THE
CLEVELAND - CLIFFS IRON CO.
MINING DEPARTMENT

AGENT'S ANNUAL REPORT
FOR
YEAR ENDING
DECEMBER 31ST. 1914

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THE CLEVELAND-CLIFFS IRON COMPANY

MINING DEPARTMENT

AGENT'S ANNUAL REPORT.

FOR

YEAR ENDING DECEMBER 31, 1914.

#2106

I N D E X .

MORO MINE:

LAKE MINE:

CLIFFS SHAFT MINE:

SALISBURY MINE:

NEGAUNEE MINE:

MAAS MINE:

ATHENS MINE:

MORRIS-LLOYD MINE (CONT'D):

CHASE MINE:

DEXTER MINE:

GWINN DISTRICT:

AUSTIN MINE:

STEPHENSON MINE:

PRINCETON MINE:

GWINN MINE:

GWINN DISTRICT GENERAL:

GWINN DISTRICT GENERAL (CONT'D).

REPUBLIC MINE:

IMPERIAL MINE:

CROSBY MINE:

REMARKS BY AGENT:

ENGINEERING DEPARTMENT:

GEOLOGICAL DEPARTMENT:

MECHANICAL DEPARTMENT:

SAFETY DEPARTMENT:

SAFETY DEPARTMENT (CONT'D):

PENSION DEPARTMENT:

EDUCATIONAL DEPARTMENT:

THE CLEVELAND-CLIFFS IRON COMPANY.

Ishpeming, Michigan,

January 1, 1915.

Mr. Wm. G. Mather, Pres.,

Cleveland, Ohio.

Dear Sir:-

I beg to submit the following report of the operations and present conditions of the mines of this Company. The inventories, maps, and statements relating to this report go forward to you under separate cover.

The tinted portions of the maps show the extensions for the year, and the location of each contract is indicated by the corresponding number.

The reports on the different mines of the Company were made by the superintendents in charge, and the reports of the Mechanical, Engineering, Geological, Pension, Educational, and Safety Departments by the heads of these departments.

ANNUAL REPORT

(1914)

OF THE

MORO MINE.

Production and Shipments.

The Moro Mine remained closed throughout the year 1914. No shipments were made from stockpile.

Surface.

The old warehouse was sold to Wm. Trebilcock, and was torn down during the summer.

New Construction.

E. and A. No. 270. New Barn.

Four new ventilators were put up on the barn in January and the interior work was finished. An addition was built on the north side of the garage and a board fence erected connecting the barn and the garage. The grounds about the two buildings were also improved. The expenditures on this E. and A. were as follows:-

E. and A. No. 270. New Barn.

No.	Account	Total	Estimate
1	Changes in building	4494.43	2500.00
2	Moving and setting up carriage shed	2722.46	2000.00
3	Cost of carriage shed	500.00	500.00
	Total	7716.89	5000.00
	Add 10% for contingencies		450.00
	Grand total	7716.89	5450.00

E. and A. No. 265. General Storehouse.

The loading platform was erected and the stock of supplies moved from the old warehouse to the new quarters. The total expenditures on this E. and A. are shown in the following table:

No.	Account	Total	Estimate
1	Partition wall of brick	594.78	500.00
2	Changing doors and windows	664.00	270.00
3	Concrete floor including filling	1420.27	1400.00

E. and A. No. 265, (continued)

No.	Account	Total	Estimate
4	Taking down foundation	253.01	200.00
5	Second floor and stairway	308.84	481.00
6	Loading platform	155.97	387.50
7	50 concrete piers	38.80	100.00
8	Office complete	351.37	100.00
9	Elevator		200.00
10	Racks, bins and shelving	801.66	300.00
	Total	4588.70	3938.50
	Add 10% for contingencies		393.85
	Total	4588.70	4332.35
11	Miscellaneous, scales, wiring, etc.	975.73	
	Grand total	5564.43	4332.35

Lucien Eaton

MORO MINE.

ORE STATEMENT AND SHIPMENTS FOR YEAR-1914

	SCOTCH	SCOTCH SILICA	TOTAL	TOTAL LAST YEAR
On Hand January 1, 1914,	40,128	86,875	127,003	202,515
Shipments,	0	0	0	75,512
Balance on Hand,	40,128	86,875	127,003	127,003

ANNUAL REPORT

(1914)

OF THE

LAKE MINE.

Production

The Lake Mine worked on single-shift throughout the year. The mine worked 299 days, and produced 326,506 tons of ore, an average of 1092 tons per day. The average tons per man per day for the year was 4.24.

20,788 tons of rock were hoisted during the year.

Table I.

Comparison of Production for 1913 and 1914.

Year	Days Worked	Ore Tons	Rock Tons	Ore & Rock Tons	Ore per Day Tons	Rock per Day Tons	Ore & Rock Per Day Tons
1913	301	474,654	19,842	494,496	1,577	66	1,643
Stockpile shortage		5,606		5,606	19		19
Total 1913	301	469,048	19,842	488,890	1,558	66	1,624
1914	299	326,506	20,788	347,294	1,092	69	1,161

Table II.

Distribution of Production by Levels.

	Ore Tons	Rock Tons	Ore & Rock Tons
Above Third Level			
335 Foot Sub-level	6,727	1	6,727
Third Level	27,441	1,262	28,703
Total	34,168	1,262	35,430
Between 3rd and 4th Levels.			
364 Foot Sub-level	40,888	2,783	43,671
383 " " "	54,218	1,425	55,643
398 " " "	115,527	4,582	120,109
415 " " "	50,122	3,055	53,177
425 " " "	20,346	348	20,694
Fourth Level	6,529	1,488	8,017
Total	287,630	13,681	301,311
Between 4th and 5th Levels.			
479 Foot Sub-level	3,349	595	3,944
Fifth Level	1,359	5,250	6,609
Total	4,708	5,845	10,553
Total Production	326,506	20,788	347,294

Table III.

Distribution of Production by Months.

Month	Days Worked	Ore Per Day	Total Ore	Total Rock	Total Ore & Rock
January	26	1,072	27,865	1,508	29,373
February	23	1,062	24,419	1,160	25,579
March	26	1,085	28,226	1,412	29,638
April	24	1,090	26,271	1,565	27,836
May	25	1,060	26,473	2,012	28,485
June	25	1,132	28,320	1,700	30,020
July	25	1,101	27,521	1,583	29,104
August	25	1,069	26,730	1,695	28,425
September	25	1,068	26,712	2,953	29,665
October	27	1,147	30,977	1,950	32,927
November	23	1,113	25,602	1,590	27,192
December	25	1,096	27,390	1,660	29,050
Total	299	1,092	326,506	20,788	347,294

Table IV.

Shipments.

From Pocket at Mine	192,847 Tons
From Stockpile at Mine	124,264 "
From Stockpile at Presque Isle	--- --- "
Total	317,111 "

Table V.

Ore in Stock Dec. 31, 1914.

At Mine	42,794 Tons
At Presque Isle	102,227 "
Total	145,021 "

Table VI.

Delays.

Date	Hours	Tons	Cause	Cost
				$
May 4	1	140	Chute burst out and blocked 4th level	12.86
" 19	1	130	" " " " " "	12.14
Aug. 10	1	100	Motor off track underground	1.06
Total	3	370		$26.06

Table VII.

Distribution of Rock Drifting.

	Motor Drifts Feet	Timber Roads Feet	Airways Feet	Incident to Mining Feet	Exploratory Feet	Total Feet
Third Level	69	58		158		285
364' Sub		583		218		801
383' "		195		211		406
398' "		492		276		768
415' "		424		141		565
425' "		42		10		52
Fourth Level	79	70	91	24		264
479' Sub			126			126
Fifth Level	518½			310	40	868½
	666½	1864	217	1348	40	4135½

Table VIII.

Estimate of Ore Reserves.

364 Foot Sub-level	34,000 Tons
383 " " "	71,000 "
398 " " "	117,000 "
415 " " "	297,000 "
Fourth Level	812,000 "
Total ore above Fourth Level	1,331,000 "
Fifth Level	1,194,000 "
Total	2,525,000 "
Less 10% Rock and 10% Loss in Mining	505,000
Net Total	2,020,000 "

In making this estimate a factor of 10 cu. ft. per ton was used above the fourth level, where the outlines of the ore-body are well defined, and a factor of 11 cu. ft. per ton was used below the fourth level. Readjustments of tonnage between the sub-levels were made on account of differences of elevation in different parts of the mine. The ore below the fourth level was reduced.

General.

Labor was plentiful all during the year, but the efficiency of the men underground was impaired by the high humidity and high temperature in many of the stopes. This was especially apparent during the summer, when the air outside and inside the mine was about the same temperature. A large fan and three booster fans have been ordered. The air-shaft has been enlarged from the fourth level to the third, and a large raise will soon be started to surface. An air-way is being driven in ore two subs below the fourth level, and will be connected to the bottom of the air-shaft in a short time. The air will be distributed through this air-way to the working sub-levels, and will be drawn out of the workings by the large fan, which will be placed on the third level near No. 4 shaft.

Wages were cut 10% on October 1st.

Surface.

Repairs to Machinery.

The fire arches and boiler settings were rebuilt and repaired in January and February.

Guards were put around the ladderways on the pulley stands and on the shafthouse in June.

The cooling tower for the condenser water from the air compressor collapsed on July 3rd, and was rebuilt immediately. It was made only two-thirds as long as before, however, and did not have the splash-boards put on until October.

Repairs to Launders.

The launder carrying the pump discharge was very rotten and was replaced in August and September by 1200 feet of 12 inch tile sewer-pipe.

The discharge pipe from the electric pumps in the lake bottom was moved in September and October, and the east end of the launder repaired so as to handle the water.

New hoisting ropes extending to the fifth level were put on the skip hoist in April.

Repairs to Buildings.

The boiler-house roof was patched in October and part of November.

The coal-dock was repaired in the Spring, several new caps, corbels and legs being put in.

In June the electrician's shanty in the timber-yard was moved about its length to the north-west, as it was in danger of falling into the cave.

The old pocket on the west side of the shaft was torn out, and a small building was erected with the old material further east. This is used as a dry by the engineers and surface-boss.

The coal tunnel caved in close to the shaft on June 28th, and was repaired in a few days.

Stockpiles.

The west stockpile was cleaned up, and the east half of the east pile was also shipped.

The west trestle was erected in October, and the east trestle in November.

Fire Loss.

Fire broke out in the coal-dock in the last week in November, and burned off several legs and braces. It was nearly all dug out in December, but there are still several hot places that may ignite at any time.

Presque Isle Stockpile Plant.

The stocking plant at Presque Isle was not operated by the Lake Mine during the year, nor were any shipments made from the pile.

12,577 tons of Republic fines, however, were stocked by the Republic Mine on the south side of the pile during the summer.

As the approach to the old ore-dock was condemned by the L. S. & I. Ry. during the fall the stocking-plant was demolished in December, and everything of value was shipped to Ishpeming.

Underground.

In the same way as was done last year, in order to facilitate the description of the work the raises on the different levels have been lettered.

The raises above the third level have been lettered the same as last year, namely, A, B, C, etc. beginning at the end of the crosscut to No. 4 shaft and going east, the interval between raises being approximately 50 feet. Where a raise has been put up to replace one of the regular raises, or at a shorter interval than 50 feet, it is sub-lettered, - thus the raise 25 feet east of B is called B_1. All the raises on the fourth level were lettered in 1911, and the same system has been maintained. Beginning at the farthest west in the north drift on this level and going east the raises have been lettered NA, NB, NC, etc. Where an interval has been left without a raise, the proper letter has been reserved for it. When a raise crushes, or when for any other reason another raise has to be put up, the new raise is sub-lettered:- e. g. if the raise NC crushes, the new raise is called NC_1. On the fifth level the raises are lettered, beginning at the crosscut south of the shaft, EA, EB, EC, etc., going east in the east drift, and WA, WB, WC, etc. going west in the west drift.

The 335 foot sub-level and the third level have been finished.

On the 364 foot sub-level the ore in North-West has been finished, and in North-East the ore has been mined on the west as far as raise NI, and on the east as far as raise NQ. Most of the ore has also been mined on both sides of the timber-road east of raise NK. There are 13 gangs working on this sub-level.

On the 383 foot sub-level all the ore in North-West and South-East has been finished, and stoping has been going on all along the south and east sides of the pillar remaining in North-East, leaving a pillar approximately 550 feet long and 100 feet wide. There are 11 gangs working on this sub-level.

The 398 foot sub-level has been the largest producer during the year, and now has 18 gangs working. All the ore in South-East has been mined, from raise SM to the east end, the pillar remaining in South-West has been nearly finished, and in North-West a pillar roughly 100 feet long east and west and 150 feet north and south has been mined, leaving only a narrow pillar on the north side of the north-west timber-road. In North-

East nearly all the ore has been mined east of raise NQ, and there are six gangs stoping along the south side of the pillar on the footwall. This pillar is approximately 600 feet long and 110 feet wide.

On the 415 sub-level the ore west of dike A has been finished, and a little stoping has been done on the east side of the dike in North-West. The ore in south-east has been pretty thoroughly opened up, and six gangs are now stoping here. There are 11 gangs working on the sub-level.

On the 425 foot sub-level three gangs are opening up in South-East and six gangs are stoping in North-West.

On the fourth level no stoping has been done. Both the east and west loops in the main drift have caused a great deal of trouble by crushing, and it has been necessary to drive two new drifts beside the old one in North-West. Three raises have been holed from the fifth level in South-East, and the rock raise constituting the air-shaft has been enlarged from the fourth level to the third level.

The 479 foot sub-level has been opened up as an air-way, and will soon be connected to the bottom of the air-shaft. There are four gangs drifting on this sub-level, two drifting east and west in South-West, and one drifting east and one south in South-East. The east and west drifts are 450 feet long, and will be connected in a couple of months. This sub-level will serve as a pipe to carry the fresh air directly from the air-shaft to the working sub-levels.

On the fifth level the east drift has been extended 300 feet in rock, and the west drift 218 feet in rock. Two crosscuts were driven south to test the width of the ore, one 300 feet west of the crosscut and one 210 feet east of it. There was little ore in the west crosscut and only 15 feet in the east one. Raises EC, ED and EH have been completed to surface and raises EK and WJ are being put up. The east drift is being driven ahead, but the west drift has been stopped 30 feet from the boundary.

DETAILS BY CONTRACTS.

335 Foot Sub-level.

This sub-level in the pillar at the south end of the crosscut to No. 4 shaft was finished in April. Six contracts worked on it.

No. 8 finished the pillars over the third level motor drift between raises H and I, and went down to the third level at the end of January.

No. 21 mined the ore north of raise B_1 and both north and south of raise B, and went down to the third level in March.

No. 51 and No. 52 mined the ore between A and B raises, and went down to the third level in February and March.

No. 56 mined the ore east of raise B_1 and north of raise C, and went down to the third level at the end of March.

No. 68 mined the ore under the hanging-wall on the east side of the crosscut south of raise B, and moved to the third level in March.

Third Level.

North-East.

No. 11 holed a timber raise from the 364 foot sub-level, and drifted north-west 20 feet to the main crosscut by A raise in January. They repaired the crosscut north of raise NI in February, and went down to the 383 foot sub-level.

No. 4 mined a little ore on the west side of Dike B, 40 feet north-west of raise NI, and then drifted east 90 feet from raise NI to Dike C. With No. 8 they mined the ore south of this drift from Dike C to the hanging-wall, and then stoped the ore near the footwall between B and C raises. They went to the 364 foot sub-level in November.

