

MAAS MINE
ANNUAL REPORT
YEAR 1930

8. COST OF
OPERATING:

Hoisting Equipment: (Cont)

	<u>Wire Rope</u>	<u>Sub Division</u>	
		<u>Skip & Skip Roads</u>	<u>Electric Hoists</u>
1930	\$ 61.43	\$ 5,093.01	\$ 2,227.66
1929	<u>681.26</u>	<u>1,467.44</u>	<u>766.48</u>
Decrease	619.83		
Increase		3,625.57	1,461.18

The increase is due to more repairs to skips and skip roads and repairs caused by accident March 21st when skip caught in shaft and fell to bottom. The increase in expense for electric hoists is due to installing a new solution tank and pump for speed control, new brake arms on skip hoist, and changing key on main gear of the cage hoist, which was an expensive job as the drum had to be removed.

Shaft:

1930 Amount	\$2,092.29	Cost per ton	\$.005
1929 Amount	<u>6,355.61</u>	" " "	<u>.019</u>
Decrease	5,736.68		.014

Decrease due to less repairs to shaft and shaft pockets in 1930. The 3rd level pocket was rebuilt in 1929 and completed in January 1930.

Top Tram Equipment:

1930 Amount	\$2,015.29	Cost per ton	\$.005
1929 Amount	<u>866.68</u>	" " "	<u>.003</u>
Increase	1,148.61		.002

Detail

	<u>1930</u>	<u>1929</u>
Engine & Motors	115.12	8.89
Tracks & Cars	911.85	352.02
Wire Rope	785.99	296.00
Sheaves	<u>202.33</u>	<u>209.77</u>
	2,015.29	866.68

Increase due to more repairs to engine & motors, more repairs to cars, and more new rail and wire rope used in 1930.

Docks, Trestles & Pockets:

1930 Amount	\$726.66	Cost per ton	\$.002
1929 Amount	<u>126.89</u>	" " "	<u>.000</u>
Increase	599.77		.002

Increase due to more repairs to pockets and chutes in shaft house in 1930.

Mine Buildings:

1930 Amount	\$ 3247.63	Cost per ton	\$.008
1929 Amount	<u>1678.96</u>	" " "	<u>.005</u>
Increase	1588.67		.003

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8. COST OF
OPERATING:

Mine Buildings: (Cont)

	<u>Sub Division</u>	<u>1930</u>	<u>1929</u>
Office		1,101.32	
Warehouse		85.21	
Shops		31.82	30.46
Garage		571.16	
Engine House		77.19	12.23
Dry House		1,036.22	1,390.46
Miscellaneous		31.72	245.81
		3,247.63	1,678.96

Increase due to repairing and painting interior, painting exterior, and tarring roof of office and warehouse. Repairing storage building and repairing, guniting and painting garage. More repairs to engine house building; repairing and remodeling coal dock.

Total Surface Costs:

1930 Amount	\$63,273.70	Cost per ton	\$.152
1929 Amount	49,274.48	" " "	.148
Increase	13,999.22		.004

GENERAL MINE ACCOUNTS:

Insurance:	1930 Amount	\$136.14	Cost per ton	\$.000
	1929 Amount	149.68	" " "	.000
	Increase	13.54		

Engineering:

1930 Amount	\$2,829.49	Cost per ton	\$.007
1929 Amount	2,848.55	" " "	.009
Increase	19.06		.002

Decrease due to less time spent by engineers on mine surveys and estimating stockpiles.

Mechanical & Electrical Engineering:

1930 Amount	\$1,888.73	Cost per ton	\$.005
1929 Amount	1,626.67	" " "	.005
Increase	262.06		

Increase due to more time at mine by Mechanical Department employees supervising repairs to cage and skip hoists, and compressors

Analysis:

1930 Amount	\$14,172.24	Cost per ton	\$.034
1929 Amount	12,336.43	" " "	.032
Increase	1,835.81		.002

Cost per determination in 1930		-	\$.15350
" " "	" " "	-	.13387
Increase			.01963

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8. COST OF
OPERATING:

Analysis: (Cont)

	<u>Prop. of Cost of Optg.</u> <u>Negaunee Mine Laboratory</u>	<u>No. Determinations</u>
1930	\$ 6,929.22	45,136
1929	<u>6,700.63</u>	<u>50,288</u>
Increase	228.59	
Decrease		5,152

Increase due to increase of \$497.00 in direct charges from Central Office Shipping Department, also to two extra samplers the entire year. Extra samplers were put on in July 1929, one on surface and one underground when hoisting on the night shift was started.

Personal Injury Expense:

1930 Amount	\$17,188.75	Cost per ton	\$.041
1929 Amount	<u>15,111.19</u>	" " "	<u>.047</u>
Increase	2,077.56	Decrease	.006

More expense on account of compensation payments for personal injuries and 2% reserve, also catastrophe insurance in 1930. Cost per ton decreased on account of larger product.

Safety Department Expense:

1930 Amount	\$1,431.19	Cost per ton	\$.004
1929 Amount	<u>2,977.10</u>	" " "	<u>.010</u>
Decrease	1,545.91		.006

Decrease due to change in method of distributing costs in 1930. Expense in 1929 includes Maas Mine proportion of cost of safety picnic.

Telephones & Safety Devices:

1930 Amount	\$1,013.85	Cost per ton	\$.003
1929 Amount	<u>630.65</u>	" " "	<u>.002</u>
Increase	383.20		.001

Detail

	<u>1930</u>	<u>1929</u>
Lighting for shaft and levels	541.51	550.01
Mine Phones	74.32	18.32
Safety Gates	72.32	27.89
Sign boards and signals	<u>325.70</u>	<u>34.43</u>
	1,013.85	630.65

Increase due to more repairs to mine phones, safety gates, and installing safety switches on main levels.

Local General Welfare:

1930 Amount	\$5,330.07	Cost per ton	\$.013
1929 Amount	<u>4,454.58</u>	" " "	<u>.014</u>
Increase	875.49	Decrease	.001

Increase due to more local and general welfare expense in 1931.

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8. COST OF
OPERATING:

Special Expenses, Pensions & Allowances:

1930 Amount	\$10,978.40	Cost per ton	\$.026
1929 Amount	<u>108.53</u>	" " "	<u>.000</u>
Increase	10,869.87		.026

Large increase due to change in method of distributing costs in 1930.

Ishpeming Office:

1930 Amount	\$15,554.56	Cost per ton	\$.037
1929 Amount	<u>28,020.95</u>	" " "	<u>.084</u>
Decrease	12,466.39		.047

Decrease due to change in method of distributing costs in 1930.

Mine Office:

1930 Amount	\$14,892.93	Cost per ton	\$.035
1929 Amount	<u>14,936.50</u>	" " "	<u>.045</u>
Decrease	43.57		.010

Decrease due to less office expense.

Total General Mine Expenses:

1930 Amount	\$85,416.35	Cost per ton	\$.205
1929 Amount	<u>80,345.69</u>	" " "	<u>.243</u>
Increase	5,070.66	Decrease	.038

9. EXPLORATIONS

AND
FUTURE
EXPLORATIONS:

There were no explorations by diamond drilling in the Maas Mine during 1930.

10. TAXES:

	1930		1929	
	Valuation	Taxes	Valuation	Taxes
City of Negaunee				
Maas Mine, 257.18 Acres	1,850,000	71,509.90	1,590,000	59,488.26
Race Course, 15.58 Acres	600,000	23,192.40	300,000	11,224.20
Adams strip, 3.2 Acres	280,000	10,823.12	300,000	11,224.20
Stockpile, Equipment, etc.	590,000	22,805.86	810,000	30,305.34
Miscellaneous Parcels	19,075	737.39	19,050	712.78
Total	3,339,075	129,068.67	3,019,050	112,954.78
Collection Fees		1,290.73		1,129.55
Total Operating Maas Mine		130,359.40		114,084.33
Tax Rate		3.8654		3.742
Total City of Negaunee Tax		611,259.85		600,686.18
Maas Mine % of City Tax		21.32%		19%

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10. TAXES: (Cont)

Description City of Negaunee	1930		1929	
	Valuation	Taxes	Valuation	Taxes
Maas Mine Rented Houses:				
C. C. I. Co. 1st Addition	109,900	4,238.56	109,900	4,112.04
Harris Addition	5,000	193.28	5,000	187.07
Corbit's 1st Addition	8,300	320.88	8,300	310.56
Corbit's 2nd Addition	7,400	286.10	7,400	276.88
Kirkwood & Kellan's Addition	38,200	1,476.82	37,700	1,410.53
Gaffney's Addition	53,500	2,068.15	51,200	1,915.61
Pioneer Plat	10,400	402.03	10,400	389.11
Reed & Winter Addition	6,100	235.80	6,100	228.25
McKenzie's Addition	900	34.79	900	33.67
Miscellaneous - unplatted	12,100	467.72	12,300	460.22
Total Rented Houses	251,800	9,724.13	249,200	9,324.01
Collection Fees		97.24		93.24
Total		9,821.37		9,417.25

The valuation of the mine increased \$260,000 in 1930, due to inclusion by the Tax Commission of an additional tonnage on the Race Course. The tax rate was higher in 1930 due to decrease in total valuation of City of Negaunee. The amount of taxes raised by the City was the same as in 1929.

11. ACCIDENTS
AND
PERSONAL
INJURY:

There was no fatal accident at the Maas in 1930, but there were 10 minor accidents which caused lost time. The sources of these accidents were as follows:

Handling timber	1
Blasting	1
Motor Train	3
Tools	4
Jumped from stage	1
Total	10

	1930	1929	1928
Fatal	0	1	1
Time lost - more than 4 months	2	2	1
" " - 1 to 4 months	7	4	5
" " - less than 1 month	1	2	11
Total	10	9	18

No. of cases paid compensation for accidents prior to January 1, 1930	9	7	2
No. of cases being paid difference in wages	1	3	2

The injuries sustained in the accidents causing loss of time of over four months were fracture of ankle and lacerations of both hands.

The injuries sustained in the accidents causing loss of time of from one to four months were loss of little finger (2), laceration of face, 2 contusions, loss of thumb, laceration of ear drum.

The record is better than in the previous year in that there was no fatal accident, but there were more accidents causing loss of time of from one to four months. It is hoped that by stricter discipline and the monthly district meetings of bosses that improvement will be made in the accident record in 1931.

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12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

a. E. & A. #513 - Moving 44 Maas Houses

Total estimate	\$109,815.47
Total expended to January 1, 1930	111,516.94
Total expended in 1930	1,432.63
Unexpended balance January 1, 1931	3,134.10 (red)

Expenditures in this account for 1930 were for repairing garages and sheds and small amount for grading and fencing. This E. & A. was completed in 1930.

b. E. & A. #531 - Healy Avenue Extension

Total estimate	\$14,000.00
Less Negaunee Mine Proportion - 37 $\frac{1}{2}$ %	5,250.00
C. C. I. Co. proportion - 62 $\frac{1}{2}$ %	8,750.00
Total expended to January 1, 1930	6,756.79
Total expended in 1930	20.11
Unexpended balance January 1, 1931	1,973.10

This E. & A. was completed in 1930.

c. E. & A. #533 - Painting 30 Houses and Sheds

Total estimate	\$4,713.00
Total expended to January 1, 1930	3,469.99
Total expended in 1930	489.19
Unexpended balance January 1, 1931	753.83

This E. & A. was not completed in 1930.

d. E. & A. #548 - Sinking Maas Shaft and Developing 5th Level

Total estimate	\$133,160.00
Total expended to January 1, 1930	22,664.59
Total expended in 1930	68,083.09
Total unexpended balance January 1, 1931	42,412.32

Assembling Equipment:

Total estimate	1,000.00
Total expenditures in 1929	1,416.05
Total expenditures in 1930	0
Unexpended balance January 1, 1931	416.05 (red)

This work was completed in 1929.

4. Sinking in Rock:

(a) Sinking 140' (Actual Sinking 155')

Total estimate	15,000.00
Total expenditures to January 1, 1930	7,889.77
Total expenditures in 1930	13,299.27
Total unexpended balance January 1, 1931	6,189.04 (red)

This work was completed in 1930.

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12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION: (Cont)

d. E. & A. #548 - Sinking Maas Shaft and Developing 5th Level: (Cont)

(b) Timbering and Steel Sets:

Total estimate	\$ 6,000.00
Total expenditures to January 1, 1930	3,203.34
Total expenditures in 1930	3,764.58
Total unexpended balance January 1, 1931	967.92 (red)

This work was completed in 1930.

5. Drifting to Ore Body:

Total estimate	\$38,800.00
Total expenditures in 1930	17,710.16
Total unexpended balance January 1, 1931	21,089.84

On December 31st the shaft crosscut was 724 ft. from the shaft.
This work was not completed in 1930.

6. Plats and Pockets:

Total estimate	\$14,000.00
Total expenditures to January 1, 1930	2,538.53
Total expenditures in 1930	15,405.30
Total unexpended balance January 1, 1931	3,943.83 (red)

This work was completed in 1930.

10. Permanent Equipment:

Total estimate	\$22,600.00
Total expenditures to January 1, 1930	2,620.49
Total expenditures in 1930	9,439.55
Total unexpended balance January 1, 1931	10,539.96

The charges to this account for 1930 were for a Conway Loader, 1 N-72 Ingersoll-Rand Drifter, 1 7-K Denver Drifter, drill steel, main level tracks, and excavating pumphouse. Expenditures not completed at end of year.

76. Hoisting Plant:

Total estimate	\$ 6,705.00
Total expenditures to January 1, 1930	3,734.64
Total expenditures in 1930	1,027.43
Total unexpended balance January 1, 1931	1,942.93

The main charge to this account in 1930 was for a new skip rope, 2,000 ft. long, installed in 1930.

81. Electric Haulage:

Total estimate	\$11,950.00
Total expenditures to January 1, 1930	1,261.77
Total expenditures in 1930	7,313.86
Total unexpended balance January 1, 1931	3,374.37

The principal charge to this account in 1930 was 14 rocker dump cars. Expenditures were not completed in 1930.

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12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION: (Cont)

d. E. & A. #548 - Sinking Maas Shaft and Developing 5th Level: (Cont)

82. Pumping Plant:

Total estimate	\$ 4,800.00
Total expenditures in 1930	85.93
Total unexpended balance January 1, 1931	4,714.07

Not completed in 1930.

84. Safety Appliances & Lights:

Total estimate	\$ 200.00
Total expenditures in 1930	39.01
Total unexpended balance January 1, 1931	160.99

Not completed in 1930.

e. E. & A. #559 - Electric Haulage Generator Set:

Total estimate	\$4,917.00
Total expenditures to January 1, 1930	1,993.03
Total expenditures in 1930	2,190.71
Total unexpended balance January 1, 1931	733.26

The charges to this account for 1930 were mostly for trolley wire and installation of motor generator set purchased from the Negaunee Mine. This E. & A. was completed in April 1930.

13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

The Maas Mine steam shovel was repaired in winter 1929-1930 at the Negaunee Mine.

b. Stockpile Trestles:

Wooden Trestle:

30 bents were erected in the summer and fall on the West side of the shaft to stock Maas Ore.

5 bents were erected on the East end of the rock trestle to increase capacity for rock on account of developing the 5th level.

d. Scraper Hoists:

The mine is now equipped with the following scraper hoists:

<u>Company</u>	<u>On Hand</u> <u>1/1/1930</u>	<u>Purchased</u> <u>1930</u>	<u>On Hand</u> <u>1/1/1931</u>
Ingersoll-Rand air	21	0	21
Denver air	1	0	1
Sullivan 6½ h. p. electric	8	0	7
" 7½ " "	2	0	2
" 15 " "	9	3	12
" 25 " "	1	0	1
Ingersoll-Rand 15 h.p. electric	0	3	3
Lake Shore steel scraper slide with 20 h. p. motor	1	0	1
	43	6	48

1 6½ h. p. electric scrapped in 1930.

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14. MAINTENANCE
AND REPAIRS:

A new Ingersoll-Rand drill sharpener was purchased and installed in 1930. There was considerable repairs to equipment in the Engine House during the year, consisting of repairs to the brakes of the skip hoist, also a general overhauling of the compressor; a pump and solution tank costing approximately \$500.00 was installed to improve the control of the speed of the skip hoist. The key way on the cage hoist became loose and the drum had to be lifted out to install a new key way and key. An electric haulage generator set purchased from the Negaunee Mine was installed.

15. POWER:

Electric power was supplied by the Cliffs Power & Light Company, a subsidiary of The Cleveland-Cliffs Iron Company. The rate charged for current was $1\frac{1}{2}$ ¢ per kilowatt hour, the same as last year. The boiler plant and steam turbine was not operated during the year.

17. CONDITION
OF
PREMISES:

Some further improvement was made in arrangement of shrubbery in the planted areas, and thinning in some areas was underway in the Fall but was not completed. The premises were kept in good condition during the year.

18. NATIONALITY
OF
EMPLOYEES:

This has been prepared under two statements. The first statement gives the report as has been ordinarily submitted to the Company, that is, it shows the nationality of employees according to parentage. The second statement divides the employees according to country of birth:

<u>As to parentage</u>	<u>1930</u>	<u>%</u>	<u>1929</u>	<u>%</u>
American	3	1.0	2	.8
English	87	34.0	75	30.8
Finnish	93	36.5	85	34.8
Italian	22	8.5	24	9.8
Swedish	22	8.5	24	9.8
French	11	4.0	12	4.9
Danish	4	1.5	5	2.0
Irish	7	3.0	7	2.9
German	8	3.0	6	2.5
Canadian	-	-	3	1.2
Norwegian	1	-	1	.5
Total	258	100.0	244	100.0

<u>As to birth:</u>	<u>Total</u>	<u>American born</u>	<u>Foreign born</u>
American	21	21	-
English	87	30	57
Finnish	93	31	62
Italian	22	3	19
Swedish	22	12	10
German	8	7	1
Danish	4	2	2
Norwegian	1	-	1
Total	258	106	152

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19. MAAS CRUSHER:

PRODUCT	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Composed of:	12,338	80,927		68,589
Hard Ores	0	1,017		1,017
Hematite	12,338	79,910		67,572

The crusher operated 12 single 8-hour shifts in 1930, as compared with 77 single 8-hour shifts in 1929.

Average tons crushed per shift - 1930	-	1,028
" " " " " - 1929	-	1,051

It is impossible to obtain from the Cleveland Office the necessary data to complete the cost of operating the crusher for the year, so as to include the comparative costs for 1930 and 1929 in this report.

Considerable repairs were made to the crusher in April and May, as follows:

Installed new grizzly made up of tee bars and manganese wearing plates.

Replaced worn plates in pockets and chutes.

New shafts for rollers on conveying belt.

Replanked the sides of the railroad loading pocket.

The old concrete foundation for the jaw crusher was removed, 70 truck loads of rock picked out several years ago from ore from Ogden Pit cleaned up, and the grounds graded around the crusher plant.

A new conveying belt is on hand and should be installed but the tonnage crushed was so small that it was possible to go through the year without changing it.

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1. GENERAL:

The mine operated on one 8-hour shift, six days per week, until July 16th, for the balance of the year it operated five days per week. Days lost on account of holidays were made up by working on Saturdays; the average days worked per month on the five-day schedule was 22, as compared with 25 days on a full time basis. In addition to working one less day starting the middle of July, the average daily hoist was reduced from 1400 tons per day to 1320 tons, and three gangs of miners were laid off. A small crew of men worked night shift the entire year loading at chutes, tramping, and hoisting ore. The capacity of the hoist is approximately 100 tons per hour so it was not possible to obtain the product by hoisting on day shift only.

In March a diamond drill hole was drilled on the -480' sub level to prove up the ore above the 6th level on the South footwall. This hole found more ore than was expected, due to the hanging being higher than was anticipated in the center of the trough. It is probable that this ore extends up to the elevation of the 4th level on the East footwall. Practically all of this ore is on Lots 8 and 9, Mitchell Lease.

Stoping was continued in practically the same areas as in 1929, with the exception that mining was completed for the time being 25 ft. above the 4th level on Lot 11, Mitchell Lease. The sub levels in this area that were mined in 1930 were quite small due to the flat footwall, to more dikes, and more lean ore. The mining of ore South of the fault dike just below the 4th level has proceeded quite rapidly due to the hanging coming down lower here than was anticipated, but on the sub level being worked at the end of the year the jasper hanging has fallen back very rapidly with a corresponding increase in the ore area.

Several 15 h. p. scraper hoists were purchased in 1930 and the results with these larger units justify the gradual replacement of all of the small air and electric units now in the mine.

The saddleback 4-ton main line tram cars that had been in use at the mine ever since it opened were replaced in 1930 with 4-ton solid body rocker dump cars. Track cleaning in the haulage drifts away from the chutes has been practically eliminated; this has improved haulage conditions and decreased cost for track cleaning.

Labor conditions were satisfactory throughout 1930. There was a very low turnover and at all times there has been a waiting list of applicants for underground and surface jobs. The last of the year a few men were put to work on a half time basis in order to provide employment for some of the old employees of the company that were laid off at the Holmes Mine following the sale of this property to the U. S. Steel Corporation.

I regret to report that a fatal accident occurred in March, a miner being instantly killed by a cap breaking while he was standing on a stage spragging one of the legs of the set. The cap that broke was a sound green Tamarack nearly 12" in diameter. A leg from the sub above was driven down by a movement in the mat and broke the cap one foot from the leg. The accident was classified as a trade risk as all ordinary precautions had been taken.

The mine was in good condition at the end of the year. Production can be increased by working full time and increasing the number of miners. Additional ore is being developed by a crosscut on the 6th level and raising from this new crosscut in preparation for mining the ore near the South footwall between the 6th level and the hanging in the same block that is now being mined North and South of the fault dike.

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1. GENERAL: (Cont)

The grade of ore produced in 1930 averaged the same as in 1929. The moisture in shipments averaged 1/2% lower so that iron natural averaged higher than in 1930.

Standards have been adopted covering all work underground and with the strict enforcement of these standards better safety records are being made. Monthly meetings of foremen are held, where the standards are studied, accidents discussed, discipline stressed, and enthusiasm for safety maintained. Every effort is being made to decrease accidents and progress has been made in 1930.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

Only one grade of ore (Athens) was produced in 1930, the same as in previous years. The output from the Mitchell Lease decreased 60% in 1930. Over 96% of the ore produced in 1930 came from the parcels owned in fee.

<u>Grade</u>	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Athens Fee	368,524	306,510	62,014	
Mitchell Lease	<u>14,232</u>	<u>36,637</u>		<u>22,405</u>
Total Ore	382,756	343,147	39,609	
Rock	<u>2,060</u>	<u>1,437</u>	<u>623</u>	
Total Hoist	384,816	344,584	40,232	

b. Shipments:

<u>Grade of Ore</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>	<u>Total</u> <u>Last Year</u>
Athens Ore	83,798	242,038	325,836	434,115
Mitchell Lease	3,165	16,639	19,804	51,825
Lucky Star	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	86,963	258,677	345,640	485,940
Total Last Year	<u>49,370</u>	<u>436,570</u>	<u>485,940</u>	
Increase	37,593			
Decrease		177,893	140,300	

Shipments decreased 140,300 tons, or nearly 29%, in 1930. Shipments from pocket were larger due to shipping all summer, while in the previous year shipments were made only in the latter part of the summer.

c. Stockpile Inventories:

<u>Grade of Ore</u>	<u>Dec. 31, 1930</u>	<u>Dec. 31, 1929</u>	<u>Increase</u>	<u>Decrease</u>
Athens Fee	89,551	46,863	42,688	
Mitchell Lease	<u>1,683</u>	<u>4,550</u>		<u>2,867</u>
Total	91,234	51,413	39,821	

Ore in stock increased due to decrease in shipments. Most of the overrun from previous years was shipped in 1929; none of the overrun from ore stocked in 1930 was shipped, so there is more ore in stock than is shown by above figures.

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d. Division of Product by Levels:

The ore hoisted from various levels was as follows:

	<u>1930</u>	<u>1929</u>
4th Level	13,495	44,604
8th Level	<u>371,966</u>	<u>298,543</u>
Total	385,461	343,147

The 6th level does not connect with the shaft for hoisting; the ore is sent through raises to the shaft pocket on the 8th level. The division of product mined above the 6th level and mined between the 6th and 8th levels was as follows:

6th Level	161,220
8th Level	<u>210,746</u>
Total hoisted from 8th Level	371,966

e. Production by Months:

The production by months is as follows:

<u>Month</u>	<u>Athens</u>	<u>Mitchell Lease</u>	<u>Total</u>	<u>Rock</u>
January	32,267	2,323	34,590	561
February	30,551	2,672	33,223	112
March	35,460	1,301	36,761	188
April	29,327	2,911	32,238	128
May	35,246	1,920	37,166	89
June	31,815	246	32,061	42
July	32,315	0	32,315	0
August	29,609	0	29,609	0
September	27,989	0	27,989	675
October	31,176	979	32,155	142
November	24,627	930	25,557	69
December	<u>28,142</u>	<u>950</u>	<u>29,092</u>	<u>54</u>
Total	368,524	14,232	382,756	2,060
Transferred from	0	0	0	
Stockpile overrun	<u>0</u>	<u>2,705</u>	<u>2,705</u>	
Total	368,524	16,937	385,461	
Total 1929	<u>402,774</u>	<u>47,117</u>	<u>449,891</u>	<u>1,437</u>
Increase				623
Decrease	34,250	30,180	64,430	

Production decreased in last half of the year due to working five days per week.

