MAINTENANCE ACCOUNTS

Compressors and Power-Drills

1922	$ 383.07	$ .002
1923	1,589.24	.006
Increase	$ 1,206.17	$ .004

In 1922 one drill cost $ 110. In 1923 six drills cost $ 1020, an increase of $ 910. Air-line cost increased $ 118, on account of repairs to the line to the Angeline Mine. Repairs to the compressor increased $ 178.

Hand Tramming Equipment

1922	$ 2,736.24	$ .013
1923	3,021.75	.011
Increase	$ 285.51	
Decrease		$ .002

The increase is in track expense.

Electric Tram Equipment

1922	$ 4,629.36	$ .021
1923	5,554.38	.020
Increase	$ 925.02	
Decrease		$ .001

Locomotives cost less in 1923 than in 1922, but tracks and cars cost more. Main-line tracks increased $ 424 and car-repairs increased $ 654, mostly on account of over-hauling the cars on the third level.

Pumping Machinery

1922	$ 344.72	$ .002
1923	449.98	.002
Increase	$ 105.26	$ .000

The increase is mostly in supplies for repairs to electric pumps. There was trouble with the impellors on the centrifugal pump.

SURFACE COSTS

Hoisting

1922	$ 14,925.18	$ .069
1923	17,733.62	.064
Increase	$ 2,808.44	
Decrease		$ .005

Supplies, mostly power, increased $ 1684, and labor of operation, on account of longer operation on two shifts, increased $ 1125.

Stocking Ore

1922	$ 9,013.08	$ .041
1923	12,230.22	.044
Increase	$ 3,217.14	$ .003

Portable trestle cost decreased $ 88, but operating the tram system increased $ 3156, and rock-pickers cost $ 172 more in 1923.

Screening-Crushing at Mine

1922	$ 4,202.02	$ .019
1923	5,993.03	.022
Increase	$ 1,791.01	$ .003

Supplies for maintenance increased $ 1131 on account of concaves, gears, and repairs to motor. Operating expense increased $ 770, mostly labor.

Dry House

1922	$ 5,585.51	$ .026
1923	6,222.57	.023
Increase	$ 637.06	
Decrease		$ .003

The increase is nearly all labor on account of the longer period of double-shift operation.

General Surface Expense

1922	$ 6,153.24	$ .028
1923	7,339.76	.027
Increase	$ 1,186.52	
Decrease		$ .001

The increase is due to more intensive operation in 1923.

MAINTENANCE ACCOUNTS

Hoisting Equipment

1922	$ 1,773.99	$ .008
1923	4,159.98	.015
Increase	$ 2,385.99	$ .007

Two Lilly Hoist Controllers cost $ 1955 in 1923, wire-ropes were about the same in both years, and repairs to skips and skip-roads increased $ 400.

Shaft

1922	$ 180.27	$ .001
1923	493.47	.002
Increase	$ 313.20	$ .001

Repairs in 1923 included fire-proofing and putting in new sets after the accident in March. New steel sets were purchased also.

Top Tram Equipment

1922	$ 914.69	$ .004
1923	1,154.75	.004
Increase	$ 240.06	$ .000

Motors cost $ 201 more in 1923, cars $ 39 more and wire-rope $ 73 more. Sheaves and rollers were $ 72 less.

Docks, Trestles and Pockets

1922	$ 1,482.52	$ .007
1923	2,318.24	.008
Increase	$ 835.72	$ .001

Grading and planking stock-pile floors cost $ 636 less in 1923, but relaying floors on permanent trestles cost $ 1191 more, and pockets and chutes cost $ 280 more.

Mine Buildings

1922	$ 1,516.39	$ .007
1923	1,416.55	.005
Decrease	$ 99.84	$ .002

In 1922 the principal cost was for painting, especially the shaft-house. In 1923 a new hot-water tank and new piping for the dry were the largest items.

GENERAL MINE ACCOUNTS

Insurance

1922	$ 17.28	$ .000
1923	31.48	.000
Increase	$ 14.20	$ .000

Engineering

1922	$ 1,807.11	$ .008
1923	1,497.20	.005
Decrease	$ 309.91	$ .003

This is a Central Office charge. When the Cliffs Shaft Mine started up in 1922 part of the engineering charge was absorbed by that mine.

Analysis

1922	$ 7,305.63	$ .034
1923	8,931.46	.032
Increase	$ 1,625.83	
Decrease		$ .002

In 1922 Central Laboratory charges were $ 6247 and in 1923 they were $ 7460, an increase of $ 1213. The balance is nearly all labor at the mine on account of larger shipments.

Personal Injury Expense

1922	$ 3,842.32	$ .018
1923	15,951.05	.058
Increase	$ 12,108.73	$ .040

This is a Central Office charge. The principal items in 1923 were payment for Mike Ritari's death, $ 4200, settlement with Jacob Kangas, $ 3871, and settlement with Paul St. John, $ 1292.

Safety Department Expense

1922	$ 294.89	$ .001
1923	163.51	.001
Decrease	$ 131.38	$ .000

Central Office charge.

Telephones and Safety Devices

1922	$ 25.94	$ .000
1923	1,726.47	.006
Increase	$ 1,700.53	$ .006

The principal items of increase were:-

Telephones	$ 40
Safety gates, etc., including part of E. and A. 444	897
Signs and signals	68
Railings	32
Fire protection, including proportion of cost of new fire-helmets	620
	$ 1657

Local General Welfare

1922	$ 716.41	$ .003
1923	875.23	.003
Increase	$ 158.82	$ .000

This is a Central Office charge. The increase is mostly in supplies.

Mine Office

1922	$ 10,819.58	$ .050
1923	9,670.14	.035
Decrease	$ 1,149.44	$ .015

Direct labor charges decreased from $ 4934 in 1922 to $ 3325 in 1923, on account of increased activity at other mines in 1923. Local office salaries were higher in 1923.

RECAPITULATION

	Year 1922		Year 1923		Increase		Decrease	
	Total	Per Ton	Total	Per Ton	Total	Per Ton	Total	Per Ton
Underground Costs	271681.32	1.246	372582.10	1.347	100900.78	.101		
Surface Costs	45746.89	.210	59062.19	.214	13315.30	.004		
Gen. Mine Accounts	24829.16	.114	38846.54	.140	14017.38	.026		
Cost of Production	342257.37	1.570	470490.83	1.701	128233.46	.131		

REPUBLIC MINE.

ANALYSIS OF COST SHEETS FOR THE YEARS 1922 & 1923.

UNDERGROUND COSTS.

EXPLORING IN MINE.

Year	1922,	$9,139.79
"	1923,	15,182.42
Increase,		6,042.63

Increased due to the mine operating full time in 1923, whereas in 1922, we operated only three single shifts a week up until June 1st.

Larger cost also due to 10% increase in wages effective May 1st, 1923.

Although the total cost increased, the actual cost per foot showed a large decrease, as follows:-

Cost per foot for	1922,	$3.57
" " "	1923,	3.196

Decreased due to drilling a larger proportion of footage in ore and Soaprock than in the year previous when most of the drilling was in hard material.

SHAFT SINKING.

Year	1922,	$15,825.75
"	1923,	18,208.96
Increase,		2,383.21

Increased due to more days spent in the shaft by the sinking crew in the year 1923 than in 1922, and also due to 10% increase in wages.

DEVELOPMENT IN ROCK.

Year	1922,	$10,188.01
"	1923,	22,843.44
Increase,		12,655.43

Increased due to the mine operating full time in 1923, whereas in 1922, we were on a part time basis for a portion of the year.

Increased cost also due to average wage scale for 1923 being $4.58, whereas in 1922, it was $4.11 per day.

Due to shortage of trammers and the miners therefore being compelled to tram their own dirt, the cost per foot shows a larger increase than is accounted for in the two reasons given above. The miners are naturally not as efficient in loading rock as a gang of trammers would be, as the latter are always much younger and more active men than the miners. We hope to over-come this discrepancy in 1924 by the use of scrapers.

ORE DEVELOPMENT.

Year	1922,	$21,916.54
"	1923,	27,152.59
Increase,		5,236.05

Increased due to the same reasons as given above, viz: increased wages and more days operated in 1923.

In 1922, 16,163 tons were broken in development work compared with 21,128 tons in 1923. The unit cost for the two years was 1.36 and 1.28, showing a small decrease for 1923.

STOPING.

Year	1922,	$71,715.54
"	1923,	115,951.72
Increase,		44,236.18

The unit cost for stoping in 1922 was .731 and in 1923, .972 on the actual tonnage broken. The cost per ton for supplies for the two years was .214 and .222, showing very little change. The increased labor cost is due to the smaller combined cross-sectional area of the stopes worked during the year compared with the previous year.

TIMBERING.

Year	1922,	$ 8,062.44
"	1923,	9,214.98
Increase,		1,152.54

The unit cost for the two years shows practically no change. The total cost for 1923 is a little larger due to the additional shifts operated in that year compared with last year.

TRAMMING.

Year	1922,	$32,721.49
"	1923,	51,169.17
Increase,		18,447.68

The tramming cost increased due to larger car rate paid contract trammers in 1923 compared with previous year.

The cars per trammer per day averaged 16.7 for 1922 compared with 18.6 in 1923.

This account includes not only contract tramming, but also considerable Co. a/c labor, such as skip-tenders, motor-men, pocket-men, chute-men, etc.; as the daily average hoist was only 356 tons per day in 1923, compared with 411 in 1922, the over-head cost for tramming per ton naturally show a considerable increase.

PUMPING.

Year	1922,	$6,789.37
"	1923,	7,063.13
Increase,		273.76

Water pumped in	1923,	37,204,860 gallons,
" " "	1922,	41,620,635 "

The increased expense in 1923 was entirely due to the 10% increase in wages.

COMPRESSORS & AIR PIPES.

Year	1922,	$ 7,124.23
"	1923,	12,468.93
Increase,		5,344.70

Large increase due to drought making it necessary to operate steam compressors. In 1922, 12.52% of compressed air was made with the steam compressors; in 1923, 28.65% of compressed air made by steam. You will note that the latter is over double the amount made the year before.

UNDERGROUND SUPERINTENDENTS.

Year	1922,	$5,021.83
"	1923,	6,176.03
Increase,		1,154.20

Increased entirely due to the mine operating 297 shifts in 1923 compared with 239 in 1922.

COMPRESSORS & POWER DRILLS.

Year	1922,	$ 199.18
"	1923,	2,495.56
Increase,		2,296.38

Increased due to purchasing new #248 drilling machines for the sinking of the Pascoe Shaft.

TRAMMING EQUIPMENT.

Year	1922,	$5,444.90
"	1923,	6,538.17
Increase,		1,093.27

Increased due to heavier maintenance, particularly labor on the cars on the motor haulage level. These cars were first put in service in 1920, and a great many of them had to be entirely re-built in 1923.

PUMPING MACHINERY.

Year	1922,	$ 814.65
"	1923,	1,335.16
Increase,		520.51

Increased due to purchasing new belt for the Pascoe Shaft 1223' Level electric pump.

Increased cost also due to cutting out pump house and sump on the 2670' Level, Pascoe Shaft.

SURFACE COSTS.

HOISTING.

Year	1922,	$26,150.26
"	1923,	33,006.72
Increase,		6,856.46

Increased due to larger coal consumption in 1923 compared with previous year.

The electric power consumed in the No. 9 Shaft hoist also shows an increase, due to larger tonnage handled. The amount expended for power in 1923 was $15,217.20 compared with $12,563.25 for 1922.

The 10% increase in wages in 1923 also helped to swell the total cost.

STOCKING ORE.

Year	1922,	$9,244.78
"	1923,	9,247.15
Increase,		2.37

The reason for the cost not being increased in 1923 was due to the fact that all of the Crushed ore produced from the mine during the shipping season was sent to the Docks; whereas, in the previous year, the Crushed product was stocked during the shipping season.

CRUSHING - SCREENING AT MINE.

Year	1922,	$1,348.97
"	1923,	5,836.06
Increase,		4,487.09

Large increase due to operating the Crushing Plant during the shipping season; in 1922, the Crushing Plant was operated only a few days.

DRY HOUSE.

Year	1922,	$1,688.89
"	1923,	2,135.48
Increase,		446.59

Increased due to mine operating full time in 1923 compared with only part time operations in 1922.

GENERAL SURFACE EXPENSE.

Year	1922,	$4,472.00
"	1923,	5,416.27
Increase,		944.27

Increased due to operating 297 shifts in 1923 compared with 239 shifts in 1922; also due to 10% increase in wages.

HOISTING EQUIPMENT.

Year	1922,	$6,130.13
"	1923,	8,877.29
Increase,		2,747.16

The maintenance cost increased due to putting on 3,000 feet of 1¼" new Plow Steel Hoisting Rope, No. 9 Shaft.

Increase also due to building new skip for #9 Shaft which is the first one constructed for this shaft since 1914.

A spare #9 cage was also repaired.

The sheaves for the underground hoist, Pascoe Shaft, had to be renewed.

SHAFT.

Year	1922,	$ 582.04
"	1923,	3,939.61
Increase,		3,357.57

Increased due to repairing Pascoe Shaft from the 2370' Level down to the 2670' Level.

Increase also due to repairing the storage pockets on the motor haulage level. While the mine was operating part time in 1921-1922, very few repairs were made, and as a result, considerable extraordinary repairing had to be done in 1923.

TOP TRAM EQUIPMENT.

Year	1922,	$1,584.49
"	1923,	2,217.92
Increase,		633.43

Replacement of 5/8" and 3/4" top tram ropes were much heavier in 1923, due to operating more shifts than the year previous.

DOCKS, TRESTLES & POCKETS.

Year	1922,	$3,321.99
"	1923,	1,387.99
Increase,		1,934.00

The expense in 1922 was heavier than 1923 due to planking #9 Shaft Lump ore stocking grounds.

MINE BUILDINGS.

Year	1922,	$ 734.89
"	1923,	7,189.92
Increase,		6,455.03

Increased due to re-building and repairing No. 9 Shaft Dry.

ENGINEERING.

Year	1922,	$1,433.88
"	1923,	1,629.03
Increase,		185.15

The Engineering work at the Republic Mine involved some additional labor in 1923, because of the measuring up and calculating the contents of all the stockpiles.

ANALYSIS.

Year	1922,	$2,593.19
"	1923,	2,924.70
Increase,		331.51

The cost of operating the Laboratory shows an increase for 1923, because of the fact that it required more labor and chemicals to make the determinations involved in analyzing shipments, which showed a very large increase in 1923 compared with previous year.

PERSONAL INJURY EXPENSE.

Year	1922,	$2,775.59
"	1923,	2,173.67
Decrease,		601.92

It is difficult to explain this decrease exactly except in a general way. The Personal Injury Expense depends entirely on the number and severity of the accidents during the year. During 1923, we were fortunate in having nothing but minor accidents.

SAFETY DEPARTMENT EXPENSE & SAFETY DEVICES.

Year	1922,	$1,253.31
"	1923,	1,501.10
Increase,		247.79

These accounts show an increase due to the purchasing of five new fire fighting helmets.

MINE OFFICE EXPENSE.

Year	1922,	$23,046.33
"	1923,	23,623.15
Increase,		576.82

The mine office expense increased due to increase in wages, effective May 1st, 1923.

COMPARISON OF COSTS

TOTALS OF NEGAUNEE, MAAS, CLIFFS SHAFT AND MORRIS-LLOYD MINES FOR MONTHS OF MAY, JUNE, JULY FOR YEARS 1923 AND 1918.

