owing to the influx of water and the lateness of the season the work was discontinued.

In the way of surface improvements there has been added to the plant and mine equipment, for the payment of which funds were provided by an assessment of 10 cents per share on the capital stock, levied by the board of directors in April last, one 80-horse power boiler, 1 Merritt's 6 feet hoisting drum, 1 Duplex Rand air compressor, capacity 4 power drills, 4 Rand power drills, 5 Tullock automatic ore feeders, 700 feet of wire rope, 1 exploding battery, besides many other appliances.

There has been built one dry house, 12x20 feet, hoisting drum house, 20x25 feet, one blacksmith and carpenter shop, 20x40 feet, addition to and raising boiler house, 20x48 feet, one barn, two stories, 20x24 feet, sided and repaired frame house, house purchased, 20x25 feet, of Julius Tallene, boarded and roofed shaft house.

The additions to the plant for mill and mine have required considerable expenditure

of labor and money to place in position and working order, but their advantage is shown in the rapidity with which developments have been carried forward in the mine, keeping in reserve large blocks of ground. The mine is in excellent condition and the reserves can be very cheaply extracted. This factor must be borne in mind and a portion of the year's expenditure credited with these reserves.

Early in the season the management contemplated several modifications, changes and improvements in the mill. These have been carried into effect as time and opportunity would allow. Most of them are completed and at a small cost. An increase in the amount of ore crushed has been the great desideratum. It has been accomplished, and we are now crushing from 33 to 35 tons to-day, against 17 tons a year ago—results that correspond to mills elsewhere when it is considered that we crush our ore much finer, using a 50-mesh screen, our gold, being finer, requiring it.

The first week in July, owing to the excessive and unprecedented drouth, the sources from which a sufficient supply of water had been obtained gave out, causing a stoppage of the mill for a time. Steps were immediately taken to bring in two small rivulets rising in a series of hills a mile or so to the west of the mill. Dams were built at a point on them which would give a head of 18 feet, which would bring it over an intervening hill and drop it into the swamp to the west of the mill; 1,200 feet of 3-inch pipe was laid west from the outlet, and the dams connected with this by 700 feet of 2-inch and 800 feet of 2½-inch pipe. Work was started on the 8th and the water got to the mill on the 18th, causing a suspension of ten days of milling. But for the supply from this source the mill could not have been run two months since July 1.

Number of men employed has averaged 49 per month.

With the promising condition of the mine, and the increased capacity of the mill, the outlook is more promising for the future.

The loss in the tailings ranges from 95 cents to $2.50 per ton, according to the grade of ore, averaging $1.90 per ton, 80 or 90 per cent. of the value being gold.

We have crushed 6,959 tons the past year, giving a product as shown by the secretary's report.

Our mining captain, Mr. Trevarthen, and mill superintendent, Mr. Weatherston, have been untiring in their efforts to make their respective departments a success, and profitable to the company.

As a summary of the above facts the following is pertinent:

With the existence of large bodies of ore below the present levels as proved by the shaft, the body between the 5th and 6th levels, not included in the estimate, which are in sight (no winze between to the east as yet), a much larger reserve stands in the mine than the 38,000 tons reported, the larger part of which has been developed by the expenditure of the past year. While a year ago small bodies were in sight with promising indications, they remained to be proved up. The 38,000 tons at least should now be credited as a resource at $1 to $2 per ton net.

Though a close estimate of the value of these bodies, say 48,000 tons, would not be attempted, taking the results of the past year's work as a basis, at $5 to $7 per ton they approximate to a value of from $200,000 to $250,000 at the lowest. With the increased capacity of the mill, the skill and knowledge of the work acquired in the past both in the mine and mill, insuring a reduction of expenses, with no interference or interrup-

tion from causes as in the past, the outlook for a profitable year's run is certainly promising.

S. S. CURRY, Superintendent.
JULIUS ROPES, President.

ISHPEMING, March, 1, 1887.

The following directors were elected for the ensuing year :

Julius Ropes, S. S. Curry, William F. Swift, W. H. Rood, Ishpeming ; Dr. W. F. Carpenter, Stambaugh.

Twelve months ago there was but little ore in sight, and while everything underground presented a "healthy" appearance the mill was keeping pace with the miners, even though averaging but 19 tons per day. The introduction of a more powerful hoisting plant, air compressors and power drills provided means for more rapid advance in mining work, and the fact that there are now 38,000 tons of ore ahead of the mill above the 5th level furnishes ample proof that satisfactory progress in the way of mine development has been made.

THE YEAR'S PRODUCTION.

The following facts regarding the product of the mine in concentrates and bullion we take from the company's books. With the exception of the February yield the figures are exact. The amount of the latter month are estimated, by careful assay, and will be found substantially correct, varying but little from the returns of the mint which have not yet been received by the company :

CONCENTRATE PRODUCT FOR YEAR ENDING MARCH 1, 1887.

