

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1933

7. UNDERGROUND: (Cont)

i. Pumpings:

The number of gallons of water pumped per minute in each month of the year for the past five years is shown in the following statement:

<u>Month</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>	<u>1930</u>	<u>1929</u>
January	814	942	990	1118	1285
February	808	982	914	1183	1226
March	751	963	891	1095	1153
April	816	973	878	1058	1155
May	926	1000	847	958	1179
June	876	835	960	1087	1303
July	984	918	972	1073	1223
August	882	885	923	1071	1274
September	889	889	953	1063	1279
October	866	786	931	1075	1231
November	849	920	839	934	1202
December	826	771	875	1011	1250
Total Average	857	905	914	1060	1230

The following statement shows gallons of water pumped per minute for the past nine years:

<u>Year</u>	<u>Gals. per Min.</u>
1933	857
1932	905
1931	914
1930	1,060
1929	1,230
1928	1,198
1927	1,144
1926	819
1925	705

There was another decrease in amount of water pumped in 1933, 48 gallons per minute, as compared with 9 gallons per minute in 1932. This is the fourth year there has been a decrease as compared with the five previous years, in which there was an increase.

j. Underground in General:

The cost of timber repairs in the mine was approximately \$8,000.00 during the idle period of 1933. The main levels are now in good condition, but only temporarily, for as soon as ground movement starts (within a few months after mining has been resumed) the effect of the idle periods will result in an increase of repair costs to above normal. The idle periods effect the timber in raises, where there is no circulation of air, and many raises are in need of repairs. This work is now underway and will continue for months, otherwise the raises would cave and be lost. The mine is developed for a production of 600,000 tons per year, while the present schedule calls for product of only 216,000 tons. Operating at one-third capacity naturally results in higher cost per ton. Every effort is being made to keep expenses down but repairs have to be made irrespective of the product.

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k. Idle Period:

The mine closed on April 8th, however, work preliminary to closing was underway for three weeks prior to this time. All equipment that would deteriorate if left in the mine was brought to surface. Due to the thorough overhauling of the scraper hoists and drill machines in 1932, very little expense was incurred during the idle period in 1933 for overhauling.

For several months after closing there was only a small crew employed on repair work; the crew was gradually increased to take care of necessary repairs. Although the mine was idle one more month in 1933, idle labor expense was 14% less than in 1932. The work done during the idle period covered repairs on main levels, to raises, No. 3 shaft, permanent trestles, timber tunnel, overhauling equipment, etc. Approximately 59 men were employed during the idle period as compared with 75 in 1932. When the mine reopened the men were taken back gradually as working places were gotten ready for them and at the end of the year the crew required for production of 18,000 tons per month was nearly complete. The crew is still less than formerly employed due to economies effected.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	61,941	84,046		22,105
Underground Costs	1.148	1.142	.006	
Surface Costs	.206	.221		.015
General Mine Expenses	.441	.448		.007
Cost of Production	1.795	1.811		.016
Depreciation - Plant & Equipt.	.032	.033		.001
Taxes	.747	.723	.024	
Loading & Shipping	.200	.004	.196	
Total Cost at Mine	2.774	2.570	.204	
Administrative & General Exp.	.067	.048	.019	
Miscellaneous Income	.038	.026	.012	
Idle Expense	2.023	1.451	.572	
Reopening Mine (included under U.G. Cost)				
TOTAL COST	4.826	4.043	.783	
No. of Days Operated	49½	52		2½
No. Shifts & Hours	1-8	1-8		
Average Daily Product	1,251	1,616		365

COST OF PRODUCTION:

	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>	<u>Increase</u>	<u>Decrease</u>
Labor	.752	41.9	.782	43.9		.030 2%
Supplies	1.043	58.1	1.006	56.1	.037 2%	
Total	1.795	100.0	1.788	100.0	.007	

b. Detailed Cost Comparison:

(1) Days and Shifts:

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1933	49½	1-8	134	15,843
1932	51½	1-8	163	19,274½
Decrease	2		29	3,431½

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:

(2) Wages:

In 1933, wages were increased 15% on July 16th and salaries increased for some in July and August, and for Mining Captain on November 1st.

In 1932 wages were reduced 15% on May 16th and salaries reduced on February 1st and June 1st.

(3) Comparison of Production:

Production - 1933	61,941 tons
Production - 1932	84,046 "
Decrease	22,105 "

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate per Day</u>
1933	134	15,843	62,266.57	3.93
1932	163	19,274 $\frac{3}{4}$	81,271.97	4.22
Decrease	29	3,431 $\frac{1}{4}$	19,005.40	.29

(5) Tons per Man per Day:

	<u>1933</u>	<u>1932</u>	<u>Decrease</u>
Surface	13.77	16.95	3.18
Underground	5.46	5.87	.41
Total	3.91	4.36	.45

(6) Cost of Production:

1933	\$111,204.44	Cost per ton	\$1.795
1932	152,179.27	" " "	1.811
Decrease	40,974.83		.016

	<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>
1933	46,571.18	40.4	68,634.74	59.6	.752	1.108	1.860
1932	67,367.15	43.9	84,812.12	56.1	.801	1.010	1.811
Increase				3.5		.098	.049
Decrease	20,795.97	3.5	16,177.38		.049		

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8. COST OFOPERATING:b. Detailed Cost Comparison:(7) Detail of Accounts:

	<u>1933</u>		<u>1932</u>		<u>Increase</u>		<u>Decrease</u>	
Days per Week	2 & 3		2					
Shifts & Hours	1-8		1-8					
Production, Tons	61,941		84,046				22,105	
Avg. Daily Product - Tons	1,251		1,632				381	
Number of Days Worked	49½		51½				2	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs</u>								
1. Exploring in Mine	26.03	.000	278.47	.003			252.44	.003
2. Sinking in Shaft	-	-	3184.09	.038			3184.09	.038
3. Development in Rock	1689.01	.027	1782.74	.021	93.73	.006		
4. Development in Ore			531.93	.006			531.93	.006
5. Stopping	19403.70	.313	26329.88	.313			6926.18	
6. Timbering	18842.05	.304	21850.40	.260		.044	3008.35	
7. Tramming	3885.58	.063	7024.66	.084			3139.08	.021
8. Ventilation	2018.22	.033	2570.89	.031		.002	552.67	
9. Pumping	11061.88	.179	15483.63	.184			4321.75	.005
10. Compressors & Air Pipes	5971.42	.096	7802.24	.093		.003	1830.82	
11. Reopening Expense	1998.01	.032	1962.54	.023	35.47	.009		
12. Undg. Superintendence	2523.58	.041	3634.85	.043			1111.27	.002
14. Maint: Compr & P. Drills	99.19	.002	300.00	.004			200.81	.002
15. Scrapers & M. Leaders	1675.91	.027	1717.50	.020		.007	41.59	
16. Elec. Tram Equipt.	1616.18	.026	1160.57	.014	455.61	.012		
17. Pumping Machy.	318.85	.005	412.60	.005			93.75	
Total U.G. Costs	71129.61	1.148	96026.99	1.142		.006	24897.38	
<u>Surface Costs:</u>								
18. Hoisting	5164.48	.083	5969.33	.071		.012	804.85	
19. Stocking Ore	1498.48	.024	2246.37	.027			747.89	.003
21. Dry House	1972.43	.032	3280.92	.039			1308.49	.007
22. Gen. Surface Expense	1138.29	.019	1392.43	.017		.002	254.14	
23. Maint: Hoisting Equipt.	488.05	.008	1533.61	.018			1045.56	.010
24. Shaft	1263.98	.020	938.20	.011	325.78	.009		
25. Top Tram Equipt.	302.15	.005	712.23	.008			410.08	.003
26. Docks, Tres & Pkts	677.54	.001	2332.82	.028			1655.28	.027
27. Mine Buildings	230.54	.004	132.98	.002	97.56	.002		
Total Surface Costs	12735.94	.206	18538.89	.221			5802.95	.015
<u>General Mine Expense</u>								
28. Insurance	143.60	.002	165.99	.002			22.39	
29. Mining Engineering	391.38	.006	846.24	.010			444.86	.004
30. Mech & Elec Engineering	472.34	.008	669.43	.008			197.09	
31. Analysis & Grading	2671.78	.043	2140.15	.026	531.63	.017		
32. Personal Injury	5726.07	.092	9464.74	.113			3738.67	.021
33. Safety Department	163.04	.003	367.52	.004			204.48	.001
34. Telephones & S. Devices	524.55	.008	633.46	.008			108.91	
35. Local & Gen. Welfare	1269.62	.021	2022.86	.024			753.24	.003
36. Spec Exp., Pen. & Allows	7617.38	.126	11366.26	.135			3748.88	.009
37. Ishpeming Office	4651.54	.075	5638.84	.067		.008	987.30	
39. Mine Office	3507.69	.057	4297.90	.051		.006	790.21	
Total Gen. Mine Exp.	27338.89	.441	37613.39	.448			10374.50	.007
COST OF PRODUCTION	111204.44	1.795	152179.27	1.811			40974.83	.016
40. Taxes	46258.61	.747	60777.71	.723		.024	14519.10	
TOTAL COST	157463.05	2.542	210994.44	2.534		.008	53531.39	

General: This mine operated one month less in 1933; it was only by close supervision of all expenses that the cost per ton for product 22,105 tons less than in 1932 was kept within one cent of the cost in 1932.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

UNDERGROUND COSTS:

1. Exploring in Mine

1933	26.03
1932	<u>278.47</u>
Decrease	<u>252.44</u>

Central Office Charge. Expense of the Geological Dept. sharply reduced in 1933.

2. Sinking in Shaft:

1933	0.00
1932	3184.09

Cost per ton \$.038

No shaft sinking in 1933.

3. Development in Rock:

1933	1689.01	Cost per Ton \$.027
1932	1782.74	" " " .021

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost per Ft.</u>
1933	151'	174'	325'	5.20
1932	<u>154'</u>	<u>157'</u>	<u>311</u>	<u>5.73</u>
Increase		17'	14'	
Decrease	3'			.53

Feet of development in rock nearly equal but cost per ft. lower in 1933.

4. Development in Ore:

1933	0.00
1932	531.93

Cost per Ton \$.006

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost per Ft.</u>
1933	0	0	0	0
1932	<u>15'</u>	<u>90'</u>	<u>105'</u>	<u>5.06</u>
Decrease	15'	90'	105'	5.06

No development in ore in 1933, only 105' in 1932.

5. Stoping:

		<u>Cost Per</u>					<u>Tons</u>
		<u>Ton</u>	<u>Labor</u>		<u>Supplies</u>		<u>Stoping</u>
1933	19,403.70	<u>.313</u>	14004.73	72.2%	5398.97	27.8%	19.80
1932	26,329.88	<u>.313</u>	20455.43	77.7%	5874.45	22.3%	21.25
Incr.					5.5		
Decr.			6450.70	5.5	475.48		1.45

Labor cost decreased .017 per ton in 1933 and supply cost increased .017. More mining in tight ground near the footwall increased cost for explosives.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

6. Timbering:

	<u>Labor</u>		<u>Supplies</u>		<u>Total Cost per Ton</u>
1933	10625.91	56.4%	8216.14	43.6%	.304
1932	<u>12898.41</u>	59.0	<u>8951.99</u>	41.0	<u>.260</u>
Increase				2.6	.044
Decrease	2272.50	2.6	735.85		

There was a decrease in actual expenditures due to operating one month less and less gangs mining. Cost per ton increased on account of curtailed product, to charging out of rotted timber in yards, to use of more poles for covering down floors of sub levels, and use of larger size timber to offset decrease in strength in old timber due to dryness and partial rot.

7. Tramming:

1933	3885.58	Cost per ton	.063
1932	<u>7024.66</u>	" " "	<u>.084</u>
Decrease	3139.08		.021

Decrease due to less expense on account of smaller product.

8. Ventilation:

1933	2018.22	Cost per ton	.033
1932	<u>2570.89</u>	" " "	<u>.031</u>
Decrease	552.67	Increase	.002

Increase in cost per ton due to fan operating more hours and to smaller product.

9. Pumping:

1933	11061.88	Cost per ton	.179
1932	<u>15483.63</u>	" " "	<u>.184</u>
Decrease	4421.75		.005

	<u>Gallons Pumped</u>	<u>Gals per Min.</u>	<u>Cost For Power</u>
1933 - 5 Months Working Period	173,841,316	799	10192.86
1932 - 6 " " " "	<u>242,672,906</u>	<u>905</u>	<u>11965.83</u>
Decrease	68,831,590	106	1772.97

Decrease due to less gallons per minute pumped during 5 months operating period as compared with 6 months operating period in 1932, and water pumped on one less shift per 24-hour period than in 1932.

10. Compressors & Air Pipes:

1933	5971.42	Cost per ton	.096
1932	<u>7802.24</u>	" " "	<u>.093</u>
Decrease	1830.82	Increase	.003

	<u>Operating Comp. Cost</u>	<u>Cost for Air Pipes</u>	<u>Cu. Ft. of Air</u>	<u>Cu. Ft. Air per Ton</u>
1933	5440.38	531.04	126,855,000	2,048
1932	<u>6265.70</u>	<u>1536.54</u>	<u>161,775,000</u>	<u>1,925</u>
Increase				123
Decrease	825.32	1005.50	34,920,000	

Cost per ton slightly higher due to less product. Expense for piping materially reduced in 1933.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

12. <u>Underground Superintendence</u>				
1933	2,523.58	Cost per ton	.041	
1932	<u>3,634.85</u>	" " "	<u>.043</u>	
Decrease	1,111 27		.002	

Decrease in cost per ton due to lower wages and salaries.

14. <u>Maintenance - Compressors & Power Drills:</u>				
1933	99.19	Cost per ton	.002	
1932	<u>300.00</u>	" " "	<u>.004</u>	
Decrease	201.81		.002	

Repairs were low in both years due to idle periods and small product.

15. <u>Scrapers & Mechanical Loaders:</u>				
1933	1,675.91	Cost per ton	.027	
1932	<u>1,717.50</u>	" " "	<u>.020</u>	
Decrease	41.59	Increase	.007	

Increase in cost per ton due to more wire rope used in 1933. Up to the shutdown in April, all possible old rope used; on reopening, new rope required.

16. <u>Electric Tram Equipment:</u>					
	<u>Gen. & Motors</u>	<u>Locomotives</u>	<u>Wiring</u>	<u>Tracks</u>	<u>Cars</u>
1933	85.31	923.85	74.39	476.92	141.85
1932	<u>52.54</u>	<u>476.93</u>	<u>139.25</u>	<u>480.09</u>	<u>11.76</u>
Increase	32.77	446.92			130.09
Decrease			64.86	3.17	
1933 - Cost	1616.18	Cost per ton	.026		
1932 - "	<u>1160.57</u>	" " "	<u>.014</u>		
Increase	455.61		.012		

Increase due to repairing four locomotive armatures in 1933, cost \$150.00 each, or \$600.00, none in 1932, also expense for rebuilding car used for cleaning the skip pit, and more repairs to motor cars.

17. <u>Pumping Machinery:</u>	
Cost per ton is the same for both years - .005. Expense was less in 1933.	

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

SURFACE COSTS:

18. <u>Hoisting:</u>				Cost per Ton
	<u>Cost</u>	<u>Cost per Ton</u>	<u>Power Cost</u>	<u>for Power</u>
1933 -	5164.48	.083	3850.59	.062
1932 -	5969.33	.071	4463.42	.053
Inc.		.012		.009
Dec.	804.85		612.83	

Increase in cost per ton due to smaller product.

19. Stocking Ore:

1933	1498.48	Cost per Ton	.024
1932	2246.37	" " "	.027
Dec.	747.89		.003
1933	Tons Stocked	53,043	- 85.6% of total product
1932	" "	76,390	- 90.9% " " "
Decrease		23,347	5.3%

Decrease due to less ore stocked in 1933.

21. Dry House Expense:

1933 -	1972.43	Cost per Ton	.032
1932 -	3280.92	" " "	.039
Decr.	1308.49		.007
	<u>Coal to Heating Plant - Tons</u>	<u>Cost</u>	<u>Cost Per Month</u>
1933 -	5 months optg. period	619	2785.50
1932 -	6 " " "	691	3374.22
Decrease		72	588.72
			5.27

The saving is in labor expense as the fuel cost was practically the same per month in each year. Economies in operation were effected which account for the decrease in labor expense. The dry house was shut down for several months in the summer and men going underground travelled via the Maas Mine.

22. General Surface Expense:

Slight increase in cost per ton is due to smaller production. The cost includes wages of mine policemen and proportion of Chief of Police and upkeep of mine grounds.

23. Maintenance - Hoisting Equipment:

	<u>Sheaves</u>	<u>Wire Rope</u>	<u>Electric Hoists</u>	<u>Skips & Skip Roads</u>	<u>Total</u>	<u>Cost Per Ton</u>
1933	1.36	9.61	122.19	313.35	488.05	.008
1932	69.69	572.30	362.83	528.79	1533.61	.018
Decrease	68.33	562.69	240.66	215.44	1045.56	.010

All accounts show decreases due to shorter operating period and less product.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

24. Maintenance - Shaft:

1933	1263.98	Cost per ton	.020
1932	<u>938.20</u>	" " "	<u>.011</u>
Increase	325.78		.009

Increase due to heavy program of repairs to concrete shaft (960') underway throughout the year. Runners in skip and cage roads were reinforced by steel brackets, new casing between cage and skip roads, steel dividers between cage and ladder compartments were reinforced, also a number of new runners put in cage road.

25. Maintenance - Top Tram Equipment:

1933	302.15	Cost per ton	.005
1932	<u>712.23</u>	" " "	<u>.008</u>
Decrease	410.08		.003

	<u>General Repairs</u>	<u>Wire Rope</u>
1933	183.85	99.60
1932	<u>583.12</u>	<u>129.11</u>
Decrease	399.27	29.51

The decrease of .003 per ton due to practically no expense for repairs to top tram motors and less expense for wire rope.

26. Maintenance - Docks, Trestles & Pockets

1933	677.54	Cost per ton	.011
1932	<u>2332.82</u>	" " "	<u>.028</u>
Decrease	1655.28		.017

Large decrease due to extraordinary expense for erection of wood trestles in 1931 and 1932. Considerable material used in 1931 was charged in 1932. Expense in 1933 is for material for bents erected late in 1932 at East end of steel trestle, for sollar plank, and for assembling and framing timber for new rock trestle (not yet erected).

27. Mine Buildings:

1933	230.54	Cost per ton	.004
1932	<u>132.98</u>	" " "	<u>.002</u>
Increase	97.56		.002

	<u>1933</u>	<u>1932</u>
Office	-	.50
Shops	166.39	11.86
Shaft House	2.50	10.11
Engine House	-	2.56
Dry House	39.71	27.94
Coal Dock	.51	31.15
Miscellaneous	<u>21.43</u>	<u>48.86</u>
	230.54	132.98

Increase due to installing heating boiler in the shops. Unit heaters will be used to replace the pipe heaters. Installation not completed at end of year. Only minor repairs made to other buildings.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

GENERAL MINE EXPENSES:

28. Insurance:

1933	143.60	Cost per Ton	.002
1932	<u>165.99</u>	" " "	<u>.002</u>
Decrease	22.39		

Cost per ton is the same for both years. Insurance valuation of contents of buildings lower in 1933 on account of reduction in supplies on hand.

29. Mining Engineering:

1933	391.38	Cost per Ton	.006
1932	<u>846.24</u>	" " "	<u>.010</u>
Decrease	454.86		<u>.004</u>

No mine engineer employed during 7 months idle period.

30. Mechanical & Electrical Engineering

1933	472.34	Cost per Ton	.008
1932	<u>669.43</u>	" " "	<u>.008</u>
Decrease	197.09		

Expense reduced on account of lower salaries and curtailment.

31. Analysis & Grading:

	<u>Cost.</u>	<u>Cost</u>	<u>No.</u>	<u>Cost per</u>
		<u>per ton</u>	<u>Determinations</u>	<u>Determination</u>
1933	2671.68	.043	7,541	.1833
1932	<u>2140.15</u>	<u>.026</u>	<u>4,607</u>	<u>.2527</u>
Increase	531.53	.017	2,934	
Decrease				.0694

Increase in cost due to large shipments from stockpile.

32. Personal Injury

1933	5726.07	Cost per Ton	.092
1932	<u>9464.74</u>	" " "	<u>.113</u>
Decrease	3738.27		<u>.021</u>

Decrease is due to one less operating month, smaller payrolls, and cancelling of Personal Injury Reserve account Dec. 1, 1933.