The product was distributed as follows:

<u>Grade</u>	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Athens	368,524	306,510	62,014	
Mitchell Lease	<u>14,232</u>	<u>36,637</u>		<u>22,405</u>
Total	382,756	343,147	39,609	

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f. Ore Statement:

	<u>Athens</u>	<u>Mitchell</u>	<u>Total</u>	<u>Total</u>
		<u>Lease</u>	<u>Total</u>	<u>Last Year</u>
On Hand Jan. 1, 1930	46,863	4,550	51,413	87,462
Product for Year	368,524	14,232	382,756	343,147
Overrun	0	2,705	2,705	106,744
Transferred from	0	0	0	
Total	415,387	21,487	436,874	537,353
Shipments	325,836	19,804	345,640	485,940
Balance on Hand	89,551	1,683	91,234	51,413
Increase in Product			39,609	
Increase in ore on hand			39,821	

1930 - 1-8 hour shift 6 days per week, January 1st to July 16th

 1-8 " " 5 " " " July 16th to December 31st.

1929 - 1-8 " " 6 " " " January 1st to December 31st.

g. Delays:

The non-electrical delays were as follows:

Sept. 22nd - 4 hours delay on account of trouble with compressor bearing

 " 23rd - 4 " " " " " " " " " "

Oct. 30th - Idle on the night shift on account of timber truck loaded with poles being pushed into the shaft. This accident was caused by the unexplained ringing of the signal bells, possibly due to testing for a short on the bell line, which signalled to lower the cage and was not heard by the timber landers.

h. Delays from Lack of Current:

Feb. 6th - 4 hours delay on account of lack of current.

3. ANALYSIS:

a. Average Mine Analysis on Output:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Athens	60.44	.123	6.40
Mitchell Lease	58.72	.143	7.12

b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Mine</u>			<u>Lake Erie</u>	
	<u>Iron</u>	<u>Phos.</u>	<u>Moist</u>	<u>Iron</u>	<u>Moist</u>
Athens		None		None	
Mitchell Lease		"		"	

c. High Sulphur Ore:

No high sulphur ore was encountered during the year in mining or development work.

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4. ESTIMATE OF
ORE RESERVES:

a. Developed Ore:

Assumption: 12.75 cu. ft. equals one ton

10% deducted for rock

10% deducted for loss in mining

Percentage of Bessemer equals 0.

4th level and above	972,016 tons
4th level to 6th - South side of dike	1,672,726 "
4th Level to 6th - North side of dike	330,690 "
6th level to 660' Sub - South side of dike	361,126 "
6th level to 660' Sub - North side of dike	198,682 "
660' Sub to 8th Level	944,151 "
8th level to 9th level	451,949 "
9th level to 10th level	354,812 "
Below 10th level	<u>49,236 "</u>
 Total developed ore - 1930	 5,335,388 "
Total developed ore - 1929	<u>5,352,505 "</u>
Decrease - 1930	17,117 "

Developed ore decreased 17,117 tons in 1930. Including the product of 382,756 tons, there was actually 365,639 tons developed during the year. This increase occurred in two areas - South of dike between 4th and 8th levels, due to drilling underground hole No. 11, the other on North side of dike between the 4th and 6th levels, due to hanging flattening in this area, thereby increasing the width of the ore. The main increase was in the area South of the dike. Roughly, this increase was about 280,000 tons, leaving 102,000 tons as the increase North of the dike.

b. Prospective Ore:

Since 1928 all the ore in the Athens Mine has been considered developed.

c. Estimated Analysis:

Ore Reserves: Approximate expected Natural Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Athens Ore	52.50	.115	5.90	.390	2.70	1.00	.900	.011	1.44	13.00

Ore in Stock: Average Natural Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Athens Ore	52.84	.110	5.55	.386	2.81	1.04	.769	.011	1.30	12.50

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was no labor shortage during the year. The wage scale was the same as in the previous years.

(2) New Construction:

E. & A. #575 - 30 rocker dump main level cars - completed. These cars are being charged out at the rate of two each month.

E. & A. #577 - Equipping Nordberg Compressor with Feather Valves - completed. The cost of this work was charged to operating, being spread over the last six months of the year.

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5. LABOR AND WAGES:b. Comparative Statement of Wages and Product:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	385,461	343,147	42,314	
No. Shifts and Hours	1-8 hr	1-8 hr		
<u>AVERAGE NO. MEN WORKING:</u>				
Surface	44	41	3	
Underground	161	140	21	
Total	205	181	24	
<u>AVERAGE WAGES PER DAY:</u>				
Surface	4.41	4.40	.01	
Underground	5.13	5.03	.10	
Total	4.97	4.88	.09	
<u>WAGES PER MONTH OF 25 DAYS:</u>				
Surface	110.25	110.00	.25	
Underground	128.25	125.75	2.50	
Total	124.25	122.00	2.25	
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	28.94	26.88	2.06	
Underground	8.36	8.12	.24	
Total	6.48	6.34	.14	
<u>LABOR COST PER TON:</u>				
Surface	.152	.164		.012
Underground	.614	.619		.005
Total	.766	.783		.017
<u>AVERAGE PRODUCT MINING:</u>				
Stoping	21.96	19.13	2.83	
Ore Development	12.12	10.03	2.09	
Total	21.44	18.84	2.60	
AVERAGE WAGES CONT. LABOR	5.87	5.61	.26	
<u>TOTAL NUMBER OF DAYS:</u>				
Surface	13,321	12,766	555	
Underground	46,133	42,259	3,874	
Total	59,454	55,025	4,429	
<u>AMOUNT FOR LABOR:</u>				
Surface	58,767.95	56,150.18	2,617.77	
Underground	236,466.51	212,526.80	23,939.71	
Total	295,234.46	268,676.98	26,557.48	

Proportion of Surface to Underground Men:

1930 - 1 to 3.66	One 8-hour shift, 6 days per week,	Jan. 1st to July 16th
" "	" " " 5 " " "	July 16th to Dec.31st
1929 - 1 to 3.41	" " " 6 " " "	
1928 - 1 to 3.54	" " " 5 " " "	
1927 - 1 to 3.51	" " " 5 " " "	
1926 - 1 to 3.68	" " " 5 " " "	

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6. SURFACE:a. Buildings, Repairs:

The interior of the dry house was painted and minor repairs were made. There were some repairs to the shaft house enclosure and the entrance to the skip compartment was enclosed to facilitate changing and working around the skips in severe cold weather. Standard iron rope slides are being placed in the engine house to replace the old wooden slides. This change was made following the fire which occurred at the Cliffs Shaft Mine in the rope slide and burned off one of the hoisting ropes. Two new sheds were built at the West end of the shops, one along the tunnel for storage of scrapers and shaft runners, the other on the North side of the shops for an iron and blacksmith coal house. Both of these sheds are practically fireproof as they have toncan metal sides over a 2 x 4 frame.

b. Stockpiles:

An additional bent was erected on the rock trestle and other repairs made. The wooden stocking trestle at the end of the Southeast steel trestle used for stocking Mitchell Ore was repaired. The decking over the railroad tracks on the Northwest permanent steel stocking trestle was widened to catch any ore that might fall from the tram cars, to insure safety for railroad employees and others passing underneath.

c. Timber Treating Plant:

The comparative cost of treating timber for 1930 and 1929 is as follows:

	<u>Cost of treating, per foot</u>	
	<u>1930</u>	<u>1929</u>
Peeling	.0313	.0312
Treating	.0396	.0364
Decking	.0080	.0073
Zinc Chloride	m.0456	.0431
Heat, Water, etc.	.0075	.0071
Total	<u>.1320</u>	<u>.1251</u>
Rigging up old plant	-	.0081
Maintenance Cost	<u>.0124</u>	<u>.0028</u>
Grand Total	<u>.1444</u>	<u>.1360</u>

Number of pieces treated, 1930 -	682	Number of feet,	5,461
" " " " 1929 -	2,768	" " " "	23,431

	<u>1930</u>	<u>1929</u>
Number of pieces used at the Athens Mine	378	477
" " " shipped to Maas Mine	357	886
" " " " " Negaunee Mine	-	607
" " " " " Morris-Lloyd Mine	-	<u>504</u>
Total pieces used and shipped	735	2,474
Decrease in 1930	1,739	

	<u>Treated Timber</u> <u>on hand 12/31/30</u>	<u>Peeled untreated timber</u> <u>on hand 12/31/30</u>
9' pieces	2,164	571
8' "	<u>249</u>	<u>1,217</u>
Total	2,413	1,788
Total - 1929	1,712	695

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7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking at the Athens Mine during the year.

b. Development:

The most important development of the year was the discovery of a considerable width of ore on the South side of the fault dike. In March a diamond drill hole was drilled to the Southeast on the -480 ft. sub level to cross the formation to the South footwall. This hole proved the ore to be over 400 ft. wide at this elevation.

Mining reached the elevation of the -480 ft. sub, the former travelling road and airway, and it became necessary to make a new travelling or intermediate sub level between the workings and the 6th level. This new sub level was opened at -550 ft. elevation 40 ft. above the 6th level. A drift was driven near all the raises that were in use at this elevation, after which a small connection was driven from the drift to each of the raises. During the year three branch raises were put up from this new sub level on the North side of the fault dike to facilitate mining in this area where the ore body had widened.

On the 6th level a crosscut was driven to the South to develop the ore found in underground diamond drill hole No. 11. Four raises were started from this drift, one of which was up over 150 ft. at the end of the year.

A year ago it was not thought that there would be any further mining on the Mitchell Lease for several years. The discovery of the great width of ore disclosed by No. 11 diamond drill hole made it necessary to open this territory immediately. About two-thirds of the ore found in this drill hole is located on Mitchell Lease lots 8 and 9 so it will be necessary to resume mining of Mitchell Ore as soon as the development work is completed.

No. 809 raise was put up at the West end of the 8th level to help in mining the ore that lies just North of the slate footwall South of the fault dike. This area is quite wet and an additional raise was needed here. This raise proved that the ore extended further to the West than had been anticipated.

There was an average of 2.3 contracts on development work throughout the year as compared with 1.7 in 1929.

c. Stoping:

At the beginning of the year mining operations were underway in the same three blocks that were being mined in 1929. These were as follows:

1st. Territory on the South footwall above 4th level

2nd. The North and South sides of the fault dike above the 6th level

3rd. The North and South sides of the fault dike above the 8th level

In May mining was completed in the first of these blocks on the sub levels immediately above the 4th level, after which the contracts were transferred to the second block which has been growing larger on both sides of the fault dike. Mining in the second block at the end of the year had reached a point midway between the 4th and 6th levels, while operations in the third block were 200 ft. below, or just half way between the 6th and 8th levels.

There was an average of 37.5 contracts stoping during 1930 as compared with 33 in 1929.

The detail of mining operations on the various levels and sub levels is as follows:

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7. UNDERGROUND:c. Stoping: (Cont)Subs above the 4th level:-365' Sub Level - South side of dike:

A small pillar in the center of the ore body in this block was mined during January 1930, which completed work at this elevation.

-375' Sub Level:

This sub level was opened late in 1929 and all the ore was mined early in 1930. Careful sorting and constant analysis were necessary because of a mixture of lean ore, dike, and slate in this area. Completion of this sub level marked the end of production from the 4th level until a new mining block is started North and East of this territory. This will not take place for several years until the blocks now being mined above the 8th level diminish in size as they approach the 10th level.

Subs above the 6th level:-445' Sub Level - South side of dike:

Removal of pillars during January and February completed mining on this sub level. Work was started here in September 1929.

-450' Sub Level - North side of dike:

Work was started on this sub level in July 1929 and was completed in February 1930. The ore body midway between the present mining limits in this block was considerably larger than on the sub above due to the Northerly dip of the jasper hanging wall.

-450' Sub Level - South side of dike:

Mining in this area started in December 1929 and finished in April 1930.

Mining conditions were ideal on the sub levels mined South of the dike during the year. There was a good covering, scraping distances were short, there was no water, and very little weight. The contacts with dike and hanging were regular, in fact, all conditions contributed to a clean, rapid, and complete extraction of the ore.

-460' Sub Level - North side of dike:

Mining was started on this sub level in October 1929 and completed in August 1930. The width of ore on this sub level showed a large increase over that on the sub above. Near the Eastern mining limit the jasper hanging dipped so flatly to the North that the width of ore increased 50 ft. A branch raise was put up to this elevation and used in mining this extension.

-460' Sub Level - South side of dike:

Mining was started on this sub level in March 1930 and completed in July. The size of the ore body was about the same as on the sub above. X

-470' Sub Level - North side of dike:

Mining was started here in March and at the end of the year a few pillars remained to be mined by the five contracts working here. At this elevation, about the center of the Northern contact, dike was encountered instead of the hanging wall jasper. This is the large diorite dike which forms the Northern boundary of the ore body on lower levels. It dips to the South so that the ore body at this elevation shows the greatest width. Two branch raises were put up to this sub level to mine the extension of the ore to the North, which was first found on the sub above.

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7. UNDERGROUND:c. Stoping: (Cont)-470' Sub Level - South side of dike:

This sub level was opened in June and completed in November. The size of the ore body was about the same as on the sub above although on the Eastern mining limit the jasper hanging was not encountered. Information obtained from diamond drill hole No. 11 on the sub level below indicated that the hanging would flatten about this elevation. It was necessary to set an East-West mining limit here so as to not undercut the ore to the South now being opened for mining by the crosscut and raises on the 6th level.

-480' Sub Level - North side of dike:

Mining was started on this sub level, the former travelling and ventilation sub, late in October, and at the end of the year four contracts were working here connecting raises and starting to mine.

-480' Sub Level - South side of dike:

Underground diamond drill hole No. 11 was drilled at this elevation in March and April to prove up the ore lying between this point and the South footwall. The hole started in ore and with the exception of a small dike, continued in ore until it entered the slate footwall at a depth of 407 ft. About two-thirds of the ore shown up by the drill hole was on Mitchell Lease lots 8 and 9. Mining started South of the dike in September and at the end of the year four contracts were removing pillars. The area to be mined between the dike and the East-West mining limit is narrow so that the ore will soon be mined. It is expected that mining on this sub level will be completed within 60 days.

-505' Sub Level - South side of dike:

Late in December a contract cut out at the most Western raise and started drifting Eastward to connect raises and prepare the sub for mining.

-550' Sub Level - North and South side of dike:

This sub level was started in November 1929 for the purpose of improving ventilation and providing easy access to the working sub levels above. It was also utilized as a starting point for branch raises to the North portion of the ore body North of the dike on the subs above. By locating these branch raises on the sub level it was unnecessary to put up raises from the 6th level.

Drifting was practically completed in August 1930. There is one connection yet to be driven to 610 raise as well as a connection to the South to the new raises being put up from the 6th level crosscut. There was a total of 370 ft. of ore drifting and 15 ft. of rock drifting in 1930.

The following branch raises were put up to the -470' sub: 638-A, 639-A, and 640-A.

Sixth Level - North side of dike:

642-A raise, double compartment, was started in September and was completed at a height of 105 ft. in November, material ore.

643-A raise was being started at the end of the year.

Both of these raises will be used in mining the ore in the block above that grows larger as the mining limit of the old workings retreats further West on each successive sub level.

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7. UNDERGROUND:c. Stoping: (Cont)Sixth Level - South side of dike:

Soon after diamond drill hole 11 was completed, a crosscut was started to the South to develop the ore towards the footwall. This ore body on sub levels being mined above the 6th was quite narrow, but about the elevation of the -470 ft. sub the hanging flattened and the ore extended across to the South foot. An East-West mining limit was established on the -470 ft. sub level. In order that mining of this comparatively narrow ore body would not get too far in advance of the ore further to the South it became necessary to speed up development work. The elevation of the top of the ore is unknown but it seems likely that it may extend in part of the area to the 4th level.

At the end of the year the new crosscut had been driven 235 ft. in ore and four raises had been started. The record of raising here is as follows:

#621	raise	- up	150'	in	ore
#622	"	"	15'	"	"
#623	"	"	15'	"	"
#624	"	"	15'	"	"

Sixth Level - General:

In November an underground powder magazine was constructed at the end of the straight drift South of the shaft. All gangs working below the 6th level now get their powder here.

Subs above the 8th level:-660' Sub Level - South side of dike:

Mining on this sub level was started in 1929 and completed in May 1930. Slate was encountered practically the whole length on the South side of the ore body on this sub level. The Northerly dip of the slate footwall indicated that the ore area on successive sub levels would be smaller.

-675' Sub Level - North side of dike:

Mining was started on this sub level in October 1929 and completed in January 1930 with the mining of a few pillars in the central and West portions of the ore area.

-675' Sub Level - South side of dike:

Mining was started here in October 1929 and completed in November 1930. Practically this whole sub was mined in 1930.

-685' Sub Level - North side of dike:

Mining was started at this elevation in May 1929 and with the removal of the ore adjacent to the central and West line of raises work was completed in June 1930. The small East-West dike that divides the ore body increased in width from 3 ft. to 15 ft. for 100 ft. of its length on this sub level.

-685' Sub Level - South side of dike:

Mining started on this side of the dike in April 1930 and at the end of the year five contracts were mining the ore adjacent to the East line of raises.

-695' Sub Level - North side of dike:

Mining at this elevation was started in October 1929 and completed in November 1930. Practically all of this sub level was mined during the past year.

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7. UNDERGROUND:c. Stoping: (Cont)-695' Sub Level - South side of dike:

At the end of the year a contract had cut out at two of the raises in the wet part of the ore body preparatory to connecting them and starting to mine.

-710' Sub Level - North side of dike:

This sub level was started in February 1930 and during the year the mining of ore along the West-North, North-central, and East line of raises was completed. In December the four contracts working here had connected the central line of raises and started mining.

-720' Sub Level - North side of dike:

In April and May a contract mined a small amount of ore at the intersection of the jasper hanging wall and the slate footwall in the Southwest corner of the ore body. This ore was mined in order to divert the water that came in on the slate footwall into a small area and thereby prevented it spreading Eastward as mining reached this area on the upper sub levels. In September regular mining operations were started on this sub level and at the end of the year three contracts were mining from the North line of raises, five from the North-central line, two from the East line, and two from the West line. The -720 ft. sub level was originally opened several years ago for a travelling and airway sub level and now that mining has been started here proper ventilation of the working places is no longer possible without booster fans. Five booster fans have been moved to the bottom of the raises on the 8th level to force fresh air to the working places and keep temperatures reduced in this area. Additional fans will soon be needed here.

-720' Sub Level - South side of dike:

In December a connection to the travelling and ventilation drift was driven from new raise No. 836-A.

-745' Sub Level - North side of dike:

In July, and for two months after, one contract mined from 809 raise in the Southwest corner of the ore body in order to confine the water to this section and prevent it spreading Eastward. So much water was encountered in this area on the -720 ft. sub level that the interval between subs here was increased to 21 ft. so that the ore in the back would prevent the water from coming in until it was caved and mined in retreating towards the raise. It only requires the mining of a small area here to divert the water to a lower elevation and make it possible to mine all the ore under favorable conditions on the upper sub levels.

Eighth Level:

No drifting was done on this level during the year but several raises were put up to improve mining conditions on account of the increased size of the ore body on sub levels above. The record of raising on this level is as follows:

<u>No. Raise</u>	<u>Location</u>	<u>Height</u>	<u>Material</u>	<u>Started</u>	<u>Completed</u>
807	N. side dike	110'	Ore	Dec. 1929	Jan. 1930
808	" " "	90'	Ore	June 1930	June 1930
809	" " "	90'	Ore 70' Jasper 20'	Jan. 1930	Feb. 1930
836-A	S. side dike	120'	Ore	Oct. 1930	Nov. 1930

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7. UNDERGROUND:c. Stoping: (Cont)10th Level:

The only work done on this level during the year consisted of replacing timber sets that had rotted. Most of these were treated timber sets that had been standing from three to five years. The time spent on this work was about equal to one contract employed here throughout the year.

d. Timbering:

The amount of timber used in 1930 increased due to larger product, but the feet of timber per ton of ore decreased due to use of less large timber. Due to rapid mining with scrapers, less retimbering was necessary on the sub levels. Even with the added expense for wire fencing used in covering down the last six months of the year, the cost was slightly lower than in 1929. The use of wire fencing for the full year would have made the cost practically the same as in 1929. There was an increase in expense for 9½ ft. poles due to using them exclusively for covering down.

Statement of Timber Used:

	<u>LINEAR</u> <u>FEET</u>	<u>AVG. PRICE</u> <u>PER FOOT</u>	<u>AMOUNT</u> <u>1930</u>	<u>AMOUNT</u> <u>1929</u>
6 to 8" timber	72,741	.0372	2,708.44	3,437.70
8 to 10" "	109,991	.0660	7,257.96	5,062.22
10 to 12" "	54,339	.1019	5,539.58	5,285.10
12 to 14" "	25,237	.1508	3,806.39	3,764.78
Total Timber - 1930	262,308	.0736	19,312.37	
Total Timber - 1929	246,867	.0711		17,549.80
		<u>Per 100'</u>		
7' Lagging	1,004,311	.7115	7,146.12	7,565.87
Poles - 9½'	743,947	1.3589	10,109.20	9,170.84
Total - 1930	1,748,258	.9870	17,255.32	
Total - 1929	1,653,174	1.0124		16,736.71
Cover Boards - 1"				547.20
Wire Fencing (1905 Rods) sq.ft.	117,606		1,433.97	
Grand Total - 1930			38,001.66	
Grand Total - 1929				34,833.71
Product			385,461	343,147
Feet of timber per ton of ore			.681	.719
Feet of lagging per ton of ore			2.605	3.052
Feet of poles per ton of ore			1.930	1.765
Feet of lagging per foot of timber			3.829	4.243
Square feet of wire fencing per ton of ore (179,422 tons)			.6554	-
Cost per ton for timber			.0501	.0511
" " " " lagging			.0185	.0221
" " " " poles			.0262	.0267
" " " " covering boards			-	.0016
" " " " wire fencing (In use 6 months)			.0037	-
Total cost per ton			.0985	.1015
Equivalent of stall timber to board measure			479,091	472,241
Feet of board measure per ton of ore			1.243	1.376

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7. UNDERGROUND:d. Timbering: (Cont)Statement of Timber Used: (Cont)

Total cost for timber, lagging, poles, cover boards, and wire fencing, and cost per ton:

<u>Year</u>	<u>Amount</u>	<u>Cost per ton</u>
1930	\$38,001.66	\$.0985
1929	35,086.43	.1015
1928	29,160.74	.1207
1927	23,288.37	.1001
1926	21,637.70	.0956
1925	27,082.05	.1288
1924	24,403.00	.0984

e. Drifting and Raising:

The following table gives comparative figures of drifting and raising for the years 1930 and 1929:

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>		<u>Total</u>
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>	
1930	527'	91'	833'		1,451'
1929	365'	143'	910'	26'	1,444'
Increase	162'				7'
Decrease		52'	77'	26'	

Raising during 1930 was confined to the 6th and 8th levels and to branch raises from the 550' sub above the 6th level. The only main level drifting was on the 6th level.

f. Explosives, Drilling and Blasting:Statement of Explosives Used:

	<u>Quantity</u>	<u>Average Price</u>	<u>1930 Amount</u>	<u>1929 Amount</u>
50% Am. Gel.	36,800	.1290	4,749.00	10,198.50
60% Am. Gel.	88,850	.1403	12,462.71	6,607.91
Total Powder - 1930	125,650	.1370	17,211.71	
Total Powder - 1929	124,800	.1347		16,806.41
Fuse	440,200	5.90	2,597.30	2,491.93
Caps	72,500	11.60	841.03	793.54
Cap Crimpers				29.01
Connecting Wire	60	38.80	23.28	8.20
Tamping Bags				56.00
Total Fuse, etc. 1930			3,461.61	
Total Fuse, etc. 1929				3,378.68
Total All Explosives - 1930			20,673.32	
Total All Explosives - 1929				20,185.09
Product			385,461	343,147
Pounds of powder per ton of ore			.3260	.3637
Cost per ton for powder			.0446	.0490
" " " " fuse, caps, etc.			.0090	.0098
" " " " all explosives			.0536	.0588

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7. UNDERGROUND:

f. Explosives, Drilling and Blasting: (Cont)
Statement of Explosives Used: (Cont)

	<u>Sinking, Rock Development, etc.</u>		<u>1930</u>	<u>1929</u>
	<u>Quantity</u>	<u>Average Price</u>	<u>Amount</u>	<u>Amount</u>
Hercomite				204.00
50% Am. Gel.				637.00
60% Am. Gel.	100	13.99	13.99	56.99
Total Powder - 1930	100	13.99	13.99	
Total Powder - 1929	6,900	13.01		897.99
Fuse	700		4.28	48.05
Caps	200		2.32	15.11
Connecting Wire				9.98
Cap Crimpers				
Tamping Bags				
Total Fuse, etc. 1930			6.60	
Total Fuse, etc. 1929				73.14
Total All Explosives - 1930			20.59	
Total All Explosives - 1929				971.13
Total Explosives Used in Mine - 1930			20,693.91	
Total Explosives Used in Mine - 1929				21,156.22
Average price per pound for powder			.1370	.1344
71% of all powder used in 1930 was 60%				
35% " " " " " 1929 " 60%				

Only 850 lbs. more powder was used in 1930, while the product increased 42,314 tons. More 60% powder was used as it works better than 50% in breaking the Athens Ore. No more powder is required to break a cut using 9 ft. legs than one using 8 ft. legs, so that the general use of 9 ft. timber in 1930 decreased the cost for explosives.

g. Mining and Loading:

There were no changes in mining practice in 1930, except the use of 9 ft. legs and in some areas 9 ft. caps on the sub levels in place of 8 ft. legs and caps. Slightly larger timber is required on account of the increased height of sub levels. This is a negligible factor in cost considering the increased output per foot of advance.