1886.	Ounces.		Price.	Silver.	Gold.
March	369.75	silver at	$1.01	$272 45	
	41.148	gold "	20.67		$850 53
April	100.73	silver "	98.04	98 98	
	31.876	gold "	20.67		658 88
May	211.17	silver "	.96	202 72	
	27.127	gold "	20.67		560 72
June	305.89	silver "	.95	290 60	
	43.477	gold "	20.67		898 67
July	370.85	silver "	.96⅜	362 23	
	33.714	gold "	20.67		696 87
August	275.61	silver "	1.00⅝	280 09	
	26.001	gold "	20.67		537 44
September	381.56	silver "	1.01⅜	386 81	
	26.337	gold "	20.67		544 39
October	216.93	silver "	.98½	213 68	
	30.283	gold "	20.67		625 95
November	291.54	silver "	.99⅓	290 08	
	39.51	gold "	20.67		816 67
December	152.04	silver "	1.01⅝	154 51	
	32.411	gold "	20.67		669 94
1887.					
January	198.35	silver "	1.01½	201 32	
	153.60	silver "	1.01⅞	155 94	
	66.33	gold "	20.67		1,371 04
February		silver "	1.01⅞	152 88	
		gold "	20.67		607 50
Total				$3,062 29	$8,838 60

BULLION PRODUCT FOR YEAR ENDING MARCH 1, 1877.

Year.	Month.	Silver.	Gold.
1886	March	$120 47	$1,774 06
1886	April	81 21	1,887 35
1886	May	152 33	2,487 44
1886	June	222 55	4,116 54
1886	July	101 95	1,690 96
1886	August	168 74	2,602 48
1886	September	114 40	1,822 60
1886	October	104 52	1,928 26
1886	November	144 43	3,101 12
1886	December	163 57	3,133 74
1887	January	111 95	2,733 91
1887	February	105 51	2,382 87
Total bullion		1,591 63	29,661 33
Concentrates ford		3,062 29	8,838 60
Total		4,653 92	38,499 93

SUMMARY.

Amount silver produced	$4,653 92	
Amount gold produced	38,499 93	
	$43,153 85	
Number tons quartz treated		6,959
Average yield per ton, over	$6 20	
On hand including February bullion and concentrates		$3,972 50

There was expended the past year for permanent improvements the sum of $12,000; $8,000 were raised by an assessment of 10 cents per share.

INDEX.

INDEX.

	PAGE.
Adventure Mine	266
Agogebic Iron Range	11, 125
Alabastine Co.	196
Antrim Iron Co.	172
Allouez Mine	211
Albion Mine	89
Alpha Mine	162
Anderson Mine	44
Anvil Mine	153
Appleton	165
Argyle Mine	77
Arthur	164
Ash Bed Mining Co.	276
Ashland Mine	128
Atwood Option	158
Atlantic Mining Co.	250
Aurora Mine	133
Aztec Co.	267
Babcock, W. R.	17
Ball, Ed.	47
Bacon, D. H.	71
Ball, Thomas	53
Bay State Mine	94
Bangor Furnace	174
Barnum Mine	80
Barge, T.	83
Beaufort Mine	111
Benjamin, H. M.	159
Belt Mines	263
Beecher, Luther	94
Bennett, S.	207
Bertie Mine	56
Beta Mine	51
Bessemer	125
Bessemer Steel	126, 11
Bice, Wm.	40
Best, Fred	137
Bigelow, A. S.	222
Blany Mine	57
Blue Jacket Mine	143
Bonnie Iron Mining Co.	140
Boston Mine	104
Breitung, Hon. Edward	60
Briar Hill Mine	33
Brockway, D. D.	211
Brotherton Mine	160
Brown, Fayette	171
Buffalo Mine	90
Burton, J. E.	140
Cady, C. H.	39
Cages	6
Caledonia Mine	59
Calumet Mine	124
Calumet and Hecla	216
Cambria Mine	96
Cascade Iron Range	121-122
Centennial Mine	215
Central Mine	202
Christopher, J. B.	148
Champion Iron Co.	112
Champion Lode	262
Channings	163
Chapin Mine	34
Chandler, J. H.	211
Chynoweth, Ben. F.	258
Cheshire Mine	123
Chicago & N. W. R'y Co.	16, 14
Chicago Mine	161
Christopher, J. P.	148
Clark, J. W.	222, 214
Cleveland Hematite	69
Cleveland Iron Mining Co.	67
Cliff Mine	210
Cliff Shaft	81
Coal	177
Colby Mine	149
Collins, J. B.	147
Columbia Iron Co.	120
Commonwealth Mine	45
Conglomerate Mine	200
Copper Falls Mine	208
Copper Mines	200