No. 8 came down from the 335 foot sub-level in February, crosscut south from No. 4's drift, 60 feet east of raise NI, to the hanging-wall, and with No. 4 mined the ore back to the east drift. They drifted north-east from the east drift along Dike C to the footwall and stoped back towards raise NI, taking out all the ore as they went. They moved to the 383 foot sub-level in December.

No. 68 came down from the 335 foot sub-level in March, and crosscut north from the motor drift to the footwall, 10 feet east of B raise, and stoped the ore back from the footwall to raise NI, finishing with No. 8 in December. They went to the 364 foot sub-level.

No. 62 came to this level in March, and drifted east 20 feet from the motor drift at raise D to No. 3's raise. They mined the ore between raise B_1 and the footwall, and moved to the fifth level in June.

No. 21 came down from the 335 foot sub-level in April, and crosscut north from No. 4's drift 40 feet east of raise NI to the motor drift at raise B. They drifted north-west 70 feet from the crosscut 20 feet north of raise NI, and mined the ore on the footwall west of the crosscut to No. 4 shaft. They went to the 364 foot sub-level in December.

No. 3 raised from the 364 foot sub-level in February 40 feet south-west of E raise to make a new motor drift. They holed to No. 27, mined a pillar south of their raise, and went down to the 425 foot sub-level in May.

No. 27 and No. 58 mined the ore from the drift between raises NO and NP, to the footwall, and drifted west to meet No. 3's new motor drift. No. 27 mined the ore north of this drift as far west as raise F. Both contracts finished in November and went to the 364 foot sub-level.

No. 51 mined the ore on both sides of the motor drift between raises D and F and south as far as the old workings. They finished on this sub-level in September.

364 Foot Sub-level.

North-East.

No. 3 repaired the footwall drift 100 feet north-east of raise NL, and put up a timber raise to the third level in February.

No. 28 drifted north-west through the pillars north of raises NN, NM and NL, making a new timber-road, and holed to the old timber road 160 feet east of raise NI. They drove a side drift north on the east side of their crosscut north of raise NN to the footwall. They repaired the footwall drift, and drove a side drift west on the south side of the new tim-

ber drift from the crosscut north of raise NN to that north of raise NM. They stoped west of raise NN for one month, and then mined the ore on the footwall on the east side of their crosscut. They are now stoping 50 feet north of raise NN.

No. 65 stoped on the west side of Dike C south of raise NJ for two months, repaired the crosscut north of raise NJ, and went to the 398 foot sub-level in April.

No. 59 stoped the pillars remaining south-east of raise NN, took up the bottom of the crosscut north of raise NN and of the drift east of the raise, to bring the grade down to the level of the timber road, and went to the 383 foot sub-level in August.

No. 46 mined the ore east of the crosscut 40 feet north of raise NM for three months, and drove a side drift west 70 feet along the south side of 28's new timber drift from the crosscut 80 feet north of raise NM, crossed the old timber drift, and drove a new timber drift west on the north, holing to the crosscut 120 feet north of raise NJ in June. Since that time they have been stoping between the footwall and the timber road on the east side of the crosscut north of raise NM.

No. 56 came down from the third level in April and doubled up with No. 46 in driving the new timber drift west. Since July they have been stoping the ore north of the timber drift from Dike C east to the crosscut north of raise NM.

No. 4 came down from the third level in November, drifted west 30 feet from the crosscut 40 feet north of raise NI, and are stoping on the footwall 70 feet north of the raise.

No. 21 came down from the third level in December, and started a stope 20 feet west of raise NI.

No. 68 came down from the third level in December, and drove a side drift north for 30 feet on the east side of the crosscut north of raise NJ.

No. 58 came down from the third level in November, and drifted south-west 50 feet in the pillar west of raise NP.

No. 27 came down from the third level in December, and crosscut north from the drift 25 feet west of raise NO to the timber-road.

No. 52 came down from the third level in October, and started a stope on the footwall 90 feet north-west of raise NO. They have continued stoping on the footwall towards the east, and are now 60 feet north-west of the raise.

No. 51 started a crosscut south from raise NO in December.

No. 1 and No. 39 mined the ore on the west side of Dike E south of raise NR, and No. 39 went to the 383 foot sub-level in June. No. 1 caved back the drift between raises NR and NO, and went down to the 383 foot sub-level in August.

No. 26 drifted south-west from the crosscut 40 feet south of raise NP to the old workings, and sliced back towards the north. They are now stoping 60 feet south-west of raise NP.

No. 41 worked four men most of the year. They stoped south and west of raise NQ for two months, and then one gang went to the 383 foot sub-level. The other gang stayed on the 364 foot sub-level, and have mined the ore on the east side of Dike D and on the west side of the crosscut south of raise NQ. They are now stoping 20 feet south-west of raise NQ.

North-West.

No. 15 stoped west of raise NH for five months, and went to the 383 foot sub-level in June.

No. 35 mined the pillars on the south side of the timber road 60 feet west of raise NH, crosscut south from raise NH through Dike B, and stoped on the south side of the dike for three months. In May they drifted west from the crosscut 55 feet north-west of raise NI, and mined the pillar on the north side of the timber-road. They went to the 383 foot sub-level in July.

No. 67 mined the ore on the footwall 100 feet north of raise NI, and stoped to the south, mining the ore north of No. 35's stope. They finished in August.

383 Foot Sub-level.

North-East.

No. 53 in March raised from the 398 foot sub-level 15 feet east of raise NG.

No. 22 drifted north-east from the timber road 20 feet east of raise NG, and raised to the 364 foot sub-level 50 feet south-east of raise NH. This drift caved quickly, and they mined the ore on the east side of it for a width of 40 feet. With No. 36 they finished the ore east and south of raise NG in October, and went down to the next sub-level.

No. 8 came down from the third level in December, and repaired the drift by raise NK.

No. 48 mined the ore south of raise NK from Dike C on the west to the old workings on the east, and went to the 398 foot sub-level in June.

No. 60 crosscut from raise NL to the old workings, and mined the ore on the east side of the crosscut for five months. In July they crosscut north 95 feet from raise NL, and drifted west from this crosscut 35 feet north of the raise, until they holed to the timber drift, 50 feet north-east of raise NK. They repaired the timber drift, and crosscut north from it, 50 feet north of raise NK, for 70 feet for a new timber road. They are now repairing near raise NL.

No. 40 drifted east from raise NM 140 feet to the timber crosscut south of raise NO, to make a new timber-road. They stoped on the west side of the crosscut south of raise NL for three months, and then crosscut south from raise NQ 120 feet to Dike E. They stoped back on the north side of this dike on the west side of the crosscut until the end of the year.

No. 19 stoped 140 feet south-east of raise NO for two months, and then crosscut south from the new timber-road 40 feet east of raise NM to the old workings. They stoped on both sides of this crosscut, slicing back to the north, until the end of the year.

No. 41 came down from the 364 foot sub-level in March, and drifted east and west from raise NQ. They continued this drift to the south-west for 100 feet, until they holed to the crosscut 60 feet south-east of raise NO,

and to the east to raise NR.

No. 39 came down from the 364 foot sub-level in June, drifted south-west from raise NR 80 feet to No. 13's old stope, and mined the ore west of Dike E back to the raise. In December they moved to No. 1's crosscut 50 feet north-west of raise NR, and stoped west on the footwall.

No. 1 came down from the 364 foot sub-level in August, and crosscut north to the footwall from the drift 20 feet west of raise NR. They are now stoping east on the footwall.

No. 7 came up from the 398 foot sub-level in June, crosscut north from the timber-road to raise NN, and then crosscut south to the old workings 30 feet further east. They have stoped on the east side of this crosscut during the rest of the year.

North-West.

No. 53 in February drifted north-east and north in the pillar east of raise NF_1 for a timber-road, and then stoped west of raise NF_1. They put up a raise to the 364 foot sub-level, 15 feet east of raise NG, in March.

No. 63 stoped 20 to 30 feet west of raise NF_1 for three months, and went down to the next sub-level in June.

No. 18 and No. 23 mined the ore on the west side of the old timber-road from raise NF_1 to the footwall, and went down to the 398 foot sub-level in November.

No. 35 came down from the 364 foot sub-level in July, and stoped the ore on the north side of Dike B towards the north until the end of the year. They are now stoping 10 feet west of raise NH.

No. 25 stoped on the footwall 60 feet west of raise NH in June, and went back to the 398 foot sub-level.

No. 11 came down from the third level in April, and drifted south-west from raise NH to the timber-road. They mined the ore on the footwall north-west of raise NH, and in November opened a stope on the east side of the crosscut 10 feet north of raise NH. They are still mining here.

No. 15 came down from the 364 foot sub-level in June, and drifted east 70 feet from the crosscut 20 feet south of raise NH, passing through Dike B, and have been mining the ore on the east side of the dike during

the remainder of the year.

No. 16 mined the pillars remaining between raise NG and Dike B, and went down to the 398 foot sub-level in October.

No. 36 came up from the 415 foot sub-level in February, and cross-cut north from raise NG to No. 16's stope. They mined the ore north and east of the raise as far as No. 22's stope, and finished in October, going down to the 398 foot sub-level.

398 Foot Sub-level.

North-East.

No. 53 in June drifted south-west along the north side of Dike C to meet No. 5, who were drifting north-east from the timber-road 25 feet north of raise SG. After holing with No. 5 they moved to the old timber crosscut south of raise NJ, and stoped the ore on the west side as far as Dike C. They are now stoping 65 feet south of raise NJ.

No. 48 came down from the 383 foot sub-level in June and cross-cut south 70 feet from raise NK to the old workings. They have sliced back 40 feet on the east side of this crosscut for a length of 50 feet.

No. 65 crosscut north-west to the footwall, and raised to the 383 foot sub-level 85 feet north of raise NI in April and May, and moved to North-West.

No. 16 came down from the 383 foot sub-level in October, and drifted east from raise NG 80 feet to Dike C. They have been stoping on the north side of Dike C for the last two months.

No. 36 came down from the 383 foot sub-level in November, and are stoping 20 feet south of raise NG.

No. 73 came up from the 479 foot sub-level in November, and cross-cut south 70 feet from raise NL to the old workings. They are opening a stope at the south end of the crosscut.

No. 7 drove the main timber drift 270 feet east from raise NL until they holed to the south crosscut on the 383 foot sub-level, south of raise NP, and went up to the 383 foot sub-level in June.

No. 10 crosscut north to this timber-road, 30 feet south of raise NO in May and June.

No. 75 stoped east on the north side of Dike C 40 feet south-west of raise NI in November and December.

No. 49 crosscut north 20 feet from raise NS to the footwall, drifted west 80 feet, and mined the ore between the footwall and Dike E. They went to the next sub-level above in May, but returned in June, and repaired the timber-road south of raises NQ, NR and NS. In November and December they stoped on the east side of the crosscut 65 to 80 feet south of raise NS.

No. 29 crosscut south-west 120 feet from raise NS to No. 24's crosscut. They drifted west in the pillar 115 feet north of raise SU, and mined the ore next to the old timber-road. In April they drifted south-west from the crosscut 50 feet south of raise NS to No. 57's new crosscut north of raise SU, and mined some ore on the east side. With No. 49 they have kept the timber roads open, and are now stoping on the west side of the crosscut 60 feet south-west of raise NS.

No. 33 stoped on the footwall north and east of raise NU until August. Their raise caved and they put up raise NU_1 25 feet further west. They have mined most of the ore south and west of the new raise.

In February and March No. 25 drifted north-east 50 feet from the timber-road at NI, and raised to the 383 foot sub-level.

South-East.

No. 61 and No. 75 mined the ore on the footwall from 180 feet south-east of raise NV north to No. 33's stope east of raise NU. No. 75 moved to the drift west of raise NJ in November, and No. 61 are just finishing the ore east of raise NV.

No. 14 and No. 17 drifted south-east from raise SW through Dike G for 200 feet, and mined the ore south of Dike G to a point 80 feet east of raise SV. They also mined the ore east and west of raise SW north of Dike F, and on the west side of their crosscut between the two dikes. They went down to the 425 foot sub-level in December.

No. 2 and No. 32 mined the ore south of Dike G for 80 feet east of raise SV, and as far west as the crosscut south of raise SU. They also mined some ore west of No. 14's stope west of raise SW, and are now stoping

north of Dike F, 60 feet west of raise SW.

No. 24 crosscut north on the east side of the timber-road north of raise SU for 115 feet to No. 29's drift, and drifted east from raise SU to raise SV. They mined the ore south of raise SU, and moved to raise SS in August, where they drifted west on the south side of the dike to raise SR. They repaired the crosscut north of raise SS, and drifted north-east 70 feet on the north side of Dike E, where they have been stoping for two months.

No. 57 mined the ore south of raises ST and SS, and repaired the crosscut north of raise SU. They stoped north of Dike F, on the west side of this crosscut until July, and drifted north-west from raise ST to raise SS in rock. They went to the fourth level in August.

No. 44 mined the ore north and south of raise ST with No. 57, and went down to the 425 foot sub-level in August.

No. 13 crosscut north from raise SS through Dike E and Dike F, and drifted north-west 45 feet to the timber raise 115 feet north of raise SR. They mined the ore between Dikes E and F on the east side of the crosscut north of raise SS, and repaired the crosscut again. They drifted north-west under the timber-raise again, and started stoping on the east side of Dike D 90 feet north of raise SR.

No. 10 mined a small pillar south of raise SR, repaired the crosscut north of the raise, and continued it until it holed to No. 7's new timber drift 30 feet south of raise NO. They drifted east to No. 13's crosscut on the north side of Dike E, and went to the 415 foot sub-level in August.

No. 34 stoped east of the crosscut 50 feet north of raise SQ for one month and went to the 415 foot sub-level in February. They returned in March, and drifted north-east 85 feet north of raise SQ, following the south side of Dike D to the timber raise. They crosscut north through Dike D, and mined the ore on the west side of the dike 140 feet north of the raise. They went down to the 415 foot sub-level in September.

No. 64 mined the pillars left to protect the drift between raises SN and SO, and went to the 415 foot sub-level in March.

No. 20 mined the pillars north of raise SN, and between raises SN

and SM, from February to April, and went down to the 415 foot sub-level in May.

No. 42 finished the pillars left along the old timber-road north of raise SM, and went down to the 415 foot sub-level in the latter part of April.

South-West.

No. 5 mined the pillars on both sides of the timber crosscut south of Dike C near raise SG, and went to the 415 foot sub-level in March. They came back in May and drifted north-east from the crosscut 20 feet north of raise SG, following the north side of dike C until they holed to No. 53, who were drifting to meet them. They holed to No. 53 in another drift east of raise SF, and went back to the 415 foot sub-level in August.

No. 30 and No. 31 nearly finished the ore south-east of raise SE, and mined the ore north of the raise as far as Dike B. No. 30 went down to the 415 foot sub-level in the latter part of November.

No. 53 drifted east 30 feet from raise SF to the timber road, and later continued this drift east through the next pillar to meet No. 5.

North-West.

No. 43 mined the pillars south of raise NE, drifted east from raise NE to the next crosscut and went down to the 415 foot sub-level in May. No. 6 mined the pillars north-east of raise NE to the footwall, and went down to the 415 foot sub-level in July.