The standard sub level interval is now 12 ft., but in some areas where pressure is heavy and the mat is good the sub level interval is 13 ft. at the raise.

In 1929 a new system of poling or covering down the floors of sub levels was adopted. This was further improved in 1930 by the use of wire fencing laid on top of the poles and fastened to them with 2½" staples. The wire fencing binds the mat together more securely and helps to prevent runs of rock. It has been in use for only six months. In some areas mining is underway on a lower sub level but it will be some time before the full benefit is obtained.

Scrapers were used for handling ore in all stoping contracts in 1930. The small h. p. scraper units are being gradually replaced with the standard 15 and 20 h. p. hoists which have a low upkeep cost and much greater capacity and speed.

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7. UNDERGROUND:i. Ventilation:

There has been considerable repairing of airways, especially on the 10th level. The main ventilation sub, the 480', between the 4th and 6th levels, was reached by mining operations during the year and was replaced by opening the 550' sub level, where the operating raises will be connected with the main air raise from the 6th to the 4th levels early in 1931. Mining below the 6th level during the year continued to the 720 ft., or ventilation sub, and attendant caving caused the blocking of the drifts to the main air raises from the 8th to 6th levels. Here it will be impossible to keep the main air current circulating through the subs and six booster fans are now in operation supplying air from the 8th level to the subs. Additional booster fans will be required when more gangs reach the elevation of the 720 ft. sub level.

j. Pumping:

The number of gallons pumped per minute during 1930, 1929, and 1928, are shown below:

<u>Month</u>	<u>1930</u>	<u>1929</u>	<u>1928</u>
January	230	219	233
February	230	218	231
March	233	211	228
April	231	216	227
May	228	221	227
June	228	223	227
July	222	222	227
August	234	226	228
September	239	225	230
October	233	226	230
November	239	231	227
December	<u>242</u>	<u>232</u>	<u>224</u>
Total Average	232	223	228

The average number of gallons pumped per minute over the last six years is as follows:

<u>Year</u>	<u>Gallons per minute</u>
1930	232
1929	223
1928	228
1927	242
1926	268
1925	251

There was a small increase, 9 gallons per minute, in gallons pumped per minute in 1930. Starting in 1926, a decrease occurred each year until 1930. The total in 1930 was about the same as in 1928.

k. Shaft:

Three additional skip road dividers were installed early in the year, making 69 in all. These have strengthened the skip roads greatly and cut the maintenance materially.

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7. UNDERGROUND:1. Underground in General:

Conditions in the mine have been good throughout the year, with an average of 37.5 contracts stoping and 2.3 developing. Water interfered with mining in a few areas but conditions in this respect were not quite as bad as in the previous year, due to additional raises that have been put up in these areas.

A considerable amount of the 10th level timber was replaced during the year, due to the decaying of the old sets put in when mining was in progress on that level. It is necessary that the drifts be kept open as this level is the main intake for the air which ventilates the workings above, and also so they will be in good condition when mining is again started between the 9th and 10th levels.

New rocker dump cars have been installed on the 6th and 8th levels to take the place of the old saddleback cars. They have proven very satisfactory in loading and dumping and have reduced track cleaning and car repairing to a minimum.

Early last summer it was decided to use wire netting to help keep back the rock and tie the mat closer together. This has been a regular practice on the Mesabi Range for some years but had never before been tried out on the Marquette Range. The wire is a regular fence type with 4" diamond mesh, being used in 42" and 50" widths. The drift is first poled down with 9½ ft. poles, of which there are not less than six in any cross section; these poles are spiked to cross poles and are in turn covered with strips of the netting running the entire length of the slice and overlapping 3". The wire also extends up on the sides far enough to allow for bending down around the legs to completely cover the space between the slices. It is fastened to the poles with 2½" staples and under new ground further reinforced with poles or lagging. Near jasper or dikes the wire is placed on the sides and extended to the top of the drift, with blocking placed against it to keep the rock from coming into the next slice and to the sub below.

The wire netting has proven very satisfactory in keeping out the rock, which formerly caused runs, thereby diluting the ore or stopping work until the breakdown was repaired.

9 ft. legs have been in general use and in some areas 9 ft. caps were used during the year, thus increasing the product at very little additional expense.

8. COST OF OPERATING:a. Comparative Mining Costs:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	385,461	343,147	42,314	
Underground Costs	1.107	1.125		.018
Surface Costs	.182	.209		.027
General Mine Expenses	.121	.133		.012
Cost of Production	1.410	1.467		.057
Depletion - Original Cost	.100	.127		.027
Increment	.205	.275		.070
Depreciation - Plant & Equipmt.	.070	.287		.017
Development	.089	.117		.028
Movable Equipmt.	.000	.001		.001
Taxes	.243	.281		.038
Loading and Shipping	.023	.054		.031
Total Cost at Mine	2.140	2.409		.269

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8. COST OF OPERATING:

a. Comparative Mining Costs: (Cont)

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Total Cost at Mine (Brot ford)	2.140	2.409		.269
Administrative & General Expenses	.087	.105		.018
Miscellaneous Income (Red)	.013	.019	.006	
Obsolete Supplies	-	-		
Supply Inventory Adjustment	-	-		
Total Cost	2.214	2.495		.281
No. of Days Operated	282	299		17
No. Shifts & Hours	1-8 hr	1-8 hr		
Average Daily Product	1,367	1,148	219	
COST OF PRODUCTION:	1930	%	1929	%
Labor	.780	55.32	.803	44.68
Supplies	.630	54.60	.664	45.40
Total	1.410		1.467	.057

b. Detailed Cost Comparison:

(1) Days and Shifts:

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1930	1-8 hr 6 days per week to July 16)	282	205	59,454 $\frac{1}{4}$
	1-8 hr 5 " " " bal. of yr.)			
1929	1-8 hr 6 " " "	299	181	55,024 $\frac{1}{2}$
	Increase		24	4,429 $\frac{3}{4}$
	Decrease	17		

(2) Wages:

The mine operated on the same wage schedule in 1930 and 1929.

(3) Comparison of Production:

Production - 1930	385,461 tons
Production - 1929	343,147 "
Increase	42,314 "

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate per day</u>
1930	205	59,454 $\frac{1}{4}$	\$295,234.46	\$ 4.97
1929	181	55,024 $\frac{1}{2}$	268,676.98	4.88
Increase	24	4,429 $\frac{3}{4}$	26,557.48	.09

(5) Tons per man per day:

The tons of ore mined per man per day were as follows:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>
Surface	28.94	26.88	2.06
Underground	8.36	8.12	.24
Total	6.48	6.24	.24

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3. COST OF OPERATING:

b. Detailed Cost Comparison: (Cont)

(6) Cost of Production:

1930	-	\$543,355.01	Cost per ton	\$1.410
1929	-	<u>503,575.16</u>	" " "	<u>1.467</u>
Increase		39,779.85	Decrease	.057

	Total Cost				Cost per ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1930	- \$300,528.62	55.31	\$242,826.39	44.69	\$.780	\$.630	\$1.410
1929	- <u>275,413.14</u>	<u>54.60</u>	<u>228,162.02</u>	<u>45.40</u>	<u>.803</u>	<u>.664</u>	<u>1.467</u>
Incr.	25,115.48	.71	14,664.37		.		
Decr.				.71	.023	.034	.057

(7) Detail of Accounts:

UNDERGROUND COSTS:

Exploring in Mine:

1930	Amount	\$1,164.92	Cost per ton	\$.003
1929	Amount	<u>266.14</u>	" " "	<u>.001</u>
Increase		898.78		.002

The large increase is due to underground diamond drill hole #11 on -480' sub level.

Development in Rock:

1930	Amount	\$472.75	Cost per ton	\$.001
1929	Amount	<u>827.02</u>	" " "	<u>.002</u>
Decrease		354.27		.001

	Sub Division		Total Ft.	Cost per Ft.
	Drifting	Raising		
1930	91'		91'	\$5.20
1929	<u>143'</u>	<u>26'</u>	<u>169'</u>	<u>4.89</u>
Decrease	52'	26'	78'	
Increase				.31

The decrease is due to less drifting and raising in rock in 1930.

Development in Ore:

1930	Amount	\$6,864.83	Cost per ton	\$.018
1929	Amount	<u>4,913.05</u>	" " "	<u>.014</u>
Increase		1,951.78		.004

	Sub Division		Total Ft.	Cost per Ft.
	Drifting	Raising		
1930	527'	833'	1,360'	\$5.05
1929	<u>15'</u>	<u>944'</u>	<u>959'</u>	<u>5.12</u>
Increase	512'		401'	
Decrease		111'		.07

The increase is due to more ore drifting on main levels in 1930.

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8. COST OF
OPERATING:

Stopping:

1930 Amount	\$147,881.01	Cost per ton	\$.384
1929 Amount	<u>145,390.80</u>	" " "	<u>.424</u>
Increase	2,490.21	Decrease	.040

Detail

	<u>Labor</u>		<u>Supplies</u>	
1930 -	\$107,773.62	72.9%	\$40,107.39	27.1%
1929 -	<u>102,342.15</u>	<u>70.4%</u>	<u>43,048.65</u>	<u>29.6%</u>
Increase	5,431.47	2.5%		
Decrease			2,941.26	2.5%

Cost per Ton

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1930	\$.280	\$.104	\$.384
1929	<u>.298</u>	<u>.126</u>	<u>.424</u>
Decrease	.018	.022	.040

The following scraper hoists were charged out in 1930 and 1929:

1930 - 4	15 h.p. Sullivan Electric Hoists	- Cost	\$4,610.00
1929 - 6	15 h.p. " " "	" "	<u>6,643.00</u>
		Decrease 1930	2,033.00

1930 - 1	Ingersoll-Rand air hoist	- cost	645.00
1929 - 3	" " " "	" "	<u>1,935.00</u>
		Decrease 1930	1,290.00

Tons per foot - scraper rope	15.765
Cost per ton - " "	.005

The product increase 42,314 tons in 1930, but stopping cost shows only a small increase of \$2,490.21, resulting in a decrease of nearly 10% in the cost per ton for stopping. Tons per man per day stopping were 19.13 in 1929 and 21.96 in 1930. The cost for powder decreased .0052 per ton in 1930.

Timbering:

1930 Amount	\$121,154.25	Cost per ton	\$.314
1929 Amount	<u>101,753.89</u>	" " "	<u>.297</u>
Increase	19,400.36		.017

Detailed Cost of Timber

	<u>1930</u>	<u>1929</u>
Timber Cost	\$19,312.37	\$17,549.80
Cost of lagging, poles, cover boards, and wire netting	<u>18,689.29</u>	<u>17,283.91</u>
Total	38,001.66	34,833.71
Feet of timber per ton of ore	.681	.719
Feet of lagging per ton of ore	2.605	3.052
Feet of poles per ton of ore	1.930	1.765
Feet of wire netting per ton of ore	.6554	
Cost per ton for wire netting	<u>.0037</u>	
Cost per ton for all timber and netting	.0985	<u>.1015</u>
Decrease - 1930	.0030	

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8. COST OF
OPERATING:

Timbering (Cont)

Expenditures in this account increased in 1930 due to more labor expense for timbering and an increase in amount of timber used. Expense for repairing raises and the two ventilation and travelling sub levels was heavy for several months of the year; this was in addition to the regular repair work on operating sub levels and main levels from 4th to 10th level, inclusive.

Tramming:

1930 Amount	\$42,577.13	Cost per ton	\$.111
1929 Amount	<u>38,211.71</u>	" " "	<u>.111</u>
Increase	4,365.42		

Increase due to larger product in 1930.

Ventilation:

1930 Amount	\$4,259.32	Cost per ton	\$.011
1929 Amount	<u>4,725.95</u>	" " "	<u>.014</u>
Decrease	466.63		.003

The decrease in charges for 1930 due to one new booster fan charged out and more ventube used in 1929. The cost of electric power in 1930 was \$2,870.85, and in 1929 \$3,012.51.

Pumping:

1930 Amount	\$20,367.89	Cost per ton	\$.053
1929 Amount	<u>19,803.93</u>	" " "	<u>.058</u>
Increase	563.96	Decrease	.005

	<u>1930</u>	<u>1929</u>
Total gallons of water pumped	121,785,145	117,645,970
Gallons pumped per minute	232	223

Increase in expenditures due to more water pumped in 1930. Cost per ton decreased due to larger product.

Compressors & Air Pipes:

1930 Amount	\$46,826.25	Cost per ton	\$.122
1929 Amount	<u>49,226.59</u>	" " "	<u>.143</u>
Decrease	2,400.34		.021

	<u>Compressors</u>	<u>Air Pipes</u>
1930	\$41,327.92	\$5,498.33
1929	<u>44,140.75</u>	<u>5,085.84</u>
Decrease	2,812.83	
Increase		412.49

Total cu. ft. of air used in 1930	- 1,060,650,000
" " " " " " " " 1929	- 1,154,380,000
Cubic feet per ton of ore - 1930	2,752
" " " " " " " " - 1929	3,364

The decrease is due to mine operating 17 less days in 1930. Expense for air pipes shows a small increase due to extension of air lines in the new crosscut on the 6th level and in a number of raises.

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8. COST OF
OPERATING:

Underground Superintendence:

1930 Amount	\$12,764.68	Cost per ton	\$.033
1929 Amount	<u>11,014.84</u>	" " "	<u>.032</u>
Increase	1,749.84		.001

There were five shift bosses during all of 1930, while in 1929 there were only four up to October when another boss was added.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills:

1930 Amount	\$2,371.22	Cost per ton	\$.006
1929 Amount	<u>1,693.19</u>	" " "	<u>.005</u>
Increase	678.03		.001

	<u>Compressors</u>	<u>Power Drills</u>	<u>Air Lines</u>
1930	\$1,861.22	\$ 510.00	-
1929	<u>458.48</u>	<u>1,190.00</u>	<u>\$44.71</u>
Increase	1,402.74		
Decrease		680.00	44.71

Increase in charges to compressors due to equipping Nordberg compressor with feather valves to replace the complicated Corliss valves, which cost \$1,491.43.

There were three new auger drill machines charged out in 1930 as compared with seven in 1929.

Electric Tram Equipment:

1930 Amount	\$17,472.40	Cost per ton	\$.045
1929 Amount	<u>7,662.79</u>	" " "	<u>.022</u>
Increase	9,809.61		.023

	<u>Sub Division</u>				
	<u>Gen. & Motors</u>	<u>Locomotives</u>	<u>Wiring</u>	<u>M. L. Tracks</u>	<u>M. L. Cars</u>
1930	108.95	2,068.04	1574.14	3907.69	9813.58
1929	<u>35.13</u>	<u>1,544.26</u>	<u>1195.08</u>	<u>2223.01</u>	<u>2665.31</u>
	73.82	523.78	379.06	1684.68	7148.27
	Incr.	Incr.	Incr.	Incr.	Incr.

The increases in expense to Generator & Motors, and Locomotives, were due to more repairs. The increase in Wiring expense was due to replacing the old 2/0 Figure 8 wire on the 6th level with 4/0 grooved wire. Increase in M. L. Tracks due to extending tracks and more repairs. Increase in M. L. Cars due to charging out 16 four-ton rocker dump cars at rate of two each month. The rocker dump cars replaced the 4-ton saddleback cars.

Pumping Machinery:

1930 Amount	\$2,439.55	Cost per ton	\$.006
1929 Amount	<u>660.92</u>	" " "	<u>.002</u>
Increase	1,778.63		.004

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8. COST OF
OPERATING:

Pumping Machinery: (Cont)

The increase in 1930 was due to installing a new body, costing \$300.00, on one of the electric pumps, and providing subway boxes for terminals of pump cables, costing \$721.00. There were also charges of \$878.00 from the General Shops for labor and material on pump repairs.

Total Underground Costs:

1930 Amount	\$426,616.40	Cost per ton	\$1.107
1929 Amount	<u>385,884.68</u>	" " "	<u>1.124</u>
Increase	40,731.72	Decrease	.017

SURFACE COSTS:

Hoisting:

1930 Amount	\$33,097.50	Cost per ton	\$.086
1929 Amount	<u>31,750.15</u>	" " "	<u>.092</u>
Increase	1,347.35	Decrease	.006

Electric Power - 1930 -	\$26,719.65	Cost per ton	\$.069
Electric Power - 1929 -	<u>25,152.75</u>	" " "	<u>.073</u>
Increase	1,566.90	Decrease	.004

In 1930 there were 387,452 tons of ore and rock hoisted from an average depth of 2,186 ft. In 1929 there were 344,584 tons hoisted from an average depth of 2,148 ft.

Stocking Ore:

1930 Amount	\$7,835.35	Cost per ton	\$.020
1929 Amount	<u>8,074.60</u>	" " "	<u>.023</u>
Decrease	239.25		.003

In 1930 there were 295,793 tons dumped on stockpile as compared with 293,777 tons in 1929. There were less repairs to wooden stocking trestle in 1930.

Dry House:

1930 Amount	\$6,273.71	Cost per ton	\$.016
1929 Amount	<u>7,579.26</u>	" " "	<u>.022</u>
Decrease	1,305.55		.006

Coal to Boiler House:

	<u>Tons</u>	<u>Cost</u>
1930	659	\$3,425.56
1929	<u>807</u>	<u>3,990.60</u>
Decrease	148	565.04

Decrease in 1930 due to alterations made to interior of dry house in 1929 when the old pipe racks for drying clothes were taken out and overhead pulleys, chains, and hooks, installed, new benches built, and the walls and ceiling painted. Two new hot water tanks were also installed in 1929 at a cost of \$479.47. In 1930 the interior was repainted but there were no other repairs.

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8. COST OF OPERATING:

General Surface Expense:

1930 Amount	\$6,579.22	Cost per ton	\$.017
1929 Amount	<u>6,474.19</u>	" " "	<u>.019</u>
Increase	105.03	Decrease	.002

The charges to improvement and care of grounds in 1930 were \$600.98, while in 1929 they were \$595.66. A gasoline driven lawn mower was purchased in 1930 for use at the three mines in the Negaunee District; the Athens proportion was \$62.64.

MAINTENANCE ACCOUNTS:

Hoisting Equipment:

1930 Amount	\$9,851.56	Cost per ton	\$.026
1929 Amount	<u>11,196.97</u>	" " "	<u>.033</u>
Decrease	1,345.41		.007

	<u>Sub Division</u>		
	<u>Wire Rope</u>	<u>Mach. Parts</u>	<u>Skips & Skip Roads</u>
1930	<u>\$3,037.37</u>	<u>\$3,061.09</u>	<u>\$3,453.10</u>
1929	<u>4,842.43</u>	<u>3,239.05</u>	<u>3,115.49</u>
Increase			337.61
Decrease	1,805.06	177.96	

The total expense for new hoisting ropes in 1930 was \$3,037.37. Two 1 3/8" hoisting ropes, one costing \$1,772.93, and the other \$1,264.44, were put on the skip hoist. In 1929 two 1 3/8" hoisting ropes, one costing \$1,264.44, and the other \$1,772.80, were put on the skip hoist, one 1 1/4" rope costing \$1,056.62 on the cage hoist, and one 1 1/8" rope, costing \$748.57, was put on the counter balance on the cage hoist.

The decrease in machinery parts was due to less repairs to hoisting engines. In 1929 a new shaft was installed on the cage hoist and repairs made to stator of Torque motor on skip hoist. In 1930 a new brake band was installed on skip hoist and new rope slides lined with asbestos blocks were made for rope holes.

The increase in expense for skips and skip roads was due to more repairs.

Shaft:

1930 Amount	\$2,836.75	Cost per ton	\$.007
1929 Amount	<u>3,302.37</u>	" " "	<u>.010</u>
Decrease	465.62		.003

	<u>Sub Division</u>	
	<u>Steel Sets</u>	<u>U. G. Pockets</u>
1930	<u>\$1,313.64</u>	<u>\$1,523.11</u>
1929	<u>2,109.22</u>	<u>1,193.15</u>
Increase		329.96
Decrease	795.58	

Decrease in expense to Steel Sets due to less repairs and replacements. Increase in charges to U. G. Pockets due to making alterations for dumping new rocker dump cars and more repairs to pockets.

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8. COST OF
OPERATING:

Top Tram Equipment:

1930 Amount	\$1,951.35	Cost per ton	\$.005
1929 Amount	<u>2,094.26</u>	" " "	<u>.006</u>
Decrease	142.91		.001

	<u>Sub Division</u>			
	<u>Engines & Motors</u>	<u>Tracks & Cars</u>	<u>Wire Rope</u>	<u>Sheaves Rollers, etc.</u>
1930	209.67	497.05	670.69	573.94
1929	<u>274.14</u>	<u>713.38</u>	<u>672.24</u>	<u>434.50</u>
Increase				139.44
Decrease	64.47	216.33	1.55	

There was a decrease in expense to Engines & Motors and Tracks & Cars due to less repairs, and to Wire Rope due to less rope used. Increase in Sheaves, Rollers, etc. due to replacing sheaves and spools and more wood rollers used.

Docks, Trestles & Pockets:

1930 Amount	\$1,050.10	Cost per ton	\$.003
1929 Amount	<u>914.97</u>	" " "	<u>.003</u>
Increase	135.13		

Increase due to more repairs and replacing steel plates in skip dump and pockets. Longer decking timbers were placed on steel trestle over railroad tracks to carry plank for floor to protect railroad employees and others passing beneath.

Mine Buildings:

1930 Amount	\$768.81	Cost per ton	\$.002
1929 Amount	<u>203.26</u>	" " "	<u>.001</u>
Increase	565.55		.001

Detail of Mine Buildings

	<u>1930</u>	<u>1929</u>
Office		39.90
Warehouse	10.02	
Shops	.86	7.65
Shaft House	57.73	9.76
Engine House	173.37	29.02
Boiler House	2.86	2.35
Dry House	10.79	11.64
Coal Dock		30.39
Timber Tunnel		72.55
Iron House	360.41	
Scraper House	<u>152.77</u>	
	768.81	<u>203.26</u>

Charges to Warehouse: New Door
 " " Shaft House: Repairs to roof
 " " Engine House: Repairs to roof
 " " Iron House: New building near shops
 " " Scraper House: New building near shops

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8. COST OF
OPERATING:

Total Surface Costs:

1930 Amount	\$70,244.35	Cost per ton	\$.182
1929 Amount	<u>71,590.03</u>	" " "	<u>.209</u>
Decrease	1,345.68		.027

GENERAL MINE ACCOUNTS:

Insurance:

1930 Amount	\$26.81	Cost per ton	\$.000
1929 Amount	<u>23.73</u>	" " "	<u>.000</u>
Increase	3.08		

Mining Engineering:

1930 Amount	\$2,291.36	Cost per ton	\$.006
1929 Amount	<u>2,512.58</u>	" " "	<u>.007</u>
Decrease	221.22		.001

Less expense in 1930 for underground surveys and office work.

Mechanical & Electrical Engineering:

1930 Amount	\$1,639.39	Cost per ton	\$.004
1929 Amount	<u>1,429.49</u>	" " "	<u>.004</u>
Increase	209.90		

More time at mine by mechanical and electrical department employees on account of repairs to hoists, etc.

Analysis & Grading:

1930 Amount	\$7,293.06	Cost per ton	\$.019
1929 Amount	<u>7,234.55</u>	" " "	<u>.021</u>
Increase	58.51	Decrease	.002

Athens proportion of cost of operating Negaunee Mine Laboratory:

	<u>Amount</u>	<u>No. Determinations</u>	<u>Cost per Determ.</u>
1930	3,702.53	24,244	.15350
1929	<u>3,820.54</u>	<u>28,513</u>	<u>.13387</u>
Increase			.01963
Decrease	18.01	4,269	

The number of determinations decreased in 1930 due to less ore shipped from stockpile.

Personal Injury Expense:

1930 Amount	\$13,261.23	Cost per ton	\$.035
1929 Amount	<u>12,052.08</u>	" " "	<u>.035</u>
Increase	1,209.15		

This account was charged with 2% of the labor cost to set up a reserve fund for personal injury expense. Increase due to payroll being larger in 1930.

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8. COST OF
OPERATING:

Safety Department:

1930 Amount	\$1,256.68	Cost per ton	\$.003
1929 Amount	<u>2,748.18</u>	" " "	<u>.008</u>
Decrease	1,491.50		.005

The decrease is due to extraordinary expense in 1929 for safety picnic.

Telephones & Safety Devices:

1930 Amount	\$715.40	Cost per ton	\$.002
1929 Amount	<u>621.75</u>	" " "	<u>.002</u>
Increase	93.65		

Detail of Charges

	<u>1930</u>	<u>1929</u>
Lighting for shaft and levels	509.37	477.67
Mine Telephones	66.21	44.45
Safety Gates & U. G. Improvement	68.55	32.96
Appliances for care of injured	9.43	-
Signs & Signals	9.17	24.59
Fire Equipment	<u>52.67</u>	<u>42.08</u>
	715.40	621.75

There was an increase in expense for lighting shaft and levels, mine telephones, safety gates & underground improvement, and for fire equipment, and a decrease in expense for signs and signals.

