

MAAS MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

Stocking Ore

1929 Amount	\$5,385.46	Cost per ton	\$.016
1928 Amount	<u>4,913.22</u>	" " "	<u>.019</u>
Increase	472.24	Decrease	.003

Tons stocked - 1929	131,372
Tons stocked - 1928	<u>134,176</u>
Decrease	2,804

There were 19 double ore, 3 double rock, and 8 single rock bents erected in 1929 and more expense on account of new rock trestle, as compared with 21 double ore and 8 single rock bents erected in 1928.

Dry House

1929 Amount	\$6,573.40	Cost per ton	\$.020
1928 Amount	<u>6,364.22</u>	" " "	<u>.024</u>
Increase	209.18	Decrease	.004

Dry House proportion of heating plant expense - 1929	-	\$4,795.28
" " " " " " " " 1928	-	<u>4,703.57</u>
Increase		91.71

Coal used in 1929 - 577 tons @ \$5.28	-	\$3,045.86
" " " 1928 - <u>657</u> " " 5.54	-	<u>3,645.96</u>
Decrease	80 "	600.10

Increase due to mine operating 30 $\frac{1}{2}$ more days in 1929, which increased the labor cost for dryman.

General Surface Expense

1929 Amount	\$4,194.96	Cost per ton	\$.013
1928 Amount	<u>4,515.46</u>	" " "	<u>.017</u>
Decrease	320.50		.004

Decrease due to less surface expense for planting around lawn area, and for a screen on lawn side of timber tunnel at South entrance to grounds.

MAINTENANCE ACCOUNTS:

Hoisting Equipment

1929 Amount	\$2,915.18	Cost per ton	\$.009
1928 Amount	<u>3,146.56</u>	" " "	<u>.012</u>
Decrease	231.38		.003

Sub Division

	<u>1929</u>	<u>1928</u>
Electric Hoists	766.48	876.38
Wire Rope	681.26	810.91
Skips, cages and skip roads	<u>1,467.44</u>	<u>1,459.27</u>
	2,915.18	3,146.56

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OPERATING:

Hoisting Equipment (Cont)

Decrease due to less repairs to hoisting machinery. There were two 1800' 1 3/8" second-hand wire ropes charged in 1929 as compared with 1928 when there was one 1800' 1 1/4" new rope charged, and 2 8' sheaves. The cost for repair of skips, cages, and skip roads was about the same in both years.

Shaft

1929 Amount	\$6,355.61	Cost per ton	\$.019
1928 Amount	<u>605.20</u>	" " "	<u>.002</u>
Increase	5,750.41		.017

The increased cost was due to rebuilding the third level pocket and installing new measuring pockets on the 3rd and 4th levels.

Top Tram Equipment

1929 Amount	\$866.68	Cost per ton	\$.003
1928 Amount	<u>672.75</u>	" " "	<u>.003</u>
Increase	193.93		.000

	<u>Sub Division</u>			
	<u>Engine & Motors</u>	<u>Tracks & Cars</u>	<u>Wire Rope</u>	<u>Sheaves, etc.</u>
1929	\$ 8.89	\$352.02	\$296.00	\$209.77
1928	<u>18.26</u>	<u>383.86</u>	<u>208.55</u>	<u>62.08</u>
Increase			87.45	147.69
Decrease	7.37	31.84		

Increase due to more new rope required and more sheaves and wooden rollers replaced in 1929. There were less repairs to engine and motors and tracks and cars.

Docks, Trestles & Pockets

1929 Amount	\$126.89	Cost per ton	\$.000
1928 Amount	<u>40.26</u>	" " "	<u>.000</u>
Increase	86.63		.000

Increase due to renewing plates in shaft house pockets.

Mine Buildings

1929 Amount	\$1,678.96	Cost per ton	\$.005
1928 Amount	<u>1,684.87</u>	" " "	<u>.006</u>
Decrease	5.91		.001

	<u>Sub Division</u>	
	<u>1929</u>	<u>1928</u>
Office		54.10
Warehouse		148.82
Shops	30.46	3.31
Barn		6.44
Shaft House		6.55
Engine House	12.23	119.71
Dry House	1,390.46	630.01
Coal Dock		289.58
Miscellaneous	<u>245.81</u>	<u>426.35</u>
Total	1,678.96	1,684.87

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8. COST OF
OPERATING:

Mine Buildings (Cont)

The main items of expense in 1929 were for Dry House alterations and concreting and extending the spur timber tunnel to the East.

Total Surface Costs

1929 Amount	\$49,274.48	Cost per ton	\$.148
1928 Amount	<u>38,265.44</u>	" " "	<u>.146</u>
Increase	11,009.04		.002

GENERAL MINE ACCOUNTS:

Insurance

1929 Amount	\$149.68	Cost per ton	\$.000
1928 Amount	<u>113.94</u>	" " "	<u>.000</u>
Increase	35.74		.000

Cleveland Office charge.

Engineering

1929 Amount	\$2,848.55	Cost per ton	\$.009
1928 Amount	<u>2,525.26</u>	" " "	<u>.010</u>
Increase	323.29	Decrease	.001

Increase due to more time by engineers on Maas Mine surveys on account of more development work.

Analysis

1929 Amount	\$10,681.81	Cost per ton	\$.032
1928 Amount	<u>7,689.30</u>	" " "	<u>.029</u>
Increase	2,992.51		.003

This account includes the operating laboratory charge.

	<u>No. of Dets.</u>	<u>Cost per Det.</u>	<u>Amount</u>
1929	50,288	\$.133870	\$6,700.63
1928	<u>33,188</u>	<u>.148543</u>	<u>4,947.01</u>
Increase	17,100	Decr. .014667	Incr. 1,853.62

Increase due to more determinations worked and more working days in 1929. Determinations increased due to more Bessemer ore shipped from stockpile.

Personal Injury Expense

1929 Amount	\$6,423.93	Cost per ton	\$.019
1928 Amount	<u>5,262.94</u>	" " "	<u>.020</u>
Increase	1,160.00	Decrease	.001

The charge in both years was on a basis of 2% of the labor expense as per cost sheet, set up as a reserve. This reserve was started April 1st, 1928.

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OPERATING:

Safety Department Expense

1929 Amount	\$1,986.90	Cost per ton	\$.006
1928 Amount	<u>306.46</u>	" " "	<u>.001</u>
Increase	1,680.44		.005

Increase due to Maas Mine proportion of Safety Picnic, \$1,606.82, charged in 1929.

Telephones & Safety Devices

1929 Amount	\$630.65	Cost per ton	\$.002
1928 Amount	<u>401.85</u>	" " "	<u>.002</u>
Increase	228.80		.000

Increase due to more lighting for shaft and levels in 1929, also lighting on sub levels at electric scraper hoists.

Local General Welfare

1929 Amount	\$ 924.00	Cost per ton	\$.003
1928 Amount	<u>1,075.06</u>	" " "	<u>.004</u>
Decrease	151.06		.001

Decrease due to less expense in 1929 for local general welfare.

Mine Office

1929 Amount	\$14,790.89	Cost per ton	\$.045
1928 Amount	<u>12,974.30</u>	" " "	<u>.050</u>
Increase	1,816.59	Decrease	.005

Central Office charges, 1929	\$12,610.25
Central Office charges, 1928	<u>11,127.62</u>
Increase 1929	1,482.63

Increase due to additional charge for Assistant Superintendent's choreboy, increase in Central Office salaries, and increase in proportion of General Warehouse overhead.

Total General Mine Accounts

1929 Amount	\$38,524.92	Cost per ton	\$.116
1928 Amount	<u>30,349.11</u>	" " "	<u>.116</u>
Increase	8,175.81		.000

An analysis of the cost shows the increase due to the improvement program underway during the past year. The elimination of this extraordinary expense would have lowered the cost at least \$.04 per ton.

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9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS:

There was no exploring by diamond drilling in 1929. The footwall ore body on the Race Course was found to extend to the 3rd level and it will be developed on the 3rd level in 1930 by extending the main haulage drift to the South and West.

Shaft sinking to the 5th level, 125 ft. below the 4th level, was started in the Fall and was not completed at the end of the year.

10. TAXES:

DESCRIPTION	1929		1928	
	VALUATION	TAXES	VALUATION	TAXES
<u>CITY OF NEGAUNEE</u>				
Maas Mine, 257.18 acres	1,590,000	59,488.26	1,285,000	43,424.01
Race Course, 15.58 acres	300,000	11,224.20	300,000	10,137.90
Adams Strip, 3.2 acres	300,000	11,224.20	325,000	10,982.73
Stockpile, Equipment, etc.	810,000	30,305.34	890,000	30,075.77
Miscellaneous Parcels	19,050	712.78	21,350	721.49
Total	3,019,050	112,954.78	2,821,350	95,341.90
Collection Fees		1,129.55		953.42
TOTAL OPERATING MAAS MINE		114,084.33		96,295.32
Tax Rate		3.742		3.379
Total City of Negaunee Tax		600,686.18		571,121.55
Maas Mine % of City Tax		19%		16.9%
<u>MAAS MINE RENTED HOUSES:</u>				
C. C. I. Co. 1st Addition	109,900	4,112.04	-	-
Harris Addition	5,000	187.07	-	-
Corbit's 1st Addition	8,300	310.56	11,400	385.23
Corbit's 2nd Addition	7,400	276.88	72,400	2,460.56
Kirkwood & Kellan's Addition	37,700	1,410.58	36,600	1,236.80
Gaffney's Addition	51,200	1,915.61	50,500	1,654.53
Pioneer Plat	10,400	389.11	10,400	351.46
Reed & Winter's Addition	6,100	228.25	3,400	114.88
McKenzie's Addition	900	33.67	900	30.41
Miscellaneous - unplatted	12,300	460.22	25,900	875.23
Total Rented Houses	249,200	9,324.01	211,500	7,109.10

The valuation of the mine, as set by the State Tax Commission, was increased \$305,000 in 1929 and this, with the higher tax rate in the City of Negaunee, accounts for the increase of \$17,789.01 in taxes.

11. ACCIDENTS
AND
PERSONAL
INJURY:

There was one fatal and six minor accidents in 1929, as compared with one fatal and seventeen minor accidents in 1928.

The fatal accident occurred on December 14th at 8:30 a.m. and was caused by a fall of ground, Joseph Paris, a miner, being instantly killed. The accident occurred on the 160 ft. sub level above the 4th level in No. 24 contract. Paris

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11. ACCIDENTS
AND
PERSONAL
INJURY: (Cont)

and his partner were slicing with a scraper and had blasted on quitting work the previous day. They had finished two slices and were in about 50 ft. from the raise on the third slice at the time of the accident. The first slice had been blasted down, leaving an open slice next to their working place. On the sub above the ore was only two slices wide so that the slice they were driving was under the hanging. The two previous slices and the one they were driving had been in blue steel hard ore until the blast made on the evening prior to the accident when the ground changed to a soft grey ore. Due to the irregularities in the hanging, ore is often left in the back as the slice advances in new ground. On Saturday morning Paris trimmed the back, working on top of the broken ore which did not give him room to do this work properly. He then put in 7 ft. round lagging as fore poles and placed cross lagging over them to catch up the back, which, in his estimation, made the place secure so that they could scrape out the broken ore. He then crawled in on the broken ore under the fore poles and was cutting a hitch for the pole used to carry the head block for the scraper hoist when some ground came out of the breast and back to a smooth slip and broke the fore pole on the left side of the drift. The broken fore pole and lagging, together with some of the ore, came down on Paris, breaking his neck. There is no doubt but that Paris thought he had made the place secure. He did not observe one of the rules which requires that where a place cannot be made safe by trimming the back, regular spiling poles must be used. He should have attached the head block for the scraper hoist to the last set and scraped out some of the ore so that he could have more room to work, after which the ground could have been properly trimmed and regular spiling poles put in.

The accident was classified by the Central Safety Committee as - "Selection of improper method of doing work. (By injured workman)".

Paris was an experienced miner, 34 years old, was married, and had two young children.

To avoid a possibility of a repetition of an accident of this character, a rule was adopted that 9½ ft. fore poles or spiling poles must always be used under new ground or in any place where ore is left in the back. As a further precaution, in the three mines in the Negaunee District 10 ft. lengths of 40 lb. rail are being put in beside each of the fore poles to catch up the cross lagging in case a fall of ground breaks the fore poles. The rails are wedged in position with a tail board but as they are not as high as the fore poles they can be taken out and used again and again. Since adopting this added precaution there has been one case where a fore pole broke due to loosening of a large chunk of ore and the rails prevented the fall of ground.

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

	<u>1929</u>	<u>1928</u>
Fatal	1	1
Time lost - less than one month	2	11
Time lost - one to four months	4	5
Time lost - more than four months	<u>2</u>	<u>1</u>
Total accidents	7	18
No. of cases paid compensation for accidents prior to January 1st, 1929	7	2
No. of cases being paid difference in wages	3	2

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11. ACCIDENTS
AND
PERSONAL
INJURY: (Cont)

The four accidents causing loss of time from one to four months were two contusions, a broken toe, and a fractured skull. The two accidents involving loss of time more than four months were each caused by broken leg.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

a. E. & A. #504 - Moving Race Course Houses:

Total estimate	\$135,951.00
Total expended to January 1, 1929	100,908.84
Total expended in 1929	25,358.34
Unexpended balance January 1, 1930	9,683.82

\$23,000.00 has been credited to this E. & A. for sale of 23 lots to the Negaunee Mine Company.

(1) New Road from Cherry Street: (Completed in 1929)

Total estimate	\$13,311.00
Total expenditures to January 1, 1929	13,274.51
Total expenditures in 1929	0
Unexpended balance January 1, 1930	36.49

This road was built in 1928, and was widened 4 ft. for a distance of about 400 ft. in 1929. This 4 ft. strip widened the new road in front of the Negaunee Mine houses moved to the East end of Cherry Street to the same width as Cherry Street. A penetration coat of tarvia was applied to this strip in the Fall.

(2) Streets in New Plat: (Not completed)

Total estimate	\$28,870.00
Total expenditures to January 1, 1929	15,733.76
Total expenditures in 1929	14,619.46
Unexpended balance January 1, 1930	1,483.22 (red)

In 1929 the streets were all surfaced with tar penetration after they had been brought to grade. The Baldwin Kiln Road was graded, surfaced with rock, and tar penetration applied, and this expense was borne by the City of Negaunee. A short extension of Lake Street in the Harris Addition, East of the Baldwin Kiln Road, was also graded but not surfaced. This short extension was not contemplated when the addition was first laid out.

(3) Sidewalks:

Total estimate	\$4,134.00
Total expenditures to January 1, 1929	4,430.48
Total expenditures in 1929	3,895.76
Unexpended balance January 1, 1930	4,192.24 (red)

All the sidewalks were completed in 1929 in the streets and from the street to the houses.

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

a. E. & A. #504 - Moving Race Course Houses: (Cont)

(4) Curbing: (Completed)

Total estimate	\$5,992.00
Total expenditures to January 1, 1929	2,504.75
Total expenditures in 1929	2,988.05
Unexpended balance January 1, 1930	499.20

All curbing in the New Location was finished before the streets were surfaced.

(5) Sewer System: (Completed)

Total estimate	\$15,760.00
Total expenditures to January 1, 1929	5,855.45
Total expenditures in 1929	6,802.65
Unexpended balance January 1, 1930	3,101.90

Sanitary sewers were extended to the ten houses on the North end of Corbit's 2nd Addition. Nine catch basins were put in while the curbing was being built, and connected with the storm sewer. This work has all been finished.

(6) Water System: (Completed)

Total estimate	\$11,525.00
Total expenditures to January 1, 1929	7,595.88
Total expenditures in 1929	5,581.04
Unexpended balance January 1, 1930	1,651.92 (red)

The water system has been completed.

(7) Transferring 22 Houses to New Location:

Total estimate	\$44,000.00
Total expenditures to January 1, 1929	45,651.92
Total expenditures in 1929	0.00
Unexpended balance January 1, 1930	1,651.92 (red)

No work done in 1929.

(8) Superintendence and Engineering:

(9) Personal Injury Expense:

(10) Legal:

Total estimate	\$ 0.00
Total expenditures to January 1, 1929	1,812.99
Total expenditures in 1929	273.87
Unexpended balance January 1, 1930	2,086.86 (red)

No provision was made for these expenses in the original estimate.

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

a. E. & A. #504 - Moving Race Course Houses: (Cont)

(1) Street Lighting: (Completed)

Total estimate	\$ 0.00
Total expenditures in 1929	278.30
Unexpended balance January 1, 1930	278.30 (red)

A proportion of the total expense for the ornamental street lamps was charged to this E. & A.; the balance was borne by the other E. & A's and the City of Negaunee. The new location has the best lighting system in the City.

b. E. & A. #513 - Moving Additional Race Course Houses:

Total estimate	\$109,815.47
Total expended to January 1, 1929	84,513.50
Total expended in 1929	27,003.44
Unexpended balance January 1, 1930	1,701.47 (red)

(1) Moving 44 houses and sheds:

Total estimate	\$ 88,000.00
Total expenditures to January 1, 1929	76,011.63
Estimated expenditures in 1929	15,493.27
Unexpended balance January 1, 1930	3,504.90 (red)

The expenditures for this account in 1929 were for repairing houses and sheds and building garages. The work was not entirely completed at the end of the year.

(2) Fencing 44 House Lots:

Total estimate	\$ 5,500.00
Total expenditures to January 1, 1929	803.57
Estimated expenditures in 1929	4,841.89
Unexpended balance January 1, 1930	145.46 (red)

All the fencing in the Location was included in this account, a total of 86 lots. It was practically completed at the end of the year.

(3) Grading and Seeding:

Total estimate	\$ 3,000.00
Total expenditures to January 1, 1929	4,555.59
Estimated expenditures in 1929	5,982.59
Unexpended balance January 1, 1930	7,538.18 (red)

Seeding and planting of shrubbery was not completed at the end of the year.

(4) Seven Additional Lots: (Completed)

Total estimate	\$ 1,332.25
Total expenditures to January 1, 1929	258.41
Estimated expenditures in 1929	556.05
Unexpended balance January 1, 1930	517.79

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CONSTRUCTION
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CONSTRUCTION: (Cont)

b. E. & A. #513 - Moving Additional Race Course Houses: (Cont)

(4) Seven Additional Lots: (Cont)

There was \$556.05 charged this account in 1929 for street lighting which had not been included in the original estimate. There were no other charges to this account in 1929. The cost of curbing and sidewalks for these lots, which was done in 1929, was taken up in E. & A. #504 instead of in this account.

(5) Compensation Insurance:

(6) Contract Bond:

Total estimate	\$ 0.00
Total expenditures to January 1, 1929	1,283.02
Total expenditures in 1929	0.00
Unexpended balance January 1, 1930	1,283.02 (red)

There was no estimate made for these two accounts in the original E. & A.

(7) Superintendence and Engineering: (Completed)

Total estimate	\$2,000.00
Total expenditures to January 1, 1929	1,601.28
Estimated expenditures in 1929	129.64
Unexpended balance January 1, 1930	269.08

c. E. & A. #527 - New Pockets, Stocking Trestle, and Pumphouse:

Total estimate	\$50,270.00
Total expenditures to January 1, 1929	44,207.20
Total expenditures in 1929	3,462.16
Unexpended balance January 1, 1930	2,600.64

(a) Installing Lake Mine Ore Pockets at Maas: (Completed)

Total estimate	\$3,300.00
Estimated expenditures to January 1, 1929	2,365.50
Estimated expenditures in 1929	1,685.49
Unexpended balance January 1, 1930	750.99 (red)

The South pocket was completed and in service during the Fall of 1928. The North pocket was erected and equipped and ready for service when the 1929 shipping season opened.

(b) Installing Plunger Pump on Fourth Level: (Completed)

Total estimate	\$6,050.00
Total expenditures to January 1, 1929	5,286.49
Estimated expenditures in 1929	1,390.26
Unexpended balance January 1, 1930	626.75 (red)

The pumphouse was finished in the latter part of 1928. The foundations were built and pump erected and placed in service early in 1929. The cost of foundations, piping, and erecting charges, were all greater than the estimate, the erecting charge being the greatest, amounting to nearly \$600.00 over the estimate.

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CONSTRUCTION: (Cont)

c. E. & A. #527 - New Pockets, Stocking Trestle, and Pumphouse: (Cont)

(c) Steel Trestle: (Completed)

Total estimate	\$36,350.00
Total expenditures to January 1, 1929	35,906.62
Estimated expenditures in 1929	386.41
Unexpended balance January 1, 1930	56.97

The expenditures in 1929 covered the extension of rock collar on the stockpile ground a short distance to the West, and leveling off the rock fill over the entire stockpile ground.

(d) Engineering: (Completed)

Total estimate	\$ 0.00
Total expenditures to January 1, 1929	648.59
Total expenditures in 1929	0.00
Unexpended balance January 1, 1930	648.59 (red)

There were no charges to this account in 1929. The E. & A. was closed off in 1929.

(d) E. & A. #531 - Healy Avenue Extension (C. C. I. Co. 62 $\frac{1}{2}$ %, Negaunee Mine Company 37 $\frac{1}{2}$ %):

Total estimate	\$14,000.00
Less Negaunee Mine Proportion (37 $\frac{1}{2}$ %)	5,250.00
Total Maas Mine Proportion (62 $\frac{1}{2}$ %)	8,750.00
Estimated expenditures in 1929 (62 $\frac{1}{2}$ %)	6,760.11
Unexpended balance January 1, 1930	1,989.89

The extension of Healy Avenue was completed in 1929, with curbing, sidewalks and tar penetration surface. The two houses on the Cherry Street end were moved to their new location further East on Cherry Street, and the lots graded and fenced. These new lots will be seeded in 1930, and shrubbery planted around the houses.

(e) E. & A. #533 - Painting 30 Houses and Sheds:

Total estimate	\$4,713.00
Total expended to January 1, 1929	1,499.45
Total expended in 1929	1,970.54
Unexpended balance January 1, 1930	1,243.01

This E. & A. was not completed in 1929.

(f) E. & A. #548 - Sinking Maas Shaft and Developing 5th Level: (Not completed)

Total estimate	\$133,160.00
Total expended in 1929	22,664.59
Unexpended balance January 1, 1930	110,495.41

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(f) E. & A. #548 - Sinking Maas Shaft and Developing 5th Level: (Not completed)

Assembling Equipment:

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

All charges under this account were completed in 1929.