No. 25 crosscut north-east 60 feet from the drift 20 feet east of raise NF in January, and moved to North-East. They returned in April, and mined the pillars north of raise NF. They went to the fourth level in December.

No. 18 came down from the 383 foot sub-level in November, drifted north-west 25 feet from the timber road 10 feet south-west of raise NF_1, and started mining the pillar west of the raise.

No. 23 came down from the 383 foot sub-level in November, and started mining the pillar 40 feet north of raise NF_1.

No. 63 came down from the 383 foot sub-level in June, and drove a side drift north-east on the north side of the timber drift north-east of raise NF_1. They crosscut west from this timber-road 20 feet north of raise NF_1 to the old workings and stoped to the north until November. They repaired the timber road, and crosscut north to the footwall 50 feet west of raise NH.

No. 22 came down from the 383 foot sub-level in November, drifted west from raise NG to No. 59's stope, and started mining the pillar south of raise NG.

In May and June No. 65 repaired the timber road south-east of raise NH.

415 Foot Sub-level.

South-East.

No. 34 came down from the 398 foot sub-level in February and crosscut south 30 feet from raise SQ to the drift east of the crosscut south of raise SP, and went back to the 398 foot sub-level. They returned in September, and crosscut north from raise SQ 55 feet to Dike D, which they followed north-east for 80 feet. 100 feet north of the raise they drifted west through the dike for 90 feet, and are starting to stope the ore on the west side.

No. 10 came down from the 398 foot sub-level in August, repaired raise SQ, and crosscut north 130 feet from raise SR, holing to the end of No. 34's drift. From this crosscut 15 feet north of the chute they drifted east 40 feet, and raised to the 398 foot sub-level. Then they crosscut south 70 feet from raise SR to the footwall.

No. 12 crosscut south from raise SP in January 60 feet to the footwall and drifted east 40 feet from the crosscut 20 feet south of the chute. They drifted on the footwall 85 feet west and 50 feet east to the end of the ore and mined the ore between the dike and the footwall. They are now stoping 50 feet south-west of the chute.

No. 64 came down from the 398 foot sub-level in March, and repaired

the main drift from the air-shaft to the east end 60 feet north-east of raise SP. They continued this drift east, crossing No. 34's north crosscut, until they holed to No. 10's crosscut 40 feet north of raise SQ. They moved back to raise SO, and crosscut north 110 feet to No. 20's stope. They turned east here and have drifted east 50 feet.

No. 20 crosscut north 40 feet north of raise SN, and went up to the 398 foot sub-level in February. They returned in May, continued their crosscut north until the breast was 130 feet north of the raise, and opened a stope 60 feet long on the east side. They are now stoping on the east side of the crosscut 105 feet north of the raise.

No. 42 came down from the 398 foot sub-level in April, crosscut north 130 feet from raise SM, and have mined the ore 25 feet wide from this crosscut east to No. 20's crosscut and west to the old timber road. They are now stoping 100 feet north of the raise.

No. 36 continued their crosscut north-east from raise SL, until it holed to the timber road, and drove a side drift north 45 feet along the west side of the timber road. They went to the 383 foot sub-level in February.

No. 65 repaired the main drift east and west of the air shaft in August and September.

No. 5 crosscut north 35 feet from raise SG in March, and went back to the 398 foot sub-level. In September this crosscut broke down, and they drifted around the cave on the east side, raised to the 398 foot sub-level 35 feet north of the chute, and crosscut north again for 60 feet. They are now drifting north-east 55 feet east of raise SG towards the timber road.

South-West.

No. 50 finished the ore south of raise SC and west of Dike A, and went to the 425 foot sub-level in August.

No. 55 finished the ore north and south of raise SB, and went down to the 425 foot sub-level in September.

No. 37 finished the ore south of raise SA, and went to the 425 foot sub-level in August.

No. 9 mined the ore south of raise NA, leaving a pillar 40 feet wide against the boundary, and went down to the 425 foot sub-level in August.

No. 30 came down from the 398 foot sub-level in November, drifted east 10 feet from raise SE, and crosscut north 20 feet.

No. 6 drifted east from the timber road 40 feet west of raise SE, and holed to No. 30's crosscut 5 feet north of the turn.

North-West.

No. 47 mined the ore left south of raise NB, drifted east to raise NC, and went to the 425 foot sub-level in April.

No. 54 mined the ore for 60 feet south of raise ND_1 three sets wide on the east side of Dike A, and mined the pillar on the north side of the drift as far east as raise NE. They went down to the 425 foot sub-level in May.

No. 6 came down from the 398 foot sub-level in July, and stoped on the footwall 40 feet north of raise NE for four months. Then they moved to South-West to drift to No. 30. They are now stoping on the west side of the main drift 60 feet south of raise NE.

No. 43 came down from the 398 foot sub-level in May, and crosscut north from raise NE to the footwall. They crosscut north-east from the timber drift 30 feet south-east of raise NE 110 feet to the footwall, and have opened a stope at the end of the crosscut.

425 Foot Sub-level.

South-East.

No. 44 came down from the 398 foot sub-level in August, and crosscut 60 feet north from raise ST, passing through Dike F. 40 feet north of the chute they drifted west 50 feet, and raised to the 398 foot sub-level. 50 feet north of the chute they drifted east, and are now in 100 feet from the turn.

No. 14 and No. 17 in December put up raise SW_1 from the fourth level, and have started a drift to the south-west.

South-West.

No. 37 came down from the 415 foot sub-level in August, and

drifted east from raise SA to raise SB. They crosscut south from raise SA to the footwall, and have mined the ore four sets wide for 65 feet west of the crosscut.

No. 55 came down from the 415 foot sub-level in September, drifted east from raise SB until they holed with No. 50's drift west from raise SC, and crosscut north 65 feet from raise SB to No. 3's stope. They stoped on the east side of this crosscut for two months, and are now crosscutting south 30 feet south of the raise.

No. 50 came down from the 415 foot sub-level in August, drifted west from raise SC to meet No. 55, who were drifting east from raise SB, and crosscut south 80 feet from raise SC to the footwall. From this crosscut 70 feet south of the chute they drifted east 80 feet to Dike A, and followed the contact south to the footwall. They are now stoping here.

North-West.

No. 47 came down from the 398 foot sub-level in April, put up raise NA_1, 20 feet west of raise NB, and crosscut south from this raise to raise SA. They drifted west 12 feet from raise NA_1 to the footwall, and drifted north-east 30 feet from the chute, mining the ore between the footwall and a small dike. They drifted west 50 feet to raise NA from the crosscut 40 feet south of raise NA_1, and sliced back. They are now stoping 40 feet south-west of raise NA_1.

No. 9 came down from the 415 foot sub-level in August, and drifted west from the crosscut 60 feet south of raise NA_1 for 50 feet. They mined the ore north of this drift up to No. 47's stope, leaving a 40 foot pillar next to the boundary line, drove a side drift north on the east side of the crosscut north of raise SA, and drifted east through the pillar to No. 3's stope.

No. 54 came down from the 415 foot sub-level in May, and mined the ore 20 feet wide between the footwall and Dike A for 45 feet west of raise ND_1.

No. 38 put up raise NC_1 in May, and stoped the ore on the footwall two sets wide for 35 feet east of the raise.

No. 3 came down from the 364 foot sub-level in May, put up raise NB_1, 20 feet east of raise NB, and drifted west 40 feet to the crosscut 15 feet south of raise NA_1. They drifted east 60 feet from raise NB_1 to Dike A, and stoped back three sets wide. They crosscut 40 feet north of the raise to the east end of No. 47's footwall stope, and mined the ore on the footwall. In November they crosscut south 40 feet from the raise, and are stoping on the east side next to No. 55's stope.

Fourth Level.

North-East.

No. 33 put up raise NU_1, 20 feet west of raise NU in August.

South-East.

No. 45 crosscut south from raise EC to the motor drift by raise SL in January, and went back to the fifth level.

No. 62 crosscut south 20 feet from raise ED to the motor drift in August, and from raise EG to the motor drift in November, and went back to the fifth level.

No. 14 and No. 17 put up raise SW_1, 15 feet south of raise SW in December.

No. 38 and No. 57 enlarged the air shaft from the fourth level to the third in November and December.

South-West.

The south-west drift has been retimbered twice.

North-West.

No. 47 put up raise NA_1, 20 feet west of raise NB, in April, and repaired the main drift from raise NA to raise NB in October.

No. 38 drove a side drift west on the footwall ffom a point 20 feet west of raise ND to raise NB_1, and put up raise NC_1, 15 feet east of raise NC, in May. They drove a new drift south-west from raise ND_1 for 80 feet, and holed to No. 57, who drifted south-east 60 feet from raise NB_1, in October.

No. 3 in May put up raise NB_1, 20 feet east of raise NB, but on the south side of the drift.

479 Foot Sub-level.

South-East.

No. 72 drifted west from raise EC 25 feet in October, and holed to No. 71. They have drifted south-east 120 feet from raise EC, holing to raise ED in passing, and are now headed for raise EG.

No. 71 drifted east 25 feet from raise EB in October, and holed to No. 72. They put up a small timber raise to the fourth level south of the chute, and drifted west 120 feet. They are now crosscutting south-west in rock 70 feet south-west of raise EB, to get under the bottom of the air-shaft.

South-West.

No. 67 drifted east 50 feet in rock and 50 feet in ore from raise WG in October and November, and are now drifting west from the chute.

No. 74 took No. 67's place in December and are drifting south-east 110 feet east of raise WG.

Fifth Level.

South-East.

No. 62 put up raises ED and EG to the fourth level, and are now putting up raise EJ. They are up 70 feet in rock.

No. 45 drove the east drift ahead 300 feet in rock. The breast is now 525 feet east of the crosscut to the shaft.

No. 62 also crosscut south through 16 feet of ore and 14 feet of rock from the motor drift 10 feet east of raise ED.

South-West.

No. 66 drove the west drift ahead 218 feet, leaving the breast 30 feet from the boundary. They are now putting up raise WG, and are up nearly to the fourth level. They had rock for 98 feet.

No. 69 in July drove a crosscut south 15 feet in rock from the main drift 10 feet west of raise WG.

No. 4 Shaft.

No. 45 in February and March put in the skip-runners below the fourth level, cleaned the skip-pit and fixed the pockets. The new ropes for the skips were put on in April, and hoisting through the winze was discontinued.

LAKE MINE.

COMPARATIVE MINING COST FOR THE YEAR.

	1914	1913	INCREASE	DECREASE
PRODUCT	326,506	469,048		142,542
General Expense	.044	.041	.003	
Maintenance	.079	.050	.029	
Mining Expense	.764	.780		.016
Cost of Production	.887	.871	.016	
DEPRECIATION				
Plant	.004	.021		.017
Equipment		.001		.001
New Construction, New Crusher	.006	.015		.009
Original Purchase	.134		.134	
Total Depreciation	.144	.037	.107	
Taxes	.148	.118	.030	
Central Office	.060	.058	.002	
Sundry Expense	.042	.017	.025	
Miscellaneous	.005			.005
COST ON STOCKPILE	1.276	1.101	.175	
Loading & Shipping	.013	.028		.010
Total Cost on Cars	1.294	1.129	.165	
Number of days operating	299	301		2
Number shifts and hours	1-8hr	2-8hr 1-8hr		
Average daily product	1092	1558		466
COST OF PRODUCTION				
Labor	.663	.667		.004
Supplies	.224	.204	.020	
Total	.887	.871	.016	

LAKE MINE.

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COMPARISON OF COST SHEETS

FOR 1913 AND 1914.

In 1913 the Lake Mine worked two shifts until December 1, and then went on one shift. This caused a decrease in most of the operating accounts for the year 1914, although there was little decrease in tons per man. Tons per man on surface decreased and underground increased. Wages were increased 10¢ a day Feb. 1, 1913 and reduced 10% Oct. 1, 1914.

Production.

Year 1913	469,048 Tons	1,558 Tons per Day	
Year 1914	326,506 "	1,092 " " ""	
Decrease	142,542 "	466 " " "	

Labor.

	1913	1914
Average number of men	351	246
" rate per day	$2.86	$2.81

Tons Per Man Per Day.

	1913	1914
Surface	21.74	18.74
Underground	5.32	5.49
Total	4.28	4.24

Cost of Production.

	1913	1914
Labor	$ .667	$ .663
Supplies	.204	.224
Total	.871	.887

GENERAL EXPENSE.

No. 26 - Insurance.

1913	$208.67	.000
1914	208.94	.001
Increase	.27	.001

The increase in cost per ton is due to the decreased tonnage.

No. 27 - Engineering.

1913	$729.85	.002
1914	661.65	.002
Decrease	68.20	.000

The decrease is due to the smaller amount of underground surveying required.

No. 28 - Analysis.

1913	$6158.63	.013
1914	5677.93	.017
Decrease	480.70	
Increase		.004

The decrease is due to the decrease in production and shipments, being principally in the labor of taking and preparing samples.

No. 30 - Personal Injury Expense.

1913	$4594.22	.010
1914	103.19	.000
Decrease	4491.03	.010

In 1913 the principal charges to this account were

Settlement with Henry Myllola	$3070.18
" " Konsta Hermanson	699.59
Total	$3769.77

The balance is for the cost of the department, which was not charged in 1914.

No. 30a - Mine Office.

1913	$7313.50	.016
1914	7670.52	.024
Increase	357.02	.008

There was a decrease of $262.67 in labor, but supplies increased $619.69, the principal items in 1914 being superintendent's livery and stable expense $119.01 and central safety station equipment $220.25. There was an increase of $448.71 in direct charges from the Central Office.

MAINTENANCE.

No. 125 - Tracks and Yards.

1913	$1402.49	.003
1914	937.84	.003
Decrease	464.55	.000

The principal item in 1913 outside the C. & N. Ry. maintenance bills was the cost of tearing down the foundations at No. 1 shaft-house. This rock was used to raise the tracks by the shaft-house. The bills for maintenance of tracks amounted to $538.05 in 1913 and to $380.53 in 1914.

No. 126 - Docks, Trestles & Pockets.

1913	$ 671.71	.001
1914	1099.51	.003
Increase	427.80	.002

The increase is in labor, mostly on the rock-dump, which has caved badly during the year. Two bents of the permanent trestle were rebuilt during the year, and the old pocket west of the shaft was torn down.

No. 127 - Buildings.

1913	$1070.36	.002
1914	1837.64	.006
Increase	767.28	.004

The principal items in 1914 were:

Repairs to coal-dock	$973.43
Motor shop & engineer's dry	208.42
Dry-house repairs	154.92
Painting shaft-house	237.52
Engine-house roof	201.85

No. 128 - Shop Machinery.

1913	$73.42	.000
1914	99.34	.000
Increase	25.92	.000

No. 129 - Boiler Plant.

1913	$4348.45	.009
1914	1773.39	.005
Decrease	2575.06	.004

In 1913 the economizer was rebuilt at a cost of $2940.14. In 1914 the brick-work of all the boilers was thoroughly repaired.

No. 130 - Hoisting Machinery.

1913	$856.62	.002
1914	970.86	.003
Increase	114.24	.001

The new spider for the cage-hoist cost $358.94.

No. 131 - Compressors & Power Drills.

1913	$810.18	.002
1914	2801.95	.009
Increase	1991.77	.007

In 1913 four drills cost $663.04. In 1914 16 drills cost $1570.00, and rebuilding the cooling tower cost $1062.52.