Special Expenses, Pensions & Allowances:

1930 Amount	\$1,372.31	Cost per ton	\$.004
1929 Amount	<u>1,222.02</u>	" " "	<u>.004</u>
Increase	150.29		

Increase is due to change in method of distributing cost in 1930.

Ishpeming Office:

1930 Amount	\$8,139.78	Cost per ton	\$.021
1929 Amount	<u>8,070.46</u>	" " "	<u>.023</u>
Increase	69.32	Decrease	.002

The increase is due to change in method of distributing cost in 1930.

Mine Office:

1930 Amount	\$10,498.24	Cost per ton	\$.027
1929 Amount	<u>9,914.47</u>	" " "	<u>.029</u>
Increase	583.77	Decrease	.002

Increase in expense due to purchase of a Monroe calculator, more expense for General Storehouse overhead, and extra clerical help in office for a short period.

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8. COST OF
OPERATING:

Total General Mine Expenses:

1930 Amount	\$46,494.26	Cost per ton	\$.121
1929 Amount	<u>45,834.31</u>	" " "	<u>.133</u>
Increase	659.95	Decrease	.012

9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS:

The only exploration during the year was the drilling of No. 11 diamond drill hole on the -480' sub level, horizontal S. 53° 31' E. The material was as follows: 0-123 Ore; 123-130 Dike; 130-407 Ore; 407-430 Slate. This hole was drilled to prove the extent of the ore South of the dike at the point where the jasper hanging started to flatten. The ore found in this hole connects with ore on the 4th level near the South foot, but between the ore on the -480' sub and that near the foot in the hole, it is not known how high the ore extends. A drift is being driven on the 6th level from which raises will be put up to the hanging in this area, after which mining will start here.

10. TAXES:

The comparison of the total taxes for the Athens Iron Mining Company for the years 1930 and 1929 are as follows:

<u>Description</u>	<u>1 9 3 0</u>		<u>1 9 2 9</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty (Tax Commission)	1,950,000	75,375.30	2,102,000	78,644.22
Ore in Stock, Equipment and Supplies	450,000	17,394.30	448,000	16,761.47
<u>Sterling Addition</u>				
Lots 31 to 38 (C. C. I. Co. Purchase, 1927)	4,600	177.81	4,600	172.10
<u>Harvey Plat</u>				
Lots 1, 2, 3, Portion of	1,300	50.27	1,300	48.65
Total	2,405,900	92,997.28	2,555,900	95,626.44
Collection Fees		929.98		956.26
Total Operating Athens Mine		93,927.66		96,582.70
Rented Buildings (Harvey Plat)				
Lots 5, 6 & 7	7,900	305.40	7,900	275.62
<u>Sterling Addition</u>				
Lots Nos. 1, 2, 3, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 72, 73, 74 & 75	22,700	877.61	22,700	849.36
Collection Fees		11.83		11.45
Total Rented Buildings		1,194.84	30,600	1,156.43
Total Athens Iron Mining Co.	2,436,500	95,122.50	2,586,500	97,739.13
Tax Rate		3.8654		3.742
Total City of Negaunee tax	611,259.85		600,686.18	
Athens Mine % of City tax		15.56%		16.27%

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11. ACCIDENTS
AND
PERSONAL
INJURY:

There was one fatal and five minor accidents in 1930 as compared with no fatal and four minor accidents in 1929. The causes of the accidents were: Falls of Ground 5, Handling Timber 1.

The following table shows the classification of accidents for three years:

	<u>1930</u>	<u>1929</u>	<u>1928</u>
Fatal accidents	1	0	0
Time lost, more than four months	1	2	1
Time lost, one to four months	2	2	5
Time lost, less than one month	<u>2</u>	<u>0</u>	<u>6</u>
Total Accidents	6	4	12

Number of cases paid compensation for accidents received prior to January 1, 1930	7	4	1
Number of cases being paid difference in wages	2	2	1

The nature of the injuries sustained by the accidents causing the loss of time of over four months was a fracture of both bones in the leg, and the injuries from the two accidents causing loss of time of from one to four months were also fractures of the legs.

The fatal accident occurred on March 25th at 3:20 P. M. and was caused by a fall of ground, Peter Koskilla, a miner, being instantly killed.

Koskilla was mining on the -685' sub level in No. 12 contract. He and his son had scraped out the broken ore in the morning and were putting up a set at the breast, which was about 25 ft. from the raise. They had put in six forepoles from the previous set to the breast and after blocking these up to the mat above put the new set against the breast under the poles. Koskilla was standing on the stage spragging the right hand leg of the set when the second cap broke one foot from the leg, bringing down the forepoles and knocking Koskilla off the stage, pinning him to the floor by the poles. The breast of their drift was within two or three sets of a 20 ft. dike that runs through the ore. On the other side of the dike mining had progressed to one sub below the -685' sub and the Koskillas were mining from a new raise put up on the South side of the dike in order that mining on both sides of the dike would be at the same elevation. On the sub above a drift had been driven through the dike and this probably weakened the dike and caused it to crush and force into the adjacent mat in a sudden movement which drove a leg in the mat down on the cap and broke it.

This accident was classified as a trade risk. Added precautions have since been taken to use larger timber near dikes, place the sets closer together, and to use extra care in covering down. When the breast or side of a drift exposes dike or other rock, wire netting is placed from top to bottom and reinforced with poles and blocking before the drift is blasted in.

Koskilla was married and had eleven children, seven of whom were under 16.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

E & A #575 - Rocker Dump Haulage Cars:

Total estimate	\$ 14,550.00
Total expenditures in 1930	<u>14,550.00</u>
Total unexpended balance January 1, 1931	0.00

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12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

E & A #575 - Rocker Dump Haulage Cars: (Cont)

These cars have been charged out on the regular cost sheet at the rate of two each month, and although the E & A has been completed there remain 12 cars to charge in 1931.

E & A #577 - Feather Valves for Nordberg Compressor:

Total estimate	\$ 900.00
Total expenditures in 1930	<u>1,491.43</u>
Total unexpended balance January 1, 1931	591.43 (red)

This E & A was completed in July 1930 and has been charged into operating expense, being spread over several months.

13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

One shovel was rented and kept in service at the mine during the shipping season. The Athens Mine does not own a steam shovel.

b. Stockpile Trestles:

An additional bent was erected on the rock trestle and other repairs made. The wooden stocking trestle at the end of the Southeast steel trestle used for stocking Mitchell Ore was repaired.

c. Timber Treating Plant:

The timber was treated this year in the steel tanks. Some repairs were made to the piping after all the timber was treated. Only a small amount of timber was treated in 1930 due to a fairly large carry-over from the previous year.

d. Scraper Hoists:

The mine is now equipped with the following scraper equipment:

<u>Company</u>	<u>On Hand</u> <u>1/1/1930</u>	<u>Purchased</u> <u>1930</u>	<u>On Hand</u> <u>1/1/1931</u>
Ingersoll-Rand - air	33 *	0	28
Sullivan Machinery Co. - 6½ h.p. Electric	2	0	2
" " " - 15 " "	<u>6</u>	<u>4</u>	<u>10</u>
Total	41	4	40

* Five scrapped in 1930.

14. MAINTENANCE
AND REPAIRS:

A compressor bearing burnt out in September causing a half-day delay on two different days while it was being repaired and fitted.

The 100 h.p. heating plant boiler was repaired, new tubes and a new breeching being installed.

A new brake band was installed on the skip hoist in 1930.

ATHENS MINE
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15. POWER:

Electric power was purchased from the Cliffs Power & Light Company, a subsidiary of The Cleveland-Cliffs Iron Company. The charge for power was $1\frac{1}{2}$ ¢ per kilowatt hour, the same as last year.

17. CONDITION
OF
PREMISES:

The grounds around the buildings were maintained in good condition during 1930.

18. NATIONALITY
OF
EMPLOYEES:

This has been prepared under two statements. The first gives the report as ordinarily submitted to the Company. It shows the nationality of the employees as to parentage. The second separates the nationalities into foreign-born and American-born, the latter being shown as Americans.

<u>As to Parentage</u>	<u>1930</u>	<u>%</u>	<u>1929</u>	<u>%</u>
English	47	23	39	22
Finnish	83	40	71	39
Italian	23	11	23	13
Swedish	18	9	17	10
Irish	2	1	3	2
Scotch	2	1	1	-
French	18	9	17	9
German	4	2	3	2
Austrian	2	1	1	-
Norwegian	5	3	5	3
Danish	1	-	1	-
Total	205	100	181	100

<u>As to Birth:</u>	<u>Total</u>	<u>American born</u>	<u>Foreign born</u>
English	47	31	16
Finnish	83	34	49
Italian	23	6	17
Swedish	18	13	5
Irish	2	2	-
Scotch	2	2	-
French	18	18	-
German	4	4	-
Austrian	2	2	-
Norwegian	5	5	-
Danish	1	1	-
Total	205	118	87
	100%	57%	43%
Total Last Year	181	107	74
	100%	59%	41%

NORTH JACKSON MINE
ANNUAL REPORT
YEAR 1930

1. GENERAL:

This mine has not operated since 1908.

6. SURFACE:

The fences around the pits at the North Jackson were repaired in the Spring.

The machinery left along the highway near the Jackson Monument was removed to the scrap bin at the Negaunee Mine. All the small parts had been stolen and the machinery itself was obsolete.

10. TAXES:

<u>Description</u>	<u>1 9 3 0</u>		<u>1 9 2 9</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
47% of Sec. 1-47-27, except certain small parcels and right of way	235,000	9,083.69	235,000	8,792.50
Collection Fees		90.83		87.92
Total		9,174.52		8,880.42
<u>Rented Buildings:</u>				
Old Jackson Office	500	19.33	500	18.71
Collection Fees		.19		.19
Total		19.52		18.90
 Total Taxes North Jackson		9,194.04		8,899.32
 Tax rate per \$100 valuation		3.8654		3.742

SOUTH JACKSON MINE
ANNUAL REPORT
YEAR 1930

1. GENERAL:

There was no work done at this idle property in 1930.

4. ESTIMATE OF ORE RESERVES:a. Available Ore:

Above present pit available by present system of mining:

On Southwest side	35,000 tons
North of Lucy Pit	5,000 "
South and Southwest of Lucy Pit	<u>3,000 "</u>
Total	43,000 "

Below present pit and above drainage tunnel available by milling:

West of Crusher	186,000 tons
Area below bottom of present pit shown by churn drilling	<u>105,226 "</u>
Total	291,226 "
Grand Total	334,226 "

c. Estimated Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Alum</u>	<u>Mang</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni</u>	<u>Moist</u>
Natural	34.55	.066	36.00	1.42	2.00	.435	.175	.010	2.00	7.00

8. COST OF OPERATING:a. Comparative Mining Costs:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Surface Costs	4.15	136.08		131.93
General Mine Expenses	0	0		
Total	4.15	136.08		131.93
Taxes	10,345.75	9,313.85	1,031.90	
Total Cost	10,349.90	9,449.93	899.97	

10. TAXES:

<u>Description</u>	<u>1930</u>		<u>1929</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
53% of Sec. 1-47-27, except certain small parcels and right of way	265,000	10,243.32	265,000	9,914.50
Collection Fees		102.43		99.15
Total Taxes South Jackson		10,345.75		10,013.65
Tax rate per \$100 valuation		3.8654		3.742

LUCY MINE
ANNUAL REPORT
YEAR 1930

There were no changes in the condition of this property in 1930.

6. SURFACE:

There were some repairs to fences around the caves at the Lucy Mine in the summer.

10. TAXES:

<u>Description</u>	<u>1930</u>		<u>1929</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$ Sec. 6, S. of L.S. & I.	10,000	386.54	10,000	374.14
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$ North of State Road	2,000	77.31	2,000	74.82
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$ Com. at W. Line of Gold St.	400	15.47	400	14.97
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$ W. of W. Line Silver St. - 41 A.	2,600	100.51	2,600	97.27
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$ S. of State Road - 5.64 A.	4,600	177.82	4,600	172.10
NW $\frac{1}{4}$ of NW $\frac{1}{4}$ Sec. 7-47-26	10,000	386.54	10,000	374.14
Iron Plat - Lots 89 to 198 as per Tax List, except those paid by Land Dept. and other parties	20,500	792.66	20,500	767.23
Total	50,100	1,936.85	50,100	1,874.67
Collection Fees		19.37		18.75
Total Taxes		1,956.22		1,893.42
Tax rate per \$100 Valuation		3.8654		3.742

GWINN DISTRICT MINES
ANNUAL REPORT
YEAR 1930

1. GENERAL:

Conditions in the Gwinn District were good throughout 1930 as there were relatively few unemployed men. The Archibald Mine of the C. K. Quinn Company did not reopen after the Christmas holidays. It was announced that reopening depended on the sale of the ore and that it was hoped that operations could be resumed within 60 days. There is about 150,000 tons of ore in the mine that is considered available, enough to insure operating from six to eight months before the mine is finally abandoned. The general business situation makes it at least an even chance that the property will not resume operations and as the idle cost is over \$3,000 a month it is unlikely that this expense will be continued for any length of time. 165 men were laid off and 15 retained, most of whom are on a part time basis. A few old Company employees have been given work at the Gardner-Mackinaw Mine. There is no work in the woods available as jobbers have stopped all cutting due to lack of sale outlet. Conditions due to shutdown of the mine have not as yet affected the community, but if the mine does not reopen the situation will become serious within a short time due to inability of the men to find work anywhere in the County. Over 60% are former employees of the Company, many with service records of from 10 to 20 years, and in the main were good workmen. A few own their homes at Gwinn, Princeton, and New Swanzy, and, if possible, employment must be found for these men at the Gardner-Mackinaw. In other cases there are large families which has made it impossible for the father to save money for an emergency of this character. Some of these men will have to be given employment if a place can be found for them.

Savings deposits at the Gwinn Bank increased in 1930 as conditions in the community were above average.

a. STATEMENT SHOWING TOTAL ORE PRODUCED FROM 1903 TO 1930 INCLUSIVE:

<u>YEAR</u>	<u>AUSTIN</u>	<u>PRINCETON</u>	<u>STEPHENSON</u>	<u>GWINN</u>	<u>FRANCIS</u>	<u>GARDNER- MACKINAW</u>	<u>TOTAL</u>
Total to							
1/1/30	1,582,616	1,584,333	3,792,429	988,665	522,602	409,250	8,879,895
1930	0	0	0	0	0	125,157	125,157
Total	1,582,616	1,584,333	3,792,429	988,665	522,602	534,407	9,005,052

b. STATEMENT SHOWING TOTAL ORE SHIPMENTS FROM 1905 TO 1930 INCLUSIVE:

<u>YEAR</u>	<u>AUSTIN</u>	<u>PRINCETON</u>	<u>STEPHENSON</u>	<u>GWINN</u>	<u>FRANCIS</u>	<u>GARDNER- MACKINAW</u>	<u>TOTAL</u>
Total to							
1/1/30	1,589,018	1,442,325	3,585,110	988,325	222,865	367,232	8,194,875
1930	0	3,230	68,353	0	92,828	60,385	224,796
Total	1,589,018	1,445,555	3,653,463	988,325	315,693	427,617	8,419,671

c. STATEMENT SHOWING ORE IN STOCK AT CLOSE OF 1929 AND 1930:

<u>YEAR</u>	<u>AUSTIN</u>	<u>PRINCETON</u>	<u>STEPHENSON</u>	<u>GWINN</u>	<u>FRANCIS</u>	<u>GARDNER- MACKINAW</u>	<u>TOTAL</u>
Jan. 1, 1930	0	142,008	206,138	0	299,737	42,018	689,901
Jan. 1, 1931	0	138,778	155,656	0	206,909	106,790	608,133

5. LABOR AND WAGES:

The number of men employed in the district by The Cleveland-Cliffs Iron Company was about the same as in the previous year. The Archibald employees numbered 180 as compared with 160 in 1929.

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5. LABOR AND WAGES: (Cont)

Woods operations were on a much reduced scale, particularly in the latter months of the year, so that there is considerable unemployment of this class of labor. Several of these families are destitute and are being cared for, temporarily, by the County Poor Fund. No relief is in sight until general business conditions improve and work in the woods is resumed.

The population of Gwinn and surrounding locations increased slightly in 1930, and there are more children in the schools than in 1929.

10. TAXES:

The following statement shows taxes in detail for the two years for all property in the district except mines, where the totals only are shown in the summary, as the detail of taxes for each mine is shown in the report on the mine. The total tax, Cliffs Power and Light Company, is also included in the summary in order to show total tax paid by The Cleveland-Cliffs Iron Company in Forsyth Township.

Description	1930		1929	
	Valuation	Taxes	Valuation	Taxes
Mineral Lands Gwinn Fee:				
Lots 1, 2 & 3, Sec. 36-45-25, 52 Acres	100	3.90	100	3.47
" 7, 8 & 9, " 36 " 98.92 Acres	200	7.73	200	6.95
" 11, " 36 " 13.2 "	20	.80	20	.69
SW $\frac{1}{4}$ of SW $\frac{1}{4}$ " 26 " 40 "	80	3.09	80	2.78
NW $\frac{1}{4}$ of SE $\frac{1}{4}$ " 27 " 40 "	80	3.09	80	2.78
NW $\frac{1}{4}$ of " 35 " 160 "	320	12.37	320	11.10
N $\frac{1}{2}$ of NE $\frac{1}{4}$ " 34 " 80 "	160	6.18	160	5.56
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ " 34 " 40 "	80	3.09	80	2.78
NE $\frac{1}{4}$ of NW $\frac{1}{4}$ " 34 " 40 "	80	3.09	80	2.78
NE $\frac{1}{4}$ of SE $\frac{1}{4}$ " 34 " 40 "	80	3.09	80	2.78
S $\frac{1}{2}$ of SE $\frac{1}{4}$ " 27 " 80 "	160	6.18	160	5.56
NE $\frac{1}{2}$ of SE $\frac{1}{4}$ " 28 " 40 "	600	23.17	600	20.83
S $\frac{1}{2}$ of NE $\frac{1}{4}$ " 28 " 80 "	130	5.03	130	4.54
S $\frac{1}{2}$ of N $\frac{1}{2}$ " 22 " 160 "	500	19.34	500	17.35
N $\frac{1}{2}$ of NW $\frac{1}{4}$ " 22-45-26 87.08 "	90	3.49	90	3.12
NE $\frac{1}{4}$ of " 22 " 165.61 "	190	7.35	190	6.60
Total	2,870	110.99	2,870	99.67
Collection Fees		1.11		1.00
Total Taxes		112.10		100.67
Adjustment with C. & N. W.		44.45		7.65
Total		156.55		93.02

Gwinn Townsite - Surface Only:

NE $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec. 21-45-25, 27.40 Acres	150	5.77	150	5.21
That part of S $\frac{1}{2}$ of NW $\frac{1}{4}$ Sec. 21-45-25 not included in plat of Gwinn, 25.01 Acres	200	7.74	200	6.96
E $\frac{1}{2}$ of SE $\frac{1}{4}$, Sec. 21-45-25, 65.84 Acres	400	15.46	400	13.88
That part of W $\frac{1}{2}$ of SE $\frac{1}{4}$, Sec. 21-45-25 not included in plat of Gwinn, 38.80 Acres	300	11.60	300	10.42
Gwinn Townsite Plat	102,185	3,949.75	102,185	3,548.05
Part of W $\frac{1}{2}$ of SE $\frac{1}{4}$ Sec. 21-45-25, Superintendent's residence, 1.2 Acres	3,500	135.23	3,500	121.47
NW $\frac{1}{4}$ of NE $\frac{1}{4}$, Sec. 21-45-25, except 5 Acres in Cemetery, 35 Acres	100	3.86	100	3.47
Part of S $\frac{1}{2}$ of NE $\frac{1}{4}$, Sec. 21-45-25, 69.69 Acres	400	15.46	400	13.88
Total	107,235	4,144.87	107,235	3,723.34
Collection Fees		41.45		37.33
Total Current Payment		4,186.32		3,760.57
Lot 4, Block 4, 1927-28-29 for 1930 Amounts		17.03		
Total Taxes		4,203.35		

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10. TAXES: (Cont)

	1 9 3 0		1 9 2 9	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>Gardner-Mackinaw Location</u>				
N $\frac{1}{2}$ of NE $\frac{1}{4}$ Sec. 35-45-25	6,500	251.12	6,500	225.57
Collection Fees		2.51		2.25
Total Taxes		253.63		227.82
<u>District Office and Crusher:</u>				
Personal	800	31.21	800	28.03
N $\frac{1}{2}$ of NW $\frac{1}{4}$ Sec. 27-45-25, District Crusher	1,000	39.02	1,000	35.06
Total	1,800	70.23	1,800	63.09
Collection Fees		.70		.63
Total Taxes		70.93		63.72
<u>Austin Location</u>				
Part of Lot 5, Sec. 20-45-25	5,000	193.15	5,000	173.51
NW $\frac{1}{4}$ of SE $\frac{1}{4}$ " "	10,000	386.30	10,000	347.00
NE $\frac{1}{4}$ of SW $\frac{1}{4}$ " "	320	12.37	800	27.77
Part of SW $\frac{1}{4}$ of SE $\frac{1}{4}$ Sec. 20-45-25	300	11.60	300	10.42
Total	15,620	603.42	16,100	558.70
Collection Fees		6.03		5.59
Total Taxes		609.45		564.29
<u>Summary:</u>				
Austin Mine	0	0	70,000	2,429.00
Stephenson Mine	230,660	8,910.40	335,160	11,630.07
Princeton Mine	281,260	10,865.18	281,260	9,759.78
Francis Mine	271,000	10,471.55	315,500	10,950.40
Gardner-Mackinaw Mine	125,200	4,836.49	96,200	3,338.15
Mineral Lands	2,870	155.44	2,870	99.67
Gwinn Townsite	107,235	4,161.90	107,235	3,723.34
Austin Location	15,620	603.42	16,100	558.70
Gardner-Mackinaw Location	6,500	251.12	6,500	225.57
Gwinn District Office and Crusher	1,800	70.23	1,800	63.09
Total C. C. I. Co.	1,042,145	40,325.73	1,232,625	42,777.77
Collection Fees		401.91		427.11
Total C. C. I. Co.		40,727.64		43,204.88
Less Adjustments		64.29		2.55
Total Taxes, C. C. I. Co., Mines, etc.		40,663.35		43,202.33
Cliffs Power and Light Company	101,280	3,912.39	93,780	3,254.32
Cliffs Electric Co.	5,000	195.08	5,000	173.51
Total	106,280	4,107.47	98,780	3,427.83
Collection Fees		41.07		34.28
Total Taxes	106,280	4,148.54		3,462.11
Grand Total	1,148,425	44,811.89	1,331,305	46,664.44

GWINN DISTRICT MINES
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10. TAXES: (Cont)

	<u>Taxes Levied - Forsyth Township</u>			
	<u>1930</u>	<u>1929</u>	<u>1928</u>	<u>1927</u>
State	7,742.15	8,837.14	6,770.27	8,670.96
County	16,180.47	15,619.99	13,341.05	13,232.64
County Road	5,679.86	6,697.18	6,742.11	6,101.27
Contingent	4,007.74	3,016.00	3,500.00	4,000.00
Highway Improvement	5,009.91	4,008.95	2,000.00	3,000.00
Highway Repair	5,011.13	4,009.25	4,000.00	4,000.00
Library	-	100.00	100.00	100.00
School and One Mill	36,101.82	38,239.35	40,350.80	34,469.00
Cemetery	-	-	500.00	500.00
Rejected	Incl. in roll	Inc in roll	29.24	13.07
Total	79,733.08	80,527.86	77,333.47	74,086.94
Amount paid by C. C. I. Company	44,811.89	46,664.44	46,092.40	49,005.39
Percent paid by C. C. I. Company	56.20	57.96	59.60	66.14

The percentage of tax paid by the Company in 1930 decreased due to lower valuation of personal property at idle mines on account of less ore in stock. The tax rate per \$100 increased in 1930 as total tax showed practically no decrease, while total valuation was lower. The tax rate was \$3.863 as compared with \$3.470 in 1929, and in 1931 will be at least \$4.20 or higher.

16. WATER SUPPLY:

Some trouble developed in the summer due to low water and operation of Escanaba River Water Power Plant on day shift only, with the flow of river cut off entirely at night. Repairs to dam at pump station were made to keep the water level high enough to insure flow to the suction well. Heavy charges of chlorine gas were necessary during this period to purify the water. Analysis of samples are made weekly at the State Laboratory at Houghton and monthly reports made to the Department of Health at Lansing.

Due to the intermittent shutting down of the pumping plant while changing the transmission lines and hooking up with new sub station, with the consequent accumulation of air in the mains, a considerable number of leaks developed and in two cases short sections of the old wood pipe was replaced with steel. The mains were repaired every month of the year and in some places the wood pipe is rotting and becoming more and more difficult to repair. The total cost for repairs, however, was lower than in the previous year.

The following table gives the cost of operating the pump station in 1930 and 1929:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
General Expense	52.62	54.48		1.86
Maintenance Labor	1,018.77	1,726.97		708.20
Maintenance Supplies	648.52	472.37	176.15	
Operating Labor	1,727.48	1,909.78		182.30
Operating Supplies	4,325.34	5,104.16		778.82
Total	7,772.73	9,267.76		1,495.03

The 1930 and 1929 operating costs were charged off as follows:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
C. C. I. Co. Mines	147.00	245.00		98.00
Gwinn Townsite Expense	4,081.16	5,422.80		1,341.64
Water Service Accts. Rec.	3,544.57	3,599.96		55.39
Total	7,772.73	9,267.76		1,495.03

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17. CONDITION OF
PREMISES:

The streets, alleys, and numerous parks in Gwinn Townsite were cleaned at regular intervals by township employees and were kept clean and neat as in former years. Prizes were awarded by the Company for the best kept premises and for vegetable gardens, with considerable competition. A number of the yards were kept in unusually attractive condition with mown lawns and beds of flowers and shrubbery.