Sinking in Rock:

(a) Sinking 140 ft.:

Total estimate	\$15,000.00
Total expenditures in 1929	7,889.77
Unexpended balance January 1, 1930	7,110.23

The shaft had been sunk 56 ft. by the end of the year. Sinking operations can only be done on the night shift, and the waste material is hoisted to the Fourth Level and trammed to the pockets. Work in the shaft was temporarily stopped late in November, and the rest of the year occupied in cutting plat. Sinking will be resumed early in 1930.

(b) Timbering and Steel Sets:

Total estimate	\$6,000.00
Total expenditures in 1929	3,203.34
Unexpended balance January 1, 1930	2,796.66

Twenty-five steel sets were purchased and charged out in 1929. Seven sets have been installed in the shaft.

Drifting to Ore Body:

Total estimate	\$38,800.00
Total expenditures in 1930	0
Unexpended balance January 1, 1930	38,800.00

The only drifting on the 5th level has been on the plat. The drift to the ore body will not be started until the shaft is sunk and pockets are installed on the 5th level.

Plats and Pockets:

Total estimate	\$14,000.00
Total expenditures in 1929	2,538.53
Unexpended balance January 1, 1930	11,461.47

About two-thirds of the plat over the pockets and a drift 35 ft. South from the cage road had been excavated at the end of the year.

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CONSTRUCTION: (Cont)

(f) E. & A. #548 - Sinking Maas Shaft and Developing 5th Level: (Not completed)

Permanent Equipment:

(b) Power Drills:

Total estimate	\$2,500.00
Total expenditures in 1929	2,620.49
Unexpended balance January 1, 1930	120.49 (red)

Ten sinking machines were purchased, six Ingersoll-Rand, and four Gardner-Denver, together with air hose, etc.

Hoisting Plant:

(a) New Cage Rope:

(b) New Skip Ropes:

Total estimate	\$1,905.00
Total expenditures in 1929	1,253.52
Unexpended balance January 1, 1930	651.48

A cage rope and one skip rope, each 2,000 ft. in length, were installed in 1929.

(c) Counterbalance and Installing:

Total estimate	\$4,500.00
Total expenditures in 1929	2,481.12
Unexpended balance January 1, 1930	2,018.88

A 10" pipe was installed in the Southeast corner of the ladder road for counterweight, and an 8 ft. bicycle sheave set on the shaft house. The counterweight was necessary, as without it the cage hoist could not handle the regular cage and sinking cage.

Electric Haulage:

(c) 20 Underground Tram Cars:

Total estimate	\$9,500.00
Total expenditures in 1929	1,243.09
Unexpended balance January 1, 1930	8,256.91

Twelve rocker dump cars were purchased and installed on the Third Level during December, but only $2\frac{1}{2}$ cars had been charged out at the end of the year.

(d) Wiring and Bonding:

Total estimate	\$1,000.00
Total expenditures in 1929	18.68
Unexpended balance January 1, 1930	981.32

Signal wires were installed to the 5th level plat for operating the sinking cage.

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

(g) E. & A. #559 - Electric Haulage Generator Set: (Not completed)

Total estimate	\$4,917.00
Total expended in 1929	1,993.03
Unexpended balance January 1, 1930	2,923.97

(1) Motor Generator Set:

Total estimate	1,500.00
Total expenditures in 1929	0.00
Unexpended balance January 1, 1930	1,500.00

A second-hand generator set from the Negaunee Mine has been received but has not yet been installed. This set is a duplicate of the present unit and the two can be connected and operated together. The present set was overloaded due to increase of electric scraper load.

(2) 3-Circuit Feeder Panel:

(3) 1,750 ft. Shaft Cable:

Total estimate	\$1,950.00
Total expenditures in 1929	1,536.24
Unexpended balance January 1, 1930	363.76

The cable in the shaft carrying the underground haulage and scraper load was considered inadequate for the service required, and a new cable was installed. The old cable serves the tunnel and 3rd level, and the new one the 4th and the new 5th level. The new panel was necessary in order to handle the two circuits.

(4) 75 Trolley Hangers:
2,000 ft. of Trolley Wire:

Total estimate	\$ 510.00
Total expenditures in 1929	216.91
Unexpended balance January 1, 1930	293.09

The trolley wire in the 4th level rock drift from the shaft to the ore body was replaced by a new wire and a feeder cable was also installed. The old wire was badly worn and full of splices.

(5) Installation:

Total estimate	\$ 500.00
Total expenditures in 1929	239.88
Unexpended balance January 1, 1930	260.21

The shaft cable and 4th level trolley wire have been installed and are in service. The foundations for the generator set will be ready early in the coming year. The switchboard panel is still in service at the Negaunee Mine, but will be released early in January. The generator should be installed and in operation about the middle of February.

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13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Stockpile Trestles:

Nineteen wooden bents were erected West of the shaft from the permanent steel trestle for stocking Maas Ore. Additional rock dump capacity was secured at the East end of the steel stocking trestle by extending the North track for eleven bents, and the South track three bents. Prior to this time the South track was the only one used for rock, eight bents being erected here in 1928.

b. Scraper Hoists:

The mine is now equipped with the following scraper hoists:

	On Hand <u>1/1/1929</u>	Received <u>1929</u>	On Hand <u>1/1/1930</u>
Ingersoll Rand air	20	1	21
Denver air	1	0	1
Sullivan air	0	0	0
Sullivan 6½ h.p. electric	8	0	8
Sullivan 15 h.p. electric	1	8	9
Sullivan 7½ h.p. electric	2	0	2
Sullivan 25 h.p. electric	1	0	1
Lake Shore steel scraper slide with 20 h.p. scraper hoist	<u>0</u>	<u>1</u>	<u>1</u>
Total	33	10	43

In 1928 ten second-hand hoists were purchased. All the scraper hoists purchased in 1929 were new and were charged out during the year. The 15 h.p. electric has been adopted as the standard and will be purchased exclusively in the future.

14. MAINTENANCE
AND REPAIRS:

The alterations in the dry house to bring it in line with the standard adopted by the company was well advanced at the end of the year and should be completed within 40 days.

The charge for water for the dry, office, shops, and for cooling the compressors was abnormally high at the Maas Mine as compared with the Negaunee and Athens. In October and early November larger suction and discharge pipes were installed from the cooling pond in the lawn to the circulating pump which was moved from the engine house to the heating plant at the East end of the dry house. The piping of the spray nozzles in the cooling pond was also changed. A separate meter was installed for the cooling water used by the Cliffs Power & Light transformers in the sub station, and this, with the improvements noted above, reduced the charge for water in November to \$97.00 and in December to \$57.00 from an average of \$200.00 in the previous months of the year. These changes will apparently result in a saving of from \$1500 to \$1800 per year.

Only minor repairs were made to other buildings.

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15. POWER:

Electric power was supplied by the Cliffs Power and Light Company, a subsidiary of The Cleveland-Cliffs Iron Company. The rate charged for current was $1\frac{1}{2}$ ¢ per k. w. hour, the same as last year.

The boiler plant and steam turbine was not operated during the year.

17. CONDITION
OF
PREMISES:

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>Nationality of Employees:</u>		<u>Country of Birth</u>		<u>Percent</u>
Americans	2	United States	104	42.6
English	75	England	47	19.3
Finnish	85	Finland	57	23.4
Italian	24	Italy	20	8.2
Swedish	24	Sweden	10	4.1
French	12	Canada	3	1.2
Danish	5	Denmark	1)	
Irish	7	Germany	1)	1.2
Germans	6	Norway	1)	
Canadians	3			
Norwegians	<u>1</u>			
Total	244		<u>244</u>	<u>100 %</u>

19. MAAS CRUSHER:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	80,927	137,194		56,267
Composed of:				
Hard Ores	1,017	118,197		117,180
Hematite	79,910	18,997	60,913	

The crusher operated 77 single 9-hour shifts in 1929, as compared with 136 single 9-hour shifts in 1928.

Average tons crushed per shift, 1929 - 1,051 tons
Average tons crushed per shift, 1928 - 1,009 tons.

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19. MAAS CRUSHER: (Cont)

Cost of Operating Crusher - 1929 and 1928:

	To Nov. 1, 1929	Cost per Ton	Full Year 1928	Cost per Ton
PRODUCT	80,927		137,194	
General Expense	\$ 255.16	.003	\$ 1,266.88	.009
Maintenance	0.00	.000	8,522.63	.062
Operating	3,239.89	.042	9,392.74	.069
Depreciation	0.00	.000	6,859.70	.050
Switching	725.40	.010	1,816.60	.013
Total	4,220.45	.055	27,858.55	.203

The latest cost sheet available for this report is for the month of October and does not give the full year's cost.

There was comparatively little ore crushed in November but there was considerable expense for cleaning up ore spilled during the year from the conveying belts.

In December some maintenance expense was incurred in relining the railroad loading pocket with new plank and plate.

Considerable maintenance expense will be necessary before the plant goes into operation in 1930. A list of the necessary repairs are given below:

New grizzly tee bars with manganese wearing plates.

New rubber conveying belt.

New shafts for rollers on conveying belt.

Build slides under conveying belt to catch ore that drops from the belt;
install track for tram car to take ore from the slides to the belt.

The above improvements, when completed, will reduce the operating cost to approximately the same figure as is obtained at the Gwinn District Crusher.

The cost for 1929 was about 14¢ per ton lower than in 1928 due to very little maintenance expense and no depreciation. The operating cost was lower in spite of a much lower tonnage crushed.

The jaw crusher was removed in the Spring and shipped to the Holman-Cliffs Pit on the Mesabi Range.

The #7¹/₂ McCulley gyratory crusher was installed and the foundations repaired.

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1. GENERAL:

The mine operated throughout the year on one eight-hour shift, six days per week; in 1928 it operated five days per week. The increase of one day per week in the operating schedule increased the estimated product from 240,000 tons to 300,000 tons. On July 20th an increase in production to 420,000 tons per year, or 35,000 tons per month, was authorized. As miners were scarce the working force was increased gradually and the new schedule of production was not obtained until in October. On the basis of 300,000 tons product per year, effective January 1st, it was necessary to add a small night shift crew to tram ore from chutes and hoist on account of the depth of the shaft to the operating levels.

Stoping was continued in the same areas as in 1928, except that more contracts worked South of the fault dike just below the 4th level. Mining on the Mitchell lease, Lot 11, just above the 4th level, was nearly completed at the end of the year. The ore body here was smaller than anticipated due to the flattening of the footwall, to more small dikes, and more low grade ore.

More rapid mining of sub levels made possible by use of scrapers and operating six days per week has improved operating conditions in the mine by decreasing the amount of repair work at raises and in connecting drifts between the raises on the sub levels.

Labor conditions were satisfactory during 1929. There was some delay in recruiting miners after the increase in production was authorized in July. The labor turnover during the year was extremely low.

The mine is now operating practically at the limit of production, hoisting two eight-hour shifts. Any further increase in product would require hoisting ore either three eight-hour shifts or overtime hoisting on one or both of the two eight-hour shifts, depending on the amount of increase.

The grade of ore produced in 1929 averaged 1/2% lower in iron than in 1928, due to leaner ore in some of the areas mined. More benefit will be obtained from the new system of poling down during subsequent years than was possible this year when it was being introduced. Mining on some sub levels is now under the poles and other areas will be mining under poles before the end of 1930.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

Only one grade of ore is made, namely, Athens Ore. Nearly all the ore produced in 1929 came from the parcels owned in fee, the balance from the Mitchell lease. The ore from the Mitchell lease is stocked separately.

<u>Grade</u>	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Athens	306,510	184,205	122,305	
Mitchell Lease	<u>36,637</u>	<u>57,385</u>		<u>20,748</u>
Total Ore	343,147	241,590	101,557	
Rock	1,437	387	1,050	

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	43,965	390,150	434,115	257,334
Mitchell Lease	5,405	46,420	51,825	62,866
Lucky Star	<u>0</u>	<u>0</u>	<u>0</u>	<u>40</u>
Total	49,370	436,570	485,940	320,240
Total Last Year	1,912	318,328	320,240	
Increase	47,458	118,242	165,700	

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

b. Shipments: (Cont)

Shipments increased in 1929 and for the first time in many years practically all of the stockpiles were shipped. To avoid tearing down the wooden trestle on the end of the Southeast steel trestle, some Mitchell Ore stocked in the winter of 1928 and 1929 was left in stock. All the Athens Ore stocked prior to the Fall of 1929 was shipped. Stocking facilities were greatly improved, otherwise it would not have been possible to operate the mine on a basis of 35,000 tons per month throughout the winter. Shipment from pocket increased materially in 1929. A number of samples taken underground showed the moisture content of the dry ore to average the same as the ore loaded from stockpiles. Actual loading of railroad cars gave the same result and for the balance of the season from 25 to 35% of the ore hoisted was loaded at pocket into railroad cars.

c. Stockpile Inventories:

The ore in stock by grades December 31st, 1929, as compared with December 31st, 1928, is shown below:

<u>Grade</u>	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Athens Fee	46,863	78,204		31,341
Mitchell Lease	4,550	9,258		4,708
Total	51,413	87,462		36,049

The old stockpiles were entirely cleaned up during 1929 with the exception of a few thousand tons of Mitchell Ore, and the ore now in stock, with the above exception, is part of 1929 product.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

	<u>1929</u>	<u>1928</u>
Fourth Level	44,604	60,314
Eighth Level	298,543	181,276
Total	343,147	241,590

Production from the 4th level decreased due to the reduction in size of the territory mined and the consequent decrease in the number of contracts working.

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	20,445	5,077	25,522	-
February	19,108	3,700	22,808	-
March	22,676	2,746	25,422	104
April	22,033	2,789	24,822	-
May	23,758	2,770	26,528	147
June	23,145	2,641	25,786	-
July	25,785	3,191	28,976	204
August	27,590	2,950	30,540	-
September	28,362	3,175	31,537	189
October	33,083	3,022	36,105	4
November	29,992	2,456	32,448	573
December	30,533	2,120	32,653	216
Total	306,510	36,637	343,147	1,437

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

e. Production by Months: (Cont)

<u>Month</u>	<u>Athens</u>	<u>Mitchell Lease</u>	<u>Total</u>	<u>Rock</u>
Total - brot forward	306,510	36,637	343,147	1,437
Stockpile overrun	96,264	10,480	106,744	
Total	402,774	47,117	449,891	
Total last year	184,205	57,385	241,590	387
Increase	218,569		208,301	1,050
Decrease		10,268		

f. Ore Statement:

	<u>Athens</u>	<u>Mitchell Lease</u>	<u>Total</u>	<u>Total Last Year</u>
On Hand Jan. 1, 1929	78,204	9,258	87,462	166,072
Output for Year	306,510	36,637	343,147	241,590
Overrun	96,264	10,480	106,744	-
Total	480,978	56,375	537,353	407,662
Shipments	434,115	51,825	485,940	320,200
Balance on Hand	46,863	4,550	51,413	87,462
Increase in Output			101,557	
Decrease in ore on hand			36,049	

1929 - 1-8 hour shift 6 days per week, January 1st to December 31st, 1929.

1928 - 1-8 hour shift 5 days per week, January 1st to December 31st, 1928.

g. Delays:

The non-electrical delays were as follows:

April 20th - One-half shift due to broken brake band on skip hoist.

Aug. 10th, 12th - Two shifts due to installation of new shaft on the cage hoist.

h. Delays from Lack of Current:

There were no delays from lack of current.

3. ANALYSIS:

a. Average Mine Analysis on Output:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Athens	60.63	.126	6.26
Mitchell Lease	58.20	.136	7.51

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% deduction for rock.
10% deduction for loss in mining.

Percentage of Bessemer equals 0.

Fourth level and above	983,427 tons
Fourth level to Sixth, South side of dike	1,582,949 "
Fourth level to Sixth, North side of dike	324,691 "
Sixth level to 660' sub, South side of dike	351,094 "
Sixth level to 660' sub, North side of dike	198,682 "
660' sub to Eighth Level	1,074,252 "
Eighth level to Ninth level	451,949 "
Ninth level to Tenth level	354,812 "
Below Tenth level	<u>49,236 "</u>
Total developed ore	<u>5,371,092 "</u>

Developed ore increased 1,334,056 tons due to including the ore lying South of the dike between the Fourth and Sixth levels that has previously been considered as prospective ore. Comparing the total ore at end of 1929 with the total at end of previous year shows a decrease of 530,010 tons. Deducting from this figure the ore hoisted in 1929 leaves 186,863 tons as the decrease in ore reserves, exclusive of the product; 37,525 tons of this decrease occurs below the 8th level, 51,458 tons above the 4th, and the balance, or 88,983 tons, in the area from the 6th and 4th levels. A new estimate was made of the ore below the 8th level which showed 37,525 tons less in this area due to excluding some lean ore areas. The decrease above the 4th was due to flattening of the footwall, to small dikes in the ore, and to lean ore areas. The decrease between the 6th and 4th levels was due to jasper cutting off the ore areas.

b. Prospective Ore:

None.

Total all ore	5,371,092 tons
Decrease from 1928 estimate	530,010 "

c. Estimated Analysis:

Ore Reserves: Approximate expected Natural 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>
Athens Ore	53.00	.115	5.90	2.70	.440	1.00	.900	.011	1.44	13.00

Ore in Stock: Average Natural 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>
Athens Ore	52.63	.113	6.00	2.55	.424	1.13	.783	.011	1.39	13.00

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was no labor shortage during the year.

(2) New Construction:

None.

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

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	343,147	241,590	101,557	
No. Shifts and Hours	1-8 hr	1-8 hr		
<u>AVERAGE NO. MEN WORKING:</u>				
Surface	41	35	6	
Underground	140	124	16	
Total	181	159	22	
<u>AVERAGE WAGES PER DAY:</u>				
Surface	4.40	4.46		.06
Underground	5.03	5.01	.02	
Total	4.88	4.88		
<u>WAGES PER MONTH OF 25 DAYS:</u>				
Surface	110.00	111.50		.50
Underground	125.75	125.25	.50	
Total	122.00	122.00		
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	26.88	23.66	3.22	
Underground	8.12	7.23	.89	
Total	6.34	5.54	.80	
<u>LABOR COST PER TON:</u>				
Surface	.164	.189		.025
Underground	.619	.693		.074
Total	.783	.882		.099
<u>TONS PER MAN PER DAY:</u>				
Stopping	19.13	18.52	.61	
Ore Development	10.03	10.33		.30
Total	18.84	17.96	.88	
AVG. WAGES CONTRACT MINERS	5.61	5.57	.04	
<u>TOTAL NUMBER OF DAYS:</u>				
Surface	12,766	10,211 $\frac{1}{2}$	2,554 $\frac{1}{2}$	
Underground	42,259	33,431	8,828	
Total	55,025	43,642 $\frac{1}{2}$	11,382 $\frac{1}{2}$	
<u>AMOUNT FOR LABOR:</u>				
Surface	56,150.18	45,559.78	10,590.40	
Underground	212,526.80	167,475.94	45,050.86	
Total	268,676.98	213,035.72	55,641.26	

Proportion of Surface to Underground Men:

1929 - 1 to 3.41 One 8-hour shift six days per week
 1928 - 1 to 3.54 One 8-hour shift five days per week
 1927 - 1 to 3.51 One 8-hour shift five days per week
 1926 - 1 to 3.68 One 8-hour shift five days per week
 1925 - 1 to 3.80 One 8-hour shift five days per week

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6. SURFACE:

a. Buildings, Repairs:

The interior of the dry house was painted and chains with hooks for drying the mine clothes substituted for the former pipe drying racks. New benches with high backs were installed, and two of the three wash troughs removed from the wash room. The dry house is now better lighted, more roomy, and conforms to the standard practice.

The exterior of the sheet iron walls of the timber tunnel were painted.

b. Stockpiles:

Six wooden trestle bents were erected in January at the end of the Southeast steel stocking trestle which, with the two erected in December 1928, made a total of eight, or 192 ft. of stocking trestle 50 ft. in height. Mitchell ore was stocked here in the winter of 1928-1929. Some ore was loaded by steam shovel along both sides of the trestle and this winter all the Mitchell Lease ore hoisted is being stocked here.

The removal of the ore stocked from the wooden trestles many years ago cleaned up the stocking grounds and increased stocking capacity of the South-east steel trestle.

Late in the Fall after shipping was completed the shovel moved a pile of ore along the South side of the Northeast trestle, casting it over onto the stocking ground. This ore could not be cleaned up in the Spring due to frost.

At the present rate of production it will be necessary to move the ore in stock next summer to insure stocking room for the winter 1930-1931.

c. Timber Treating Plant:

The comparative cost of treating timber for 1929 and 1928 is as follows:

	<u>Cost of treating, per foot</u>	
	<u>1929</u>	<u>1928</u>
Peeling	.0312	.0312
Framing	-	.0128
Treating	.0364	.0416
Decking	.0073	.0126
Unloading	-	.0074
Zinc Chloride	.0431	.1021
Heat, Water, etc.	<u>.0071</u>	<u>.0096</u>
Total	.1251	.2175
Rigging up old plant	.0081	-
Maintenance Cost	<u>.0028</u>	<u>-</u>
Grand Total	.1360	.2175

Number of pieces treated, 1929 - 2,768	Number of feet, 23,431
Number of pieces treated, 1928 - 2,098	Number of feet, 18,018

	<u>1929</u>	<u>1928</u>
Number of pieces used at the Athens Mine	477	1,210
" " shipped to Maas Mine	886	106
" " " " Negaunee Mine	607	483
" " " " Holmes Mine	-	225
" " " " Morris-Lloyd Mine	<u>504</u>	<u>-</u>
Total pieces used and shipped	2,474	2,024
Increase in 1929	450	

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6. SURFACE:

c. Timber Treating Plant: (Cont)

	<u>Treated Timber</u> <u>on hand 12/31/29</u>	<u>Peeled untreated timber</u> <u>on hand 12/31/29</u>
9' pieces	901	5
8' pieces	<u>811</u>	<u>690</u>
Total	1,712	695
Total 1928	1,418	1,047

An investigation of the concrete treating tanks showed that the expense of making them water tight was not warranted and it was decided to discontinue their use. The two former vertical steel tanks were rigged up for service and treating commenced June 17th and continued until the middle of September.

e. Timber Tunnel:

The first switch on the timber tunnel track was 200 ft. from the shaft. All empty timber trucks had to be trammed this distance before a loaded truck could be brought to the shaft and put on the cage. A new switch was installed about 30 ft. from the shaft and a track laid from this point and connected with the old switch track 200 ft. from the shaft. Since the new switch and track was installed two more truck loads of timber can be sent down in an hour. This has eliminated some overtime work sending down timber.

f. Tracks & Roads:

The L. S. & I. Railroad built a sidetrack about 400 ft. in length on the South side of the loading track leading to the Southeast steel trestle stockpile grounds. The new track was extended along the edge of the cut on the South side of the stockpile grounds. A loading platform was built on top of the bank which extended beyond the top of the railroad ore car. Lump ore was dumped from a truck directly into the ore car. Prior to this time lump ore was loaded by the steam shovel after two handlings, one loading the trucks, the other loading again by hand into the steam shovel dipper. The cost of loading lump ore was reduced nearly one-half after the side track was installed. The side track also is used for storing empties and saves considerable time in switching.