No. 132 - Pumping Machinery.

1913	$878.22	.002
1914	1520.83	.005
Increase	642.61	.003

The new discharge on surface cost in 1914, $1015.00.

No. 133 - Top Tram Engines and Cars.

1913	$575.77	.001
1914	655.61	.002
Increase	79.84	.001

The increase in cost per ton is due to the smaller production.

No. 134 - Skips and Skip-Roads.

1913	$1221.08	.003
1914	1113.86	.003
Decrease	107.22	.000

Charges were higher 1913 on account of repairs to the skip-road and a new bail and frame for the skips.

No. 135 - Underground Tracks and Cars.

1913	$2102.78	.004
1914	1545.59	.005
Decrease	557.19	
Increase		.001

The decrease is nearly all in supplies used, mostly rails and fittings, on account of working only one shift in 1914.

No. 136 - Electric Tram Plant.

1913	$8209.31	.018
1914	8911.62	.027
Increase	702.31	.009

The increase is in labor for laying new tracks and installing electric haulage on the fifth level.

No. 137 - Telephones and Safety Devices.

1913	$1332.61	.003
1914	1676.75	.005
Increase	344.14	.002

In 1914 guards on pulley-stands and shaft-house cost $189.69; new telephones cost $128.58. Safety devices in engine and boiler-houses cost $305.05.

No. 139 - Lake Angeline Drainage.

1913		
1914	$525.13	.002
Increase	525.13	.002

In 1913 maintenance was charged with operating expense. Charges are mostly for launder repairs and moving discharge-pipe.

No. 140 - Ventilation.

1913		
1914	$143.04	.001
Increase	143.04	.001

Charges are for doors and partition for new ventilating system.

No. 141 - Fire Expense & Damage.

1913		
1914	$ 79.78	.000
Increase	79.78	.000

Charges are for fire in coal-dock in December, 1914.

MINING EXPENSE.

No. 150 - Air-pipes.

1913	$1466.85	.003
1914	1297.43	.004
Decrease	169.42	
Increase		.001

The decrease is in labor, on account of working only one shift in 1914.

No. 151 - Compressors.

1913	$13417.86	.029
1914	9565.41	.029
Decrease	3852.45	.000

The decrease is on account of operating the mine on only one shift in 1914.

No. 152 - Hoisting.

1913	$11239.82	.024
1914	8973.42	.028
Decrease	2266.40	
Increase		.004

The decrease is on account of operating the mine on only one shift in 1914.

No. 153 - Pumping.

1913	$ 7747.85	.017
1914	2165.83	.007
Decrease	5582.02	.010

Pumping with electricity started June 2, 1913.

No. 154 - Sinking and Shaft Repairs.

1913	$26.29	.000
1914	655.12	.002
Increase	628.83	.002

In 1914 the charges are for finishing the skip-ways and pockets at the fifth level.

No. 155 - Rock Drifting.

1913	$27197.70	.058
1914	17651.09	.054
Decrease	9546.61	.004

In 1913 there were 6364 feet of rock drifting done at $4.27 per foot, and in 1914 4139 feet at $4.26 per foot.

No. 156 - Breaking Ore.

1913	$194212.81	.414
1914	121293.90	.371
Decrease	72918.91	.043

The decrease is due to less ore produced and more efficient work on account of the single-shift, to the cut in wages Oct. 1, and to the greater efficiency of the drills purchased.

No. 157 - Tramming.

1913	$25308.44	.053
1914	17333.97	.053
Decrease	7974.47	.000

The decrease is on account of operating the mine on single-shift in 1914.

No. 158 - Filling.

1913	$1182.43	.003
1914	942.47	.003
Decrease	239.96	.000

The decrease is on account of operating the mine on single-shift in 1914.

No. 159 - Timbering.

1913	$56923.65	.121
1914	47993.45	.147
Decrease	8930.20	
Increase		.026

There was a decrease of over $5000 in mine-timber used, on account of reduced production, and a corresponding reduction in labor of distribution and framing. The cost of repairing is about the same for both years.

No. 160 - Captain and Bosses.

1913	$8201.02	.018
1914	7229.92	.022
Decrease	971.10	
Increase		.004

There was one less boss in 1914.

No. 161 - Dry-house.

1913	$2479.38	.005
1914	3300.80	.010
Increase	821.42	.005

The increase is due to increased charges for heating in 1914.

No. 162 - Top Landing & Tramming.

1913	$4960.37	.011
1914	4056.08	.013
Decrease	904.29	
Increase		.002

The decrease is on account of operating the mine on single-shift in 1914.

No. 163 - Stocking Ore.

1913	$4195.50	.009
1914	3722.02	.011
Decrease	473.48	
Increase		.002

In 1913, 164,944 tons were stocked at $.025 per ton; in 1914, 123,659 tons at $.030.

No. 164 - Sorting Ore.

1913		
1914	$137.92	.000
Increase	137.92	.000

The charges are for picking rock on the stockpile. In 1913 this was included in stocking ore.

No. 166 - Cave In.

1913	$1694.26	.003
1914	1898.01	.006
Increase	203.75	.003

These charges are for pumping water from the caved ground in the lake bottom.

No. 167 - L. A. Pumping Expense.

1913	$2258.31	.005
1914	985.60	.003
Decrease	1269.71	.002

In 1913 maintenance was included in this account. The cost of removing water from the basin is the sum of No. 139, No. 166 and No. 167, which was $3411.74 in 1914 and $3952.57 in 1913.

No. 170 - Stocking Ore at Presque Isle.

1913	$3230.82	.007
1914	393.25	.001
Decrease	2837.57	.006

In 1913, 17,880 tons of ore were stocked at Presque Isle. No ore was stocked in 1914, but the plant was torn down.

RECAPITULATION.

	1913		1914		Increase		Decrease	
Account	Total	Per Ton	Total	Per Ton	Total	Per Ton	Total	Per Ton
General Expense	19004.87	041	14322.23	044		003	4682.64	
Maintenance	23553.00	050	25692.74	079	2139.74	029		
Mining Expense	365743.36	780	249598.69	764			116144.67	016
Cost of Production	408301.23	871	289613.66	887		016	118687.57	

Lucien Eaton

LAKE MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1914

GRADE	IRON	PHOS.
Lake Ore,	58.41	.128

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1914

GRADE	Mine		Lake Erie	
	IRON	PHOS.	IRON	MOIST.
Lake Ore,	58.36	.142	58.52	13.09

ORE STATEMENT - DECEMBER 31ST, 1914.

	LAKE ORE AT MINE	LAKE ORE STKD AT PRESQUE ISLE	TOTAL	TOTAL LAST YEAR
On Hand January 1, 1914	33,399	102,227	135,626	182,378
Output for Year,	326,506		326,506	469,048
Other Ores dumped on Lake Stockpile at Presque Isle,				1,257
Total,	359,905	102,227	462,132	652,683
Shipments,	317,111		317,111	517,057
Balance on Hand,	42,794	102,227	145,021	135,626
Decrease in Output - 30%			142,542	
Increase in Ore on Hand,			9,395	

1914--- 1-8 Hr. Shift during Year.
1913--- 2-8 Hr. Shifts Jany. 1st to Nov. 30th,
1-8 Hr. Shift Dec. 1st to Dec. 31st.

SHIPMENTS FOR YEAR--1914

	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lake,	192,847	124,264	317,111	517,057
Last Year,	309,710	207,347	517,057	
Decrease -- 39%			199,946	

LAKE MINE.

COMPARATIVE AVERAGE WAGES AND PRODUCT.

PRODUCT '14 326,506 Tons PRODUCT '13 469,048	SURFACE		UNDERGROUND		TOTAL	
	1914	1913	1914	1913	1914	1913
Avg. no. men working	56	69	190	282	246	351
Avg. wages per day	2.40	2.41	2.92	2.96	2.81	2.86
Avg. wages per mo. 25 days	60.00	60.25	73.00	74.00	70.25	71.50
Avg. product per man per day	18.74	21.74	5.49	5.32	4.24	4.28
Labor cost per ton	.128	.111	.533	.557	.661	.668
Diff. in labor cost per ton	+.017	-.014	-.024	+.058	-.007	+.044
Avg. product brkg. & trammg.			8.94	8.00		
Avg. wages for miners contract			3.01	3.034		
Total avg. wages for contract			3.01	3.034		

	1 9 1 4	1 9 1 3	INCREASE	DECREASE
SURFACE				
Total number of days	17,425¼	21,581¼		4,156
Average Rate	2.40	2.41		.01
Total	41,855.48	52,104.60		10249.12
UNDERGROUND				
Total number of days	59,501¼	88112-3/4		28,611½
Average Rate	2.92	2.96		.04
Amount	173,959.64	261,248.97		87289.33
Total days	76,926½	109,694		32,767½
Average rate	2.81	2.86		.05
Total Amount	215,815.12	313,353.57		97538.45
Labor cost per ton	.661	.557	.104	

No. shifts and hours 1-8hr 2-8hr
1-8hr

			Tons	%
Tons per man per day	SURFACE	DECREASE	3.00	13.8
"	UNDERGROUND	INCREASE	.17	3.
"	SURF.& UNDG.	DECREASE	.04	1.

Proportion of Surface to Underground men: 1914 - 1 to 3.42
1913 - 1 to 4.10
1912 - 1 to 3.38
1911 - 1 to 3.17
1910 - 1 to 5.52

Decreased wages per day: Surface .01 ---- .04%
Underground .04 ---- 1.35%
Total .05 ---- 1.75%

LAKE MINE.

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1914.

KIND.	LINEAL FEET.	AVG. PRICE PER FOOT	AMOUNT 1914	AMOUNT 1913
6" to 8" Timber	50,238	.02	1,204.72	804.86
8" to 10" "	145,758	.04	5,830.34	6,731.32
10" to 12" "	86,362	.06	5,181.72	8,061.54
12" to 14" "	17,671	.08¼	1,457.86	1,166.37
14" to 16" "	2.280	.10-3/4	245.10	112.86
Total 1914	312,307	.0446	13,919.74	
Total 1913	385,061	.0438		16876.95

	LINEAL FEET	PER 100'	1914	1913
5" Lagging	788,800	.47	3,712.00	6,025.00
7" "	35,500	.55	195.25	347.24
8" "	34.409	.55	189.25	146.85
Total lagging	858,709	.477	4,096.50	6,519.09
Poles	41,309	.95	390.43	396.15
Trestle Timber				336.80
Total 1914	900,018	.50	4,486.93	
Total 1913	1,429,234	.507		7,252.04

Feet of timber per ton of ore	.956	.82
Feet of lagging	2.76	2.95
Feet of lagging per foot of timber	2.75	3.60
Cost per ton for timber, lagging, and poles	.056	.0514
Equivalent of stull timber to board measure	559,096	625,139
Feet board measure per ton of ore	1.71	1.33
Total product	326,506	469,048

Total cost of timber and lagging - 1914	18,406.67
Total cost of timber and lagging - 1913	24,128.99
Total cost of timber and lagging - 1912	21,525.33
Total cost of timber and lagging - 1911	19,916.58
Total cost of timber and lagging - 1910	26,717.90
Total cost of timber and lagging - 1909	21,927.42
Total cost of timber and lagging - 1908	17,499.22
Total cost of timber and lagging - 1907	21,989.00

LAKE MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY	AVERAGE PRICES.	AMOUNT 1914	AMOUNT 1913
50%	56,250	.115	6,468.75	8,651.50
Total Powder	56.250	.115	6,468.75	8,651.50
Fuse	147,700	3.82	564.06	797.47
Caps	36,500	6.02	219.92	412.84
Cap Crimpers	14	.25	3.50	3.91
Electric Exploders	100	30.30	3.03	
Connecting Wire	2	.30	.60	.33
Total Fuse, Etc.			791.11	1,214.45
Grand Total			7,259.86	9,865.95
Product			326,506	469,048
Pounds powder per ton of ore			.172	.168
Cost per ton for powder			.020	.0185
Cost per ton fuse, caps, etc.			.002	.0025
Cost per ton all explosives			.022	.0 21
Avg. price per lb. for powder			,115	.11

ANNUAL REPORT

(1914)

OF THE

CLIFFS SHAFT MINE.

Production and Shipments.

The Cliffs Shaft mine worked 299 days in 1914, and produced 300, 771 tons, an average of 1006 tons per day. The product was screened throughout the year, except during about six weeks in October and November. The production by grades is shown in table I.

Table I.

Production by Grades.

Lump	107,841 Tons
Crushed	192,930 "
Total	300,771 "

20,122 tons of rock were produced during the year, all of which was dumped underground.

The mine worked on single 8-hour shift throughout the year, with the exception of two contracts in rock on the fifteenth level, and some drifting and raising contracts on the ninth and tenth levels.

Table II.

Comparison of Product for 1913 and 1914.

Year	Days Worked	Ore Tons	Rock Tons	Ore & Rock Tons	Ore per Day Tons	Rock per Day Tons	Ore & Rock Per Day Tons
1913	300	284,352	16,770	301,122	948	56	1004
Stockpile Overrun		15,000			50		
					998		1054
Total 1913	300	299,352	16,770	316,122	1001	56	1057
1914	299	300,771	20,122	320,893	1006	67	1073

Table III.

Distribution of Product.

Level	"A" Shaft			"B" Shaft			Total		
	Ore Tons	Rock Tons	Ore & Rock Tons	Ore Tons	Rock Tons	Ore & Rock Tons	Ore Tons	Rock Tons	Ore & Rock Tons
1				19,543	214	19,757	19,543	214	19,757
2	2,184		2,184	7,514		7,514	9,698		9,698
3	9,322		9,322		620	620	9,322	620	9,942
4				379		379	379		379
5	15,180	120	15,300	14,129	24	14,153	29,309	144	29,453
6	27,130	114	27,244	39,148	30	39,178	66,278	144	66,422
7	25,337		25,337	17,462	156	17,618	42,799	156	42,955
8	38,450	114	38,564	11,907	186	12,093	50,357	300	50,657
9	25,687	352	26,039	10,133	62	10,195	35,820	414	36,234
10	14,589	1,676	16,265	18,842	234	19,076	33,431	1,910	35,341
11				3,834	920	4,754	3,834	920	4,754
15		13,944	13,944		1,356	1,356		15,300	15,300
Total	157,879	16,320	174,199	142,891	3,802	146,693	300,770	20,122	320,892

Table IV.

Production by Months.

Month	Days Worked	Ore per Day Tons	Crushed Tons	Lump Tons	Total Tons	Rock Tons	Total Ore and Rock Tons
January	26	973	15,680	9,458	25,138	1,464	26,602
February	23	1,021	14,703	8,790	23,493	1,332	24,825
March	26	1,044	16,975	10,183	27,158	1,546	28,704
April	24	985	14,719	8,914	23,633	1,356	24,989
May	25	959	14,701	9,285	23,986	1,730	25,716
June	25	1,016	13,731	11,679	25,410	2,418	27,828
July	25	1,059	14,100	11,325	25,425	2,564	27,989
August	25	981	13,473	11,061	24,534	2,176	26,710
September	25	1,038	15,004	10,945	25,949	1,646	27,595
October	27	1,056	22,399	6,107	28,506	1,492	29,998
November	23	1,005	22,399	727	23,126	1,198	24,324
December	25	977	15,046	9,367	24,413	1,200	25,613
	299	1,006	192,930	107,841	300,771	20,122	320,893

Table V.