33. Safety Department:

	<u>Foremen's</u>	<u>First Aid</u>	<u>Ish. Office</u>		<u>Cost</u>
	<u>Meetings, Etc.</u>	<u>Supplies</u>	<u>Charge</u>	<u>Total</u>	<u>Per Ton</u>
1933	20.14	18.90	124.00	163.04	.003
1932	<u>59.06</u>	<u>18.76</u>	<u>289.70</u>	<u>367.52</u>	<u>.004</u>
Increase		.14			
Decrease	38.92		165.70	204.48	.001

Less foremen's safety meetings and less charges from Ishpeming Office.

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8. GOST OF OPERATING: (Cont)

b. Detailed Cost Comparison: (Cont)
(7) Detail of Accounts:

34. Telephones & Safety Devices:

1933	524.55	Cost per Ton	.008
1932	633.46	" " "	.008
Decrease	108.91		

Expense lower on account of longer idle period.

35. Local & General Welfare:

	<u>District</u>	<u>General</u>
1933	112.36	1157.26
1932	198.61	1824.25
Decrease	86.25	666.99

Decrease is due to one less operating month and reduction in Ishpeming Office charge.

36. Special Expense

	<u>Curtailment</u>	<u>Pensions & Allowances</u>	<u>Other Expense</u>
1933	4298.32	2837.37	681.69
1932	3601.99	3354.77	4409.50
Increase	696.33		
Decrease		517.40	3717.81

Increase in curtailment expense due to one month longer idle period. In 1932 employees and residents of Negaunee furnished wood for fuel by the Company, and expense for gardens.

37. Ishpeming Office

1933	4651.54
1932	5638.84
Decrease	987.30

Decrease due to curtailment in expense at Ishpeming Office.

39. Mine Office

	<u>Salaries</u>	<u>Supplies</u>
1933	3096.36	411.33
1932	3802.16	495.74
Decrease	705.80	84.41

Decrease is due to one less operating month and lower salaries.

40. Taxes:

1933	46258.61
1932	60777.71
Decrease	14519.10

Decrease due to lower valuation by Tax Commission and slight reduction in Negaunee City Tax Rate.

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9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS:

There was no diamond drilling on the Negaunee Mine property in 1933. At the end of the year a hole was being drilled from surface on the Maas Mine property near the Negaunee boundary (West of the Negaunee Mine workings) to determine how soon a cave to surface was likely to occur in this area. Mining at the Maas is at considerably greater depth than at the Negaunee, a cave to surface on Maas property would, therefore, have no effect at the Negaunee Mine except perhaps when mining reaches a similar depth, after which the Negaunee Mine might get more water.

10. TAXES:

The tax rate decreased, also the valuation set by the State Tax Commission; as a result, taxes paid by the Negaunee Mine Co. decreased \$20,928.11, or 17.2%.

A comparison of taxes paid by The Negaunee Mine Co. in 1933 and 1932 follows:

	<u>1 9 3 3</u>		<u>1 9 3 2</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty - 213.19 Acres	2,485,000	68,943.84	3,100,000	88,381.00
Personal-Stockpile, Equip & Supp.	<u>1,035,000</u>	<u>28,715.04</u>	<u>1,050,000</u>	<u>29,935.50</u>
Total by Tax Commission	3,520,000	97,658.88	4,150,000	118,316.50
Collection Fees		976.59		1,183.16
Total Optg. Negaunee Mine	<u>3,520,000</u>	<u>98,635.47</u>	<u>4,150,000</u>	<u>119,499.66</u>
 <u>Rented Buildings:</u>				
G. C. I. Co. First Addition	34,400	954.58	35,700	1,017.87
Collection Fees		9.55		10.18
Total Rented Buildings	<u>34,400</u>	<u>964.13</u>	<u>35,700</u>	<u>1,028.05</u>
 Total Negaunee Mine Co.	 3,554,400	 99,599.60	 4,185,700	 120,527.71
Total City of Negaunee Tax		357,648.77		409,706.92
Tax Rate		2.774		2.851
Negaunee Mine % of City Tax		27.85%		29.41%

11. ACCIDENTS
AND
PERSONAL
INJURY:

The following table shows the number and classification of accidents causing personal injury for the past five years:

	<u>1933</u>	<u>1932</u>	<u>1931</u>	<u>1930</u>	<u>1929</u>
Fatal	0	0	0	1	1
Time Lost - Over 4 months	0	1	1	2	2
" " 1 to 4 "	2	1	4	5	4
" " Less than 1 month	<u>0</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>2</u>
Total Accidents	2	3	5	11	9

Number of cases paid compensation for accidents prior to Jan. 1st, 1933	14	14	12	12	7
Number of cases paid difference in wages (Included in above total)	4	4	5	4	3

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11. ACCIDENTS
AND
PERSONAL
INJURY:

The nature of injuries caused by accidents in 1933 were as follows:
One man, who lost 46 days, received a comminuted fracture of right fibula, four inches above the maleolus.
The other man, who lost 97 days, received general contusions, sprained back, and shock.

At the end of the year, the Negaunee Mine had a record of 201 days on surface and 297 days underground without a lost time accident.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

No E & A's were authorized or active in 1933 and none are contemplated in the immediate future.

13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

During the shipping season No. 7 shovel, owned by the Negaunee Mine, loaded 307,752 tons of ore. No. 16 and 15 shovels, rented from The C. C. I. Co., loaded 46½ days, 152,207 tons, and 3 days, 7,089 tons, respectively. No. 7 shovel repairs were very light last winter due to small tonnage loaded in 1932. This shovel is old and nearly worn out and it is a question whether a thorough overhauling is justified.

b. Stockpile Trestles:

(2) Wooden Trestle:

No wood trestles were erected in 1933. Ore was stocked in the early months of the year from the nine wood bents erected late in 1932 at the East end of the East Steel trestle. The heavy shipments in 1933 made it necessary to dismantle all the wood trestles used for stocking ore in 1931, 1932, and 1933. All usable material was salvaged.

Material has been assembled for a rock trestle that will be erected when weather conditions permit as a branch trestle leading to the North-east toward the cave from the permanent trestle East of the shaft. The present rock trestle West of the end of the West steel trestle is nearly filled and a new stocking ground for rock will soon be necessary. The new trestle will shorten the tramping distance from shaft over 600 feet.

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13. EQUIPMENT
AND
PROPOSED
EQUIPMENT: (Cont)

c. Scraper Hoists:

The mine is now supplied with the following scraper hoists:

Company	On Hand 1-1-1933	Purchased 1933	Cost for Repair Parts per Machine	
			1933	1932
Ing-Rand 15 h.p. Electric	6	0	2.97	.61
" 10 " "	5	0	2.14	.00
" Air ## (Not used 1933)	8	0	.00	.00
Sullivan 25 h.p. Electric	2	0	2.11	.92
" 20 " "	1	0	.00	8.32
" 15 " "	10	0	.91	2.13
" 6½ " " (not used 1933)	5	0	.00	.00
Gardner-Denver 15 H.P. Elec. Scraper	2	0	1.49	.00
" 10 " " "	3	0	.00	.00
" 7½ " " "	# 8	0	10.34	17.92
" Air " "	# 4	0	.15	.00
Total	54	0		

25 h.p. Electric Scraper Slide 1
from L. S. Engine Works (Loaned to Maas Mine)

Will be converted into timber hoists.
Not in use at end of year.

The Negaunee Mine has 24 electric hoists, 2 electric transfer hoists, and a electric operated scraper slide that are up to date equipment. The balance of scraper hoists are obsolete, either due to small capacity or prohibitive upkeep cost or to a combination of these two. Due to small product and idle periods in both 1933 and 1932, upkeep cost for both years was relatively low. The Ingersoll-Rand air hoists are being converted into timber hoists by removal of one drum. It is expected that a similar use can be made of the 6½ Sullivan electric hoists. The small Gardner-Denver units, both electric and air, are being discarded on account of the excessive cost of repairs. When in use, parts are supplied from machines scrapped. (No new parts purchased for Gardner-Denver hoists since 1931).

14. MAINTENANCE
AND REPAIRS:

There was no extraordinary maintenance or repairs made in 1933, except to No. 3 shaft. The work done here covered reinforcing of steel sets where skip and cage guides are fastened, replacement of sheet iron casing with 2" plank, reinforcing of steel dividers between cage and ladder roads, and a number of new ladders and sollars, also some new guides in the cage compartment. It was started in 1932, continued through 1933, and was not quite completed at the end of the year. It was confined to the circular concrete shaft which is 960 ft. in depth.

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15. POWER:

Electric power was purchased from The Cliffs Power & Light Company, a subsidiary of The Cleveland-Cliffs Iron Company, at a rate of $1\frac{1}{2}$ ¢ per k. w. hour.

The following statement shows a comparison in detail of the power used and cost for the operating periods of 1933 and 1932. The cost per k. w. in 1933 was increased due to the 3% State Sales Tax.

	<u>1933 - 5 Months Optg.</u>			<u>1932 - 6 Months Optg.</u>		
	<u>K. W.</u>	<u>Cost</u>	<u>Per Ton</u>	<u>K. W.</u>	<u>Cost</u>	<u>Per Ton</u>
Stopping	6,275	95.00	.002	16,666	250.00	.003
Timbering	1,858	28.33	-	1,552	23.28	-
Ventilation x	144,156	2,196.25	.035	136,320	2,044.81	.024
Pumping x	671,977	10,192.86	.165	731,055	11,965.83	.142
Hoisting x	254,519	3,850.59	.062	297,561	4,463.42	.053
Stocking Ore x	16,021	241.01	.004	16,222	243.33	.003
Dry House x	4,941	74.79	.001	6,380	95.07	.001
Telephones & Safety Devices	11,948	181.59	.003	12,072	181.08	.002
Mine Office x	537	7.84	-	534	8.01	-
Electric Haulage x	50,179	758.02	.012	51,453	771.80	.009
Shops x	9,613	146.26	.002	4,873	73.10	.001
Optg. Compressors x	313,194	4,738.04	.077	379,069	5,686.04	.068
Total	1,485,218	22,510.58	.363	1,720,384	25,805.77	.307
Product		61,941			84,046	
K. W. per Ton of Ore		23.98			20.47	
Cost per K. W.		.01516			.015	

x Metered Accounts

Increase in k. w. hours per ton of ore and cost per ton for electric power due to decreased product.

17. CONDITION
OF
PREMISES:

The grounds around the mine buildings were kept in neat condition throughout the year. Expense was curtailed as much as possible and work confined mainly to cutting grass on the lawn.

The scrap at mine was sold and scrap yard cleaned up, also the discarded saddleback underground motor cars were sold, cut up, and shipped by the purchaser.

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18. NATIONALITY
OF
EMPLOYEES:

This report has been prepared under two statements. The first shows the nationality of the employee as to parentage; for instance, a man has been classified as a Finn when born in this country of Finnish parentage. This naturally shows only a few Americans employed. The second statement separates the nationalities into "Foreign Born" and "American Born".

<u>As to Parentage</u>	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>
English	41	20	55	25
Finnish	75	38	87	39
Italian	22	11	22	10
Swedish	28	14	24	11
French Canadians	21	11	18	8
Germans	3	2	2	1
Austrians	1	-	4	1
Norwegians	2	1	4	1
Irish	2	1	2	1
Danish	3	2	6	3
Total	<u>198</u>	<u>100</u>	<u>224</u>	<u>100</u>

<u>As to Birth</u>	<u>American Born</u>		<u>Foreign Born</u>	
	<u>1933</u>	<u>1932</u>	<u>1933</u>	<u>1932</u>
English	18	35	23	20
Finnish	28	31	47	56
Italian	4	4	18	18
Swedish	5	9	23	15
French Canadians	6	16	15	2
Germans	-	-	3	2
Austrians	-	2	1	2
Norwegians	-	2	2	2
Irish	1	2	1	-
Danish	2	5	1	1
Total	<u>64</u>	<u>106</u>	<u>134</u>	<u>118</u>
Percentage	<u>32%</u>	<u>48%</u>	<u>68%</u>	<u>52%</u>

MAAS MINE
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1. GENERAL

The Maas Mine operated one eight hour shift four days per week from January 1st to April 8th, with two crews working alternate weeks and then closed down, except the Fifth Level Development which was continued and put on a six day week schedule. The working places were increased from two to five which gave employment to over 50 men, each working 2 days per week. The regular crew employed underground at the mine numbered about 100 men at the time it was closed on April 8th.

During the idle period, a crew of 7 to 13 men was employed keeping certain main tramways and raises on the Fourth Level in repair and open for the circulation of air. The latter part of June, orders were received to mine 18,000 tons of Bessemer Ore before October 1st. All of this ore had to come from the Southwest part of the Fourth Level ore body, where extensive repairs were necessary before mining could be started. Additional men were hired and repair work started with three crews of men, each working two days per week. As the places were made ready, contracts were placed until a total of some 16 raises were available. At the same time, more raises were started on the Fifth Level.

The Mine was worked 5 days per week with 2 crews working alternate weeks on this Bessemer production, from August 1st to November 13th. On November 8th, all the Company's properties were ordered to resume mining operations on a three day week basis. We started hiring men and reorganizing the working crews and started on the 3 day week basis on November 13th. The working schedule is for each crew to work the last three days of one week and the first three days of the following week. The surface men work every other day, Monday, Wednesday and Friday.

In order to realize a monthly Bessemer production of 10,000 tons, it is necessary to work the Bessemer areas five nights in addition to the six days. By the end of the year there were six places being worked night shift.

The large shipment from stockpile was very gratifying and left our stockpiles cleaned up of the tonnage as shown carried in stock, the balance on hand being overrun. By removing this large tonnage, it was unnecessary to go to the expense of building a new trestle for stocking Maas and Race Course ore. The ground was prepared during the summer by filling the low ground south of the steel trestle with rock from the old pile south of the shaft.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. <u>Production by Grades</u>	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
Maas-Bessemer	51,428	21,106	30,322	
Race Course Bessemer	4,807	2,840	1,967	
Maas	51,642	63,187		11,545
Race Course	23,697	3,398	20,299	
Total	131,574	90,531	41,043	
Rock	21,711	6,779	14,932	
Total Hoist	153,285	97,310	55,975	

b. <u>Shipments</u>	<u>Pocket</u>	<u>Stockpile</u>	<u>Total</u>	<u>Total</u>
<u>Grade of Ore</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Last Year</u>
Maas Bessemer	18,626	60,690	79,316	59,776
Race Course Bessemer	2,570	13,171	15,741	13,273
Maas	19,117	325,180	344,297	6,041
Race Course	10,118	16,421	26,539	
Total	50,431	415,462	465,893	79,090
Total Last Year	1,132	77,958	79,090	
Increase	49,299	337,504	386,803	

c. <u>Stockpile Inventories</u>	<u>12-31-33</u>	<u>12-31-32</u>	<u>Increase</u>	<u>Decrease</u>
<u>Grade of Ore</u>				
Maas Bessemer	14,696	37,308		22,612
Race Course Bessemer	1,535	12,469		10,934
Maas	13,594	298,392		284,798
Race Course	1,984	4,826		2,842
Total	31,809	352,995		321,186

d. Division of Product by Levels

	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>
Third Level	5,202	4.0	25,930	28.6
Fourth Level	96,319	73.2	64,601	71.4
Fifth Level	30,053	22.8	0	0
Total	131,574	100.0	90,531	100.0

MAAS MINE
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2. PRODUCTION
SHIPMENTS &
INVENTORIES

e. Production by Months

<u>Month</u>	<u>Maas</u>		<u>R.C.</u>	<u>Race</u>	<u>Total</u>	<u>Rock</u>
	<u>Bess.</u>	<u>Maas</u>	<u>Bess.</u>	<u>Course</u>		
January	5,593	7,081	138	244	13,056	1,281
February	5,899	4,033	486		10,418	702
March	5,940	3,192	846	742	10,720	1,017
April	906	658	190	2,278	4,032	555
May			180	4,620	4,800	360
June		420	16	3,983	4,419	704
July	1,965	1,305	492	2,313	6,075	2,276
August	6,580	2,718	168	2,458	11,924	3,692
September	3,080	4,681	1,189	2,138	11,088	1,700
October	5,345	6,115	958	1,860	14,278	3,015
November	6,526	8,240		1,204	15,970	3,158
December	8,530	9,229	309	633	18,701	3,251
	<u>50,364</u>	<u>47,672</u>	<u>4,972</u>	<u>22,473</u>	<u>125,481</u>	<u>21,711</u>
This year's stockpile overrun	<u>2,638</u>	<u>2,396</u>		<u>1,059</u>	<u>6,093</u>	
	<u>53,002</u>	<u>50,068</u>	<u>4,972</u>	<u>23,532</u>	<u>131,574</u>	<u>21,711</u>
Prior years stockpile overrun	<u>5,276</u>	<u>7,857</u>			<u>13,133</u>	
	<u>58,278</u>	<u>57,925</u>	<u>4,972</u>	<u>23,532</u>	<u>144,707</u>	<u>21,711</u>

The product was distributed as follows:

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
George Maas Lease	104,465	68,152	36,313	
Catholic Cemetery	2,771	8,084		5,313
American Mining Co.	2,747	2,636	111	
C.C.I.Co. (Right of Way)	5,626	3,355	2,271	
Race Course	28,504	6,238	22,266	
City of Negaunee	594	2,066		1,472
	<u>144,707</u>	<u>90,531</u>	<u>54,176</u>	

f. Ore Statement

	<u>Maas</u>		<u>R.C.</u>	<u>Race</u>	<u>Total</u>	<u>Total Last Year</u>
	<u>Bess.</u>	<u>Maas</u>	<u>Bess.</u>	<u>Course</u>		
On hand 1-1-33	37,308	298,392	12,469	4,826	352,995	341,554
Product for Year	50,364	47,672	4,972	22,473	125,481	90,531
Overrun this Year	2,638	2,396		1,059	6,093	
" Prior "	5,276	7,857			13,133	
Transfer to & from	1,574	1,574	165	165		
TOTAL	<u>94,012</u>	<u>357,891</u>	<u>17,276</u>	<u>28,523</u>	<u>465,893</u>	<u>432,085</u>
Shipments	79,316	344,297	15,741	26,539	465,893	79,090
Balance on Hand	14,696	13,594	1,535	1,984	31,809	352,995
Increase in Output					41,043	
Decrease in ore on hand					321,186	

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2. PRODUCTION
SHIPMENTS &
INVENTORIES

f. Ore Statement (Continued)

- 1933 1-8 hr. shift, 4 days per week; 2 crews working alternate weeks.
Jan. 1st to April. 8th.
Mine idle from April 8 to July 1st.
6 days per week, 3 crews 2 days each, April 8th to
July 1st. 5th Level Development.
6 days per week, 3 crews, 2 days each, July 1st to
August 1st, Bessemer Production & 5th Level Develop-
ment.
5 days per week, 2 crews working alternate weeks,
August 1st to November 13th.
6 days per week and 5 nights; 3 crews working three
or four days per week, Nov. 13 to Dec. 31st.
- 1932 1-8 hr. Shift, 2 days per week, Jan. 1st to May 31st.
Mine idle June 1st to Oct. 31st.
2 days per week, Nov. 1st to Dec. 31st.
- 1931 1-8 hr. shift, 5 days per week, Jan. 1st to May 1st.
4 days per week, May 1st to June 8th
3 days per week, June 8th to Nov. 16th
2 days per week, Nov. 16th to Dec. 31st.
- 1930 1-8 hr. shift, 6 days per week, Jan. 1st to July 16th
5 days per week, July 16 to Dec. 31st.

g. Delays

There was only one delay during the year, on November 18th, when the mine was idle the entire day shift with a loss of product of 600 tons. The delay was due to replacing a broken casting on the air brake of the skip hoist. A heavier casting was installed so as to prevent a recurrence as this was the second one that has broken within a little over a year. Repairs were made on Saturday and Sunday and the hoist was ready to start operating on Monday, November 20th.

h. Delays from Lack of Current

There were no delays from lack of current.