Expense for repairs was high in 1930 as it was necessary to put new roofs on 22 houses. The chimneys were repaired and cleaned, fences repaired, and many repairs made to porches, etc. Cost of repairs for the year was \$7,587.12, the income from rents was \$14,560.12.

Austin Location:

The alleys in this location were cleaned several times by company employees. There were 34 houses occupied in 1930 and 31 vacant. The vacant houses are deteriorating rapidly and repairs are not warranted as it is unlikely that they will ever be occupied again. Repairs at this location were confined to the occupied houses and covered only absolutely necessary repairs. Chimneys were cleaned and repaired and new roofs put on several houses, etc. Rent collections in 1930 were \$3,545.50 and repair costs were \$535.59.

Princeton Location:

This location was cleaned twice during the summer at township expense. Ten of the houses owned by the Company were occupied and five were vacant. Repair expense was kept down by making only absolutely necessary repairs. The income from rents in 1930 was \$781.00, repair expense \$260.04.

Gardner-Mackinaw Location:

The streets and alleys at this location were cleaned by the company employees. At the end of the year 14 houses were occupied and 37 were vacant. The children are transported by bus to the Gwinn School. One new roof was put on and minor repairs made to all the occupied houses. Rent collections were \$1,300.00 for the year; repair expense, including fire protection and cleaning sewers, was \$716.46.

19. GWINN ASSOCIATION,
GWINN HOTEL,
GWINN COUNTY PARK:

a. Gwinn Association:

The Gwinn Association finished another successful year with funds in the treasury. One source of income for the Association and entertainment for the residents is approaching an end, namely, the silent movie. It is expected that the last silent pictures will be available in 1931. The closing of the Archibald Mine will reduce the income in 1931 by about \$75.00 per month, or the dues paid by the employees at 50¢ per man; a like amount paid by the C. K. Quinn Company will continue to be paid for a few months. This is certainly not the time to curtail the activities at the Club House as this institution is needed now more than ever as a recreational center for the idle men. The funds on hand will last until Spring with no curtailment of activities; if the Archibald reopens it can continue for another six months, after which some additional financing by our Company will be necessary.

The annual report of the activities of the Association is omitted from this report as it appears in full in the report of Mr. W. H. Moulton.

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19. GWINN ASSOCIATION,
GWINN HOTEL, ETC.: (Cont)

The Gwinn Club House and associated activities, under the capable management of the Secretary, Mr. E. L. Miller, provides a real community center. The moral and physical development of the young people is controlled and guided with results that are outstanding. I seriously question an equal success in any small industrial center.

A hardwood floor was installed in the gymnasium at an expense of about \$500.00. This expense was borne by the Company as the Club finances were not in condition to take care of this large amount.

b. Gwinn Hotel:

There was no change in the management of the Gwinn Hotel. The equipment is being maintained and kept in good condition by the Manager. The tourist business was poor in the summer of 1930 and the closing of the Archibald Mine has reduced the number of regular boarders. It will be difficult, if not impossible, to operate the hotel at a profit in 1931 if the Archibald Mine does not reopen.

c. Gwinn County Park:

This county park is becoming more popular every year. The attractive bath house erected in 1929 was used a great deal this year due to the unusually warm weather. The park is used all summer by the local residents for picnics, swimming, etc.

e. Company Houses:

The following table shows the number of houses in each location vacant and occupied during 1930 and 1929:

	<u>1930</u>			<u>1929</u>		
	<u>Vacant</u>	<u>Occupied</u>	<u>Total</u>	<u>Vacant</u>	<u>Occupied</u>	<u>Total</u>
Princeton Location	5	10	15	6	9	15
Austin Location	31	34	65	30	36	66
Gardner-Mackinaw Location	37	14	51	39	12	51
Gwinn Townsite	11	112	123	12	111	123
Total	84	170	254	87	168	254

Gain in occupied houses in 1930 - 2

f. Gwinn District Crusher:

Summary of crusher operations for 1930 and 1929:

	<u>1930</u>		<u>1929</u>		<u>Increase</u>		<u>Decrease</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Expense	240.12	.001	357.83	.002			117.71	.001
Maintenance	310.65	.001	2,085.37	.012			1,774.72	.011
Operating	6,151.93	.028	5,022.64	.028	1,129.29	.000		
Total Optg. Cost	6,702.70	.030	7,465.84	.042			763.14	.012
Switching	627.50	.003	820.00	.005			192.50	.002
Grand Total	7,330.20	.033	8,285.84	.047			955.64	.014

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19. GWINN ASSOCIATION,
GWINN HOTEL, ETC.: (Cont)

f. Gwinn District Crusher: (Cont)

The following table shows the grade and tons of ore crushed:

<u>Grade</u>	<u>1930</u> <u>Tons</u>	<u>1929</u> <u>Tons</u>	<u>Increase</u>	<u>Decrease</u>
Stephenson	3,704	10,626		6,922
Austin	0	525		525
Gardner-Mackinaw	60,385	95,285		34,900
Francis	3,838	0	3,838	
Total C. C. I. Co.	<u>67,927</u>	<u>106,436</u>		<u>38,509</u>
Archibald	93,782	44,967	48,815	
Junior	9,905	5,523	4,382	
Foundry	42,002	3,139	38,863	
Roberts	1,271	17,886		16,615
Total Others	<u>146,960</u>	<u>71,515</u>	<u>75,445</u>	
Grand Total	214,887	177,951	36,936	

	<u>1930</u>	<u>1929</u>
Average tons crushed per day	1,557.15	1,678.78
No. Days Operated	138	106
Shifts and Hours	1-9 hr	1-9 hr
Rated capacity per 10-hour shift	1,000	1,000

The cost of operation for 1930 is lower than in 1929 due to more ore crushed and, therefore, operating more nearly to full capacity. There was a decrease in the amount of C. C. I. Co. ore crushed but the increase of 75,445 tons of ore from the Archibald Mine of the C. K. Quinn Company made a total increase of 36,936 tons for the year.

There were no extraordinary expenses for repairs as in the previous year.

The cost for crushing is the lowest that has been made at the plant.

During idle periods in the fall the crusher crew worked at the Francis Mine cleaning the ore from the sollar.

STEPHENSON MINE
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1. GENERAL:

The Stephenson Mine was abandoned on July 29, 1927. Further dismantling was done in 1930 on the permanent trestle, the pulley stands, and the removal of collar plank from stockpile grounds. At the end of the year the only buildings remaining were part of the brick dry house, the oil house, and the combined boiler and engine house. Considerable of the old trestle timber was shipped to the Gardner-Mackinaw Mine and used for shaft timber.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:b. Shipments:

<u>Grade of Ore</u>	<u>1930</u> <u>Stockpile</u> <u>Tons</u>	<u>1929</u> <u>Stockpile</u> <u>Tons</u>
Stephenson Lease, Sec. 20:		
1. Stephenson	(1) 14,348	69,252
2. Stephenwood	<u>28,753</u>	<u>0</u>
Total Stephenson Lease	43,101	69,252
C. & N. W. Ry. Co. Lease, Sec. 29:		
1. Northdale	(2) 9,405	25,055
2. Northwood	<u>15,847</u>	<u>5,011</u>
Total C. & N. W. Ry. Co. Lease	25,252	30,066
Grand Total	68,353	99,318
Decrease in shipments - 1930	30,965	

(1) Stockpile overrun

(2) 3,523 tons stockpile overrun.

c. Stockpile Inventories:

	<u>1930</u>	<u>1929</u>	<u>Decrease</u>
Stephenson Lease, Sec. 20:			
1. Stephenson Ore	0	0	
2. Stephenwood Ore	132,506	161,259	28,753
Total Stephenson Lease	<u>132,506</u>	<u>161,259</u>	28,753
C. & N. W. Ry. Co. Lease, Sec. 29:			
1. Northdale	0	5,882	5,882
2. Northwood	23,150	38,997	15,847
Total C. & N. W. Ry. Co. Lease	<u>23,150</u>	<u>44,879</u>	21,729
Grand Total	155,656	206,138	50,482

There is still a small amount of Stephenson and Northdale ore in stock, also some Northwood. The shipment of the Northdale and Northwood in 1931 will make it possible to surrender the lease from the C. & N. W. Ry. Co. on the N $\frac{1}{2}$ of NW $\frac{1}{4}$ of Sec. 29-45-25

STEPHENSON MINE
ANNUAL REPORT
YEAR 1930

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

f. Ore Statement:

	<u>Stephenson Lease</u>		<u>C. & N.W. Ry. Co.</u>		<u>Total</u>	<u>Total</u>
	<u>Stephenson</u>	<u>Stephenson-wood</u>	<u>Lease, Sec. 29</u>	<u>Northdale wood</u>		
On Hand Jan. 1, 1930	0	161,259	5,882	38,997	206,138	300,003
Output for year	0	0	0	0	0	0
Total	0	161,259	5,882	38,997	206,138	300,003
Shipments	14,348	28,753	9,405	15,847	68,353	99,318
Overrun	14,348	0	3,523	0	17,871	5,453
Balance on Hand	0	132,506	0	23,150	155,656	206,138
Decrease in ore on hand					50,482	

All the Stephenson and nearly one-half the Northdale shipped in 1930 from stockpile was overrun, amounting to 17,871 tons.

1930 - Mine abandoned
1929 - Mine abandoned.

3. ANALYSIS:

b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>
Stephenson		All mixed		
Stephensonwood		"		
Northdale		"		
Northwood		"		

6. SURFACE:

When the steam shovel was idle the crew was kept busy cleaning up the scattered ore on the sollar and piling it against the remaining ore. They also took up the best of the old sollar plank and loaded one car for the Mackinaw-Gardner.

Early in the season most of the permanent trestles were dismantled and two carloads of timber sent to the Gardner-Mackinaw Mine to be used in the auxiliary shaft below the 5th level. Considerable other trestle timber, also timber from pulley stands was trucked to the Gardner-Mackinaw and used in the mine.

The last of the year four oil storage tanks were removed from the oil house and sent to the General Storehouse at Ishpeming.

The three boilers in the boiler house were sold and shipped - two to the L. S. & I. Ry. Co., the other to the Negaunee Mine.

At the end of the year the following buildings and equipment remained on the property:

Steel shaft house, no value except for scrap.

Engine and boiler house, brick building, contains part of skip hoist.

Dry House, brick building, partly dismantled. Nearly all equipment removed.

Oil House, brick building, contains two oil tanks.

Permanent trestles and pockets and top tram buildings, nearly all dismantled. Work will be completed in 1931.

Rail and pipe were removed from property in 1930 and only some pump equipment remains.

STEPHENSON MINE
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8. COST OF
OPERATING:

a. Comparative Mining Costs:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	0	0		
Surface Costs	1,512.00	1,008.00	504.00	
General Mine Accounts	593.22	1,381.57		788.35
Cost of Production	2,105.22	2,389.57		284.35
Loading and Shipping	5,774.57	7,945.08		2,170.51
Taxes	8,999.50	11,746.36		2,746.86
Track Agreement with E L S Ry.	1,077.53	1,731.32		653.79
Total Cost at Mine	17,956.82	23,812.33		5,855.51
Estimated Budget Cost at Mine	16,113.00			

Increase in surface costs due to charging all the time of one policeman to the Stephenson Mine.

General Mine Accounts expense due to shipping less ore in 1930, which decreased 2% reserve fund for accidents, also decreased cost for analysis.

Loading and Shipping cost less for 1930 on account of shipping 30,965 tons less ore from stockpile.

Taxes were less on account of less ore in stock and a consequent reduction in personal property valuation.

10. TAXES:

<u>Description</u>	<u>1 9 3 0</u>		<u>1 9 2 9</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
S $\frac{1}{2}$ of SW $\frac{1}{4}$ Sec. 20-45-25, 80 Acres	5,000	193.15	5,000	173.51
N $\frac{1}{2}$ of NW $\frac{1}{4}$ Sec. 29-45-25, 80 "	160	6.18	160	5.56
Personal Property	225,500	8,711.07	330,000	11,451.00
Total	230,660	8,910.40	335,160	11,630.07
Collection Fees		89.10		116.29
Total Taxes		8,999.50		11,746.36
Tax Rate per \$100		3.863		3.470

Taxes decreased due to less ore in stock.

PRINCETON MINE
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1. GENERAL:

There were practically no changes in conditions at this idle property in 1930. The mine has been idle since August 27, 1921. The levels were kept repaired and the pumps operating until in June 1927 when they were removed and the mine allowed to fill with water. Extensive repairs to dry house and office building were made in 1930 to save the buildings. All the trestles must be dismantled in 1931 as they have stood idle 10 years and have rotted so that they are now dangerous.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:b. Shipments:

<u>Grade of Ore</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>	<u>Total</u> <u>Last Year</u>
Cambridge	0	3,230	3,230	7,162
Princeport	0	0	0	0
Total	0	3,230	3,230	7,162
Total Last Year	0	7,162	7,162	
Decrease 1930		3,932	3,932	

1930 Mine idle during year
1929 " " " "

c. Stockpile Inventories:

The ore by grades in stock December 31, 1930, was as follows:

	<u>1930</u> <u>Tons</u>	<u>1929</u> <u>Tons</u>	<u>Increase</u>	<u>Decrease</u>
Cambridge Ore	113,557	116,416		2,859
Princeport Ore	9,160	9,160		
Sec. 19 Cambridge	14,748	15,119		371 *
Sec. 19 Princeport	1,313	1,313		
Total	138,778	142,008		3,230

* This tonnage was transferred from Sec. 19 Cambridge to Cambridge when shipped in 1930.

f. Ore Statement:

	<u>Prince</u> <u>port</u>	<u>Sec.19</u> <u>Prince</u> <u>port</u>	<u>Cambridge</u>	<u>Sec. 19</u> <u>Cambridge</u>	<u>Total</u>	<u>Total</u> <u>Last Year</u>
On Hand Jan. 1, 1930	9,160	1,313	116,416	15,119	142,008	149,170
Output for Year	0	0	0	0	0	0
Transferred			371	371		
Total	9,160	1,313	116,416	15,119	142,008	149,170
Shipments	0	0	3,230	0	3,230	7,162
Balance on Hand	9,160	1,313	113,186	15,119	138,778	142,008

1930 Mine idle during year
1929 Mine idle during year

3. ANALYSIS .b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>
Cambridge			All mixed	

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore

Assumption: 12 cu. ft. equals one ton
10% deduction for rock
10% deduction for loss in mining
Percentage of Bessemer equals 0.

	Prince- port	Cambridge	Sec. 19 Prince- port	Sec. 19 Cambridge	Total
Ore above 2nd level	2,552				2,552
" " 4th "		78,325			78,325
" " 5th "	20,000	58,778			78,778
" " 6th "	60,318	445,694	9,000	57,128	572,140
Total	82,870	582,797	9,000	57,128	731,795

b. Prospective Ore

Ore below 6th level	20,000	418,815	5,000	46,921	490,736
Total Ore - - - - -					1,222,531

c. Estimated Analysis

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist
<u>Princeport</u>										
Dried 212°	59.50	.300	7.73	.505	1.214	1.605	1.037	.023	2.235	
Natural	50.60	.256	6.57	.429	1.032	1.365	.882	.020	1.900	15.00
<u>Cambridge</u>										
Dried 212°	59.75	.853	4.42	1.193	.937	3.676	.840	.023	1.447	
Natural	50.80	.725	3.76	1.014	.797	3.125	.714	.020	1.230	15.00

d. Estimated Tonnage as Required by State Tax Commission:

Non-Bessemer Ore:

Developed,	1. Princeport	91,870 tons	
	2. Cambridge	639,925 "	
	Total Developed		731,795 tons
Prospective,	1. Princeport	25,000 "	
	2. Cambridge	465,736 "	
	Total Prospective		490,736 "
Grand Total			1,222,531 "

The above estimates of ore in the mine were made in December 1921.

6. SURFACE:

a. General:

Shipments by rail to paint manufacturers were made during the summer but in reduced volume as compared with the previous year. One small cargo was loaded by steam shovel for lake shipment.

A new roof was put on the mine office and warehouse building in 1930 and the foundations and base of building repaired.

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6. SURFACE:a. General: (Cont)

A new roof was put on the East half of the dry house building. The sheeting had rotted on a portion of the roof and was replaced before the new roof was put on.

Part of the ore and rock trestles have started to fall due to rotting and all the trestles will be dismantled in 1931 as they are too dangerous to be left standing.

8. COST OF OPERATING:a. Comparative Mining Costs:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	5.05	226.03		220.98
Surface Costs	2,260.92	1,078.53	1,182.39	
General Mine Expenses	151.58	233.61		82.03
Total	2,417.55	1,538.17	879.38	
Loading and Shipping	282.79	718.80		436.01
Taxes	10,974.05	9,857.38	1,116.67	
Obsolete Supplies	323.66	618.36		294.70
Total Cost at Mine	13,998.05	12,732.71	1,265.34	
Budget Cost	13,863.00			

Underground costs decreased in 1930 due to only slight repairs to the fence that was erected in 1929 around No. 1 shaft pit.

Surface expense increased due to repairing roof of dry and office buildings. The foundations and base of office building also were repaired.

Loading and Shipping decreased on account of shipping 3,932 tons less ore in 1930.

Taxes increased due to a higher rate in 1930. The valuation of property by State Tax Commission was the same in both years.

0. TAXES:

<u>Description</u>	<u>1 9 3 0</u>		<u>1 9 2 9</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
NE $\frac{1}{4}$ of NE $\frac{1}{4}$ Sec. 19-45-25 (C & N W)	10,000	386.30	10,000	347.00
158.27 Acres in Sec. 18-45-25	5,000	193.15	5,000	173.51
160.00 " " NW $\frac{1}{4}$ of Sec. 20-45-25	120,000	4,635.60	120,000	4,164.00
NW $\frac{1}{4}$ of NE $\frac{1}{4}$ Sec. 19-45-25 Location	420	16.26	420	14.59
S $\frac{1}{2}$ of NE $\frac{1}{4}$ " " "	840	32.52	840	29.18
Personal Property	145,000	5,601.35	145,000	5,031.50
Total	281,260	10,865.18	281,260	9,759.78
Collection Fees		108.87		97.60
Total Taxes		10,974.05		9,857.38
Tax Rate per \$100		3.863		3.47

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1. GENERAL:

In 1930 mining of available ore on the Gardner property was completed. Some time in the future it may be possible to obtain a small amount of additional ore by robbing the floors. This ore will not be available until mining is completed on the Mackinaw property.

The sinking of the Mackinaw shaft 280 ft. to a point assumed to be below the bottom of the ore body as found by diamond drilling from surface was authorized in December 1929. Before sinking was started it was decided to change the plan and sink an auxiliary shaft in the ore body as the advantage of such a shaft would more than compensate for the extra cost entailed by handling the ore twice. The hazard of accidents in sinking would be largely eliminated, the shaft would be sunk in ore, and the drift from the ore body to the main hoisting shaft in footwall rock would also be unnecessary. The auxiliary shaft would permit of more rapid development of the ore and later on if the ore body warranted the expense a drift could be driven to the site of the main shaft on the bottom level and the main shaft raised. This change in plan was approved by the Manager and accordingly work preliminary to sinking was started in January and continued through February and sinking started in April. The shaft was sunk a distance of 285 ft. on the incline and the 6th level opened 125 ft. vertically, or 165 ft. on the incline, below the 5th level.

During the year the ore body on the 6th level was developed, raises put through to the 5th, and stoping was under way at the end of the year. Late in the year it was decided to continue sinking the auxiliary shaft and open one or more levels, whichever was necessary, down to the bottom of the deposit. Sinking was resumed in December and at the end of the year the shaft was down 140 ft. on the incline below the 6th level. The dip of the ore body has flattened and the dip of the shaft has also been flattened, the dip at the bottom being about 42° as compared with 52° on the 6th level. It is planned to open the 7th level 125 ft. vertically below the 6th and after cutting the plat and installing the skip pit pocket, to continue sinking, following the ore, if possible, down to the bottom of the deposit.

The showing of ore on the 6th level was not particularly encouraging. The ore body is longer than on the 5th but for a distance of several hundred feet near the Southeast end the ore body has narrowed and is not over 10 ft. wide. It is hoped that this condition is local to this horizon and that on lower levels the ore body will again widen.

In September there was a settlement of the hanging between the 2nd and 3rd levels on the Gardner property that caused several pillars to break in this area; there was also some evidence of weight in the 3rd and 2nd level haulage drifts. It was decided to fill a first level stope and a 2nd level stope directly beneath in the line of this pressure, which work was completed early in December. A few days later evidence of extension of the pressure to the Northwest was noticed, which gradually increased, causing the crushing of pillars and some movement of ground in the back, directly above several of the open stopes between the 2nd and 3rd levels. This condition continued for about ten days and ended when sufficient ground had fallen from the back to fill the 2nd level stopes in the area affected. Since this occurred there has been no further evidence of pressure and conditions have been normal throughout the mine. As a safeguard it was decided to fill two more stopes between the 1st and 2nd in the line of pressure to prevent any movement of ground above the area already involved. This work was started in December and one more stope will soon be filled. Filling of the third will be postponed until Spring when the frost is out of the ground. Material for filling was obtained from a rock pile at the Gardner Mine, a steam shovel being used for loading the rock which was sent underground and dumped from cars directly into the stope.

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1. GENERAL: (Cont)

The unfortunate feature attending this pressure and settlement of ground is an increase in the mine water. This is due to opening of several drill holes in ore that had been plugged. It was then decided to put a drill outfit on surface, sink standpipe on the line of the old diamond drill holes in the hopes of encountering the holes at ledge, and then fill the upper portion of the holes with concrete. This work was started in December and the first hole was encountered after sinking 124 ft. in sand and gravel. This hole was plugged for 50 ft. with concrete and the drill moved to another hole which was not found at the ledge. However, a considerable quantity of cement was pumped down in the hopes that it would flow far enough away from the standpipe to plug the drill hole. This work will be continued until an attempt has been made to plug all the drill holes that penetrate the ore body. The normal water a year ago was 125 gallons per minute. It started to increase in July and reached 250 gallons in September, then remained near this figure until the middle of November when it increased again and reached a maximum in December of 475 gallons a minute. A slight reduction has been effected by the work done on the two drill holes and it is confidently expected that the water will be further reduced by continuation of this work.

At the end of the year the mine was in good shape for ore production in 1931. At the present time it is handicapped by sinking operations which permit the use of only one skip in the auxiliary shaft and limits the time of hoisting to the day shift and between five and six hours on the night shift.

The 6th level is fully developed by a drift for the entire length of the ore body and stoping operations are under way in several stopes. This level is in condition for continual production until all the ore is removed. Prior to that time it is expected that the 7th and 8th levels will be in process of development which will provide a supply of ore for the remaining life of the property.

The property continued to operate in 1930 until May 19th before an accident occurred. This extended the period without an accident to 546 days. This accident entailed a loss of 108 days and I am glad to report that no other accident occurred during the year and at the end of the year the mine had operated 221 days again without an accident. The Gardner-Mackinaw Mine has the distinction of establishing the best record yet made by a company mine, namely, one accident in 767 days.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

<u>Grade of Ore</u>	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Gardner	8,028	82,045		74,017
Mackinaw	117,129	35,179	81,950	
Total Ore	125,157	117,224	7,933	
Rock	4,044	2,294	1,750	
Total Ore and Rock	129,201	119,518	9,683	

There was a large decrease in product from the Gardner Mine and an increase from the Mackinaw property.