Shipments.

Crushed	178,755 Tons
Lump	107,472 "
Total	286,227 "

Table VI.

Ore in Stock Jan. 1, 1915.

Crushed	63,724 Tons
Lump	13,350 "
Total	77,074 "

Table VII.

Delays.

Date	Hours	Tons	Cause	Cost
				$
Jan. 3	1½	50	No. 5 Crusher motor burned out	19.60
" 9	4	400	Top tram motor burned out	7.21
" 12	6	600	No. 5 Crusher out of order	6.24
" 13	1	100	Lower tram car off track	3.62
" 16	1½	100	Top tram motor burned out	1.04
" 26	1½	200	No. 5 Crusher motor burned out	73.79
" 28	½	100	"B" Shaft skip overturned	.52
" 29	1	75	Electric hoist out of order	1.20
Feb. 2	½	70	Repairing screen chute	30
" 4	2	300	Top tram motor burned out	2.75
" 9	1	150	"A" Shaft skip frozen	1.40
" 10	1	100	Rock dump frozen in "A" Shaft	36.28
" 11	1	100	Dump wheel broke "A" Shaft skip	3.68
" 25	6	700	Top tram motor burned out	16.18
" 27	3½	180	" " " " "	13.75
March 6	½	50	" " " " "	1.59
" 25	1½	150	Skip tore out pocket door in "B" shaft	7.20
April 3	½	50	Accident to lower tram car	2.95
" 8	2½	370	Top tram motor burned out	5.10
" 29	1½	150	No current. Main line trouble	
	38½	3995		$204.40

Table VII.(continued)

Date	Hours	Tons	Cause	Cost
Br't F'w'd	38½	3995		204.40
April 30	1	50	No current. Main line trouble	
May 4	1	125	Casting broke in lump chute	16.43
" 11	1½	180	Eighth level chute was blocked	2.66
" 12	1	100	Stockpile car off the track	1.10
June 3	1½	150	Grids on hoist controller burnt out	107.05
" 10	1	100	Dump wheels on "A" shaft skip broke	2.34
" 26	1	100	Broken runner in "A" shaft	5.37
July 25	1½	150	Belt slipped off No. 5 Crusher	.78
Aug. 7	1	25	Electric hoist out of order	.30
" 22	1	175	No railroad cars	
" 26	1½	200	Breaking chunks in gondolas	1.26
" 27	1	100	" " " "	.84
Sept. 9	1	150	" " " "	.84
" 19	1	20	Broken runner in "A" shaft	5.28
Oct. 7	1	100	No current. Main line trouble	
" 8	½	50	Motor off track	.93
" 10	1	100	"A" shaft skip broke dump-wheel	2.34
" 19	1½	150	No current. Main line trouble	
" 24	1½	150	Crusher blocked. Break in current on main line.	1.72
" 28	½	50	"B" shaft pocket blocked	.58
" 28	1	100	Car off track on 10th level "A" shaft	.93
" 29	1	50	Bearing caps of No. 5 Crusher broken	12.90
" 30	½	50	Waiting for railroad cars	
Nov. 1	1	100	Electric hoist broke down	.26
" 10	1	100	Gear broke on No. 5 Crusher	103.60
" 10	½	50	Crusher blocked. Current off on main line	1.15
" 16	2	300	Drawhead broke on top tram car	49.50
" 18	1	125	Chunk of ore blocked "B" shaft skip	2.20
	68½	7095		$524.76

Table VII.(continued)

Date	Hours	Tons	Cause	Cost
Br't F'w'd	68½	7095		$524.76
Nov. 20	2½	250	Runner broke in "A" shaft-house	5.73
Dec. 4	3	150	" " " "B" " "	5.98
" 29	½	50	Changing lower tram car	1.15
" 29	1	50	"B" shaft pocket blocked	.49
Total,	75½	7595		$538.11

Table VIII.

Delays Caused by Lack of Electric Current on Main Line.

Date	Hours	Tons Lost	
April 29	1½	150	Snow and ice on wires
" 29	½	50	
Oct. 7	1	100	Rain-storm
" 19	1½	150	Broken circuit
" 24	1½	150	Current off, causing crusher to block.
Nov. 10	½	50	" " " " " "
Total	6½	650	

Table IX.

Estimate of Ore Reserves.

	"A" Shaft Tons	"B" Shaft Tons	Total Tons
Pillars	905,000	705,000	1,610,000
Floors	1,667,000	1,086,000	2,753,000
Partly Developed	593,000	124,000	717,000
Total	3,165,000	1,915,000	5,080,000
Less 10% for Rock	317,000	191,000	508,000
Net Total	2,848,000	1,724,000	4,572,000
To support Surface	1,474,000	997,000	2,471,000
Available ore Jan. 1, 1915	1,374,000	727,000	2,101,000
Less 10% for rock and 10% for loss in mining	275,000	145,000	420,000
Net Available Ore Jan. 1, 1915	1,099,000	582,000	1,681,000

SURFACE.

Crusher Building.

The west No. 5 crusher developed a crack in the body-casting in November, and it was necessary to crush the entire product in the big crusher for three weeks, until this damage was repaired.

The "A" shaft top tram car broke off its drawhead on Nov. 9, and ran away. It was derailed about 100 feet from the shafthouse.

Stockpiles.

Shipments from stockpile closely approximated the amount stocked since Nov. 15, 1913, so that little change was necessary in the trestles. The trestle for crushed ore was erected in October, and that for lump ore in the latter part of November and the first of December.

Repairs to Buildings.

The coal-dock was repaired in April and May, several new legs and caps being put in.

The roof of the boiler-house was renewed where necessary, and new asbestos felt put on during July and August. In September and October the engine house roof was similarly repaired, but an extra layer of boards was put on with an air space between the two layers. There has been no trouble with the roof sweating inside since this was done.

The fly wheel was taken off the hoist on February 22nd, and the hoist has been run by electricity ever since. The removal of the fly wheel made little difference in the current consumption.

Shops.

A small fire occurred in the blacksmith shop roof in December, the damage being slight.

A No. 5 Leyner drill sharpener was purchased in September, and the old No. 3 sharpener was sent to the Hard Ore shops for repairs.

Surface.

The retaining wall south of "A" shaft became dangerous during the summer, and was braced by a pile of rock in September.

The launder carrying the water from the pump was replaced by a

12 inch pipe in November and December. The old tunnel through which this pipe runs will be filled in the spring.

An old shanty was brought over from the Hard Ore in September and set up on the old stocking grounds south of the coal dock. It will be used as a smoke room for helmet practice for the mine rescue teams of the Ishpeming District.

UNDERGROUND.

Ore Bodies in "A" Shaft.

The names given the ore bodies in "A" shaft are the same as were used in the last two reports. They are as follows:-

1. North Deposit. The North Deposit is a rather flat ore body, or series of ore bodies, that lies north of the great east and west fault.

2. Main Vein. The Main Vein extends east and west from the shaft, dipping to the south and pitching to the east. It is developed for 1940 feet east of the shaft.

3. Small Body. This is an isolated body, practically exhausted, 300 feet north-east of the shaft. There has been no work done in it this year.

4. South Lens. This is not really a lens of ore, but a "U"-shaped deposit lying in the bottom of a trough. It extends 300 to 1300 feet south-east of the shaft.

5. South Vein. This ore has been opened on the tenth level. It is apparently the continuation of the ore in the old Incline Mine.

Ore Bodies in "B" Shaft.

The same names have been used this year as last for the ore bodies in "B" shaft. They are as follows:-

1. Main Vein. This vein strikes north-east and south-west, and has been developed from a point 400 feet north-east of the shaft on the upper levels to a point approximately 1500 feet south-west of the shaft on the tenth level.

2. North Deposit. This ore extends from 500 feet north-east of the shaft to 800 feet north-west of the shaft, and lies on the north side of the main east and west fault.

3. Fault Vein. The main east and west fault has been found to carry ore of varying width in its western part, where it swings to the south-west, below the fifth level, and this ore has been developed on the sixth, seventh, eighth, ninth and tenth levels from 700 to 1400 feet south-west of the shaft.

UNDERGROUND.

General.

Efforts were made as in previous years to clean up the available ore on the upper levels and in the isolated deposits, concentrating the reserves as much as possible on the lower levels and in the larger and better defined ore bodies. The development of new ore-bodies, especially those in the North Deposit was hindered to some extent by the necessity of meeting a high guarantee of analysis and by lack of drilling equipment, the underground diamond drill equipment having been transferred early in the year to the Morris-Lloyd and Dexter mines.

The ore in the Main Vein in "A" shaft was cut off on the eighth, ninth and tenth levels, and it was not until December that its extension was discovered. After the electric pumps were installed on the fifteenth level development was started in the South Vein on the tenth level. Two raises were put up, which cut a large amount of water, and a crosscut was started to the south.

In "B" shaft the Fault Vein was followed west on the sixth, seventh, eighth and ninth levels and was opened on the tenth level. Stoping has been resumed at the west end of the tenth level and the ore has been crosscut on the eleventh level with very satisfactory results.

The pump house and sump have been excavated on the fifteenth level and the pumps installed. Pumping is still being done by steam, however, on account of shortage of water for the Carp River power plant. The rock drifts east and west on this level have been extended.

General Description of Underground Work.

"A" Shaft.

First Level.

A raise was put up from the third level at the east end of the

level, and the floors in the east part of the main vein are being mined.

Second Level.

No mining has been done on this level during the year, but most of the rock produced in "A" shaft above the fifteenth level has been dumped here.

Third Level.

One gang has been stoping in the South Lens about 300 feet south of the shaft, throughout the year.

Fourth Level.

Two gangs mined floors in the Main Vein about 800 feet east of the shaft most of the year.

Fifth Level.

One gang mined floors in the North Deposit 1300 feet north-east of the shaft during the first part of the year, and another gang is now crosscutting south-east from the South Lens workings 500 feet south-east of the shaft to reach the ore found in D. D. H. No. 202.

Sixth Level.

Two of the gangs that were working on this level in 1913 moved down to the seventh level, and little new ore has been developed. All the work has been in the North Deposit. One gang found the downward extension of the vein on the fifth level 1000 feet north-east of the shaft, and followed it west for over 100 feet. Three other gangs have been stoping in the north-east part of the ore body.

Seventh Level.

Two gangs have been driving stopes in new ground in the North Deposit throughout the year. Another gang worked here for a few months, but had to be moved on account of the analysis of the ore. Another gang has worked all the year mining floors in the South Lens 650 feet south-east of the shaft.

Eighth Level.

Two gangs have been driving stopes in the North Deposit nearly all the year, and another gang has followed the Main Vein east for 160 feet.

This ore was cut off at the end of the year. Another gang worked for a few months in the south part of the South Lens.

Ninth Level.

In the North Deposit a small body of ore was developed and mined, but was cut off in the latter part of the year. Two gangs have been stoping most of the year in the pillars of the Main Vein, and another gang has followed the Main Vein east. This ore has twice been cut off by jasper, but the extension has again been found. Another gang has been stoping in the south part of the South Lens during half the year.

Tenth Level.

The main drift was continued to the south-east for 100 feet, and then was turned north-east for about 170 feet to cut the ore found in drill hole No. 208. This crosscut, however, was all in jasper. Another drift was driven 450 feet due east near the footwall, cutting this crosscut 150 feet from the turn. Raises are now being started from this drift.

In the South Vein there has been one gang stoping nearly all the year 1250 to 1400 feet south-east of the shaft. Two raises have been put up nearly to the ninth level from the eastern part of the south-east drift. One of these was in rock, but the other is in ore. It has been temporarily abandoned, however, on account of the water. A crosscut is now being driven to the south-east to reach the ore found in D. D. H. No. 185, 1800 feet south-east of the shaft.

Fifteenth Level.

The pump house has been finished and the sump cut, and the east drift advanced 385 feet in siderite.

"B" Shaft.

First Level.

On the 1200 foot sub-level four machines have been kept running, and one stope has been driven east 150 feet and another, 100 feet further south, has been driven west 160 feet. Some drifting has also been done in rock at the west end of this ore body.

Second Level.

A small hole was broken through a rock pillar separating the stopes of "A" and "B" shafts, 300 feet north of the shaft, in November, and all available ore is being cleaned out of the old stope, so that it will be available as a rock dump. All the rock hoisted in "B" shaft in 1914 was dumped on this level.

Third Level.

Some ore was mined during the first part of the year in the back of the old stope 100 feet north of the shaft. A cut was also driven through a pillar 180 feet south-east of the shaft.

Fourth Level.

One gang has been mining floors near the west end of the Main Vein during a large part of the year.

Fifth Level.

One gang has been mining floors most of the year at the west end of the Main Vein 1350 feet west of the shaft, and another gang mined floors in the same vein 200 feet nearer the shaft for three months.

In the North Deposit one gang followed the ore east on the foot-wall for five months, until it was cut off by conglomerate. They tried one crosscut to the south further west, with the same result, mined what ore there was in the back, and went to the sixth level. Another gang mined a little ore in the back at the west end of this vein before moving to the sixth level.

Sixth Level.

On the 945 foot sub-level one gang has been stoping all the year, about 400 feet north-west of the shaft, but have nearly finished.

In the North Deposit one gang drove the north stope east until the ore was cut off by conglomerate, drove a cut through the pillar, and then moved to the next stope south, which they are driving east. Another crosscut has been driven in the pillar between these two stopes. Further west one gang has been stoping in the back most of the year, and another gang followed the footwall east for 100 feet until they holed to the main stope 540 feet

north-west of the shaft. They drove one cut through the pillar, and are now mining floors 650 feet north-west of the shaft.

One gang has followed the Fault Vein west for 80 feet and are now 1360 feet south-west of the shaft.

Seventh Level.

Two gangs have worked on this level all the year. One has followed the Fault Vein west for 160 feet and the other has opened a good stope in the new ore in the North Deposit 340 feet north of the shaft. They have followed this ore for 100 feet. Another gangx put up a raise from the eighth level in the Main Vein 1100 feet south-west of the shaft and mined the floor for two months.

Eighth Level.

Three gangs have worked on this level. One gang followed the Fault Vein west for 130 feet, and another raised to the seventh level in the Main Vein, 1100 feet south-west of the shaft, mined floors for two months, and then crosscut north-west to the hanging-wall 1200 feet west of the shaft on the eighth level, and followed the ore south-west for 100 feet. The third gang mined floors near the hanging-wall of the Main Vein 1000 feet west of the shaft for several months.

Ninth Level.

One gang mined the floors of the magnetite deposit 600 to 700 feet north-west of the shaft during the first part of the year, and another gang followed the Fault Vein south-west for 200 feet. This vein has been very narrow on this level.

Tenth Level.

In the Main Vein three stopes have been driven in the pillars about 800 feet west of the shaft, and another was driven in a pillar 150 feet north of the main drift. One gang is now stoping in the back of the north stope, and another is stoping west, 1500 feet west of the shaft.

A crosscut was driven south nearly 200 feet in jasper, 1100 feet west of the shaft, to cut the Fault Vein, and a stope is now being driven west in this ore. Another gang is raising to the ninth level.

Eleventh Level.

A drift was driven west 90 feet in rock from the big raise, 820 feet west of the shaft, to the ore, and a raise put up to the tenth level in ore. A stope was then driven west 90 feet in ore to the hanging-wall, which is being followed to the south-west.

Fifteenth Level.

The main drift has been driven west 440 feet in rock.