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3. ANALYSIS

a. Average Mine Analysis on Output

<u>Grade</u>	<u>1933</u>			<u>1932</u>		
	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>
Maas Bessemer	63.23	.041	4.82	63.24	.043	5.47
Maas	62.31	.074	5.18	61.35	.075	6.96
Race Course Bess.	63.88	.045	3.98	62.72	.042	5.63
Race Course	60.67	.110	5.54	60.46	.073	7.94

b. Average Mine Analysis on Ore Shipped

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Alum.</u>	<u>Mang.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Maas & Race Course Bess.	95,057	62.75	.040	5.88	2.31	.21	.40	.18	.011	1.32	10.82
Maas & Race Course Non- Bessemer	370,836	60.80	.076	7.56	2.30	.22	.85	.25	.015	1.67	10.82

c. Average Analysis of Ore in Stockpile

Average Natural 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>Loss</u>	<u>Moist.</u>
Maas Bessemer	54.97	.040	5.66	.19	1.98	.80	.22	.010	1.00	11.50
Race Course Bess.	54.76	.040	6.50	.20	2.24	1.07	.29	.011	1.80	11.50
Maas	53.20	.068	7.52	.20	2.24	1.07	.29	.010	1.80	11.50
Race Course	53.20	.080	5.28	.21	2.21	.88	.22	.011	1.76	11.50

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.
10% equals percentage of Bessemer.

<u>Location</u>	<u>Maas Lease</u> <u>Tons</u>	<u>Race Course</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
Between 2nd & 4th Levels	3,994,355	475,184	4,469,539
Between 4th & 5th Levels	1,749,937	1,157,944	2,907,881
Total above 5th Level	5,744,292	1,633,128	7,377,420
D.S.S. & A. Strip (Adams)			465,598
Total Maas Group			7,843,018

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4. ESTIMATE
OF ORE
RESERVES

c. Estimated Reserve Analysis

<u>Natural</u> <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>Loss.</u>	<u>Moist.</u>
Maas & Race Course Bessemer	53.50	.040	6.40	.195	2.00	.80	.225	.010	1.10	12.00
Maas & Race Course Bessemer	52.45	.060	6.63	.208	2.20	1.10	.320	.010	1.80	12.50

d. Estimated Production

The following is the estimated tonnage by grades and expected analysis of the 1934 production from the Maas Mine. The estimate is based on operating the mine from January 1st to December 31st, working 6 day shifts and 5 night shifts per week giving the men an average of 3 to 4 days work each week or about a 66-2/3% operation.

<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>Loss.</u>	<u>Moist.</u>	<u>TONS</u>
Maas & Race Course Bessemer	62.50	.042	6.50	.18	2.23	.30	.15	.015	1.16	11.75	120,000
Maas & Race Course Non- Bessemer	61.00	.075	7.00	.22	2.51	1.20	.33	.015	2.00	11.75	180,000

5. LABOR & WAGES

a. Comments

1. Labor

There was a 15% increase in underground and a 10% increase in surface wages, also surface employees changed from a 9 to an 8 hour day effective July 16, 1933.

Development work on the 5th Level was continued after production was suspended April 8th. This gave employment to a small crew. On July 1st, mining of a limited tonnage of Bessemer ore was started, giving employment to additional men. This permitted taking on some Negaunee and Athens men as the Cambria Mine of the Republic Steel Corporation had absorbed a number of our miners early in the summer.

Extensive stockpile loading also gave employment to a number of old employees on a 2 day week basis.

2. New Construction

The only new construction undertaken during the year was the completion of the Fifth Level pump house and sump covered by E&A #633.

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5. LABOR
AND
WAGES

b. Comparative Statement of Wages & Product

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
Product	131,574	90,531	41,043	
No. Shifts & Hours				
<u>AVG. NO. MEN WORKING</u>				
Surface	35 $\frac{1}{2}$	29 $\frac{1}{2}$	5 $\frac{3}{4}$	
Underground	171	144	27	
Total	<u>206$\frac{1}{2}$</u>	<u>173$\frac{1}{2}$</u>	<u>32$\frac{3}{4}$</u>	
<u>AVG. WAGES PER DAY</u>				
Surface	3.68	3.89		.21
Underground	4.20	4.21		.01
Total	<u>4.09</u>	<u>4.13</u>		<u>.04</u>
<u>AVG. WAGES PER MONTH</u>				
Surface	52.94	48.54	4.40	
Underground	45.73	40.57	5.16	
Total	<u>46.96</u>	<u>42.04</u>	<u>4.92</u>	
<u>PRODUCT PER MAN PER DAY</u>				
Surface	21.63	18.61	3.02	
Underground	5.89	5.43	.46	
Total	<u>4.63</u>	<u>4.20</u>	<u>.43</u>	
<u>LABOR COST PER TON</u>				
Surface	.170	.983	.100	
Underground	.713	.774	.061	
Total	<u>.883</u>	<u>.983</u>	<u>.100</u>	
<u>AVERAGE PRODUCT MINING</u>				
Stoping	20.60	18.49	2.11	
Ore Development	11.69	11.41	.28	
Total	<u>16.49</u>	<u>18.00</u>		<u>1.51</u>
AVG. WAGES CONTRACT LABOR	4.74	4.75		.01
<u>TOTAL NO. OF DAYS</u>				
Surface	6,081 $\frac{3}{4}$	4,863 $\frac{3}{4}$	1,218	
Underground	22,327 $\frac{3}{4}$	16,667 $\frac{3}{4}$	5,660	
Total	<u>28,409$\frac{3}{4}$</u>	<u>21,531$\frac{3}{4}$</u>	<u>6,878</u>	

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5. LABOR
AND
WAGES

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

	<u>1933</u>	<u>1932</u>	<u>Incr.</u>	<u>Decr.</u>
<u>AMOUNT FOR LABOR</u>				
Surface	22,395.60	18,930.29	3,465.31	
Underground	93,831.88	70,108.91	23,722.97	
Total	<u>116,227.48</u>	<u>89,039.20</u>	<u>27,188.28</u>	
<u>AVE. WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL</u>				
Surface		36.68		
Underground		41.67		
Total		<u>40.67</u>		

Proportion of Surface to Underground Men

1933 - 1 to 4.85	1-8 hr. shift, 2 days per week, Jan. 1 to Apr. 8. Mine idle April 8 to July 1st. 1-8 hr. shift, 2 days per week, Apr. 8 to July 1st-5th Level development 1-8 hr. shift, 2 days per week, partial operation July 1st to August 1st 1-8 hr. shift, 5 days per week, 2 crews working alternate weeks August 1, to Nov. 13. 1-8 hr. shift, 6 days & 5 nights per week, 3 crews working 3 and 4 days per week, Nov. 13 to Dec. 31.
1932 - 1 to 4.88	1-8 hr. shift, 2 days per week, Jan. 1 to May 31st. Mine idle June 1st to October 31st. 1-8 hr. shift, 2 days per week, Nov. 1 to Dec. 31
1931 - 1 to 4.63	1-8 hr. shift, 5 days per week, Jan. 1 to May 1 1-8 hr. shift, 4 days per week, May 1st to June 8 1-8 hr. shift, 3 days per week, June 8 to Nov. 16 1-8 hr. shift, 2 days per week, Nov. 16 to Dec. 31
1930 - 1 to 4.49	1-8 hr. shift, 6 days per week, Jan. 1 to July 16 1-8 hr. shift, 5 days per week, July 16 to Dec. 31
1929 - 1 to 3.84	1-8 hr. shift, 5 days per week, Jan. 1 to April 15 1-8 hr. shift, 6 days per week, April 15 to Dec. 31
1929 - 1 to 4.11	1-8 hr. shift, 5 days per week,

M
MAAS MINE
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5. LABOR
AND
WAGES

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

Proportion of Surface to Underground Men (Cont.)

1928 - 1 to 4.11 1-8 hr. shift, 5 days per week.

6. SURFACE

a. Buildings, Repairs

Only minor repairs were made to the mine buildings and structures during 1933. The larger part of the expense against Mine Buildings is for rearranging the office to provide a room for the new Superintendent. The Negaunee Mine Office building is the only one of the office buildings that has an office for the Superintendent.

b. Stockpiles

The grading of additional ground for stocking Maas and Race Course ore was started late in July. The ground to the south of the steel trestle was filled by moving the rock pile just south of the shaft. There were about 6,000 yards of material in excess of the fill. Arrangement was made with the County Road Commission to take this rock, the only expense to us being the loading charge. The moving of the entire rock pile made it possible to lay shovel loading tracks for loading out the Maas ore without being delayed by one or two car spots at the East end of the pile. The grading, leveling and rolling of the new ground was finished in August.

A large tonnage of rock is being hoisted from the Fifth Level development and the Rock Trestle at the east end of the Steel trestle was filled to capacity early in the year. Four additional bents were erected in January. This same condition existed again in December, when 4 more bents were added, extending the trestle to the east property line. The tram is long and when hoisting rock every other skip is delayed. After the Fifth Level development is completed, which will take three or four months longer, this condition will be corrected.

Although the ground was prepared and material assembled for erecting a trestle for stocking Maas and Race Course ore, it is not being used. Enough ore was loaded out from the Steel Trestle to permit the stocking of the expected tonnage of Maas and Race Course Bessemer and Race Course. On the West side, nearly the entire pile was shipped. Twenty-three double bents were erected during October. The trestle is long enough to handle the expected tonnage of Maas grade.

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6. SURFACE

b. Stockpiles (Cont.)

The ore pile hangs up when loading with steam shovel. In order to eliminate the danger of blasting from the bottom of the pile, two inch pipes 12' long are being placed between the bents, fastened to the inside of the inside track stringer. These pipes will be loaded with powder and the top part of the pile blasted down. We hope by this means to prevent the recurrence of the double fatality of the past summer at the Maas Mine stockpile.

7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking during 1933.

b. Development

Fourth Level

The development on this level during the past year has not developed any additional tonnage. The drifts driven have been to make new tramways to areas being mined above the Fourth Level. Early in the year, the cross-cut 150' East and parallel to the East boundary of the Race Course, was holed to the main drift from the shaft. This new drift was very badly needed as mining had reached so near the main cross-cut that it is difficult to maintain. After this new cross-cut was holed, a connection was made to the 400 drift in order to repair the timber and remove the props as far East as 425 Raise which is the main ventilation raise to the Negaunee Mine.

One new raise, No.501, was put up to the 160' sub in the 500 drift just east of the main cross-cut. This was necessitated by the crushing of the 2 old raises, while the mine was shut down during 1932.

It was decided early in October to extend the 280 drift, which parallels the South line of the Race Course property, southwesterly, swing around and connect with the 600 drift. This was done to improve ventilation in the sub level workings above and to make it possible to tram from the 280 system of raise through the 600 drift when it became impossible to hold open the 280 drift between No. 280 and 282 Raises - and the switch to the main cross-cut to the shaft. This drift was in Jasper for the first 50' when it encountered a dike about 6' thick. After passing through this dike the drift was in Bessemer ore for 80' until the main south dike was reached. The Jasper hanging seems very close to the western side of the drift as is also the case after passing through the main dike. This information proves that the ore area south

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7. UNDERGROUND

b. Development (Continued)
Fourth Level (Cont.)

of the dike is not as large as we had anticipated. This drift holed to 600 drift the latter part of December.

No. 621 Raise was put up from the South side of the 600 drift just west of where the dike crosses. It was hoped that we could mine the ore on the subs above South of the Negaunee boundary from this raise. The raise was cut out on the 160' elevation during December but the development to date has not been too encouraging.

Five Raises put up from the Fifth Level in the Race Course were holed to the West cross-cut on the Fourth Level and are being continued to the 140' elevation, so as to be able to start mining under the hanging from these Raises. This is a Bessemer territory.

Fifth Level

The development of the Fifth Level was resumed in March and continued throughout the year and even during the idle period in the rest of the mine. As the mining in the Bessemer areas above the Fourth Level was getting close to the Level and the haulage drifts were beginning to crush because of excessive weight, it was important to speed up this development, not only of the drifts, but also the raises.

The footwall drift was extended West to the West boundary of the Race Course. Drifting was started this year at the point of frog to the Sixth cross-cut West and was advanced 15' in Jasper, then encountered 2' seam of dike, passed into ore for the remaining 165'. The turn-out for the next cross-cut west was opened up as far as the double leg and then stopped.

The No. 4 cross-cut just West of the East boundary of the Race Course was advanced to the Southeast 500 to the point of curve, curving to the West and paralleling the Maas-Negaunee boundary 140' north. The main south dike was encountered midway between the 2nd and 3rd cross-cuts to the west. This drift has been in Jasper west of the dike.

The No. 5 cross-cut west was advanced 670' southeast holing to the South footwall drift.

No. 6, or the West cross-cut, was advanced from the North footwall drift to within 50' of South footwall drift and will hole about the middle of January.

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7. UNDERGROUND

b. Development (Continued)
Fifth Level (Cont.)

In December 2 contracts were drifting on the main Fifth Level.

Nine Raises were started from the 5th Level toward the 4th of which six were completed to the 4th Level elevation, two were stopped below the level and one had not been completed.

In December 4 contracts were raising from the Fifth Level.

70' Sub-Level

No. 5018 Raise was put up from the North footwall drift, approximately 150' East of the Race Course boundary, to explore the territory North of the dike. This raise went up in Bessemer ore to a height of 58' above the level. It encountered Jasper at 98' from the rail and a sub level cut out at + 70'. From here a 35° timber and ventilation raise was put up to the 4th Level in the footwall and holed in December. Sub-level drifts will be driven South and West to outline the ore at this elevation. If it is found practical, a mining limit can be started under the hanging between this limit and the West boundary of the Race Course. The pitch of the ore body is very flat here and considerable ore can be removed without endangering mining above to the East.

c. Stoping
Subs Between 2nd & 3rd Levels

465' Sub-Level East Footwall Pillar

This sub level in the territory adjacent to the Roman Catholic Cemetery and the Railroad Pillar along the Negaunee Mine Boundary, was opened up about 1916 and then stopped as it was found that the ore under the hanging extended considerably higher. As mining above progressed the sub-level was again started in 1929 when a traveling road was driven in the footwall to facilitate the handling of timber, and to improve ventilation. Actual mining of this territory started in 1931 and has been continuous while the mine was in operation until April of this year. Only 3 small areas have been completed and it is planned to resume operations here as soon as the amount of Maas Grade to be produced will allow, as the raises to the 3rd Level are 150 long and need constant maintenance. The ground in this area is very heavy. The ore is mostly of non-Bessemer grade.

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7. UNDERGROUND

c. Stoping (Continued)

401' Sub-Level East Footwall Pillar

The history of this part of the 401 sub-level follows very closely that of the 465' sub above, with the exception that actual mining has not yet reached this elevation. Two footwall raises to the 2nd Level for the distribution of timber, have been connected with some of the main Raises from the 3rd Level. The only other work that will be done here for some time is to connect 113 and 118 Raises so that there will be available, half way between the 3rd and 2nd Levels, a place to inspect or repair these long raises.

One to two contracts have been repairing on these 2 subs and in the raises practically the entire year.

355' Sub-Level West Footwall Pillar

The only work done in this new territory, which was developed north of the dike, in and near the Race Course above the 3rd Level during the last 3 years, was that of mining a small pillar around 2 E Raise. This work was done in the first 3 months of the year and although there is still a little more to be mined, work was not resumed this Fall. The bulk of the ore mined in 1933 came from the area to the East and South of the Race Course above the Fourth Level. This area averages about 40% Bessemer grade which explains our concentrating mining operations here.

185' Sub-Level

A pillar about 150 x 75' in the Eastern end just north of the Negaunee boundary, was completed in October. In the western end just north of the dike, a small area under the hanging was mined out in January and February of this year. This finished all the mining that will be done on this elevation for some years to come, as the ore to the North and East has not been mined much below the 3rd Level which is 130' above.

170' Sub-Level

In the extreme Western end one contract mined the small area north of the dike which was exhausted in October. In the larger area to the east 6 to 7 contracts have been mining throughout the operating schedule. In December, there was 1 contract just south of the Race Course removing the pillar remaining here and 5 gangs employed stoping between the Negaunee Mine boundary and the Eastern mining limit. It will probably take 4 or 5 months more to mine out this sub-level.

160' Sub-Level

With the exception of two small areas mined in 1931 and 1932, mining on an extensive scale was not started here until this year. Several of the Raises have been connected and in December 6 contracts were stoping in the Western end, 2 just Southeast of the Race Course and 1 cutting out. One gang started to mine from 622 raise just North of the dike.

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7. UNDERGROUND

c. Stoping (Continued)

150' Sub-Level

An area under the hanging in the Southeast corner of the Race Course was opened up first on the 185' sub-level and has increased in size to the Southwest as mining has descended. Mining on this elevation started in 1931 and was finished in December of this year.

d. Timbering

There was a marked increase in the amount of timber used and cost per ton of ore in 1933 over 1932. The development program on the Fifth Level was heavy compared to the operating schedule. In fact, the production of ore was discontinued on April 8th for three months, then on a curtailed basis for 4½ months, while the development of the Fifth Level was continuous throughout the year, working six days a week. Then on account of having a large territory opened in advance of mining operations, the repairing was excessive. Further, the timber in the yards had been on hand two to three years and we added 10% each month to our actual consumption to take care of part we were forced to cull.

We used 9 times as much cribbing this year as last and put up five times the footage of new raises, the difference going into repairs. All of the treated timber was used on the Fifth Level which explains the large difference. The total ore and rock for 1933 was 57.5% more than in 1932, while the ore alone was only 45% more which explains the increase in cost per ton of ore for timber.

Our timber yard is almost cleaned up of old timber and we should show a decided decrease in timber cost during 1934.

Statement of Timber Used

<u>Kind</u>	<u>Linear Feet</u>	<u>Price</u>	<u>Amount 1933</u>	<u>Amount 1932</u>
6" x 8" Cribbing Timber	126,782	.043	5,455.04	690.37
8" x 10" Stull "	19,340	.0588	1,138.02	1,221.05
10" x 12" " "	32,641	.0889	2,903.21	1,533.36
12" x 14" " "	25,716	.1475	3,792.68	1,904.88
12" x 14" Treated "	9,605	.322	3,084.79	191.06
Total Timber, 1933	214,084	.0764	16,373.74	
Total Timber, 1932	68,819			5,540.72
7 Ft. Lagging	519,673	.637	3,309.87	1,965.34
9½ Ft. Poles	254,119	1.40	3,557.65	3,188.99
Total, 1933	773,792		6,867.52	
Total, 1932	562,499			5,154.33

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7. UNDERGROUND

d. Timbering (Cont.)

Statement of Timber Used (Cont.)

<u>Kind</u>	<u>Linear Feet</u>	<u>Price</u>	<u>Amount 1933</u>	<u>Amount 1932</u>
Wire Fencing (50 Rods)Sq. Ft.	3,438	.889 Rd.	44.45	162.45
Grand Total - 1933			23,285.71	10,857.50
Product, Tons			131,574	90,531
Feet of Timber per Ton of Ore			1.627	.760
Feet of Lagging per Ton of Ore			3.9497	3.6579
Feet of Poles per Ton of Ore			1.9314	2.554
Feet of Wire Fencing per Ton of Ore			.0261	.0982
Feet of Laggins per Foot of Timber			2.4274	4.8119
Feet of Poles per Foot of Timber			1.1870	3.3616
Cost per Ton for Timber			.1244	.0612
Cost per Ton for Lagging			.0252	.0217
Cost per Ton for Wire Fencing			.0003	.0018
Cost per Ton for Poles			.0270	.0352
Cost per Ton for All Timber			.1769	.1199
Equivalent of Stull Timber to Board Measure			439,889	170,934
Feet of Board Measure per Ton of Ore			3.343	1.888

Total Cost for Timber, Lagging, Poles, etc., and Cost per Ton:

<u>Year</u>	<u>Amount</u>	<u>Cost per Ton</u>
1933	23,285.71	.1769
1932	10,857.50	.1199
1931	32,879.88	.1076
1930	42,731.94	.1025
1929	43,332.70	.1305
1928	28,083.62	.1074
1927	23,097.31	.0865

e. Drifting and Raising

The following is a comparison of the drifting and raising done in the years 1933 and 1932:

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>	
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>
1933	1,057	1,439	1,805	146
1932	114	305	337	62
Increase	943	1,134	1,468	84

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7. UNDERGROUND

e. Drifting and Raising (Cont.)

The large increase in drifting and raising is due to the pushing of the development on the Fifth Level and Raises to the Fourth Level.

f. Explosives, Drilling and Blasting

The cost per ton for all explosives increased from \$.0593 to \$.0634 per ton due to the large amount of ore drifting and raising on the Fifth Level. The same explanation covers the increased cost for explosives for development in Rock. With the Fifth Level drifting almost completed, we should show a large decrease the coming year.