	YEAR 1923		YEAR 1918		INCREASE	DECREASE
Total Product	289,735 Tons		391,650 Tons			111,915
Monthly Average	96,578 "		130,550 "			33,972
Tons per Man per Day	4.59 "		4.20 "		.39	
Total Days Worked	63,101		93,104			30,003
Total Earnings	305,126.49		437,670.55			132,544.06
Average Rate per Day	4.84		4.69		.15	
	AMOUNT	PER TON	AMOUNT	PER TON		
Labor	337,933.08	1.166	455,831.44	1.164	.002	
Electric Power	62,825.21	.217	70,013.74	.179	.038	
Explosives	31,173.72	.108	50,441.20	.129		.021
Lumber & Timber	19,812.69	.068	19,374.35	.050	.018	
Other Supplies	74,881.65	.257	109,339.34	.279		.022
Total,	526,626.35	1.816	705,000.07	1.801	.015	
Taxes	99,000.00	.341	69,500.00	.178	.163	
Depreciation & Miscellaneous	44,500.25	.154	79,248.81	.202		.048
Grand Total,	670,126.60	2.311	853,748.88	2.181	.130	

LAKE MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1923.

GRADE	IRON	PHOS.	SILICA
Lake,	(No Production)		
Lakedale,	(No Production)		

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1923.

	Mine		Lake Erie	
GRADE	IRON	PHOS.	IRON	MOIST.
Lake,	(No Shipments)			
Lakedale,	(All Mixed)			

ORE STATEMENT - DECEMBER 31ST, 1923.

	LAKE ORE AT MINE	LAKEDALE AT MINE	LAKE ORE STOCKED AT PRESQUE ISLE	TOTAL	TOTAL LAST YEAR
On Hand January 1, 1923,	11,522	157,905	22,963	192,390	220,972
Output for Year,	-	-	-	-	-
Total,	11,522	157,905	22,963	192,390	220,972
Shipments,	-	92,919	-	92,919	28,582
Balance on Hand,	11,522	64,986	22,963	99,471	192,390
Decrease in Ore on Hand,				92,919	

1923 -- Mine closed.

1922 -- Mine closed.

LAKE MINE

SHIPMENTS FOR YEAR-1923

GRADE	POCKET	STOCKPILE	PRESQUE ISLE STOCKPILE	TOTAL	TOTAL LAST YEAR
Lake,	-	-	-	-	832
Lakedale,	-	92,919	-	92,919	27,750
Total,	-	92,919	-	92,919	28,582
Total Last Year,	-	28,582	-	28,582	
Increase,				64,337	

LAKE MINE

COMPARATIVE WAGES AND PRODUCT

	1923	1922	INCREASE	DECREASE
PRODUCT	-	-		
No.Shifts & Hours				
AVG.NO. MEN WORKING				
Surface	1	1		
Underground	0	0		
Total	1	1		
AVG.WAGES PER DAY				
Surface	8.20	7.23	.97-13.4%	
Underground				
Total	8.20	7.23	.97-13.4%	
WAGES PER NO.OF 25 DAYS				
Surface	205.00	180.75	24.25	
Underground				
Total	205.00	180.75	24.25	
PRODUCT PER MAN PER DAY				
Surface				
Underground				
Total				
LABOR COST PER TON				
Surface				
Underground				
Total				
AVG.PRODUCT BRK'G & TRM'G				
" WAGES CONTRACT MINERS				
" " " TRAMMERS				
TOTAL NO.OF DAYS				
Surface	312	334		22
Underground				
Total	312	334		22
AMOUNT FOR LABOR				
Surface	2560.00	2415.39	144.61	
Underground	2			
Total	2560.00	2415.39	144.61	

Abandoned June 1, 1921.
Only Captain employed during 1922 and 1923.

ANNUAL REPORT

OF THE

CLIFFS SHAFT MINE (1923)

PRODUCTION AND SHIPMENTS

The Cliffs Shaft Mine worked 299 days in 1923, and produced 290,615 tons of ore, an average of 972 tons per day. Production in May and June was low on account of a shortage of trammers, but was increased again by greater use of mechanical equipment and by some changes in mining methods.

15,112 tons of rock were produced, all of which was dumped underground.

Shipments to the docks started on April 21st and closed on December 3rd. Shipments from stock-pile were large, and the balance on hand at the end of the year was the smallest for several years.

TABLE I

PRODUCTION BY GRADES

	Year 1923		Year 1922	
Grade	Tons	Per Cent	Tons	Per Cent
Lump	192,502	66.2	89,970	68.4
Crushed	98,113	33.8	41,532	31.6
Total	290,615	100.0	131,502	100.0

TABLE II

SHIPMENTS

Grade	Pocket Tons	Stock-Pile Tons	Total Tons
Lump	117,099	104,097	221,196
Crushed	54,560	161,253	215,813
Total	171,659	265,350	437,009

TABLE III

ORE IN STOCK DEC. 31, 1923

Lump	54,012 Tons.
Crushed	71,087 Tons.
Total	125,099 Tons.

TABLE IV

DIVISION OF PRODUCT BY LEVELS.

	A SHAFT			B SHAFT			BOTH SHAFTS		
Level	Ore Tons	Rock Tons	Total Tons	Ore Tons	Rock Tons	Total Tons	Ore Tons	Rock Tons	Total Tons
1				25,171	180	25,351	25,171	180	25,351
2	11,012	118	11,130	478		478	11,490	118	11,608
3	2,383		2,383	2,182	52	2,234	4,565	52	4,617
4	5,698	538	6,236	6,754		6,754	12,452	538	12,990
5	27,226	148	27,374	1,229	42	1,271	28,455	190	28,645
6	17,621		17,621	7,649	636	8,285	25,270	636	25,906
7	30,984	714	31,698	20,899	40	20,939	51,883	754	52,637
8	8,854	1,232	10,086	4,502	536	5,038	13,356	1,768	15,124
9	9,127	176	9,303	3,470	626	4,096	12,597	802	13,399
10	8,203	1,432	9,635	3,758	3,726	7,484	11,961	5,158	17,119
11	10,006	72	10,078	5,462	1,572	7,034	15,468	1,644	17,112
12	9,065	58	9,123	26,105	450	26,555	35,170	508	35,678
13				21,180	1,192	22,372	21,180	1,192	22,372
14				18,880	534	19,414	18,880	534	19,414
15	190	686	876	2,527	352	2,879	2,717	1,038	3,755
Total	140,369	5,174	145,543	150,246	9,938	160,184	290,615	15,112	305,727

TABLE V

PRODUCTION BY MONTHS.

Month	Days	Ore Per Day Tons	Lump Tons	Crushed Tons	Total Ore Tons	Rock Tons	Total Ore And Rock Tons
January	26	1,009	17,055	9,175	26,230	1,288	27,518
February	23	965	14,447	7,760	22,207	1,220	23,427
March	26	940	15,880	8,541	24,421	1,642	26,063
April	24	984	15,589	8,016	23,605	2,106	25,711
May	26	899	15,820	7,569	23,389	1,742	25,131
June	25	863	14,460	7,113	21,573	882	22,455
July	25	955	15,795	8,086	23,881	894	24,775
August	26	995	17,081	8,802	25,883	1,168	27,051
September	24	1,075	17,274	8,530	25,804	994	26,798
October	25	1,020	17,118	8,373	25,491	1,198	26,689
November	25	957	16,265	7,665	23,930	948	24,878
December	24	1,008	15,718	8,483	24,201	1,030	25,231
Year	299	972	192,502	98,113	290,615	15,112	305,727

TABLE VI

DELAYS

Date	Hours	Tons Lost	Cause	Repair Cost
Jan. 4	1¼	150	Lump chute in crusher building broke down.	$ 6.20
7	1¼	150	" " " " " " "	6.20
9	¾	50	Dumping rod on B shaft top tram car broke.	7.97
14	¾	50	" " " " " " " " "	7.97
19	1½	150	While B shaft skip was being changed, at noon, it dumped over on its side.	4.05
30	½	150	No current.	
31	1	100	A shaft pocket blocked with chunks.	
Feb. 5	1¼	200	Loading R.R. cars; cars frozen to track.	
7	½	60	A shaft skip went through fifth level gate.	23.46
8	½	100	Loading R.R. cars; one of cars was too large to pass crusher building.	
9	¾	100	Loading R.R. cars; cars frozen to track.	
10	2	200	Broken axle and rope on lump stockpile car.	2.26
15	½	75	Loading R.R. cars.	
21	1	150	Axle on lump stockpile car broke.	15.92
March 6	2	200	Two runners on second level A shaft broke.	13.69
9	1¾	200	Rope on lump stockpile car broke.	47.32
12	¾	75	Axle on " " " " .	15.55
13	2	150	Gate and timber smashed at 8th level A shaft	13.12
16	¾	100	Rope on lump stockpile car broke.	1.72

Date	Hours	Tons Lost	Cause	Repair Cost
March 19	1	125	Changing rope on lump stockpile car.	
22	1	150	Rubber on winding sheave wore out, causing rope to come off lump car.	$ 7.72
28	½	60	Chutes blocked in crusher.	
May 3	1	125	Waiting for R.R. cars.	
7	1	125	Wheel on top tram car broke.	17.78
June 7	1½	200	Waiting for R.R. cars	
July 25	1½	200	Taking down storage battery motor - A shaft.	
Aug. 10	8	995	President Harding's funeral.	
Oct. 5	1¼	150	No air.	
15	2½	250	Broken counterbalance - A.M.	12.90
			Skip pulled out air lift and pocket door-P.M.	10.65
25	1	125	No current.	
Nov. 1	1	150	Chutes clogged with mud - crusher building.	
2	3	300	Chunks blocked pockets on surface.	
6	2½	225	" " " " "	
7	1½	175	" " " " "	
9	1	125	A shaft pocket blocked with chunks.	
14	2¾	300	No current-2 hours; no R.R. cars-45 minutes.	
26	1	125	Motor belt smashed in lower tram-½ hour.	23.90
			Chunks blocked A shaft pocket-½ hour.	
Dec. 4	1½	175	A shaft pocket blocked with chunks.	
5	1	125	Chunks blocked pockets on surface.	
31	1	125	B shaft pocket blocked with chunks.	
		6,740		
Total	55¼	6,740		$ 238.38

DELAYS DUE TO LACK OF CURRENT

Date	Hours	Tons Lost	Cause
Jan. 30	½	150	Main line trouble.
Oct. 25	1	125	" " "
Nov. 14	2	225	" " "
Total	3½	500	

TABLE VII

ESTIMATE OF ORE RESERVES, DEC. 31, 1923.

	A Shaft Tons	B Shaft Tons	Total Tons
Pillars	1,009,000	633,000	1,642,000
Floors	1,970,000	1,006,000	2,976,000
Partly Developed	24,000	24,000	48,000
Total	3,003,000	1,663,000	4,666,000
Less 10% Rock	300,000	166,000	466,000
Net Total	2,703,000	1,497,000	4,200,000
To Support Surface	1,505,000	994,000	2,499,000
Available Ore	1,198,000	503,000	1,701,000
Less 10% Rock & 10% Loss in Mining	240,000	100,000	340,000
Net Available Ore	958,000	403,000	1,361,000

RECAPITULATION

	Developed Tons	Prospective Tons	Total Tons
Available Ore	1,653,000	48,000	1,701,000
Less 10% Rock & 10% Loss in Mining	330,000	10,000	340,000
Net Available Ore	1,323,000	38,000	1,361,000

Factors used :- 8, 9, 10 cu. ft. per ton.

GENERAL

LABOR

Labor of all kinds was plentiful until April. From April until December there was a shortage of trammers, which was greatest in September, at which time less than half the normal number of trammers were working. The supply of surface-labor was sufficient at all times.

Wages were increased 10% on May 1.

NEW CONSTRUCTION AND EQUIPMENT.

E. AND A. 428. FINE CRUSHER.

Work on the erection of the fine-crushing plant was continued during the winter, but was delayed by late delivery of material, especially electric motors.

The crusher was tried out in February, but would not handle wet ore, and several changes were necessary to overcome this difficulty. The large amount of magnetite in the ore also caused trouble, and changes and adjustments were necessary, so that regular crushing was not started until April. Crushing at night was started in May and continued until June 14th. On that date crushing Cliffs Shaft ore was discontinued, and thereafter the crusher was run on night-shift only, crushing Holmes ore, until July 21st. It was started again in the fall, working only at night, and crushed the remaining amount of Holmes ore that had been sold.

18,403 tons of Cliffs Shaft ore and 27,111 tons of Holmes ore were crushed during the season.

E. AND A. 434. 3 STORAGE BATTERY LOCOMOTIVES.

In anticipation of a shortage of trammers three 4-ton Goodman storage-battery locomotives were ordered early in the year, but were not delivered until July. One was put on the first level in B shaft, one on the fifth level in A shaft, and the third, which was planned for the rock-dump, was put on the seventh level in A shaft, all three being charged from the trolley-circuit. They have been of great help in maintaining production while the shortage of trammers was acute.

Sixteen new cars were built, and eight old ones were repaired and changed for service with these locomotives. Considerable track-work was necessary to prevent derailments, but results have been even better than anticipated.

E. AND A. 437. LILLY HOIST CONTROLS.

Two Lilly Hoist Controls were erected in the engine-house and connected to the hoists in October and November. They were charged out directly into operating expense.

E. AND A. 444. FIRE PROTECTION.

A thorough study was made of conditions on surface and underground, and extra precautions have been taken to prevent the occurrence of fire and to facilitate the work of extinguishing it, if it does occur.

Extra fire extinguishers and fire-pails have been purchased and placed in the principal buildings, hose connections have been made underground, and doors for controlling ventilation in case of fire underground have been ordered, but have not yet been received.

E. AND A. 448. STEEL ORE-CARS.

Sixteen 5-ton steel rocker-dump cars have been ordered for the fifteenth level to replace the wooden cars now in use, which will be used on the eighth level in A shaft and the tenth level in B shaft. The new cars have not been received yet, but the work of changing chutes and pockets has been started.

ELECTRIC HAULAGE

The trolley locomotive on the tenth level in B shaft was started in January, and the eighth level in A shaft has been prepared for motor-haulage, the only work remaining to be done being hanging the trolley-wire and bonding the rails. All of this work has been charged directly to operations.

SCRAPERS

Seven new scrapers and six scraper-hoists were purchased or built

during the year, and have aided materially in reducing the cost of tramming and increasing the production of the mine. Experiments with an electric hoist have been so successful that this kind of power will undoubtedly be used for the larger units in the future.

ROCK-DRILLS

The old No. 18 Ingersoll-Leyner drills are being replaced by No. 248 drills of the same make, 14 new drills having been purchased and charged out during the year.

EXPLORATION.

UNDERGROUND DIAMOND DRILLING.

The diamond drill was started late in September, and hole No. 325 was drilled N 60° W horizontally from the west end of the fifteenth level in B shaft. This hole was continued to a depth of 291 feet, and cut three veins of ore, at least one of which promises to be large enough to mine.

The next hole was drilled due south from the fifteenth level drift at a point 1500 feet west of B shaft, and was finished at a depth of 339 feet without finding any ore.

The drill was then moved to the eleventh level in A shaft, and is putting in hole No. 327 due south from a point 1280 feet east of A shaft. This hole is in altered diorite for 49 feet, and is still being drilled.

POWER

The main boiler-plant was shut down on May 31, and heat was supplied by the boiler in the dry until September 29. The main boiler-plant and the steam-driven air-compressor were both started up on that date, and the compressor was run until October 19th and again from October 30th to the end of the year.