DETAILS BY CONTRACTS.

"A" Shaft

First Level.

Main Vein.

No. 3 raised from the third level 590 feet east of the shaft in August and September, and mined floors around this raise to a depth of 12 feet during the rest of the year.

Third Level.

South Lens.

No. 15 raised in the back of the two stopes 280 and 330 feet south of the shaft, put up a raise to the west on the footwall 330 feet south of the shaft, and drove a stope through the pillar between the stopes. They mined the ore in the back of the stope 100 feet further east, and are now raising from this stope to the west 340 feet south-east of the shaft.

Main Vein.

No. 3 put up a raise to the third level in August and September 590 feet east of the shaft.

Fourth Level.

Main Vein.

No. 24 continued mining floors during the whole year, from 750 to 790 feet east of the shaft. They also put up a raise from the fifth to the third level at the edge of their stope, 790 feet east of the shaft. As there is jasper under the ore this has been all sub-level work.

No. 45 mined the floors in the hanging-wall drift from March to September from 750 to 880 feet east of the shaft.

North Deposit.

No. 26 mined the floor of the raise from the fifth level, 600 feet north-east of the shaft, for three months, and then moved to the fifth level.

Fifth Level.

North Deposit.

No. 26 came down from the fourth level in April and mined the floors of the north-east stope, 1270 feet north-east of the shaft, for four months, and then moved to the sixth level.

South Lens.

No. 45 in November started a crosscut south-east in rock from the end of the old crosscut 475 feet south-east of the shaft. They are drifting to reach the ore found in diamond drill hole No. 202.

Sixth Level.

North Deposit.

No. 20 continued their crosscut south 840 feet north-east of the shaft, following a narrow vein of ore with jasper on both sides for 25 feet, and then moved west to the crosscut 770 feet north-east of the shaft. They crosscut south here for 60 feet, following the contact between the slate and jasper, until they reached the ore, in which they have stoped west for 110 feet.

No. 45 reached the end of the ore in their west stope 930 feet north-east of the shaft, cleaned all the ore off the rock in the breast, and moved to the fourth level at the end of February.

No. 5 continued their stope west along the boundary 1380 feet north-east of the shaft for two months, and then moved 100 feet south in their crosscut stope, as their ore was poor. Here they stoped west for three months, and then moved back to the boundary line, which they followed east for one month, but the hanging-wall came down so low that they had to stop. They went to the seventh level in July, and raised to the sixth level, 1580 feet north-east of the shaft. They are now stoping south from this raise.

No. 17 continued their stope east for one month, 1460 feet north-east of the shaft, but had rock low down in the back, and moved west 70 feet, where they started a crosscut north. They drove this crosscut north 60 feet to jasper, and then drove a stope to the east from the right side of it for 90 feet, leaving a pillar 25 feet thick on the south. They are now crosscutting north from the breast of this stope, 1500 feet north-east of the shaft. They are going to meet No. 5.

No. 26 in August came down from the fifth level, where they had been mining floors and drove a stope east through the pillar 1300 feet north-east of the shaft. They are now stoping west in the pillar on the opposite side of the crosscut, 1230 feet north-east of the shaft.

No. 39 stoped to the east in the pillar 1180 feet north-east of the shaft for one month and moved to the seventh level.

Seventh Level.

North Deposit.

No. 32 drove their stope west in fine ore along the boundary for 110 feet. The breast is now 1220 feet north-east of the shaft, and has some jasper mixed with the ore.

No. 8 drove their stope west, paralled to No. 32 and 50 feet further south, for 60 feet, until the ore was cut off by jasper, and then cut through the pillar between their stope and No. 32's, 1360 feet north-east of the shaft. They went to the eighth level in July.

No. 3 continued their stope east for two months and a half, 1500 feet north-east of the shaft, but the grade became so poor that they had to stop. They moved to the tenth level "B" shaft, working with No. 10 contract, in the middle of March.

No. 39 came down from the sixth level at the end of January, and crosscut north-east from the east end of the Main Vein, 1520 feet east of the shaft. They had rock for 10 feet and then opened a stope, which they drove north 50 feet to rock. They drove a stope west from this crosscut stope for 75 feet in good ore. The breast is now 1460 feet north-east of the shaft.

No. 5 raised to the sixth level 1580 feet north-east of the shaft in July and August.

South Lens.

No. 36 have been mining floors all the year from 600 to 675 feet south-east of the shaft.

Eighth Level.

North Deposit.

No. 29 continued their stope north to the footwall for 60 feet, and turned north-west along the contact. They have followed the footwall for 80 feet, and the breast is now 1400 feet north-east of the shaft.

No. 8 came down from the seventh level in July and started a stope east along the footwall opposite No. 29. Their ore pinched out in October, and they moved to the west side of the crosscut, 50 feet south of No. 29's stope, and started a stope west in the pillar. The ore was not very good, and they are starting a stope south from 29's stope near the breast.

No. 27 crosscut north through the footwall of the Main Vein in March, 1550 feet east of the shaft. They passed through 15 feet of rock and stoped north 55 feet to rock again. They crosscut north-east 30 feet in this rock, and then started stoping to the west from their crosscut stope. They have gone in 60 feet, and the breast is now 1475 feet north-east of the shaft.

Main Vein.

No. 27 drifted south-west from their footwall stope, 1110 feet east of the shaft, for 60 feet in ore and jasper, until they holed to the old stope. This drift was driven to make a road around the chutes in which the ore is dumped from the sixth and seventh levels.

No. 21 continued their stope east in fine ore, following the hanging-wall, for 160 feet, but now have jasper in the breast 1880 feet east of the shaft.

South Lens.

No. 18 stoped south to the footwall, 700 feet south-east of the shaft, moved east 60 feet, and drove a stope east along the footwall for 25

feet, and then moved north again, leaving a pillar 25 feet thick on the north side of the last stope. They stoped to the east here 40 feet, and moved to the ninth level in June. In December they holed a raise from the ninth level to this stope, and are now mining the floor.

Ninth Level.

North Deposit.

No. 4 crosscut north through 30 feet of mixed ore and rock in March, 1500 feet east of the shaft, and opened a stope in the North Deposit. They followed the ore west 90 feet, until it was cut off by slate, and are now drifting west in rock.

No. 25 stoped east on the footwall opposite No. 4 in July and August for 50 feet.

Main Vein.

No. 31 drove their crosscut north to the footwall in January, 860 feet east of the shaft and went to the tenth level. They raised from No. 34's stope to the eighth level, 1660 feet east of the shaft, in March.

No. 25 continued their crosscut stope north, 1120 feet east of the shaft until they holed to the footwall stope. Then they drifted north-east 50 feet in jasper from this stope to No. 4's old stope, 1200 feet east of the shaft, to make a travelling road around the seventh and eighth level chutes. They finished here late in June.

No. 6 started on this level in September, crosscutting north-west in jasper, 1420 feet east of the shaft, to reach the ore found in drill hole No. 228. They reached the ore in October, and stoped to the north for two months, No. 16 taking their place in December.

No. 4 stoped to the south-east two months, 1550 feet east of the shaft, following the ore along the footwall.

No. 9 took No. 4's place in March and continued the stope to the south-east for one month. In January and February No. 9 finished a raise to the eighth level, 1200 feet east of the shaft, and crosscut north through the pillar from their old stope, 1320 feet east of the shaft to No. 4's footwall stope. In April they crosscut north from the hanging-wall stope,

1075 feet east of the shaft, through the pillar to the main drift. They moved back 50 feet west and drove another crosscut north through the pillar. In September they started a crosscut north from the main drift, 1020 feet east of the shaft, and had just reached the footwall at the end of the year.

No. 34 continued their stope east from 1840 to 1880 feet east of the shaft, until the ore was cut off by jasper. They crosscut south-east 15 feet in rock, and opened out in ore again. They followed this ore east 60 feet until it was again cut off, crosscut south-east 90 feet in mixed slate and ore, trying to find the extension. This was apparently found by the diamond drill in December. In November and December they raised to the eighth level 1810 feet east of the shaft, and at the end of the year had started a drift to reach the new ore.

South Lens.

No. 18 came down from the eighth level in June, and drifted west 40 feet in rock from the crosscut 870 feet south-east of the shaft. They opened a stope here, and followed the ore west for 50 feet to the end. In November and December they raised to the eighth level from this stope 800 feet south-east of the shaft.

Tenth Level.

Main Vein.

No. 23 drifted due east from the crosscut north of No. 34's chute, 1550 feet east of the shaft, for 390 feet, until they holed into No. 41's crosscut. The drift was about half in ore and half in rock. In December they started putting up two raises, 1840 and 1890 feet east of the shaft. They also opened out in ore on the north side of the drift, 1720 feet east of the shaft.

No. 41 continued the main drift south-east 80 feet in ore, and turned north-east in ore for 20 feet. They continued this crosscut north-east in jasper 145 feet, to reach the ore found in diamond drill hole No. 208, but this ore did not materialize, and they drifted east 70 feet in jasper on line with No. 23, so that when the latter holed the track would be straight. In November they stoped a little ore 1880 feet east of the

shaft, and moved to the South Vein.

No. 31 raised to the ninth level on the footwall 1100 feet east of the shaft in the latter part of January and February.

South Lens.

No. 25 started drifting west from the main crosscut 1190 feet south-east of the shaft in November and are in about 25 feet in ore.

South Vein.

No. 16 followed the south footwall west for 180 feet, until the ore pinched out, 1220 feet south-east of the shaft. They raised to the ninth level in September, 1400 feet south-east of the shaft, the ore being cut off by rock at this elevation. They put up a raise 50 feet in mixed ore and rock on the north side of the south-east drift, 1900 feet south-east of the shaft, and another 40 feet in ore on the south side of the same drift, 1830 feet south-east of the shaft. This last raise made so much water that it has been temporarily abandoned. They went to the ninth level in December.

No. 41 started a crosscut south-east, following drill hole No. 195, 1720 feet south-east of the shaft, and were in 40 feet in jasper at the end of the year.

No. 25 drove a crosscut stope south in the pillar north of No. 16's stope, 1330 feet south-east of the shaft, in September and October, and in the latter part of November moved to the South Lens.

Fifteenth Level.

No. 12 and No. 47, working together, finished the pump-house and sump north of "A" shaft, and No. 12 drove the east drift ahead 125 feet, 15 feet wide, making the plat 180 feet long, and then drifted 260 feet 8 feet wide. The breast was in white jasper at the end of the year 440 feet east of the shaft.

"B" Shaft

First Level.

1200 Foot Sub-level.

Main Vein.

No. 48 continued their stope east along the hanging-wall, 470

feet south-east of the shaft, for 135 feet, until the ore was cut off in the breast. They were joined by No. 30 in September. One gang is now crosscutting north 480 feet south of the shaft.

No. 30 raised 30 feet high on the jasper 560 feet south of the shaft, and then moved to the west end of this part of the sub-level, 500 feet south-west of the shaft. They drifted west here 70 feet partly in ore and partly in rock, following the contact with the jasper, and crosscut 20 feet north-west in slate. They crosscut south 35 feet in jasper until they were under D. D. H. No. 18, and joined No. 48 in September.

South Lens.

No. 42 and No. 49 working together drove their stope west 160 feet to a point 590 feet south of the shaft. They holed to No. 30's raise, 560 feet south of the shaft in September. They are still stoping west.

Second Level.

North Deposit.

No. 43 drifted through 6 feet of rock, 300 feet north of the shaft, to an old "A" shaft stope, in November, and are now mining some ore in the floor. This place will be used as a rock dump as soon as the ore is all removed.

Third Level.

Main Vein.

No. 43 mined some ore in the back of the old stope 80 feet north of the shaft from March to July, and then drove a cut through the big pillar 180 feet south-east of the shaft. They went to the second level in November.

Fourth Level.

Main Vein.

No. 43 raised to the third level, 1240 feet south-west of the shaft, in the first part of January, and moved to the fifth level, where they raised again, holing to the fourth level under their raise to the third.

No. 1 have mined floors near the hanging-wall 1200 to 1250 feet south-west of the shaft for nine months, working on the fifth level in January, March and September.

Fifth Level.

North Deposit.

No. 38 stoped south-east and south for five months, until their ore was cut off by conglomerate, 440 feet north-east of the shaft. They moved west 60 feet in their stope and drove a crosscut south 20 feet to the conglomerate. After mining what ore there was in the back of the stope, they moved to the sixth level in November.

No. 7 stoped in the back of the west stope, 550 feet north-west of the shaft, for three and a half months, stripping off all the ore up to the conglomerate, and moved to the sixth level, where they continued mining in the back.

Main Vein.

No. 43 raised to the fourth level in the latter part of January, 1240 feet west of the shaft.

No. 1 mined floors 1150 feet south-west of the shaft in part of January, March and September.

No. 35 mined floors near the hanging-wall, 1350 feet south-west of the shaft, from March until the end of the year. They are nearly through here. As there is jasper lying flat under the ore, this work was carried on on sub-level.

Sixth Level.

North Deposit.

No. 7 came down from the fifth level in April, and stoped in the back during the rest of the year from 450 to 500 feet west of the shaft. They have a large pile of ore broken.

No. 13 crosscut south from the east end of the north stope, 490 feet north-east of the shaft, for 30 feet, until the ore was cut off by conglomerate. They moved west 125 feet, and crosscut south through the pillar to No. 35's old stope. They then drove this stope ahead to the east in fine steel ore for 60 feet. At the end of the year the breast was 420 feet north-east of the shaft.

No. 38 came down from the fifth level in November and drove a

crosscut south in the pillar 50 feet east of No. 13's last crosscut. At the end of the year they were in 30 feet with rock in the breast.

No. 37 continued their stope to the east, following the footwall around until they holed to the old stope 530 feet north-west of the shaft. They moved west 50 feet and crosscut south through the pillar for 60 feet. They have had good ore in the bottom all the time, but there is conglomerate in the back. In November they broke through to the top of their raise, 670 feet north-west of the shaft, and mined floors during the rest of the year.

Main Vein.

No. 35 finished their crosscut south through the pillar 1100 feet south-west of the shaft, and moved to the fifth level in March.

Fault Vein.

No. 11 continued their stope west in the Fault Vein for 85 feet. They had one rock crossing four feet thick.

945 Foot Sub-level.

No. 22 continued stoping on this sub-level throughout the year, but are nearly finished. They stoped east, 400 feet north-west of the shaft for 50 feet, and then cut through the pillar on the west side, 440 feet north-east of the shaft. Going back to their chute they cut out on the east side, and stoped east 60 feet and north 30 feet, holing to their north stope. They are now mining a little ore left in the floor north of the chute.

Seventh Level.

North Deposit.

No. 6 stoped east for one month to the end of the ore 420 feet north-east of the shaft, and moved to the tenth level.

No. 14 continued their crosscut south 20 feet to the rock, 370 feet north of the shaft, and drifted east 60 feet to the ore found in drill hole No. 205. This ore was very small, and they returned to their crosscut on the west side of which they had good ore. They followed this ore south-west for 100 feet, and still have a good breast.

Fault Vein.

No. 28 have followed the ore west for 160 feet. It has been narrow most of the time, but is now getting a little wider. The breast is 1530 feet south-west of the shaft.

Main Vein.

No. 46 raised from the eighth level in January, and mined floors for two months, 1100 feet west of the shaft.

Eighth Level.

Main Vein.

No. 6 raised from the ninth level 1040 and 970 feet west of the shaft in March and mined floors from April to September.