	PAGE.
Copper, price of	3
Copper Statistics Table	276
Corunna Coal Co.	180
Cornell Mine	43
Crown Pt.	161
Cundy, Capt. J.	103–115
Curry, S. S.	111, 133
Curry Mine	33
Curnow, John U.	21
Cyclops Mine	28
Dalliba Mine	106
Daniell, John	230, 214
Davidson, O. C.	47
Day, J.	133
Day, Loren	196
Deer Lake Iron Co.	175
Delaware	201
Delphic Mine	61
Demmon, D. L.	248, 241, 237
Detroit, Marquette & Mackinac R. R.	14, 127
Detroit Iron Furnace Co.	172
Detroit Iron Mine	99
Dexter Mine	104
Diamond, Capt. H.	79
Dickie	163
Dickinson, W. E.	45
Discoveries	15
Duncan, L. & I. Co.	264
Dunstan, Capt. John	207
Dunn, W. A.	45
Dunn M'g Co.	57
East Champion Mine	114
East Norrie	133
East Anvil	156
Edwards, T. W.	232
Elk Rapids Furnace	170
Emerson, B. F.	209
Emerson, L. G.	232
Emerson, R. H.	180
Erie Mine	120
Eureka Iron Co.	171
Evergreen Bluff Mine	258
Evergreen Bluff Range	259
Fairbanks Mine	54
Fayette Furnaces	171
Felch Mountain	123
First National	142
Fisher, H. D.	46
Fitch, W.	115
Flint Steel Mine	210
Florence Mine	159, 46
Foley, J. F.	44
Ford, J. C.	170
Foster Mine	80, 90
Foster, E. T.	43
Fowle, J. C.	102
Fremont Iron Co.	120
Franklin Mine	237
Freidrich, John	44
Furnaces	170
Gaylord Iron Co	171
Geological	15
Gibson Mine	106
Godfrey & Bro.	196
Gogebic Range	11, 125
Gold	269
Goodrich Mine	89
Grand Portage Mine	250
Grand Rapids Plaster Co.	196
Great Western Mine	55
Gribben Mine	122
Gypsum	195
Hagey, J. E.	17
Hall, Capt. J.	215
Hall, C. H.	75
H. & C. R. R.	—
Hamilton Ore Co.	42
Hancock Mining Co.	276
Hartford Mine	100
Harris, S. B.	236
Hayward, J. A.	153
Hewitt Mine	40
Holland	164
Holyoke	163
Home Mine	122
Houghton	162
Hubbell, Jay A.	158
Humboldt Mine	115
Hunt, M. R.	54
Huron Copper Co.	245
Indiana Mine	33
Iron King Mine	138
Iron Age M'g Co.	163
Iron Cliffs Co.	80
Iron Chief	159
Iron Mines	3
Iron Prince	162
Iron River Furnace	51
Iron River Mine	47
Ironsides	162
Iron Star Mine	55
Isle Royal Mine	249
Ironwood	125
Ironton Mine	147
Jackson Iron Co.	171, 63
Jeffery, J. B.	97
Joplin, Ed.	107
Kearsarge Mine	213
Keweenaw County	200
Kimberly, P. L.	83
Kidder, A.	115, 79, 93
Kimball Mine	56
Kincaid, Todd	180
Kirkpatrick, J.	121