A large tonnage of coal was dumped in the dock in the fall, and there are now 3666 tons on hand.

On account of a shortage of water-power the mine was closed on October 6th and 13th.

CLIFFS SHAFT MINE

SURFACE

COAL-DOCK

The coal-dock was extensively repaired, and, except for some work to be done on the side sheathing, should give no trouble for several years.

HOISTING EQUIPMENT

One skip was entirely rebuilt and one was repaired during the year.

The small wood-lined idler sheaves have been replaced by small cast-iron sheaves with roller bearings.

A new hoisting-rope was put on for B shaft.

STOCK-PILES

Enough crushed ore was shipped to clear the "Deer Lake track", which has been blocked for three years, and it will not be necessary to cover this track again this winter.

All the lump ore was shipped, except that part of the pile close to the pocket-track near the crusher-building. There is a substantial overrun in this pile. The stock-pile sollars have been repaired and a new trestle erected for lump ore.

TOP TRAM

The floor of the high trestle that was not finished last year near B shaft was relaid early in the summer. One car was rebuilt, and a new car for the lump stock-pile was built.

Changes were made in the crusher-building, where the cars are dumped, to facilitate handling the large chunks that were hoisted during the latter half of the year.

UNDERGROUND

GENERAL

On account of a shortage of labor during the summer months the number of contracts was slightly reduced, and half of the gangs working had to do their own tramming. Six scrapers were put in use, four in B shaft and two in A shaft,

dragging the ore into chutes, which helped to relieve the situation. These scrapers are operated by the miners, no trammers being necessary. Additional raises have also been put up, where the position of the vein made it possible, so that the miners can break the ore directly into the chutes with little or no handling, and more work of this kind is now being carried on in anticipation of a shortage of trammers again next summer. These changes in mining practice, however, have caused some delays in hoisting and stocking ore on account of the large chunks that occasionally get into the cars.

At the beginning of the year the mine started out with fifty contracts working, but this number was reduced during the summer months so that the average for the year was 48, which is also the number of gangs now working. During the first part of the year there was an unusually large number of contracts engaged in drifting and raising both in rock and ore, the drifting being more on account of narrow veins than extra development. This condition was improved as the year advanced.

The average classification of the contracts is shown in the following table:-

CLASSIFICATION OF CONTRACTS

	A Shaft	B Shaft	Total
Stopes	9	8	17
Floors	9	8	17
Backs	1	1	2
Drifts and Raises in Ore	4	4	8
Rock	2	2	4
Total	25	23	48
Developing New Ore	12	10	22
Mining Known Reserves	11	11	22
Rock	2	2	4
Total	25	23	48

DEVELOPMENT.

A SHAFT.

In the North Vein the principal development has been on the sixth level at the east end of the vein, where the ore is being followed to the north-east. The ore is 80 feet wide, 2,000 feet north-east of A shaft, and the geological conditions make it probable that this ore will connect either on the sixth or seventh level with the ore on the fifth level of No. 3 Mine, 700 feet further north-east. Further development on the eighth level under this ore-body will be necessary to facilitate its mining.

On the fifth level the ore in the North Vein has been followed west for 100 feet into B shaft territory, 800 feet north-west of A shaft, and the breast is still in good ore.

On the seventh level in the same vein the rock drift west under the sixth level ore-body was finished in January, and two raises were put up in ore. The floor of the sixth level is being mined through these raises.

In the Main Vein there has been no development of importance above the seventh level. This level has been driven to the east partly in ore and partly in rock to open the ore below the bottom level of the Incline Mine, and the drift is now 2400 feet east of A shaft. A new raise has been put up here from the eighth level to serve as a chute. Some new ore has been found already, and, as soon as the electric haulage on the eighth level is in operation, drifting will be increased, and new ground will be opened up. Two veins of ore are already known in this territory.

There is no development in the Main Vein between the eighth and eleventh levels. On the eleventh level the ore was followed to the east in two stopes until it apparently was cut off. By going through some poor ground, however, the ore was found again, and is being followed to the east along the south foot-wall. On the twelfth level the ore was cut off on the east end, and a cross-cut was driven north toward the foot-wall, 1440 feet east of the shaft. In this cross-cut it was thought that the jasper foot-wall had been reached, and a stope was turned off to the west along the contact, but ore has been found behind the jasper, and the limits of the ore on this side of the vein are

as yet undetermined. The diamond drilling campaign that has been started includes several holes from the eleventh and twelfth levels in this vein.

In the South-East Deposit, approximately a quarter of a mile southeast of A shaft, the greatest amount of development has been carried on. From the fifth level three raises were put up to the south, and two of these have been connected on the fourth level. On the sixth level a narrow vein of ore was followed west for 200 feet until it pinched out, and then a drift was driven east from the east end of the level. The ore pinched out in this drift also, but has opened up again and is being followed to the east. On the seventh level one gang is following the ore to the west and another to the east. The latter contract is drifting to reach the top of a raise, which they put up in ore from the ninth level 300 feet further east. On the ninth level the ore was followed through various irregularities south of the main stope, but finally pinched out. The back is now being mined further north, where a new raise was put up from the tenth level.

B SHAFT

In the North Vein a raise was put up from the fifth level, 650 feet north of B shaft, nearly to the third level, following a vein of ore about 15 feet wide until it was cut off by rock. This raise has been opened out to the full width of the ore, which will be followed east and west. This discovery does not promise a large tonnage, but is in new territory. There have been no other new discoveries in the North Vein.

In the Main Vein on the 1190 foot sub-level above the first level south of B shaft the ore has been followed east further than was anticipated, and raises have been put up from the 1165 foot sub-level, showing a floor 10 feet deep in part of this deposit. Nearer the hanging-wall a long raise was put up in hard jasper from the first level, 240 feet south of the shaft, to the 1290 foot sub-level, and the ore is now being mined directly into this raise.

There has been no other development in this vein down to the tenth level, where some test-holes have proved there is some ore in a floor that had been considered barren. A drift and raise on the eleventh level have been

driven to facilitate mining this ore. On this level also a drift was driven west for 200 feet from a point 1430 feet west of the shaft, following a narrow vein of ore, and from this drift a raise was put up to the ninth level with branches to the eighth level, through which a considerable tonnage has been mined during the last few months. Another vein close to this is being followed west 20 feet below the ninth level in a raise put up from the eleventh level.

On the fourteenth level the ore was followed northeast along the hanging-wall until it was cut off, and a raise has been put up almost to the thirteenth level. The ore is for the most part good, but is narrow, averaging less than 15 feet in normal thickness. The ore was also followed to the south-west along the hanging-wall on a sub-level 14 feet below the fourteenth level, and the end had apparently been reached, but more ore has been found recently on the foot-wall side of the vein.

In the Fault Vein a drift was driven 175 feet south and west in the foot-wall from 1100 to 1250 feet south-west of the shaft, and two raises with double branches were put up to the ninth level to facilitate mining the ore up to the seventh level. Other raises were put up in ore from the ninth to the seventh level for the same purpose, but it was not necessary to use these raises this season to maintain production. They will be available for use when trammers are scarce next summer.

Two gangs, stoping on the fourteenth level, have developed some very promising ore in this vein from 1300 nearly to 1600 feet west of the shaft with a maximum width of 60 feet, but this ore does not go down to the fifteenth level. The same sort of development is planned for this deposit as has been carried out on the tenth level, and a drift is about to be started on the fifteenth level to pass under the ore. Through raises from this drift the ore up to the tenth level can be cheaply mined with very little handling.

STOPING

A SHAFT

Stoping has continued on the upper levels in the old workings, taking out small blocks of ore left in previous years, in continuance of the policy of

cleaning up the upper levels and concentrating ore reserves in a smaller area on the lower levels.

Two contracts have worked throughout the year at the east end of the Main Vein near the hanging-wall on the second level, and two others worked most of the year mining the floor of the first level north-west of the shaft. One of these contracts was moved to B shaft in the summer. Another gang has been mining the floor of the fourth level 600 feet north-west of the shaft in the North Vein, and four others are mining the floor of the sixth level and one the floor of the ninth level, all in the North Vein.

In the South Lens two gangs are mining the floors of the third and fourth levels south of the shaft, and two more are mining the floors of the seventh and eighth levels further east.

The other stoping operations in this shaft have been mentioned under Development.

B SHAFT

Besides those operations described under Development stoping has been carried on on the upper levels in B shaft, following the same plan as in A shaft. One gang has been stoping most of the year close to the south boundary on the 1218 foot sub-level in the South Lens, 700 feet south of the shaft, and another has mined the floor of the 1190 and 1204 foot sub-levels 350 feet south-west of the shaft in the Main Vein. Another gang has mined the floor of the fifth level in the Main Vein nearly down to the sixth level, 600 feet west of B shaft, and two more are mining the floor of the sixth level in the North Vein, 400 and 500 feet north of the shaft.

Between the shafts one gang has mined the floor of the third level, 450 feet south-east of B shaft throughout the year, and another has been mining the back of the second level 850 feet further south-east since late summer.

In the Fault Vein one gang is mining the floor of the seventh level 1100 feet south-west of B shaft, and another finished the floor of the tenth level, 1500 feet south-west of the shaft, and moved to the eighth level.

CLIFFS SHAFT MINE

In the Main Vein one gang has mined the floor of the eighth level at the west end of the vein during the second half year, and is now starting on the floor of the ninth level. Early in the year part of the floor of the eleventh level near the north foot-wall was mined, and two more gangs have mined the floor of this level on the north branch of the vein throughout the year, and have mined the ore nearly down to the twelfth level. There are also two gangs of miners working along the south side of the ore-body on the thirteenth level, one stoping and one mining the back, and between them they have produced a large tonnage and extended the known limits of the ore.

CLIFFS SHAFT MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1923.

GRADE	IRON	PHOS.	SILICA
Lump Cliffs Shaft,	59.59	.105	5.48
Crushed Cliffs Shaft,	57.85	.108	6.56

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1923.

	Mine		Lake Erie	
GRADE	IRON	PHOS.	IRON	MOIST.
Lump Cliffs Shaft,	59.44	.104	59.50	.43
Crushed Cliffs Shaft,	58.35	.104	58.42	1.87

ORE STATEMENT - DECEMBER 31ST, 1923.

	LUMP CL. SHAFT	CRUSHED CL. SHAFT	TOTAL	TOTAL LAST YEAR
On hand January 1, 1923,	82,706	188,787	271,493	319,488
Output for Year,	192,502	98,113	290,615	131,502
Total,	275,208	286,900	562,108	450,990
Shipments,	221,196	215,813	436,009	179,497
Balance on Hand,	54,012	71,087	126,099	271,493
Increase in Output,			159,113	
Decrease in Ore on Hand,			145,394	

1923 -- 1-8 Hour Shift, Jan. 1st to Dec. 31st, 1923.

1922 -- Idle from Jan. 1st to June 28th, 1922.
1-8 Hour Shift, 6 days per week, June 29th to Dec. 31st, 1922.

CLIFFS SHAFT MINE

SHIPMENTS FOR YEAR-1923.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Lump Cliffs Shaft,	117,099	104,097	221,196	178,100
Crushed Cliffs Shaft,	54,560	161,253	215,813	1,397
Total,	171,659	265,350	437,009	179,497
Total Last Year,	67,897	111,600	179,497	
Increase,			257,512	

CLIFFS SHAFT MINE

COMPARATIVE MINING COST FOR YEAR

	1923	1922	INCREASE	DECREASE
PRODUCT	290,615	131,502	159,113	
Underground Costs	1.541	1.543		.002
Surface Costs	.218	.216	.002	
General Mine Accounts	.081	.074	.007	
Cost of Production	1.840	1.833	.007	
Plant Account	.003	.015		.012
Equipment	.011	.013		.002
Uncompleted Construction	.011		.011	
Taxes	.343	.363		.020
Central Office	.085	.089		.004
Contingent Expense	.034	.035		.001
Idle Expense		.681		.681
Cost Adjustment	.031	.010	.041	
Cost on Stockpile	2.358	3.019		.0661
Loading & Shipping	.073	.065	.008	
Total Cost on Cars	2.431	3.084		.0653
No.Days Operating	299	152	147	
No.Shifts & Hours	1-8	1-8		
Avg.Daily Product	972	865	107	
COST OF PRODUCTION				
Labor	1.199	1.207		.008
Supplies	.641	.626	.015	
Total	1.840	1.833	.007	

CLIFFS SHAFT MINE

COMPARATIVE WAGES AND PRODUCT

	1923	1922	INCREASE	DECREASE
PRODUCT	290,615	131,502	159,113	
No.Shifts & Hours	1-8	1-8hr		
Avg.NO.MEN WORKING				
Surface	56	31	25	
Underground	189	105	84	
Total	245	136	109	
AVG.WAGES PER DAY				
Surface	4.18	3.81	.37- 9.71%	
Underground	4.91	4.28	.63-14.71%	
Total	4.74	4.17	.57-13.66%	
WAGES PER MO.of 25 DAYS				
Surface	104.50	95.25	9.25	
Underground	122.75	107.00	15.75	
Total	118.50	104.25	14.25	
PRODUCT PER MAN PER DAY				
Surface	17.32	14.47	2.85	
Underground	5.15	4.28	.87	
Total	3.97	3.30	.67	
LABOR COST PER TON				
Surface	.242	.263		.021
Underground	.954	1.000		.046
Total	1.196	1.263		.067
AVG.PRODUCT BRK'G & TRM'G	7.28	6.20	1.08	
" WAGES CONTRACT MINERS	5.03	4.36	.67	
" " " TRAMMERS	5.45	4.62	.83	
" " " LABOR	5.18	4.52	.66	
TOTAL NO.OF DAYS				
Surface	16,782½	9,088¼	7,694¼	
Underground	56,443	30,731	25,712	
Total	73,225½	39,819¼	33,406¼	
AMOUNT FOR LABOR				
Surface	70,208.25	34587.87	35620.38	
Underground	277,266.84	131544.63	145722.21	
Total	341,475.09	166132.50	181342.59	

Proportion Surface to Underground Men:
1923 - 1 to 3.37
1922 - 1 to 3.39
1921 - 1 to 2.04
1920 - 1 to 2.44
1919 - 1 to 2.30
1918 - 1 to 3.14

Mine reopened June 26, 1922. Ore production started June 29th; one 8-hour shift.
1923 - Worked whole year.

CLIFFS SHAFT MINE.

CLIFFS SHAFT MINE

STATEMENT OF EXPLOSIVES USED FOR STOPING & DEVELOPING IN ORE (BREAKING ORE)

KIND	QUANTITY	AVERAGE PRICES	AMOUNT 1923	AMOUNT 1922
50% Powder	262,100	.1446	37,894.15	17,566.77
60% Powder	200	.1575	31.50	7.63
Total Powder	262,300	.1446	37,925.65	17,574.40
Fuse	341,300	6.34	2,162.24	1,150.39
Caps	73,000	11.51	840.13	538.17
Crimpers	2	.46	.92	16.65
Total Fuse, Etc.			3,003.29	1,705.21
Total All Explosives			40,928.94	19,279.61
Product			290,615	131,502
Pounds Powder Per Ton Ore			.9026	.9189
Cost Per Ton For Powder			.1305	.1336
Cost Per Ton For Fuse, Etc.			.0103	.0129
Cost Per Ton For All Explosives			.1408	.1465
Average Price Per Lb. For Powder			.1446	.1454

ANNUAL REPORT

OF THE

SALISBURY MINE (1923)

PRODUCTION AND SHIPMENTS

The Salisbury Mine remained closed throughout the year, but late in November preparations were started for reopening the mine, and in December most of the drifts were cleaned out, and 264 tons of Silica ore and 502 tons of rock were hoisted.