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

b. Shipments:

<u>Grade of Ore</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>	<u>Total</u> <u>Last Year</u>
Gardner		51	51	77,040
Mackinaw	26,531	33,803	60,334	18,357
Total	26,531	33,854	60,385	95,397
Total Last Year	59,013	36,384	95,397	
Decrease - 1930	32,482	2,530	35,013	

Shipments decreased 35,013 tons in 1930.

c. Stockpile Inventories:

<u>Grade of Ore</u>	<u>Dec. 31, 1930</u>	<u>Dec. 31, 1929</u>	<u>Increase</u>	<u>Decrease</u>
Gardner Ore	33,173	25,196	7,977	
Mackinaw Ore	73,617	16,822	56,795	
Total	106,790	42,018	64,772	

Shipments decreased 35,013 tons in 1930, while production increased 7,933 tons, resulting in an increase of 64,722 tons of ore in stock at the end of 1930.

d. Division of Product by Levels:

	<u>1930</u>		<u>1929</u>	
	<u>Gardner</u>	<u>Mackinaw</u>	<u>Gardner</u>	<u>Mackinaw</u>
1st Level	7,006	-	34,860	-
2nd Level	-	439	40,185	4,050
3rd Level	1,022	2,820	7,000	3,975
4th Level	-	408	-	4,398
5th Level	-	84,435	-	22,756
6th Level	-	29,027	-	-
Total	8,028	117,129	82,045	35,179
Decrease - 1930	74,017			
Increase - 1930		81,950		

The Gardner Ore from the 2nd level was transferred and hoisted from the 3rd level as there is no connection to the Gardner Shaft on the 2nd level.

e. Production by Months:

<u>Month</u>	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>	<u>Rock</u>
January	1,812	9,566	11,378	44
February	1,170	9,064	10,234	1,747
March	-	10,988	10,988	336
April	-	11,054	11,054	84
May	-	11,528	11,528	12
June	-	11,143	11,143	1,099
July	-	12,624	12,624	65
August	1,559	10,687	12,246	127
September	2,772	7,641	10,413	-
October	715	8,475	9,190	-
November	-	6,992	6,992	-
December	-	7,367	7,367	530
Total	8,028	117,129	125,157	4,044

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

e. Production by Months: (Cont)

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>	<u>Rock</u>
Total (brot ford)	8,028	117,129	125,157	4,044
Transferred from	-	-	-	-
Stockpile Overrun	-	-	-	-
Total - 1930	8,028	117,129	125,157	4,044
Total - 1929	82,045	35,179	117,224	2,294
Increase		81,950	7,933	1,750
Decrease	74,017			

The product was distributed as follows:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
Gardner Ore	8,028	82,045		74,017
Mackinaw Ore	117,129	35,179	81,950	
Total	125,157	117,224	7,933	

f. Ore Statement:

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>	<u>Total</u>
	<u>Ore</u>	<u>Ore</u>	<u>Ore</u>	<u>Last Year</u>
On Hand Jan. 1, 1930	25,196	16,822	42,018	20,191
Product for Year	8,028	117,129	125,157	117,224
Overrun	-	-	-	-
Transferred from	-	-	-	-
Total	33,224	133,951	167,175	137,415
Shipments	51	60,334	60,385	95,397
Balance on Hand	33,173	73,617	106,790	42,018
Increase in Output			7,933	
Increase in ore on hand			64,772	

1930 - One 8-hour shift, 6 days per week, January 1st to July 16th
 " " " 5 " " " July 16th to December 31st
 1929 - One 8-hour shift, 6 days per week, full year.

g. Delays:

January 14th & 15th - 16 hours delay on account of a heavy snow storm blocking the road to the mine.
 February 8th - 3 hours delay while changing skip and cleaning out ice from skip compartment.
 September 2nd - 6 hours delay on account of repairing Underground Pocket.
 December 17th - 20th - 30 hours delay on account of sending men home while the settlement in the back of the 2nd and 3rd level stopes was in progress. This was a safety precaution until the ground movement had subsided.

h. Delays from Lack of Current:

June 23rd - 8 hours delay - sub station burned out in electrical storm
 " 24th - 8 " " - " " " " " " "
 Nov. 17th - 12 " " - 5th level flooded as pumps could not work on account of lack of current due to break in line to the mine.

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3. ANALYSIS:a. Average Mine Analysis on Output:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sulphur</u>
Gardner	58.10	.116	.587
Mackinaw	60.79	.152	.724

The average mine analysis on output, Gardner Ore, was .48% lower in 1930, but tonnage involved was small; analysis of Mackinaw Ore was 1.06% higher in iron, but sulphur also increased .114%.

b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Mine</u>						<u>Lake Erie</u>		
	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Sul.</u>	<u>Moist</u>	<u>Iron</u>	<u>Phos.</u>	<u>Moist</u>
Gardner				None				None	
Mackinaw	60.61	.121	3.43	.240	.747	11.17	61.03	-	10.22

Average analysis on straight cargoes was 2.11% higher in iron in 1930 at mine, and 2.39% higher in iron at Lake Erie ports.

c. High Sulphur Ore:

Some very high sulphur ore was found at the Northwest end of the ore body on the 5th level, but less of this ore was found in the same area on the 6th level 125 ft. below. On both levels, however, seams of rock in the ore carry the increased sulphur.

4. ESTIMATE OF ORE RESERVES:a. Developed Ore:

Assumption: 12 cu. ft. equals one ton.
10% deducted for rock.
10% deducted for loss in mining.
Estimate is of available ore only.

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total Tons</u>
Non-Bessemer	0	79,254	79,254

b. Prospective Ore:

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total Tons</u>
Non-Bessemer	0	60,095	60,095
Total All Ore	0	139,349	139,349

The above estimate represents available ore only and does not include ore in pillars left to support the hanging. Mining has been completed on the Gardner property, hence no estimate is made. Some ore may later be recovered from pillars on both properties, but no estimate has been made of this ore owing to the uncertainty of the tonnage that can be mined with safety. The estimate this year is lower both for developed and prospective ore. Deducting the product in 1930 from the 1929 estimate shows a net decrease of 26,307 tons in the total for 1930. The estimate is based on 50% of the ore being available.

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4. ESTIMATE OF
ORE RESERVES: (Cont)

c. Estimated Analysis:

Ore Reserves: Approximate Expected Natural Analysis:

Developed Ore:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Mackinaw	52.90	.126	3.10	.220	1.64	1.88	1.20	.625	2.45	12.50

Prospective Ore:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Mackinaw	52.00	.150	3.10	.220	1.64	1.88	1.20	.650	2.45	12.50

Ore in Stock: Average Natural Analysis.

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Gardner	50.94	.096	2.10	.258	1.65	3.06	2.21	.597	4.20	12.50
Mackinaw	53.21	.126	2.80	.206	1.64	1.88	1.08	.625	2.45	12.50

Moisture was higher in 1930 due to change in physical character of the greater part of the product. The ore on the average is softer and many areas are now drilled with auger drills. Moisture runs higher in the softer ores.

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was an ample supply of labor available during the year. The temporary closing of the Archibald Mine of the C. K. Quinn Company on Dec. 25th threw 165 men out of work, about 60% of whom were former employees of the Company. The mine officials announced that the mine had closed for from 30 to 60 days and would reopen as soon as sales were made. There is some reason for assuming that the shutdown may be permanent, for they estimate only 150,000 tons to mine and it will not pay to keep the mine pumped out for any length of time for this small tonnage. A few former employees can be taken on at the Gardner-Mackinaw; the balance will have to wait for the reopening and if it does not materialize will have to look for work elsewhere. It might become desirable to work the Gardner-Mackinaw double shift later on to speed up mining and provide employment for at least a few of our former valuable employees.

(2) New Construction:

The following E. & A's were in operation in 1930:

E. & A. #537 - Sinking Mackinaw Shaft & Developing 5th Level
E. & A. #566 - " " " " " 6th "

These will be taken up in detail under 12-a.

b. Comparative Statement of Wages and Product:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	125,157	117,224	7,933	
No. Shifts and Hours	1-8 hr.	1-8 hr.		

AVERAGE NO. MEN WORKING:

Surface	26	24	2	
Underground	68	68		
Total	94	92	2	

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6. SURFACE: (Cont)b. Stockpile:

Before stocking ceased in the Spring two bents were erected on the old trestle. On account of the small shipments a new stocking ground to the South of the old stocking trestle was cleared, graded, and planked, and 30 bents erected. The sollar plank was in most part obtained from the Francis and Stephenson stocking grounds, together with several cars of 2" No. 3 and 4 Grade hemlock plank.

c. Tracks, Roads, etc.

Some filling was necessary on the road to the mine where it crosses the swamp. Filling around the shops and dry house was continued and completed.

7. UNDERGROUND:a. Shaft Sinking:

It had originally been intended to sink the Mackinaw Shaft below the 5th level and open one or two levels to mine the ore near the bottom of the deposit. This work was authorized in December 1929, E. & A. 566. This plan was abandoned and an auxiliary shaft sunk on an incline in the ore body. After the site of the shaft had been reached from a drift in the hanging on the 5th level and an engine house excavated, the shaft was raised on an incline of 52° a distance of 74 ft. in ore above the 5th level. Sinking started April 14th and the following is a record of the progress:

April	41'
May	124'
June	<u>120'</u>
Total depth	285' on the incline

It was put down on an incline of 52° in ore for a distance of 200 ft. when the foot was encountered. The inclination was then flattened to 45° and continued at this angle until sinking was stopped and the 6th level opened.

Sinking the auxiliary shaft below the 6th level was resumed in the early part of December 1930. At that time the shaft was down 120 ft. on the incline below the 6th level. The mine is only operating five days a week and sinking has to be done on the night shift from 11 P. M. to 7 A. M. At the end of the month the shaft had been sunk 25 ft. further, or to a total depth of 145 ft. on the incline below the 6th level. The inclination for the first 200 ft. of the shaft below the 5th level was 52°; it then flattened and continued at an angle of 45° until sinking was stopped at the end of June. Since sinking has been resumed the inclination of the shaft has been further flattened and it was being sunk on an angle of 42° at the end of the year. For the last 80 ft. the shaft has been in the footwall, the contact of the ore being followed on the hanging side of the shaft. The contact is flattening so it will be necessary to again flatten the shaft in order not to lose the ore. Several holes have been drilled into the ore and analysis taken which indicates that the grade of the ore is still good at increased depth. Due to deviation of the deep drill holes from surface it has been assumed that the bottom of the ore body was in the neighborhood of 260 ft. below the 5th level. The auxiliary shaft is now down 220 ft. The ore body seems persistent and although the inclination is flattening somewhat it has not yet flattened enough to indicate the near approach of the bottom of the deposit. It seems likely that it will extend to a considerable greater depth than was shown by the deepest diamond drill hole. Several possibilities exist and warrant sinking in order to gain this information: First: There is a possibility of more of a concentration at the bottom of the trough with an extension of the ore body to the Southwest, its thickness and width dependent on the width of the trough and the degree of concentration. Second: There is a possibility

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7. UNDERGROUND:

a. Shaft Sinking: (Cont)

of getting below the horizon that carries sulphur. In the Negaunee District sulphur is found in the ore in definite horizons, that is, it extends down from surface to a certain depth and then practically disappears. No information is available in the Gwinm District along these lines; there is, nevertheless, the possibility that a similar condition may exist. The auxiliary shaft can be used for exploration and mining purposes until the dip of the ore body flattens so that it is no longer possible to follow the ore, but by sinking in the footwall at an angle which will permit the skip to run and then drifting out to the ore body it can be used for mining all of the ore. At the end of the year it was planned to continue sinking, excavate for the 7th level at a vertical depth of about 125 ft. below the 6th, and continue the shaft downward to the bottom of the deposit. This may entail opening of additional levels as it is not economical to locate levels at greater intervals than 125 ft. vertically.

b. Development:

There was a heavy program of development work under way during 1930. An auxiliary shaft was sunk and an entirely new level opened involving the driving of a haulage drift 940 ft. in length, cutting out for 20 stopes, raising on an incline 170 ft. to the 5th level, also driving a connecting sub level drift 500 ft. in length.

It seems probable that more ore will be mined between the 6th and 5th levels than was obtained from stoping operations between the 5th and 4th. On the 5th there were a number of stopes that did not reach the elevation of the 4th level. All of the 6th level stopes will probably extend the full 170 ft. on the incline between the two levels.

c. Stoping:

During the year there was produced at the Gardner property 8,028 tons and from the Mackinaw 117,129 tons. Production from the Gardner continued during January and February; it was then stopped for five months and resumed in August, all the available ore being removed from the 1st, 2nd, and 3rd levels in October. Production from the Mackinaw increased monthly until July, after which there was a gradual decrease for the balance of the year, the lowest product being obtained in November.

There was a small reserve of broken ore in three stopes above the 6th level Mackinaw at the end of the year. This level was still in the process of development at the end of the year.

The only ore obtained in 1930 from the Gardner came from taking floors out of some of the stopes above the 1st level and a small amount of ore from the 2nd and 3rd levels. The main part of the Mackinaw Ore came from stoping operations above the 5th level. This ore was nearly exhausted in August and by November the entire product was coming from the 6th level. The character of the ore has changed somewhat with depth and it is now considerably softer than on the upper levels. This has made it necessary to leave larger pillars than was left on the upper levels where the ore was much harder. Only 50% of the ore is being mined on the lower levels. Some of the ore that is left in the pillars will undoubtedly be available for mining after the bottom of the deposit is reached.

The following is a detail of stoping operations during the year:

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7. UNDERGROUND:

c. Stoping: (Cont)

Gardner Mine - 1st Level:

Some ore was obtained from the footwall in several of the old stopes above the 1st level in the early months of 1930. Brief comment will be made in the following paragraphs, reference to the stopes being made by the numbers given them on the mine maps.

#77 Stope:

Some ore was mined in the floor of this stope in January, February and March. This ore averaged nearly 25 ft. in thickness near the bottom of the stope and gradually decreased in thickness as work progressed towards the upper part of the old stope. Several thousand tons of ore were obtained here in 1930.

#78 Stope:

Some ore was mined from the foot of this stope in January 1930. This work was started in 1929, the stope being extended upward to an elevation of 140 ft. above the 1st level. Only a small tonnage was mined and hoisted from this stope in 1930.

#79 Stope:

Some ore was broken from the foot of this stope in the latter months of 1929. This work was continued in January and February, another roll in the footwall being found, and several thousand tons of ore was mined here in 1930.

#80 Stope:

Some ore was mined in the early months of 1930 from the foot of #80 stope.

1st Level - General:

The work described above covers all stoping operations above the 1st level in 1930. An examination made late in the year of the stopes showed no change in condition from the previous year; that is, there had been no slabbing of pillars which is common in the lower levels of the mine.

The last of October it was decided to fill No. 56 stope, extending from the 2nd to the 1st levels, in order to prevent spread of the pressure area from the 2nd to 1st levels. The top of this stope was easy of access on the 1st level, so aside from relaying some tracks near the top of the stope no other work was necessary on the 1st level during the process of filling.

In December it was decided to fill #55 stope, the next one immediately to the Northwest of #56. This stope had been stopped about the elevation of the 1st level so in order to get room to dump rock it was necessary to blast and extend the stope about 10 ft. above the elevation of the 1st level. Filling continued during the month and at the end of the year it was about 70% filled.

It is planned to put up a raise in the hanging about 15 ft. Northwest of #55 stope, a distance of 25 ft. above the 1st level, then drive a drift to the Southwest into the hanging for 300 ft. to bring it above the area on the 2nd level that has been involved in the recent pressure and ground movement. This will give information of the upward extension of the movement and will provide an easy and safe way to determine how far this movement extends. It will give warning of the extension of the cave should any occur.

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7. UNDERGROUND:

c. Stoping: (Cont)

Mackinaw Mine - 2nd Level:

In 1929 and during the month of January 1930 mining was continued at the Northwest end of the ore body between the 1st and 2nd levels. There was a roll in the formation at this end of the mine that caused a trough or depression in the ore body between the 1st and 2nd levels. The footwall above the 1st level had a general Northwest-Southeast strike; this trough changed the strike to an almost East-West course. On the North limb of this trough there was a narrow seam of ore varying in thickness from 10 to 18 ft., which was followed upward from a point just above the 2nd level, some distance above the floor of the 1st level. Mining of the upper portion and most of the lower portion of this ore body was completed in 1929. In January work was finished with the mining of an area a short distance under the elevation of the 1st level.

Gardner Mine - 2nd Level:

The pressure area described elsewhere in this report first showed on the hanging wall side of the 2nd level haulage drift on the Gardner property. It was next observed in the same location on the 3rd level. In order to prevent caving of the ground above the 2nd level stopes it was decided to fill a stope, also the stope immediately above between the 1st and 2nd levels. A raise was put up on the hanging side of the 2nd level opposite #55 stope in a pillar and at an elevation of 30 ft. above the level a drift was driven over to the 2nd level stope. This gave means of access to observe the filling of No. 56 stope between the 1st and 2nd levels. In the hanging of #56 stope a hole was blasted through to the top of No. 19 stope so that material dumped on the 1st level could move directly down to fill this stope.

Late in December, just before the final movement of ground occurred, when pressure adjusted itself, it became necessary to put in a number of props on the 2nd level to insure that there would be no crushing of the main haulage drift. Sets through the affected area were propped and also in the drift to the Mackinaw Shaft near the contact of the ore body.

Mackinaw Mine - 3rd Level:

In 1929 some ore was found in the foot of the 3rd level haulage drift near the Northwest end of the ore body and a raise put up in this ore to the 2nd level. Stopping started here late in 1929 and was completed in January.

Gardner Mine - 3rd Level:

The evidence of a pressure area extending from the 2nd to the 3rd levels and later to the 4th level was observed in the fall. It became more pronounced in October, in which month the filling of a stope between the 1st and 2nd levels and a stope between the 3rd and 2nd levels was started and completed in December. This pressure was particularly manifest near the Southeast end of the 3rd level on the Gardner property where a drift extended some distance into the hanging, at the end of which was located the main travelling road to the 4th level. In order to safeguard the haulage road on the 3rd level, wood bulkheads were built on the hanging side of the drift in the area involved. Later in the year additional bulkheads were built in the drift leading into the hanging and at several other points on the level. In December when the main movement of ground occurred props and lining sets were installed in the Southeast half of the 3rd level haulage drift. Since this movement subsided there has been no further change in conditions on this

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7. UNDERGROUND:

c. Stoping: (Cont)

Gardner Mine - 3rd Level: (Cont)

level. There is not the slightest evidence of pressure and it is expected there will be no further ground movement here. #19 stope, extending from the 3rd to the 2nd level, has been completely filled with rock and sand from surface. Before filling was started some hanging material fell from the back of this stope and the pillars on each side showed evidence of heavy pressure with resultant cracking and slabbing. With the filling of the stope all danger of ground movement in this immediate area has been removed.

Mackinaw Mine - 4th Level:

The only work done in 1930 on the 4th level other than the holing of six additional raises in the center line of stopes from the 5th level was confined to one small area near the Southeast end of the ore body and a similar area near the Northwest end. No. 1 stope from the 5th level was in a narrow seam of ore at the elevation of the 4th level. This seam of ore was followed up on the footwall about 30 ft. above the 4th level, the ore being about 8 ft. thick between foot and hanging.

In 1929 while stoping was getting under way on the 5th level a small stope was opened in the wide portion of the ore body above the 4th level near the Northwest end of the deposit. This stope was about 30 ft. above the floor of the 4th level and was continued along the hanging for a distance of 160 ft. It averaged about 18 ft. in width and from 12 to 18 ft. in height. Stoping was completed here in February 1930.

A connection was made to the 4th level from stopes 14, 15 and 16 above the 5th level by following the ore at the top of the stopes in a Southeast direction until the old haulage drift on the 4th level was encountered.

Late in the year a section about 50 ft. long in the old 4th level haulage drift caved and had to be retimbered. A block of ore loosened in the back of the drift and broke down the sets and it was necessary to clean up the ore, retimber, and lagg the sides and back.

Mackinaw Mine - 5th Level:

The 5th level was very active and the chief source of the ore produced in 1930. Work on this level started to decrease in the summer and before the end of the year all the broken ore in the stopes was removed, after which operations at the mine were confined to the 6th level and shaft sinking. In 1929 eleven raises had holed through from the 5th level to the 4th, one of which was a permanent travelling road, the other ten being raises in the center line of the stopes. In 1930 five other raises were either carried up to the elevation of the 4th or stoping continued to the upward limit of the ore and the stopes then connected by an incline drift to the 4th level. Stoping operations on the 5th level started in October 1929 and at the end of the year two stopes had been completed to the 4th level and stoping was underway in several others. Stoping was continued in 1930 and practically completed in July. The broken ore was drawn from the stopes at a rate that gave a fair production until in November when all the available ore was removed.

There were a number of good stopes developed above the 5th level; several had a width of 40 ft., and one a maximum width from foot to hanging of 60 ft. Stopes 14 to 19 inclusive at the Northwest end of the ore body were of varying heights.

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7. UNDERGROUND:

c. Stoping: (Cont)

Mackinaw Mine - 5th Level: (Cont)

The ore body on the 5th level extended over 200 ft. further to the Northwest than on the 4th level. The height of the stopes decreased gradually starting with #14 stope, the top of which was 10 ft. below the 4th level, to #19 stope which only extended about 30 ft. above the 5th level. As stoping operations approached the Northwest end, the grade of the ore decreased and the sulphur increased. When the 5th level was developed it was thought that the ore would average somewhat lower in sulphur but due to the higher sulphur ore found near the Northwest end the average sulphur for the level was slightly higher than on the upper levels of the mine.

Sinking the Mackinaw Shaft and opening the 6th level was authorized in December 1929, E. & A. #566. Before sinking started it was decided to abandon the original plan of sinking the main shaft and drifting to the ore body and instead sink an incline shaft in the ore. The only disadvantages were the employment of additional brakemen to hoist the ore and another tramping crew on the 5th level to take the ore from the auxiliary shaft to the main hoisting shaft. It was decided to locate the auxiliary shaft on the hanging contact of the ore between No. 10 and 11 stopes. This was about the center of the ore body and in good grade ore. Several months were required to complete the preparations for sinking the shaft. A drift was driven in the hanging wall starting at a point between No. 8 and 9 stopes and continued Northwestward for 100 ft. to the shaft site. A drift was then driven 75 ft. into the hanging and the ground excavated for an engine house. The shaft was raised on an incline of 52° a distance of 74 ft. in ore above the 5th level. In the meantime two raises had been put up from the footwall side of the 5th level to hole near the top of the shaft, these two raises constituting the storage pockets for the ore that was later to be hoisted from lower levels.

Mackinaw Mine - 6th Level:

It was decided to open the 6th level a vertical distance of 125 ft. below the 5th. The cutting of plat on this level started in July, after which ground was excavated for shaft pocket and pocket built. Drifting was then started, one drift following the ore to the Northwest, the other to the Southeast. The drifts were continued until the limits of the ore was reached. The total length of the ore body on the 6th level was 940 ft. as compared with a total length of 860 ft. on the 5th level. There was an extension of 45 ft. at the Southeast end and 35 ft. at the Northwest end.

Two discouraging features developed on the 6th level. To the Southeast of the auxiliary shaft the ore continued normal width for 75 ft. when jasper was encountered, the ore being offset about 15 ft. to the Southwest. From this point on to the end of the ore body, a distance of 380 ft., the ore was narrow, averaging in width from 8 to 15 ft.; for most of the distance it was practically only drift wide. The grade, however, was excellent with the ore running 62% iron, .110 phos, and not over .650 sulphur. The other discouraging feature of the main level development occurred in the Northwest drift, the last 230 ft. of which was in lean ore that did not average over 58% iron, nearly 1% sulphur, and in some areas was quite high in phosphorus. As the drifts advanced away from the auxiliary shaft ground was cut out for raises and as fast as possible the raises in center line of stopes were started and continued upward for 50 ft. A sub level was opened 50 ft. on the incline above the level to aid in ventilation and for use as a travelling road for the lower part of the stopes. At the end of the year the raises in center line of Nos. 8, 9, 11, 12 and 14 stopes had holed to the 5th level. Raising was under way in Nos. 15, 16, 17 and 18 stopes. No. 13 stope encountered rock at the elevation of the sub level drift 50 ft. above the 6th and was not continued above this point. There seems to be a lean area here or a horse of rock in the ore

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7. UNDERGROUND:c. Stoping: (Cont)Mackinaw Mine - 6th Level - Cont:

body, although it is possible that there is a thin seam of ore lying under this rock near the footwall which may later be developed. Building of additional chutes in both drifts preliminary to raising was underway at the end of the year and it will only be a short time until the 6th level ore body is completely developed.

Stoping was started in November in Nos. 9 and 11 stopes and they were completed at the end of the year. Stoping has also been started in two other stopes. It is quite gratifying to report that the ore encountered in the raises has averaged better in grade than was indicated by the 6th level main haulage drift.

Opposite the auxiliary shaft on the 6th level a drift was driven to the hanging, then on an incline for a length of 40 ft., to provide a small sump for water encountered on the level ^{and} from sinking.

d. Timbering:

The cost for timber increased 33% in 1930 due to timbering the main level haulage drifts on the 5th and 6th levels and to repairing timber, installing props and bulkheads on the upper levels of the mine. The cost per ton for timber is low, however, due to system of mining, which does not require any timber in stoping operations.

Statement of Timber Used:

<u>KIND</u>	<u>LINEAR FEET</u>	<u>AVG. PRICE PER FT.</u>	<u>AMOUNT 1930</u>	<u>AMOUNT 1929</u>
8 to 10" Stull Timber	2,628	.0483	126.98	104.72
10" to 12" " "	8,149	.0915	745.98	431.02
12" to 14" " "	910	.1150	104.65	165.48
14" to 16" " "	730	.1202	87.73	147.81
Total Timber - 1930	12,417	.0857	1,065.34	
Total Timber - 1929	7,951	.1068		849.03
		<u>Per 1000'</u>		
5' Lagging	53,550	5.975	376.42	249.95
Poles, 9½ ft.	54,459	15.771	858.90	623.06
Total - 1930			1,235.32	
Total - 1929				873.01
Grand Total - 1930			2,300.66	
Grand Total - 1929				1,722.04
Product			125,157	117,224
Feet of timber per ton of ore			.00992	.0068
Feet of lagging per ton of ore			.04278	.03117
Feet of lagging per foot of timber			4.3126	4.5969
Cost per ton for timber			.0085	.0072
" " " " lagging			.0030	.0021
" " " " poles			.0069	.0054
" " " " all timber			.0184	.0147
Equivalent of stull timber to board measure			44.6927	28.6182
Feet of board measure per ton of ore			.00357	.00244

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7. UNDERGROUND:d. Timbering: (Cont)Statement of Timber Used: (Cont)

Total cost for timber, lagging, and poles, and cost per ton:

1930	\$ 2,300.66	\$.0184
1929	1,722.04	.0147
1928	737.82	.0081

e. Drifting and Raising:

There was more drifting and raising in 1930 due to completing development of the 5th level and opening and developing the 6th level. The main drifts on 6th level were finished at the end of the year but there was still considerable raising and also some drifting on the sub level 50 ft. above the 6th level.