Stopping and Ore Development

<u>Kind</u>	<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1933</u>	<u>Amount</u> <u>1932</u>
1 $\frac{1}{4}$ " 50% Amonia Gel. Powder	42,970	.1148	4,935.25	2,133.83
1 $\frac{1}{4}$ " 60% " " "	2,400	.1276	306.25	55.94
1 $\frac{1}{2}$ " 50% " " "				30.62
1 $\frac{1}{4}$ " Gelamite "A"	11,500	.1239	1,425.00	2,125.56
1 $\frac{1}{4}$ " " IX				38.25
1 $\frac{1}{4}$ " " 2X	1,000	.1250	125.00	
Total Powder - 1933	57,870	.1173	6,791.50	
" " - 1932	35,465	.1236		4,384.20
Fuse	Ft. 195,429	.5770	Ft. 1,128.15	721.28
Blasting Caps #6	No. 31,694	1.103 C.	349.77	225.40
Powder Bags	Ea. 18	2.853	51.36	14.82
Tamping Bags				6.75
Fuse Lighters	3,100	6.75 M.	20.93	19.57
Total Fuse, Caps. Etc.			1,550.21	987.82
Total All Explosives			8,341.71	5,372.02
Product, Tons			131,574	90,531
Pounds of Powder per Ton of Ore			.4393	.3917
Cost per Ton for Powder			.0516	.0484
Cost per Ton for Fuse, Caps, Etc.			.0118	.0109
Cost per Ton for all Explosives			.0634	.0593

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7. UNDERGROUND

f. Explosives, Drilling and Blasting (Cont.)

Rock Development & Filling

<u>Kind</u>	<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1933</u>	<u>Amount</u> <u>1932</u>
1 1/4" 50% Amonia Gel. Powder	7,930	.1172	929.70	9.19
1 1/4" 60% " " "	3,100	.1270	393.88	25.06
1 1/4" Gelamite "A"	100	.1250	12.50	469.56
Total Powder - 1933	11,130	.1200	1,336.08	
Total Powder - 1932	4,025	.1252		503.81
Fuse Ft.	38,410	.592C. Ft.	227.25	47.69
Blasting Caps #6	6,003	1.101 C.	66.09	17.18
Total Fuse, Caps, etc.			293.34	64.87
Total All Explosives			1,629.42	568.68
Total Explosives Used at Mine			9,971.13	5,940.70
Average price per pound for powder			.11779	.12377

8% of all powder used in 1933 was 60%
48% of all powder used in 1932 was 60%.

Statement showing cost per ton for explosives, exclusive of rock development, for the period 1928 to 1933:

<u>Year</u>	<u>Cost per Ton</u>	<u>Product</u>
1933	.0634	1131,574
1932	.0593	90,531
1931	.0629	305,604
1930	.0603	416,653
1929	.0654	331,922
1928	.0607	261,454

g. Idle Period

Conditions at the Maas Mine make idle periods expensive due to the great number of openings that have to be maintained; further, mining is underway in widely separated areas in addition. Mining on the sub levels above the Fourth Level is now close enough to the main level to cause much crushing. As a result, more propping was necessary than at either the Negaunee or Athens Mines. The work of propping the main level drifts and removing the miners equipment to surface was completed about the end of April. At first the repair crew consisted of 7 men but about the middle of May, due to crushing of several raises, the crew was increased to 13 men.

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7. UNDERGROUND

g. Idle Period (Cont.)

Orders to mine 18,000 tons of Bessemer ore prior to October 1st were received the last of June and as all this ore had to come from the 4th Level, extensive repairs were necessary before mining could be started. Additional men were hired and repair work started with three crews of men each working two days per week. Toward the end of July in order to get more gangw mining, night repair crews were worked. Repairing of main level drifts and re-cribbing of raises has continued throughout the year. In many places, the timber has given away simply due to dry rot. When operations are suspended in the sub-levels, the circulation of air is cut off and the cribbing rots rapidly if not wet.

The mine was put on a normal operating basis three days a week on November 13th. It has been necessary to do considerable repair work since then as the result of the idle period or the curtailed operation.

The main ventilation fan at the Negaunee Mine was continued in operation 24 hours a day even during the idle period

h. Mining and Loading

Large scrapers are now in general use and with only half the number of gangs working, we have sufficient of the 15 H.P. electric hoists for each working place. Each contract tries to complete the cycle each shift of drilling, blasting, mucking and timbering. Where it is necessary to make repairs due to crushing, of course the cycle cannot be completed. Mining is interrupted from time to time due to crushing of drifts or raises due to dry rot as the result of the idle period. This condition applies to all the mines in the Negaunee District but particularly to the Maas, which has to maintain a large area of openings, as a result of the necessity in the past years of maintaining the surface and now trying to secure a larger percentage of Bessemer grade than the average of the reserve tonnage. At the Maas, the level interval is 200', except between the 4th and 5th, with long raises and mining should proceed at a rapid pace to avoid heavy repair costs.

i. Ventilation

The ventilation at the Maas Mine is a problem in the sub-levels, especially above the Fourth Level where the weight is heavy and it is difficult to keep communicating drifts open. Booster fans are used on the levels to provide ventilation in the sub-levels but at best it is not effective. The temperature of many of the working places is high and the efficiency of the men is greatly impaired. Everything possible to correct this condition by building ventilating doors and driving drifts to provide free flow of air, is being done.

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7. UNDERGROUND

j. Pumping

The number of gallons pumped per minute during 1933, 1932, 1931, 1930, 1929, are shown below:

<u>Month</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>	<u>1930</u>	<u>1929</u>
January	1039	1103	925	1102	1076
February	1065	1156	1114	1042	1089
March	1049	1105	1124	1036	1075
April	1052	1090	1149	1080	1009
May	1070	1085	1147	1094	1023
June	1071	1070	1134	1009	1014
July	1047	1083	1135	1106	1018
August	1068	1079	1061	1095	1030
September	1970	1076	1091	1103	1062
October	1029	1087	1115	1202	1102
November	1047	1089	1113	1147	1064
December	1050	1101	1232	1108	1058
Total Average	1055	1094	1112	1102	1052

8. COST OF OPERATING

a. Comparative Mining Cost

	<u>1933</u>	<u>1932</u>	<u>Incr.</u>	<u>Decr.</u>
Product	131,574	90,531	41,043	
Underground Cost	1.362	1.337	.025	
Surface Cost	.153	.170		.017
General Mine Expense	.424	.428		.004
Cost of Production	1.939	1.935	.004	
Depletion - Original Cost	.080	.073	.007	
Depreciation-Plant.& Equipmt.	.051	.046	.005	
Development	.043	.039	.004	
Movable Equipmt.	.008	.010		.002
Taxes	.469	.635		.166
Loading and Shipping	.114	.045	.069	
Total Cost at Mine	2.704	2.783		.079
Reopening Expense	.087	.022	.065	
Idle Expense	.376	.930		.554
Total Cost	3.167	3.735		.568
No. of days Operated	90½	60½	30	
No. shifts and hours	1-8	1-8		
Average Daily Product	1,454	1,496		42

COST OF PRODUCTION

	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>	<u>Incr.</u>	<u>Decr.</u>
Labor	.791	41.0	.838	43.3		.047
Supplies	1.148	57.0	1.097	56.7	.051	
Total	1.939	100.0	1.935	100.0	.004	

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8. COST OF OPERATING

b. Detailed Cost Comparison

(1) Days and Shifts

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1933	90 $\frac{1}{2}$	1-8	206 $\frac{1}{2}$	28,409 $\frac{1}{2}$
1932	60 $\frac{1}{2}$	1-8	173 $\frac{1}{2}$	21,531 $\frac{1}{2}$
Increase	30	-	33	6,878

(2) Wages

In 1933 wages were increased on July 16th, 15% underground and 10% surface. Salaries of the Captain and Clerks were reduced about 50% May 1st. In July they were adjusted upward and in December the Clerks and Captains were put on an operating salary basis to permit them working six days per week and unlimited hours.

In 1932 wages were reduced 15% on May 16th. Salaries were reduced 10% on February 1st and again on June 1st

(3) Comparison of Production

Production 1933	131,574 tons
" 1932	90,531 "
Increase	41,043 "

(4) Comparison of Number of Men & Wages

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1933	206 $\frac{1}{2}$	28,409 $\frac{1}{2}$	116,227.48	4.09
1932	173 $\frac{1}{2}$	21,531 $\frac{1}{2}$	89,039.20	4.13
Incr.	32 $\frac{3}{4}$	6,878	27,186.28	.04
			Decr.	

(5) Tons per Man per Day

	<u>1933</u>	<u>1932</u>	<u>Incr.</u>
Surface	21.63	18.61	3.01
Underground	5.89	5.43	.46
Total	4.63	4.20	.43

(6) Cost of Production

1933	\$ 255,113.71	Cost per ton	1.939
1932	175,226.87	" "	" 1.935
Incr.	79,886.84		.004

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8. COST OF OPERATING (9 months 1933 compared with 7 months 1932)

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

	<u>1933</u>		<u>1932</u>		<u>Increase</u>		<u>Decrease</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Surface Costs</u>								
18. Hoisting	8,321.26	.064	5,571.27	.062	2,748.99	.002		
19. Stocking Ore	3,186.40	.024	2,051.56	.023	1,134.84	.001		
21. Dry House	3,573.02	.027	3,169.64	.035	403.38			.008
22. Genl. Surface	2,035.14	.015	1,681.03	.019	454.11			.004
23. Maint. Hoisting Equipment	1,600.17	.012	1,855.74	.020	255.57			.008
24. Shaft	203.29	.002	182.51	.002	20.78			
25. Top Tram Equipt.	513.59	.004	182.51	.002	331.08	.002		
26. Docks T. & Pkts.	457.94	.003	371.03	.004	86.91			.001
27. Mine Buildings	200.36	.002	313.71	.003	113.45			.001
Total Surface Cost	20,091.17	.153	15,379.00	.170	4,712.17			
<u>General Mine Expense</u>								
28. Insurance	160.79	.001	169.55	.002	8.76			.001
29. Mining Engrg.	935.20	.007	1,073.35	.012	138.15			.005
30. M. & Elec. Engr.	1,046.78	.008	780.70	.009	266.08			.001
31. Analysis & Gradng.	6,113.76	.047	3,075.38	.034	3,038.38	.013		
32. Personal Injury	10,136.88	.077	6,501.74	.071	3,635.14	.006		
33. Safety Dept.	379.06	.003	439.22	.005			60.16	.002
34. Tel. & S. Devices	720.98	.005	631.36	.007	89.62			.002
35. Local & G. Welfare	4,011.81	.030	2,399.84	.027	1,611.97	.003		
36. Sp. Exp. Pens. & All	10,786.08	.082	9,399.33	.104	1,386.75			.022
37. Ishpeming Off.	15,459.88	.118	8,623.55	.102	6,836.33	.016		
39. Mine Office	6,017.70	.046	5,063.34	.056	954.36			.010
Total Gen. Mine Exp.	55,768.92	.424	38,801.10	.428	16,967.82			.004
Cost of Production	255,113.71	1.939	175,226.87	1.935	78,886.84	.004		
40. Taxes	61,646.50	.469	57,460.86	.635	4,185.64			.166
Total Cost	316,760.21	2.408	232,687.73	2.570	84,072.48			.162
Idle Expense	49,439.91	.376	84,191.66	.930	34,751.75			.554
Reopening Exp.	11,421.16	.087	1,939.75	.022	9,481.41	.065		
GRAND TOTAL COST	377,621.28	2.871	317,819.14	3.522	59,802.14			.651

UNDERGROUND COSTS

1. Exploring in Mine

Increased total amount is for proportion of Geological Department expense and is distributed on a payroll basis. On account of 5th Level development and mining of Bessemer ore during summer, payrolls for 1933 were higher.

3. Development in Rock

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost per Foot</u>
1933	1,439'	146'	1,585	6.05
1932	305'	62'	367	6.29
Incr.	1,134	84	1,118	.25 Dec.

Increased cost per ton is due to 5th Level development work in 1933. The increase in rock drifting and raising was a larger percentage than in ore produced.

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

4. Development in Ore

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost Per Foot</u>
1933	1,057'	1,805'	2,862	4.78
1932	114'	337'	451	5.37
Incr.	943	1,468	2,411	.59 Decr.

Increased cost per ton due to 5th Level Development work in 1933. The percent increase in ore produced was very much less than the increase in ore development during 1933.

5. Stoping

	<u>Labor</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>Cost per Ton</u>	<u>Total</u>
1933	24,536.59	.186	7,886.84	.060	.246
1932	22,691.19	.251	6,157.77	.068	.319
Incr.	1,845.40		1,729.07		
Decr.		.065		.008	.073

The increase in total labor and supply cost is due to increased operating schedule and more tons produced. The decrease in labor cost per ton is explained by the fact that during the curtailed summer operation part of the labor was charged to idle and reopening expense, while in 1932 at no time was the mine partly operating and idle.

6. Timbering

	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>	<u>Cost Per Ton</u>
1933	20,975.09	51.7	21,176.31	48.3	.320
1932	15,293.64	55.0	12,517.84	45.0	.307
Incr.	5,681.45		8,658.47	3.3	.013
Decr.		3.3			

Increased cost per done is due to percent of timber used in 1933, increase 3.3%, also 10% added each month to the actual amount used to take care of culls account of dry rot.

7. Tramming

	<u>Labor</u>	<u>Cost per Ton</u>
1933	8,511.81	.057
1932	7,562.34	.083

Increased total account larger production. Decrease in cost per ton for labor is explained by concentrating mining on 4th Level with increased tonnage.

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8. COST OF
OPERATING

b. Detailed Cost Comparison (Cont.)

(7) Detail of Accounts (Cont.)

8. Ventilation

Increased cost per ton is due to the necessity of ventilation during the curtailment period.

9. Pumping

	<u>12 Months</u> <u>1933</u>	<u>12 Months</u> <u>1932</u>
Total Gals. Water pumped	553,157,402	576,727,573
Gals. Pumped per minute	1,052	1,094
Cost of Elec. Current	40,157.09	39,499.62

Decreased cost per ton due to greater product.

10. Compr. & Air Pipes

	<u>12 Months 1933</u>	<u>12 Months 1932</u>
Cu. Ft. Compressed Air	367,560,000	210,825,000

Increased cost per ton due to operating compressors while on curtailed development and production schedule from April 8th until November 13. Operation of compressor on part load more expensive than full load and normal production.

12. Underground Supt.

Decreased cost per ton due to reduction in wages and salaries. The increase in total money was more than off-set by the larger production.

14. Maintenance Compr. & Power Drills

The cost per ton was the same each year. There were two second-hand R.B. 12 machines charged in 1932 as compared with 1 BBR 230 in 1933.

15. Maintenance Scrapers & M. Loaders

Decreased cost per ton due to no new equipment purchased in 1933 with an increase of production.

16. Electric Tram Equipt.

Increased charges against this account due to more rails, bonding and trolley wire used in 5th Level Development work. The total cost was more than the increase in production, resulting in a higher cost per ton for 1933.

17. Pumping, Machinery

Extensive repairs were made to the Prescott Plunger pump in the Third Level pump house. Repairs were also made to the Aldrich pump and the motor on one of the centrifugal pumps in the same pumphouse which explains the increased total and cost per ton.

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8, COST OF
OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

SURFACE COSTS

18. Hoisting

Increased cost per ton is entirely in labor and due to curtailed operations from July 1st to November 13th. The labor is the same up to a certain point regardless of tonnage hoisted.

19. Stocking Ore

Increase in total money due to more trestle erected in 1933. There were 23 double bents erected west of the shaft and 4 bents added to the east rock dump in 1933, compared to 7 bents in 1932. The cost per ton, due to increased production, shows only small increase.

21. Dry House

	<u>1933</u>	<u>1932</u>
Tons Coal used in Heating Plant	662	585.3
Cost per ton Cost of Coal	4.23	4.62
Cost of Coal	2,799.59	2,707.04

Increase in both labor and supplies due to operating schedule during 1933, instead of being idle, the operation was curtailed.

22. General Surface

Decreased cost per ton due to less general surface work and reduction in policemen's salaries and wages. Increase in total money due to 9 months operation compared to 7 months in 1932.

23. Maintenance - Hoisting Equipt.

Decreased cost per ton due to less repairs to hoists, skip and skip roads and less hoisting rope expense. There were two ropes installed in 1932 one on north and one on south skips, cost \$978.80. In 1933 there was only one rope installed on south skip, cost \$539.00.

24. Maintenance - Shaft

Only minor repairs made each year, the cost per ton being the same, as the increased production off-set the higher charge against this account.

25. Maintenance - Top Tram Equipt.

Increased cost per ton due to installing 3200' 5/8" rope, cost \$305.00 in 1933 as compared with none in 1932.

26. Maintenance - Docks, Trestles & Pockets

Decreased cost per ton due to less repairs and replacements.

27. Mine Buildings

Decreased cost per ton due to less repairs to building and increased production. In 1932 \$290.00 or 90% of cost was for repairs to Engine House Roof. In 1933, \$150.00 or 75% of the cost was for repairs to Office Building, making office for Superintendent.

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8. COST OF
OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

GENERAL MINE EXPENSE

31. Analysis & Grading

	<u>1933</u>	<u>1932</u>
Number of Determinations	21,261	6,520
Cost per Determination	.18103	.25407

The decreased cost per determination is due to larger scale on which laboratory was operated. The increased total and cost per ton is the large number of determinations on account of large tonnage shipped from stockpile. The increased cost per ton is due to production compared to number of determinations made.

32. Personal Injury

	<u>1933</u>	<u>1932</u>
Compensation Department	919.04	331.79
Hospital Loss	3,063.14	4,588.55
Reserve & Catastrophe	2,159.36	1,578.11
Insurance Premium from May 1st to December 31, 1933	3,995.34	
	<u>10,136.88</u>	<u>6,498.45</u>

The increase is entirely due to insurance premium paid on compensation insurance. Increased cost per ton small due to larger production.

33. Safety Department

Decreased cost per ton due to reduction in salaries and curtailment in the department with an increased production.

34. Telephones & Safety Devices

Decreased cost per ton due to less lighting for shaft and levels and less repairs to sign boards and signals for the tonnage produced.

36. Special Expense, Pensions & Allowances

	<u>1933</u>	<u>1932</u>
Legal	672.15	492.18
Pensions	10,039.64	5,106.18
Adjustment	74.29	43.39
Wood and Gardens		3,747.58
	<u>10,786.08</u>	<u>9,399.33</u>

The large increase in pensions, which are apportioned on a payroll basis, is due to the stronger operation at the Maas than at other Company properties. This increase was partly offset by charge in 1932 for wood showing a decrease in cost per ton for 1933 on account of a larger production.

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

37. Ishpeming Office

This expense is distributed on a tonnage basis and due to the Maas producing on a curtailed schedule while all other properties were idle, accounts for increase against this caption, which was partly offset by the larger production.

39. Mine Office

Larger proportion of Superintendent's time charged during curtailed operation was partly offset by decrease in salaries. The decrease in cost per ton due to larger production.

40. Taxes

The total amount of money paid for taxes for 1933 was about \$11,000 less. The increase shown on the operating cost sheet is explained by the fact we show 9 operating months compared with 7 in 1932. The decreased cost per ton is due to lower valuation and lower rate and increased production.

Idle Expense

The idle expense for 1933 covers a 3 months period compared with 5 months in 1932, explaining the decrease in total money and cost per ton. The decreased cost per ton is extra large account the greater production.

Opening Expense

This charge includes the expense of repairs to main drifts and raises starting on the curtailed operating schedule in July. The tonnage produced was not large enough to absorb this expense in cost of production.