All the Clinton and Clinton Silica ore in stock was shipped except about 300 tons scattered along the base of the bluff on the south side of the stock-pile grounds.

TABLE I

STOCK-PILE SHIPMENTS

Grade	Tons
Clinton	24,419
Clinton Silica	2,768
Total	27,187
Shortage	1,853

TABLE II

STOCK-PILE BALANCES, DEC. 31, 1923.

Grade	1923	1922
	Tons	Tons
Clinton		27,413
Clinton Silica	264	1,627
Total	264	29,040

TABLE III

ESTIMATE OF ORE RESERVES.

DEVELOPED ORE.

Level	Bessemer Tons	Clinton Tons	Clinton Silica Tons	Total Tons
4			4,000	4,000
5			4,000	4,000
8		3,500	16,500	20,000
9		2,500	9,000	11,500
10		5,500	14,500	20,000
11		4,500	11,000	15,500
12		7,000	7,000	14,000
13		8,500		8,500
14	5,000	22,500		27,500
16	3,000	11,000	9,000	23,000
Total	8,000	65,000	75,000	148,000
Less 10% Rock and 10% Loss in Mining	1,500	13,000	15,000	29,500
Net Total	6,500	52,000	60,000	118,500

Factors Used;- Bessemer and Clinton in place;- 12 cu. ft.

- Silica;- 13-15 cu. ft. per ton.

The estimate is the same as in 1922.

LABOR

Wages were increased 10% on May 1.

PREPARATIONS FOR REOPENING MINE.

SURFACE.

COAL-DOCK.

The coal tunnel was cleaned out, and the pocket under the tunnel was repaired, new bents were erected under the stringers of the coal-dock approach, new legs and braces were erected in the coal-dock itself, and the track and the turn-sheave at the end were repaired. The trestle leading to the boiler-

house was also repaired. Twenty cars of coal were then dumped in the dock.

HOISTING EQUIPMENT

The turn sheaves and high pulley-stands were repaired, straightened and braced, the sheaves in the shaft-house were straightened, a new rope was put on the skip, and the bell-wires were renewed.

DRY

The windows and doors in the dry were repaired, and two wash-troughs were brought over from the Lake Mine, and erected in place of the old wooden troughs which had gone to pieces.

AIR-COMPRESSOR

The air-compressor was re-assembled and tried out, but a number of leaky tubes were found in the intercooler, and these were repaired.

A six-inch pipe-line was laid from the Angeline Mine to the Salisbury engine-house, using pipe from the Lake and Cliffs Shaft Mines, so that air can be obtained from the Holmes Mine on day-shift.

SHAFT-HOUSE

The shaft-house was in bad condition on the outside, especially on the south side, and it was necessary to build a heavy frame-work just inside the old timbers to catch up the landing-floor and the skip-dump, which, being inclosed, had not suffered much from decay. The pockets will also have to be renewed.

TRESTLES

Two bents were erected on each of the Clinton and Clinton Silica trestles, and the railing on the permanent trestles was renewed.

EQUIPMENT

Two new timber-hoists and a scraper-hoist were purchased, and two scrapers are being made by the Holmes Mine.

A 3-ton storage battery locomotive was also purchased, and was received and sent underground on December 27.

SALISBURY MINE

UNDERGROUND

The sheaves at the knuckle in the shaft were found to be out of line, and these were straightened, and some repairs made to the timbering. The rest of the shaft was in good condition.

The fifth, eighth and twelfth levels were pretty well filled with rock and ore, where they had been repaired, and have been cleaned out. Some of the ladderways were rotten also, and had to be renewed.

The fourteenth level was not in bad shape, but has been cleaned out and some new switches and ties were put in the track to make it better for the locomotive.

LOCATION

During the summer and fall new wire fences were built around the house-lots on East Terrace Street and the other fences in the location were repaired using material from the best of the fences that were torn down.

EXPLORATION. SURFACE DIAMOND DRILLING.

Hole No. 70 was started south of the old open pit east of the pump-house, but the drill went into diorite at ledge, and is still in the same material. This hole is down 128 feet.

SALISBURY MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1923.

GRADE	IRON	PHOS.	SILICA
Salisbury Bessemer,	(No Production)		
Clinton,	(No Production)		
Clinton Silica,	51.58	.113	14.74

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1923.

GRADE	Mine IRON	Mine PHOS.	Mine SILICA	Lake Erie IRON	Lake Erie MOIST.
Salisbury Bessemer,	(No Shipments)				
Clinton,	(All Mixed)				
Clinton Silica,	(All Mixed)				

ORE STATEMENT - DECEMBER 31ST, 1923.

	SALISBURY BESSEMER	CLINTON	CLINTON SILICA	TOTAL	TOTAL LAST YEAR
On hand January 1, 1923,	-	27,413	1,627	29,040	61,013
Output for Year,	-	-	264	264	-
Transferred,	-	2,994	2,994	-	-
Stockpile Overruns and Shortages,	-	-	1,853	1,853	7,249
Total,	-	24,419	3,032	27,451	53,764
Shipments,	-	24,419	2,768	27,187	24,724
Balance on Hand,	-	-	264	264	29,040
Increase in Output,				5,660	
Decrease in Ore on Hand,				28,776	

1923 -- Mine Idle.

1922 -- Mine Idle.

SALISBURY MINE

SHIPMENTS FOR YEAR-1923

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Salisbury Bessemer,	-	-	-	254
Clinton,	-	24,419	24,419	2,404
Clinton Silica,	-	2,768	2,768	22,066
Total,	-	27,187	27,187	24,724
Total Last Year,	-	24,724	24,724	
Increase,			2,463	

SALISBURY MINE

COMPARATIVE WAGES AND PRODUCT

	1923	1922	INCREASE	DECREASE
PRODUCT	1,589	7,249	5,660	
No.Shifts & Hours				
AVG.NO.MEN WORKING				
Surface	5	5		
Underground	6	8		2
Total	11	13		2
AVG.WAGES PER DAY				
Surface	4.39	3.70	.69-18.65%	
Underground	4.91	4.27	.64-14.9 %	
Total	4.67	4.05	.62-15.3 %	
WAGES PER MO. OF 25 DAYS				
Surface	109.75	92.50	17.25	
Underground	122.75	106.75	16.00	
Total	116.75	101.50	15.25	
PRODUCT PER MAN PER DAY				
Surface				
Underground				
Total				
LABOR COST PER TON				
Surface				
Underground				
Total				
AVG.PRODUCT BRK'G & TRM'G				
" WAGES CONTRACT MINERS				
" " " TRAMMERS				
TOTAL NO.OF DAYS				
Surface	1,542	1,282	260	
Underground	1,851	2,008		157
Total	3,393	3,290	103	
AMOUNT FOR LABOR				
Surface	6770.34	4743.08	2027.26	
Underground	9087.00	8567.48	519.52	
Total	15857.34	13310.56	2546.78	

NOTE: Mine idle only 1922 and 1923.

Proportion Surface to Underground Men;
1923 - 1 to 1.2
1922 - 1 to 1.66
1921 - 1 to 2.55
1920 - 1 to 3.7
1919 - 1 to 3.23

SALISBURY MINE.

ANNUAL REPORT

OF THE

ANGELINE MINE (1923)

GENERAL

The Angeline Mine remained closed throughout the year, and pumping was continued by the O. I. M. Co. in D Shaft.

SURFACE

The trestle-timber has been taken to the Cliffs Shaft Mine and the old rail from the stock-piles to the Holmes Mine. Six old cars from the fourth level were sold to the Rolling Mill Mining Company.

In December the six inch air-line from the Holmes Mine was extended from a point about 200 feet east of D Shaft to the Salisbury Mine engine-house, using pipe from the Lake and Cliffs Shaft Mine.

NO. 56 RAISE

During the summer No. 56 timber-raise squeezed together about forty feet from surface, and is now fully blocked and out of line, so that no air can come up through the workings above the fourth level.

ESTIMATE OF ORE RESERVES.

DEVELOPED ORE.

Sub-Level	Angeline Bessemer Tons
1318	4,600
1310	5,300
1290	5,000
1274	1,500
1258	2,300
Total	18,700
Less 10% Mining Loss and 10% Rock	3,700
Net Total	15,000

A factor of twelve cubic feet per ton was used. All the ore is near No. 56 raise above the fourth level, and the estimate is the same as in 1921 and 1922.

The mine has been abandoned, and the amount of ore in sight is not sufficiently valuable to pay the cost of reopening and extraction.

LOCATION

During the summer and fall new fences were erected around all the houses in the location, except Captain Tamblin's house, and a cinder sidewalk 600 feet long was built on Angeline Street.

ANNUAL REPORT

OF THE

HOLMES MINE (1923)

PRODUCTION and SHIPMENTS

The Holmes Mine worked 300 days in 1923, and produced 276,672 tons of ore, an average of 922 tons per day. The mine worked on double shift, full time, throughout the year.

Total shipments of all grades were 328,193 tons, the largest made in any year since the mine was opened. The amount of ore left in stock at the end of the year was 51,521 tons less than a year ago, but is still large.

13,308 tons of rock were produced, an average of 44 tons per day.

TABLE I

PRODUCTION by GRADES

Grade	1923 Tons	1922 Tons
Holmes Bessemer	53,662	64,734
Holmes	19,544	7,910
Junction Bessemer	47,933	39,618
Junction	155,533	105,804
Total	276,672	218,066

TABLE II

SHIPMENTS

Grade	Pocket Tons	Stock-Pile Tons	Total Tons
Holmes Bessemer	31,659	130,410	162,069
Holmes	4,323	29,941	34,264
Junction Bessemer	25,400	23,765	49,165
Junction	45,457	37,238	82,695
Total	106,839	221,354	328,193

TABLE III

STOCK-PILE BALANCES, DECEMBER 31, 1923

Grade	Tons
Holmes Bessemer	7,228
Holmes	22,753
Junction Bessemer	6,220
Junction	152,425
Total	188,626

TABLE IV

DIVISION OF PRODUCT BY LEVELS

Level	Holmes Bessemer Tons	Holmes Tons	Junction Bessemer Tons	Junction Tons	Total Ore Tons	Rock Tons	Total Ore and Rock Tons
Second	7,674	2,795	25,117	81,499	117,085	4,623	121,708
Third	45,988	16,749	22,816	74,034	159,587	8,685	168,272
Total	53,662	19,544	47,933	155,533	276,672	13,308	289,980

TABLE V

PRODUCTION BY MONTHS

Month	Days	Ore Per Day Tons	Holmes Bessemer Tons	Holmes Tons	Junction Bessemer Tons	Junction Tons	Total Ore Tons	Rock Tons	Total Ore and Rock Tons
January	26	853	3,931	952	3,964	13,345	22,192	940	23,132
February	23	872	3,296	992	3,548	12,247	20,083	872	20,955
March	26	880	3,049	1,416	4,004	14,407	22,876	1,100	23,976
April	24	909	3,819	612	3,980	13,402	21,813	1,052	22,865
May	26	933	6,020	852	4,672	12,724	24,268	1,144	25,412
June	25	1,025	5,090	2,049	4,151	14,343	25,633	852	26,485
July	25	928	5,038	1,462	4,884	11,819	23,203	832	24,035
August	27	955	4,929	1,390	5,055	14,417	25,791	1,332	27,123
September	24	957	5,134	1,608	3,503	12,725	22,970	1,264	24,234
October	25	950	4,438	2,942	2,899	13,466	23,745	1,456	25,201
November	25	910	4,301	3,212	3,121	12,127	22,761	1,184	23,945
December	24	889	4,061	2,024	3,916	11,336	21,337	1,280	22,617
Year	300	922	53,106	19,511	47,697	156,358	276,672	13,308	289,980
Transferred To And From			556	33	236	- 825			
Total	300	922	53,662	19,544	47,933	155,533	276,672	13,308	289,980

TABLE VI

DELAYS

Date	Hours	Tons Lost	Cause	Repair Cost
March 7	4	225	Fatal accident; cave in.	$ 74.88
May 16	11		Skip caught in shaft.	
May 17	8	1050	" " " " .	197.82
Aug. 10	8	430	President Harding's funeral.	
Total	31	1705		$ 272.70

HOLMES MINE

TABLE VII

ESTIMATE OF ORE RESERVES

DEVELOPED ORE

Level	Holmes Bessemer	Holmes	Junction Bessemer	Junction	Total
	Tons	Tons	Tons	Tons	Tons
Second			1,000	4,000	5,000
Third	111,000	40,000	60,000	342,000	553,000
Fourth	76,000	72,000	96,000	543,000	787,000
Total	187,000	112,000	157,000	889,000	1,345,000

PROSPECTIVE ORE

Level	Holmes Bessemer	Holmes	Junction Bessemer	Junction	Total
	Tons	Tons	Tons	Tons	Tons
Fourth	8,000	12,000			20,000
Below Fourth			40,000	235,000	275,000
Total	8,000	12,000	40,000	235,000	295,000
Total Ore	195,000	124,000	197,000	1,124,000	1,640,000

Factors used:- Hard Ore - 9 cu. ft. per ton.

Soft Ore - 12 cu. ft. per ton.

Deductions of 10% for loss in mining and 10% for rock were made in calculating tonnage.

HOLMES MINE

GENERAL

LABOR

During the summer months there was a shortage of men underground, due partly to loss of time from accidents and sickness, and partly to absence from work for berry-picking, farming or recreation. This is a seasonal shortage and is most acute in July and August.

Except during August the full number of contracts was maintained. There was no shortage of labor on surface at any time.

Wages were increased approximately 10% on May 1.

NEW CONSTRUCTION

E. and A. No. 437. Lilly Hoist Controls.

Lilly Hoist Controls were installed in the engine-house and connected to both hoists during the summer. This construction was charged to operation.

E. and A. No. 444. FIRE PROTECTION.

In order to reduce danger from fire both on surface and underground a comprehensive study was made of conditions at the mine, and extra precautions against the occurrence of fire were taken. Additional fire-extinguishers and fire-pails were purchased and placed in the principal buildings, and inflammable construction was made as fire-proof as possible. The timber-tunnel was given a coat of "gunite", the doors for controlling ventilation were covered with sheet iron, and both the skip-roads and the cage-road were sheathed in sheet-iron both inside and out from the collar of the shaft to the skip-dump. Fireproof doors were also erected at the collar of the shaft, so that the shaft can be sealed off tight. Other doors for controlling ventilation underground have been ordered, but have not been received. The work has not been completed, and will be continued during the coming year.

HOLMES MINE

FATAL ACCIDENT. MIKE RITARI.

At 10 A.M. on March 7, Mike Ritari, a miner working in No. 1 contract on the second level, was instantly killed by a fall of ground, which completely filled the drift in which he was working. The body was recovered at noon the next day.

Ritari and his partner had cut out for a side-set under the hanging wall of the Hard Ore Vein 16 feet west of No. 358 chute, and were putting in timber. While the partner was outside getting a piece of timber, the back caved in, and Ritari was caught under a cap, and instantly killed.

Ritari was a Finn, 36 years old, and left a widow and nine small children. The mine was closed for the funeral on the afternoon of March 12th.

ACCIDENTS TO EQUIPMENT. SKIP.

At 4 P.M. on May 16th the south skip caught in the shaft about 500 feet from surface, and tore out several dividings. The mine was closed until 7:30 P.M. on the following day, while repairs were being made.