7. UNDERGROUND:

a. Shaft Sinking:

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

b. Development:

The main development during the year was the completion of six raises on the South side of the dike above the 6th level and the subsequent starting of mining in this territory. The first sub level was opened under the hanging just below the 4th level and the area of each successive sub level has been larger due to the expected Southerly dip of the jasper hanging wall. A drift was driven connecting these raises on the same elevation as the drift on the North side of the dike (480' sub level) to provide a travelling road and air way.

On the North side of the dike above the 6th level mining is progressing so rapidly that a new intermediate sub level was started late in the year to connect the raises at an elevation of about 40' above the 6th level. During the year new raises, in some cases branch raises from existing raises, were put up from both the 6th and 8th levels in order to permit of more economical mining in various areas by decreasing the length of scraper haul. A small amount of drifting was then necessary to connect these raises with the travelling roads on the 720 ft. sub level, above the 8th level.

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7. UNDERGROUND:

c. Stoping:

Mining was continued throughout the year in the same three blocks as last year. The absence of water and heavy pressures in the areas being mined again allowed 100% scraper equipment. The location of operations in the three blocks during the year was (1) just above the 4th level along the South foot-wall, (2) just below the 4th level and above the 6th level on both the North and South sides of the fault dike, and (3) above the 8th level on both North and South sides of the fault dike. Due to the rapid encroachment of the footwall into the ore body above the 4th level this block was reduced in size as mining progressed downward towards the level. This block will be completely mined above the 4th level early in 1930 and the contracts released will be moved to the block above the 6th level which is rapidly increasing in size. The block above the 8th level has been mined nearly half way between the 6th and 8th levels and a number of new raises in this territory has speeded up mining and improved operating conditions here.

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

Subs above the 4th Level:

-340' Sub Level:

Mining was started at this elevation in October 1928 and was completed in March of this year. The ore area showed the expected reduction in size because of the encroachment of the dike and slate footwall from the South and East.

-355' Sub Level:

Mining started here in February and was completed in August. The lean ore area North of the ore body was explored for ore without success while the ore body was again reduced in size due to being cut off on the East by the foot and on the South by the dike.

-365' Sub Level:

This sub level was started in June and at the end of the year one contract was removing the last pillar Southwest of #423 raise. The lean ore at this elevation confined mining operations to the West side of the raises.

-375' Sub Level:

This sub level, the last one to be mined above the 4th level for a number of years, was started in October. Two contracts were mining here at the end of the year in mixed ground which makes it necessary to select and grade very carefully.

Subs above the 6th Level:

-430' Sub Level: South side of dike:

This sub level was started in December 1928 and mining was completed in June. The area of the sub level was much larger than the sub level above which was mined last year. The increase in size was due to the flat dip of the jasper hanging wall to the South and West.

-440' Sub Level: North side of dike:

Mining on this side of the dike was resumed in October 1928 and completed in April of this year. The ore body was quite wide along the mining limit on the East side because of the Northerly dip of the jasper hanging wall.

-440' Sub Level: South side of dike:

This sub level was completely mined during the year from the six raises put up from the 6th level. Mining started here in May and was finished in October.

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7. UNDERGROUND:

c. Stoping:

-445' Sub Level: North side of dike:

Mining was started on this sub level in February and completed in September. The size of the ore area was again increased due to the Northerly dip of the jasper hanging wall.

-445' Sub Level: South side of dike:

At the end of the year three contracts were removing pillars at the West end of this ore area. Mining was started here in September and nearly 90% of the ore was mined at the end of the year. The size of the ore body increased, especially in the area midway between the mining limits due to the Southerly dip of the jasper hanging wall.

-450' Sub Level: North side of dike:

Four contracts were removing pillars in the East half of this sub level at the end of the year. Mining was started here in July and will be finished in sixty days.

-450' Sub Level: South side of dike:

This sub level was opened in December by two contracts. At the end of the year they had connected the two Easterly raises and had started to mine.

-460' Sub Level: North side of dike:

Mining was started on this sub level in October and at the end of the year three raises had been connected in the West half of the ore area and mining was underway, three contracts working here.

-480' Sub Level: South side of dike:

Early in the year the travelling road and air way connecting the six raises on this side of the dike was completed. There was 125 ft. of ore drifting and 20 ft. of rock drifting.

-550' Sub Level: North side of dike:

Because of the rapid approach of mining operations to the travelling road and air way on the 480 ft. sub level, a new intermediate sub level was started in November. It is 40 ft. above the 6th level and will connect all raises at this elevation to provide easy access to the working places above and as an aid to ventilation. One contract had completed 80 ft. of ore drifting at the end of the year. From this new sub level a branch raise was started from #638 raise and at the end of the year was up 85 ft., of which 65 ft. was the advance for the month of December. Of the total, 75 ft. was in ore and 10 ft. in jasper. This branch raise is intended to cut down the length of scraper haul on the sub levels above in the wide section of the ore body along the mining limit.

Sixth Level:

The raising program planned for the 6th level and above was started late in 1928 and completed early in the year. All the raises were located on the South side of the dike. The following is a record of the raising done in 1929:

#631 raise	-	54'	in ore
#632	"	- 27'	"
#633	"	- 62'	"
#634	"	- 65'	"
Total		208'	

Subs above the 8th Level:

-635' Sub Level: South side of dike:

The mining of the ore area adjacent to the mining limit was completed in July. The South boundary of the ore body was partly slate footwall and partly hanging jasper. This sub level has the widest section of ore that may be expected on this side of the dike because the Northerly dip of the slate will reduce the area on lower sub levels.

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7. UNDERGROUND:

c. Stoping:

-645' Sub Level: South side of dike:

Mining operations were started on this side of the dike late in 1928 and were completed in December of this year. A section of jasper hanging wall in a small area again prevented the ore from making the contact with the slate footwall on a part of the South boundary.

-660' Sub Level: North side of dike:

The removal of pillars in the Southwesterly part of the ore area early in the year completed mining on this sub level.

-660' Sub Level: South side of dike:

An extremely wet area in the West end of the ore body on this sub level necessitated leaving a small amount of ore in place as a protection for mining of adjacent areas on lower sub levels. Four contracts were mining pillars in the East half of this sub level at the end of the year.

-675' Sub Level: North side of dike:

Mining was started here in October 1928 and at the end of the year two contracts were completing the removal of the last small pillars along the central line of raises. In the Northeast corner of the ore block a horse of jasper slightly reduced the size of the ore area at this elevation.

-675' Sub Level: South side of dike:

Three contracts were mining from the three raises in the West half of the ore area at the end of the year. Mining was started on this side of the dike in October.

-685' Sub Level: North side of dike:

Mining was started on this sub level in May. At the end of the year the removal of ore on the North and East line of raises had been completed while four contracts were mining from the West and central line of raises.

-695' Sub Level: North side of dike:

Mining was started from the East line of raises in October and at the end of the year eight contracts were mining from both the North and East line of raises.

-720' Sub Level:

There was 160 ft. of ore drifting on this sub level in 1929 to connect the new raises put up from the 8th level during the year, with the travelling roads already driven. On the South side of the dike three double compartment branch raises were put up to the working sub levels from this sub level to improve water conditions and cut down the length of scraper haul.

- #857-C Raise advanced 77' in ore
- #837-A " " 77' "
- #857-D " " 65' "

Eighth Level:

During 1929 four raises were completed to the working sub levels above and a fifth was being put up at the end of the year. They were all double compartment raises.

- #805 Raise advanced 90' in ore
- #806 " " 117' "
- #858 " " 120' of which 90' was ore and 30' rock
- #838 " " 110' " " 60' " " " 50' "
- #807 " " 50' in ore - not completed

These raises will improve mining conditions in the large ore area on the sub levels above the 8th level by decreasing the average length of scraper haul. They will also cut down the amount of time necessary to mine the block of ore from each raise thereby decreasing retimbering expense and will also improve operating conditions in wet areas.

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7. UNDERGROUND:

d. Timbering:

Statement of Timber Used:

	<u>LINEAR</u> <u>FEET</u>	<u>AVG. PRICE</u> <u>PER FOOT</u>	<u>AMOUNT</u> <u>1929</u>	<u>AMOUNT</u> <u>1928</u>
6" to 8" timber	79,992	.0430	3,437.70	3,838.68
8" to 10" "	80,603	.0628	5,062.22	4,329.76
10" to 12" "	58,406	.0905	5,285.10	3,488.82
12" to 14" "	27,866	.1351	3,764.78	4,245.40
Total Timber - 1929	246,867	.0711	17,549.80	
Total Timber - 1928	228,944	.0695		15,902.66
		<u>Per 100'</u>		
7' Lagging	1,047,375	.7224	7,565.87	5,884.23
Poles	605,799	1.5138	9,170.84	5,798.42
Total - 1929	1,653,174	1.0124	16,736.71	
Total - 1928	1,175,363	.9940		11,682.65
Covering Boards, 1"	30,400	18.0000 M	547.20	1,575.43
Product for year			343,147	241,590
Feet of timber per ton of ore			.719	.948
Feet of lagging per ton of ore			3.052	3.338
Feet of lagging per foot of timber			4.243	3.522
Cost per ton for timber			.0511	.0658
Cost per ton for lagging			.0221	.0244
Cost per ton for covering boards			.0016	.0065
Cost per ton for poles			.0267	.0240
Cost per ton for timber, lagging, poles & boards			.1015	.1207
Equivalent of stull timber to board measure			472,241	428,408
Feet of board measure per ton of ore			1.376	1.773

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

<u>YEAR</u>	<u>AMOUNT</u>	<u>COST PER TON</u>
1929	\$ 34,833.71	\$.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
1923	23,356.15	.0951
1922	16,566.21	.0857
1921	23,169.19	.1316
1920	22,622.15	.1146

The cost per ton for timber decreased in 1929 due to less ore drifting on main levels, less ore raising, and to more rapid mining which decreased the amount of timber repairs required to keep the sub levels open. The cost per foot for timber increased slightly while the cost per 100 for 7 ft. lagging and 9½ ft. poles decreased. More 8 to 10" timber was used than in the previous year; this was made possible by mining more rapidly, particularly in the areas where larger scraper hoists were installed during the past year. The product increased 42%, the amount of timber used only 7%, but the amount of 7 ft. lagging and poles increased 40%. This latter increase occurred mainly in the 9½ ft. poles, a large number of which were used on the sub levels for floor covering. Under new ground the poles are placed close together and nailed to three cross poles, making a very strong and close floor covering. The timber repair work on the main levels, which has always been a considerable item at this property in the cost for timber, is practically constant from year to year, so that with a larger product it has less influence on the cost per ton for timber.

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7. UNDERGROUND:

e. Drifting and Raising:

The following statement gives comparative figures of drifting and raising for the years 1929 and 1928.

<u>Year</u>	<u>Ore Drifting</u>	<u>Ore Raising</u>	<u>Rock Drifting</u>	<u>Rock Raising</u>	<u>Total</u>
1929	365'	910'	143'	26'	444'
1928	951'	1,097'	30'	0'	2,078'
Decrease	586'	187'			634'
Increase			113'	26'	

Ore drifting decreased in 1929 due to no drifting on main levels and to less drifting on intermediate sub levels for ventilation, travelling and timber roads. Ore raising was slightly less but there was some rock raising in 1929, none in 1928. There was more rock drifting in 1929, through dikes mainly on sub levels above the 4th level.

f. Explosives, Drilling and Blasting:

Statement of Explosives Used:

	<u>Quantity</u>	<u>Average Price</u>	<u>1929 Amount</u>	<u>1928 Amount</u>
50% Am. Gel.	78,450	13.00	10,198.50	9,040.04
60% Am. Gel.	46,350	14.25	6,607.91	4,609.50
Total Powder - 1929	124,800	13.47	16,806.41	
Total Powder - 1928				13,649.54
Fuse	425,900	5.85	2,491.93	1,861.24
Caps	68,100	11.65	793.54	562.09
Cap Crimpers			29.01	9.32
Connecting Wire			8.20	3.83
Tamping Bags & Fuse Containers	40	1.40	56.00	10.75
Total Fuse, etc. 1929			3,378.68	
Total Fuse, etc. 1928				2,447.23
Total All Explosives - 1929			20,185.09	
Total All Explosives - 1928				16,096.77
Product			343,147	241,590
Pounds of powder per ton of ore			.3637	.3955
Cost per ton for powder			.0490	.0565
" " " " fuse, caps, etc.			.0098	.0101
" " " " all explosives			.0588	.0666

Sinking, Rock Development, etc.

	<u>Quantity</u>	<u>Average Price</u>	<u>1929 Amount</u>	<u>1928 Amount</u>
Hercomite	1,600	12.75	204.00	-
50% Am. Gel.	4,900	13.00	637.00	41.25
60% Am. Gel.	400	14.25	56.99	127.50
Total Powder - 1929	6,900	13.01	897.99	
Total Powder - 1928				168.75

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7. UNDERGROUND:

f. Explosives, Drilling and Blasting: (Cont)

	<u>Quantity</u>	<u>Average Price</u>	<u>1929 Amount</u>	<u>1928 Amount</u>
Fuse	8,200	5.86	48.05	11.13
Caps	1,300	11.62	15.11	2.13
Cap Crimpers				2.67
Connecting Wire			9.98	
Total Fuse, etc. 1929			73.14	
Total Fuse, etc. 1928				15.93
Total All Explosives - 1929			971.13	
Total All Explosives - 1928				184.68
Total Explosives Used in Mine - 1929			21,156.22	
Total Explosives Used in Mine - 1928				16,281.45
Average price per pound for powder			.1344	.1429

On account of the larger product more explosives were used in 1929 - 124,800 lbs. as compared with 95,550 lbs. in 1928. The pounds of powder per ton of ore decreased due to less mining in areas where ore was hard and tough (blue steel ore) and to less ore drifting and raising. The average price per pound for powder decreased 5.7%, the cost per ton for all explosives decreased 13%. The factors accounting for the decrease in cost per ton were: less drifting and raising in ore, lower cost per pound for powder, and less mining in areas where ore was tough and hard to break.

g. Mining and Loading:

The latter part of the year in areas where there was a good mat the sub level interval was increased to 12½ ft. In areas opened under new ground the interval was 11 ft. The larger the sub level interval, consistent with safety and clean extraction, the lower the stoping cost and higher the tons per man stoping. Under new ground shorter intervals are taken for safety but as sub levels are opened beneath and the mat increases in thickness, the interval is increased and it is hoped will eventually reach 13 ft.

A new system of poling down floors of sub levels was adopted at all the company soft ore mines in 1929. Three or more cross poles 9½' long, 4 to 6" in diameter, are laid on the floor of the sub level and poles then laid lengthwise and spiked to the cross poles. Gaps are left for lapping and spiking so that the floor covering in a drift is continuous and all tied together. The interval between the poles is governed by the amount of mat above, with a minimum of about eight poles where the mat is thick. In new ground the poles are laid close together and cross lagged on top with 7' lagging to make a tight floor covering. The new system is now in general use throughout the Athens and is proving very satisfactory. The new system of poling down has made it possible to increase the sub level interval with safety.

Scrapers were used for handling the ore in all stoping contracts during the past year. Some difficulty was experienced in a few wet areas but additional raises have improved operating conditions.

i. Ventilation:

The reopening to full size of the airways on and between levels, which work had been started in 1928, was completed early in 1929, and the ventilation was greatly benefited. Two additional booster fans were installed in the subs above the eighth level. There are now five of these fans in this territory that are moved about as conditions require to secure adequate ventilation.

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7. UNDERGROUND:

j. Pumpings:

The number of gallons pumped per minute in 1929 as compared with 1928 and 1927 is shown by the following table:

<u>Month</u>	<u>1929</u>	<u>1928</u>	<u>1927</u>
January	219	233	261
February	218	231	257
March	211	228	251
April	216	227	239
May	221	227	232
June	223	227	233
July	222	227	239
August	226	228	238
September	225	230	236
October	228	230	236
November	231	227	235
December	<u>232</u>	<u>224</u>	<u>234</u>
Total Average	223	228	242

The average gallons pumped per minute for the past seven years is as follows:

<u>Year</u>	<u>Gals. per minute</u>
1929	223
1928	228
1927	242
1926	268
1925	251
1924	218
1923	195

There was a further small decrease in gallons pumped per minute in 1929. A decrease has occurred every year since 1925.

k. Shaft:

The installation of the new steel skip road dividers that were purchased late in 1928 continued during the year. During 1929, 66 dividers were put in place, leaving only a few to be put in next year to complete this work. Since these new dividers have been installed the shearing of rivets and breaking of the steel sets has ceased.

l. Underground in General:

General conditions in the mine have been good throughout the year. The customary amount of repair work was done on the main levels, treated timber was installed where pressures were not excessive. Scrapers were used to move all ore on sub levels; conditions are good in about 90% of the working places, in 10% water interferes and ditching is necessary. Additional raises have been put up in the wet areas, giving more outlets for the ore and smaller areas to mine from each raise. The water is conducted to one or more raises which greatly improves operating conditions at the other raises.

Two additional blowers were installed on intermediate sub levels, making five in all, to improve ventilation on the sub levels being mined above.

The reopening of all ventilation drifts and raises on the main air ways, which work was started in 1928, was completed in 1929. Special lights have been installed in all ventilation raises used as travelling roads where the air current is so strong as to make it impossible to go through the raise and keep a carbide lamp burning.

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8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	343,147	241,590	101,557	
Underground Costs	1.124	1.248		.124
Surface Costs	.208	.225		.017
General Mine Accounts	.071	.082		.011
Cost of Production	1.403	1.555		.152
Loading and Shipping	.054	.035	.019	
Total Cost at Mine as per Cost Sheet	1.457	1.590		.143
Depreciation - Plant and Equipment	.087	.138		.051
Depletion	.097	.082	.015	
Movable Equipment	.001	.002		.001
Development	.089	.089		
Increment Depletion	.212	.200	.012	
Taxes	.281	.396		.115
Central Office	.037	.047		.010
Welfare, Safety, Hosp.	.020	.032		.012
Misc. Debits & Credits	.015	.016		.001
Administrative Expense	.050	.050		
Total Cost at Mine	2.346	2.642		.296
No. of Days Operated	299	261½	37½	
No. Shifts & Hours	1-8 hr	1-8 hr		
Average Daily Product	1,148	921	227	

COST OF PRODUCTION:

Labor	.788	.898	.110
Supplies	.615	.657	.042
Total	1.403	1.555	.152

b. Detailed Cost Comparison:

(1) Days and Shifts:

<u>Year</u>	<u>Shifts & Days per Week</u>	<u>Days Worked</u>	<u>Average No. Men</u>	<u>Total Days Worked</u>
1929	1-8 hr 6 days per week	299	181	55,024½
1928	1-8 hr 5 days per week	261½	159	43,642½
Increase 1929	1 day per week	37½	22	11,382

(2) Wages:

The mine operated on the same wage schedule in 1929 and 1928.

(3) Comparison of Production:

Production - 1929	343,147 tons
Production - 1928	241,590 "
Increase	101,557 "

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8. COST OF OPERATING:

b. Detailed Cost Comparison: (Cont)

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate per day</u>
1929	181	55,024 $\frac{1}{2}$	\$ 268,676.98	\$ 4.88
1928	159	43,642 $\frac{1}{2}$	213,035.72	4.88
Increase	22	11,382	55,641.26	0

(5) Tons per man per day:

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

	<u>1929</u>	<u>1928</u>	<u>Increase</u>
Surface	26.88	23.66	3.22
Underground	8.12	7.23	.89
Total	6.24	5.54	.70

(6) Cost of Production:

1929 -	\$481,562.32	Cost per ton	\$1.403
1928 -	375,952.87	" " "	1.555
Increase	105,609.45		
Decrease			.152

	<u>Total Cost</u>				<u>Cost per ton</u>		
	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1929 -	\$270,604.77	56.20	\$210,957.55	43.80	\$.788	\$.615	\$1.403
1928 -	217,040.17	57.75	158,912.70	42.25	.898	.657	1.555
Incr.	53,564.60		52,044.85				
Decr.					.110	.042	.152

(7) Detail of Accounts:

UNDERGROUND COSTS:

Development in Rock

1929 Amount	\$ 827.02	Cost per ton	\$.002
1928 Amount	111.93	" " "	.000
Increase	715.09		.002

	<u>Sub Division</u>			<u>Total</u>	<u>Cost per Ft.</u>
	<u>Drifting</u>	<u>Raising</u>			
1929	143'	26'		169'	\$ 4.89
1928	30'	None		30'	3.70
Increase	113'	26'		139'	1.19

There was more rock drifting and raising in 1929. Most of the rock drifting was in dikes on the sub levels above the 4th level.

Development in Ore

1929 Amount	\$4,913.05	Cost per ton	\$.014
1928 Amount	7,328.86	" " "	.030
Decrease	2,415.81		.016

	<u>Sub Division</u>			<u>Total</u>	<u>Cost per Ft.</u>
	<u>Drifting</u>	<u>Raising</u>			
1929	15'	944'		959'	\$ 5.12
1928	951'	1,097'		2,048'	3.58
Decrease	936'	153'		1,089'	1.54 Increase

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Development in Ore: (Cont)

The decrease was due to less raising and drifting in 1929. There were 5,895 tons of ore mined in development in 1929, at an average of 10.03 tons per man per day, while in 1928, 9,401 tons were mined at an average of 10.33 tons per man per day. The decrease for 1929 was 3,506 tons and 0.30 tons per man per day.