<u>Analysis of Supplies Used</u>	<u>9 months</u>		<u>7 months</u>		<u>Increase</u>		<u>Decrease</u>	
	<u>1933</u>	<u>Per</u>	<u>1932</u>	<u>Per</u>	<u>Amount</u>	<u>Per</u>	<u>Amount</u>	<u>Per</u>
	<u>Amount</u>	<u>Ton</u>	<u>Amount</u>	<u>Ton</u>				
41. Genl. Supplies	7867.09	.060	5482.41	.061	2384.68			
42. Iron & Steel	2597.01	.020	1177.71	.013	1419.30	.007		
43. Oil & Grease	1020.83	.008	496.25	.005	524.58	.003		
44. Machy. Supplies	2191.32	.017	2338.20	.026			146.88	.009
45. #Explosives	10078.45	.076	5863.53	.065	4214.92	.011		
46. Lumber & Timber	24761.56	.188	11726.57	.130	13034.99	.058		
47. Fuel	2747.59	.021	2671.68	.029	75.91			.008
48. Electric Power	54890.46	.417	38065.08	.420	16825.38			.003
49. Sundries	2675.02	.020	674.23	.007	2000.79	.013		
50. Other Mine & Accts.	226.64	.002	273.76	.003			47.12	.001
TOTAL	108602.69	.825	68221.90	.753	40380.79	.072		

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8. COST OF
OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

Every item of supplies shows an increase for 1933 with one exception, Machinery Supplies. This is due almost entirely to a heavier operating schedule and an increase in production. In 1933 the mine was on a part operating basis, the entire year, as the development of the 5th Level was continued after the production of ore was suspended on April 8th, then on July 1st the mine was put on a curtailed operating schedule and about the middle of November the operating schedule was increased to 6 days per week and also part night shift. In 1932 the mine operated 4 days per week for seven months and idle for 5 months. On account of the varied operating schedule in 1933, it is impossible to analyze each item of supplies.

9. EXPLORATIONS
AND
FUTURE
EXPORATIONS

There were no explorations by diamond drilling at the Maas Mine.

The area on the Maas South and East of the Race Course and adjacent to the Negaunee Mine, had been mined for a vertical distance of 160 feet and extending over an area of between 500 and 600 feet North and South and the same distance East and West. With this large volume mined, the cave had not come through to surface, which is unusual. If the rock above the workings has arched itself and there is no large cavity, there is little danger from the dropping away of a large part of the rock, but on the other hand, if very little has broken away and the matt has settled leaving a large open space, in case there were a large mass to drop away the sub-level on which mining is being conducted would, no doubt, collapse, endangering the lives of the miners.

In order to determine the condition, it was decided to put down a churn drill hole to strike the highest part of the underground workings. The Armstrong No. 29 churn drill machine from the Tilden Mine was loaded on a flat car on December 13th and shipped to Negaunee.

As the drill would be set upon dangerous ground and men working around it, every precaution possible is being taken. Two strong poles 30 feet long were anchored in the ground some 150' back on safe territory so that a line between them crossed the proposed hole. A 3/8" steel cable was strung between these. Trolleys are fastened to the cable and the men wear safety

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9. EXPLORATIONS
AND FUTURE
EXPLORATIONS

belts which are tied by hemp rope to the trolley, thus being suspended in case the ground caved from under them. A winch is fastened to one of the poles so as to pull the men to safe ground if necessary. The crew is large enough so as to have a man on safe ground on the lookout at all times while drilling.

The drill was unloaded on December 18th and drilling actually started on the 20th, and the 8" pipe had been driven through sand and gravel to a depth of 123' by the end of the month. At this writing, January 19, 1934, the depth was 320'. Solid ledge was encountered at 165' (broken ledge at 156') when a 6" pipe was sealed in the ledge. No water was encountered at ledge. Evidently the ledge is sloping to the East and the water has drained through a cave several hundred feet to the East, which is part of the Negaunee Mine cave. We now feel the men are safe with 155' of solid rock under them but they are still wearing the safety belts tied to the trolleys. If a large opening is found to exist, it may be necessary to fill the opening through this churn drill hole. The information gained will be of great value in determining the exact conditions.

10. TAXES

	<u>1933</u>		<u>1932</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Maas Mine	\$ 1,060,000	29,408.64	\$1,235,000	35,209.85
Race Course	760,000	21,085.44	760,000	21,667.60
Adams Strip	180,000	4,993.92	200,000	5,702.00
Stockpile & Equipt.	835,000	23,166.24	950,000	27,084.50
Miscel. Parcels	12,100	335.72	13,900	396.97
Total Mine	<u>\$ 2,847,100</u>	<u>78,989.96</u>	<u>\$3,158,900</u>	<u>90,060.12</u>
Collection Fees		789.90		900.60
Total Optg. Maas Mine		<u>79,779.86</u>		<u>90,960.72</u>
Tax Rate		2.774		2.851
Total City of Negaunee Tax		354,107.70		409,706.92
Maas Mine % of City Tax		23.20		22.20

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10. TAXES

	<u>1933</u>		<u>1932</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Maas Rented Houses	\$ 238,900	6,629.14	\$ 255,000	7,270.73
Mineral Lands, Etc.	24,100	668.63	29,400	838.22
Total Houses & Lands	\$ 263,000	7,296.77	\$ 284,400	8,108.95
Collection Fees		72.97		81.09
TOTAL		7,369.74		8,190.04

11. ACCIDENTS
AND
PERSONAL
INJURY

There were two fatal accidents and two less serious, one a fracture of a thumb and the other a fracture of a toe. Our accident record showed an improvement up to the time of the double fatality.

The first accident occurred on March 29th at 9:30 A.M. to Jacob Koski, who was employed in No.38 contract and working on the 185' sub-level. It was caused by a piece of ore falling out of the breast, while he was drilling striking his left thumb, causing a fracture of proximal end of second distal phalanx. He was home six weeks receiving \$90.00 compensation.

The second accident occurred on August 21st at 9:30 A.M. to Henry Hyvonen, who was employed repairing No.618 raise. While he was working recribbing this raise, a piece of ore fell from behind the cribbing, striking his right foot, bruising and causing a fracture of distal phalanx of 4th toe. He was only home 5½ days and received no compensation.

The double fatality occurred on surface at 12:10 P.M. Friday, October 27th, due to cave of ore pile ahead of No. 43 shovel. John Niemie, a miner, and his helper, Leo Field, a steam shovel pitman, were drilling a hole to blast the pile which was over 40 feet in height. This work was being done at the noon hour so as not to interfere with loading. No one saw the accident, it was first discovered by the fireman who with the runner and cranesman were eating their dinner on the shovel. He noticed that the drill machine was not running and on looking out saw that a cave had occurred and that the men drilling had disappeared. Help was immediately obtained and a large crew of men worked an hour to recover the bodies. The two men were caught at the drill machine and instantly buried under six feet or more of ore. The ore broke away from the front of two legs of the old stocking trestle. The day was cold and stormy with frequent snow flurries and the smoke and steam from the steam shovel blew against the pile where the men were drilling, making it difficult for them to observe the usual signs of an approaching cave. Caves give warning by some falling ore and cracks opening so that if the men are

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11. ACCIDENTS
AND
PERSONAL
INJURY

observing the pile they have ample time to get back to safety. The customary procedure is for one man to drill and the other watch the pile, also, if there seems to be danger of a cave for the shovel runner to watch. The practice of drilling the pile ahead of the shovel is the most effective way to bring down the ore and has been used this year more than formerly due to shipping the old piles that have been in stock for several years and which are very compact.

The hanging up of the ore pile is very dangerous, both to the shovel pit men and driller and there are many narrow escapes from accidents when the pile caves with little warning. A new method has been adopted to take care of this situation. After the pile has built up to a height of about 12 feet, below the trestle stringers, 2 inch pipes, sharpened to a point at one end and split at the other so holes can be drilled for spiking it to the inside of the track stringers, are driven into the pile a foot or two. When loading these piles will be sprung with a small amount of powder so as to open the end of the pipe and form a chamber in the ore. Then it will be loaded again and the pile blasted. This can be done before the shovel moves ahead and will make better loading and prevent caves which cover up the shovel jack arms and cause delays.

John Niemie was 50 years of age, married with four children. His widow will receive \$16.00 per week for a total amount of \$5,000 and \$200.00 allowance for funeral expenses.

Leo Field was 31 years of age, married with two children. His widow will receive \$12.80 per week for a total amount of \$4040.00 and \$200.00 allowance for funeral expenses.

	<u>1933</u>	<u>1932</u>
Fatal	2	0
Time Lost - Over 4 months	0	1
" " - 1 to 4 months	0	1
" " - Less than 1 months	<u>2</u>	<u>0</u>
Total accidents	4	2
Number of cases paid compensation for accidents prior to Jan.1,1933	6	7
Number of cases paid difference in wages (Included in above total)	0	1

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12. NEW CONSTRUCTION
AND PROPOSED
NEW CONSTRUCTION

All E&A's were cancelled as of December 31st, 1932 and where certain facilities were incomplete, a new one was made out. E&A #633 covers completion of 5th Level Pumping Plant and takes the place of E&A #548 which included sinking of the shaft, 5th Level Development, Pump House, Sump and Pumping Plant.

The following is the expenditure against E_A #633, Pumping Plant, which was completed during the early part of the year:

Account 82 - Pumping Plant

Original estimate E&A #548		\$ 4,800.00
Expended to Jan. 1st, 1933		<u>3,548.08</u>
Balance unexpended Jan. 1, 1933		\$ 1,251.92
Estimate E&A #633		\$ 600.00
Expended on Pumping Plant in 1933	\$ 887.77	
" " Safety Appliances 1933	<u>125.30</u>	
Total expenditures in 1933	1013.07	<u>1,013.07</u>
Expenditures over estimate		\$ 413.07

It will be noted, while the expenditures under E&A #633 were exceeded by \$413.07, they were \$238.85 under the unexpended balance of E&A #548 the original estimate.

Included in E&A #548 Sinking Maas Shaft and Developing 5th Level, were 16 rocker dump cars. Three of these were not purchased during 1932 but will be needed with increased production. from the 5th Level. E&A #640 dated December 21, 1933, covers the purchase of three 65 cu.ft. rocker dump cars from the Lake Shore Engine Works for \$535.00 each or a total of \$1605.00.

13. EQUIPMENT
AND PROPOSED
EQUIPMENT

a. Steam Shovels

The shovels were overhauled at the General Shops, Ishpeming. Several second hand shovels were purchased and put into use to avoid the expense of frequent moves from pile to pile or another mine.

b. Stockpile Trestles

There were 23 bents erected for Maas ore in 1933 as compared with extending the trestle seven bents in 1932.

c. Scraper Hoists

There were two 15 H.P. Sullivan 2 HDE4 double drum electric hoists received from the Wade Mine Equipment through the Storehouse November 1933.

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13. EQUIPMENT
& PROPOSED
EQUIPMENT

c. Scraper Hoists (Cont.)

The hoists on hand 12-31-33 were as follows:

Ingersoll-Rand	15 H.P. Electrics	8
"	" 10 "	3
Sullivan	25 "	2
	20 "	1
	15 "	14
	7½ "	1
	6½ "	4
Ingersoll-Rand	Air	<u>15</u>
	Total	48

When the mine was closed down in April, the scraper hoists were brought to surface and overhauled during the idle period. In most cases only cleaning and painting of the armatures and rotors of the electric hoists was necessary.

d. Tractors

A new Gletrac tractor was purchased in October and covered by E&A #637.

Original cost of Tractor	\$ 1,395.00
Allowance on old tractor	<u>300.00</u>
Net Cost	\$ 1,095.00

14. MAINTENANCE
AND REPAIRS

The repairs to the 3rd Level pumps were the only extraordinary expense for maintenance incurred during 1933. The account Maintenance of Electric Tram Equipment was \$6016.96 for 1933 compared with \$1795.86 in 1932. This increase was for track and trolley lines on the new 5th Level. On account of conditions of the mining business, maintenance repairs were reduced to a minimum during 1933. This will be reflected the coming year as many repairs cannot be delayed longer.

15. POWER

Electric power was supplied by the Cliffs Power & Light Company, a subsidiary of the Cleveland-Cliffs Iron Co. The rate charged for current was 1½¢ per K.W.H. the same as last year. The boiler plant and steam turbine were not operated during the year.

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17. CONDITION OF
PREMISES

There were no improvements of the grounds around the mine. The grounds were kept in good condition through the year.

18. NATIONALITY OF
EMPLOYEES

<u>As to Parentage:</u>	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>
English	81	30.0	82	34.5
Finnish	21	8.8	19	8.0
Italian	13	5.5	2	.8
Swedish	8	3.4	1	.4
French (Canadian)	1	.4	1	.4
American (Mixed)	6	2.5	4	1.7
Germans	4	1.7		
Crotians				
Norwegians				
Irish				
Danish				
Total	238	100.0		

<u>As to Birth</u>	<u>Total</u>		<u>American Born</u>		<u>Foreign Born</u>	
	<u>1933</u>	<u>1932</u>	<u>1933</u>	<u>1932</u>	<u>1933</u>	<u>1932</u>
Americans	4	2	4	2		
English	86	81	32	24	54	57
Finnish	111	82	38	20	73	62
Italians	26	21	6	4	20	17
Swedish	23	19	12	11	11	8
Germans	9	8	8	7	1	1
Crotians	1	1			1	1
Norwegians	2	1	1		1	1
Danish	4	4	3	3	1	1
Irish	6	6	6	6		
French(Canadians)	16	13	16	13		
TOTAL	288	238	126	90	162	148
Percentage			44%	38%	56%	62%

19. MAAS CRUSHER

The crusher was operated 77 days compared with only a few days in 1932 crushing some Cliffs Shaft Lump and Negaunee Mine ore. Very few repairs weremade during the season and the crushing cost was exceedingly low averaging \$.032 per ton.

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19. MAAS CRUSHER

<u>Product</u>	<u>1933</u>	<u>1932</u>	<u>Incr.</u>	<u>Decr.</u>
Cliffs Shaft Lump		2,946		2,946
Negaunee	16,159	1,785	14,374	
Morris Lloyd	108,925	0	108,925	
Maas	4,700		4,700	
Athens	2,808		2,808	
Total	<u>132,592</u>	<u>4,731</u>	<u>127,861</u>	
Morris-Inland Steel	559		559	
	<u>133,151</u>	<u>4,731</u>	<u>128,420</u>	

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ATHENS MINE
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1. GENERAL:

The Athens Mine operated on a two day a week schedule from January 1st to April 8th, was then idle for seven months to November 9th, when operations were resumed on a three day per week schedule. It operated 48½ days in 1933 as compared with 60½ days in 1933.

Due to working two crews of men four days each on alternate weeks in the first operating period in 1933, it was possible to concentrate mining in a relatively small area. This staggered plan of operation was continued in November when the mine reopened on a three day per week schedule. In order to conform with the N. R. A. code, one crew worked the last three days of the week and the first three days of the following week. This gives each man six successive days work in each half month or on an average 13 days per month. This schedule affects all men underground and also the surface crew on the top landing. The balance of surface crew work on Monday, Wednesday, and Friday of each week. The reduction in number of working places due to staggering employment reduces the amount of equipment required, also reduces maintenance expense on account of fewer openings to keep repaired. Some raises are idle, however, under this plan of operation and rotting of cribbing, lining plank, ladders, and ladder sollars, has been accelerated by the idle periods of 1932 and 1933. Repairs are now underway to prevent loss of any of the raises.

Satisfactory costs cannot be made on the present basis of production, due to fixed costs that do not vary with the product. The mine is in good condition considering the two idle periods and a larger product can be obtained on short notice. From the standpoint of cost of production, an increase is desirable.

Shipments in 1933 of 237,052 tons from stockpile provided ample room for more than a year's product on basis of present production. This winter's product will all be stocked from the Southeast steel trestle.

Only one accident, causing 43 days lost time, occurred in 1933, as compared with two in 1932. Safety work was continued during the year largely by personal contacts and instruction. Employees are observing the safety standards but eternal vigilance is necessary to prevent accidents. Regular monthly meetings of the Superintendent and foremen at Athens and Negaunee mines are planned for 1934 to review the rules and standards, receive and discuss safety suggestions, etc.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
Athens Fee	37,590	68,716		31,126
Mitchell Lease	9,778	7,809	1,969	
Total Ore	47,368	76,525		29,157
Rock	2,138	1,165	973	
Total Hoist	49,506	77,690		28,184

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	231	224,432	224,663	6,055
Mitchell Lease	0	12,620	12,620	0
Total	231	237,052	237,283	6,055
Total Last Year	0	6,055	6,055	
Increase	231	230,997	231,228	

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES: (Cont)

c. Stockpile Inventories:

<u>Grade of Ore</u>	<u>Dec. 31, 1933</u>	<u>Dec. 31, 1932</u>	<u>Decrease</u>
Athens Fee	49,245	236,318	187,073
Mitchell Lease	6,159	9,001	2,842
Total	<u>55,404</u>	<u>245,319</u>	<u>189,915</u>

d. Division of Product by Levels:

The ore hoisted from various levels was as follows:

	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>
4th Level	680	1.4	-	-
6th Level	19,092	40.3	25,250	32.6
8th Level	27,596	58.3	51,275	67.4
Total	<u>47,368</u>	<u>100.0</u>	<u>77,525</u>	<u>100.0</u>

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	8,652	2,411	11,063	473
February	7,861	1,411	9,272	478
March	8,397	925	9,322	341
April	1,421	299	1,720	96
November	3,759	732	4,491	198
December	7,500	4,000	11,500	552
Total 1933	<u>37,590</u>	<u>9,778</u>	<u>47,368</u>	<u>2,138</u>
Total 1932	<u>68,716</u>	<u>7,809</u>	<u>76,525</u>	<u>1,165</u>
Increase		1,969		973
Decrease	31,126		29,157	

The product by leases was distributed as follows:

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
Athens	37,590	68,716		31,126
Mitchell Lease	9,778	7,809	1,969	
Total	<u>47,368</u>	<u>76,525</u>		<u>29,157</u>

Production of ore from the Mitchell Lease is increasing due to mining in Block 3 on the South footwall.

f. Ore Statement:

	<u>Athens</u>	<u>Mitchell Lease</u>	<u>Total</u>	<u>Total Last Year</u>
On hand Jan. 1, 1933	236,318	9,001	245,319	174,849
Product for Year	37,590	9,778	47,368	76,525
Overrun	--	--	--	--
Total	<u>273,908</u>	<u>18,779</u>	<u>292,687</u>	<u>251,374</u>
Shipments	<u>224,663</u>	<u>12,620</u>	<u>237,283</u>	<u>6,055</u>
Balance on Hand	49,245	6,159	55,404	245,319
Decrease in Product			29,157	
Decrease in ore on hand			189,915	

1933 - 1 8-hr shift, 2 days per week, Jan. 1st to April 8th
 Mine idle April 8th to November 9th
 1 8-hr shift, 3 days per week, Nov. 9th to Dec. 31st.

1932 - 1 8-hr shift, 2 days per week, Jan. 1st to June 1st
 Mine idle June 1st to Nov. 1st.
 1 8-hr shift, 2 days per week, Nov. 1st to Dec. 31st.

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES: (Cont)

- g. Delays:
There were no delays in 1933.
- h. Delays from Lack of Current:
February 6th - 1 hour delay - trouble at Maas sub station.

3. ANALYSIS:

a. Average Mine Analysis on Output:

	<u>1933</u>			<u>1932</u>		
<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Athens	61.68	.123	5.63	61.66	.125	5.94
Mitchell Lease	61.65	.134	5.74	61.49	.131	5.59

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>Iron</u>	<u>Moisture</u>
Athens	61.00	.127	6.29		None

c. High Sulphur Ore:

No high sulphur ore was encountered during the year.

4. ESTIMATE
OF ORE
RESERVES:

a. Developed Ore

Assumption: 12.75 cu. ft. equals one ton.
10% deducted for rock
10% deducted for loss in mining
Percentage of Bessemer equals 0.

4th Level and above	971,336 tons
4th Level to 6th Level	1,897,383 "
6th Level to 8th Level	1,323,805 "
8th Level to 9th Level	451,949 "
9th Level to 10th Level	354,812 "
Below 10th Level	49,236 "
Total developed ore Dec. 31st, 1933	<u>5,048,521 "</u>

Statement showing ore reserves and new ore development for the following years:

	<u>1929</u>	<u>1930</u>	<u>1931</u>	<u>1932</u>	<u>1933</u>
Ore in Mine Jan. 1st	5,901,102	5,371,092	5,335,388	5,172,414	5,095,889
Production	<u>343,147</u>	<u>385,461</u>	<u>251,580</u>	<u>76,525</u>	<u>47,368</u>
Balance	5,557,955	4,985,631	5,083,808	5,095,889	5,048,521
Ore in Mine Dec. 31st	<u>5,371,092</u>	<u>5,335,388</u>	<u>5,172,414</u>	<u>5,095,889</u>	<u>5,048,521</u>
New Ore Developed	-186,863x	349,757xx	88,606xx	0	0

x Decrease due to large roll in jasper hanging cutting off the ore.

xx Increase is mostly in the ore body South of dike between 4th and 6th levels

No new ore was developed in 1933. Increases in one or more areas were balanced by decreases in others. The estimate of ore reserves was obtained as in 1932 by subtracting the product from the previous year's estimate.