AIR-COMPRESSOR

Just before noon on October 22nd the exciter for the air-compressor motor burned out, and the compressor was idle until late in the afternoon. A temporary exciter was erected, and the compressor has been run with this outfit up to the end of the year.

REPAIRS TO EQUIPMENT

The steel main-level cars on the third level were thoroughly overhauled and rebuilt early in the year.

The sumps in the pump-house were cleaned out in June.

A new floor of creosoted fir plank was laid on the permanent trestles south of the shaft.

Ball-bearings have been put in the wheels of nearly all the sub-level cars.

HOLMES MINE

POWER

Owing to a shortage of water for electric power the mine was closed on October 6th and 13th.

SURFACE

RAILROAD TRACKS

As the Chicago and Northwestern Railway track to the Section 16 Mine, from which entry from the south to the Holmes Mine has been made heretofore by the L. S. & I. Ry., became impassable early in the summer, a new connection was made on the north side of the Holmes Mine, using the old tracks crossing the Lake Superior Hard Ore Mine, and this track has been used by the L. S. & I. Ry. most of the time since then. In the fall the D. S. S. & A. Ry. abandoned its north track across the Section 16 Mine caved ground, and laid a new track from its main line further west to the L. S. & I. Ry. tracks on the Holmes Mine property.

A new lagging-track was also built by the L. S. & I. Ry. through the north part of the timber-yard, and a short timber-track was graded and built north of the shaft, so that unloading timber will not block the service track coming in from the north.

CAVED GROUND

The subsidence over the Section 16 Mine workings has extended to the southeastern corner of the Holmes Mine, where the surface has gone down 15 or 20 feet. Except in this place there has been very little visible effect from the workings of the Holmes Mine. On the Section 16 Mine side of the boundary line the subsidence covers a large area, and has extended westward nearly to the main line of the railroad.

STOCK-PILES

Junction Ore was stocked on the south side of Excelsior Street at intervals from early spring until December 1. All stock-pile shipments of this grade were made from the pile west of the shaft, where a large enough excavation was made to accommodate the Junction Bessemer Ore to be mined during

this winter.

The Junction Bessemer stock-pile was cleaned up, and the book-balance of Holmes Bessemer ore was also shipped, but there remains a substantial overrun of this ore along the west edge of the stock-pile floor.

Shipments of Holmes ore from stock-pile cleaned up the south half of the pile, except for about 3,000 tons, which was overcast with a steam shovel in December to make room for the coming season's Holmes Bessemer ore.

UNDERGROUND

GENERAL

The average number of contracts working was 31. This number was never exceeded, but only in one month was the number of gangs less than 31, although there were often days when it was considerably smaller. The only development undertaken was raising and such rock drifting as was necessary in opening the sub-levels.

The average classification of contracts was as follows:-

Stoping	21	contracts.
Drifting and raising in ore	9	"
Drifting and raising in rock	1	"
Hard Ore Vein	9	"
Soft Ore Vein	21	"
Total	31	"

The average production per contract per month in hard ore was 678 tons and in soft ore 969 tons.

Although the amount of hard ore mined was approximately the same as in 1922, the percentage of non-bessemer ore increased from 10.9% to 26.7% of the hard ore product, and the total hard ore product decreased from 33.3% to 26.4% of the total production. In the soft ore the percentage of bessemer to non-bessemer decreased from 27.3% in 1922 to 23.5% in 1923.

DEVELOPMENT

Six raises, Nos. 322, 323, 336, 340, 343 and one compartment of No. 348, were put up from the third level to the 340 foot sub-level, and eight

raises, Nos. 322, 323, 330, 338, 340, 342, 343, one compartment of No. 348 and a timber-raise were put up from the 340 foot sub-level to the second level.

STOPING.

HARD ORE VEIN.

The motor-track was removed from the drift in the Hard Ore Vein, and all the ore left in the back and along the sides of this drift was mined. Work in this vein was continued, the east end of the vein being mined first, so that the contracts are now working in a series of steps from the 320 foot sub-level near the south boundary, where the vein crosses into the Section 16 Mine, to the 375 foot sub-level at the west end. There are eleven contracts working in this vein, as follows: two on the 375 foot sub-level near the west end of the vein, one on the 365 foot sub-level, four on the 355 foot sub-level, two on the 340 foot sub-level, and two on the 320 foot sub-level fifty feet north of the south boundary-line and 250 feet west of the corner.

SOFT ORE VEIN

The motor-track has been taken up from all of the level, except the cross-cut to the shaft and the foot-wall drift, and all ore is now being hoisted from the third level. The ore on this level has been nearly all mined from the foot-wall near the east boundary westward 300 feet. Beyond this point some new ore, leaner than the main ore-body, has been found, extending rather irregularly for another 200 feet. It is badly cut up by dikes and jasper, and the tonnage is not large. There are six gangs stoping on this level.

The 435, 420, 410 and 400 foot sub-levels above the second level have been finished in the eastern part of the ore-body, and the foot-wall deposit on both sides of the cross-cut to the shaft has been mined down to the 410 foot sub-level, leaving a back of only four feet above the main level.

At the beginning of the year the 375 foot sub-level, twelve feet below the second level, was being opened near the south-east corner of the property. The ore on this sub-level has been mined for a distance of 180

feet north of the south boundary and 200 feet west of the east boundary, and there are now five gangs stoping further north near the foot-wall for 100 feet west of the east boundary.

The 365 foot sub-level was opened early in the year, and the soft ore was mined from the east foot-wall west to a point 180 feet west of the east boundary and 160 feet north of the south boundary.

The 355 foot sub-level has been opened for a length of 250 feet along the foot-wall, and the ore within 130 feet of the south-east corner has been mined. There are now three gangs working on this sub-level.

The ore on the 340 foot sub-level has been mined for 200 feet west from the east boundary and as far north as the main drift, an average of 65 feet from the south boundary. One gang is working here.

The 330 foot sub-level was opened during the summer, and the ore along the south boundary has been mined as far west as the Hard Ore Vein. One gang is stoping on this level near the foot-wall.

There are three gangs opening the 320 foot sub-level near the south boundary.

HOLMES MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1923.

GRADE	IRON	PHOS.	SILICA
Holmes Bessemer,	62.95	.034	5.45
Holmes,	61.77	.069	6.21
Junction Bessemer,	61.04	.035	6.97
Junction,	57.71	.084	7.83

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1923.

GRADE	Mine IRON	Mine PHOS.	Lake Erie IRON	Lake Erie PHOS.	MOIST.
Holmes Bessemer,	62.55	.033	62.45	.033	4.41
Holmes,	61.05	.065	61.12	-	3.91
Junction Bessemer,	(All Mixed)				
Junction,	(All Mixed)				

ORE STATEMENT - DECEMBER 31ST, 1923.

	HOLMES BESS.	HOLMES	JUNCTION BESSEMER	JUNCTION	TOTAL	TOTAL LAST YEAR
On hand January 1, 1923,	115,635	37,473	7,452	79,587	240,147	284,332
Output for Year,	53,106	19,511	47,697	156,358	276,672	217,576
Transferred,	556	33	236	825	-	-
Stockpile Overrun,	-	-	-	-	-	490
Total,	169,297	57,017	55,385	235,120	516,819	502,398
Shipments,	162,069	34,264	49,165	82,695	328,193	262,251
Balance on Hand,	7,228	22,753	6,220	152,425	188,626	240,147
Increase in Output,					58,606	
Decrease in Ore on Hand,					51,521	

1923 -- 2-8 Hour Shifts, Jan. 1st to Dec. 31st, 1923.

1922 -- 1-8 Hour Shift, Jan. 1st to June 4th, 1922
2-8 Hour Shifts, June 4th to Dec. 31st, 1922.

HOLMES MINE

SHIPMENTS FOR YEAR-1923.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Holmes Bessemer,	31,609	130,355	161,964	49,225
Holmes,	4,323	29,853	34,176	16,509
Junction Bessemer,	25,400	23,765	49,165	42,949
Junction,	45,457	37,238	82,695	153,568
Total,	106,789	221,211	328,000	262,251
Total Last Year,	118,501	143,750	262,251	
Increase,			65,749	

HOLMES MINE

COMPARATIVE MINING COST FOR YEAR

	1923	1922	INCREASE	DECREASE
PRODUCT	276,672	218,066	58,606	
Underground Costs	1.347	1.246	.101	
Surface Costs	.214	.210	.004	
General Mine Accounts	.140	.114	.026	
Cost of Production	1.701	1.570	.131	
Original Cost	.001	.002		.001
Plant Account	.215	.500		.285
Equipment	.001	.002		.001
Uncompleted Construction	.002		.002	
Taxes	.177	.219		.042
Central Office	.081	.084		.003
Contingent Expense	.031	.041		.010
Cost Adjustment	.015	.009	.006	
Cost on Stockpile	2.224	2.431		.207
Loading & Shipping	.077	.048	.029	
Cost on Cars	2.301	2.479		.178
No.Days Operating	301	302		1
No.Shifts & Hours	2-8	1-8:2-8		
Avg.Daily Product	919	722	197	
COST OF PRODUCTION				
Labor	1.152	1.029	.123	
Supplies	.549	.541	.008	
Total	1.701	1.570	.131	

HOLMES MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 3	1 9 2 2	INCREASE	DECREASE
PRODUCT	276,672	218,066	58,606	
No.Shifts and Hours	2-8hr	1-8:2-8		
AVG.NO.MEN WORKING				
Surface	55	60		5
Underground	166	167		1
Total	221	227		6
AVG.WAGES PER DAY				
Surface	4.17	3.75	.42-11.2%	
Underground	5.02	4.29	.73-17%	
Total	4.81	4.15	.66-15.8%	
WAGES PER MO.OF 25 DAYS				
Surface	104.25	93.75	10.50	
Underground	125.50	107.25	18.25	
Total	120.25	103.75	16.50	
PRODUCT PER MAN PER DAY				
Surface	16.88	15.68	1.20	
Underground	5.53	5.51	.02	
Total	4.17	4.08	.09	
LABOR COST PER TON				
Surface	.247	.239	.008	
Underground	.907	.778	.129	
Total	1.154	1.017	.037	
AVG. PRODUCT BRK'G & TRM'G	7.48	7.26	.22	
" WAGES CONTRACT MINERS	5.25	4.39	.86	
" " " LABOR	5.25	4.39	.86	
TOTAL NO.OF DAYS				
Surface	16,393	13,903	2,490	
Underground	50,024	39,547	10,477	
Total	66,417	53,450	12,967	
AMOUNT FOR LABOR				
Surface	68327.85	52195.87	16,131.98	
Underground	251038.80	169720.30	81,318.50	
Total	319366.65	221916.17	97,450.48	

Proportion Surface to Underground Men:
1923 - 1 to 3.01
1922 - 1 to 2.78
1921 - 1 to 2.63
1920 - 1 to 2.87
1919 - 1 to 2.55

1922-2-8hr June 5, 1922.

HOLMES MINE.

HOLMES MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1923

KIND	LINEAR FEET	AVG. PRICE PER FOOT	AMOUNT 1923	AMOUNT 1922
6" to 8" Timber	64,057	.0372	2,381.47	4,181.82
8" to 10" "	92,760	.0649	6,018.26	3,971.77
10" to 12" "	49,478	.0873	4,321.74	2,832.86
12" & Larger "	26,163	.0948	2,480.34	2,759.88
Total 1923	232,458	.0654	15,201.81	
Total 1922	225,866	.0609		13,746.33
	LINEAR FEET	PER 100'		
5' Lagging	999,600	.8227	8,223.61	6,590.45
7' "				72.50
Total Lagging	999,600	.8227	8,223.61	6,662.95
Poles	389,093	1.1400	4,435.17	3,782.74
Total Lagging & Poles	1,388,693	.926	12,658.78	
Do 1922	1,200,325	.9874		10,445.69

Product	276,672	218,066
Feet timber per ton of Ore	.840	1.036
" Lagging " " " "	5.02	3.91
" " per foot of Timber	5.97	3.77
Cost per ton for Timber	.055	.063
" " " " Lagging	.030	.031
" " " " Poles	.016	.017
" " " " Timber, Lagging & Poles	.101	.111
Feet Board Measure per ton of Ore	1.64	2.13

Cost for Timber, Lagging, & Poles - 1923	27,860.59
1922	24,192.02

HOLMES MINE

STATEMENT OF EXPLOSIVES USED FOR BREAKING ORE

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1923	AMOUNT 1922
50% L. F. Powder	70,750	14.46	10,230.89	14,001.94
60% L. F. "	65,850	15.45	10,175.74	3,540.25
50% Gelatin "	150	15.50	23.25	1,836.62
60% " "	300	16.84	50.53	
Total Powder	137,050	14.94	20,480.41	19,378.81
Fuse	405,425	6.30	2,555.38	2,200.42
Caps	94,770	11.61	1,100.59	859.07
Cap Crimpers	18	1.00	18.00	17.55
Total Fuse, Etc.			3,673.97	3,077.04
Total Explosives			24,154.38	22,455.85
Product			276,672	218,066
Pounds Powder per ton of Ore			.4954	.5707
Cost per ton for Powder			.0740	.0889
" " " " Fuse, Caps, Etc.			.0133	.0141
" " " " All Explosives			.0873	.1030
Average price per lb. for Powder			.1494	.1557

Mine operated from Jan. 1st, to Dec. 31st, - 2-8 hr. Shifts.

NEGAUNEE MINE - 1923.

The product by grades for the year was as follows:-

Bessemer,	41,887 tons,
Negaunee,	340,028 "
Total,	381,915 "
Rock,	2,768 "

The mine operated throughout the year on its regular day shift schedule of eight hours with the exception of the period from May to October when shaft sinking was in progress, the shaft work being done on the night shift. The shaft work required no night surface crew.

Mining throughout the year was in territories previously opened, viz., Above the ninth level in the American Mining Company strip and supporting pillar adjoining the Maas Mine, also near #1 shaft pillar on the South foot; between the ninth and tenth levels in these same areas; between the tenth and eleventh levels in areas in the center of the ore body and under the hanging; on the eleventh level at #4 and #4-A crosscuts and at the shaft. No work was done in the #1 and #2 shaft areas.

The labor shortage which keenly affected the other mines in the district was not felt at the Negaunee.

The work on the various levels and sub levels in detail is as follows:-

UNDERGROUND.

NINTH LEVEL.

NORTH FOOT.

This section, in the American Mining Company strip and supporting pillar, was opened in the fall of last year. Mining continued until August of this year when all of the pillars were mined with the exception of an area on the North foot wall between #46 and #55 raises. Mining will be started there this winter. This territory is extremely wet.

SUBS BETWEEN NINTH AND TENTH LEVELS.

595' SUB LEVEL.

NORTH FOOT.

This section also in the Northwest corner of the mine, includes the American Mining Company strip and supporting pillar. It was opened in January and mining has continued throughout the year.

In December there were six contracts in the American Mining Company pillar and six in the supporting pillar, all stoping.

588' SUB LEVEL.

SOUTH FOOT.

This sub level, South of the dike, was started in 1922 when most of the development work was done. Mining continued throughout the whole of the present year - the sub level being finished in December.

580' SUB LEVEL.

SOUTH FOOT.

Mining in the area between #1 and #2 dikes which was in progress last year was continued until this fall when this section was completed.

The area between #1 dike and the foot has been developed and stoping started.

In December eight contracts were engaged stoping in this area.

565' SUB LEVEL.

In the South end of the mine, i.e., South of #2 dike, a new sub level was started in May. Development work has been in progress since that date.

The ore around the top of the vertical winze under the hanging was stoped during the year.