Year	Drifting		Raising		Total
	Ore	Rock	Ore	Rock	
1930	1,775'	16'	2,600'	0'	4,391'
1929	1,400' (1)	0'	2,200'	25'	3,625'
Increase	375'	16'	400'		766'
Decrease				25'	

(1) There was a total of 870' of rock drifting on 5th level charged to E. & A. #537, "Sinking Mackinaw Shaft & Developing 5th Level".

f. Explosives, Drilling and Blasting:

There was a large increase in amount of powder used in 1930 due to more drifting and raising and to increase in product. The cost per ton increased due to the unusual amount of development work done during the year. Over 25% of the 5th level was developed in 1930, also 75% of the 6th level.

In 1929 only the explosives used in Stoping are shown in following statement due to error by mine clerk in compiling report, while in 1930 the statement covers all explosives used in stoping and ore development. The comparative statement is of little value.

Statement of Explosives Used: (Ore Development and Stoping)

	Quantity	Average Price	1930	1929
			Amount	Amount
Dupont, Extra A, Powder	4,350	.1275	554.63	2,934.55
Gel. Spec., 50% "	110,710	.1278	14,158.44	7,492.62
" " 60% "	10,950	.1334	1,461.14	
Total Powder - 1930	126,010	.1283	16,174.21	
Total Powder - 1929	78,582	.1327		10,427.17
Fuse	211,440	.6238	1,319.12	943.85
Caps	32,875	1.2101	397.84	284.79
Cap Crimpers				.42
Cap Crimpers & Fuse Cutter				23.23
Tamping Bags				16.12
Total Fuse, etc.			1,716.96	1,268.41
Total All Explosives			17,891.17	11,695.58
Product			125,157	117,224
Pounds of powder per ton of ore			1.006	.670
Cost per ton for powder			.1292	.089
" " " " fuse, caps, etc.			.0137	.011
" " " " all explosives			.1429	.100

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7. UNDERGROUND:

f. Explosives, Drilling and Blasting:
Statement of Explosives Used: (Cont)

	<u>Rock Development, etc.</u>		<u>1930</u>	<u>1929</u>
	<u>Quantity</u>	<u>Average Price</u>	<u>Amount</u>	<u>Amount</u>
50% Am. Gel.	<u>300</u>	<u>.1233</u>	<u>37.00</u>	-
Total Powder	300	.1233	37.00	-
Fuse	<u>500</u>	<u>.6000</u>	<u>3.00</u>	-
Total Fuse	500		3.00	-
Total Powder & Fuse			40.00	-

g. Mining & Loading:

There was no change in the mining methods in 1930 except that larger pillars were left between the 6th and 5th levels than in the upper part of the mine. The variation in dip of footwall made it necessary to handle the ore by scrapers in a number of stopes. No additional scraper units were purchased in 1930 but a number of additional units will be necessary as mining progresses at greater depth where the dip of the formation is flatter.

h. Ventilation:

Several new ventilation doors were built during the year in order to provide better control of the air currents. Ventilation at this property is by natural means, the Mackinaw shaft usually being upcast and the Gardner downcast. Ventilation on the lower levels of the Mackinaw has been very good although the shafts do not connect below the 4th level.

i. Pumping:

There was an increase in the amount of water pumped in 1930. This increase was first apparent in September. Another increase occurred in November and by the end of the year the water had increased 300 gallons per minute over the average of the previous year. The increase followed the development of a pressure area between the 2nd and 3rd levels and it is believed is due entirely to the settlement of a slab of jasper from the hanging that opened cracks connecting with drill holes from surface. Whenever a drill hole is encountered underground it is plugged to shut off the flow of water. The loosening of this slab of jasper in the hanging again opened drill holes that had been plugged and undoubtedly others that were in pillars and had not been encountered in mining operations. It is hoped that the work of plugging the drill holes at surface with concrete will be successful, at least to an extent that will materially reduce the amount of water that has to be handled underground.

The following table shows the gallons pumped per minute by months:

<u>Month</u>	<u>1930</u>	<u>1929</u>	<u>1928</u>
January	100	116	Unwatering Mine
February	101	113	" "
March	100	111	" "
April	126	115	" "
May	102	101	127
June	114	104	135
July	104	109	134
August	111	106	138

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7. UNDERGROUND:i. Pumping: (Cont)

<u>Month</u>	<u>1930</u>	<u>1929</u>	<u>1928</u>
September	128	109	193
October	180	99	231
November	236	99	132
December	350	99	110
Total Average	142	107	150

The average number of gallons pumped per minute over the last three years is as follows:

<u>Year</u>	<u>Gals. per minute</u>
1930	142
1929	107
1928	150

j. Underground in General:

The life of the mine is limited as only one year is required to mine 100 ft. vertical depth. The 6th level is now being developed and sinking is underway in the auxiliary shaft in the ore body. Another level, the 7th, will be opened in 1931, which will be about 1200 ft. below surface. It is planned to continue sinking in 1931 below the 7th and if possible go down to the bottom of the ore body. If the ore body grows larger at depth and continues for any appreciable distance downward in merchantable ore, there is a possibility of three or more years life.

The ore mined in 1931 will come from the 6th level and from development work on the 7th level.

If the sulphur decreases with depth, a valuable mine would result as the physical character of the ore is very good.

Conditions at the mine at the end of the year were good. The ground movement it is hoped has definitely subsided; success is being attained in plugging the old diamond drill holes at ledge, additional ore is being developed by sinking, and 16 stopes are nearly ready to be mined above the 6th level.

The flattening of the deposit at depth will increase the use of scraper hoists. They will be needed to clean the ore off the footwall in all of the stopes above the 6th level.

The mine is kept clean and the mining standards are observed, otherwise the good safety record would not have been possible.

8. COST OF OPERATING:a. Comparative Mining Costs:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	125,157	117,224	7,933	
Underground Costs	1,242	1,322		.080
Surface Costs	.270	.235	.035	
General Mine Expenses	.198	.210		.012
Cost of Production	1.710	1.767		.057
Depletion - Original Cost	-	-		
Increment	-	-		
Depreciation - Plant & Equip.	.448	.527		.079
Development	.626	.547	.079	
Movable Equip.	.003	.003		
Taxes	.039	.029	.010	
Unwatering & Reopening	-	.167		.167
Loading and Shipping	.037	.060		.023
Total Cost at Mine	2.863	3.100		.237

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8. COST OF OPERATING:

a. Comparative Mining Costs: (Cont)

	1930	1929	Increase	Decrease
No. Days Operated	282	297		15
No. Shifts & Hours	1-8 hr	1-8 hr		
Average Daily Product	444	396	48	
<u>COST OF PRODUCTION:</u>				
	1930	%	1929	%
Labor	.987	57.8	.999	56.6
Supplies	.723	42.2	.767	43.4
Total	1.710	100.0	1.766	100.0

b. Detailed Cost Comparison:

(1) Days and Shifts:

	Days Worked	Shifts & Hours	Men Employed	Total Days Worked
1930	282	1-8 hr	94	24,345 $\frac{1}{4}$
1929	297	1-8 hr	92	23,321
Increase			2	1,024 $\frac{1}{4}$
Decrease	15			

(2) Wages:

The mine operated on the same wage schedule in 1930 as in 1929.

(3) Comparison of Production:

Production - 1930	125,157 tons
Production - 1929	117,224 "
Increase	7,933 "

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate per day
1930	94	24,345 $\frac{1}{4}$	\$119,752.26	\$4.92
1929	92	23,321	113,943.22	4.88
Increase	2	1,024 $\frac{1}{4}$	5,809.04	.04

(5) Tons per man per day:

The tons of ore mined per man per day were as follows:

	1930	1929	Increase	Decrease
Surface	19.12	19.73		.61
Underground	7.03	6.75	.28	
Total	5.14	5.03	.11	

(6) Cost of Production:

1930	\$213,949.27	Cost per ton	\$1.710
1929	206,920.46	" " "	1.767
Increase	7,028.81	Decrease	.057

	Total Cost				Cost per ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1930	\$123,506.65	57.8	\$90,442.61	42.2	\$.987	\$.723	\$1.710
1929	117,139.67	56.6	89,780.79	43.4	.999	.767	1.766
Incr.	6,366.98	1.2	661.82				
Decr.				1.2	.012	.044	.056

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8. COST OF
OPERATING:

b. Detailed Cost Comparison: (Cont)

(7) Detail of Accounts:

UNDERGROUND COSTS:

Exploring in Mine:

1930 Amount	\$523.22	Cost per ton	\$.004
1929 Amount	-	" " "	-
Increase	523.22		.004

The charges in this account cover cost of Geological work at mine and posting maps at Ishpeming. Due to development of the 6th level in 1930 more time was spent on this work which accounts for the increase.

Development in Rock:

1930 Amount	\$144.00	Cost per ton	\$.001
1929 Amount	-	" " "	-
Increase	144.00		.001

Increase due to rock drifting on 6th level in October. No rock drifting in the year 1929 except that covered by E. & A. #537.

	<u>Drifting</u>	<u>Sub Division</u>		<u>Cost per Ft.</u>
		<u>Raising</u>	<u>Total Ft.</u>	
1930	16'	0'	16'	9.00
1929	0'	25'	25'	-
Increase	16'			
Decrease		25'	9'	

The cost last year for the 25 ft. of rock raising was charged in error to E. & A. #537 - Developing 5th Level.

Development in Ore:

1930 Amount	\$26,535.43	Cost per ton	\$.213
1929 Amount	24,956.76	" " "	.214
Increase	1,578.67	Decrease	.001

	<u>Drifting</u>	<u>Sub Division</u>		<u>Cost per Ft.</u>
		<u>Raising</u>	<u>Total Ft.</u>	
1930	1,775'	2,600'	4,375'	6.06
1929	1,400'	2,220'	3,620'	6.89
Increase	375'	380'	755'	
Decrease				.83

Increase due to more ore development work in 1930 opening up the 6th level and completing development work on the 5th level.

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8. COST OF OPERATING:

Stoping:

1930 Amount	\$63,579.26	Cost per ton	\$.509
1929 Amount	<u>74,810.95</u>	" " "	<u>.639</u>
Decrease	11,231.69		.130

Detail

	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>
1930	\$42,827.07	67.3	\$20,752.19	32.7
1929	<u>49,817.62</u>	<u>66.6</u>	<u>24,993.33</u>	<u>33.4</u>
Decr.	6,990.55		4,241.14	.7
Incr.		.7		

Cost per ton

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1930	.342	.167	.509
1929	<u>.425</u>	<u>.214</u>	<u>.639</u>
Decrease	.083	.047	.130

Decrease due to less contracts engaged in stoping during 1930, more contracts on development work.

Timbering:

1930 Amount	\$10,325.74	Cost per ton	\$.080
1929 Amount	<u>8,808.86</u>	" " "	<u>.075</u>
Increase	1,516.88		.005

	<u>1930</u>	<u>1929</u>
Timber Cost	1,065.34	849.03
Lagging, poles, etc.	<u>1,235.32</u>	<u>873.01</u>
Total	2,300.66	1,722.04
Feet of timber per ton of ore	.0099	.0068
Cost per ton for all timber	.0184	.0147
Feet of lagging per ton of ore	.04278	.03117
Feet of poles per ton of ore	.0435	.0352
Average price per foot	.0857	.1068

Increase due to more timber used in 1930 timbering main level drifts on 6th level and building chutes on 5th and 6th levels. Also includes timber used in propping timber sets on the 2nd and 3rd levels, in bulkheads, and in repairs.

Tramming:

1930 Amount	\$15,713.56	Cost per ton	\$.126
1929 Amount	<u>14,988.59</u>	" " "	<u>.128</u>
Increase	724.97	Decrease	.002

Increase due to extra tramming expense on account of transferring ore from auxiliary shaft on 5th level to the main shaft. The product from 6th level, all of which was handled twice, amounted to 23% of the product for the year.

Pumping:

1930 Amount	\$8,843.57	Cost per ton	\$.071
1929 Amount	<u>6,245.83</u>	" " "	<u>.053</u>
Increase	2,597.74		.018

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8. COST OF
OPERATING:

Pumping: (Cont)

	<u>1930</u>	<u>1929</u>
Total gallons of water pumped	74,823,761	56,528,157
Gallons pumped per minute	142	107
Cost for power	4,049.05	2,868.00

Increase due to more water pumped in last five months of the year. Power cost in December was nearly four times as much as in any month up to August. Gallons per minute in December averaged 350 as compared with 100 in early part of the year.

Compressors & Air Pipes:

1930 Amount	\$12,013.12	Cost per ton	\$.096
1929 Amount	<u>14,808.62</u>	" " "	<u>.126</u>
Decrease	2,795.50		.030

	<u>Compressors</u>	<u>Air Pipes</u>
1930	\$11,517.52	\$ 495.60
1929	<u>13,695.47</u>	<u>1,113.15</u>
Decrease	2,177.95	617.55

Total cu. ft. of air used in 1930	- 621,450,000
" " " " " " " " 1929	- 570,635,000
Cubic feet per ton of ore - 1930	- 4965
" " " " " " " " - 1929	- 4868

Decrease due to less expense for compressed air in 1930, also less expense for extension of air lines. Part of compressor expense was charged to E. & A. 537 - Sinking Mackinaw shaft. More second hand pipe was used in 1930.

Back Filling:

1930 Amount	\$4,977.02	Cost per ton	\$.040
1929 Amount	-		-
Increase	4,977.02		.040

Increase due to filling several stopes in the Gardner Mine. There were 5,600 yards of filling sent down from surface in October, November and December.

Underground Superintendence:

1930 Amount	\$6,384.96	Cost per ton	\$.051
1929 Amount	<u>5,573.07</u>	" " "	<u>.047</u>
Increase	811.89		.004

Increase due to more time by shift bosses and also bonus system in force during 1930.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills:

1930 Amount	\$1,370.00	Cost per ton	\$.011
1929 Amount	-		-
Increase	1,370.00		.011

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COST OF
OPERATING:

Compressors & Power Drills: (Cont)

	<u>Compressors</u>	<u>Power Drills</u>
1930	-	\$1,370.00
1929	-	-
Increase	-	1,370.00

Increase due to charging out four new drill machines during 1930. Drills charged out in 1929 were charged in error to Stopping.

Electric Tram Equipment:

1930 Amount	\$4,364.86	Cost per ton	\$.035
1929 Amount	<u>4,495.59</u>	" " "	<u>.038</u>
Decrease	130.73		.003

Sub Division

	<u>Gen. & Motors</u>	<u>Locomotives</u>	<u>Wiring</u>	<u>M.L.Tracks</u>	<u>M.L.Cars</u>
1930	222.43	1113.92	572.52	1028.64	1427.35
1929	<u>1315.21</u>	<u>224.59</u>	<u>698.74</u>	<u>524.51</u>	<u>1732.54</u>
Incr.		889.33		504.13	
Decr.	1092.78		126.22		305.19

Decrease due to less repairs to Generators & Motors, Main Line Cars, and Wiring in 1930. Expense for Locomotives and M. L. Tracks increased.

Pumping Machinery:

1930 Amount	\$693.24	Cost per ton	\$.005
1929 Amount	<u>266.19</u>	" " "	<u>.002</u>
Increase	427.05		.003

Increase due to more expense for repairing pumps and installing pumps on 5th and 6th levels.

Total Underground Costs:

1930 Amount	\$155,467.98	Cost per ton	\$1.242
1929 Amount	<u>155,274.61</u>	" " "	<u>1.322</u>
Increase	193.37	Decrease	.080

Decrease in cost per ton due to larger product.

SURFACE COSTS:

Hoisting:

1930 Amount	\$10,708.39	Cost per ton	\$.085
1929 Amount	<u>7,753.47</u>	" " "	<u>.067</u>
Increase	2,954.92		.018

Electric Power - 1930	-	Cost per ton	\$.038
Electric Power - 1929	<u>3,095.34</u>	" " "	<u>.026</u>
Increase	1,737.66		.012

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COST OF
OPERATING:

Hoisting: (Cont)

Increase due to more current used on account of operating underground hoist at auxiliary shaft. In 1929 while shaft sinking was underway the expense for operating this hoist was charged to E. & A. #537.

Stocking Ore:

1930 Amount	\$6,374.02	Cost per ton	\$.052
1929 Amount	<u>4,118.99</u>	" " "	<u>.036</u>
Increase	2,255.03		.016

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>
Tons stocked - 1930	8,028	90,598	98,626
Tons stocked - 1929	<u>41,389</u>	<u>16,822</u>	<u>58,211</u>
Increase		73,776	40,415
Decrease	33,361		

Increase due to 40,415 tons more ore stocked during 1930.

Dry House:

1930 Amount	\$3,514.08	Cost per ton	\$.028
1929 Amount	<u>4,531.97</u>	" " "	<u>.038</u>
Decrease	1,017.89		.010

Coal to Boiler House:	<u>Tons</u>	<u>Cost</u>
1930	301 @ 5.741	\$1,728.09
1929	<u>531 @ 5.685</u>	<u>3,018.80</u>
Decrease	230	1,290.71

Decrease due to charging out less coal for last eight months of year to reduce the overrun in coal pile. The amount charged out in 1929 was excessive due to error in calculating weight of wagon and truck load.

General Surface Expense:

1930 Amount	\$3,437.39	Cost per ton	\$.027
1929 Amount	<u>3,641.58</u>	" " "	<u>.029</u>
Decrease	204.19		.002

Decrease due to less expense for repairing roads, grading and filling around mine buildings.

MAINTENANCE ACCOUNTS:

Hoisting Equipment:

1930 Amount	\$3,082.65	Cost per ton	\$.025
1929 Amount	<u>2,315.67</u>	" " "	<u>.019</u>
Increase	766.98		.006

	<u>Wire Rope</u>	<u>Sub Division</u>		<u>Total</u>
		<u>Skips & Skip</u>		
		<u>Roads</u>	<u>Elec. Hoists</u>	
1930	839.83	1,667.33	575.49	3,082.65
1929	<u>472.06</u>	<u>1,169.95</u>	<u>673.66</u>	<u>2,315.67</u>
Increase	367.77	497.38		766.98
Decrease			98.17	

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COST OF
OPERATING:

Hoisting Equipment: (Cont)

Increase due to charging out two new ropes - 1400 ft. 1 $\frac{1}{4}$ " rope in January, costing \$434.02, and 1450 ft. 1 1/8" rope in February, costing \$271.15; also to expense for building two new skips for auxiliary shaft in July.

Shaft:

1930 Amount	\$309.11	Cost per ton	\$.003
1929 Amount	<u>890.61</u>	" " "	<u>.008</u>
Decrease	581.50		.005

Large decrease due to less repairs to shafts. The Gardner shaft operated only part of the year. There was some expense in both years for keeping the shaft free of ice during the winter months.

Top Tram Equipment:

1930 Amount	\$1,411.66	Cost per ton	\$.011
1929 Amount	<u>1,762.32</u>	" " "	<u>.015</u>
Decrease	350.66		.004

Decrease due to less repairs to top tram equipment during 1930. A new 5/8" top tram rope was charged out in December 1930.

Docks, Trestles & Pockets:

1930 Amount	\$2,751.70	Cost per ton	\$.022
1929 Amount	<u>2,292.26</u>	" " "	<u>.020</u>
Increase	459.44		.002

Increase due to erecting new portable trestle at the Mackinaw, also grading and planking the new stocking grounds.

Mine Buildings:

1930 Amount	\$2,179.17	Cost per ton	\$.017
1929 Amount	<u>328.56</u>	" " "	<u>.003</u>
Increase	1,850.61		.014

Large increase due to remodeling the interior of the dry building at an expense of \$1,837.86.

Total Surface Costs:

1930 Amount	\$33,768.17	Cost per ton	\$.270
1929 Amount	<u>27,635.43</u>	" " "	<u>.235</u>
Increase	6,132.74		.035

Increase due to increase in expense for hoisting, hoisting equipment, docks, trestles & pockets, and Mine Buildings, that are explained under their respective headings.

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COST OF
OPERATING:

GENERAL MINE ACCOUNTS:

Insurance:

1930 Amount	\$320.69	Cost per ton	\$.003
1929 Amount	<u>410.59</u>	" " "	<u>.004</u>
Decrease	89.90		<u>.001</u>

Mining Engineering:

1930 Amount	\$1,981.47	Cost per ton	\$.014
1929 Amount	<u>2,061.17</u>	" " "	<u>.015</u>
Decrease	79.70		<u>.001</u>

Expense for mining engineering was practically the same for 1930 and 1929.

Mechanical & Electrical Engineering:

1930 Amount	\$702.95	Cost per ton	\$.005
1929 Amount	<u>606.30</u>	" " "	<u>.005</u>
Increase	96.65		

More time by mechanical and electrical engineering departments in 1930.

Analysis:

1930 Amount	\$1,566.06	Cost per ton	\$.012
1929 Amount	<u>1,117.85</u>	" " "	<u>.009</u>
Increase	448.21		<u>.003</u>

This account includes proportion of Negaunee district laboratory expense and sampling.

	Prop. of Cost of Optg. <u>Neg. Mine Laboratory</u>	<u>No. Determinations</u>
1930	\$ 611.16	3,976
1929	<u>892.06</u>	<u>6,712</u>
Decrease	280.90	2,736

Increase due to expense moving crusher house from Gardner to Mackinaw Mine and to a different method of distributing costs by Ishpeming Office. Expense at mine for analysis was less in 1930 due to less determinations.

Personal Injury Expense:

1930 Amount	\$2,966.08	Cost per ton	\$.023
1929 Amount	<u>2,719.57</u>	" " "	<u>.023</u>
Increase	246.51		-

Increase due to larger payroll which increased the 2% reserve.

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8. COST OF
OPERATING:

Safety Department Expense:

1930 Amount	\$ 874.22	Cost per ton	\$.007
1929 Amount	<u>1,065.83</u>	" " "	<u>.009</u>
Decrease	191.61		.002

Decrease due to less safety department expense in 1930.

Telephones & Safety Devices:

1930 Amount	\$520.39	Cost per ton	\$.004
1929 Amount	<u>573.99</u>	" " "	<u>.005</u>
Decrease	53.60		.001

Decrease due to less repairs to telephones and less expense for lighting levels.

Local General Welfare:

1930 Amount	\$1,447.92	Cost per ton	\$.012
1929 Amount	<u>1,021.95</u>	" " "	<u>.009</u>
Increase	425.97		.003

Increase due to more expense in Gwinn District for local general welfare, Gwinn Association, etc.

Special Expenses, Pensions & Allowances:

1930 Amount	\$3,825.23	Cost per ton	\$.031
1929 Amount	<u>3,529.78</u>	" " "	<u>.030</u>
Increase	295.45		.001

Increase due to change in method of distributing costs.

Ishpeming Office:

1930 Amount	\$5,374.74	Cost per ton	\$.043
1929 Amount	<u>5,650.99</u>	" " "	<u>.048</u>
Decrease	276.25		.005

Decrease due to change in method of distributing cost.

Mine Office:

1930 Amount	\$5,133.37	Cost per ton	\$.042
1929 Amount	<u>4,635.68</u>	" " "	<u>.029</u>
Increase	497.69		.003

	<u>Direct Charges</u>	<u>Mine Office</u>
1930	\$4,457.37	\$ 676.00
1929	<u>3,867.01</u>	<u>768.67</u>
Increase	590.36	
Decrease		92.67

Increase due to employment of an additional clerk for last nine months of year.

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8. COST OF
OPERATING:

Safety Expense:

1930 Amount	-	Cost per ton	-
1929 Amount	\$592.77		\$.005
Decrease	592.77		.005

The expense in this account in 1929 was the Gardner-Mackinaw proportion of the cost of the safety picnic held Sept. 1, 1929.

Total General Mine Accounts:

1930 Amount	\$24,713.12	Cost per ton	\$.198
1929 Amount	24,010.42	" " "	.205
Increase	702.70	Decrease	.007

The accounts responsible for most of the increase were: Analysis & Grading, Local & General Welfare, and Mine Office.

9. EXPLORATIONS

AND
FUTURE

EXPLORATIONS:

There was no exploring in the mine during 1930.

10. TAXES:

Description	1930		1929	
	Valuation	Taxes	Valuation	Taxes
C. & N. W. Lease, Gardner:				
SE $\frac{1}{4}$ of SE $\frac{1}{4}$ Sec. 35-45-25	7,000	270.41	7,000	242.90
NW $\frac{1}{4}$ of NE $\frac{1}{4}$ Sec. 2-45-25	200	7.74	200	6.96
Personal Property	90,000	3,476.70	61,000	2,116.70
Total	97,200	3,754.85	68,200	2,366.56
Collection Fees		37.55		23.67
Total Taxes		3,792.40		2,390.23
D. M. & M. Lease, Mackinaw:				
N $\frac{1}{2}$ of SE $\frac{1}{4}$ & SW $\frac{1}{4}$ of SE $\frac{1}{4}$ Sec. 35-45-25	28,000	1,081.64	28,000	971.59
Collection Fees		10.82		9.71
Total Taxes		1,092.46		981.30
Gardner-Mackinaw Dwellings	6,500	251.12	6,500	225.57
Collection Fees		2.51		2.25
Total Taxes		253.63		227.82
Total Taxes - Gardner-Mackinaw Mine and Location		5,138.49		3,599.35
Increase - 1930		1,539.14		

The value set by Tax Commission on the Mackinaw Mine in 1930 increased \$29,000 over the value in 1929. The valuation in both years was quite low and does not exceed the actual value of equipment on the property.