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4. ESTIMATE
OF ORE
RESERVES: (Cont)

b. Prospective Ore

No prospective ore in the mine. All ore considered as developed since 1928.

c. Estimated Analysis:

Ore Reserves: Approximate Expected Natural Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Athens Ore	52.50	.115	5.90	.390	2.70	1.00	.90	.011	1.44	13.00

Ore in Stock: Average Natural Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist</u>
Athens Ore	53.10	.117	5.60	.400	2.70	1.00	.750	.010	1.37	12.00

5. LABOR
AND
WAGES:

a. Comments:

(1) Labor:

There was a large excess of men available during 1933, until in December when the Civil Works Administration started to function. Due to decrease in product fewer men have been employed since reopening in November than in the early part of the year. A smaller crew was employed during the idle period than last year.

There was an increase of 15% in wages on July 16th and an increase of salaries affecting some in July, others in August and in November.

(2) New Construction:

There were no active E & A's at this mine in 1933.

b. Comparative Statement of Wages and Product:

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
<u>PRODUCT</u>	47,368	76,525		29,157
<u>No. Shifts and Hours</u>	1-8	1-8		
<u>AVERAGE NO. MEN WORKING:</u>				
Surface	31	36		5
Underground	86	120		34
Total	117	156		39
<u>AVERAGE WAGES PER DAY:</u>				
Surface	3.57	3.77		.20
Underground	4.01	4.16		.15
Total	3.88	4.05		.17
<u># AVERAGE WAGES PER MONTH:</u>				
	10½ days	10 days	½ days	
Surface	42.83	45.24	.59	
Underground	40.17	40.35		.18
Total	40.87	41.56		.69
<u>PRODUCT PER MAN PER DAY:</u>				
Surface	10.62	14.58		3.96
Underground	4.58	5.49	.09	
Total	3.20	3.99		.79

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5. LABOR AND WAGES: (Cont)

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

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
<u>LABOR COST PER TON:</u>				
Surface	.336	.258	.078	
Underground	<u>.875</u>	<u>.758</u>	<u>.117</u>	
Total	1.211	1.016	.195	
 <u>AVERAGE PRODUCT MINING:</u>				
Stopping	21.41	20.72	.69	
Ore Development	<u>11.83</u>	<u>12.96</u>		1.13
Total	20.80	19.97	.83	
 <u>AVERAGE WAGES CONT. LABOR</u>				
	4.59	4.82	.23	.23
 <u>TOTAL NUMBER OF DAYS:</u>				
Surface	4,462	5,249		787
Underground	<u>10,340</u>	<u>13,939</u>		<u>3,599</u>
Total	14,802	19,188		4,386
 <u>AMOUNT FOR LABOR:</u>				
Surface	15,934.05	19,765.62		3,831.57
Underground	<u>41,453.41</u>	<u>58,028.79</u>		<u>16,575.38</u>
Total	57,387.46	77,794.41		20,406.95
 <u>AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL:</u>				
	10 days	10 days		
	<u>Per Month</u>	<u>Per Month</u>		
Surface	39.79	42.58		
Underground	38.85	38.97		

Includes Captain and Clerk, each 26 days per month, also during 7 months' idle period the Surface Foreman, Chief Mechanic, and Electrician, who were allowed 13 days per month.

Proportion of Surface to Underground Men:
 1933 - 1 to 2.77 - 1 8-hour shift, 2 days per week, Jan. 1st to April 8th
 Mine idle April 8th to November 9th
 1 8-hour shift, 3 days per week, Nov. 9th to Dec. 31st

 1932 - 1 to 3.33 - 1 8-hour shift, 2 days per week, Jan. 1st to June 1st
 Mine idle June 1st to November 1st
 1 8-hour shift, 2 days per week, Nov. 1st to Dec. 31st

6. SURFACE:

a. Buildings, Repairs:

In the summer a new roof was put on the office as the old roof was leaking badly and was beyond repair.
 New ties were put on Southeast steel trestle during the idle period, also quite a number on the permanent steel trestle. All new ties were soaked in creosote before installation.
 The outside of steel girders and bracing at piers, also upper part of piers were painted in the Fall as they were beginning to rust. After cleaning off all rust and loose paint with an electric steel brush, paint was applied with a paint gun. This work will be completed next summer.

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6. SURFACE: (Cont)b. Stockpiles:

Mitchell Lease ore is stocked from a wooden trestle at the end of the Southeast steel trestle. All the ore, 12,620 tons, that could be loaded by steam shovel without dismantling or wrecking the trestle was shipped this year. All the Athens ore except a small rill in the center of the pile was shipped from the stockpile under the Southeast steel trestle. Nearly all the ore in stock on the North side of the East steel trestle was also shipped. At the present rate of production all the ore hoisted in 1934 can be stocked from the Southeast trestle, leaving the stocking space under the East trestle as a reserve.

c. Timber Treating Plant:

The peeled untreated timber decked since summer of 1931 at the mine was treated in the summer of 1933. The plant was idle in 1932. The stock of treated timber on hand at end of year was quite low due to the heavy shipments to the Maas Mine.

	<u>Cost of Treating per Foot - 1933</u>	<u>Cost of Treating per Foot - 1931</u>
Peeling	.0278	.0312
Treating	.0367	.0365
Decking	.0119	.0124
Zinc Chloride	.0517	.0681
Heat, Water, etc.	.0430	.0075
Total	<u>.1711</u>	<u>.1557</u>
Maintenance Cost	<u>.0082</u>	<u>.0118</u>
Grand Total	<u>.1793</u>	<u>.1675</u>

No. of Pieces treated 1933 - 991 - No. of Feet - 8,800
 " " " " 1931 - 1,355 " " " " - 11,763

The treatment cost in 1933 was slightly higher than in 1931 due to greater cost for heating on account of operating the heating plant for treating timber only. The mine was idle, so no expense for heating could be charged to the mine.

	<u>1933</u>	<u>1932</u>
No. of Pieces used at Athens	976	627
No. of Pieces shipped to Maas	<u>1,102</u>	<u>0</u>
Total Pieces used and shipped	2,078	627
Increase	1,451	

	<u>Treated Timber on Hand 12-31-33</u>	<u>Peeled Untreated Timber on Hand 12-31-33</u>
9' Pieces	138 ##	0
8' Pieces	<u>0</u>	<u>0</u>
Total 1933	138	0
Total 1932	<u>1,811</u>	<u>1,328</u>
Decrease	1,673	1,328 #

Of the 1,328 pieces of peeled untreated timber on hand for treatment last summer it was necessary to cull 331 pieces, mainly due to splitting. Some of the culled pieces have been used in the mine for props and legs on sub levels.

The pieces of treated timber on hand at end of year according to above figures should have been 724 whereas only 138 are shown on hand.

There was an accumulation of culls from many years, amounting to 586 pieces, that were eliminated this year. These pieces had to be culled on account of splitting.

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6. SURFACE: (Cont)

d. Water Purchased from City of Negaunee:

The following table shows the cost of the water consumed in heating, cooling, watering lawn, etc. for the years 1931, 1932, and 1933:

	<u>1933</u>		<u>1932</u>		<u>1931</u>	
	<u>Gallons</u>	<u>Amount</u>	<u>Gallons</u>	<u>Amount</u>	<u>Gallons</u>	<u>Amount</u>
1st Quarter	240,000	22.98	508,000	43.40	1,570,000	117.77
2nd Quarter	145,000	17.02	441,000	40.07	1,715,000	131.63
3rd Quarter	403,000	35.49	159,000	19.29	1,695,000	131.73
4th Quarter	223,000	21.21	149,000	15.66	1,542,000	116.15
Total	1,011,000	96.70	1,257,000	118.42	6,522,000	497.28
Cost per ton		.00204		.00155		.00197

Actual cash expense for water decreased in 1933 and would have been less if there had been more rainfall in the latter part of the summer. The long dry period made it necessary to frequently water the lawn and shrubbery.

e. Grounds:

The grounds were kept in good condition during 1933. Expense was confined to cutting grass on lawn and watering lawn and planted areas.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1933.

b. Development:

Development work in 1933 was confined to raising in ore and rock and to one drift in ore to provide an airway. In actual footage it was exactly 50% less than in 1932. This was due to shorter operating period and elimination of all dead work not absolutely necessary.

Raising was confined to the 6th level, where raises, on Mitchell Lease, started in 1932, were completed and to the new airway raise from 6th to 4th level which was also completed early in 1933. Drifting in ore was on sub level 50' above the 6th where connection for airway was being driven from area being opened for mining on Mitchell Lease toward #609, the new airway raise to the 4th level.

Although the cost of work was carried under stoping account, nearly all the work done on Mitchell Lots 8 and 9 in outlining the ore body under the hanging was in reality development work. The results in tons per man per day are necessarily low while an ore body is being outlined in an area where the hanging contact is irregular as in this particular area.

c. Stopings:

In 1933 mining was continued in the two blocks that were being mined for the past several years, i.e., Block 2 above the 8th level, and Block 3, above the 6th level. Due to the curtailed schedule of operation, with small product, comparatively little change occurred in 1933 in the elevations of the areas being mined. Above the 8th level mining was confined to the 720', 735', 745', and 760' sub levels. Above the 6th level in the ore body North of the fault dike, it was confined to the 500' and 515' sub levels, South of the fault dike in Block 3, mining in the new area being opened on Mitchell lots 8 and 9 was underway in several small areas from the 4th level elevation down 30' to the 430' sub level. The enrichment on the hanging contact in this area is quite irregular. In some places chimneys of ore extended up into the hanging. In two areas auxiliary raises were put up to mine these chimneys and the ore transferred on a lower sub level. At the end of the

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7. UNDERGROUND: (Cont)
c. Stoppings: (Cont)

year mining was underway on the 430' sub level where the ore extends over a larger area and it is evident that on the new lower sub the ore body will be continuous for a distance of over 100 ft. Near the South footwall the ore rises to the elevation of the 4th level where it was outlined years ago in a small area by a drift under the hanging wall jasper. This area was opened by an auxiliary raise near the East mining limit of Block 3 and the ore mined at the elevation of the 4th level was transferred to #626 raise on the 440' sub level.

The staggered basis of employment, whereby two crews of men work in each place, has reduced the number of working places to thirteen, to yield a product of 12,500 tons per month. This number may have to be slightly increased if mining conditions become unfavorable in a number of the contracts due to water or restriction of mining areas by intrusions of lean ore, jasper, and dikes.

Repairs to idle raises are now imperative as rotting progresses more rapidly during the idle periods due to lack of circulation of air. This work is now underway with one gang of miners.

Following is a detailed description of mining operations:

SUBS ABOVE THE 6th LEVEL

4th Level - Mitchell Lease - South Footwall:

After reopening the mine in November, one small sub level was mined under the jasper hanging at the elevation of the 4th level. This area was developed on the 4th level years ago by a Southwesterly drift from a crosscut that followed the jasper hanging. The ore was mined from an auxiliary raise, #626-A, put up from the 440' sub level at a point near the East boundary of Block 3. This ore is on the South footwall and the area was quite small at the 4th level elevation. It is expected that it will increase in area on each lower sub level. By the time mining reaches the elevation of the 440' sub or perhaps sooner it is probable that it will connect with the main ore body.

The new ventilation raise, #609, from the 6th to 4th levels, was completed in March, after which a 15' drift in jasper was driven to connect with a 4th level crosscut. The old 4th level crosscut was also repaired and all loose rock cleaned up

-415' Sub Level - South Foot - Mitchell Lease

Two short transfer raises were put up to the hanging from the 430' sub level adjacent to the East mining limit of Block 3, about 60' to the East of #624 and #625 raises. The ore area at each transfer raise was small. The enrichment was merely a chimney extending up 22' into the hanging above the floor of the 430' sub level. Extra precautions were taken in covering down the floor of the sub level with poles and wire fencing. The hanging jasper breaks into small pieces which run through a very small opening so extra care was necessary to prevent dilution of the ore on lower sub levels.

The last week of December one contract was cutting out at the elevation of this sub level from transfer raise #626-A where mining was completed on the 4th level elevation in December.

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7. UNDERGROUND: (Cont)
c. Stoping: (Cont)

-430' Sub Level - South Foot - Mitchell Lease

Mining was started on this sub level last March and resumed in November. The ore area was small on the sub above but evidently has widened on this sub level as the ore extends from #624 raise across and beyond #625. As slicing has progressed, some small seams of jasper have been encountered in the ore but as the ore is high grade blue steel ore the analysis has been above 60% in iron. Two contracts were slicing here at the end of the year. Mining conditions in this area should be favorable as scraping hauls are correct, no crushing, no water, and there is also controlled ventilation.

-440' Sub Level - South Footwall - Mitchell Lease

This transfer sub level was started late in 1932 to develop the ore on the South footwall. It was started from #626 raise with jasper in the back, which disappeared within 25 ft. The exploratory drift struck the footwall, then turned Eastward following the footwall to the East limit of the mining block. A transfer raise, #626-A, was started in February 1933 and completed in March when it reached the jasper hanging at the elevation of the 4th level. A sub level was opened here and mined as outlined under the heading "4th Level" in a preceding paragraph.

-500' Sub Level - North Side of Dike:

Three small pillars left on this sub level were mined early in the year. This completed mining operations in Block 3 on the North side of the dike.

-515' Sub Level - North Side of Dike:

The raises in the series extending to this area were connected by drifts early in 1933. Drifting had been started late in 1932. Mining was started by two gangs just before the mine closed last Spring and was resumed in November. Mining Northwest of #641 raise disclosed an additional loss of ore area because of encroachment of the jasper hanging. The jasper contact Northwest of the whole series of raises is no longer clearly defined because of incomplete enrichment of the ore. There are a number of seams of jasper in the ore which lower the grade below the limit set for mining.

-515' Sub Level - South Side of Dike:

In 1933 a drift was driven on this sub level from #631 to #632 raise to provide for air circulation to prevent rotting of cribbing in these raises. If an increased product is requested, mining will be started here.

-550' Sub Level - South Side of Dike:

The drift which will connect #621 raise, the most Northerly in this series, with the new airway raise, #609, (to provide ventilation for the area being mined on the South footwall), was nearly completed at the end of the year. Since reopening the mine in November it has advanced 75' from #609 raise. When completed it will improve ventilation on all the sub levels above the 620 series of raises in the South footwall area on Mitchell Lots 8 and 9.

6th Level - South Side of Dike:

The only work done on the 6th level, aside from repairing, was the completion of #609 ventilation and traveling way raise from the 6th to 4th levels. This raise was started late in 1932, the total height on incline was 221 ft., it was in ore for a height of 156', the upper 65' was in the jasper hanging wall. The footage raised in 1933 was 48' in ore and 65' in jasper.

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7. UNDERGROUND: (Cont)
c. Stoppings: (Cont)

SUBS ABOVE THE 8th LEVEL

-710° Sub Level - South Side of Dike:

Two small pillars South of #857 raise adjacent to the footwall were mined from the next lower sub level by caving. They could not be mined on the 710° sub due to a heavy flow of water which was temporarily concentrated in this small area or crotch formed by the junction of the impervious slate footwall and fault dike.

-720° Sub Level - South Side of Dike:

Several ore pillars along the footwall, Southwest of #838 and 836 raises, were mined during the year. At the end of the year one contract was mining near #835 raise where several small pillars remain to be mined. In the area near the junction of the East mining limit of Block 2 and the fault dike the ore is becoming increasingly contaminated by stringers of dike, apparently offshoots from the fault dike. It has already been necessary to abandon a few small areas on account of these stringers and additional areas may have to soon be abandoned as conditions are apparently growing worse on each lower sub level.

-735° Sub Level - North Side of Dike:

An ore pillar West of #852 raise was mined early in the year, also a drift started from #856 to #855 raise. Lean ore, due to intrusion of stringers of dike or ferruginous slate were encountered and this drift had to be abandoned. At the end of the year one contract was starting to mine the remaining pillars on this side of the dike, adjacent to #851 raise.

-735° Sub Level - South Side of Dikes:

Early in the year a drift was driven through the fault dike connecting #838 and #839 raises. Slicing was then started from #839 raise and most of the ore in this area mined.

-735° Sub Level - South Side of Dike:

A small area to the West of #857 raise had to be temporarily abandoned on account of water conditions. A drift driven from #840 raise since the mine reopened along the slate footwall has reached this area and this pillar is already over 50% mined. One more slice will completely remove it. The water has continued to come to #857 raise, leaving the balance of the pillar in condition to mine.

Nearly all ore pillars in the area adjacent to the slate footwall near the crotch formed by junction of the slate footwall and fault dike have to be mined from two or more raises. The first drift, driven under difficult conditions usually acts as a drain for the water concentrated in this area. Sometimes two drifts from different raises are necessary before the pillar can be mined by slicing from a third raise.

-745° Sub Level - North Side of Dike:

Pillars adjacent to #802 to #805 raises, inclusive, also #809 raise, were being mined during the year on this sub level. Since reopening in November three contracts have nearly completed mining the pillars North of these raises, while another contract had started to mine West of #832 raise. A connecting drift from #831 to #833 raise was stopped at the latter raise on account of stringers of dike in the ore. These stringers are extending greater distances from the fault dike into the ore body on each successive sub level.

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7. UNDERGROUND: (Cont)
c. Stoping:

-760' Sub Level - North Side of Dike:

One contract started to open this sub level in November and at the end of the year, had connected #807 and #805 raises. A connection will now be made to #806 raise to provide for circulation of air, after which slicing will start.

8th Level:

The only work done on this level in 1933 was general repairing - the area demanding the most repairs was #851 crosscut. This crosscut is beginning to show weight from mining operations on sub levels a short distance above.

9th Level:

At the end of the year timber sets were being put in preliminary to starting a raise for ventilation purposes, in the main 9th level crosscut, not far from the East mining limit of Block 1. This "inside" ventilation raise will carry air under pressure from the ventilation fan on the 10th level to the 8th level where ventilation doors will force it up 8th level raises to the subs being mined directly above in this "inside" territory.

10th Level:

This level was used for storage of water from March until late in July, during which time pumping was done on two shifts per 24 hours. This arrangement was put in effect to save the wages of one pumpman and one hoisting engineer. The last of July the stop logs on the 10th level were removed as repairs to #1010 ventilation raise had to be made. This is one of the main airway raises from the 10th to the 9th level. It is in dike rock which slabs on exposure to air, making repairs difficult. Extensive repairs are necessary every two years. It was decided to concrete the raise as this would seal the dike rock from contact with the air. There was no weight here caused by mining operations so it seemed there was an excellent chance to use concrete and thereby eliminate all future repairs. The 10th level drift was first concreted under the raise to protect the bottom of the raise, also to form a support for the concrete walls of the raise. The cribbing on the bottom and sides of the raise were then removed for a space of from 2 to 5 ft., depending on the looseness of the dike rock. Collapsible forms were made so that they would be serviceable for the entire job. On account of loose ground in the hanging side of the raise, only one or two pieces of cribbing were removed in each section concreted. The forms allowed for 6" of concrete outside the hanging wall cribbing and the concrete also ran in behind the cribbing, cementing the loose rock into a solid mass. Reinforcing was used on all sides of the raise but especially on the hanging wall side. The center dividing, which makes two compartments in every raise, was omitted in the concrete raise. The actual area of opening was greater in the concrete raise, the smooth sides also reduce resistance to passage of air.

Concreting of the raise was completed in October, after which the top of the raise on the 9th level was concreted and the concrete extended along one side of the drift for the full width of the dike, about 40 ft. Bolts were installed in the concrete on the foot side of the raise for ladders - which were installed after the concrete work was completed. No signs of cracks in the concrete are discernable and it therefore appears that the job has been successful. There is no question, however, that for airways in rock a concrete raise has everything in its favor over cribbing raises that rot, get out of shape, restrict the passage of air, and are a constant source of expense for repairs.

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7. UNDERGROUND: (Cont)

c. Stopings: (Cont)

10th Level: (Cont)

Considerable rock accumulated at the bottom of raise on the 10th level, which had to be cleaned up and hoisted to surface. For over a year the skips had not gone below the 8th level loading pocket where they rested on chairs. One skip rope had been shortened to permit of this arrangement. The shortened skip rope was replaced by a full length rope, the temporary skip pit pocket on the 10th level plat was removed and hoisting resumed from the 10th level early in November. The rock has all been cleaned up but further cleaning on the main level drifts will be undertaken shortly.