Stoping:

1929 Amount	\$145,390.80	Cost per ton	\$.424
1928 Amount	101,707.14	" " "	.421
Increase	43,683.66		.003

		<u>Detail</u>	
		<u>Labor</u>	<u>Supplies</u>
1929 -	\$102,342.15	70.4%	\$43,048.65 29.6%
1928 -	73,129.03	71.9%	28,578.11 28.1%
Increase	29,213.12		14,470.54

In 1929, there were 337,252 tons mined from stoping operations, an average of 19.13 tons per man per day, while in 1928 there were 232,189 tons mined, averaging 18.52 tons per man per day. The increase in 1929 was 105,063 tons and 0.61 tons per man per day.

In 1929, there were charged to stoping cost six new 15 h.p. Sullivan electric scraper hoists, \$6,643.00, and three new Ingersoll Rand air scraper hoists, \$1,935.00, a total of \$8,578.00. In 1928 this account was charged with three new Ingersoll-Rand air scraper hoists, costing \$1,981.00, five second-hand Ingersoll Rand air scraper hoists, costing \$1,694.50, and two second hand Sullivan 6½ h.p. electric scraper hoists, costing \$780.00, a total of \$4,455.50.

There was also more expense in 1929 for repairs to scraper hoists and more wire rope used, etc. due to the larger product and more scraper hoists in service.

The cost per ton increased slightly in 1929 due mainly to more expense for purchase of scraper hoists.

Explosives:

	<u>1929</u>	<u>1928</u>
Total pounds of powder	124,800	95,550
Average price per pound	.1347	.1429
Total Amount for powder	\$16,806.41	\$13,649.54
Cost of fuse, caps, etc.	3,378.68	2,447.23
Cost of all explosives	20,185.09	16,096.77
Pounds of powder per ton of ore	.3637	.3955
Cost per ton for powder	.0490	.0565
Cost per ton for all explosives	.0588	.0666

Explosive costs were lower in 1929, due mainly to a lower cost per pound for powder.

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Timbering

1929 Amount	\$101,753.89	Cost per ton	\$.297
1928 Amount	89,431.49	" " "	.370
Increase	12,322.40	Decrease	.073

Detailed Cost of Timber

	<u>1929</u>	<u>1928</u>
Cost of Stull Timber	\$17,549.80	\$15,902.66
Cost of lagging and poles	17,283.91	13,258.08
Total Cost	34,833.71	29,160.74
Feet of timber per ton of ore	.719	.948
Cost per ton for timber, lagging and poles	.1015	.1207
Decrease 1929	.0192	

There were three second hand single drum tigger hoists bought from the Stephenson Mine equipment in 1928, costing \$469.00. None bought in 1929. Less cribbing timber was used in 1929 on account of less raising. More 8 to 10" timber was used in 1929 on account of mining more rapidly. There was less repairing on the intermediate sub levels used for ventilation, travelling, and timber roads. More rapid mining due to use of scrapers has also decreased the amount of retimbering around raises on sub levels and in the ventilation and timber drifts connecting the various raises on each sub level.

Tramming

1929 Amount	\$38,211.71	Cost per ton	\$.111
1928 Amount	25,921.00	" " "	.107
Increase	12,290.71		.004

The increased schedule of production necessitated a night shift hoisting and tramming crew throughout 1929, while in 1928 all extra hoisting was done on overtime. There were also 38½ more working days in 1929 than in 1928.

Ventilation

1929 Amount	\$4,725.95	Cost per ton	\$.014
1928 Amount	2,944.71	" " "	.016
Increase	1,781.24	Decrease	.002

There was an increase in current for operating the fan due to the mine working 299 days in 1929 as compared with 261½ days in 1928. The cost for power in 1929 was \$3,012.51, and in 1928 \$2,136.78, an increase of \$875.73. More ventube was used in 1929 than in 1928 on account of installing two more booster fans.

Pumping

1929 Amount	\$19,803.93	Cost per ton	\$.058
1928 Amount	20,872.94	" " "	.067
Decrease	1,030.99		.029

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Pumping (Cont)

	<u>1929</u>	<u>1928</u>
Total gallons of water pumped	117,645,970	120,178,303
Gallons pumped per minute	223	228

There was a decrease in 1929 of 2,532,333 gallons of water pumped, or 5 gallons per minute. Labor cost was less in 1929 as a pumpman helper was not necessary on the night shift on account of tramping and hoisting. During 1928 a helper was required throughout the year.

Compressors & Air Pipes

1929 Amount	\$49,226.59	Cost per ton	\$.143
1928 Amount	34,005.62	" " "	.141
Increase	15,220.97		.002

	<u>Sub Division</u>		
	<u>1929</u>	<u>1928</u>	<u>Increase</u>
Compressors	\$44,140.75	\$29,388.96	\$14,751.79
Air Pipes	5,085.84	4,616.66	369.18

Cubic feet of air compressed in 1929	-	1,154,380,000
" " " " " " 1928	-	710,640,000
Cost per thousand cubic feet in 1929	-	\$.0382
" " " " " " 1928	-	.0419

The increase in 1929 was 443,740,000 cubic feet, at a decrease of \$.0037 per thousand cubic feet. There were three more air scraper hoists operating in 1929 than in 1928, and more shifts were worked.

Underground Superintendence

1929 Amount	\$11,014.84	Cost per ton	\$.032
1928 Amount	10,008.80	" " "	.042
Increase	1,006.04	Decrease	.010

There was another shift boss added in October, making a total of five, whereas there were four at the beginning of the year and four during all of 1928.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills

1929 Amount	\$1,693.19	Cost per ton	\$.005
1928 Amount	364.87	" " "	.002
Increase	1,328.32		.003

	<u>Repairs to</u> <u>Compressors</u>	<u>Air Lines</u>	<u>Power Drills</u>
1929	\$ 458.48	\$ 44.71	\$1,190.00
1928	364.87	None	None
Increase	93.61	44.71	1,190.00

Increase in repairs to compressors due to more parts purchased for Ingersoll Rand compressor. Charges to air lines were for repairs to 6" air line on surface.

There were 7 new auger air drill machines bought in 1929. None in 1928. The new machines were bought on account of adding contracts in the summer when production was increased.

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Hand Trammig Equipment

1929 Amount	\$ 0.00	Cost per ton	\$.000
1928 Amount	9.95	" " "	.000
Decrease	9.95		

There were no sub level cars in use during 1929.

Electric Tram Equipment

1929 Amount	\$7,662.79	Cost per ton	\$.022
1928 Amount	6,131.34	" " "	.025
Increase	1,531.45	Decrease	.003

	Sub Division			
	1929	1928	Increase	Decrease
Generator & Motor	35.13	21.50	13.63	
Locomotives	1,544.26	1,145.48	398.78	
Wiring	1,195.08	758.27	436.81	
Main Line Tracks	2,223.01	1,905.57	317.44	
Main Line Cars	2,665.31	2,300.52	364.79	

The increase in expense for Locomotives was due to more repairs to underground haulage motors.

The increase in Wiring expense was due to extending and repairing trolley lines.

The increase in Main Line Tracks and Cars was due to more expense for overhauling and repairing.

Pumping Machinery

1929 Amount	\$ 660.92	Cost per ton	\$.002
1928 Amount	1,691.07	" " "	.007
Decrease	1,030.15		.005

The decrease in 1929 was due to less repairs to pumps. In 1928 repairs were high due to replacing eight pumpplungers and bushings and also a section of pump cable which had blown out.

Total Underground Costs

1929 Amount	\$385,884.68	Cost per ton	\$1.124
1928 Amount	301,523.85	" " "	1.248
Increase	84,360.83	Decrease	.124

Three items account for most of the above decrease in cost per ton as follows:

Timbering	.073
Pumping	.029
Underground Superintendence	<u>.010</u>
	.112

The balance is from small decreases in a number of the accounts.. The decrease in cost per ton in nearly all accounts was due to larger product.

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SURFACE COSTS:

Hoisting

1929 Amount	\$31,750.15	Cost per ton	\$.092
1928 Amount	22,745.03	" " "	.094
Increase	9,005.12	Decrease	.002

In 1929 there were 344,584 tons of ore and rock hoisted from an average depth of 2,148 feet. In 1928 there were 241,977 tons hoisted from an average depth of 2,100 feet. The increase in 1929 was 102,607 tons and an increase in depth of 48 feet.

Stocking Ore

1929 Amount	\$8,074.60	Cost per ton	\$.023
1928 Amount	5,602.01	" " "	.023
Increase	2,472.59		

In 1929 there were 293,777 tons stocked, as compared with 239,678 tons in 1928, an increase of 54,099 tons.

Dry House

1929 Amount	\$7,579.26	Cost per ton	\$.022
1928 Amount	5,432.17	" " "	.023
Increase	2,147.09	Decrease	.001

In 1929 the old clothes drying pipe racks were taken out and overhead pulleys installed, new benches built, and the interior of dry house painted. Two new hot water tanks were installed at a cost of \$479.47. The mine operated 38½ more days in 1929.

Coal to Boiler House

	<u>Tons</u>	<u>Cost</u>
1929	807	\$3,990.60
1928	827	4,529.11

General Surface Expense

1929 Amount	\$6,109.23	Cost per ton	\$.318
1928 Amount	6,068.30	" " "	.025
Increase	40.93	Decrease	.007

The charges to improvement and care of grounds in 1929 were \$595.66, while in 1928 they were \$646.08, a decrease of \$50.42 in 1929. The increase in expense to surface was due to more labor repairing roads and fences.

MAINTENANCE ACCOUNTS:

Hoisting Equipment

1929 Amount	\$11,196.97	Cost per ton	\$.033
1928 Amount	8,840.34	" " "	.037
Increase	2,356.63	Decrease	.004

Sub Division

	<u>Mach. Parts</u>	<u>Skips & Skip Roads</u>	<u>Wire Rope</u>
1929	\$3,239.05	\$3,115.49	\$4,842.43
1928	3,251.55	2,543.76	3,045.03
Increase		571.73	1,797.40
Decrease	12.50		

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Hoisting Equipment (Cont)

In 1929 the new shaft made by the Lake Shore Engine Works in 1928 for the cage hoist was installed. There was an additional charge of \$135.00 by the Lake Shore Engine Works on the shaft before it was received at the mine, and considerable work was done by the Hard Ore shops on other repairs to hoist when shaft was installed.

The stator of torque motor on skip hoist was shipped to General Electric Co. for rewinding at a cost of \$210.87

Shaft

1929 Amount	\$3,302.37	Cost per ton	\$.010
1928 Amount	2,229.67	" " "	.009
Increase	1,072.70		.001

	Sub Division		<u>Increase</u>	<u>Decrease</u>
	<u>1929</u>	<u>1928</u>		
Steel Sets	2,109.22	1,778.77	330.45	
U.G.Pockets	1,193.15	450.90	742.25	

Increase in charges to Steel Sets due to replacing more steel dividers in the skip compartment of the shaft.

Increase in U. G. Pockets due to more repairs to pockets. The top of the transfer raises at shaft from 6th to 8th level were concreted.

Top Tram Equipment

1929 Amount	\$2,094.26	Cost per ton	\$.006
1928 Amount	1,923.31	" " "	.008
Increase	170.95	Decrease	.002

	Sub Division		<u>Increase</u>	<u>Decrease</u>
	<u>1929</u>	<u>1928</u>		
Engine & Motors	\$274.14	\$ 62.98	\$211.16	
Tracks & Cars	713.38	808.17		\$ 94.79
Wire Rope	672.24	695.52		23.28
Sheaves, Rollers, etc.	434.50	356.64	77.86	

Increase in charges to Engine & Motors due to more repairs to motors and rubber linings for sheave.

Decrease in expense to Tracks & Cars and Wire Rope due to less repairs to tracks and cars and less rope used.

Increase in Sheaves, Rollers, etc. due to more rollers used.

Docks, Trestles & Pockets

1929 Amount	\$ 914.97	Cost per ton	\$.003
1928 Amount	1,271.04	" " "	.005
Decrease	356.07		.002

	Sub Division	
	<u>1929</u>	<u>1928</u>
Permanent Trestles	\$ 17.33	\$ 72.98
Portable Trestles	568.45	1,047.40
Pockets, chutes, etc.	329.19	150.66

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Docks, Trestles & Pockets (Cont)

Decrease in Portable Trestles due to cost of timber for eight bents of wood stocking trestle charged in 1928 and only two erected. In 1929 the other six bents were erected.
Increase in Pockets, Chutes, etc. due to repairs to skip dump in shaft house.

Mine Buildings

1929 Amount	\$203.26	Cost per ton	\$.001
1928 Amount	396.54	" " "	.002
Decrease	193.28		.001

Detail of Mine Buildings

	1929	1928
Office	\$ 39.90	\$ 54.75
Shops	7.65	9.24
Shaft House	9.76	-
Engine House	29.02	30.98
Boiler House	2.35	2.27
Dry House	11.64	209.35
Coal Dock	30.39	76.31
Tunnel	72.55	13.64

The decrease was due to less minor repairs to buildings. The tunnel expense was for painting sheet iron covering.

Total Surface Costs

1929 Amount	\$71,225.07	Cost per ton	\$.208
1928 Amount	54,508.41	" " "	.226
Increase	16,716.66	Decrease	.018

The decrease in cost per ton due to larger product.

GENERAL MINE ACCOUNTS:

Insurance

1929 Amount	\$23.73	Cost per ton	\$.000
1928 Amount	19.92	" " "	.000
Increase	3.81		

Engineering

1929 Amount	\$2,177.13	Cost per ton	\$.006
1928 Amount	1,850.71	" " "	.008
Increase	326.42	Decrease	.002

The expense for engineering was greater in 1929, due to more time by engineer on mine surveys and to raise in salary given engineer on January 1st, 1929

Analysis

1929 Amount	\$5,780.49	Cost per ton	\$.017
1928 Amount	4,158.71	" " "	.017
Increase	1,621.78		

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Analysis (Cont)

The Athens Mine samples were worked at the Negaunee Mine laboratory. The number of determinations in 1929 was 28,513, at a cost of \$.13387 per determination, while in 1928, 17,342 determinations were made, at a cost of \$.148543, an increase of 11,171 determinations and a decrease of \$.014673 per determination.

Personal Injury Expense

1929 Amount	\$5,644.04	Cost per ton	\$.016
1928 Amount	4,463.71	" " "	.018
Increase	1,180.33	Decrease	.002

This account was charged with 2% of the labor cost at the mine set up as a reserve fund for personal injury expense. Increase due to payroll being larger in 1929.

Safety Department Expense

1929 Amount	\$376.83	Cost per ton	\$.001
1928 Amount	364.20	" " "	.001
Increase	12.63		

There was a decrease in labor of \$72.27 due to less time on inspections and first aid practices and an increase in supplies due to giving knives to employees for six months perfect safety record and furnishing safety goggles to men working in places where they are in danger of eye injuries.

Telephones & Safety Devices

1929 Amount	\$621.75	Cost per ton	\$.002
1928 Amount	911.50	" " "	.004
Decrease	289.75		

Sub Division

	<u>1929</u>	<u>1928</u>
Lighting shaft and levels	\$ 477.67	\$ 739.69
Mine Telephones	44.45	112.39
Safety Gates & U.G. Improvement	32.96	15.79
Sign Boards, Signals, etc.	24.59	17.66
Fire Equipment	42.08	25.97

The decrease in Lighting Shaft and Levels due to the installation of more lights on levels, and in raises used for travelling roads between levels and in airways, in 1928 as a safety measure.

Special Expense

1929 Amount	\$184.05	Cost per ton	\$.001
1928 Amount	152.06	" " "	.001
Increase	31.99		

Increase due to larger assessment for the Lake Superior Iron Ore Association in 1929.

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Mine Office

1929 Amount	\$8,214.17	Cost per ton	\$.024
1928 Amount	7,999.80	" " "	.033
Increase	214.37	Decrease	.009

	Sub Division	
	<u>Direct Charges</u>	<u>Central Office</u>
1929	\$ 904.95	\$7,309.22
1928	855.19	7,144.61
Increase	49.76	164.61

Increase in Direct Charges due to more mine office expense.
Increase in Central Office charges due to more expense for Central Warehouse overhead in 1929.

Safety Expense

1929 Amount	\$1,425.38	Cost per ton	\$.004
1928 Amount	-	" " "	-
Increase	1,425.38		.004

This expense is the Athens Mine proportion of the cost of the Safety Picnic held on Sept. 2nd.

Total General Mine Accounts

1929 Amount	\$24,452.57	Cost per ton	\$.071
1928 Amount	19,920.61	" " "	.082
Increase	4,531.96	Decrease	.011

The decrease in cost per ton due to larger product.

9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS:

There were no explorations at the mine in 1929.

10. TAXES:

The comparison of the total taxes for the Athens Iron Mining Company for the years 1929 and 1928 are as follows:

	1 9 2 9		1 9 2 8	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Realty (Tax Commission)	2,102,000	78,644.22	2,259,000	76,338.00
Ore in Stock, Equipment and Supplies	448,000	16,761.47	541,000	18,282.01
STERLING ADDITION				
Lots 31 to 38 (C. C. I. Co. Purchase, 1927)	4,600	172.10	4,600	155.44
HARVEY PLAT				
Lots 1, 2, 3, Portion of Total	1,300	48.65	1,300	43.93
Collection Fees	2,555,900	95,626.44	2,805,900	94,819.78
		956.26		948.19
TOTAL OPERATING ATHENS MINE		96,582.70		95,767.97
Rented Buildings (Harvey Plat) Lots 5, 6, & 7	7,900	275.62	7,900	266.92

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10. TAXES: (Cont)

STERLING ADDITION	1 9 2 9		1 9 2 8	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</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	849.36	22,700	767.07
Collection Fees		11.45		10.34
TOTAL RENTED BUILDINGS	30,600	1,156.43	30,600	1,044.33
TOTAL ATHENS IRON MINING CO.	2,586,500	97,739.13	2,836,500	98,812.30
Tax Rate		3.742		3.379
Total City of Negaunee Tax		600,686.18		571,121.55
Athens Mine % of City Tax		16.27%		17%

The increase in taxes in 1929, with a lower valuation, is due to a higher tax rate. The City of Negaunee raised the same amount of money for city purposes in 1929 and 1928 but total valuation decreased and the tax rate increased.

11. ACCIDENTS
AND
PERSONAL
INJURY:

There were four minor accidents during 1929 as compared with twelve in 1928. They were all, however, more severe than in 1928, as the following table of time lost shows:

	<u>1929</u>	<u>1928</u>
Fatal accidents	0	0
Time lost, less than one month	0	6
Time lost, one to four months	2	5
Time lost, more than four months	<u>2</u>	<u>1</u>
Total Accidents	4	12
Number of cases paid compensation for accidents incurred prior to Jan. 1, 1929	4	1
Number of cases being paid difference in wages	2	1

The two accidents causing loss of time from one to four months in each case resulted in the loss of a finger.

The other two accidents were more serious, one being a broken hip, and the other a severe cut in the hand which may result in a partial disability.

The first accident in 1929 occurred on Feb. 26th, after the mine had operated 194 days without a lost time accident.

Pocket knives were given to each employee at the mine in recognition of having worked a six months period without an accident involving the loss of more than one day.

The four accidents in 1929 occurred in a short period. At the end of the year the mine had worked 196 days without an accident.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTIONa. New Construction:

There was no new construction in 1929.

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13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

One steam shovel was rented for the entire summer, and a second one for part of the season, as the Athens Mine does not own a shovel.

b. Stockpile Trestles:

Six wood bents were erected at the end of the Southeast steel trestle, making a total of eight bents. It went into commission in February for stocking Mitchell ore.

c. Timber Treating Plant:

The former steel tanks were repaired and put into service in June. The concrete tanks were abandoned on account of leaking which could not be repaired.

d. Scraper Hoists:

The mine is now equipped with the following scraper equipment:

<u>Company</u>	<u>Size & Type</u>	<u>On Hand</u> <u>1/1/29</u>	<u>Purchased</u> <u>1929</u>	<u>On Hand</u> <u>1/1/30</u>
Ingersoll-Rand Co.	Air	30	3	33
Sullivan Mach. Co.	6½ h.p. Electric	2	0	2
" " "	15 " "	0	6	6
Total		32	9	41

The 15 h.p. electric hoist has been adopted as standard equipment and small h.p. hoists will be replaced as they wear out with 15 h.p. electric.

g. Hoisting Ropes:

Both skip ropes were changed during 1929. The North skip rope, Roebling special blue center lang-lay, was taken off in May after 391 days service and handled 141,952 tons. The South skip rope, Hazard extra strong cast crucible steel regular lay, was removed in October, after 317 days service, hoisting 143,948 tons. The Hazard plow steel cage rope was taken off in June after 700 days service.

14. MAINTENANCE
AND REPAIRS:

There were not any unusual repairs during the year, only minor repairs to buildings and equipment.

15. POWER:

Power was supplied by the Cliffs Power and Light Company, a subsidiary of The Cleveland-Cliffs Iron Co. The rate was 1½¢ per kilowatt hour, the same as last year.

17. CONDITION
OF
PREMISES:

The grounds around the buildings were kept up to the high standard of previous years.

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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>1929</u>	<u>Percent</u>	<u>1928</u>	<u>Percent</u>
English	39	22	34	21
Finnish	71	39	60	38
Italian	23	13	21	13
Swedish	17	10	15	9
Irish	3	2	3	2
Scotch	1		1	
French	17	9	17	11
German	3	2	4	3
Austrian	1			
Norwegian	5	3	4	3
Danish	1			
	<u>181</u>	<u>100%</u>	<u>159</u>	<u>100%</u>

<u>As to Birth:</u>	<u>Total</u>	<u>American born</u>	<u>Foreign born</u>
English	39	28	11
Finnish	71	29	42
Italian	23	5	18
Swedish	17	14	3
Irish	3	3	
Scotch	1	1	
French	17	17	
German	3	3	
Norwegian	5	5	
Danish	1	1	
Austrian	1	1	
	<u>181</u>	<u>107</u>	<u>74</u>
	100%	59%	41%

NORTH JACKSON MINE
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1. GENERAL:

The North Jackson Mine has not operated since 1908.
The fences around the pits were repaired during the summer of 1929.
During May the timber cover over the old Pendill shaft caved in due to rotting of the shaft sets near surface. The collar of the shaft was leveled off to solid ground and the shaft entirely covered with old sound 12" x 14" square timber from the Maas Mine.