No. 46 came down from the seventh level in March and drifted north-west through the rock to the ore near the hanging-wall, 1200 feet west of the shaft. They have followed this ore south-west for 90 feet, and still have good ore, but it is only 8 feet wide.

Fault Vein.

No. 19 have followed the ore west for 140 feet, to a point 1400 feet south-west of the shaft. They now have jasper across most of the breast.

Ninth Level.

Main Vein.

No. 33 mined the ore in the floor of the magnetite vein from 620 to 690 feet north-west of the shaft, and went to the tenth level in October.

Fault Vein.

No. 2 followed the ore south-west for 190 feet, and are now 1080 feet south-west of the shaft. The ore has been very narrow nearly all the way.

Tenth Level.

Main Vein.

No. 33 came down from the ninth level in October, and raised in the back of the north stope 750 feet north-west of the shaft. They had

just reached the top of the ore at the end of the year at the elevation of the ninth level.

No. 10 drove a stope through the pillar 820 feet north-west of the shaft, and then crosscut south 170 feet in jasper, 1150 feet west of the shaft to the Fault Vein.

No. 40 continued their stope south for two months, 750 feet west of the shaft, then stoped east 35 feet in the pillar on the east side. They drove one cut through the pillar on the west side, and moved to the west end of the level in August, where they opened a stope in the ore found in drill-hole No. 213. They are now following this ore west 1500 feet west of the shaft.

No. 6 came down from the seventh level in February and crosscut north through the pillar 700 feet west of the shaft. They went to the ninth level in March.

Eleventh Level.

Main Vein.

No. 44 drifted west from the big raise, 820 feet west of the shaft, for 90 feet in rock, and raised to the tenth level in ore in June. They opened a stope in the ore, and drove it west for 90 feet, reaching the hanging-wall in December.

Fifteenth Level.

No. 47 drifted west 440 feet in diorite and hard jasper from June until the end of the year. The breast is now 1360 feet west of the shaft.

CLIFFS SHAFT MINE.

COMPARATIVE MINING COST FOR YEAR.

	1914	1913	INCREASE	DECREASE
PRODUCT	300,771	299,351	1,420	
General Expense	.036	.044		.008
Maintenance	.128	.100	.028	
Mining Expense	.950	.912	.038	
Cost of Production	1.114	1.056	.058	
Exploratory	.009	.019		.010
DEPRECIATION				
Plant	.052		.052	
New Construction	.005	.067		.062
New Storehouse		.003		.003
Original Investment	.134		.134	
Total Depreciation	.191	.070	.121	
Taxes	.154	.139	.015	
Central Office	.067	.064	.003	
Sundry Expense	.040	.024	.016	
COST ON STOCKPILE	1.575	1.372	.203	
Loading & Shipping	.019	.031		.012
Total cost on cars	1.594	1.403	.191	
Number of days operating	299	300		1
Number shifts and hours	1-8hr	1-8hr		
Average Daily product	1,006	998	8	
COST OF PRODUCTION				
Labor	.779	.765	.014	
Supplies	.335	.291	.044	
Total	1.114	1.056	.058	

CLIFFS SHAFT MINE.

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COMPARISON OF COST SHEETS

FOR 1913 AND 1914.

In 1913 an estimated overrun of 15,000 tons in the stockpile was taken up in the production for the year, reducing the cost per ton approximately 5% in all accounts. No overrun from the stockpile was taken up in 1914. The production for 1914 without overrun is almost the same as that in 1913 with overrun.

Wages were increased 10¢ a day Feb. 1, 1913, and were reduced 10% Oct. 1, 1914.

Production.

	Total	Per Day
Year 1913	299,351 Tons*	998 Tons
Year 1914	300,771 "	1,006 "
Increase	1,421 "	8 "

*Includes 15,000 tons estimated overrun in stockpile.

Labor.

	Year 1913	Year 1914
Average number of men	268	285
Average rate per day	$2.83	$2.71

Tons Per Man Per Day.

	Year 1913		Year 1914
	With Overrun	Without Overrun	
Surface	16.38	15.55	16.13
Underground	4.79	4.55	4.49
Total	3.71	3.52	3.51

Cost of Production.

	Year 1913		Year 1914
	With Overrun	Without Overrun	
Labor	$.765	$.806	$.779
Supplies	.291	.306	.335
Total	1.056	1.112	1.114

COST COMPARISON.

GENERAL EXPENSE.

No. 26 - Insurance.

1913	$165.54	.000
1914	168.91	.001
Increase	3.37	.001

No. 27 - Engineering.

1913	$1786.50	.006
1914	1616.11	.005
Decrease	170.39	.001

The decrease has been in office-work on maps and land surveys.

No. 28 - Analysis.

1913	$1931.41	.007
1914	1970.23	.007
Increase	38.82	.000

No. 30 - Personal Injury Expense.

1913	$2805.68	.009
1914	---	---
Decrease	2805.68	.009

In 1913 the principal charges were:

Half day's wages to Emil Aho's widow	$297.38
Settlement for Emil Aho's death	2151.30
Settlement with Oscar Kuoppila	350.00
Total	$2798.68

No. 30a - Mine Office.

1913	$6602.92	.022
1914	7036.61	.023
Increase	433.69	.001

The increase in direct charges by the Central Office for supplies was $382.93.

MAINTENANCE.

No. 125 - Tracks and Yards.

1913	$1498.93	.005
1914	1061.98	.004
Decrease	436.95	.001

The principal item of extra expense charged to this account in 1913 was clearing away the refuse and tearing out the foundations of the old crusher building.

No. 126 - Docks, Trestles and Pockets.

1913	$1131.89	.004
1914	402.88	.001
Decrease	729.01	.003

In 1913 plank and laying cost $325.70, and lump ore pocket for stocking cost $500.97.

No. 127 - Buildings.

1913	$2801.61	.009
1914	4702.18	.016
Increase	1900.57	.007

New roofs were put on the engine-house and boiler-house and the coal-dock was repaired in 1914.

No.128 - Shop Machinery.

1913	$215.86	.000
1914	985.48	.003
Increase	769.62	.003

In 1914 a No. 5 Leyner drill-sharpener was purchased costing $859.00.

No. 129 - Boiler Plant.

1913	$1292.11	.004
1914	1088.24	.000
Decrease	203.87	.000

In 1913 new grates and fire-arches were installed, four boilers being in use. In most of 1914 only three boilers were used.

No. 130 - Hoisting Machinery.

1913	$1691.94	.006
1914	1943.56	.006
Increase	251.62	.000

In 1914 the principal items were one new rope $346.50, reversing-panels for electric-hoist $150.40, resistance grids $100.80, and turn-sheave for "B" shaft $101.05.

No. 131 - Compressor & Power Drills.

1913	$3688.99	.012
1914	3406.40	.011
Decrease	282.59	.001

In 1913, 15 new drills cost $3283.82.
In 1914, 13 " " " 3119.37
Air-hose was charged to this account in 1913 and to No. 150 in 1914.

No. 132 - Pumping Machinery.

1913	$1391.73	.005
1914	7224.77	.024
Increase	5833.04	.019

In 1914 the excavation of the sump and pump-house cost $6080.39.

No. 133 - Top Tram Engines & Cars.

1913	$846.03	.003
1914	1498.36	.005
Increase	652.33	.002

In 1914 repairs to car that fell off the trestle cost $70.60. New rotor and field coils for top-tram motor and labor for repairs cost $703.48.

No. 134 - Skips and Skip-Roads.

1913	$2151.14	.007
1914	1493.65	.005
Decrease	657.49	.002

About $440 decrease was in labor of cleaning skip-pits, which was charged to tramming in 1914. Balance is mostly repairs to skips and cages.

No. 135 - Underground Tracks & Cars.

1913	$5858.23	.020
1914	5466.45	.018
Decrease	391.78	.002

In 1913, 25 sets of roller-bearing wheels were purchased and in 1914 only 10 sets.

No. 136 - Electric Tram Plant.

1913	$2567.20	.009
1914	4049.39	.014
Increase	1482.19	.005

Cars and car repairs increased $801.73. Labor on tracks and extensions of trolley-wires increased over $600, as the plant did not get well under way to April 1913.

No. 137 - Telephones and Safety Devices.

1913	$1510.43	.005
1914	2077.07	.007
Increase	566.64	.002

Safety devices in the engine-house cost $127, and supplies increased $378, the principal charges being for central station equipment and livery expense, $253.55, oxygen tanks, etc. stretcher, bandages, blankets, etc. $85.72, and new signal boards, $54.85. There was also an increase in lighting charges.

No. 138 - Crushing & Screening.

1913	$2679.72	.009
1914	3064.25	.010
Increase	384.53	.001

In 1914 both No. 5 crushers were relined with concaves, one new head was put in, and the west crusher had the body-part reinforced, where it cracked.

No. 139 - Fire Expense and Damage.

1913	$504.26	.002
1914	71.47	.000
Decrease	432.79	.002

In 1913 the charges were mostly for a fire in the crusher-building on March 14th.

MINING EXPENSE.

No. 150 - Air-pipes.

1913	$2128.02	.007
1914	2283.05	.008
Increase	155.03	.001

Air-hose was charged to this account in 1914 and to No. 131 in 1913.

No. 151 - Compressors.

1913	$11047.35	.037
1914	15477.24	.051
Increase	4429.89	.014

In 1914 the air made by the compressor at the mine cost $11744.03, and additional air was purchased from North Lake for $4553.41. Of these amounts, $820.20 was charged to drill sharpening.

No. 152 - Hoisting.

1913	$9232.81	.031
1914	8623.09	.029
Decrease	609.72	.002

There was a decrease of nearly $1000 in labor, but an increase of nearly $400 in supplies on account of using electric power.

No. 153 - Pumping.

1913	$10732.44	.036
1914	12907.11	.043
Increase	2174.67	.007

In 1914, on account of the electric hoisting, pumping had to take up a larger proportion of boiler-house expense than formerly.

No. 154 - Sinking and Shaft Repairs.

1913	$12845.10	.043
1914	1781.41	.006
Decrease	11063.69	.037

In 1913 "A" shaft was sunk and raised 233 feet @ $51.03 a foot. The charges in 1914 were for repairs and for the pockets and plat at the 15th level.

No. 155-Rock Drifting.

1913	$29070.26	.097
1914	37133.81	.124
Increase	8063.55	.027

In 1913 there were 2682 feet of drifting and raising @ $10.83 per foot, and in 1914 3348 feet at $11.09 per foot. The rock-drifting, shaft-work and pump-house in 1914 correspond to the shaft-sinking and rock drifting in 1913, an increase of $3080 in 1914.

No. 156 - Breaking Ore.

1913	$100562.12	.336
1914	107593.36	.358
Increase	7031.24	.022

In 1913, 284,351 tons of ore were broken at $.354 per ton. In 1914, 300,771 tons were broken at $.358 per ton.

No. 157 - Tramming.

1913	$68688.46	.229
1914	70659.54	.235
Increase	1971.08	.006

In 1913 the actual tonnage trammed was 284,351 tons at $.241 per ton. The reduction in wages in the last three months of 1914 showed particularly in this account.

No. 158 - Filling.

1913	$1558.92	.005
1914	1592.85	.005
Increase	33.93	.000

In 1913, 16,770 tons of rock were dumped underground at a cost of $.093 per ton. In 1914 20,122 tons were dumped at a cost of $.079.

No. 159 - Timbering.

1913	$3856.14	.013
1914	2151.34	.007
Decrease	1704.80	.006

Shaft repairs, amounting to $1781.41, were made by the timber-gang in 1914. In 1913 most of this work was done by the shaft-men, while the timbermen were retimbering drifts and building chutes.

No. 160 - Captain and Bosses.

1913	$8102.67	.027
1914	8214.58	.027
Increase	111.91	.000

In 1914 another shift-boss was put on in May, which more than offset the decrease in wages on Oct. 1.

No. 161 - Dry-house.

1913	$1167.13	.004
1914	1926.44	.006
Increase	759.31	.002

The increase is in heating-charges, which were changed in 1914.

No. 162 - Top Landing & Tramming.

1913	$2740.60	.009
1914	2637.16	.009
Decrease	103.44	.000

The decrease is due to the cut in wages on Oct. 1 and to less supplies used.

No. 163 - Stocking Ore.

1913	$3091.17	.010
1914	4198.64	.014
Increase	1107.47	.004

The stockpile trestles were longer in 1914 than in 1913. In 1913 lump ore was not stocked until Feb. 6, and in 1914 an extra man was kept on the crushed pile on account of the increased tonnage and the short dumping space on the stockpile.

No. 164 - Sorting Ore.

1913	$4341.58	.015
1914	4481.10	.015
Increase	139.52	.000

The number of rock pickers underground was higher in 1914 than in 1913 during part of the year.

No. 168 - Crushing Ore.

1913	$533.57	.002
1914	671.55	.002
Increase	137.98	.000

In 1913, 25,354 tons were crushed at $.020 per ton. In 1914, 40,827 tons were crushed at $.016 per ton.

No. 169 - Screening Ore.

1913	$3298.57	.011
1914	3415.33	.011
Increase	116.76	.000

In 1913, 258,997 tons were screened at $.012 per ton. In 1914, 259,944 tons were screened at $.013 per ton.

RECAPITULATION.

Account	1913 With Overrun Total	1913 With Overrun Per Ton	1913 Without Overrun Per Ton	1914 Total	1914 Per Ton	Increase Total	Increase Per Ton	Decrease Total	Decrease Per Ton
General Expense	13292.05	.044	.047	10791.86	.036			2500.19	.008
Maintenance	29830.07	.100	.105	38536.61	.128	8706.54	.028		
Mining Expense	272996.91	.912	.960	285747.60	.950	12750.69	.038		
Cost of Production	316119.03	1.056	1.112	335076.07	1.114	18957.04	.058		

Lucien Eaton

CLIFFS SHAFT MINE

AVERAGE MINE ANALYSIS OF OUTPUT FOR YEAR-1914

GRADE	IRON	PHOS.
Lump Cliffs Shaft,	59.12	.102
Crushed Cliffs Shaft,	58.82	.103

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR-1914

GRADE	Mine		Lake Erie	
	IRON	PHOS.	IRON	MOIST.
Lump Cliffs Shaft,	59.26	.099	59.49	.36
Crushed Cliffs Shaft,	58.63	.106	58.93	1.21

ORE STATEMENT - DECEMBER 31ST, 1914

	LUMP CL. SHAFT	CRUSHED CL. SHAFT	TOTAL	TOTAL LAST YEAR
On Hand Jany. 1st, 1914,	12,981	49,549	62,530	122,032
Output for Year,	107,841	192,930	300,771	299,351
Total,	120,822	242,479	363,301	421,383
Shipments,	107,472	178,755	286,227	358,853
Balance on Hand,	13,350	63,724	77,074	62,530
Increase in Output,			1,420	
Increase in Ore on Hand,			14,544	

1-8 Hr. Shift during Years 1913 and 1914.

SHIPMENTS FOR YEAR--1914

	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lump Cliffs Shaft,	53,459	54,013	107,472	85,510
Crushed Cliffs Shaft,	85,523	93,232	178,755	273,043
Total,	138,982	147,245	286,227	358,853
Total Last Year,	161,181	197,672	358,853	
Decrease - 20%			72,626	

CLIFFS SHAFT MINE.

COMPARATIVE AVERAGE WAGES AND PRODUCT.