Early in December the main ventilation fan went out of commission due to breaking of vanes in the runner. The fan that was installed in its place required more room and it took several shifts to complete the excavation. The mine was without a main ventilation fan for more than a week, the Armour fan went into operation on December 30th.

d. Timbering:

Statement of Timber Used:

	<u>Linear</u> <u>Feet</u>	<u>Avg. Price</u> <u>per foot</u>	<u>Amount</u> <u>1933</u>	<u>Amount</u> <u>1932</u>
6" to 8" Cribbing	31,583	.0375	1,182.90	1,787.70
8" to 10" Stulls	9,714	.0586	596.15	343.37
10" to 12" "	26,488	.0893	2,365.32	1,634.26
12" to 14" " (treated timber)	17,789	.2035	3,619.82	3,236.90
14" to 16" "	<u>2,519</u>	<u>.1639</u>	<u>412.99</u>	<u>428.10</u>
Total - 1933	72,988	.0925	8,150.18	
Total - 1932	91,740	.0809		7,430.33
		<u>Per 100'</u>		
Lagging - 7 ft.	192,960	.7032	1,356.94	1,594.54
Poles - 9½ ft.	<u>146,728</u>	<u>1.2713</u>	<u>1,865.38</u>	<u>2,770.02</u>
Total - 1933	339,688	.9486	3,222.32	
Total - 1932	437,673	.9972		4,364.56
Grand Total - 1933			<u>11,372.50</u>	
Grand Total - 1932				11,794.89
Product			47,368	76,525
Feet of Timber per Ton of Ore			1.541	1.198
Feet of Lagging per Ton of Ore			4.073	2.940
Feet of Poles per Ton of Ore			3.097	2.779
Feet of Lagging per Foot of Timber			2.644	2.453
Cost per Ton for Timber			.1721	.0971
Cost per Ton for Lagging			.0286	.0208
Cost per Ton for Poles			<u>.0394</u>	<u>.0362</u>
Total Cost per Ton			.2401	.1541
Equivalent of Stull Timber to Board Measure			193,209	225,484
Feet of Board Measure per Ton of Ore			4.079	2.946

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7. UNDERGROUND: (Cont)
d. Timbering: (Cont)

Statement of Timber Used: (Cont)

Total Cost for Timber, Lagging, Poles, Etc. and Cost per Ton:

<u>Year</u>	<u>Amount</u>	<u>Cost per Ton</u>
1933	11,372.50	.2401
1932	11,794.89	.1541
1931	28,704.68	.1141
1930	38,001.66	.0985
1929	35,086.43	.1015
1928	29,160.74	.1207
1927	23,288.37	.1001

Total Cost for Timber, Lagging, and Poles - 1933

	<u>Amount</u>	<u>Cost per Ton</u>
Operating Period	7,691.71	.1624
Idle Period	2,934.63	.0620
Closing Period	646.16	.0136
Reopening Period	100.00	.0021
Total	11,372.50	.2401

	<u>1933</u>	<u>1932</u>	<u>Increase</u>
Total Idle period including closing and Reopening	3,680.79	1,548.55	2,132.24

The cost per ton of ore for timber, lagging, and poles, increased in 1933 due to the following reasons: First - small product due to operating only five months on a curtailed schedule. Second - to charging out timber culled on account of being dozy and rotten due to being in stock for several years, and Thirdly, to use of larger sizes of timber on account of timber being dry and not entirely sound. To sum up, the increased cost was due to the idle periods of 1932 and 1933 and the curtailed operating schedule starting in the Fall of 1931. No more than a normal stock of timber, lagging, and poles was purchased in the winter of 1931 and 1932 but due to causes beyond control it has lasted through 1932 and 1933, and at the end of the year there was still a small amount on hand.

Since reopening, special attention has been given to covering down the floors of sub levels. The old covering is quite rotten and a new mat is needed to prevent runs of rock. Wire fencing is placed on the top of the poles to make a close cover and bind the mat together. The extra expense on account of more thorough covering of floors of sub levels is also due to idle periods and curtailed operating schedules of 1932 and 1933.

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7. UNDERGROUND: (Cont)e. Drifting and Raising:

The following statement gives comparative figures showing footage of drifting and raising in 1933 and 1932. It was below normal in both years.

Year	Drifting		Raising		Total
	Ore	Rock	Ore	Rock	
1933	75'	30'	158'	92'	355'
1932	268'	20'	250'	3'	541'
Increase		10'		89'	
Decrease	193'		92'		186'

Development work was curtailed as far as possible in 1933 in order to reduce cash expenditures. It was mainly confined to the same area as in 1932, i.e. above the new crosscut on the 6th level on Mitchell Lease Lots 8 and 9.

f. Explosives, Drilling & Blasting:

The cost for explosives was practically the same in 1932 and 1933. 50% low freezing gelatin powder was used in both years. The cost per pound was reduced slightly in 1933. The pounds of powder used per ton of ore increased .0152 in 1933. This was due to the small product, for a few contracts in tight ground where more than the normal amount of powder was required had more than normal influence on the amount of powder used.

Statement of Explosives Used: (Ore Development and Stopping)

	Quantity	Average Price	Amount 1933	Amount 1932
50% Am. Gel.	18,050	11.92	2,165.26	3,442.38
60% " "	-	-	-	-
Total Powder - 1933	18,050	11.92	2,165.26	
" " 1932	28,000	12.29		3,442.38
Fuse	61,300	5.64	345.85	594.79
Caps - No. 6	8,550	11.01	94.11	192.87
Fuse Lighters	500		3.38	4.05
Connecting Wire	10#		3.20	
Total Fuse, etc. - 1933			446.54	
" " " - 1932				791.71
Total All Explosives - 1933			2,611.80	
" " " - 1932				4,234.09
Product			47,368	76,525
Pounds of Powder per Ton of Ore			.3810	.3658
Tons of ore per pound of powder			2.624	2.733
Cost per Ton - Powder			.0457	.0449
Cost per Ton - Caps, Fuse, etc.			.0094	.0104
Cost per Ton - All Explosives			.0551	.0553
<u>Sinking, Rock Development, Etc.</u>				
Total Powder - 1933	1,700#	11.87	201.75	
" " 1932	200#	12.31		24.63
" Fuse, etc. - 1933			32.71	
" " " 1932				5.92
Total All Explosives - 1933			234.46	
Total All Explosives - 1932				30.55
Total Explosives Used in Mine			2,846.26	4,264.64
Average price per pound for powder			11.98	.1229

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7. UNDERGROUND: (Cont)

f. Explosives, Drilling and Blasting: (Cont)

Statement of Explosives Used: (Cont)

100%	of Powder used in 1933	was	50%
100%	" " " " 1932	"	50%
58%	" " " " 1931	"	60%

The following statement shows the cost per ton for explosives, exclusive of rock development, for the period 1928-1933 inclusive.

<u>Year</u>	<u>Cost per Ton</u>	<u>Product</u>
1933	.0551	47,368
1932	.0553	76,525
1931	.0548	251,580
1930	.0536	385,461
1929	.0588	343,147
1928	.0666	241,590

g. Mining and Loading:

Nine foot timber was in general use on sub levels in both 1933 and 1932, the sub level interval being from 12 to 12½ ft. The operating schedule of four days per week prior to the shutdown, with three idle days, and the seven months' shutdown, made extensive repairs necessary throughout the mine. Electric scraper hoists, mainly 15 h.p. units, were in general use in 1933. This would not have been possible, as there are comparatively few of these units at the Athens, except on the staggered basis of working the men, which reduced the number of working places by one-half. Four second-hand 15 h.p. units were purchased in 1933, bringing the total number to 16. Under normal four or five day per week operating schedule, a total of about 30 units are needed. These larger electric units, that handle the large scrapers, move the ore in a shorter time and thereby make it possible to complete the mining cycle on nearly every shift. The cost of maintenance of the small air hoists is quite high and only small scrapers can be used. The air units are now being discarded as obsolete and are being replaced with electric units by The C. C. I. Co. and also other mining companies.

h. Ventilation:

Ventilation is always a problem during the time a mine is idle, due to lack of movement in the mine. The air currents follow the line of least resistance, which naturally result in the air being dead in a number of areas. The oxygen is absorbed from the dead air by rotting of timber and heat is generated which in turn accelerates rotting. The main ventilating fan was in operation throughout the year with the exception of a period in the late summer and fall when #1010 airway raise from 10th to 9th level was being lined with concrete, and a short period in December when it was out of commission while a new fan was being installed. Doors to control ventilation are in general use throughout the mine, also a number of booster fans to force air to the sub levels. Another airway raise has been started from the 9th to 8th levels. Control of ventilation is a serious problem in a deep mine such as the Athens and constant supervision is essential.

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7. UNDERGROUND: (Cont)i. Pumpings:

The average water pumped per minute decreased slightly in 1933, but still is much greater than before the cave to surface in June 1932. It decreased each month in the first four months of the year, then increased for three months due to melting of snow and rainfall, after which it decreased each month. It is interesting to note that the level of the bottom of the cave at the Athens is 14' below the level of the water in the cave at the Breitung Hematite Mine, about one-half mile South. The water level in the Breitung cave has been lowered since the cave at the Athens, showing that there is ground drainage between the two caves. Until the Athens cave increases in area it is reasonable to assume that the water pumped will run fairly close to the average in 1933. Rainfall will be the determining factor.

The number of gallons pumped per minute during 1933, 1932, 1931, 1930, 1929, are shown below:

Month	1933	1932	1931	1930	1929
January	373	278	243	230	219
February	358	286	244	230	218
March	340	296	250	233	211
April	326	307	253	231	216
May	365	312	255	228	221
June	416	326	282	228	223
July	422	597	262	222	222
August	411	542	263	234	226
September	399	486	262	239	225
October	356	431	263	233	228
November	342	402	268	239	231
December	326	391	274	242	232
Total Average	369½	396	260	232	223

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

Year	Gals. per Min.
1933	369½
1932	396
1931	260
1930	232
1929	223
1928	228
1929	242

j. Shaft:

Cost of repairs to shaft decreased 60% in 1933, amounting to only \$108.25. They were low in both 1932 and 1933, due to the curtailed basis of operation. In 1933, expense was largely for hardwood strips on skip runners and new runners in skip compartments below the 8th level where a number had to be replaced due to excessive wear. Relatively little expense was incurred for repairs to steel sets in the circular shaft.

k. Underground in General:

Considering the idle period of one year out of the past two years and the curtailed basis of operations, the mine is in good condition. The most serious result is the rotting of cribbing, lining plank, ladder sollar, and ladders in raises. As operations expand, more raises will be used and the repair work and expense will increase. At present a careful watch is kept of the condition of all idle raises and repairs started as soon as there seems to be danger of losing the raise due to crushing of the rotted cribbing. Production can be increased on short notice and this would be advisable from the standpoint of cost of production. The pumping cost was lower than in the previous year as the gallons of water pumped per minute were less than immediately after the cave to surface in June 1932. The equipment at the mine is in good condition; however, on an increased operating schedule there would be a shortage of 10 and 15 h.p. electric scraper hoists.

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7. UNDERGROUND: (Cont)1. Idle Period:

The mine closed on April 8th and was idle for 7 months, operations being resumed on November 9th. To conserve cash, only a small repair crew was employed for several months, later in the summer it was increased to prevent damage to the mine. The levels and sub levels where mining was not finished were thoroughly propped and no areas were lost due to caving. On reopening, the props were removed and, where necessary, lining sets were installed. Only a small product was obtained in November due to work incidental to reopening.

8. COST OF OPERATING:a. Comparative Mining Costs: (5 months Operating Period 1933 - 7 months 1932)

	<u>1933</u>	<u>1932</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	47,368	76,525		29,157
Overrun in stockpile	74,069	0	74,069	
Total	121,437	76,525	44,912	
Underground Costs	.515	1.233		.718
Surface Costs	.119	.279		.160
General Mine Expenses	.128	.304		.176
Cost of Production	.762	1.816		1.054
Depletion - Original Cost	.058	.095		.037
Increment	.125	.205		.080
Depreciation - Plant & Equipt.	.038	.166		.128
Development	.055	.089		.034
Movable Equipt.		.001		.001
Taxes	.205	.538		.333
Loading & Shipping	.080	.005	.075	
Total Cost at Mine	1.323	2.915		1.592
Administrative & Gen. Expense	.064	.086		.022
Miscellaneous Income	.021	.039	.018	
Idle Expense	.701	.991		.290
Funds Impounded in Bank	.178		.178	
Reopening Expense	.022	.018	.004	
Total Cost	2.267	3.971		1.704
No. of Days Operated	48½	61		12½
No. of Shifts & Hours	1-8	1-8		
Average Daily Product	977 #	1,255		278

Does not include overrun for year of 74,069 tons.

<u>COST OF PRODUCTION:</u>	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>	<u>Increase</u>	<u>%</u>	<u>Decrease</u>	<u>%</u>
Labor	.340	44.6	.850	46.8			.510	2.2
Supplies	.422	55.4	.966	53.2		2.2	.544	
Total	.762	100.0	1.816	100.0			1.054	

b. Detailed Cost Comparison:(1) Days and Shifts:

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1933	48½	1 8-hr	117	14,802
1932	61	1 8-hr	156	19,188
Decrease	12½		39	4,386

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:

(2) Wages:

There was an increase of 15% in wages on July 16th and an increase of salaries affecting some in July, others in August and in November. In 1932 wages were reduced 15% on May 16th, salaries were reduced on February 1st and again on June 1st.

(3) Comparison of Product:

Production - 1933	47,368 tons
Production - 1932	<u>76,525</u> "
Decrease	29,157 "
Overrun	<u>74,069</u> "
Increase including overrun	44,912 "

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate per Day</u>
1933	117	14,802	57,387.46	3.88
1932	<u>156</u>	<u>19,188</u>	<u>77,794.41</u>	<u>4.05</u>
Decrease	39	4,386	20,406.95	.17

(5) Tons per Man per Day:

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

	<u>1933 #</u>	<u>1932</u>	<u>Decrease</u>
Surface	10.62	14.58	3.96
Underground	<u>4.58</u>	<u>5.49</u>	<u>.91</u>
Total	3.20	3.99	.79

(6) Cost of Production: (Does not include Idle Expense)

1933	\$ 92,564.24	Cost per ton	\$.762 ##
1932	<u>138,961.20</u>	" " "	<u>1.816</u>
Decrease	46,396.96		1.054

	<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>
1933	41,243.62	44.6	51,320.66	55.4	.340	.422	.762
1932	<u>65,019.50</u>	<u>46.8</u>	<u>73,941.70</u>	<u>53.2</u>	<u>.850</u>	<u>.966</u>	<u>1.816</u>
Incr.				2.2			
Decr.	23,775.88	1.8	22,621.04		.510	.544	1.054

Idle Expense - 1933 - \$85,137.27 Cost per Ton \$.701
Reopening " - 1933 - 2,652.93 " " " .022

Based on actual product
Includes stockpile overrun in 1933.

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8. COST OF OPERATING:

b. Detailed Cost Comparison:
(7) Detail of Accounts:

	<u>1933</u>		<u>1932</u>		<u>Increase</u>		<u>Decrease</u>	
Days per week	2 & 3		2					
Shifts and Hours	1 8-hr		1 8-hr					
Production, Tons	121,437		76,525		44,912			
Aver. Daily Product-Tons	977		1,255				278	
Number of Days Worked	48½		61				12½	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs:</u>								
1. Exploring in Mine	44.28	.000	53.26	.001			8.98	.001
3. Development in Rock	556.24	.004	192.09	.002	364.15	.002		
4. Development in Ore	802.56	.006	2357.23	.031			1554.67	.025
5. Stopping	16228.75	.134	22652.85	.296			6424.10	.162
6. Timbering	32204.70	.265	27376.37	.358	4828.33			.093
7. Tramming	4636.13	.038	7377.90	.096			2741.77	.058
8. Ventilation	3127.17	.026	2683.30	.035	443.87			.009
9. Pumping	27495.93	.227	15417.42	.201	12078.51	.026		
10. Compressors & Air Pipes	7464.46	.062	9254.77	.121			1790.31	.059
12. Undg. Superintendence	2728.30	.023	3310.99	.043			582.69	.020
13. Cave-In			46.53	.001			46.53	.001
14. Maint: Compr & P. Drills	24.03	.000	820.64	.011			796.61	.011
15. Scrapers & M. Loaders	732.66	.006	1247.86	.016			515.20	.010
16. Electric Tram Equipt	1048.29	.009	1233.81	.016			185.52	.007
17. Pumping Machy.	959.83	.008	375.04	.005	584.79	.003		
Total Undg. Costs	98053.33	.808	94400.06	1.233			3653.27	.425
<u>Surface Costs:</u>								
18. Hoisting	8337.67	.069	8117.30	.106	220.37			.037
19. Stocking Ore	1194.40	.010	1857.59	.024			663.19	.014
21. Dry House	1927.93	.016	2341.99	.031			414.06	.015
22. Gen'l Surface Expense	2612.41	.021	1870.81	.024	741.60			.003
23. Maint: Hoisting Equipt.	4967.08	.041	3823.05	.050	1144.03			.009
24. Shaft	145.81	.001	282.18	.004			136.37	.003
25. Top Tram Equipt.	474.18	.004	806.95	.011			332.77	.007
26. Docks, Tres. & Pkts	1875.65	.015	2023.71	.026			148.06	.011
27. Mine Buildings	391.89	.003	199.10	.003	192.79			
Total Surface Costs	21927.02	.180	21322.68	.279	604.34			.099
<u>General Mine Expenses:</u>								
28. Insurance	263.54	.002	174.57	.002	88.97			
29. Mining Engineering	580.25	.005	809.12	.011			228.87	.006
30. Mech & Elec Engineering	974.21	.008	829.55	.011	144.66			.003
31. Analysis & Grading	2137.82	.018	1962.79	.025	175.03			.007
32. Personal Injury	5961.98	.049	6366.38	.083			404.40	.034
33. Safety Department	270.22	.002	385.57	.005			115.35	.003
34. Tels. & Safety Devices	489.67	.004	458.46	.006	31.21			.002
36. Spec Exp., Pens & Allows	7868.55	.065	5781.54	.075	2087.01			.010
37. Ishpeming Office	3381.57	.028	2481.44	.032	900.13			.004
39. Mine Office	5026.05	.041	3989.04	.052	1037.01			.011
Total Gen Mine Exps.	26953.86	.222	23238.46	.304	3715.40			.082
COST OF PRODUCTION	146934.21	1.210	138961.20	1.816	7973.01			.606
40. Taxes	56208.21	.463	41182.97	.538	15025.24			.075
TOTAL COST	203142.42	1.673	180144.17	2.354	22998.25			.681
Reopening Expense			1397.78	.018			1397.78	.018
5 Months Idle Expense			75836.35	.991			75836.35	.991
GRAND TOTAL COST	203142.42	1.673	257378.30	3.363			54235.88	1.690

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:

(7) Detail of Accounts:

General:

Analysis of the Detailed Cost Comparison is of no value as regards cost per ton or comparison of amounts for the two years, due to inclusion in 1933 of overrun in stockpile with the product and inclusion of expense during idle and reopening periods in the amount expended in 1933 under each account. The mine operated only 5 months in 1933 as compared with 7 months in 1932. Brief comments are made where an explanation seems warranted. In general, the two operating periods are compared rather than the full year.

UNDERGROUND COSTS:

1. Exploring in Mine:

Ishpeming Office charge.

3. Development in Rock

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost per Foot</u>
1933	30'	75'	105'	5.30
1932	20'	3'	23'	8.35
Increase	10'	72'	82'	3.05

More drifting at lower cost per foot in 1933.

4. Development in Ore

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost per Foot</u>
1933	55'	146'	201'	3.99
1932	268'	250'	518'	4.55
Decrease	213'	104'	317'	.56

Less development in ore at lower cost per foot.

5. Stoping:

	<u>Labor</u>	<u>Supplies</u>	<u>Tons Per Man</u>
1933	10,223.01	3,541.97	21.41
1932	17,618.35	5,034.50	20.72
Increase			.69
Decrease	7,395.34	1,492.53	

Mine operated 48½ days in 1933 as compared with 61 days in 1932. Tons per man stoping increased in 1933.

6. Timbering:

	<u>Labor</u>	<u>Supplies</u>
1933	10,791.76	9,749.78
1932	15,631.04	11,745.33
Decrease	4,839.28	1,995.55

Expense was increased in 1933 on account of charging out old timber in yard which was no longer safe to use in the mine. Also only larger sizes of old timber was used in the mine to overcome loss of strength due to dryness.