6. SURFACE:

c. Roads:

A concrete sidewalk was constructed by the city along the road through the Cornishtown Location, South of the Jackson Monument.

10. TAXES:

<u>DESCRIPTION</u>	<u>1 9 2 9</u>		<u>1 9 2 8</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	8,792.50	235,000	7,941.36
Collection Fees		87.92		79.41
Total		8,880.42		8,020.77
Rented Buildings:				
Old Jackson Office	500	18.71	500	16.89
Collection Fees		.19		.17
Total		18.90		17.06
Total Taxes North Jackson		8,899.32		8,037.83

The increased expense for this idle mine was due to higher tax rate in City of Negaunee.

SOUTH JACKSON MINE
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1. GENERAL:

The South Jackson Mine has not been operated since 1924, and the crusher has been idle since 1926.

The rotting of the timbers in the drainage tunnel caused a small cave to surface last Spring. The entire tunnel was inspected and found to be seriously weakened by dry rot, and earth caving from the back and sides. A 24" concrete pipe was laid in the tunnel for 430 ft. where it was timbered through surface material. This work is covered in more detail under Maintenance and Repairs.

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>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	0	0		
Surface Costs	136.08	158.13		22.05
General Mine Accounts	0	0		
Total as per Cost Sheet	<u>136.08</u>	<u>158.13</u>		<u>22.05</u>
Taxes	9,313.85	9,044.69		
Welfare, Safety, Hosp.	0	196.83		
Total Cost at Mine	<u>9,449.93</u>	<u>9,399.65</u>	50.28	

The increase in taxes, due to the higher tax rate, more than offset the decrease due to no expense for Welfare, Safety, and Hospital, so that there was a small increase in expense in 1929.

The cost of the tunnel repairs was charged to "Maintenance of Locations" account and does not appear in the above statement.

SOUTH JACKSON MINE
ANNUAL REPORT
YEAR 1929

10. TAXES:

<u>Description</u>	<u>1 9 2 9</u>		<u>1 9 2 8</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	9,914.50	265,000	8,955.14
Collection Fees		99.15		89.55
Total Taxes		<u>10,013.65</u>		<u>9,044.69</u>

Taxes increased in 1929 due to lower valuation for City of Negaunee and higher tax rate.

14. MAINTENANCE & REPAIRS:

Attention was called to the weakened condition of the drainage tunnel by a small cave to surface, where a few sets had broken down from dry rot. An investigation of the tunnel disclosed the fact that much of the timber was rotted and that about two feet of material had been washed onto the floor of the tunnel from broken lagging on the sides and from the drainage along the Negaunee Road.

During October and November 430 ft. of 24" concrete pipe was installed in the North end of the tunnel and the tunnel was then back filled. Under the Negaunee Road the filling was tamped into place to prevent caving under the pavement.

The ladder road from the tunnel to surface, near the old crusher, was lagged and made safe for passage.

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LUCY MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

The Lucy Mine has not been operated since 1911.

6. SURFACE:

No repairs were required during 1929 to fences on the property.

10. TAXES:

<u>Description</u>	<u>1 9 2 9</u>		<u>1 9 2 8</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
SW $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec. 6-47-26 except right of way and roads	50,100	1,874.67	50,500	1,706.25
Collection Fees		18.75		17.06
Total Taxes		<u>1,893.42</u>		<u>1,723.31</u>

Taxes increased due to higher tax rate in City of Negaunee.

AUSTIN MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

The Austin Mine was abandoned on September 12th, 1927, when all the ore was mined. All underground and surface equipment was removed from the property and the mining lease surrendered on November 26, 1927. A provision was made for reserving the land on which ore was stocked until November 26th, 1929. All the ore in stock has been removed from the property as also all material on the stockpile grounds, and notice to this effect was given to the owners thirty days prior to November 26th.

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 Last</u> <u>Year</u>
Austinport	0	73,543	73,543	9,483
Austinwood	0	3,883	3,883	0
Total	0	77,426	77,426	9,483
Total Last Year	0	9,483	9,483	
Increase, 1929		67,943	67,943	

All ore in stock was shipped in 1929.

c. Stockpile Inventories:

<u>Grade of Ore</u>	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Austinport	0	68,352		68,352
Austinwood	0	2,672		2,672
Total	0	71,024		71,024

f. Ore Statement:

	<u>Austin</u> <u>Bessemer</u>	<u>Austin-</u> <u>port</u>	<u>Austin-</u> <u>wood</u>	<u>Total</u>	<u>Total</u> <u>Last</u> <u>Year</u>
On Hand Jan. 1, 1929	0	68,352	2,672	71,024	80,507
Output for year	0	0	0	0	0
Shipments	0	73,543	3,883	77,426	9,483
Overrun		5,191	1,211	6,402	0
Balance on Hand	0	0	0	0	71,024
Decrease in ore on hand				71,024	

1929 - Mine abandoned.

1928 - 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>	
Austinport	61.00	.345	7.02	7.96	(All mixed)
Austinwood	57.36	.907	7.96	.303	" "

6. SURFACE:

The railroad loading pocket on the stockpile grounds was dismantled; the cost of the work was charged to the Gardner-Mackinaw Mine and the usable material shipped to the mine. The railroad tracks on the property were removed by the L. S. & I. Railroad. Some rail from trestles, stored on the stockpile grounds, as also part of the air line to the Gwinn Mine, was removed in October.

AUSTIN MINE
ANNUAL REPORT
YEAR 1929

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	0	97.08		97.08
Surface Costs	1,008.00	1,009.00		1.00
General Mine Accounts	624.67	3,980.56		3,355.89
Cost of Production	1,632.67	5,086.64		3,453.97
Loading & Shipping	5,564.66	445.98	5,118.68	
Total Cost on Cars	7,197.33	5,532.62	1,664.71	
Depreciation-Movable Equipt	53.90	0	53.90	
Taxes	2,453.29	2,550.12		96.83
Central Office	395.96	173.07	222.89	
Welfare, Safety, Hosp.	62.71	21.89	40.82	
Rental of Equipment	30.00	0	30.00	
Total Cost at Mine	10,193.19	8,277.70	1,915.49	
Est. Budget Cost - 1929	9,170.00			

Surface Costs cover expense for watchman guarding the property.

General Mine Accounts show a large decrease due to setting up an amount in 1928 that was calculated would pay the balance of compensation due on old injury cases.

There was a large increase in Loading and Shipping expense due to shipping all ore in stock, 77,426 tons, as compared with 9,483 tons in 1928.

10. TAXES:

<u>Description</u>	<u>1 9 2 9</u>		<u>1 9 2 8</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Personal Property	70,000	2,429.00	80,000	2,524.87
Total	70,000	2,429.00	80,000	2,524.87
Collection Fees		24.25		25.25
Total Taxes		2,453.29		2,550.12
Tax Rate per \$100		3.4700		3.1561

The removal of the ore in stock and termination of lease on the stockpile grounds will end the payment of taxes on this mine property.

STEPHENSON MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

The Stephenson Mine was abandoned on July 29th, 1927. Some further dismantling was done during 1929 and at the end of the year the only buildings remaining intact were the combined boiler and engine house and the oil house. The office and warehouse and Captain's office, and the transfer engine house were sold and removed from the property. Considerable equipment was removed so that there was comparatively little of value remaining at the end of the year.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

b. Shipments:

<u>Grade of Ore</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>
Stephenson Lease, Sec. 20:			
1. Stephenson	0	69,252	69,252
2. Stephenwood	0	0	0
Total Stephenson Lease	0	69,252	69,252
C. & N. W. Ry. Co. Lease, Sec. 29:			
1. Northdale	0	25,055	25,055
2. Northwood	0	5,011	5,011
Total C & N W Ry. Co. Lease	0	30,066	30,066
Grand Total	0	99,318	99,318
Total Last Year	0	208,735	
Decrease in shipments - 1929		109,417	

c. Stockpile Inventories:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Stephenson Lease, Section 20:				
1. Stephenson Ore	0	63,799		63,799
2. Stephenwood Ore	161,259	161,259		
Total Stephenson Lease	161,259	225,058		63,799
C. & N. W. Ry. Co. Lease, Sec. 29:				
1. Northdale	5,882	30,937		25,055
2. Northwood	38,997	44,008		5,011
Total C & N. W. Ry. Co. Lease	44,879	74,945		30,066
Grand Total	206,138	300,003		93,865

There is still a small amount of Stephenson ore in stock, representing an overrun, and a small amount of Northdale. Only 5,000 tons of high phosphorus ore was sold in 1929, and nearly all of the ore remaining in stock is this grade. Sales must be increased in order to remove this ore within a reasonable period of time.

STEPHENSON MINE
ANNUAL REPORT
YEAR 1929

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

f. Ore Statement:

	<u>Stephenson Lease</u>		<u>C. & N.W. Ry. Co.</u>		<u>Total</u>	<u>Last Year</u>
	<u>Stephenson</u>	<u>Stephenwood</u>	<u>Northdale</u>	<u>Northwood</u>		
On Hand Jan. 1, 1929	63,799	161,259	30,937	44,008	300,003	508,738
Output for year	0	0	0	0	0	0
Total	63,799	161,259	30,937	44,008	300,003	508,738
Shipments	69,252	0	25,055	5,011	99,318	208,735
Overrun	5,453	0	0	0	5,453	0
Balance on Hand	0	161,259	5,882	38,997	206,138	300,003
Decrease in ore on hand					93,865	

1929 - Mine abandoned

1928 - 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)		
Stephenwood		"		
Northdale		"		
Northwood		"		

6. SURFACE:

The work of dismantling the surface plant was continued during the year with the result that very little equipment or buildings remain on the property. The office and warehouse building, the Mining Captain's office, and the old transfer engine house were sold, dismantled, and removed.

The two top tram plants were dismantled and the equipment stored in the Central Shop buildings.

The old steam pumps were sold for scrap.

All the stocking trestles and part of the permanent trestles were dismantled and the sound legs cut up for mine timber for the Mackinaw Mine. The stringers were shipped to the Mackinaw to be used for shaft timber and the caps for caps in the mine. None of this material could be used for trestles; the Mackinaw paid all the dismantling expense, in return for which they took all the usable material. Several carloads of old sollar plank were salvaged from the stocking grounds and shipped to the Mackinaw.

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

Steel shaft house - no value except for scrap.

Engine and boiler house - brick building, contains skip hoist and boilers. Most of the piping removed.

Dry House - brick building, one-third dismantled. Most of the equipment removed.

Oil House - brick building. Equipment still in building.

Permanent trestles - partly dismantled, balance must be torn down as they are - unsafe due to rotting of legs and plank floors on landing.

The only equipment remaining on the property other than in the buildings, consists of some rail from stocking trestles, some large pipe and part of the Layne and Bowler pump not sold to the Holman Cliffs Co. in 1928.

In November it was recommended that all insurance on Stephenson Mine buildings and contents be cancelled.

STEPHENSON MINE
ANNUAL REPORT
YEAR 1929

6. SURFACE: (Cont)

In the summer water appeared in the deepest cave, about 400 ft. East of the shaft, and by Fall there was a small lake here. It is probable that the water will only reach this elevation in times of unusual rainfall and in dry seasons it will entirely disappear.

Fences around the caves were repaired and will be maintained as long as the Company has a lease on the property.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	0	39.06		39.06
Surface Costs	1,008.00	1,034.95		26.95
General Mine Accounts	<u>1,381.57</u>	<u>11,420.48</u>		<u>10,038.91</u>
Cost of Production	2,389.57	12,494.49		10,104.92
Loading and Shipping	<u>7,945.08</u>	<u>12,283.86</u>		<u>4,338.78</u>
Total Cost on Cars	10,334.65	24,778.35		14,443.70
Taxes	11,746.36	16,894.54		5,148.18
Central Office	577.24	1,002.57		425.33
Welfare, Safety, etc.	92.90	127.67		34.77
Track Agreement with E L S Ry.	<u>1,731.32</u>	<u>5,136.72</u>		<u>3,405.40</u>
Total Cost at Mine	24,482.47	47,939.85		23,451.38
Estimated Budget Cost at Mine	27,720.00			

Surface Costs for both years represent the cost of a watchman at the property.

The large decrease in "General Mine Accounts" is due to setting up in the costs for 1928 the calculated amount still payable for old compensable accidents, also to Analysis Costs being over \$700.00 lower due to less ore shipped.

Loading & Shipping Expense decreased due to 109,417 tons less ore shipped in 1929.

Taxes decreased due to lower valuation by State Tax Commission on account of less ore in stock. The tax rate increased due to the lower valuation of property in the township (mainly due to less ore in stock at all mines in the district).

Payments to E. L. & S. Ry. on account of track agreement decreased in 1929 due to less ore shipped.

10. TAXES:

<u>Description</u>	<u>1 9 2 9</u>		<u>1 9 2 8</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	173.51	35,000	1,104.65
N $\frac{1}{2}$ of NW $\frac{1}{4}$ Sec. 29-45-25, 80 acres	160	5.56	5,000	157.82
Personal Property	<u>330,000</u>	<u>11,451.00</u>	<u>490,000</u>	<u>15,464.80</u>
Total	335,160	11,630.07	530,000	16,727.27
Collection Fees		<u>116.29</u>		<u>167.27</u>
Total Taxes		11,746.36		16,894.54
Tax Rate per \$100		3.4700		3.1561

Tax Rate was higher in 1929, but taxes decreased, due to \$160,000 lower valuation on ore in stock by State Tax Commission on account of less ore in stock.

PRINCETON MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

The Princeton Mine was closed on August 27th, 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. It took nearly twenty months for the mine to fill above the level of the bottom of the open pit at No. Shaft. By fall the water was nearly 20 feet deep in this pit. A substantial wire fence was built around the pit for protection to prevent drowning of cattle, etc.

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	7,162	7,162	3,864
Princeport	0	0	0	0
Total	0	7,162	7,162	3,864
Total Last Year	0	3,864	3,864	
Increase 1929			3,298	

1928 - Mine idle during year
1929 - " " " "

c. Stockpile Inventories:

The ore by grades in stock December 31st, 1929, was as follows:

	<u>1929</u> <u>Tons</u>	<u>1928</u> <u>Tons</u>	<u>Increase</u>	<u>Decrease</u>
Cambridge Ore	116,416	122,755		6,339
Princeport Ore	9,160	9,160		
Sec. 19 Cambridge	15,119	15,942		823*
Sec. 19 Princeport	1,313	1,313		
Total	142,008	149,170		7,162

* This tonnage was transferred from Sec. 19 Cambridge to Cambridge when shipped in 1929.

It is doubtful if the stockpile contains 142,000 tons. There is some loss each year due to washing away of ore by heavy rains. The lines of natural drainage from the stockpile grounds are covered with several inches of ore for nearly a quarter of a mile. The stockpile has now been exposed to the weather for practically ten years.

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, 1929	9,160	1,313	122,755	15,942	149,170	153,034
Output for Year	0	0	0	0	0	0
Transferred			823	823		
Total	9,160	1,313	123,578	15,119	149,170	153,034
Shipments	0	0	7,162	0	7,162	3,864
Balance on Hand	9,160	1,313	116,416	15,119	142,008	149,170

1929 - Mine idle during year
1928 - " " " "

PRINCETON MINE
ANNUAL REPORT
YEAR 1929

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)		

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.

	<u>Prince- port</u>	<u>Cambridge</u>	<u>Sec. 19 Prince- port</u>	<u>Sec. 19 Cambridge</u>	<u>Total</u>
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	<u>490,736</u>
Total Ore - - - - -					1,222,531

c. Estimated Analysis:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
<u>Princeport:</u>										
Dried 212 ^o	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 ^o	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,	<u>639,925</u> "
	Total Developed,	731,795 tons
Prospective,	1. Princeport,	25,000 "
	2. Cambridge	<u>465,736</u> "
	Total Prospective,	<u>490,736</u> "
Grand Total,		1,222,531 "

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

PRINCETON MINE
ANNUAL REPORT
YEAR 1929

6. SURFACE:

a. General:

During 1929 shipments of ore were continued from stockpile by rail to paint manufacturers. This ore was loaded with a scraper hoist directly into gondola cars. It was necessary to drill and blast the pile to loosen the ore, which added to the loading expense.

A fence was built around the large open pit at No. 1 shaft, replacing an old fence that was in bad condition and which did not provide adequate protection. Other fences on the property were repaired during the year.

A new roof must be put on the mine office building in 1930.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	226.03	58.44	167.59	
Surface Costs	1,078.53	1,030.08	48.45	
General Mine Accounts	233.61	9,834.68		9,601.07
Total	<u>1,538.17</u>	<u>10,923.20</u>		<u>9,385.03</u>
Loading & Shipping	718.80	519.94	198.86	
Total as per Cost Sheet	<u>2,256.97</u>	<u>11,443.14</u>		<u>9,186.17</u>
Central Office	144.29	142.49	1.80	
Taxes	9,857.38	8,965.66	891.72	
Welfare, Safety, etc.	23.50	16.93	7.57	
Supply Inventory	618.36	35.34	583.02	
Total Cost at Mine	<u>12,900.50</u>	<u>20,603.56</u>		<u>7,703.06</u>
Budget Cost	10,897.00			

Underground Costs increased in 1929 due to fencing the open pit at No. 1 shaft which was partly filled with water due to mine filling and heavier rainfall.

Surface Costs in both years cover expense for policeman guarding this idle property.

The large decrease in General Mine Accounts was due to setting up in 1928 a calculated amount necessary to pay compensation on old injury cases.

Loading and Shipping expense increased due to shipping 7,162 tons in 1929 while in 1928 only 3,864 tons were shipped. The per ton cost is high in both years due to loading by hand.

Expense for taxes increased due to higher tax rate in township on account of lower valuation.

Supply Inventory expense increased due to charging off some old supplies.

10. TAXES:

<u>Description</u>	<u>1 9 2 9</u>		<u>1 9 2 8</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	347.00	10,000	315.61
158.27 Acres in Sec. 18-45-25	5,000	173.51	5,000	157.82
160.00 " " NW $\frac{1}{4}$ of Sec. 20-45-25	120,000	4,164.00	120,000	3,787.32
NW $\frac{1}{4}$ of NE $\frac{1}{4}$ Sec. 19-45-25 Location	420	14.59	420	13.27
S $\frac{1}{2}$ of NE $\frac{1}{4}$ " " "	840	29.18	840	26.54
Personal Property	<u>145,000</u>	<u>5,031.50</u>	<u>145,000</u>	<u>4,576.33</u>
Total	<u>281,260</u>	<u>9,759.78</u>	<u>281,260</u>	<u>8,876.89</u>
Collection Fees		97.60		88.77
Total Taxes		<u>9,857.38</u>		<u>8,965.66</u>
Tax rate per \$100		3.47		3.156

GARDNER-MACKINAW MINE
ANNUAL REPORT
YEAR 1929

1. GENERAL:

In 1929 mining of practically all available ore on the Gardner property was completed, and only a few thousand tons will be obtained from this property in 1930. At some time in the future a small amount of ore can be obtained by robbing the floors; this ore will not be available until mining is completed on the Mackinaw property.

During the year the Mackinaw shaft was sunk 47 ft. and the 5th level opened. Development of the ore body was nearly completed at the end of the year and stoping was underway. It is gratifying to report that the ore body is increasing in size with depth and a larger tonnage will be available between the 4th and 5th levels than was found between the 3rd and 4th levels. An extension of the ore body to the Northwest beyond the limits found on the 4th level indicate a further extension on lower levels with good prospects of a larger tonnage of available ore. The greater part of the 5th level ore body averaged lower in sulphur than on the levels above; the only high sulphur ore found was in the extension to the Northwest where the formation is quite flat. High sulphur has been found in all flat areas in the ore body; when the formation steepens it will decrease. Based on present information it seems reasonable to assume that the sulphur in the 5th level ore will average about .600 as compared with an average of .720 on the upper levels. This decrease on the 5th level indicates a possibility of still lower sulphur at greater depth, particularly in the steep pitching portion of the ore body.

The sinking of the Mackinaw shaft 280 ft. to a point below the bottom of the ore body as found by diamond drilling from surface was authorized in December 1929, and preparations for starting this work was underway at the end of the year. The system of mining followed here makes it possible to have a long level interval and thus avoid the expense of opening intermediate levels. The ore body can be stoped in blocks with connecting sub levels at intervals to be determined, depending on the dip of the formation.

Operating costs were higher in 1929 due to increase in the working force on account of developing the 5th level. A large tonnage at lower cost will be available in 1930 as a result of the development work done this year.

As a result of the work done during 1929, the life of this property has been extended for several years. The announcement that the shaft was to be sunk and a new level opened was very welcome news to all the employees and their families.

It is with great pleasure that I include in this report the statement that no lost time accident occurred during 1929. On Nov. 19th the mine had operated a full year without an accident and as a reward all employees were given, on December 24th, a gold safety badge suitably inscribed. On Dec. 31st, 1929, the record was still unbroken with 407 days operated without an accident. The employees are striving to continue this excellent record and it is hoped will succeed in avoiding a lost time accident in 1930.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

<u>Grade of Ore</u>	<u>Tons</u>
Gardner	82,045
Mackinaw	35,179
Total Ore	117,224
Rock	2,294
Grand Total	119,518

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2. PRODUCTION
SHIPMENTS &
INVENTORIES:

b. Shipments:

<u>Grade</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	40,656	36,384	77,040	70,675
Mackinaw	18,357	0	18,357	0
Total	59,013	36,384	95,397	70,675
Total Last Year			70,675	
Increase 1929			24,722	

c. Stockpile Inventories:

<u>Grade</u>	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Gardner Ore	25,196	20,191	5,005	
Mackinaw Ore	16,822	0	16,822	
Total	42,018	20,191	21,827	
Increase 1929			21,827	

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

	<u>Gardner</u>	<u>Mackinaw</u>
First Level	34,860	
Second Level	40,185	4,050
Third Level	7,000	3,975
Fourth Level		4,398
Fifth Level		22,756
Total	82,045	35,179
Grand Total		117,224

The Gardner ore from the second level was transferred and hoisted from the third level, as there is no connection to the Gardner shaft on the second level.

e. Production by Months:

<u>Month</u>	<u>Gardner Ore</u>	<u>Mackinaw Ore</u>	<u>Rock</u>
January	7,568	-	93
February	8,011	-	4
March	8,466	-	-
April	7,627	-	-
May	7,727	858	-
June	7,263	1,581	-
July	7,290	3,889	46
August	6,744	5,287	704
September	6,962	5,999	704
October	6,125	6,235	113
November	5,332	4,751	203
December	2,930	6,579	427
Total	82,045	35,179	2,294
Grand Total Ore & Rock			119,518 tons

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

f. Ore Statement:

	<u>Gardner</u> <u>Ore</u>	<u>Mackinaw</u> <u>Ore</u>	<u>Total</u>	<u>Total</u> <u>Last Year</u>
On Hand Jan. 1, 1929	20,191	0	20,191	0
Output for year	82,045	35,179	117,224	90,866
Overrun & Shortage	0	0	0	0
Total	102,236	35,179	137,415	90,866
Shipments	77,040	18,357	95,397	70,675
Balance on Hand	25,196	16,822	42,018	20,191
Increase in ore on hand			21,827	

1929 - One 8-hour shift six days per week, full year.