In December nine contracts were working between #1 and #2 dikes and three South of #1 dike. Most of this work is in the nature of development.

555' SUB LEVEL.

In January a drift was started in the North foot at a point about 200' from the Maas boundary. This drift was driven North 50' and West 100'. Three raises were put up 60' from the East-West section of this drift to the

ninth level to drain the water. These were completed in July and are draining this area, however, we are not getting the volume that we had hoped to get.

TENTH LEVEL.

In January the area South of #234 raise was completed. This proved to be a small roll in the hanging.

In December a drift was started to the Northeast from #244 raise. The drift at present is within a few feet of the stope South of #234 raise. It is still in good ore.

SUBS BETWEEN TENTH AND ELEVENTH LEVELS.

500' SUB LEVEL.

In the central portion of the ore body stoping was in progress in 1922 and was continued until August of this year when the sub level was completed. The ore areas left at this elevation are the supporting pillar near the Maas and the territory South of #2 dike.

488' SUB LEVEL.

This large sub level in the central portion of the ore body was opened late in 1922.

The Northeast foot wall and the Southwest hanging wall sections have been completed and now mining is in progress over the rest of the area bounded by the foot wall on the Northeast, the hanging and supporting pillar on the Northwest, #2 dike and the hanging on the Southwest and #2 dike on the Southeast.

In December fourteen contracts were engaged stoping in the territory tributary to #8 and #10 crosscuts, eleventh level, while twelve contracts were mining in the area above #4 and #8 crosscuts. At this elevation incline slices were started in two places, one on the foot side between #212 and #227-A raises, the other above #4 crosscut, eleventh level, under the hanging. A third place is about to be opened above #4-A crosscut.

The only other development at this elevation was a traveling road which was driven to the Southeast and holed to the tenth level 60' North of the winze.

475' SUB LEVEL.

In January and February, incline slicing was in progress near the North

foot between #212 and #227-A raises; an area 60' by 83' being mined.

From May to August an incline stope in the Southwest end of the mine was worked. The area started at #2 dike and extended Northwest 65' to the hanging. It is 60' wide.

470' SUB LEVEL.

The only work here was at the incline stope under the hanging above #4 crosscut. In the interval from August to November, the sub level was opened and mined.

460' SUB LEVEL.

This sub level was started in November at the incline stope under the hanging over #4 crosscut, eleventh level.

ELEVENTH LEVEL.

No. 4-A crosscut, started last year, was continued for 250' to the Southeast until it intersected #2 dike in April. From then until November, nine raises were put up to the hanging or to the 488' sub level. These raises are vertical and arranged along the Southwest side of the drift and numbered as follows:- #9-B, #10-B, #11-B, #12-B, #13-B, #14-B, #15-B, #16-B and #17-B. No. 9-B and #17-B are double compartment, the others single compartment. The material was ore, however, #16-B and #17-B cut the hanging at 60' above the level.

In #4 crosscut three single compartment vertical raises were put up in ore on the Southwest side of the drift.

No. 16-A, height 70' to the jasper.

No. 17-A, height 60' to the jasper.

No. 18-A, height 30' to the jasper.

SHAFT.

For the past several years #3 shaft has bottomed on the twelfth level. The plat at this station being 296.6 feet above mean sea level.

Preparations were started in May of this year to sink the shaft to the thirteenth level. During this month the ladder compartment from the eleventh to the twelfth levels was cased, doors and chute built on the eleventh

level, a puffer installed on this level and work started at the twelfth level. Work was done on the night shift so as not to interfere with any of the operations of the mine, and was continued until October 5th, when it was stopped. The Company could not spare the current necessary to operate the large compressor on the night shift for this work. The bottom of the shaft is now at an elevation of 183' above mean sea level or 113.6 feet below the twelfth level. The material sunk through was as follows:- Lean ore and jasper for 76' or to a mean sea elevation of plus 221; Lean ore from 221' to 215'; Ore from 215' to 183'. The bottom of the shaft is still in this material. This ore, which is apparently in a separate lense from the other ore of the mine, ran high in sulphur and gave considerable trouble before it was discovered. It was unexpected as up to this time we had had no high sulphur ore at the Negaunee Mine.

The sinking of the shaft will be continued early in 1924. Plats will be opened at the twelfth and thirteenth levels.

The following analyses are from samples taken between sets on the North and South sides of the shaft. The dip of the formation being from 60° to 65° to the Northwest.

ANALYSES.

	SOUTH SIDE			NORTH SIDE		
MEAN SEA ELEVATION	IRON	PHOS.	SULPHUR	IRON	PHOS.	SULPHUR
221' to 215'	49.10	.054	.619	41.10	.076	1.072
215' to 209'	52.80	.124	1.031	58.60	.078	1.114
209' to 203'	57.10	.108	1.760	61.20	.098	.523
203' to 197'	61.70	.174	.573	62.40	.180	.673
197' to 191'	62.90	.074	.770	62.40	.080	.756
191' to 185'	58.90	.126	1.485	56.70	.058	1.099
185' to 183'	57.40	.074	1.256	62.30	.090	.707

UNDERGROUND IN GENERAL.

The mine is in excellent shape and if no labor shortage occurs the present product can be maintained or even increased without difficulty. The mine

is now operating at about three-fourths of its normal capacity - the output being curtailed to this amount early in 1921.

The mining has been done by the top slicing method which has been used here for years. Seven Mayne Loaders in the sub levels have given excellent results, nearly doubling the tons per man per day where used. Incline Slicing in two areas has proved that this method can be applied in places adapted to it. Here a slusher operated by a double drum hoist helps materially in increasing the tons per man per day.

Little development of main levels was done the past year, but on the twelfth level this must be pushed during the coming year, however, no development can be done here until the shaft work is completed, the twelfth level plat opened and the pocket installed.

MAYNE LOADERS.

During part of the year seven Mayne Loaders were used, one of which was the original machine that has been operating over three years. From May to December inclusive, six loaders have worked continually, most of the time drifting.

Below is a tabulation showing the results obtained with these machines over the eight month period.

LOADER NUMBER	DAYS WORKED	CONTRACT PRICE PER TON LESS THAN OTHER MINERS	INCREASED EARNINGS PER DAY OVER OTHER MINERS	TONS PER MAN INCREASE OVER AVG. OF MINE	TONS
2	375	31%	19.6%	71%	7,248
3	393½	25%	19.2%	62%	6,940
4	401	30.8%	21.7%	73%	7,392
5	374½	29%	22.6%	89%	8,052
6	401½	24.6%	20.8%	84%	7,586
7	400½	27%	15.2%	63%	6,840
AVERAGE - 2346		27.9%	19.9%	73.7%	44,058

Average tons per man per day, eight month period, with loader, 18.78

" " " " " " " " " , hand shovelling, 10.72

While the six loaders showed an average of 73.7% increase in tons per man per day over the average of miners hand shovelling, #5 Loader showed 89% for this period, with individual months running much higher, March 125%, May 97%, August 96%, September 93% and October 113%.

The ore was mined with the loaders at a saving of from 12 to 17¾ cents per ton to the company. The 44,058 tons mined in eight months by the six loaders, using the lowest figure, 12 cents, means a saving of $5,286.96 or $110.14 per month per loader.

Three new loaders have been ordered.

INCLINE SLICING.

Under the hanging above #4 crosscut just to the Northwest of #2 dike a block of incline slicing was started in February at raises #14-A and #15-A on the 488' sub level. The territory here is limited and the system was started as an experiment. Four vertical raises were put up, double compartment #12-A and single compartment #13-A, #14-A and #15-A. These raises are spaced at 15' centers. The ore chutes are of the standard size, being made of 5'4" cribbing. Slices are made to the right and left of the vertical raises and extend a distance of 30' from the edge of the raises in each direction.

At the incline stope worked last year on the foot side, the angle of dip of the slices was 33°. Most of the ore slid into the chutes, but it was hard for the men to place their sets in position on account of the steep incline. In the new stope an angle of 25° was tried. This, however, proved too flat and most of the ore for the last three sets on each slice had to be hand shovelled.

In November a double drum tugger hoist, operating a scraper, was installed which has given excellent results. About the middle of December a new sub level was started at this stope, the 460' sub level, and here an incline of 20° is used which we feel will work out satisfactorily with the scraper.

Early in the year considerable difficulty was encountered in getting the ore out of the vertical raises. It packed so tight that practically all of it had to be barred. The raises were lined with hardwood plank and corner

boards installed which helped somewhat. No. 14-A raise had the mouth of the raise widened one foot which also seemed to help a little. With decreased height, the trouble from packing ceased.

A new section, to the Northeast over #4 crosscut, has been planned for incline slicing and vertical raises have been put up. These are lined and have corner boards, but on account of the height, 80', are giving trouble from packing. Baffle boards will be put in the raises to break the fall, which we hope will remedy the trouble.

DRIFTING WITH SLUSHER AND DOUBLE DRUM HOIST.

In driving #4-A crosscut on the eleventh level, the main level cars were loaded with a scraper operated by a double drum hoist.

The car was pushed to a portable slide which was built across the drift. Beyond this slide rails and dump were placed. The scraper full of ore from the breast was drawn up the incline and dumped into the motor car. Two men in the contract did the drilling, blasting and timbering, as well as operating the slusher and hoist. The slide was placed about 30 feet from the breast so as not to interfere with the blasting. After advancing the breast 30 feet, the slide was moved ahead that distance. The results obtained were only fair, but if intensive drifting were desired, the crew could be increased and more rapid advance made.

TANKS FOR FIGHTING FIRES.

Two 100-gallon tanks, each mounted on trucks, have been placed underground. Each tank is supplied with 400 feet of hose. The tanks are filled with water and connections are made on the tanks so that they can be readily refilled.

In case of an underground fire, the truck can be taken as near as possible to the fire, air pressure applied to the tank from the air line and the hose taken directly to the fire, whether on the level or in the subs.

WATER.

The average number of gallons of water pumped per minute during the year as compared with 1922 is as follows:-

	1923	1922
January	970	875
February	1046	916
March	929	817
April	949	877
May	898	875
June	981	950
July	921	990
August	953	1008
September	926	1017
October	895	1026
November	833	983
December	823	982
Average -	927	943

The average number of gallons pumped per minute over the past four years is as follows:-

1920 - 965 gals. per minute,
1921 - 910 Do.
1922 - 943 "
1923 - 927 "

SURFACE.

SKIP HOIST.

On Monday morning, February 5th at 8:30, the 400 k.w. D.C. skip generator burned out, shutting down the mine. The men were sent home at noon and the generator sent to the Ishpeming shops. By working day and night, the repairs were completed and the mine again started on the morning of the 8th, making practically a three day shut down. Examination of the motor showed that two coils had burned on account of insullation breaking down. The arc caused by the burning coils overheated the other coils, all which had to be reinsullated.

BOILER HOUSE.

Early in November one of the boilers in the heating plant had to be shut down for repairs. As this plant has been inadequate to give sufficient steam in extremely cold weather, it was decided to take out this small boiler and install one of larger capacity. A Burt, locomotive type boiler 125 H.P., which was formerly at the Imperial Mine, was installed.

To provide room to set up the new boiler required the tearing down of

the coal room partition in the boiler room, also opening one end of the boiler house. These have been rebuilt and the boiler is now in commission.

SURFACE DRY.

In November a small change house 14' by 38' for the surface men was built to the East of the oil house. This building with the exception of the roof is practically of fire-proof construction, being gunited both inside and out. In addition to being a change house for the surface men, a section of the building will be used to store tools.

GUNITING HEADFRAME.

During the month of October the headframe was gunited from the collar of the shaft to a point 8' above the landing platform. The balance of the interior of the enclosed headframe will be gunited during the coming summer. This guniting is being done as a prevention against the possibility of fire in this structure.

EXTENSION OF STOCKING GROUNDS.

In September an area 200 feet square to the East of the present steel trestle was levelled off for additional stocking room.

EXTENSION OF STOCKING TRESTLE.

In October eight double wooden bents were added to the East end of the East steel trestle, making an extension of 167'. This was done to provide sufficient stocking room for this winter's product. The trestle was completed early in November. Stocking started here November 12th.

EXTENSION OF ROCK TRESTLE.

This trestle was extended 88' to the West in August.

SHIPMENTS.

There were shipped from the mine during the year, 336,447 tons of Negaunee ore and 43,998 tons of Bessemer ore, leaving in stock December 31st, 4,968 tons of Bessemer and 168,358 tons of Negaunee, or a total of 173,326 tons.

STOCKING FACILITIES.

Last spring at the opening of navigation, the stocking room was practi-

cally filled. During the past season the shipments from stockpiles were not heavy, The addition made to the East trestle increased the stocking room 40,-000 tons, however, during the latter part of November it was necessary to load four cargoes of ore and hold this tonnage in the vessels over winter in order to provide sufficient room for the present stocking season, if the normal production was to be maintained.

By the opening of navigation, the stocking ground will be filled to capacity. It is hoped that during the coming season, sufficient ore will be moved so that we will not be hampered by lack of stocking room during the next stocking season. If we are, it may mean a curtailment of product and a consequent reduction in the operating force. This would be a serious thing for the mine, as generally speaking there is a labor shortage in this district. Men let out readily find employment elsewhere, but if needed again are hard to replace.

OFFICE ROOF.

Repairs to the office roof, started last year, were completed in September.

DELAYS - ELECTRICAL.

February 5th	7½ hours delay account of motor on skip hoist burned out.
February 6th	8 hours idle account of skip hoist motor.
February 7th	8 " " " " " " "
February 14th	1½ hours delay account of underground motor armature burned out.
April 6th	8 hours idle account of current.
July 20th	1 hour 20 minutes delay account of no current.
July 26th	4 hours idle account of no current, water low at power plant.
August 21st	1/2 hour delay account of no current.
December 27th	1/2 hour delay account of no current.

DELAYS - NON-ELECTRICAL.

February 10th	15 minutes delay changing skip.

April 24th	40 minutes delay account of skip - trouble in dump.
April 26th	50 minutes delay account of overloaded skip.
June 13th	1/2 hour delay account of broken trolley wire on eleventh level.
July 24th	1/2 hour delay account of broken axle on eleventh level.
October 17th	2 hours delay account of skip off skip road.
December 31st	1 hour delay account of top tram car over dump.

ESTIMATE OF PROBABLE ORE IN NEGAUNEE MINE DECEMBER 31, 1923.

On North Foot above 9th level - - - -	15,213 tons,
No. 1 Shaft Pillar - - - - - - -	1,148,660 "
No. 2 Shaft Pillar - - - - - - -	113,902 "
Total above 9th level - - - - - -	1,277,775 tons.
Total between 9th & 10th levels - - -	1,072,575 Tons,
Total between 10th & 11th levels - - -	2,505,262 tons,
Total above 11th level - - - - - -	4,855,612 tons.

Percentage of Bessemer equals 11%.

GRADED AS FOLLOWS:

Bessemer Ore Developed	Trade Name. Negaunee-Bessemer	Tons 534,117
Non-Bessemer Ore Developed	Negaunee	4,321,495
Total Bessemer and Non-Bessemer,		4,855,612

ASSUMPTION:

12 cu. ft. equals one ton. 10% Deduction for Rock.
10% " " Loss in Mining.

ESTIMATED ANALYSIS.