7. Tramming:

47,368 tons trammed in 1933; 76,525 tons in 1932.

Less ore trammed in 1933 on account of less product and shorter operating period.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:
(7) Detail of Accounts:

8. Ventilation:

Expense less on account of fan idle day shift part of summer while ventilation raise from 10th to 9th levels was lined with concrete. There was an extraordinary expense in December 1933 on account of taking out main ventilation fan and replacing it with fan from Armour Mine equipment.

9. Pumping:

<u>Operating Periods</u>	<u>Gallons Pumped</u>	<u>Gallons Per Min.</u>	<u>Cost For Power</u>	<u>Power Cost Per Ton Ore Mined</u>
1933 - 5 months	75,211,835	348	8019.65	.169
1932 - 7 "	99,099,423	328	12349.81	.161
Increase		20		.008
Decrease	23,887,588		4330.16	

Small decrease in gallons pumped per minute in 1933. In operating periods which are compared above, gallons pumped per minute increased slightly in 1933.

10. Compressors & Air Pipes:

<u>Operating Periods</u>	<u>Compressors</u>	<u>Air Pipes</u>	<u>Cubic Feet of Air</u>	<u>Cu. Ft. Air per Ton</u>
1933 - 5 months	5,515.98	573.83	107,550,000	2,271
1932 - 7 "	8,722.99	531.78	140,760,000	1,828
Increase		42.05		443
Decrease	3,207.01		33,210,000	

A comparison of operating periods is given above which shows more air used per ton in 1933, also more expense for air lines. More air was used per ton on account of lower daily product.

12. Underground Superintendence:

Expense decreased on account of lower salary paid mining captain in 1933.

13. Cave-In:

Some expense for fencing cave-in in 1932. None in 1933.

14. Maintenance: Compressors & Power Drills:

	<u>Compressors</u>	<u>Power Drills</u>
1933	22.78	-
1932	650.64	170.00
Decrease	627.86	170.00

Practically no expense in 1933. New pistons for Ingersoll-Rand compressor and new intake pipe in 1932, also two second hand auger drills purchased.

15. Maintenance: Scrapers & Mechanical Loaders:

Less scraper equipment required in 1933 on account of shorter operating period and less number of gangs mining ore.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:
(7) Detail of Accounts:

16. Electric Tram Equipment:

	<u>1933</u>	<u>1932</u>
Generator	1.13	38.82
Locomotives	269.56	407.66
Wiring	133.02	195.46
Main Line Tracks	330.52	567.00
Main Line Cars	43.70	24.87
Total	<u>777.93</u>	<u>1233.81</u>

Less repairs required on account of shorter operating period and less product trammed.

17. Pumping Machinery:

	<u>1933</u>	<u>1932</u>
Hard Ore Shop Labor	104.61	232.62
Porcelain Valve Seats	67.75	51.27

Less repairs necessary in 1933.

SURFACE COSTS:

18. Hoisting:

<u>Operating Period</u>	<u>Power Cost</u>	<u>Cost per Ton for Power on Actual Product</u>
1933 - 5 months	4,072.25	.086
1932 - 7 months	6,001.02	.078
Increase		.008
Decrease	1,928.77	

The power cost in operating periods is compared above.

19. Stocking Ore:

<u>Operating Period</u>	<u>Tons Stocked</u>
1933 - 5 months	47,137
1932 - 7 months	76,525
Decrease	29,388

Less ore stocked in 1933 on account of lower product per day and shorter operating period.

21. Dry House Expense:

1933 - Coal to boiler house in year - 516 tons - Cost	\$2,482.27
1932 " " " " " " " 578 " - "	<u>2,841.95</u>
Decrease	62 359.68

The above comparison shows tons of coal burned in heating plant each full year. Economies in cost of operation of dry were effected in 1933 and mine was idle two more months.

22. General Surface Expense:

Costs were reduced in 1933.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:
(7) Detail of Accounts:

23. Maintenance - Hoisting Equipment

	<u>Sheaves</u>	<u>Wire Rope</u>	<u>Electric Hoists</u>	<u>Skips & Skip Roads</u>	<u>Total</u>
1933 - 5 months	53.97	2137.50	843.78	482.05	3517.30
1932 - 7 months	43.25	2191.38	790.74	797.68	3823.05
Increase	10.72		53.04		
Decrease		53.88		315.63	305.75

The above statement covers 5 months operating period in 1933 and 7 months 1932. Extensive repairs to hoist motor and generator were made in 1933.

24. Maintenance - Shaft

	<u>Steel Sets</u>	<u>Undg. Pockets</u>	<u>Total</u>
1933 - 5 months	10.74	97.51	108.25
1932 - 7 months	41.21	240.97	282.18

Expense for shaft and underground pocket repairs less in 1933.

25. Maintenance - Top Tram Equipment

	<u>5 Mos. Optg</u>	<u>7 Mos. Optg.</u>
	<u>1933</u>	<u>1932</u>
Engines & Motors	42.09	199.58
Tracks & Cars	83.45	106.67
Wire Rope	100.00	377.06
Sheaves, Rollers, etc.	34.46	123.64
Total	260.00	806.95
Decrease	546.95	

Decreases in expense in all accounts in 1933 on account of shorter operating period.

26. Maintenance - Docks, Trestles & Pockets

Large decrease on account of erection of stocking trestles in 1932. Expense in 1933 was for repairs and \$420.00 for material used in trestles in 1932, also \$222.25 for solar plank laid in 1932.

27. Mine Buildings

	<u>1933</u>	<u>1932</u>
Shaft House	-	3.34
Engine House	-	10.60
Boiler House	.63	-
Dry House	.63	1.01
Coal Dock	-	31.09
Timber Tunnel	-	4.98
Iron House	-	84.00
Hose House	-	-
Storage Building	-	64.08
Total	1.26	199.10

The above statement shows practically no repairs required during the operating period of 1933. The new roof on office was installed in idle period.

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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:
(7) Detail of Accounts:

28. Insurances:

Lower valuation on contents of buildings in 1933.

29. Mining Engineering:

Less engineering expense charged to Athens in 1933. Engineering force at Ishpeming reduced to minimum during 7 months idle period 1933.

30. Mechanical & Electrical Engineering

Lower salaries and less expense incurred on account of long idle period.

31. Analysis & Grading:

	<u>No. of Determinations</u>	<u>Cost per Determination</u>
1933	5,691	.184767
1932	4,302	.25800

Cost per determination lower but more determinations on account of shipping large amount of ore from stock pile in 1933.

32. Personal Injury

	<u>2% of Payroll</u>	<u>Catastrophe Insurance</u>	<u>Ishpeming Office Charges</u>
1933 - 5 Months Optg.	671.47	35.94	5,254.57
1932 - 7 " "	<u>1,324.31</u>	<u>52.97</u>	<u>4,989.10</u>
Increase			265.47
Decrease	652.84	17.03	

Cost for operating periods, also the full year, lower in 1933 on account of smaller payroll.

33. Safety Department

	<u>Foremen's Meetings, Etc.</u>	<u>First Aid Supplies</u>	<u>Ishpeming Office Charges</u>
1933 - 5 months Optg.	22.98	-	126.60
1932 - 7 " "	<u>44.76</u>	<u>44.88</u>	<u>295.93</u>
Decrease	21.78	44.88	169.33

34. Telephones & Safety Devices

	<u>Lighting</u>	<u>Mine Telephones</u>	<u>Safety Devices</u>	<u>Fire Equipment</u>
1933 - 5 months Optg.	340.76	19.54	.22	16.84
1932 - 7 " "	<u>388.68</u>	<u>34.28</u>	<u>23.37</u>	<u>12.13</u>
Increase				4.71
Decrease	47.92	14.74	23.15	

Expense in all but one sub account reduced in 1933.

ATHENS MINE
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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison
(7) Detail of Accounts

36. Special Expense, Pensions & Allowances:

1933	\$7,868.55
1932	<u>5,781.54</u>
Increase	2,087.01

Curtailment Expense 1933 - \$3,743.71 - Includes \$1700 charge off for timber culled

"	"	1932 - <u>2,427.18</u>
Increase		1,316.53

There were no charges in 1933 for gardens and wood for employees

37. Ishpeming Office

Charges lower in 1933 on account of reduction in office force and lower salaries.

39. Mine Office

Expense for full year 1933 lower than in 1932 due to lower salaries and less supplies used.

ATHENS MINE
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8. COST OF OPERATING: (Cont)

b. Detailed Cost Comparison:
(7) Detail of Accounts:

Statement of Supplies Used:

	5 Months 1933	Cost Per Ton	7 Months 1932	Cost Per Ton
General Supplies	4,483.56	.095	4,843.04	.063
Iron & Steel	352.56	.007	1,034.22	.014
Oil & Grease	307.68	.007	450.49	.006
Machinery Supplies	883.05	.019	1,695.92	.022
Explosives	2,846.26	.060	4,264.64	.056
Lumber & Timber	9,342.15	.197	12,572.02	.164
Fuel	2,323.15	.049	2,683.12	.035
Electric Power	18,731.84	.395	27,873.16	.364
Sundries	1,239.57	.026	1,467.60	.019
Other Mines & Accounts	12.05	.000	9.88	.000
Total	40,497.77	.855	56,874.33	.743

The cost per ton for supplies used increased due to the curtailed output. It was possible by careful supervision to reduce expenditures for Iron & Steel and Machinery Supplies so that the cost per ton was lower than in the previous year.

Average per Day - Supplies Purchased:

	5 Months Optg. 1933	7 Months Optg. 1932
Days Operated	48½	60½
<u>Average per Day</u>		
General	80.59	91.42
Iron & Steel	6.28	5.76
Oil & Grease	6.04	4.86
Machinery	8.71	16.41
Explosives	51.68	60.24
Lumber & Timber	20.88	98.43
Fuel	33.72	-
Electric Power	379.79	442.19
Sundries	32.77	22.81
Total	620.46	742.12
Average tons per day	977	1265

Purchases Amount per Day:

Fuel & Power	.423	.350
Other Supplies	.212	.237
Total	.635	.587

Total Purchases:

Year 1933	57,128.29
Year 1932	67,453.69
Decrease	10,325.40
Supplies charged out in 1933	40,497.77 - 5 months operating.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

There was no diamond drilling at this property in 1933, and none is contemplated in the immediate future.

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10. TAXES:

The comparison of assessed valuations and taxes for 1933 and 1932 are as follows:

Description	1933		1932	
	Valuation	Taxes	Valuation	Taxes
Realty (Tax Commission)	1,500,000	41,616.00	1,740,000	49,607.40
Ore in Stock, Equipt & Supplies	500,000	13,872.00	490,000	13,969.90
Total by Tax Commission	2,000,000	55,488.00	2,230,000	63,577.30
Sterling Addition Lots	4,600	127.62	4,600	131.14
Harvey Plat Lots	1,300	36.07	1,300	37.08
Total	2,005,900	55,651.69	2,235,000	63,745.52
Collection Fees		556.52		637.45
Total Optg. Athens Mine		56,208.21		64,382.97
Harvey Plat Rented Bldgs.	7,900	219.20	7,900	225.23
Sterling Addn. Rented Bldgs.	22,700	629.81	22,700	647.30
Total	30,600	849.01	30,600	872.53
Collection Fees		8.49		8.72
Total Rented Bldgs.		857.50		881.25
Total Athens Iron Mining Co.	2,036,500	57,065.71	2,266,500	62,264.22
Tax Rate		2.774		2.851
Total City of Negaunee Tax		357,648.77		409,706.92
Athens Mine % of City Tax		15.92%		15.92%

The valuation by the State Tax Commission was decreased \$230,000 in 1933 and the City tax rate also decreased slightly. These two factors combined resulted in lowering the taxes paid by the Athens Mine \$5,198.51.

11. ACCIDENTS
AND
PERSONAL
INJURY:

The following table shows accidents for years 1929 to 1933, inclusive. The record in 1933 was better than in the previous year.

	1933	1932	1931	1930	1929
Fatal	0	0	0	1	0
Time Lost - Over 4 months	0	2	1	1	2
" " - 1 to 4 "	1	0	1	2	2
" " - Less than one month	0	0	0	2	0
Total Accidents	1	2	2	6	4

Number of cases paid compensation for accidents prior to Jan. 1, 1933	8	7	6	7	4
Number of cases being paid difference in wages (included in above total)	4	3	2	2	2

The nature of accident causing loss of time in 1933 was a contusion of abdomen and liver. Lost time 43 days.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

There were no new "Estimates and Authorizations" in 1933 and none are proposed in the immediate future.

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13. EQUIPMENT AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

The Athens Mine does not own a steam shovel. Ore is loaded from stockpiles by a C. C. I. Co. shovel, for which rent is paid by the Athens Mine Company. In 1933, most of the ore was loaded by shovel No. 42, which was transferred from the Mesabi Range to the Marquette Range this year.

b. Stockpile Trestles:

Some expense was incurred in the Fall for repair of wood trestle used for stocking Mitchell Lease ores. Several broken legs were replaced. Athens ore was stocked in the early months of the year from the wood trestle erected in 1932 between the two steel trestles. Shipments in 1933 provided ample room for the product that will be hoisted this winter.

c. Timber Treating Plant:

The timber treating plant was operated for several weeks in the summer of 1933 and 991 pieces of timber treated. The stock of treated timber on hand was low at the end of the year due to heavy shipments to the Maas Mine. There is sufficient on hand to take care of necessary replacements at the Athens Mine until the plant is in operation next summer.

d. Scraper Hoists:

Following is a list of scraper hoist equipments:

	On Hand <u>1-1-1933</u>	Purchased <u>1933</u>	Total On Hand <u>12-31-1933</u>
Ingersoll-Rand Air (none in use)	28		28
Sullivan 6½ h.p. Electric (not in use)	2		2
Sullivan 15 " "	10	4-2nd hand	14
Ingersoll-Rand 10 h.p. Electric	<u>2</u>		<u>2</u>
Total	42	4-2nd hand	46

All mining companies are decreasing the use of air scraper hoists on account of higher maintenance cost and inadequate power. They are being replaced by 10 and 15 h.p. electric units.

The four second-hand machines bought in 1933 came from the equipment removed from the Wade Mine on the Mesabi Range.

If the product is increased to any extent in 1934, additional electric units should be purchased.

It is planned to remove one drum from the air hoists and use them for timber hoists. They have more power and greater speed than the present timber hoists (tugger hoists).

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14. MAINTENANCE
AND REPAIRS:

a. Hoisting Equipment:

An unusual accident occurred whereby the motor on skip hoist was out of commission for more than two weeks in October, fortunately, during the time the mine was idle. A nut came off a bolt in frame of motor, falling between the armature and the field poles and cut a number of coils. A ground was formed and several coils burned out. This grounded the whole system, causing insulation under commutator of the generator to break down. It was necessary to install a number of coils in the motor and a full set of commutator segment insulators and mica cones in the generator. Both the motor and generator needed minor repairs prior to the accident. An engineer came from the General Electric factory to make repairs. The cost of repairs to generator and motor were \$1276.05.

c. Main Ventilation Fan:

The motive part of the main ventilation fan, commonly called the "nummer", which contains the vanes, broke down about the middle of December. The breakdown was caused by rusting away of the vanes. The fan was dismantled and the shell brought to surface. Repairs were impossible without purchasing a full set of vanes, or an entire new shell, at a cost of about \$350.00, and a delay of several weeks. A fan of similar capacity happened to be on hand at the Hard Ore storage yard that came from the Armour No. 2 Mine in Minnesota. It was decided to install it in place of the Athens fan and this work was rushed as fast as possible. The Armour fan was somewhat larger, requiring the removal of considerable ground in the 10th level fan station. This work was done on day and night shift as the mine was without primary ventilation and dependent entirely on natural ventilation, supplemented by compressed air from the air lines. The Armour fan went into commission on December 30th. The volume of air moving through the mine is apparently greater than ever before; this will be verified by measurements as soon as possible. The new fan is of more sturdy construction and should be serviceable for years. The cost of installation and removal of the old fan was \$344.49.

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15. POWER:

Electric power was purchased from the Cliffs Power & Light Company, a subsidiary of The Cleveland-Cliffs Iron Co. The rate charged for current was 1½¢ per K. W. hour, the same as in previous years.

The following statement gives a comparison in detail of the power cost for the operating periods of 1933 and 1932.

	<u>1933 - 5 Mos. Optg.</u>			<u>1932 - 7 Mos. Optg.</u>		
	<u>K. W.</u>	<u>Cost</u>	<u>Per Ton</u>	<u>K. W.</u>	<u>Cost</u>	<u>Per Ton</u>
Stopping	9,310	140.90	.0029	16,608	249.12	.0032
Ventilation	64,615	980.73	.0208	120,566	1808.49	.0236
Pumping x	589,346	8921.50	.1884	823,320	12349.81	.1614
Compressors x	250,181	3789.76	.0800	427,806	6417.08	.0838
Hoisting x	268,966	4072.25	.0860	400,068	6001.02	.0784
Stocking Ore x	10,210	154.38	.0032	14,214	213.21	.0028
Dry House	1,372	20.81	.0004	862	12.93	.0002
Lights at Shafts & Levels	16,283	246.77	.0052	20,726	310.89	.0041
Mine Office x	493	7.45	.0001	350	5.25	.0001
Electric Haulage	23,482	355.48	.0076	30,310	454.64	.0059
Heating Plant	329	5.00	.0001	368	5.53	.0001
Shops x	2,425	36.81	.0007	3,012	45.19	.0006
Total	1,237,012	18731.84	.3954	1,858,210	27873.16	.3642
Product	47,368			76,525		
K. W. per Ton	26.115			24.282		
Cost per K. W.	.01514			.015		

.015 plus 3% State Tax since July 1, 1933

x Indicates accounts that are metered.

17. CONDITION
OF
PREMISES:

The grounds around the mine were kept in good condition throughout the year. Expense was curtailed and only necessary work done. The sale of scrap effected a cleanup of the scrap yard, also the old saddleback motor cars were cut up and removed by the scrap buyer.

18. NATIONALITY
OF
EMPLOYEES:

The following statements shows: first - the nationality of employees as to parentage, secondly, a separation of nationalities into American and foreign-born.

<u>As to Parentage</u>	<u>1933</u>	<u>%</u>	<u>1932</u>	<u>%</u>
English	30	26	39	25
Finnish	47	40	62	40
Italian	12	10	18	11
Swedish	11	9	13	8
French Canadian	10	8	13	8
Scotch	1	1	1	1
German	2	2	3	2
Austrian	1	1	1	1
Norwegian	2	2	4	2
Irish	1	1	1	1
Danish	0	0	1	1
Total	117	100	156	100

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18. NATIONALITY
OF
EMPLOYEES:

<u>As to Birth</u>	<u>American Born</u>		<u>Foreign Born</u>	
	<u>1933</u>	<u>1932</u>	<u>1933</u>	<u>1932</u>
English	21	25	9	14
Finnish	18	24	29	38
Italian	2	4	10	14
Swedish	9	10	2	3
French Canadians	10	13		
Germans	2	3		
Austrians	1	1		
Norwegians	2	3		1
Irish	1	1		
Danish	0	1		
Scotch	1	1		
Total	67	86	50	70
Percentage	57%	55%	43%	45%

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1. GENERAL:

There was no change in condition of this property in 1933.

10. TAXES:

Description	1933		1932	
	Valuation	Taxes	Valuation	Taxes
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$ Sec. 6, S. of L S & I Ry.	10,000	277.44	10,000	285.10
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$, North of State Road	2,000	55.49	2,000	57.02
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$, Com. at W Line of Gold St.	400	11.10	400	11.40
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$, W of W Line Silver St. - 41 A.	2,600	72.13	2,600	74.12
Part of SW $\frac{1}{4}$ of SW $\frac{1}{4}$, South of State Road - 5.64 A.	4,600	127.62	4,600	131.14
NW $\frac{1}{4}$ of NW $\frac{1}{4}$ Sec. 7-46-26	10,000	277.44	10,000	285.10
Iron Plat - Lots 89 to 198 as per Tax List, except those paid by Land Dept. and other parties	19,500	541.09	20,500	584.43
Total	49,100	1,362.31	50,100	1,428.31
Collection Fees		13.62		14.28
Total Taxes		1,375.93		1,442.59
Tax Rate		2.774		2.851

Valuation of property decreased \$1,000, or 2%, and tax rate also decreased 2.7%, resulting in a decrease of \$66.66 in taxes, or 4.6%.