1928 - One 8-hour shift six days per week, April 7th to December 31, 1928.

g. Delays:

January 24th and part of January 25th - both shafts idle while Gardner hoist was being put in commission and ropes adjusted. Prior to this time the Mackinaw hoist operated a skip in the Gardner shaft and a cage in the Mackinaw Shaft - Loss of product 440 tons

November 30th to December 3rd-Mackinaw Mine idle account delay caused by skip catching in ice, breaking the hoisting rope, resulting in wrecking the skip pit pocket and the skip. - Loss of product 175 tons

Miscellaneous short delays-Repairing haulage motor and broken runner and timber in shaft - Loss of product 175 tons

h. Delays from Lack of Current:

	<u>Tons Lost</u>
March 7th - No Current - 8 hours delay	300
April 6th - " - 8 " "	300
May 1st - " - 8 " "	275
June 10th - " - 3 " "	75
Oct. 23rd - " - 8 " "	400
Oct. 24th - " - 4 " "	200
Total	1,550

3. ANALYSIS:

a. Average Mine Analysis on Output:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sul.</u>
Gardner	58.58	.109		.708
Mackinaw	59.73	.110		.610

The average mine analysis on output, Gardner ore, was 0.40% higher in 1929.

b. Average Analysis on Straight Cargoes:

<u>Grade</u>	<u>Mine</u>				<u>Lake Erie</u>		
	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sul.</u>	<u>Iron</u>	<u>Phos.</u>	<u>Moist</u>
Gardner-Mackinaw	58.50	.108	3.67	.748	58.64		11.30

The average analysis on straight cargoes was 0.71% higher at the mine in 1929, at Lake Erie only .04% higher.

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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.
Estimate is of available ore only.

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>
Non-Bessemer	0	100,386	100,386

b. Prospective Ore:

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>
Non-Bessemer	0	182,399	182,399
Total all ore	0	282,785	282,785

The above estimate represents available ore only and does not include the ore in pillars that must be left to support the capping. Heretofore all the prospective ore has been included in the estimate - both available and un-available; the unavailable ore is omitted from the estimate this year. Mining has been practically completed on the Gardner property, hence no estimate is made. Some ore may later be mined on both properties by robbing of pillars and floors after mining is completed to the bottom of the deposit. Owing to the uncertainty of the tonnage that can be mined with safety, no estimate of this probable available ore has been made.

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	52.65	.106	3.54	.300	1.56	3.10	1.66	.58	3.80	11.50

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	52.21	.106	3.54	.300	1.56	3.10	1.66	.58	3.80	11.50

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	51.48	.097	3.17	2.60	1.58	2.90	1.76	.66	4.31	12.00
Mackinaw	52.41	.106	3.54	3.00	1.56	3.10	1.66	.58	3.80	11.50

The ore produced to date on the 5th level has averaged higher in iron than on the upper levels so that the natural iron has been increased. The deeper ores apparently average lower in moisture due to being harder and more dense than in the upper part of the deposit.

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was a waiting list of former employees wanting jobs in the mine but there was no surplus surface labor during the summer. Since closing down the crusher and loading by steam shovel a number of men have been laid off for the winter, most of whom have found work in the woods.

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5. LABOR AND WAGES:a. Comments:(2) New Construction:

The erection of an engine house at the Gardner Mine and installation of hoist was underway in December 1928 and was completed early in 1929. Both the hoist and frame building to house it were obtained from the Stephenson Mine. Extensive repairs were made to the Mackinaw Shaft house and permanent trestles at the shaft. The trestle to the stock-pile ground was rebuilt and later in the year a new stocking trestle was erected. A McClure top tram plant was set up under the trestle and enclosed and all necessary sheaves, idlers, etc. installed. All of the above expense was taken up in operating costs.

See 12-a for E & A 537, Sinking Mackinaw Shaft and Developing the 5th level, and E & A 566, Sinking Mackinaw Shaft and Developing the 6th level.

b. Comparative Statement of Wages and Product:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	117,224	90,866	26,358	
No. Shifts and Hours	1- 8 hr	1- 8 hr		
<u>AVERAGE NO. MEN WORKING:</u>				
Surface	24	15 $\frac{1}{2}$	8 $\frac{1}{2}$	
Underground	68	46	22	
Total	92	61 $\frac{1}{2}$	30 $\frac{1}{2}$	
<u>AVERAGE WAGES PER DAY:</u>				
Surface	4.42	4.24	.18	
Underground	5.05	4.97	.07	
Total	4.88	4.77	.11	
<u>WAGES PER MONTH OF 25 DAYS:</u>				
Surface	110.55	106.00	4.55	
Underground	126.25	124.25	2.00	
Total	122.00	119.25	2.75	
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	19.73	23.36		3.63
Underground	6.75	8.50		1.75
Total	5.03	6.16		1.13
<u>LABOR COST PER TON:</u>				
Surface	.224	.190	.034	
Underground	.748	.586	.162	
Total	.972	.776	.196	
<u>TONS PER MAN PER DAY:</u>				
Stoping	10.55	15.28		4.73
Ore Development	7.93	9.60		1.67
Total	10.00	14.03		4.03
AVERAGE WAGES CONTRACT MINER	5.26	5.12	.14	
<u>TOTAL NUMBER OF DAYS:</u>				
Surface	5942 $\frac{1}{4}$	4,062 $\frac{3}{4}$	1,879 $\frac{1}{2}$	
Underground	17378 $\frac{3}{4}$	10,684 $\frac{3}{4}$	6,694	
Total	23321	14,747 $\frac{1}{2}$	8,573 $\frac{1}{2}$	

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5. LABOR AND WAGES:

b. Comparative Statement of Wages and Product: (Cont)

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
<u>AMOUNT FOR LABOR:</u>				
Surface	26,273.64	17,247.25	9,026.39	
Underground	<u>87,669.58</u>	<u>53,218.09</u>	<u>34,451.47</u>	
Total	113,943.22	70,465.34	43,477.88	

Proportion of Surface to Underground Men:

1929 - 1 to 2.83 One 8-hour shift, six days per week.
1928 - 1 to 2.32 One 8-hour shift six days per week.

6. SURFACE:

a. Buildings, Repairs:

Some repairs were made to the mine office, the steps to doorways being rebuilt. The building is settling and must be leveled and new posts installed next Spring.

The steam heating and water lines from the heating plant to the office and dry were replaced in the Fall and new launders built where necessary.

Extensive repairs were made on the Mackinaw landing prior to hoisting ore in May. A new floor of 3" fir plank was put on the landing, new steps on stairways, new plates in skip dump, the butterfly rebuilt, and additional legs on trestles near the shaft. The cost of these repairs was charged directly to operating cost.

b. Stockpiles:

Part of the permanent trestles near the Mackinaw shaft house were repaired by laying new floors and adding trestle legs beside the old legs. The balance of trestle leading to the stocking ground was dismantled and rebuilt. The old trestle was erected on a down grade to the stocking grounds as the top tram cars ran out by gravity and were pulled back by power. The new stocking trestles were built this year on an upgrade and an endless rope haulage system installed. Twenty stocking bents were erected in the Fall at the Mackinaw; the average height was 45 ft. This increased the stocking capacity considerably as compared with the old trestles with an average height of 38 feet. Several carloads of plank were laid on the sollar to make a dividing line between the ore and the rock and sand. These plank were salvaged from the abandoned stocking grounds at the Stephenson Mine.

The stocking trestle at the Gardner was dismantled during the shipping season and one leg removed, leaving one leg standing in the ore pile. To take care of the ore hoisted this winter it was necessary to erect ten stocking bents. The caps were set on one leg and braced, the leg and cap hoisted and guided to place on the top of the standing leg. This work was slow and dangerous but was finally successfully completed.

c. Tracks and Roads:

The L. S. & I. R. R. had to completely rebuild the switch tracks to the Mackinaw shaft as no repairs had been made since the mine closed down in 1920.

The road to the mine across the sink, the low swampy ground near the mine, was raised nearly two feet by a rock fill to bring it back to grade above water level. This fill has to be made every year. The road near the shop building was given a top dressing of rock and cinders to raise it above water level at the time of the breakup in the Spring.

The road from the Mackinaw shops to the shafts was relocated and surfaced with rock in the summer.

The mine building and stocking grounds at the Gardner-Mackinaw mine are located on an island in a swamp with the normal water level about 2 ft. below surface.

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7. UNDERGROUND:

a. Shaft Sinking:

Authority to sink the Mackinaw shaft and open the 5th level was granted the latter part of 1928. Work connected with equipping the Mackinaw shaft for sinking was started in December. The last week in January a shaft sinking crew was organized and started cutting off the water in the shaft, replacing broken casing planks, and cleaning down the shaft timber preliminary to sinking. The shaft was down 94 ft. below the 4th level when sulphur was discovered in the ore body in 1918. As there was no hoisting from the 4th level since the mine reopened in 1927 no effort was made to pump the water out more than a few feet below the level. It was, therefore, necessary to unwater the shaft below the 4th level before sinking started, which work was started on January 29th and was not completed until the middle of February. It required over two weeks to clean up the broken casing plank which had been knocked off by the bailer, to repair the broken sets and clean up the rock and ore that had accumulated at the bottom of the shaft. Sinking was started the last of February and completed in March, the shaft being sunk a total depth of 47 ft. or 41 ft. below the 5th level. Part of the plat on the 5th level was cut as the shaft was sunk. A skip pit pocket was built near the bottom of the shaft and ground removed so that a car could be brought to the chute at the bottom of the skip road from the cage. The shaft was sunk deeper under the ladder-road to provide a small sump. Timber was installed, the skip pit pocket and the loading pocket on the 5th level built which completed shaft sinking work.

Authority to sink the Mackinaw 280 ft. and open the 6th level was given in December and at the end of the year equipment was being assembled. It is hoped to start this work the last of January.

b. Development:

A large amount of development work was done during 1929 in connection with the opening of the ore body on the 5th level. After sinking was completed the balance of ground on plat was removed and drift started towards the ore body. Good progress was made for a few hundred feet when hard ground was encountered which materially slowed up the advance. The hard ground proved to be much wider than was expected and delayed the time of reaching the ore body fully one month. The hard ground encountered in the drift was a compact granite with occasional seams of quartz. It required 24 holes for a cut in this ground and the advance was only 10 ft. in 24 hours on three 8-hour shifts. This hard granite continued with no change until black slate was encountered about 140 ft. from the ore body. Good progress was made in the black slate, the advance averaging 15 ft. or more per day. A thin seam of jasper was encountered on the footwall of the ore body, the same as had been found on the upper levels. Drifting in ore was continued on three 8-hour shifts during July but in August one shift was taken off and work continued for the balance of the year in the main drift in the ore body on two shifts. The total length of the drift on the 5th level in ore at the end of the year was 900 ft. The drift did not advance continuously as some time was lost while ground was blasted out for the raises and timber installed so that the chutes could be built. The actual length of the ore body on the line of the formation was somewhat less than the actual length of the drift, being 820 ft., as compared with 900 ft. of drift. The extreme length of the ore body on the 4th level is 600 ft. The actual stoping area between the 4th and 3rd levels was only 470 ft. in length as compared with a developed length of 820 ft. on the 5th level. The extension of the ore body to the Northwest beyond the limits established on the 4th level does not give much information of the tonnage which may be expected above the 5th level in this territory. As soon as raises are put up in this area full information will be gained of the available tonnage. Raising preliminary to stoping started at the Southeast end of the

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7. UNDERGROUND:

b. Development: (Cont)

ore body and has been extended to the Northwest as the drift advanced. At the end of the year ten raises had been completed through to the 4th level in the center line of the stopes and stoping was underway in three stopes. Raises were being put up in three additional stopes so that actual development was underway or had already been completed in thirteen of the twenty stopes that will be opened. As work was completed in the upper levels of the mine the contracts have been transferred to the 5th level and at the end of the year most of the men employed underground were working in this territory.

The exploration of the small ore body found on the North side of an overturn in the footwall near the Northwest end of the deposit between the first and second levels was continued throughout the past year. Mining of all available ore above the first level was completed in the summer following the development of the ore to its Eastern limit, some 80 ft. above the first level. The ore near the East end of the trough was on the Gardner property; further to the West the ore crossed from the Gardner onto the Mackinaw where it was followed upward until it pinched out. At the end of the year one contract was still working in this ore on the Mackinaw property at a point about 50 ft. above the 2nd level.

Some additional ore was developed at the Southeast end of the ore body above the first level beyond the limits established in 1929. This was due to irregularity in the contact at the Southeast limit of the ore body.

The development work in 1929 did not disclose much additional ore in the upper part of the mine. The development work on the 5th level was very favorable, indicating a larger tonnage between the 5th and 4th levels than was anticipated and indicating possibilities of much greater tonnages at depth.

c. Stoping:

During the year there was produced from the Gardner property 82,045 tons and from the Mackinaw 35,179 tons. Production from the Mackinaw started in May and showed a gradual increase from month to month until in December the greater part of the product came from this property.

There was only a small reserve of broken ore in the stopes at the end of the year. There is only a few thousand tons in the stopes above the first level and perhaps 1,000 tons in the stopes above the 5th level.

General stoping operations on the Gardner property were nearly completed in 1928 with the exception of a few stopes at the Southeast end of the ore body between the 3rd and 2nd, 2nd and 1st, and above the 1st level. This reserve was in the high sulphur part of the Gardner ore body and was not mined when the mine was first operated. At the end of 1929 two contracts were mining some ore from the footwall side of two of the first level stopes where rolls occurred in the foot which were overlooked when the stopes were originally put up. One contract was working on the Mackinaw property between the first and second and will soon complete the mining of the ore near the Northwest end of the ore body on the North side of the trough caused by the overturn or roll in the footwall. One contract was working between the third and second levels stoping out a thin seam of ore underneath a horse of rock near the Northwest end of the ore body on the Mackinaw property. On the 4th level one contract was driving a small stope near the hanging 40 ft. above the 4th level in the wide part of the ore body near the Northwest end of the deposit. All other contracts employed at the mine are working in stopes and on development work adjacent to the 5th level.

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7. UNDERGROUND:

c. Stopings (Cont)

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

First Level:

Stoping above the first level was completed in 1929. A few contracts worked here throughout the year and after completing the stopes to the limit of mining, 140 ft. vertically above the 1st level, drove drifts through the pillars between the stopes, rounded off the corners of pillars, and scrambled some ore from the foot side of the old stopes. Brief comment will be made on each stope in which work was done during the year, stopes being designated by the numbers given them in the monthly report.

#77 Stope:

This stope was completed in 1928 at an elevation of 123 ft. above the 1st level where jasper was encountered. Late last summer ore was found in the floor of 78 and 79 stopes due to a roll in the foot which led to the discovery that this roll persisted to the Northwest and that some ore could be obtained from the foot of #77 stope. In order to make mining safe when removing floors left in the old stopes, a drift was driven from the pillar to the footwall on the hanging side of the stope at a point about 35 ft. above the 1st level and a small raise put up following the foot to the limit of mining where a drift had been driven along the limit of mining to which these raises holed. Travelling roads were put in from the top down so that as stoping operations advanced the miners were always under cover and it was not necessary for them to go out in the open stopes. In putting up the raise on the foot of #77 stope the ore was found to continue under the jasper on top of the ore body and the raise advanced 17 ft. higher than the original stope. After making connection at the top of the raise to the travelling road in #76 stope the mining of the ore in the floor was started in December and was not yet completed at the end of the year. The depth of the ore in the floor of this stope was greater than in any of the other stopes further to the Southeast. It averages nearly 25 ft. in thickness and makes the total width of stope from foot to hanging at least 60 ft. It will yield several thousand tons of ore which will be hoisted during 1930.

#78 Stope:

This stope was finished to the jasper in 1928 at an elevation of 118 ft. above the 1st level. The roll in the foot which is described in the preceding paragraph in #77 stope extended to #78 stope where a raise was put up and the ore found to extend to the limit of mining 140 ft. above the level. Stoping of this ore in the foot was started in November and was not completed at the end of the year.

#79 Stope:

This stope was completed in 1928 and no further work was done here until late in the summer when ore was found in the footwall of the stope and a raise was put up to the top of the ore body and ore left on the footwall stoped out. All the ore broken in this stope has been scraped down to the chute and hoisted.

#80 Stope:

This stope was nearly completed in 1928 and the early part of 1929 was continued up to the limit of mining. At one point on the footwall, about 40 ft. above the level, a small amount of ore was found which was stoped out. The ore body being thin in the Southeast end of the mine where #80 stope is located, there was no danger in stoping the ore off the foot as the miners were close to the back.

#81 Stope:

This stope was completed to the limit of mining in 1928 and some additional ore was obtained early in 1929 by widening the drifts through the pillars.

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7. UNDERGROUND:

c. Stoping: (Cont)

#82 Stope:

This was a branch stope put up to the Northeast from #81 stope. It was started in 1928 at an elevation of 40 ft. above the first level and was up 54 ft. by the end of the year and advanced 48 ft. in 1929 to reach the limit of mining.

#83 Stope:

This stope was started in 1928 as a branch stope on the East side of #82 stope at an elevation of 50 ft. above the first level. It was extended in an Easterly direction along the flat footwall and at the end of 1928 had reached an elevation of 112 ft. above the main level. In 1929 it was extended 30 ft. to the limit of mining.

#84 Stope:

This stope, opened as a branch stope on the East side of #83 stope, was started in 1929 at an elevation of 60 ft. above the 1st level and was driven in an Easterly direction on the flat footwall a distance of 70 ft. to the limit of mining.

First Level General:

The above description covers the greater part of the work done in the ore body above the 1st level during the past year.

Late in the year a small stope was opened near the bottom of #81 stope and extended almost due East along the limit of mining. The ore here averaged about 8 ft. in thickness and a stope 20 ft. in width was carried up over the flat footwall a distance of about 80 ft. at which point the foot and hanging came together.

At the Northwest end of the ore body on the first level some exploratory work was done in the trough which was found here between the 1st and 2nd levels caused by an overturn in the foot. The ore was followed to the East on the sill floor of the main level a distance of about 50 ft; the ore averaged about 12 ft. in width. The ore on the foot was then followed in an Easterly direction to the rock which was reached at a point about 60 ft. above the level. Two small branch stopes were driven due North to the rock from the side of this stope.

Further to the West on the North side of the trough a raise was put up in a seam of ore which crossed from the Gardner property over on the Mackinaw and was extended up to the limit of mining, 140 ft. above the level. A stope was opened further to the West on the same side of the trough which reached the elevation of the 1st level and was extended some distance above it; eventually a connection was made with the raise previously described. Stopping was then started in this ore body and a stope was carried up on the incline to a point about 80 ft. above the 1st level where the ore narrowed down to the exact width of the raise which extended on up to the limit of mining. The ore mined in the upper part of these two stopes came from the Mackinaw property. Another stope was opened at a lower elevation on the same side of the trough which soon passed from the Gardner property onto the Mackinaw and was continued until rock was reached at an elevation of about 45 ft. above the 1st level. Pillars were left to support the back in this area.

In the Spring a drift was started from the hanging side of the travelling road between #76 and #77 stopes at an elevation of 40 ft. above the 1st level and driven Southwest to the hanging. From this point a drift was extended Southeast 120 ft. and Northwest 100 ft., connections being made to the open stopes as the drift advanced. Scraper hoists for scraping the ore off the footwall of the stopes were installed in this drift and it was used also for travelling road between the stopes.

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7. UNDERGROUND:

c. Stoping: (Cont)

Second Level:

One contract worked the entire year at the Northwest end of the ore body, mining the ore on the North side of the narrow trough that runs from the 2nd level to a point above the 1st. All the ore mined here has been handled by scraper hoists - in some cases it was necessary to handle it twice. Extensive work was done on the North limb of this trough during the year, some ore being obtained from the Gardner, but most of the ore was on the Mackinaw property. The ore here is thin, varying from 8 to 16 ft. in thickness from foot to hanging wall. There is a decided irregularity in the formation in this area, particularly on the North side of the trough, which changes the angle at which the stopes were driven over the footwall and in several cases made it necessary to have a second scraper hoist to move the ore out of the stope to a point where it could be reached by the main scraper that carries it to the raise that connects with the 2nd level. Developments were favorable enough to warrant continuing work here but the ore mined has been much more expensive than the ore from the other stopes. At the end of the year it was evident that mining would probably be completed here within sixty days.

#57 Stope:

Mining of the ore in this stope was not quite completed at the end of 1928. Stopping was continued and completed early in 1929. During the year the broken ore was drawn out and the fine ore cleaned off the footwall with a scraper.

#60 Stope:

This stope, located near the Southeast end of the ore body, was started in the Fall of 1928 and at the end of the year was up about 50 ft. In 1929 it was continued through to the 1st level, stoping being completed in the summer. The ore body here is quite thick, averaging over 50 ft., and a large quantity of ore was obtained from this stope.

#61 Stope:

This stope was started late in 1928 and at the end of the year had reached an elevation of 50 ft. above the 2nd level. In 1929 it was continued through to the 1st level and all available ore mined.

#62 Stope:

This stope was put up in 1929 as a branch from #61 stope and was continued through to the 1st level.

#63 Stope:

The extension of the ore body to the East along the rock on the South limit made it possible to open #63 stope as a branch from #62. This stope was started about 60 ft. above the 2nd level and was continued a distance of 40 ft. to the 1st level.

The ore in #60 to #63 stopes, inclusive, ran high in sulphur and was drawn out gradually during the year and mixed with the ore from other stopes that averaged lower in sulphur.