PRODUCT '14 300,771 PRODUCT '13 299,351	SURFACE		UNDERGROUND		TOTAL	
	1914	1913	1914	1913	1914	1913
Avg. no. men working	62	61	223	207	285	268
Avg. wages per day	2.40	2.45	2.80	2.94	2.71	2.83
Avg. wages per mo. 25 days	60.00	61.25	70.00	73.50	67.75	70.75
Avg. product per man per day	16.13	16.38	4.49	4.79	3.51	3.71
Labor cost per ton	.149	.150	.623	.613	.772	.763
Diff. in labor cost per ton	-.001	-.012	-.010	-.027	-.009	-.015
Avg. product brkg.& tramng.			~~5.54~~ 6.64	7.02		
Avg. wages for miners contract			2.82	2.96		
Avg. wages for trammers contract			2.85	3.00		
Total average wages for contract			2.83	2.98		

	1 9 1 4	1 9 1 3	INCREASE	DECREASE
SURFACE				
Total number of days	18,648	18,289	3.59	
Average rate	2.40	2.45		.05
Amount	44,749.17	44,780.88		31.71
UNDERGROUND				
Total number of days	66,978	62,480	4498	
Average rate	2.80	2.94		.14
Amount	187,499.96	183,542.45	3957.51	
Total Days	85,626	80,769	4857	
Average Rate	2.71	2.83		.12
Total Amount	232,249.13	228,323.33	3925.80	
Labor cost per ton	.772	.763	.009	
Number shifts and hours	1-8hr	1-8hr		

			TONS.	%
Tons per man per day,	SURFACE	DECREASE	.25	1.526
	UNDERGROUND	"	.30	6.2
	Surf.& UNDG.	"	.20	5.4

Proportion Surface to Underground Men:
1914 - 1 to 3.59
1913 - 1,to 3.40
1912 - 1 to 4.20
1911 - 1 to 3.35
1910 0 1 to 3.57

Decrease Wages per Day:
Surface .o5 ---- 2.04%
Underground .14 ---- 4.76%
Total .12 ---- 4.24%

CLIFFS SHAFT MINE.

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE.

KIND.	QUANTITY	AVERAGE PRICES	AMOUNT 1914	AMOUNT 1913
60% Powder	4,800	.1164	559.62	2,102.93
50% "	216,950	.1045	22,678.55	18,164.69
80% "				290.25
Total Powder	221,750	.1048	23,238.17	20,557.87
Fuse	288,600	3.84	1,108.33	979.35
Caps	56,200	6.22	349.63	311.81
Cap Crimpers				5.00
Total Fuse,Etc.,			1,457.96	1,296.16
Grand Total			24,696.13	21,854.03
Product			300,771	299,351
Pounds Powder per ton ore			.737	.675
Cost per ton for powder			.077	.069
Cost per ton for fuse,caps,etc.			.005	.004
Cost per ton for all explosives			.082	.073
Avg.price per lb. for powder			.1048	.1018

CLIFFS SHAFT MINES.

ANNUAL REPORT

(1914)

OF THE

SALISBURY MINE.

Production and Shipments.

The Salisbury Mine was closed on September 30, the only work continued being the rock drift on the fourteenth level. Up to October 1 the mine had worked 224 days, and produced 85,753 tons of ore, exclusive of stockpile overrun, an average of 383 tons per day. Since October 1 the mine has worked 75 days and produced 3308 tons of rock and 118 tons of Silica ore. The latter was obtained from cleaning down the shaft. The following table shows the average hoist per day and totals for the different grades for the nine months up to October 1, and for the whole year.

Table I.

Production by Grades.

Grade	Total for 9 months Tons	Total for Year 1914 Tons	Average per day 9 months Tons	Average per day Year 1914 Tons	Average per Day 1913 Tons
Bessemer	29,097	29,097	130	97	85
Clinton	626	626	3	2	28
Salisbury	1,943	1,943	9	7	4
Clinton Silica	54,957	55,075	245	184	302
Total Ore	86,623	86,741	387	290	419
Rock	8,780	12,088	39	40	24
Total Ore and Rock	95,403	98,829	426	330	443

All the Bessemer ore in stock was shipped, the overrun being 869 tons. A short cut was made in the Silica pile, but no Clinton was shipped from the stockpile. The shipments for the year are shown in table II.

Table II.

Shipments.

Bessemer	31,864 Tons
Clinton (none shipped)	
Salisbury	2,150 "
Clinton Silica	35,076 "
Total	69,090 "

The stockpile balances on hand at the end of the year are shown in table III.

Table III.

Stockpile Balances.

Clinton----------5,584 Tons

Clinton Silica----------174,111 "

Total 179,695 "

The division of the production by levels is shown in table IV.

Table IV.

Level	Bessemer Tons	Salisbury Tons	Clinton Tons	Silica Tons	Total Ore Tons	Rock Tons	Total Ore and Rock Tons
3	22	216	36	722	996	6	1,002
4	12,870	152	26	9,352	22,400	254	22,654
5				1,100	1,100		1,100
8	9,738	374	282	19,294	29,688	1,562	31,250
9	512	20		4,376	4,908	128	5,036
10	1,034	6		2,948	3,988	4	3,992
13				718	718		718
14	3,992	220	32	8,274	12,518	9,186	21,704
16	60	955	250	8,291	9,556	848	10,405
Total	28,228	1,943	626	55,075	85,872	12,088	97,961
Stockpile Overrun	869						
Grand total	29,097	1,943	626	55,075	85,872	12,088	97,961

Table V.

Production by Months.

Month	Days	Ore per Day Tons	Bessemer Tons	Clinton Tons	Salisbury Tons	Silica Tons	Total Ore Tons	Rock Tons	Total Ore and Rock Tons
Jan.	26	408	2,634	96		7,881	10,611	444	11,055
Feb.	23	394	2,502	38		6,512	9,052	532	9,584
March	26	351	3,004			6,122	9,126	774	9,900
April	24	373	3,600			5,362	8,962	394	9,356
May	25	383	3,390			6,192	9,582	758	10,340
June	25	426	3,961	430	66	6,200	10,657	784	11,441

Table V.(continued)

Month	Days	Ore per Day Tons	Bessemer Tons	Clinton Tons	Salisbury Tons	Silica Tons	Total Ore Tons	Rock Tons	Total Ore and Rock Tons
July	25	384	2,468	62	1,076	6,001	9,607	1,034	10,641
Aug.	25	360	3,074		623	5,308	9,005	1,590	10,595
Sept.	25	366	3,595		178	5,379	9,152	2,470	11,622
Oct.	27					48	48	1,156	1,204
Nov.	23					70	70	926	996
Dec.	25							1,226	1,226
Total	299		28,228	626	1,943	55,075	85,872	12,088	97,960
Stockpile Overrun			869				869		869
Total			29,097	626	1,943	55,075	86,741	12,088	98,829
Transfers			-207		207				
Grand total			28,890	626	2,150	55,075	86,741	12,088	98,829

Table VI.

Delays.

Date	Hours	Tons	Cause	Cost
Jan. 9	1½		Cutting skip-rope. No electric current.	$
" 19	1		Broken axle on skip	6.00
" 29	1½	20	" " " "	6.90
" 30	1½		" " " "	6.90
Feb. 4	1		Chute pulled out at 12th level	1.40
March 4	8	200	Fatal accident	217.92
" 18	4	100	Skip off track at knuckle	14.95
July 10	4	70	Broken axle on skip	8.38
" 28	2	70	Key slipped on surface turn sheave	1.16
Aug. 27	2	30	Skip jumped the track	2.20
			Total	$265.81

Table VII.

Estimate of Ore Reserves.

Level	Bessemer Tons	Clinton Tons	Silica Tons	Total Tons
3			2,000	2,000
4			6,000	6,000

Table VII.(continued)

Level	Bessemer Tons	Clinton Tons	Silica Tons	Total Tons
5	33,000	4,000	48,000	85,000
8	80,000	23,000	76,000	179,000
9	5,000	7,000	11,000	23,000
10		5,000	15,000	20,000
12		11,000	24,000	35,000
14	6,000		16,000	22,000
16	3,000	1,000	9,000	13,000
Total	127,000	51,000	207,000	385,000
Less 10% Rock and 10% Loss in Mining	25,000	10,000	42,000	77,000
Net Total	102,000	41,000	165,000	308,000

Ore Reserves Jan. 1, 1914	360,000 Tons
Production 1914	86,741 "
Balance	273,259 "
Ore Reserves Jan. 1, 1915	308,000 "
Gain	34,741 "

Fatal Accident.

At some time between 3:30 and 4:00 P. M. Wednesday, March 4, 1914, Jonas Frost and his son, John Frost, both English miners, working in No. 10 contract on the 855 foot sub-level, were killed by a fall of ground, which broke down the timber in the drift in which they were working. The bodies were found at 9:00 o'clock Wednesday evening, but were not recovered until the next morning.

Jonas Frost was a widower, aged 51, and left a son 20 years old and a daughter 16 years old.

John Frost was married, and left a widow and a daughter one year old. He was 29 years old.

The mine did not work Wednesday night, but started again with nearly a full crew on Thursday. The loss in product amounted to about 200 tons.

SURFACE.

Stockpiles.

The Bessemer stockpile was cleaned up in September, and the trestle was erected ready for stocking ore.

The Silica stockpile floor was extended to the south-west in June, July and August, to make room for the winter's production.

Buildings.

New roofing was put on the barn in September, and the roofs of the engine and boiler house, the pump house, coal tram engine house and the drill shop in the pit were painted in October. A new ladder road was built down into the pit in June.

The stack serving the two vertical boilers in the boiler house caved in in November, and was taken down.

The coal-tunnel was repaired in October and November.

General.

A new water pipe was laid to the rented houses on Salisbury street, the old pipe having been undermined.

Several cars of timber were loaded in December, and shipped to the Lake and Morris-Lloyd mines.

UNDERGROUND.

General.

North Vein.

In the Bessemer Deposit the 315, 325 and 335 foot sub-levels were finished, the 345 foot sub-level, or fourth level, was almost finished, and work had started opening the 355 foot sub-level. Four gangs worked here up to October 1, almost all in Bessemer ore.

One gang worked until the mine closed stoping on the footwall in the Footwall Deposit, 700 feet south-east of the shaft, and another gang worked five months on the 289 foot sub-level, 350 feet south-east of the shaft, robbing out ore already developed. These gangs produced mostly Silica, but made some Clinton and Salisbury.

South Vein.

The east end of the vein between the eighth and fifth levels was developed on the 405, 415, 445, 455 and 465 foot sub-levels, and floor of the fifth level was mined to a depth of 25 feet. Further stoping was done on the 445 and 465 foot sub-levels. From four to seven gangs were working on this ore. The amount of Bessemer produced was greater than was anticipated. Three gangs worked the first part of the year, and afterwards two gangs, on the 430 and 445 foot sub-levels in the loose ground in the open room that extends up to the fifth level from 890 to 960 feet south-east of the shaft. The 430 foot sub-level was finished, and about three-quarters of the ore on the 445 foot sub-level was mined. The ore was better on the 445 foot sub-level than on the 430 foot sub-level.

On the ninth level one gang worked nine months stoping the Silica ore on the footwall north-east of No. 4 shaft. Another gang nearly finished the ore at the east end of the vein on the 570 foot sub-level in the loose ground in the open room and in the pillar on the west side of the room. There are two open rooms at this end of the vein formed by the caving of stopes on the tenth and eleventh levels, and the pillar between them has been cut off, so that the roof is unsupported over a large area. It is probable that enough rock will fall from the back, while the mine is closed to ensure the safety of workings in the ore under the openings.

South-West Deposit.

The thirteenth level and the sub-level below it have been finished, and a little work has been done in opening the 770 foot sub-level at the east end of the deposit. Good Bessemer ore was mined in two places along the south diorite contact. Three gangs worked here until October 1st.

A little good ore was scrammed off the footwall on the 885 and 895 foot sub-levels south of the shaft, and the 845 and 855 foot sub-levels have been finished in the Silica ore-body on the footwall west of the shaft.

The most important piece of development work done is the rock drift on the fourteenth level, which is being driven to the south-east to

reach the ore found by diamond drilling about 1300 feet south-east of the mine. The old drift was retimbered from the air-shaft to No. 4 shaft, and was reopened 70 feet in the old workings, being turned a little to the south, 80 feet south of No. 4 shaft. Since Oct. 1 the drift has been in hard diorite, and the breast is now 694 feet south of No. 4 shaft. A little better progress is being made each month. They have 1050 feet to go to reach No. 4 drill hole.

DETAILS BY CONTRACTS.

North Vein.

Bessemer Deposit.

315 Foot Sub-level.

At the beginning of the year two contracts, No. 5 and No. 16, were working on this sub-level near the hanging-wall west of the big raise, which is 1310 feet south-east of the shaft. No. 5 finished the ore near the big raise in January, and went down to the 325 foot sub-level.

No. 16 mined the ore east of their raise, which is 1250 feet south-east of the shaft, and moved down to the 325 foot sub-level in the latter part of February.

325 Foot Sub-level.

No. 4 stoped the ore 30 feet east and west from the crosscut north of their raise, which is 50 feet north of the big raise, for three months, and moved to the 335 foot sub-level in April.

No. 15 mined the ore over the main drift east of the big raise, and moved down to the 335 foot sub-level in March. No. 5 came down from the 325 foot sub-level in January, and drifted west 60 feet from the big raise. They mined the pillar north of the big raise, and went down to the 335 foot sub-level in March.

No. 16 came down from the 315 foot sub-level in the latter part of February, and drifted east from their raise, which is 1250 feet south-east of the shaft, following the diorite contact until they holed with No. 5's drift. They mined the ore north of this drift, and went down to the 335 foot sub-level in April.

335 Foot Sub-level.

No. 15 came down from the 325 foot sub-level in March, repaired the big raise, and crosscut north from it 10 feet to the jasper footwall. They went down to the fourth level, or 345 foot sub-level in April.

No. 5 came down from the 335 foot sub-level in March, and drifted west from the big raise 60 feet, and crosscut north to No. 4's raise. They mined the ore north of their west drift, and moved down to the fourth level in July.

No. 16 came down from the 325 foot sub-level in April, and drifted east from their raise, which is 1250 feet south-east of the shaft, to No. 5's drift, following the diorite contact on the south. They mined the ore north of this drift and west of No. 5's stope, and went down to the fourth level at the end of July.

No. 4 came down from the 325 foot sub-level in April, and crosscut 40 feet north from their raise, which is 50 feet north of the big raise, to the footwall. They drifted east and west from this crosscut and mined the ore on the footwall. They went down to the fourth level at the end of July.

Fourth Level or 345 Foot Sub-level.

No. 15 came down from the 335 foot sub-level in April, cleaned up and repaired the east drift, and mined the ore on both sides and in the back as far west as the big raise. In September they went down to the 355 foot sub-level.

No. 5 came down from the 335 foot sub-level in July and retimbered the drift west of the big raise. They had mined all the ore north of this drift for 50 feet west of the big raise, when the mine closed on September 30th.

No. 16 came down from the 335 foot sub-level at the end of July, and stoped the ore north of the drift east of their raise, which is 1250 feet south-east of the shaft, for 25 feet, leaving a pillar two sets wide between their stope and No. 5's, when the mine closed on September 30th.

No. 4 came down from the 335 foot sub-level at the end of July