	IRON	PHOS.	SILICA	ALUM.	MANG.	LIME	MAG.	SUL.	IGNI.	MOIST
Negaunee:										
Dried 212°	59.10	.100	7.70	2.64	.324	.900	.306	.009	3.10	
Natural	52.00	.088	6.78	2.32	.285	.792	.269	.008	2.73	12.00
Negaunee-Bessemer:										
Dried 212°	60.00	.048	7.04	2.72	.237	.644	.307	.009	2.07	
Natural	52.80	.042	6.20	2.39	.209	.567	.270	.008	1.82	12.00

NEGAUNEE MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1923.

GRADE	IRON	PHOS.	SILICA
Negaunee Bessemer,	61.80	.047	6.62
Negaunee,	60.00	.085	7.42

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1923.

GRADE	Mine IRON	Mine PHOS.	Lake Erie IRON	Lake Erie PHOS.	MOIST.
Negaunee Bessemer,	61.70	.045	61.47	.044	11.67
Negaunee,	59.50	.086	59.44	-	11.14

ORE STATEMENT - DECEMBER 31ST, 1923.

	NEGAUNEE BESSEMER	NEGAUNEE	TOTAL	TOTAL LAST YEAR
On hand January 1, 1923,	7,079	164,777	171,856	220,460
Output for Year,	46,558	334,560	381,118	299,051
Transferred,	5,468	5,468	-	-
Stockpile Overrun,	797	-	797	-
Total,	48,966	504,805	553,771	519,511
Shipments,	43,998	336,447	380,445	347,655
Balance on Hand,	4,968	168,358	173,326	171,856
Increase in Output,			82,864	
Increase in Ore on Hand,			1,470	

1923 -- 1-8 Hour Shift, Jan. 1st to Dec. 31st, 1923.

1922 -- 1-4 Hour Shift, 6 days per week, Jan. 1st to June 4th, 1922.
1-8 Hour Shift, 6 days per week, June 5th to Dec. 31st, 1922.

NEGAUNEE MINE

SHIPMENTS FOR YEAR-1923

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Negaunee Bessemer,	17,752	26,246	43,998	40,831
Negaunee,	175,966	160,481	336,447	306,824
Total,	193,718	186,727	380,445	347,655
Total Last Year,	146,351	201,304	347,655	
Increase,			32,790	

NEGAUNEE MINE

COMPARATIVE MINING COST FOR YEAR

	1923	1922	INCREASE	DECREASE
PRODUCT	381,915	299,051	82,864	
Underground Costs	1.151	1.094	.057	
Surface Costs	.149	.152		.003
General Mine Accounts	.090	.097		.007
Cost of Production	1.390	1.343	.047	
Plant Account	.030	.030		
Taxes	.466	.562		.096
Central Office	.063	.079		.016
Contingent Expense	.008	.011		.003
Cost Adjustment	.001	.006	.005	
Cost on Stockpile	1.956	2.019		.063
Loading & Shipping	.024	.020	.004	
Misc.Debits & Credits	.004	.013	.009	
Total Cost on Cars	1.976	2.026		.050
No.Days Operating	297	302		5
No.Shifts & Hours	1-8	1-4 1-8		
Avg.Daily Product	1,286	990	296	
COST OF PRODUCTION				
Labor	.874	.811	.063	
Supplies	.516	.532		.016
Total	1.390	1.343	.047	

NEGAUNEE MINE

COMPARATIVE WAGES AND PRODUCT

	1 9 2 3	1 9 2 2	INCREASE	DECREASE
PRODUCT	381,915	299,051	82,864	
No.Shifts and Hours	1-8hr	1-8hr		
AVG.NO.MEN WORKING				
Surface	43	38	5	
Underground	188	194		6
Total	231	232		1
AVG.WAGES PER DAY				
Surface	4.17	3.73	.44-11.8%	
Underground	4.91	4.43	.48-10.83%	
Total	4.76	4.22	.54-12.8%	
WAGES PER MO. OF 25 DAYS				
Surface	104.25	93.25	11.00	
Underground	122.75	110.75	12.00	
Total	119.00	105.50	13.50	
PRODUCT PER MAN PER DAY				
Surface	28.32	29.71		1.39
Underground	6.76	6.37	.39	
Total	5.46	5.25	.21	
LABOR COST PER TON				
Surface	.147	.126	.021	
Underground	.725	.678	.047	
Total	.872	.804	.068	
AVG.PRODUCT BRK'G & TRM'G	11.17	10.41	.76	
" WAGES CONTRACT MINERS	5.03	4.40	.63	
" " " LABOR	5.03	4.40	.63	
TOTAL NO. OF DAYS				
Surface	13,487	10,065	3,422	
Underground	56,462 1/4	46,939 1/2	9,522-3/4	
Total	69,949 1/4	57,004 1/2	12,944-3/4	
AMOUNT FOR LABOR				
Surface	56234.24	37547.71	18686.53	
Underground	277039.39	202893.00	74146.39	
Total	333273.63	240440.71	92832.92	

Proportion Surface to Underground Men:
1923 - 1 to 4.37
1922 - 1 to 5.11
1921 - 1 to 5.11
1920 - 1 to 5.15
1919 - 1 to 5.35

1922 - 1-8hr 6 days week June 5,1922.

NEGAUNEE MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1923.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1923	AMOUNT 1922
6" to 8" Timber	125,838	.037	4,673.35	1,181.10
8" to 10" "	42,653	.070	2,994.07	3,475.07
10" to 12" "	77,068	.101	7,789.84	5,635.44
12" to 14" "	23,484	.138	3,234.43	2,844.80
Total - 1923	269,043	.0695	18,691.69	
Total - 1922	164,248	.0800		13,136.41
	LINEAL FEET	PER 100'		
7' Lagging	1,022,070	.765	7,822.29	6,502.65
Poles 10'	383,048	1.20	4,599.09	3,144.21
Cover Boards 1" Sq.Ft.	89,718	15.54	1,394.34	1,982.89
Total - 1923			13,815.72	
Total - 1922				10,561.70
Grand Total - 1923			32,507.41	
Grand Total - 1922				24,766.16

Product	381,915	299,051
Feet of timber per ton of ore,	.7045	.5459
Feet of Lagging per ton of ore,	2.6762	2.7524
Feet of Lagging per foot of timber,	3.7989	5.0114
Cost per ton for Timber,	.0489	.0439
" Lagging,	.0205	.0217
" Poles,	.0120	.0105
" Cover boards,	.0037	.0066
" Timber, Lagging, Poles & Boards,	.0851	.08282
Equivalent of stull timber to bd. measure,	497,603	390,632
Feet of bd. measure per ton of ore	1.303	1.306

Total cost for timber, lagging poles & boards, and cost per ton,

1923	$32,507.41	$.0851
1922	24,766.16	.08282
1921	27,285.61	.10627
1920	37,934.19	.0666
1919	35,620.73	.07151
1918	21,403.96	.0415
1917	22,137.51	.0407
1916	21,510.67	.04

NEGAUNEE MINE

STATEMENT OF EXPLOSIVES USED FOR STOPING AND DEVELOPING IN ORE
-1923-

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1923	AMOUNT 1922
40% Powder	5,900	.1423	839.40	2,888.52
50% "	117,800	.1563	18,410.24	11,877.13
60% "	39,650	.1697	6,727.65	5,438.88
Total Powder - 1923	163,350	.1590	25,977.29	
Total Powder - 1922	123,150	.1641		20,204.53
Fuse	412,800	.6436c	2,656.88	2,232.66
Caps	73,300	.1149c	842.31	702.19
Cap Crimpers	48	1.00 ea.	48.00	42.00
Tamping Bags	31,300	2.23M	69.82	40.82
Connecting Wire	34#	.43#	14.59	7.54
Electric Exploders	78	6.31c	4.92	3.93
Powder Bags				32.48
Delay Igniters	728	8.36c	60.88	
Leading Wire	7'	.06½lb.	.45	
Total Fuse, etc. - 1923			3,697.85	
Total Fuse, etc. - 1922				3,061.62
Total All Explosives - 1923			29,675.14	
Total All Explosives - 1922				23,266.15
Product			381,915	299,051
Pounds of Powder per ton of ore,			.4277	.4118
Cost per ton for powder,			.0680	.0676
" " Fuse, Caps, etc.,			.0097	.0102
" " All Explosives,			.0777	.0778
Average price per Lb. for Powder,			.1590	.1641

MAAS MINE - 1923.

The product for the year by grades was as follows:-

Bessemer,	39,593 tons,
Maas,	188,199 "
Total,	227,792 "
Rock,	796 "

Most of the ore mined came from the territory adjacent to the Negaunee Mine. Here sub levels were worked from a point fifty feet below the first level, down to fifty feet below the third. The territory between the first and second being on the foot side; between the second and third on the hanging side, except on the West end where it extended from foot to hanging, and below the third level under the hanging.

Operations were continued in the South end of the mine in the sub levels above the fourth level until April at the 185', May at the 200' and August at the 215' sub level.

Most of the Bessemer ore came from the sub levels in the South end of the mine, so that very little of this grade was made during the last five months of the year.

The product was smaller than estimated due to a labor shortage. In January there were 160 men employed underground, in July the number had dropped to 126, in August 129, and in November 136. Men are more plentiful at present and may continue so during the winter.

UNDERGROUND.

SUBS ABOVE THE SECOND LEVEL.

630' SUB LEVEL.

The pillars remaining in the Roman Catholic Cemetery were mined and the sub level completed in May.

618' SUB LEVEL.

This sub level was worked throughout the year. It was extended West to the limit of ore near #75 raise and the pillars on the foot and hanging are now being taken.

In December there were five contracts engaged here, four in the Roman Catholic Cemetery tract stoping North of the dike, and one in the Cleveland-Cliffs strip South of the dike.

600' SUB LEVEL.

This sub level was opened during the year and a traveling way made to the 618' sub level connecting with the first level raise. The ore body is now being developed from #42-A, #67, #68 and #68-A raises toward the foot and on the hanging sides.

In December five contracts were employed in development work, four in the Roman Catholic Cemetery tract South of the dike, one in the Cleveland-Cliffs strip drifting to the Northeast from #68-A raise.

535' SUB LEVEL.

This sub level was opened in 1922. Mining was carried on during the year with three contracts. The sub level was completed in November. Practically all of the product was handled through #70 raise. Work in this area has been stopped temporarily.

SECOND LEVEL.

The only work on the second level during the year was the ordinary repair work on main levels.

SUBS BETWEEN SECOND AND THIRD LEVELS.

335' SUB LEVEL.

WEST END.

The remaining pillars on the foot side between #1 and #4 raises and the pillars around the winze on the hanging side were taken during the year. The sub level was completed in October.

EAST END.

Mining was completed in this end of the sub level in the month of

February by taking the remaining pillars at #108 raise.

325' SUB LEVEL.

WEST END.

This territory was opened from the foot wall raises and from the winze raise during the year. The ore body was blocked out in pillars which are now being removed. This territory is badly cut up by the old caved main level drifts and square set rooms.

In December four contracts were employed on the foot side between the winze raise and #4 raise. Two contracts stoped on the hanging side opposite.

EAST END.

This territory was opened from #2-E and #3-E raises, put up from the 245' tramming sub, in 1922. The ore body was blocked out during this year and the remaining pillars are now being taken.

In December two contracts were stoping between #2-E and #4-E raises.

THIRD LEVEL.

In June repairs to the foot wall drift were started near the Negaunee boundary. This work was continued until the end of the year and raise #120 also repaired. From this raise at a point midway between the second and third levels is the connecting drift to the eleventh level, Negaunee Mine.

In June a ladder compartment was added to #1 raise, rock drift, extending to the 325' sub level.

In December one contract was engaged in mining the pillar North of #3-E raise in the East end territory.

Exploratory work out in the hanging at an elevation of 308' was started in 1922 from #16-S raise from #1 crosscut on the 245' tramming sub. Drifts were driven to the Northwest, Northeast, Southeast and Southwest. With the limits of the ore found, work was stopped in May.

In January the cleanout drift for the third level sump was started from the shaft at a point 40' below the third level. This drift was completed in March, the concrete dam built in September and the raise up to the sump blasted through in October.

PUMP STATION.

All timber walls at the entrance to the pumphouse were gunited. The doors were covered with Toncon metal.

SUBS BETWEEN THIRD AND FOURTH LEVELS.

300' SUB LEVEL.

WEST END.

This sub level was opened in November from #5-W raise on the hanging side where one contract is now driving West to hole to the winze, and another is driving East along the hanging to connect with the various transfer raises before starting mining.

In December this end took weight, crushing the tops of the raises and the development drifts, causing two weeks delay. The drifts and raises are being retimbered.

EAST END.

This territory was opened from #2-E raise in July and drifts driven to connect #1-E raise on the West side to #5-E raise on the East.

In December five contracts were engaged in blocking out this area into pillars preparatory to mining. One contract is drifting North from #1-E raise for a timber supply way from the third level.

285' SUB LEVEL.

This sub level was opened in 1921. Throughout the year the work consisted of taking the remaining pillars.

The sub level was completed in December.

270' SUB LEVEL.

Mining here was confined to Pillar M-3 South and East of the Race Track pillar #2. This area was opened in 1922 and was blocked out during the past year.

In December three contracts were engaged in taking the remaining pillars.

260' SUB LEVEL.

This sub level was opened in 1922 at #425 raise and a limit of mining

line established 70' East. Mining was carried on in this area and completed in May of this year.

In September development work was started from #705 raise by a drift to the Southeast to open up the area between the Race Track Pillar #2 and the Negaunee boundary.

In December three contracts were engaged in blocking out this territory for mining.

245' SUB LEVEL.

No. 2 crosscut was extended to the Southwest 115' during the year and holing was effected from this drift to #705 raise. No. 706 raise was put up to the 270' sub level during the year. No. 4-W raise was started in December. This was 35' above the rail on the last of the month in ore.

A drift was driven to the Negaunee boundary from a point 10' Northeast of #21-S raise, #2 crosscut. On the South side of this drift a trench raise 75' long was put up 60' to the 300' elevation where jasper was encountered.

In August a drift was driven 30' to the Southwest from #425 raise to start development work. This work in Pillar M-3 was stopped temporarily until the mining to the East advanced farther. No work has been done since that month.

215' SUB LEVEL.

This sub level was completed in August by taking the pillars near #602 raise.

200' SUB LEVEL.

In May a sub level was started at this elevation at #610 raise. This work was discontinued at the end of the month.

185' SUB LEVEL.

At the first of the year two contracts were employed here mining the pillars to the East and South of #406 raise in mining area #2. They completed the sub level at this point in April.

170' SUB LEVEL.

The drift started during the latter part of last year South from #404

raise was continued in January and February. In March a short raise was put up to the 185' sub level. This drift acts as a traveling road between the 170' and 185' sub levels.

FOURTH LEVEL.

No. 706 raise was started in September in jasper. Ore was encountered at an elevation of 20' above the rail. The raise on December 31st was 135' above the level in ore. It will be continued until it holes to the 245' tramming sub level.

UNDERGROUND IN GENERAL.

Practically no development work was done during the year except on the 245' tramming sub level between the third and fourth levels. The territory between the first and second levels is getting cut up with dikes and from this point down to the second level will make hard mining. The area immediately above the third level, where most of this years mining was done, was extremely heavy ground and in some places required continual retimbering. This territory had been cut up with the old main level drift which had caved at one time, and with the old square set rooms. The sub level started below the third level is in virgin ground. It will probably give us trouble on account of the main level not being properly lagged, but when the first sub level has been taken, this area should make good mining.