Second Level General:

Early in the year a raise was put up near #60 stope and the hanging wall encountered 50 ft. above the 2nd level. A drift was then driven following the hanging for a distance of 250 ft. to the Northwest, connection being made to the open stopes from #52 to #59 inclusive. The ore was mined from the floor of this drift opposite the open stopes and about 10 ft. of the floor stoped out. Two contracts worked here for six months. The ore was handled by scraper hoists at points where it did not run directly into the chutes in the stopes. A considerable tonnage was obtained from this work on the hanging side of the 2nd level.

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7. UNDERGROUND:

c. Stoping: (Cont)

Third Level:

All the Gardner ore mined and handled on the 2nd level was trammed to a transfer raise connecting with the 3rd level where it was loaded in cars and taken to the Gardner shaft. The 2nd level does not connect with the Gardner shaft.

In the latter part of 1928 a contract was engaged in repairing the main haulage drift to the Northwest that had caved when the mine was flooded. This work was not completed in 1928 and was continued for several months in 1929. The timber had broken down in this drift and considerable ore had fallen from the back; the ore was hand shovelled into motor cars, new timber installed and blocking put in to catch up the ground above the timber.

Ore was found on the footwall side of the haulage drift at a point about 150 ft. from the Northwest end of the ore body and after completing the timber repair work the contract started drifting back to the foot from the side of the haulage drift. The foot was encountered after drifting 30 ft. in a Northerly direction and a raise was then started following the ore on the foot. Lean ore was encountered 30 ft. above the level which continued for 20 ft. when good ore was encountered which continued to the 2nd level. Stoping was started here late in the year, all available ore being removed near the bottom of the raise and stoping was underway in the good ore near the top of the raise at the end of the year. When stopes were originally opened here in 1920 no mining was done in this immediate area as rock was encountered near the hanging and it was assumed that there was no ore here. There will probably be between one and two thousand tons of ore obtained from mining the seam of ore near the footwall.

The first of the year stoping operations were underway in one small area near the Southeast end of the ore body adjacent to the transfer raise that handled the Gardner ore from the 2nd level. This stope was continued upward from the 3rd level until it holed to the transfer raise about 55 ft. above the level. The transfer ore was later diverted into this stope, after which a branch raise was put up following the rock on the South side of the deposit to the 2nd level. Stoping then started from the transfer raise 50 ft. above the level and was completed to the 2nd level in the summer. Some additional ore will be available in this territory on each side of the upper portion of the transfer raise which can be widened after there is no further use for it.

The rock that came from sinking the shaft was trammed in on the 3rd level and dumped in a 4th level stope. This saved time in hoisting the rock and was also good practice as it filled two of the old stopes, thereby decreasing the area of open space in this section of the mine.

Fourth Level:

The 4th level was cleaned up during the year. In order to keep the water out of the 5th level stopes a ditch was made on the foot side of the 4th level drift from the shaft to the end of the ore body. All rotted timber and other material was removed from the level and sent to surface. At the end of the year eleven raises had holed through from the 5th level, one of which is a permanent travelling road, the other ten being raises in the center line of the stopes.

In order to obtain additional product to keep the hoist up while the 5th level was being developed, two raises were put up on the hanging side of the 4th level haulage drift in the wide part of the ore body and extended to the hanging which was encountered about 45 ft. above the 4th level. A small stope was then driven to the Northwest following the hanging and at the end of the

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7. UNDERGROUND:

c. Stoping: (Cont)

Fourth Level: (Cont)

year had connected the two raises which were 100 ft. apart and was being continued to the Northwest. The greater part of this stope is relatively small in size, being about 12' x 12'; for a short distance it is 20 ft. wide and 20 ft. high. Work will soon be completed here.

Fifth Level:

Stoping operations were started on the 5th level in October when one contract started coning out the bottom of one of the raises up to the travelling road 35 ft. above the 5th level. This work, preliminary to actual stoping, was continued the balance of the year by which time four of the stopes had been opened out to a point 35 ft. above the 5th level. Two stopes were being put up to the 4th level at the end of the year and within a few weeks work will be underway in ten or more stopes.

d. Timbering: (Cont)

The cost for timber, as shown on the following statement, increased in 1929, due to more timber used on account of opening the 5th level. Considerable of the timber used on the 5th level does not appear in this statement as it was salvaged from old trestle legs and caps at the Stephenson Mine. The statement covers new material charged out during the year.

The following is a statement of timber used:

Statement of Timber Used:

<u>KIND</u>	<u>LINEAR</u>	<u>AVG. PRICE</u>	<u>AMOUNT</u>	<u>AMOUNT</u>
	<u>FEET</u>	<u>PER FT.</u>	<u>1929</u>	<u>1928</u>
8" to 10" Timber	1,568	.06678	104.72	22.26
10" to 12" "	4,176	.10321	431.02	308.41
12" to 14" "	1,252	.13217	165.48	230.80
14" to 16" "	955	.15477	147.81	11.66
Total Timber	7,951	.10678	849.03	473.13
		<u>Per 1000'</u>		
5' Lagging	36,550	6.838	249.95	19.98
Poles, 9' 6"	38,588	16.147	623.06	244.71
Total Lagging and Poles	75,138		873.01	264.69
Product			117,224	90,866
Feet of timber per ton of ore			.0068	.0049
Feet of lagging per ton of ore			.03117	.002806
Cost per ton for timber			.0072	.0052
" " " " lagging			.0021	.0002
" " " " poles			.0054	.0027
" " " " timber, lagging, and poles			.0146	.0081
Equivalent of stull timber to board measure			28.6182	16.0530
Feet of board measure per ton of ore			.00244	.00176
Total cost for timber, lagging, and poles			1,722.04	737.82

e. Drifting and Raising:

	<u>ORE DRIFTING</u>	<u>ORE RAISING</u>	<u>ROCK DRIFTING</u>	<u>ROCK RAISING</u>	<u>TOTAL</u>
1929	1,400'	2,220'	(1) 0	25'	3,645'
1928	330'	667'	0	0	997'
Incr. 1929	1,070'	1,553'		25'	2,648'

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7. UNDERGROUND:

e. Drifting and Raising: (Cont)

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

There was a large increase in both drifting and raising due to developing the 5th level. This work was 75% completed at the end of the year. 900' of drift was driven in ore on the 5th level and 500' on the sub level opened 35' above the level connecting the stopes. Most of the ore raises were put up in the center line of the 5th level stopes.

f. Explosives, Drilling and Blasting:

The following is a statement of explosives used:

Statement of Explosives Used:

	<u>QUANTITY</u>	<u>AVERAGE PRICE</u>	<u>AMOUNT 1929</u>	<u>AMOUNT 1928</u>
Dupont, Extra A, Powder	21,382 lbs	.1372	2,934.55	6,925.10
Gel. Spec., 50% "	57,200 "	.1309	7,492.62	2,805.00
Red Cross, 50% "				67.50
Total Powder	78,582 "	.1327	10,427.17	9,797.60
Fuse	151,390	.6234	943.85	904.78
Caps	24,425	1.1659	284.79	269.36
Cap Crimpers	1	.42	.42	13.75
Cap Crimpers & Fuse Cutter	1	23.23	23.23	32.25
Tamping Bags	7,500	2.15	16.12	1.59
Connecting Wire				1.59
Total Fuse, etc.			1,268.41	1,221.73
Total All Explosives			11,695.58	11,019.33
Product			117,224	90,866
Pounds of powder per ton of ore			.670	.794
Cost per ton for powder			.089	.107
" " " " fuse, caps, etc.			.011	.014
" " " " all explosives			.100	.121

6,382 lbs. more powder were used in 1929 and the product increased 26,358 tons. It is estimated that there were only 3,000 tons of broken ore in the stopes at the end of the year as compared with 10,000 tons or more a year ago. There was more "Gelatin Special Powder" used and less Dupont Extra A, in 1929. The fact that less powder was required per ton of ore indicates that better results were obtained with the Gelatin powder. The cost per ton for all explosives was .021 lower in 1929.

g. Mining and Loading:

There was no change in the mining methods in 1929. There was more mining in flat areas where the ore was handled by scrapers than in the previous year.

h. Ventilation:

During the year several new ventilation doors were built to control the draft. Ventilation is by natural means, one shaft being upcast, the other downcast. It is necessary to control the draft in cold weather to keep ice from forming in the downcast shaft.

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7. UNDERGROUND:

i. Pumping:

There was a decrease in the amount of water pumped in 1929. This was due to success in plugging a drill hole that had been plugged before but leaked through cracks. The average water pumped in 1929 was 107 gallons per minute as compared with 150 gallons in 1928; the decrease was approximately 30%.

All pumping at the mine is done on day shift in a four hour period. The main sump is on the 4th level, Mackinaw shaft. All water from the upper levels drains to this point. A small pump at the bottom of the shaft handles the water from the shaft and the 5th level, pumping it up to the main sump on the 4th level.

In November the work of cutting a small sump on the 5th level was started and completed in December with the removal of ground for a small pumphouse. It is planned to put an electric pump here which will handle the water from the 5th to the 4th and will also take care of the water from sinking the shaft to the 6th level. The new sump on the 5th level has a capacity of 25,000 gallons and it should not be necessary to operate the pump more than once every three days until the water increases. The cost of the 5th level sump and pumphouse was charged to E & A 537, "Sinking Mackinaw Shaft and Developing the 5th Level".

It is interesting to note that practically all the water in this mine comes from small leaks just below the ledge and from diamond drill holes. On opening a new level a small amount of water drains from the ground but this later ceases. If the surface drill holes had been plugged before the casing was pulled, the mine would not make over 50 gallons of water per minute.

The following table gives the gallons pumped per minute:

<u>Month</u>	<u>Gallons per minute</u>	
	<u>1929</u>	<u>1928</u>
January	116	Unwatering Mine
February	113	"
March	111	"
April	115	"
May	101	127
June	104	135
July	109	134
August	106	138
September	109	193
October	99	231
November	99	132
December	<u>99</u>	<u>110</u>
Average gallons per minute for year	107	150
Total gallons for year	4,710,680	56,528,157

j. Underground in General:

Mining on the Gardner property was practically completed in 1929. A small amount of ore will be obtained in 1930 after which operations will cease on this property until the robbing of pillars and floors is started after mining has been completed to the bottom of the deposit on the Mackinaw property. The tonnage obtained from the Gardner this year was larger than expected a year ago; it is still considerably below the original estimates of available ore on this property. This is due to leaving pillars to support the capping and to a decrease of tonnage above the first level caused by jasper cutting off the ore in a number of the stopes, some distance below the mining limit.

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7. UNDERGROUND:

j. Underground in General: (Cont)

The extension of the ore body to the Northwest on the 5th level is a very interesting development, not only from the standpoint of additional tonnage on the 5th level, but particularly from its probable effect on tonnages below the 5th level.

The mine finished the year in splendid condition with a large tonnage practically developed between the 5th and 4th levels where the ore as shown by development work averaged higher in iron and lower in sulphur than on the upper levels.

Safety standards are carefully followed throughout the mine with the result that the levels are clean and everything is in first class condition. The observance of these standards has undoubtedly contributed to the unusual safety record at this property of 417 consecutive days without a lost time accident.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	117,224	90,866	26,358	
Underground Costs	1.322	.985	.337	
Surface Costs	.235	.202	.033	
General Mine Accounts	.101	.088	.013	
Cost of Production	1.658	1.275	.383	
Loading and Shipping	.060	.063		.003
Total Cost at Mine	1.719	1.338	.381	
Depreciation -				
Plant and Equipment	.079	-	.079	
Movable Equipment	.003	.002	.001	
Taxes	.029	.017	.012	
Central Office	.091	.097		.006
Welfare, Safety, Hospital	.015	.012	.003	
Unwatering and Reopening	.167	.150	.017	
Rental of Equipment	.002	-	.002	
Total Cost at Mine	2.105	1.616	.489	
Depreciation -				
Plant and Equipment - old	.448	.180	.268	
Development - old	.547	.199	.348	
Grand Total Cost at Mine	3.100	1.995	1.105	
No. of Days Operated	297	226	71	
No. Shifts & Hours	1-8 hr	1-8 hr		
Average Daily Product	396	402		6

COST OF PRODUCTION:

Labor	.997	.776	.221
Supplies	.661	.499	.162
Total	1.658	1.275	.383

The large increase in cost per ton in 1929 was in underground costs and was due primarily to the development of the 5th level ore body. There was also a large reserve of broken ore in the mine when it reopened in 1928; this was hoisted during the year, resulting in an unusually low cost for 1928. The

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8. COST OF OPERATING:

a. Comparative Mining Costs: (Cont)

system of mining, a modification of shrinkage stoping, makes an uneven cost from year to year, depending on whether it is a year in which ore is mined exclusively, or a year in which a new level is developed. This condition is perhaps peculiar to this property due to the relatively small ore body, particularly on the upper levels.

b. Detailed Cost Comparison:

(1) Days and Shifts:

	<u>Shift & Hours</u>	<u>Days Worked</u>	<u>Avg. Employees</u>	<u>Total Days Worked</u>
1929	1-8 hr.	297	92	23,321
1928	1-8 hr.	226	61 $\frac{1}{2}$	14,747 $\frac{1}{2}$
Increase		71	30 $\frac{1}{2}$	8,573 $\frac{1}{2}$

(2) Wages:

There was no change in the wage schedule in either 1928 or 1929.

(3) Comparison of Production:

Production - 1929	117,224 tons
Production - 1928	90,866 "
Increase - 1929	26,358

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate per day</u>
1929	92	23,321	\$113,943.22	\$ 4.88
1928	61 $\frac{1}{2}$	14,747 $\frac{1}{2}$	70,465.34	4.77
Increase	30 $\frac{1}{2}$	8,573 $\frac{1}{2}$	43,477.88	.11

(5) Tons per man per day:

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

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Surface	19.73	23.36		3.63
Underground	6.75	8.50		1.75
Total	5.03	6.16		1.13

(6) Cost of Production:

1929 - \$194,345.85	Cost per ton \$1.658
1928 - 115,865.15	" " " 1.275
Increase 78,480.70	.383

	<u>Total Cost</u>				<u>Cost per ton</u>		
	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1929	\$116,854.47	60.1%	\$77,491.38	39.9%	\$.997	\$.661	\$1.658
1928	70,541.27	61.0%	45,323.88	39.0%	.776	.499	1.275
Increase	46,313.20		32,167.50		.221	.162	.383

(7)

UNDERGROUND COSTS:

Development in Rock

1929 Amount \$ 0.00	Cost per ton \$.000.
1928 Amount 110.24	" " " .001
Decrease 110.24	.001

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Development in Rock (Cont)

	<u>Rock Drifting</u>	<u>Rock Raising</u>
1929	0	25'
1928	<u>0</u>	<u>0</u>
Increase	0	25'

The cost of 25 ft. of rock raising in 1929 was charged in error to E & A 537, "Sinking Mackinaw Shaft and Drifting to ore body on 5th Level".

Development in Ore

1929 Amount	\$24,956.76	Cost per ton	\$.214
1928 Amount	5,032.05	" " "	.056
Increase	19,924.71		.158

Sub Division

	<u>Ore Drifting</u>	<u>Ore Raising</u>	<u>Total</u>	<u>Cost per ft.</u>
1929	1,400'	2,220'	3,620'	6.89
1928	<u>330</u>	<u>667</u>	<u>997</u>	<u>5.05</u>
Increase	1,070	1,553	2,623	1.84

The development of the ore body on the 5th level accounts for the large increase in ore drifting and raising.

Stoping

1929 Amount	\$74,810.95	Cost per ton	\$.639
1928 Amount	47,054.80	" " "	.518
Increase	27,756.15		.121

The increase was due partly to a small reserve of broken ore in stopes for hoisting in 1929, as compared with a large reserve in 1928. Part of the production in 1929 was obtained from scattered operations, in some cases no more than a scam; in one case the ore was transferred twice by scraper hoists; in several places the ore was mined by stoping a small amount from the floor of stopes and drifts. In 1928, the large ore reserves broken before the mine closed in 1920, was hoisted and all ore was mined in full sized stopes.

Supply cost increased due to purchase of several scraper hoists and more scraper hoist supplies used. Due to error by the Mine Clerk, the drill machines purchased in 1929 were charged to stoping, which increased the Supply Cost.

Detail

	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>
1929	\$49,817.62	66.6%	\$24,993.33	33.4%
1928	<u>31,071.50</u>	<u>66.0</u>	<u>15,783.30</u>	<u>34.0</u>
Increase	18,746.12		9,010.03	

Cost per Ton

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1929	.425	.214	.639
1928	<u>.342</u>	<u>.176</u>	<u>.518</u>
Increase	.083	.037	.121

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Explosives

	<u>1929</u>	<u>1928</u>
Production	117,224	90,866
Total pounds of powder	78,582	72,200
Average price per pound	.1327	.1357
Total amount for powder	\$10,427.17	\$ 9,797.60
Fuse, caps, etc.	1,268.41	1,221.73
Cost of all explosives	11,695.58	11,019.33
Pounds of powder per ton of ore	.670	.794
Cost per ton for powder	.089	.107
Cost per ton for all explosives	.100	.121

The cost per ton for all explosives decreased .021 in 1929 due to use of more "Gelatin" powder and to a lower cost per pound for powder.

Timbering

1929 Amount	\$8,808.86	Cost per ton	\$.075
1928 Amount	3,824.95	" " "	.042
Increase	4,983.91		.033

Detailed Cost of Timber

	<u>1929</u>	<u>1928</u>
Timber Cost	\$ 849.03	\$ 473.13
Lagging, poles, etc.	873.01	264.69
Total	1,722.04	737.82
Feet of timber per ton of ore	.0068	.0049
Cost per ton for all timber	.03117	.00281
Average price per foot	.0146	.0081

The cost for timber used more than doubled in 1929, but the main increase was in labor timbering the 5th level and building chutes. Some expense was incurred also for re-timbering several hundred feet of haulage drift on the 3rd level that caved during the time the mine was flooded; repairs were started late in 1928 but were not completed until in the summer of 1929.

Tramming

1929 Amount	\$14,988.59	Cost per ton	\$.128
1928 Amount	11,391.71	" " "	.126
Increase	3,596.88		.002

Tramming costs increased in 1929, due to tramming on more levels than in 1928. Some ore was trammed on the 4th level in 1929; there were two motor crews on the 5th level for several months after drifting started in ore. Since November there has been two on the day shift and one on the night shift. At one time in the summer there were five motors in service, one on each level. Tramming costs will shortly decrease due to concentration of motor haulage on the 5th level.

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Pumping

1929 Amount	\$6,245.83	Cost per ton	\$.053
1928 Amount	4,858.93	" " "	.053
Increase	1,386.90		

	<u>1929</u>	<u>1928</u>
Total gallons of water pumped	56,528,157	52,760,063
Gallons pumped per minute	107	150
Cost for power	2,868.00	3,099.88

The above figures are for a full year in 1929, while for 1928 they cover the period after the pumps commenced operating on April 29, 1928.

Compressors & Air Pipes

1929 Amount	\$14,808.62	Cost per ton	\$.126
1928 Amount	<u>9,017.13</u>	" " "	<u>.099</u>
Increase	5,790.49		<u>.027</u>

Cubic feet of air used in 1929	- 570,635,000
" " " " " " 1928	- <u>214,020,000</u>
Increase	<u>356,615,000</u>

The detail for this account for the two years is as follows:

	<u>1929</u>	<u>1928</u>
Compressors	13,695.47	7,071.62
Air Pipes	<u>1,113.15</u>	<u>1,945.51</u>
Total	14,808.62	9,017.13

The increase was due to large increase in amount of air used in 1929, due to operating twelve months as compared with eight in 1928, and to working night shift part of the year developing the 5th level.

The cost for air piping decreased in 1929, due to extraordinary expense in 1928, replacing pipes throughout the mine that were destroyed by acid mine water.

Underground Superintendence

1929 Amount	\$5,573.07	Cost per ton	\$.047
1928 Amount	3,755.60	" " "	.041
Increase	1,817.47		.006

Increase due to two shift bosses employed the latter part of the year when the 5th level was being developed.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills

1929 Amount	\$ 0.00	Cost per ton	\$.000
1928 Amount	2,080.72	" " "	.023
Decrease	2,080.72		.023

There were no charges to this account in 1929 through an error by the Mine Clerk in not charging the new drill machines purchased; they were charged to stoping. The 1928 charges cover cost of new valves for Nordberg compressor to replace the complicated valve gearing, and four new drill machines.

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Electric Tram Equipment

1929 Amount	\$4,495.59	Cost per ton	\$.038
1928 Amount	1,451.67	" " "	.016
Increase	3,043.92		.022

	Sub Division		Increase	Decrease
	1929	1928		
Generator & Motor	1,315.21	11.92	1,303.29	
Locomotives	224.59	340.02		115.43
Wiring	698.74	322.26	376.48	
Main Line Tracks	524.51	288.72	235.79	
Main Line Cars	<u>1,732.54</u>	<u>488.75</u>	<u>1,243.79</u>	
Total	4,495.59	1,451.67	3,043.92	

The large increase was due to expense of rewinding armature on generator, to more wiring and track expense on account of opening the 5th level, and to repairing a number of main line cars for the 5th level.

Pumping Machinery

1929 Amount	\$266.19	Cost per ton	\$.002
1928 Amount	923.85	" " "	.010
Decrease	657.66		.008

Expense in 1929 covers ordinary repairs to pumps; in 1928 expense covered cost of 905 ft. of electric cable for the shaft. The old pump cable was sold to the Gwinn Mine a number of years ago and a new cable had to be purchased.

Total Underground Costs

1929 Amount	\$154,954.46	Cost per ton	\$1.322
1928 Amount	89,501.65	" " "	.985
Increase	65,452.81		.337

The large increase is due mainly to expense of developing the 5th level.

SURFACE COSTS:

Hoisting

1929 Amount	\$7,753.47	Cost per ton	\$.067
1928 Amount	4,718.70	" " "	.053
Increase	3,034.77		.014

Increase due to operating twelve months in 1929, as compared with nine months in 1928. Both mines operated for six months in 1929, while only one operated in 1928. The Mackinaw operated two shifts during the last half of the year, making it necessary to have three hoisting engineers, as compared with one in 1928.