The Township Tax rate was higher due to lower total valuation.

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11. ACCIDENTS
AND
PERSONAL
INJURY:

There was only one accident at the mine during the year involving the loss of more than one day, as compared with no lost time accidents for the year 1929. This accident was caused by a fall of ground and the man lost 108 shifts on account of a fractured arm.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

E. & A. #537 - Sinking Mackinaw Shaft and Developing 5th Level:

Total estimate	\$25,025.00
Total expenditures to January 1, 1930	23,902.36
Total expenditures in 1930	62.91
Total expenditures to January 1, 1931	23,965.27
Total unexpended balance	1,059.73

E. & A. completed in 1930.

E. & A. #566 - Sinking Mackinaw Shaft and Developing 6th Level:

Total estimate	\$82,280.00
Total expenditures in 1930	28,822.54
Total unexpended balance January 1, 1931	53,457.46

The principal work done under this E. & A. in 1930 was as follows:

Sinking the auxiliary shaft 285 ft. on the incline and raising shaft 74 ft. above the 5th level.

Cutting of plat and pocket on the 6th level.

Excavating for engine house on the 5th level.

Installing hoisting equipment - skips, skip dump, etc.

13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

The Gwinn District steam shovel was repaired at the mine in the winter of 1929-1930. Another shovel was sent to the district in the summer of 1930 and both shovels will be repaired at the mine this winter.

b. Stockpile Trestles:

Wooden Trestle:

Thirty bents were erected at the Mackinaw Mine this Fall for stocking. A new stockpile ground was made and provision was also made on the curve of the new trestle for another branch trestle for another new parallel stocking ground in case shipments are again low in 1931.

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13. EQUIPMENT
AND
PROPOSED
EQUIPMENT: (Cont)

c. Scraper Hoists:

<u>Company</u>	<u>On Hand</u> <u>1/1/1930</u>	<u>Purchased</u> <u>1930</u>	<u>On Hand</u> <u>1/1/1931</u>
Ingersoll-Rand air	5	1	6
Sullivan 10 h.p. Electric	3	-	3
Sullivan air	<u>1</u>	<u>-</u>	<u>1</u>
Total	9	1	10

Only one scraper hoist was purchased early in 1930.

14. MAINTENANCE
AND REPAIRS:

There was relatively little expense for maintenance and repairs in 1930, and no item that might be termed extraordinary except the alterations in the dry house. The dry house has been brought up to the Company standard for these buildings and will compare favorably with any of the other drys.

15. POWER:

Electric power was furnished by the Cliffs Power & Light Company, a subsidiary of The Cleveland-Cliffs Iron Company. The charge for power was 1¹/₂ per kilowatt hour, the same as last year.

17. CONDITION
OF
PREMISES:

The premises around the mine were kept clean and neat but there was no landscaping work at this property as the profit factor does not justify this expense.

18. NATIONALITY
OF
EMPLOYEES:

This report has been prepared under two statements. The first shows the nationality of the employees as to parentage. The second statement separates the nationalities into "Foreign born" and "American born".

<u>As to parentage</u>	<u>1930</u>	<u>%</u>	<u>1929</u>	<u>%</u>
English	10	7.8	10	8.7
Irish	1	.8	1	.9
Scotch	1	.8	1	.9
Swedish	16	12.4	17	14.7
Norwegian	5	3.9	1	.9
German	2	1.5	2	1.7
French	14	10.8	12	10.5
Italian	32	24.8	32	27.8
Finnish	<u>48</u>	<u>37.2</u>	<u>39</u>	<u>33.9</u>
Total	129	100.0	115	100.0

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18. NATIONALITY
OF
EMPLOYEES: (Cont)

<u>As to birth</u>	<u>Total</u>	<u>American born</u>	<u>Foreign born</u>
English	10	6	4
Irish	1	1	-
Scotch	1	-	1
Swedish	16	9	7
Norwegians	5	4	1
German	2	2	-
French	14	9	5
Italian	32	7	25
Finnish	48	17	31
Total	129	55	74

FRANCIS MINE
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1. GENERAL:

The steam shovel crew and also the crusher crew, when idle, spent considerable time in cleaning up the scattered ore and removing the old collar plank, the best of which were trucked to the Gardner-Mackinaw Mine. The steel shaft house and steel pulley stands are the only structures left on the property. They will be needed at the Princeton when it reopens.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

b. Shipments:

<u>Grade of Ore</u>	<u>Stockpile</u>	<u>Total</u>	<u>Total Last Year</u>
Franport	92,828	92,828	58,009
Increase in 1930		34,719	

c. Stockpile Inventories:

<u>Grade of Ore</u>	<u>1930</u>	<u>1929</u>	<u>Decrease</u>
Franport	206,909	299,737	92,828

f. Ore Statement:

	<u>Franport Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
On Hand Jan. 1, 1930	299,737	299,737	357,746
Output for year	0	0	0
Total	299,737	299,737	357,746
Shipments	92,828	92,828	58,009
Balance on Hand	206,909	206,909	299,737
Decrease in Ore on Hand		92,828	58,009

1930 - Mine abandoned
1929 - " "

3. ANALYSIS:

b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>
Franport	(All Mixed)			

The grade of the ore shipped in 1930 averaged .6% higher than the ore shipped in 1929. The cuts in 1930 were all interior cuts and therefore do not show a true cross section of the entire pile as the lump ore on the rims contains bands of slate.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	0	0		
Surface Costs	0	0		
General Mine Expenses	438.91	335.62	103.29	
Total	438.91	335.62	103.29	
Loading and Shipping	5,549.33	2,806.90	2,742.43	
Taxes	10,576.02	11,044.09		468.07
Administrative & Gen. Exp.	0	640.00		640.00
Total Cost at Mine	16,564.26	14,826.61	1,737.65	
Budget Cost	17,340.00			

FRANCIS MINE
ANNUAL REPORT
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8. COST OF OPERATING: (Cont)

General Mine Expenses increased due to more analysis and to more labor expense on account of shipping more ore from stockpile. 2% of the payroll is set up as a reserve for personal injuries.

Loading and Shipping increased on account of shipping 92,828 tons in 1930 as compared with 58,009 tons in 1929.

Taxes decreased as valuation was lower on account of less ore in stock.

10. TAXES:

<u>Description</u>	<u>1 9 3 0</u>		<u>1 9 2 9</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 27-45-25, 40 Acres	C & N W	2.81	C & N W	2.55
SW $\frac{1}{4}$ (Ex. R. of W.) " 153.56 Acres	500	19.34	500	17.35
Personal Property	270,500	10,449.40	315,000	10,930.50
Total	271,000	10,471.55	315,500	10,950.40
Collection Fees		104.47		109.48
Total Taxes		10,576.02		11,059.88
Less Rebate C. & N. W.				15.79
Total Francis		10,576.02		11,044.09
Tax Rate per \$100		3.863		3.47

Taxes decreased in spite of a higher rate due to a lower valuation on account of less ore in stock.

REFUBLIC MINEANNUAL REPORTYEAR 1930.1. GENERAL:

The Republic Mine was abandoned in 1928. Captain Pascoe, who is acting as watchman, is the only man regularly employed. Very little has transpired at this property during 1930.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:b. Shipments:

On September 11th we shipped a 100 lb. sample of Republic Crushed Ore to The Sullivan Company of Memphis, Tenn. This was followed up by a shipment of 2314 lbs. of Republic Crushed Ore to the same Company on October 1st. The ore was loaded in heavy burlap bags secured from the Furnace Department at Marquette, and the shipment made via freight collect.

We also had an inquiry from The House of David relative to a small tonnage of Republic Crushed Ore, but no sale was made to them. We have about 100 tons of this grade of ore on hand that was sorted out during the summer of 1929 when we were loading lump ore from the old rock piles.

6. SURFACE:a. Buildings:2. Location Houses:

Two more of the location houses were sold during 1930 as follows:-

<u>House No.</u>	<u>Purchaser</u>	<u>Sale Price</u>
14	Waino M. Ikola	\$ 350.00
15	Alex Sand	350.00

There were no repairs made to the houses during the year. Two of the dwellings were vacated and three rented. The Company still owns 21 houses, 13 single and 8 double ones, of which 9 single houses and 6 halves of the double houses were occupied on December 31st, 1930.

f. Sale of Equipment:

The following equipment was sold during the year:-

Holman-Cliffs Mining Company, Taconite, Minnesota.

1	-	Roll Top Desk
1	-	Revolving Chair
2	-	Laboratory Balances

Tilden Mine

1	-	Sullivan Drill Sharpener
1	-	Car Various Size Pipes
1	-	Small Lathe
1	-	Pipe Threading Machine

REPUBLIC MINE
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6. SURFACE:
(Continued)

f. Sale of Equipment:

General Storehouse

1 - 8500 Gallon Distillate Tank

Negaunee Mine

1 - Car (18,464 Ft.) 3" Plank, Salvaged from Stock-Pile Sollar.

Hercules Powder Co.

20 Tons 30 lb. Relaying Rail

10. TAXES:

<u>Description</u>	<u>1930</u>		<u>1929</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>Republic Township</u>				
Realty as Described on Tax Receipt	\$ 10,000	\$ 604.70	\$ 10,000	\$ 571.20
Personal Property	10,000	604.70	55,000	3141.60
Lots 71, 72, 86, 108 and 126	95	5.77	95	5.56
Total	\$ 20,095	\$ 1215.17	\$ 65,095	\$ 3718.36
Collection Fees		12.15		37.18
Total Opt. Republic Mine	\$ 20,095	\$ 1227.32	\$ 65,095	\$ 3755.54
Republic Mine Dwellings (Inc. Fees)	\$ 8,500	\$ 519.75	\$ 8,875	\$ 512.40
Total Republic Twp. (Inc. Fees)	\$ 28,595	\$ 1747.07	\$ 73,970	\$ 4267.94
Rate		\$ 6.047		\$ 5.712

The decreased valuation on personal property between 1930 and 1929 is due to shipping all stockpile ore during 1929. The small difference on the dwellings is explained by the sale of one house and donating another to the Finnish Church. We believe that our taxes in Republic Township are very reasonable.

W.R. MEYERS, SUPERINTENDENT.

SPIES-VIRGIL MINEANNUAL REPORTYEAR 1930.1. GENERAL:

The Spies-Virgil was operated at a normal basis on a six day week, double shift, schedule until the middle of July when the mine went on a five day week schedule. The development of the eighth level and subs above was pushed ahead and a nice orebody developed, but no stoping was undertaken until November and then only on a limited scale. Due to the conditions in the stope above the sixth level, where it was difficult to keep up the grade of ore, we did well to secure as large a tonnage as was produced.

The drilling program undertaken to more completely develop the ore below the sixth level, located a new lens in a fold in the footwall on the north side. We estimate approximately 200,000 tons of low sulphur grade from the sub-level development and drilling. There is also a substantial tonnage of high sulphur ore in this fold.

Considering the condition of the ore market the tonnage shipped during 1930 was very satisfactory, being only 1235 tons less than the low sulphur grade production.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:a. Production by Grades:

<u>Grade</u>	<u>Tons</u>
Virgil Crushed	139,089
Virgil High Sulphur	<u>3,738</u>
Total Ore	142,827
Rock	3,200

The production of 142,827 tons for 1930 compares with 165,163 tons in 1929, a decrease of 22,336 tons. This makes the total production from the Virgil Mine to Jan. 1st, 1931, 727,392 tons.

b. Shipments:

<u>Grade of Ore</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Last Year Total Tons</u>
Virgil Crushed	71,635	66,219	137,854	175,078
Total Last Year	79,570	95,508	175,078	
Decrease	7,935	29,289	37,224	

The shipment of Virgil ore for 1930 was 1,235 tons less than the production of this grade, but considering the ore market was not bad. The total shipments from the Virgil Mine to Jan. 1st, 1931 are 402,961 tons.

Orders were received to start loading from pocket into railroad cars on April 28th and continued throughout the season until October 15th, with only an occasional interruption. The reason for stockpiling was to take care of some very high phosphorus ore.

SPIES-VIRGIL MINE
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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

b. Shipments: (Continued)

The first loading from stockpile for the season was started on April 29th and was intermittent throughout the season. The final tonnage was loaded on October 24th. Half of the stockpile tonnage was loaded during July. The shovel operated three days in the main pile north-east of the shaft during August in order to secure some high phosphorus ore and the balance of the stockpile tonnage was shipped from the north pile. The cuts were taken at the extreme north end of the pile. This was necessary on account of the track arrangement. After several cuts were completed, we were able to lay the loading track along the east side of the pile. After this was done we only operated the shovel seven days.

Of the total shipments, 29,043 tons of Virgil ore was used in a Cambridge mixture and the balance of 108,811 tons as straight Virgil.

c. Stockpile Inventories:

<u>Grade</u>	<u>Tons in Stock</u>
Virgil Crushed	307,677
Virgil Crushed (High Sulphur)	<u>6,753</u>
Total	314,430

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:-

<u>Level</u>	<u>Tons</u>	<u>Per Cent</u> <u>of Product</u>
Sixth	128,092	89.69
Eighth	<u>14,735</u>	<u>10.31</u>
Total	142,827	100.00

The tonnage hoisted from the eighth level includes the 3,738 tons of high sulphur ore produced for the year. All of this high sulphur ore was secured in the raises above the eighth level and development drifting on the -131' sub-level.

SPIES-VIRGIL MINE
ANNUAL REPORT
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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

e. Production by Months:

The production by months, days operated, average daily product and tons per man per day are shown in the table below.

Month	Rock Tons	Hi-Sulphur Ore Tons	Virgil Ore Tons	Total Ore Tons	No. Days Opt.	Average Daily Product	Tons Per Man Per Day
January	108	307	9,703	10,010	21	477	5.27
February	146	984	9,802	10,786	24	449	5.24
March	1,252	312	10,210	10,522	25½	413	5.18
April	920	161	12,719	12,880	25	515	6.79
May	598	412	14,603	15,015	26	577	7.51
June	10	32	13,362	13,394	25	536	6.52
July			13,467	13,467	23	586	7.13
August	78		14,008	14,008	21	667	8.25
September	50	228	11,515	11,743	22	534	6.66
October	38	554	11,466	12,020	23	523	6.47
November		434	7,951	8,385	20	419	5.26
December		314	10,283	10,597	21	505	6.28
Year	3,200	3,738	139,089	142,827	276½	517	6.37

The production for the first three and last two months were below our estimate of 12,000 tons. During the early part of the year we were pulling the ore as fast as we could break it, as the working places did not permit the breaking of a large tonnage. This condition improved as soon as we could break ore around 604 Raise, and continued until the end of October when there was a fall of lean blocky material from the back and north side of the Northwest Stope. It took all of the month of November before the chutes were cleared of chunks and running freely.

The development on the eighth level and subs above was slow on account of the long trams until more raises were put up and the tonnage realized from this work was small. Although the average daily product for the year was only 517 tons compared with 548 tons in 1929, the tons per man per day was practically the same, namely 6.37 in 1930 and 6.35 in 1929. This was due to a few less men employed.

f. Ore Statement:

	Virgil Low Sul.	Virgil Hi-Sul.	Total	Total Last Year
On Hand Jan. 1, 1930.	306,442	3,015	309,457	319,372
Output for Year	139,089	3,738	142,827	165,163
Total	445,531	6,753	452,284	484,535
Shipments	137,854		137,854	175,078
Balance on Hand	307,677	6,753	314,430	309,457
Increase in Output	25,982	3,646	22,336	15,240
Increase in Ore on Hand	1,235	3,738	4,973	9,915

SPIES-VIRGIL MINE
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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

f. Ore Statement: (Continued)

1928 - 2-8 Hr. Shifts 6 Days per Week Jan. 1st to Dec. 31st.
1929 - 2-8 Hr. Shifts 6 Days per Week Jan. 1st to Dec. 31st.
1930 - 2-8 Hr. Shifts 6 Days per Week Jan. 1st to July 19th.
2-8 Hr. Shifts 5 Days per Week July 19th to Dec. 31st.

g. Delays:

<u>Date</u>	<u>Duration</u>	<u>Cause</u>	<u>Tonnage Lost</u>
Jan. 10	16)		
Jan. 11	8)		
Jan. 13	16)	Re-Erecting compressor.	2500
Jan. 14	16)		
Jan. 15	16)		
Jan. 16	2	Ice around crusher.	50
Feb. 24	2	Cable to crusher burned out.	50
Mar. 31	8	Repairs to hoist.	260
May 12	8	Compressor running hot.	100
Sept. 22	$2\frac{1}{2}$	Repairing wearing shoe on cage.	175
Total	$94\frac{1}{2}$		3135

A short description of the three most serious delays follows:-

The mine was closed down for one week from January 10th to the 16th while the compressor was re-erected by an engineer of The Ingersoll-Rand Company. The compressor had been pounding and bearing running hot. This was due to the fact that the compressor and motor were not in true alinement.

The drum of the hoist was loose on the shaft and there was quite a slippage every time the hoist was started, especially when hoisting a loaded skip. Work to correct this condition was started on Sunday morning, March 30th, but was not completed until the afternoon of the 31st, so the day shift did not work.

At the time the compressor was overhauled in January by an erecting engineer from the Ingersoll-Rand Company, he recommended that new piston rings be put in the cylinders. This work was done on Sunday, May 11th. The compressor was only run a short time after the job was completed and on Monday morning it began to heat up and had to be shut down. The miners were sent home, but hoisting from the stope continued, as the pocket doors were left open and one car hoisted in the skip at a time. The cylinders were opened up and an examination found everything to be O.K. The compressor was run without load all day to allow the new rings to gradually work in. We have had no trouble since.

SPIES-VIRGIL MINE
ANNUAL REPORT
YEAR 1930.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

h. Delays from Lack of Current:

There were no delays during the entire year due to lack of current.

3. ANALYSIS:

a. Average Mine Analysis on Output:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sul.</u>
Virgil Crushed	57.85	.457	6.83	.089
High Sulphur	56.97	.496	3.93	.386

b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Tons</u>	<u>Mine</u>			<u>Lake Erie</u>	
		<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Iron</u>	<u>Moist.</u>
Virgil Crushed	108,811	57.96	.422	7.70	57.77	7.08

c. High Sulphur Ore:

All of the high sulphur ore mined came from the raises and development drifts on the eighth level and the -130' sub-level. The high sulphur ore extends from the eighth level to ten to fifteen feet above the -130' elevation at the east end of the sub-level and to about the sub floor at the west end. The -130' elevation is just the location for a grizzly sub-level, as we will be able to mine all of the merchantable ore which lies above. The high sulphur ore is stockpiled separately and only that encountered in development work and must be mined is hoisted.

d. Average Analysis on Total Shipments:

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Alum.</u>	<u>Mang.</u>	<u>Lime Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Virgil	137,854	57.65	.413	7.20	1.63	.220	.55	.27	.078 6.55

e. Average Analysis of Ore in Stockpile:

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Alum.</u>	<u>Mang.</u>	<u>Lime Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Virgil	307,677	56.40	.427	8.40	2.05	.170	.70	.31	.086	6.20 8.00
Virgil) Hi-Sul.)	6,753	56.95	.525	4.05	2.97	.250	1.70	.42	.371	8.10 8.00

4. ESTIMATE
OF ORE
RESERVES:

a. Developed Ore:

Assumption:- 12 cu. ft. equals one ton.
10% deduction for rock.
10% deduction for loss in mining.

	<u>Available</u>	<u>Unavailable</u>	<u>Total</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
6th Level and Above	304,215	281,750	585,965
6th Level to 8th Level	<u>193,678</u>		<u>193,678</u>
Total Developed Ore	497,893	<u>281,750</u>	779,643

SPIES-VIRGIL MINE
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4. ESTIMATE
OF ORE
RESERVES:
(Continued)

b. Prospective Ore:

	<u>Available</u> <u>Tons</u>	<u>Unavailable</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
Below 6th Level	641,032	44,954	685,986
 Total All Ore Dec. 31st, 1930.	 1,138,925	 326,704	 1,465,629
Estimated Reserves Dec. 31st, 1930.			1,465,629
Estimated Reserves Dec. 31st, 1929.			<u>1,378,627</u>
Increase Over 1929			87,002
Production 1930 (Low Sulphur Ore Only)			139,089
Tons Developed During 1930			226,091

During the course of the mining in the stope above the sixth level in 1930 we developed 34,241 tons more than mined. Of this 34,241 tons, 20,069 tons is unavailable and 14,172 tons available.

The sub-level development and diamond drilling between the sixth and eighth levels has developed 193,678 tons, all of which is available and is an entirely new orebody in a roll in the footwall. As the diamond drilling done from the sixth level to more thoroughly outline the bottom of the main orebody showed a decided roll in the footwall from north to south, the estimate of prospective ^{ore} for 1930 was made from a new set of north-south cross-sections. This new estimate only reduced the prospective ore tonnage over 1929 by 12,915 tons.

c. Estimated Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Alum.</u>	<u>Mang.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Dried	57.50	.425	7.00	1.64	.16	.60	.30	.119	7.35	
Natural	51.75	.382	6.30	1.48	.15	.55	.26	.107	6.60	10.00

d. Estimate of Production:

The following is the estimated tonnage and expected analysis of the 1931 production from the Spies-Virgil Mine:

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Moist.</u>	<u>Iron Natural</u>
Virgil	136,000	57.50	.450	7.50	.080	8.00	52.90

5. LABOR
AND
WAGES:

a. Comments:

1. Labor:

The labor conditions at the mine were most satisfactory. There was a surplus of labor in the district due to general curtailment by all companies. We laid off several gangs of miners in March upon completion of all development drifting above the sixth level. Two of these gangs were re-employed in May for development above the eighth level. The mine went on a five day week basis the week of July 14th, 1930.

SPIES-VIRGIL MINE
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5. LABOR
AND
WAGES:
(Continued)

a. Comments: (Continued)

2. New Construction:

The building of the community garage at the location and remodeling of the boarding house into a four family residence was done by the mine carpenters.

b. Comparative Statement of Wages and Product:

	<u>1930</u>	<u>1929</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	142,827	165,163		22,336
NO. SHIFTS & HOURS	2-8	2-8		
<u>AVG. NO. MEN WORKING:</u>				
Surface	21	23		2
Underground	57	63		6
Total	78	86		8
<u>AVG. WAGES PER DAY:</u>				
Surface	\$ 4.41	\$ 4.41		
Underground	5.36	5.14	\$.22	
Total	\$ 5.08	\$ 4.94	\$.14	
<u>WAGES PER MO. OF 25 DAYS:</u>				
Surface	\$ 110.25	\$ 110.25		
Underground	134.00	128.50	\$ 5.50	
Total	\$ 127.00	\$ 123.50	\$ 3.50	
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	21.85	23.06		1.21
Underground	8.98	8.75	.23	
Total	6.37	6.35	.02	
<u>LABOR COST PER TON:</u>				
Surface	\$.2018	\$.1913	\$.0105	
Underground	.5968	.5872	.0096	
Total	\$.7986	\$.7785	\$.0201	
<u>AVERAGE PRODUCT</u>				
BREAKING AND TRAMMING	35.37	29.74	5.63	
<u>AVG. WAGES CONT. MINERS</u>				
	6.00	5.42	.58	
<u>TOTAL NO. OF DAYS:</u>				
Surface	6,536	7,160 $\frac{1}{2}$		624 $\frac{1}{2}$
Underground	15,902	18,864 $\frac{1}{4}$		2,962 $\frac{1}{4}$
Total	22,438	26,024 $\frac{3}{4}$		3,586 $\frac{3}{4}$
<u>AMOUNT FOR LABOR:</u>				
Surface	\$ 28,827.75	\$ 31,596.37		\$ 2,768.62
Underground	85,237.05	96,976.73		11,739.68
Total	\$ 114,064.80	\$ 128,573.10		\$ 14,508.30

SPIES-VIRGIL MINE
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5. LABOR
AND
WAGES:
(Continued)

b. Comparative Statement of Wages and Product:

PROPORTION SURFACE TO UNDERGROUND MEN:

1930	-	1 to 2.43
1929	-	1 to 2.74
1928	-	1 to 2.64
1927	-	1 to 3.08
1926	-	1 to 3.00

6. SURFACE:

a. Buildings, Repairs:

1. Buildings, Mine:

The compressor was dismantled and re-erected during January. This work marred the walls and floor of the engine-house to such an extent that they were painted and the machinery enameled. The walls and ceiling of the shop building were sprayed with whitewash during February and March, working when the mine was idle.

During the summer while we had the guniting machine from Ishpeming, the stucco on the shop building and office and warehouse was repaired.

A fire broke out in the oil-house on Monday night, March 21st, at 11:15 P.M. It was discovered almost immediately by the night watchman. With the help of the pumpman who had just come to surface, top landers and hoisting engineer, it was under control in about twenty minutes. Fire extinguishers were used until the hose was connected and water used, which quickly put out the fire. The oil-house is a small frame building lined inside with toncan metal. The fire started no doubt from oily waste or some source of spontaneous combustion. The damage to the building was confined to the roof, window and door frames and part of the siding. Very little of the contents were damaged. The tank containing the gasoline became so hot that it split, but the gasoline did not catch fire. Repairs were started immediately by the mine carpenters and were completed during April at a cost of \$ 152.60.

The carpenters repaired the runway on the coal dock and built a new railing on both sides. They also tore out the wood lining plank in the shaft-house loading pocket which was broken through in places due to rot. New plank and wearing plates were put in during March and April.