When mining started in the South end of the mine above the fourth level years ago, pillars running Northeast and Southwest were left to support the surface of the Race Track which adjoins the Maas Mine to the West, and on which there are numerous dwellings. Pillars 80' wide at the top were left and the sides sloped down at an angle of 50° to the Southeast and Northwest. The mining sections were the longitudinal areas lying between the pillars, the width of which narrowed as the mining proceeded from the hanging downward. The sections pinching out at the fourth level. Mining in the South mining pillar of this section has proceeded from the 280' sub level to the 215' or 65 feet. The 215' sub level being about 100 feet above the fourth level. With each sub

level decreasing in size, it would be only a matter of a couple of years before the weight would be felt on the fourth level. The mining, therefore, has been stopped here temporarily and concentrated at the East end of the mine. It is hoped that some arrangement can be made in the near future whereby the houses and surface to the West can be vacated, so that mining can proceed in a normal way. If nothing is done, the pillars can be mined to the fourth level, where work will have to stop, as no mining under this arrangement can be done below the fourth level as the supporting pillars bottom at that elevation.

For the past several years I have called attention to this condition in my annual reports and while I know the matter has been taken up several times, nothing definite has been done. The Maas Mine ore body is as regular as the Negaunee, and if mining and hoisting conditions were as favorable, it should cost no more to mine here than at the Negaunee. The shaft should be made standard, steel trestles built, headframe altered to fit shaft and steel trestle, and arrangements made so that mining would not be hampered by having to leave supporting pillars.

VENTILATION.

In July it was noticed that the ventilation was bad at the East end of the 325' sub level. A fan was secured and installed in August at #223 raise on the 425' sub level. Vent-tube was put up #2-E raise to the 325' sub and there split and sent into the contracts.

By investigation, it was found that there was practically no natural circulation on the third and fourth levels. The third level foot wall drift was being repaired at the time and as this shut off the air current to the Negaunee Mine, it was thought to be responsible for some of the trouble. In order to induce a current of air in the shaft, water was turned in the shaft each Monday morning. This helped matters and set up a circulation at once which provided fresh air for the main level drifts, the fan forcing the air into the 325' sub level.

TRENCH STOPE.

In March a trench stope was started in the area under the third level

hanging adjoining the Negaunee Mine. On the South side of the drift to the Southeast from #21-S raise, on the 245' sub level, a square set stope was placed. This room was 75' long and 60' high and the West end connected with #21-S raise as a traveling road. Each set is 10' high, 8' long and 6' wide. The stope stopped against the jasper hanging. Chutes were arranged at 15' centers at the bottom of the trench to draw off the ore.

Slicing at the top started in September on the Northeast side and has continued from that time. Three slices 50' long have been taken on this side and three on the Southwest side, the latter varying from 20' to 50' in length, the difference in length being due to encountering the jasper hanging.

This trench was opened as an experiment but gives promise of being very successful.

The ore is pulled into the trench from the breast of the slice by means of a slusher operated by a double drum tugger hoist and is drawn off into motor cars whenever desired, enough being taken to prevent packing in the trench.

SUMP.

I have mentioned above in this report that a clean-out raise was provided for the third level pump station sump. This permits drawing off the mud below the suctions. During the coming year a concrete wall should be built between the suctions and the main sump area so that this latter space can be cleaned from time to time.

FIRE PROTECTION.

Two 100-gallon tanks, each equipped with 400 feet of 1" hose and mounted on trucks, have been placed underground. The tanks are filled with water and connections made so compressed air can be applied. These can be taken to any section of the mine.

Framework for fire doors have been built on the first, second and third levels.

GUNITING.

In October the pumphouse wall next to the shaft, the fan station on the 245' sub level and the bilge pump station on the fourth level at the winze,

were gunited, as a protection against fire.

WATER.

The average number of gallons of water pumped per minute as compared with 1922 is as follows:-

	1923	1922
January	966	944
February	930	959
March	929	943
April	930	938
May	979	957
June	1012	975
July	990	1012
August	962	1028
September	1009	1036
October	975	1093
November	960	984
December	950	958
Average -	966	985

The quantity of water pumped shows a decrease of 19 gallons per minute over 1922, however, more water is reaching the fourth level. A new pump will have to be installed there this coming year to supplement the 200-gallon Aldrich. The Mechanical Department is figuring on a Gould which was formerly used at the Morris Mine, but has not been used for several years.

SURFACE.

CARPENTER SHOP.

In December of 1922 the carpenter shop was damaged by fire. In January the walls were repaired and a new roof built so that the building could be occupied. During the summer a concrete floor was placed in the building. A circular saw operated by an electric motor was added to the equipment.

BOILER PLANT.

As soon as the turbine was shut down in the spring, repairs started at once at the large boiler plant. The economizer was partly repaired, three boilers were thoroughly overhauled and the coal crusher repaired. The steam turbine went into commission in July on account of a shortage of water power and operated continuously until December 5th, since which time it has been shut down.

STOCKING TRESTLE.

In March and April six bents were added to the Maas stocking trestle. These were the regular double bents.

This fall thirty-six bents were erected for a new stocking trestle for Maas ore to the South of last years trestle. These were three legged bents that are used for double track stocking.

NEW STOCKING GROUND.

Early in the fall a new stocking ground was prepared to the South of the Maas ore pile.

AUXILLIARY BOILER PLANT.

During the war an auxilliary boiler plant was built to the East of the engine house. During the fall two boilers were taken from this plant, one sent to the Morris-Lloyd Mine, the other to the Negaunee Mine, to be used for heating plants. These were 125 H.P. Burt boilers of locomotive type.

MAAS CRUSHER.

The district crusher was overhauled early in May. The old bell and spider were removed and new ones supplied, also a new conveyor belt. During the latter part of the season a new pinion was supplied on account of a break down. A large charge was paid during the year for maintenance of tracks. It is understood, however, that from this time on the Railroad Department will care for these tracks without cost to the company. The crusher operated intermittantly throughout the summer, but was worked double shift in October and early in November, crushing ore for the Rolling Mill Mine.

The product of the crusher by grades is as follows:-

Holmes,	1,552 tons,
Morris-Lloyd,	52,074 "
South Jackson,	12,812 "
Athens,	22,757 "
Rolling Mill,	33,129 "
Total -	123,407 tons.

DELAYS - ELECTRICAL.

April 6th - 8 hours idle account of no current, water low at power plant.

April 26th - 4 hours idle account of no current, water low at power plant.

DELAYS - NON-ELECTRICAL.

January 1st - 1½ hours delay account of broken rail in skip dump.

Feb. 14th - 1½ hours delay account of top tram car over trestle.

March 6th - 1½ hours delay - hoisting on one side account of broken rope on top tram car.

April 16th - 2 hours delay account of break down to second level motor.

April 16th - 2 hours delay account of top tram car over trestle.

October 8th - Product low account of third and fourth level contracts taking weight over Sunday requiring much retimbering.

November 15 - 1 hour delay account of fourth level motor off track.

ESTIMATE OF ORE RESERVES IN MAAS MINE DECEMBER 31, 1923.

Assumption 12 cu. ft. equals one ton.

10% deduction for rock.

10% deduction for loss in mining.

AVAILABLE ORE

Ore reserve above 2nd level - - - - - - -	303,259 tons,
Ore reserve between 2nd and 3rd levels - - -	1,254,696 "
Ore reserve between 3rd and 4th levels - - -	2,161,188 "
Total available - - - - - - -	3,719,143 tons.

NON-AVAILABLE ORE

Between 3rd and 4th levels - - - - - - -	1,439,696 tons.
Total All Ore - - - - - - - - -	5,158,839 tons.
Percentage of Bessemer equals 10% - - -	515,884 tons.

BESSEMER ORE	TRADE NAME	TONS
Developed	Maas-Bessemer	371,914
NON-BESSEMER ORE		
Developed	Maas	3,347,229
Total Bessemer and Non-Bessemer - -		3,719,143

ESTIMATED ANALYSIS.

	IRON	PHOS.	SILICA	ALUM.	MANG.	LIME	MAG.	SUL.	IGNI.	MOIST.
Dried 212°										
Maas-Bessemer	61.00	.044	7.50	1.79	.206	.510	.218	.007	1.50	
Natural	53.39	.039	6.56	1.57	.181	.446	.191	.006	1.31	12.50
Dried 212°										
Maas	59.90	.116	7.60	2.34	.280	.820	.256	.009	2.80	
Natural	52.25	.101	6.63	2.04	.244	.715	.224	.008	2.44	12.75

MAAS MINE

AVERAGE MINE ANALYSIS ON OUTPUT FOR YEAR 1923.

GRADES	IRON	PHOS.	SILICA
Maas Bessemer,	61.64	.047	8.50
Maas,	59.45	.106	8.60

AVERAGE ANALYSIS ON STRAIGHT CARGOES FOR YEAR 1923.

GRADES	Mine IRON	Mine PHOS.	Lake Erie IRON	Lake Erie MOIST.
Maas Bessemer,	(All Mixed)		-	-
Maas,	60.06	.092	60.30	11.67

ORE STATEMENT - DECEMBER 31ST, 1923.

	MAAS BESSEMER	MAAS	TOTAL	TOTAL LAST YEAR
On Hand January 1, 1923,	112,529	337,678	450,207	252,464
Output for Year,	39,593	188,199	227,792	216,600
Transferred,	8,643	8,643	-	-
Total,	143,479	534,520	677,999	469,064
Shipments,	42,545	144,779	187,324	18,857
Balance on Hand,	100,934	389,741	490,675	450,207
Increase in Output,			11,192	
Increase in Ore on Hand,			40,468	

1923 -- 1-8 Hour Shift, Jan. 1st to Dec. 31st, 1923.

1922 -- 1-4 Hour Shift, 6 days per week, Jan. 1st to June 4th, 1922.
1-8 Hour Shift, 6 days per week, June 4th to Dec. 31st, 1922.

MAAS MINE

SHIPMENTS FOR YEAR-1923.

GRADE	POCKET	STOCKPILE	TOTAL	TOTAL LAST YEAR
Maas Bessemer,	14,301	28,244	42,545	2,020
Maas,	63,651	81,128	144,779	16,837
Total,	77,952	109,372	187,324	18,857
Total Last Year,	16,944	1,913	18,857	
Increase,			168,467	

MAAS MINE

COMPARATIVE MINING COST FOR YEAR

	1923	1922	INCREASE	DECREASE
PRODUCT	227,792	216,600	11,192	
Underground Costs	1.410	1.271	.139	
Surface Costs	.214	.183	.031	
General Mine Accounts	.132	.152		.020
Cost of Production	1.756	1.606	.150	
Original Cost	.076	.076		
Plant Account	.251	.251		
Taxes	.340	.338	.002	
Central Office	.077	.086		.009
Contingent Expense	.009	.012		.003
Cost Adjustment	.014	.003	.011	
Cost on Stockpile	2.523	2.372	.151	
Loading & Shipping	.037	.002	.035	
Total Cost on Cars	2.560	2.374	.186	
No.Days Operating	300	303		3
No.Shifts & Hours	1-8	1-4-131 1-8-172		
Avg.Daily Product	759	715	44	
COST OF PRODUCTION				
Labor	1.100	.962	.138	
Supplies	.656	.644	.012	
Total	1.756	1.606	.150	

MAAS MINE

COMPARATIVE WAGES AND PRODUCT

	1923	1922	INCREASE	DECREASE
PRODUCT	227,792	216,600	11,192	
No.Shifts & Hours	1-8hr	1-4:1-8		
AVG.NO.MEN WORKING				
Surface	38	38		
Underground	141	165		24
Total	179	203		24
AVG.WAGES PER DAY				
Surface	4.15	3.71	.44-11.86%	
Underground	4.71	4.19	.62-14.79%	
Total	4.59	4.10	.49-11.95%	
WAGES PER MO.OF 25 DAYS				
Surface	103.75	92.75	11.00	
Underground	117.75	104.75	13.00	
Total	114.75	102.50	12.25	
PRODUCT PER MAN PER DAY				
Surface	19.65	22.11		2.46
Underground	5.43	5.48		.08
Total	4.23	4.39		.16
LABOR COST PER TON				
Surface	.211	.168	.043	
Underground	.874	.764	.110	
Total	1.085	.932	.153	
AVG.PRODUCT BRK'G & TRM'G	8.62	9.01	.37	.39
" WAGES CONTRACT MINERS	4.86	4.29	.57	
" " " LABOR	4.86	4.29	.57	
TOTAL NO.OF DAYS				
Surface	11,593	9,795¼	1,797-3/4	
Underground	42,212½	39,500	2,712½	
Total	53,805½	49,295¼	4,510¼	
AMOUNT FOR LABOR				
Surface	48140.12	36343.90	11796.22	
Underground	198972.36	165566.44	33405.92	
Total	247112.48	201910.34	45202.14	

Proportion Surface to Underground Men:

1923 - 1 to 3.71
1922 - 1 to 4.34
1921 - 1 to 4.58
1920 - 1 to 4.56
1919 - 1 to 4.23

1-8hr June 5, 1922.

MAAS MINE

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31, 1923.

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1923	AMOUNT 1922
6" to 8" Timber	40,041	.0392	1,571.04	2,331.78
8" to 10" "	53,264	.076	4,048.07	2,977.65
10" to 12" "	24,408	.0948	2,314.31	2,206.79
12" to 14" "	13,395	.1216	1,628.79	375.12
Total - 1923	131,108	.0729	9,562.21	
Total - 1922	157,778	.05		7,891.34
	LINEAL FEET	PER 100'		
7' Lagging	869,155	.721	6,271.57	5,960.33
Poles	97,910	1.21	1,186.10	386.64
Total - 1923	967,065	.771	7,457.67	
Total - 1922	857,162	.74		6,346.97
Covering Boards, sq.ft.	80,950	1.397	1,130.76	
Covering Boards, sq.ft. 1922	75,582	1.32		1,039.28
Total Timber -			18,150.64	15,277.59

Product,	227,792	216,600
Feet of Timber per ton of ore,	.5755	.7284
Feet of Lagging "	3.82	3.35
Feet of Lagging per foot of Timber,	6.63	5.23
Cost per ton for Timber,	.042	.0364
Do. Lagging,	.0275	.0275
" Covering Boards,	.0049	.0048
" Poles,	.0052	.0018
" all timber,	.0796	.0705
Equivalent of stull timber to bd. measure,	240,498	239,083
Feet of bd. measure per ton of ore,	1.06	1.10

Total cost for timber, lagging, poles & cover boards, and cost per ton,

1923	$18,150.64	$.0796
1922	15,277.59	.0705
1921	25,610.04	.1230
1920	25,103.12	.0749
1919	27,284.08	.0808

MAAS MINE

STATEMENT OF EXPLOSIVES USED FOR STOPING AND DEVELOPMENT IN ORE
-1923-

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1923	AMOUNT 1922
40% Powder	16,250	.1339	2,175.30	6,984.35
60% "	65,450	.1697	11,104.29	5,750.40
#1 Hercules Powder				38.12
Total Powder	81,700	.1625	13,279.59	
Total Powder - 1922	80,975	.1577		12,772.87
Fuse	262,600	.6419c	1,685.52	1,751.87
#6 Blasting Caps	51,000	1.156c	589.51	598.52
Cap Crimpers	30	1.00 ea.	30.00	31.00
Battery Wire	4#	1.00 lb.	4.00	
Igniters	19	.12 ea.	2.28	
Total Fuse, etc.,			2,311.31	2,381.39
Total All Explosives,			15,590.90	15,154.26
Product,			227,792	216,600
Pounds of Powder per ton of ore,			.3587	.3738
Cost per ton for Powder,			.0583	.059
Do. Fuse, Caps, etc.,			.0101	.011
" All Explosives,			.0684	.07
Average price per pound for powder,			.1625	.1577