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Stocking Ore

1929 Amount	\$4,118.99	Cost per ton	\$.039
1928 Amount	1,914.32	" " "	.021
Increase	2,204.67		.018

	<u>Gardner</u>	<u>Mackinaw</u>	<u>Total</u>
Tons stocked 1929	41,389	16,822	58,211
Tons stocked 1928	<u>20,191</u>	<u>0</u>	<u>20,191</u>
Increase	21,198	16,822	38,020

Increase due to stocking 38,020 tons more ore in 1929 - 21,198 tons more at the Gardner and 16,822 tons at the Mackinaw. In 1928 ore was stocked at the Gardner only; in 1929 it was stocked at both properties. This increased stocking expense as two landing crews were required in 1929, only one in 1928. The expense of erecting stocking trestle at the Gardner was charged to this account in 1929; in 1928 it was a new trestle and was charged to "Docks, Trestles & Pockets".

Dry House

1929 Amount	\$4,531.97	Cost per ton	\$.038
1928 Amount	2,372.30	" " "	.026
Increase	2,159.67		.012

The increase was due to operating twelve months in 1929, as compared with only eight months in 1928. The increase in working crew at mine on account of developing the 5th level increased the time required to take care of the dry house and thus increased the labor cost.

Tons and cost of coal used in heating plant			
1929	531 tons	\$3,018.80	\$5.685 per ton
1928	334-1800 tons	1,988.79	5.938 " "

General Surface Expense

1929 Amount	\$3,486.78	Cost per ton	\$.029
1928 Amount	2,596.79	" " "	.029
Increase	889.99		

MAINTENANCE ACCOUNTS:

Hoisting Equipment

1929 Amount	\$2,315.67	Cost per ton	\$.019
1928 Amount	3,201.72	" " "	.035
Decrease	896.05		.016

	<u>1929</u>	<u>1928</u>
Sub Division		
Electric Hoists	673.66	1,668.83
Wire Rope	472.06	108.88
Skips, Cages & Skiproads	<u>1,169.95</u>	<u>1,424.01</u>
Total	2,315.67	3,201.72

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Hoisting Equipment (Cont)

Expense for electric hoists decreased in 1929 on account of the purchase of a complete new set of grids for the Mackinaw hoist in 1928. Expense was also high in 1928 on account of installing the Stephenson cage hoist at the Gardner Mine to replace the Gardner hoist which was sold several years ago.

A new cage rope was bought and put in service in 1929.

Skips, cages and skiproads expense was higher in 1928 on account of reopening the mine.

Shaft

1929 Amount	\$890.61	Cost per ton	\$.008
1928 Amount	715.16	" " "	.008
Increase	175.45		

The expense for repairing the two shafts at this property were about the same in 1929 and 1928.

Top Tram Equipment

1929 Amount	\$1,762.32	Cost per ton	\$.015
1928 Amount	240.72	" " "	.002
Increase	1,521.60		.013

	Sub Division		<u>Increase</u>	<u>Decrease</u>
	<u>1929</u>	<u>1928</u>		
Engine & Motors	65.88	112.23	538.65	
Tracks & Cars	1,005.71	54.46	951.25	
Wire Rope	30.68	66.57		35.89
Sheaves, etc.	75.05	7.46	67.59	
	<u>1,762.32</u>	<u>240.72</u>	<u>1,557.49</u>	

The large increase in 1929 was due to installing operating equipment at the Mackinaw. This included a McClure top tram plant from the Stephenson Mine, sheaves, rollers, two "A" frame take-ups, tracks on trestles, rebuilding top tram cars, etc.

Docks, Trestles & Pockets:

1929 Amount	\$2,292.26	Cost per ton	\$.020
1928 Amount	1,364.60	" " "	.015
Increase	927.66		.005

Increase due to expense of repairing permanent trestles at Mackinaw shaft, to building new permanent trestle to stocking grounds and the new stocking trestle. Part of the expense in 1928 for rehabilitating the Gardner trestles was charged to Reopening Expense.

Mine Buildings

1929 Amount	\$ 328.56	Cost per ton	\$.003
1928 Amount	1,209.74	" " "	.013
Decrease	881.18		.010

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Mine Buildings (Cont)

	Sub Division	
	<u>1929</u>	<u>1928</u>
Office	41.67	15.70
Warehouse	-	6.69
Shops	1.04	103.68
Barn	-	15.58
Shaft House	55.79	43.07
Engine House	172.25	490.52
Dry House	26.85	167.48
Miscellaneous	<u>30.96</u>	<u>367.02</u>
Total	328.56	1,209.74

Expense for repair of buildings was much lower in 1929, due to extraordinary expense for repairs in 1928 on account of reopening the mine after it had been idle for eight years.

Engine House expense was high in both years due to moving a building in sections from the Stephenson Mine and erecting it at the Gardner to house the hoisting engine. This work was done late in 1928 and in January 1929.

Total Surface Costs

1929 Amount	\$27,480.63	Cost per ton	\$.235
1928 Amount	<u>18,333.95</u>	" " "	<u>.202</u>
Increase	9,146.68		.033

The increase in surface expense was confined to three operating accounts, i.e., hoisting, stocking ore, and dry house.

GENERAL MINE ACCOUNTS:

Insurance

1929 Amount	\$410.59	Cost per ton	\$.004
1928 Amount	242.91	" " "	.003
Increase	167.68		.001

Increase due to insuring Gardner engine house, Mackinaw top tram engine house, and to higher valuation on contents of certain buildings at the mine.

Engineering

1929 Amount	\$1,789.10	Cost per ton	\$.015
1928 Amount	1,042.30	" " "	.012
Increase	746.80		.003

Increase due to more engineering work on account of sinking the Mackinaw shaft and developing the 5th level.

Analysis

1929 Amount	\$1,117.85	Cost per ton	\$.009
1928 Amount	979.69	" " "	.011
Increase	138.16	Decrease	.002

This account includes operating laboratory charge.

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Analysis (Cont)

	<u>No. of</u> <u>Determinations</u>	<u>Cost per</u> <u>Determination</u>	<u>Amount</u>
1929	6,712	.13387	892.06
1928	5,822	.148543	835.40

Increase partly due to more determinations on account of larger production and shipping more ore from stockpile. There was more expense for sampling on account of the mine operating twelve months in 1929 as compared with eight months in 1928.

Personal Injury Expense

1929 Amount	\$2,414.27	Cost per ton	\$.021
1928 Amount	1,674.20	" " "	.018
Increase	540.07		.003

This expense is due to setting up 2% of the payroll as a reserve for personal injuries.

Safety Department Expense

1929 Amount	\$ 71.84	Cost per ton	\$.001
1928 Amount	102.96	" " "	.001
Decrease	31.12		

There was less Safety Department Expense in 1929, due to shift boss being away on inspection trip (shift bosses committee) through the mines in 1928.

Telephones & Safety Devices

1929 Amount	\$573.99	Cost per ton	\$.005
1928 Amount	647.57	" " "	.007
Decrease	73.58		.002

Expense for lighting levels, and for safety devices, and for telephones, were unusually heavy in 1928 on account of reopening the mine.

Special Expense

1929 Amount	\$154.00	Cost per ton	\$.001
1928 Amount	-		-
Increase	154.00		.001

This expense is charged at the Cleveland Office; it presumably is the Lake Superior Iron Ore Association assessment.

Mine Office

1929 Amount	\$4,786.28	Cost per ton	\$.040
1928 Amount	3,339.92	" " "	.036
Increase	1,446.36		.004

Increase due to changing clerks and to including in this account a proportion of General Storehouse overhead expense.

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Safety Expense

1929 Amount	\$592.77	Cost per ton	\$.005
1928 Amount	-		-
Increase	592.77		.005

This expense is the proportion of Safety Picnic expense charged to the mine.

Total General Mine Accounts

1929 Amount	\$11,910.76	Cost per ton	\$.101
1928 Amount	8,029.55	" " "	.088
Increase	3,881.21		.013

The two accounts responsible for most of the increase were Mine Office and Safety Expense, or General Storehouse overhead expense and Safety Picnic expense.

9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS:

There was no diamond drilling done at this property in 1928 or 1929.

10. TAXES:

<u>DESCRIPTION</u>	<u>1929</u>		<u>1928</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
C. & N. W. Lease, Gardner:				
SE $\frac{1}{4}$ of SE $\frac{1}{4}$ Sec. 35-45-25	7,000	242.90	7,000	220.93
NW $\frac{1}{4}$ of NE $\frac{1}{4}$ Sec. 2-45-25	200	6.96	200	6.31
Personal Property	61,000	2,116.70	15,000	473.45
Total	68,200	2,366.56	22,200	700.69
Collection Fees		23.67		7.00
Total Taxes		2,390.23		707.69
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	971.59	25,000	789.04
Collection Fees		9.71		7.89
Total Taxes		981.30		796.93
Gardner-Mackinaw Dwellings	6,500	225.57	7,500	236.72
Collection Fees		2.25		2.37
Total Taxes		227.82		239.09
Total Taxes Gardner-Mackinaw				
Mine and Location		3,599.35		1,743.71
Increase 1929		1,855.64		

Taxes increased due to more ore in stock at Gardner Mine which increased the personal property valuation, and to a higher tax rate in township due to decrease in total valuation.

GARDNER-MACKINAW MINE
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11. ACCIDENTS
AND
PERSONAL
INJURY:

There were no accidents at the mine during the year involving a loss of more than one day. On November 19th, 1929, the mine had operated one year without an accident and at the end of the year this record had been extended to 417 days.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

E. & A. #537 - Sinking Mackinaw Shaft and Drifting to Ore Body on 5th Level

E. & A. completed in December.

Total Estimate	\$25,025.00
Total Expenditures in 1929	<u>23,902.36</u>
Unexpended balance Jan. 1st, 1930	1,122.64

(1) Sinking Mackinaw Shaft 47 ft.

Total Estimate	\$ 5,000.00
Total Expended in 1929	<u>5,000.00</u>
Unexpended balance Jan. 1st, 1930	0.00

This work was completed in March.

(2) Flat and Pockets

Total Estimate	\$ 3,000.00
Total Expenditures in 1929	<u>3,000.00</u>
Unexpended balance Jan. 1st, 1930	0.00

This work was completed in April.

(3) Pumphouse and Sump

Total Estimate	\$ 2,000.00
Estimated Expenditures in 1929	<u>1,063.97</u>
Unexpended balance Jan. 1st, 1930	936.03

This work was started in November and completed in December with the excavation of a small sump of 25,000 gallons capacity and a pumphouse 10' x 12' in size.

(4) Drifting to Ore Body 850 ft.

Total Estimate	\$12,750.00
Total Expenditures in 1929	<u>14,838.39</u>
Unexpended balance Jan. 1st, 1920	2,088.39 (red)

This work was started in April and completed the first week in July. The cost exceeded the estimate due to hard ground encountered in the drift, which delayed progress and increased the cost.

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

E & A #566 - Sinking Mackinaw Shaft 280 ft. and Developing 6th Level:

This E. & A. was authorized late in the year and assembling of equipment and supplies was underway at the end of the year.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

(1) Oil Furnace and Storage Tank from Republic:

A Ingersoll Rand oil furnace and storage tank for crude oil was purchased from the Republic Mine and installed at the mine in the summer. The furnace is used for heating and tempering and is a decided improvement over the old coke furnace formerly in use.

c. Scraper Hoists:

Scraper hoists are used to pull the ore down the flat footwall to the chutes where the slope is too flat for the ore to run. Several areas were mined in 1929, using scrapers, that would not otherwise have been available.

	<u>On Hand</u> <u>1/1/1929</u>	<u>Purchased</u> <u>1929</u>	<u>On Hand</u> <u>Jan.1,1930</u>
Ingersoll Rand	2	3	5
10 h.p. Sullivan Electrics	3	0	3
Sullivan air	<u>2</u>	<u>1</u> Scrapped	<u>1</u>
Total	7	3	9

14. MAINTENANCE AND REPAIRS:

The equipping of the Mackinaw Shaft and trestles for stocking ore, involving the installation of a top tram endless rope haulage plant, repair of landing, and building of new permanent stocking trestles, might properly be considered extraordinary maintenance and repairs.

15. POWER:

Electric power was supplied during the year by the Cliffs Power and Light Company, a subsidiary of The Cleveland-Cliffs Iron Company. There were no serious delays due to lack of power during the year. The delays from this cause are listed under 2 - h.

The rate charged for current was $1\frac{1}{2}$ per kilowatt hour, the same as has been in effect for a number of years.

16. CONDITION OF PREMISES:

The premises around the mine were kept clean and some expense incurred in filling the low swampy ground around the shops and dry house. No landscaping work has been done at this property as the profit factor did not justify any expenditures of this character.

GARDNER-MACKINAW MINE
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18. NATIONALITY
OF
EMPLOYEES:

The nationality report for the Gardner-Mackinaw Mine based on time books for the December 31st, 1929, period, is as follows:

<u>Nationality</u>	<u>No. of Men</u>	<u>Percentage</u>
English	10	8.7%
Irish	1	.9
Scotch	1	.9
Swedish	17	14.7
Norwegians	1	.9
Germans	2	1.7
French	12	10.5
Italians	32	27.8
Finnish	39	33.9
Total	115	100%

FRANCIS MINE
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1. GENERAL:

There were no changes at this abandoned mine property in 1929 other than the shipment of 58,009 tons of ore from stockpile. The steel shaft house and steel pulley stands are the only structures left on the property. These will be needed at the Princeton Mine when it is decided to reopen that property.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

b. Shipments:

<u>Grade of Ore</u>	<u>Stockpile</u>	<u>Total</u>	<u>Total Last Year</u>
Franport	58,009	58,009	21,686
Increase in 1929		36,323	

c. Stockpile Inventories:

<u>Grade of Ore</u>	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
Franport	299,737	357,746		58,009

f. Ore Statement:

	<u>Franport Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
On Hand Jan. 1, 1929	357,746	357,746	381,349
Output for Year	0	0	0
Total	357,746	357,746	381,349
Shipments	58,009	58,009	23,603
Balance on Hand	299,737	299,737	357,746
Decrease in Ore on Hand		58,009	23,603

1929 - Mine Abandoned

1928 - " "

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 ore shipped in 1929 averaged 1.4% higher than the ore shipped in 1928, but does not necessarily represent the average grade of ore remaining in stock. The outer cuts on stockpile are uniformly lower grade due to bands of slate in the lump ore on the rim of the piles. Interior cuts on piles average higher and furnished most of the ore shipped in 1929.

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8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1929</u>	<u>1928</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	0	0		
Underground Costs	0	0		
Surface Costs	0	1.90		1.90
General Mine Accounts	335.62	3,066.70		2,731.08
Total	335.62	3,068.60		2,732.98
Loading and shipping	2,806.90	1,054.87	1,752.03	
Total as per Cost Sheet	3,142.52	4,123.47		980.95
Taxes	11,044.09	10,856.39	187.70	
Central Office	150.23	106.33	43.90	
Welfare, Safety, Hospital	23.97	11.22	640.00	12.75
Rental of Equipment	640.00			
Total Cost at Mine	15,000.81	15,097.41		96.60
Budget Cost	15,222.00			

Expense under "General Mine Accounts" shows a large decrease due to setting up a calculated amount in 1928 to cover compensation payments to employees for injuries incurred when the mine operated. The 1929 expense is 2% of the payroll set up as a reserve for personal injuries.

Taxes increased due to higher tax rate in township account of lower valuation.

Loading and shipping expense increased due to shipping 58,009 tons in 1929, as compared with 23,603 tons in 1928.

Rental of Equipment expense in 1929 covers cost of renting L. S. & I. R. R. steam shovel which loaded all ore shipped.

10. TAXES:

<u>DESCRIPTION</u>	<u>1 9 2 9</u>		<u>1 9 2 8</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,	-	2.55	-	2.33
SW $\frac{1}{4}$ (Ex. R. of W.) " 153.56 acres	500	17.35	500	15.79
Personal Injury	315,000	10,930.50	340,000	10,730.80
Total	315,500	10,950.40	340,500	10,748.92
Collection Fees		109.48		107.47
Total Taxes		11,059.88		10,856.39
Less Rebate C. & N. W.		13.79		
Total Francis		11,044.09		
Total Tax Rate per \$100		3.47		3.1561

Taxes increased in 1929 in spite of a lower valuation on account of a higher tax rate.

GWINN DISTRICT MINES
ANNUAL REPORT
YEAR 1929

1. GENERAL:

Conditions in the Gwinn District were good throughout 1929, as was also the case in 1928. The Archibald Mine of the C. K. Quinn & Company continued operating on double shift and approximately the same number of employees worked for the Company. The water power plant of the Cliffs Power & Light Company on the Escanaba River, two miles above Princeton, was completed and went in operation in the summer. Woods operations have increased in the vicinity of Gwinn and more families have come in from outside points. The recent authorization to sink and develop a new level at the Mackinaw Mine insures a continuation of employment for at least 90 men at this property for several years. The operators of the Archibald Mine expect two more years life for this property. This insures a continuation of the present rate of operations in the district for the immediate future. In 1929 savings deposits increased at the Gwinn State Savings Bank in spite of the higher standard of living.

a. STATEMENT SHOWING TOTAL ORE PRODUCED FROM 1903 to 1929 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							
1/1/29	1,582,616	1,584,333	3,792,429	988,665	522,602	292,026	8,762,671
1929	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>117,224</u>	<u>117,224</u>
Total	1,582,616	1,584,333	3,792,429	988,665	522,602	409,250	8,879,895

b. STATEMENT SHOWING TOTAL ORE SHIPMENTS FROM 1905 to 1929 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							
1/1/29	1,511,592	1,435,163	3,485,792	988,325	164,856	271,835	7,851,563
1929	<u>77,426</u>	<u>7,162</u>	<u>99,318</u>	<u>0</u>	<u>58,009</u>	<u>95,397</u>	<u>337,312</u>
Total	1,589,018	1,442,325	3,585,110	988,325	222,865	367,232	8,194,875

c. STATEMENT SHOWING ORE IN STOCK AT CLOSE OF 1928 AND 1929:

<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.1,1929	71,024	149,170	300,003	0	357,746	20,191	898,134
Jan.1,1930	0	142,008	206,138	0	299,737	42,018	689,901

5. LABOR AND WAGES:

The number of men employed in the district by The Cleveland-Cliffs Iron Company on December 31st, 1929, was 112; a year ago there were 84; the increase for the year was 28. During the summer months when loading by steam shovel was underway, the Gwinn District Crusher operating, and more general surface work being done, the number of employees rose to about 140. The Archibald Mine employes about 160 men, a decrease of 20 as compared with 1928, and fully 75 men who live at Gwinn and surrounding locations work in the woods. The Stack Bros. lumber mill at Little Lake worked full time in the early months of the year, it closed in the Spring and it is rumored will not be reopened. This threw a few men who lived at Gwinn out of employment.

The population of Gwinn and surrounding locations increased in 1929 and there are now more children in the schools than for several years.

GWINN DISTRICT MINES
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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	1929		1928	
	VALUATION	TAXES	VALUATION	TAXES
<u>MINERAL LANDS GWINN FEE:</u>				
Lots 1, 2 & 3, Sec. 36-45-25, 52 acres	100	3.47	100	3.18
" 7, 8 & 9, " 36 " 98.92 acres	200	6.95	200	6.33
" 11, " 36 " 13.2 "	20	.69	20	.64
SW $\frac{1}{4}$ of SW $\frac{1}{4}$ " 26 " 40 "	80	2.78	80	2.53
NW $\frac{1}{4}$ of SE $\frac{1}{4}$ " 27 " 40 "	80	2.78	80	2.53
NW $\frac{1}{4}$ of " 35 " 160 "	320	11.10	320	10.07
N $\frac{1}{2}$ of NE $\frac{1}{4}$ " 34 " 80 "	160	5.56	160	5.04
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ " 34 " 40 "	80	2.78	80	2.53
NE $\frac{1}{4}$ of NW $\frac{1}{4}$ " 34 " 40 "	80	2.78	80	2.53
S $\frac{1}{2}$ of SE $\frac{1}{4}$ " 27 " 80 "	160	5.56	160	5.04
NE $\frac{1}{4}$ of SE $\frac{1}{4}$ " 28 " 40 "	600	20.83	600	18.94
S $\frac{1}{2}$ of NE $\frac{1}{4}$ " 28 " 80 "	130	4.54	130	4.11
S $\frac{1}{2}$ of N $\frac{1}{2}$ " 22 " 160 "	500	17.35	500	15.80
N $\frac{1}{2}$ of NW $\frac{1}{4}$ " 2-45-26 87.08 "	90	3.12	90	2.86
N $\frac{1}{2}$ of " 2 " 165.61 "	190	6.60	190	6.02
NE $\frac{1}{4}$ of SE $\frac{1}{4}$ " 34 " 40.00 "	80	2.78	130	4.11
Total	2870	99.67	2920	92.26
Collection Fees		1.00		.92
Total Taxes		100.67		93.18

GWINN TOWNSITE - SURFACE ONLY:

NE $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec. 21-45-25, 27.40 Acres	150	5.21	150	4.74
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	6.96	200	6.31
E $\frac{1}{2}$ of SE $\frac{1}{4}$, Sec. 21-45-25, 65.84 Acres	400	13.88	400	12.63
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	10.42	300	9.46
Gwinn Townsite Plat	102,185	3,548.05	101,905	3,218.15
Part of W $\frac{1}{2}$ of SE $\frac{1}{4}$ Sec. 21-45-25, Superintendent's residence, 1.2 Acres	3,500	121.47	3,500	110.48
NW $\frac{1}{4}$ of NE $\frac{1}{4}$, Sec. 21-45-25, except 5 Acres in Cemetery, 35 Acres	100	3.47	100	3.15
Part of S $\frac{1}{2}$ of NE $\frac{1}{4}$, Sec. 21-45-25, 69.69 Acres	400	13.88	400	12.63
Total	107,235	3,723.34	106,955	3,377.55
Collection Fees		37.23		33.78
Total Taxes		3,760.57		3,411.33

GARDNER-MACKINAW LOCATION:

N $\frac{1}{2}$ of NE $\frac{1}{4}$ of Sec. 35-45-25	6,500	225.57	7,500	236.72
Collection Fees		2.25		2.37
Total Taxes		227.82		239.09

DISTRICT OFFICE AND CRUSHER:

Personal	800	28.03	690	21.80
N $\frac{1}{2}$ of NW $\frac{1}{4}$ Sec. 27-45-25, District Crusher	1,000	35.06	1,000	31.58
Total	1,800	63.09	1,690	53.38
Collection Fees		.63		.54
Total Taxes		63.72		53.92