	PAGE.
Knowlton Vein	262
Klepetko, Frank	214
Knowlton Mine	259
Kool, Frank D.	157
Lake Angeline Mine	77
Lake Superior Iron Co.	72
Lake Superior Gold	269
La Rue	163
Land Plaster	195
Larsson, Per	39
Lawton, Chas. D.	1
Lewars, Geo. H.	201
Lillie Mine	98
Logan	164
Lumberman's M'g Co.	40
Ludington Mine	40
Maas, John B.	116
Maitland, A.	99, 97, 95, 85, 80, 83
Manganese	11
Marquette Iron District	61
M. H. & O. R. R.	105
Martel Furnace	170
Marine Mine	107
Mason, Thomas F.	233
Mass Mine	258
Mather, Sam.	105
Mastodon Mine	60
McMillan, Jas.	100
McComber Mine	94
McDonald, J. S.	51
McGerry, Daniel	122
Menominee Range	16
Merritt, D. H.	106
Merry, Henry	66
Mesnard Mine	107
Metropolitan	124
Michigan Coal Co.	181
Michigamme Mine	100
Mikado Co.	157
Milwaukee Mine	92
M. &. N. R. R.	14
M. L. S. & W. R. R.	14
Mills	9
Mine Filling	9
Mining Industry	1
Mineral Range R. R.	235
Minesota Mine	256
Mitchell, Capt. Samuel	90, 66
Mitchell, Geo.	92
Mitchell Mine	86
Moore, A. D.	42
Morcum, Capt.	45
Moore, N. D.	133
Moore, V. K.	56
Monthly Products	274–5
Montreal River	127
Morgan, David	118
Morse, F. A.	71
Moyle, J. H.	209
Nanaimo Mine	51
National Mine	256
Negaunee M'g Co.	89
Negaunee Concentrating Works	276
Nevada System of Timbering	7
New York Hematite	275
Neely, B.	100
New York Mine	68
Newberry Mine	144
Noble & Co.	196
Noble, E. S.	170
Nonesuch Mine	275
Norrie Mine	131
North Aurora	135
Northampton Mine	107
North Pabst	137
Northwestern Mining Co.	204, 124
North Iron King	144
North Anvil	156
Norway Mine	162, 25
Norwich Mine	276
Officer, W. J.	100
Ogima Mine	262
Olcott, W. J.	130
Oliver, Capt. John	29
Oliver, Capt. Wm.	39
Ontonagon	256
Orr, Géo.	102
Osceola Mine	222
Outhwaite, J. H.	33
Pabst Mine	135
Paint River Mine	53
Palms Mine	152
Palmer, Chas. H.	201
Parnell, E. W.	257
Pascoe Mine	105
Pascoe, Peter	118
Peninsula Mine	232
Peninsula Iron Co.	175
Penn Iron Co.	16
Perkins Mine	30
Pewabic Mine	237
Phosphorus	11
Phœnix Mine	106, 210
Pickands, Jas.	105, 151
Pilgrim	158
Pierce, J. J.	123
Pioneer Mine	83
Pioneer Furnace	171
Pine Lake I. Co.	174
Pittsburgh & Lake Angeline Co.	77
Pittsburgh & L. S. Mine	120
Pockets	215
Pope, Graham	249
Portland Mine	110

	PAGE.
Porter, J. N.	47, 50, 55
Porter Mine	180
Puritan Mine	144
Presque Isle	163
Quincy Mining Co.	232
Quinnessec Mine	29
Railroad Extension in U. P.	127, 14-15
Rees, W. D.	118
Republic Reduction Works	165
Republic Iron Co.	116
Rhinelander	157
Ridge Mine	259
Roberts, C. T.	60, 59, 54
Roberts, E. S.	25
Roberts, Sam.	87
Robert, J. F.	207
Roberts, Harry	152
Rockland Mine	256
Rolling Mill Mine	94
Ropes Mine	270
Saginaw Company	89
Saginaw Mine	89
Saunders, A. C.	120
Salisbury Mine	84
Salt	185
Sam. Mitchell (Sec. 5 Mine)	91
Scaddon, C. T. F.	54
Seabury, Chas. W.	216
Sedgwick, Wm.	83
Sellwood, Joseph	151
Selden Mine	50
Shelden and Columbia	276
Sheldon & Shafer Mine	58
Sherman, J. G.	143
Slope Mine	180
Smith, S. L.	216
Smith, Bullard & Co.	195
Smith, Fred	211
Smith Mine	123
Specular Ore	62
Speedwell	158
South Buffalo Mine	92
Spring Lake I. Co.	169
Spurr Mine	103
Stanton, John	251, 204
Star Mine	158
Star Coal Mine	180
St. Clair, Jas. O.	120
St. Clair, Geo. A.	87
St. Clair Mine	207
St. Lawrence Mine	104
Stephenson Mine	32
Sterling Mine	104
Standard Coal Co.	180
Sturtevant, H. B.	76
Stockbridge, Geo. E.	42
Stucco	196
Sunday Lake Mines	159
Swanzey Mine	123
Tamarack Mine	218
Taylor, J. A.	130
Tarbell, G. E.	155
Teal Lake Iron Co.	96
Titan Mine	111
Tobin Range	164
Tod, Henry	47
Tontine Mine	148
Trebilcock, J.	76
Tonkin, Wm.	254
Traders' Mine	45
Union Mills.	196
Union Iron Co.	176
Vaughn Mine	134
Victoria Mine	276
Vivian, Johnson	249, 245, 237
Vulcan Mines	17
Vulcan Furnace	175
Valley Iron Co.	148
Wakefield	125, 128
Watson & Palmer	110
Watson & Wall	211
Webster Mine	110
Wells & Miner Option	156
West Republic Mine	119
Wetmore Mine	107
Wheat Mine	121
Wheeler, C. M.	104, 223
Wheeling Mine	94
White, Geo. H. & Co.	196
Whittlesey, W. W.	61
Windsor Mine	276
Williams, M. E.	111
Wilson, Geo.	118
Wilcox, Ralph	163
Williamston Mines	181
Winthrop Mine	86
Wolverine Mine	215
Wood, J. R.	104
Wright, Chas. E	55, 108, 137
Wright, Fred A.	165
Wright, J. N.	218
Youngstown Mining Co.	52

ERRATA.

Page 222—John Danville—should read John Daniell.