

CAMBRIA-JACKSON MINE
ANNUAL REPORT
YEAR 1944

7. UNDERGROUND: (CONT.)

f. Explosives, Drilling and Blasting: (Cont.)

Statement of Explosives Used: (Cont.)

	<u>Amount</u> <u>1944</u>	<u>Amount 1943</u> <u>(7 Months)</u>
Total All Explosives Rock Development, Etc.	91.32	62.67
Total All Explosives Used in Mine	13,128.62	7,541.99
Average Price Per Pound for Powder	.115	.115
Explosives Used for Stopping and Development	13,128.62	7,541.99
Explosives Used for Ventilation Drift	344.34	
Explosives Used for Blasting Stockpile	23.23	
Transferred to General Supplies	<u> </u>	<u>639.50</u>
Total as per Cost Sheet	13,496.19	8,181.49

g. Mining and Loading:

In June 1943 when the Cleveland-Cliffs took over the Cambria-Jackson Mine it was being mined by the sub-level caving method and developments for this system were far in advance of mining. Immediately on taking over the company started changing the method of mining to top slicing which is standard for nearly all Cleveland-Cliffs mines but due to the already completed developments it was necessary to continue sub-level caving in a great many places until the sub was completed. At the beginning of the year there were still four gangs working on the old system. In March of this year all gangs were top slicing.

At the beginning of the year there were only two gangs in the entire mine that were scraping directly into a loading raise. The ore from all the other gangs was transferred from one to four times before reaching the haulage level. This has been entirely eliminated so that at the present time every gang has its own individual raise. These are all double compartment raises and each has been provided with a new air driven hoist so that timber and supplies are hoisted directly to every working place. Scraping distances were about the same as in 1943, or 50 to 150 feet, but the scraping time was greatly reduced by discarding several of the old, slow and underpowered hoists that were used by the former operators.

All the standard practices, such as the use of timber bulkheads, forepoling under new hanging with tamarack poles supplemented by four-inch steel "H" beams, covering down with 9½-foot poles, the use of wire netting over the poles and all other efficiency and safety measures employed at all the other Cleveland-Cliffs mines have been adopted.

h. Ventilation:

Ventilation in the mine is now provided by a fan of 20,000 cubic feet per minute capacity located on the Sixth Level. Fresh air is drawn into the mine through a cave to surface and exhausted to surface from the Seventh Level through the operating shaft after having passed through the working areas. Future plans for ventilation call for a joint ventilation system with the Mather Mine which will be the downcast shaft and the Cambria-Jackson the upcast shaft. This joint system must wait for the mines to be connected on the Seventh Level,

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7. UNDERGROUND: (CONT.)

h. Ventilation: (Cont.)

Cambria-Jackson, and the 1600-Foot Level, Mather Mine. An Aerodyne fan of 35,000 to 45,000 cubic feet capacity, (depending on the blade adjustment), operating against a 2.8" to 3" water gauge has been purchased and charged to Cambria-Jackson E. & A. No. CC-119. Several booster fans are also being used throughout the mine.

i. Pumping:

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

<u>Month</u>	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
January	333	369	413	374	332
February	285	340	387	342	326
March	328	335	375	340	309
April	344	433	430	392	330
May	425	619	477	435	555
June	389	620	465	424	540
July	378	583	421	407	513
August	347	411	379	390	481
September	410	395	362	382	461
October	408	402	391	386	431
November	423	340	394	419	400
December	397	340	386	459	374
Average gallons per minute	372	432	407	396	421

Figures previous to June, 1943 were taken from Republic Steel Corporation records.

It will be noted that the largest number of gallons pumped per minute was in June, 1943, the first month that the Cleveland-Cliffs operated. From this date to the present time pumping has decreased except for the last four months of 1944. This increase was due to the exceptional amount of rain during the fall season and to a considerable amount of water encountered in one of the diamond drill holes on the Seventh Level. It will also be noted that in 1944 there was no appreciative increase after the spring breakup. This was due to the ditching done in 1943 to divert surface water from entering pits and caves West of the shaft.

The main pumping station is located on the Fourth Level and all water from the 5th, 6th and 7th Levels is forked up to this elevation by a number of smaller pumps. It has been decided and the purchase has been made under E. & A. Number CC-137 to install on the 7th Level a vertical triplex pump which will eliminate six small centrifugal pumps located on the 5th, 6th and 7th Levels, which are in poor condition and need overhauling and new parts.

The pumps at the present time are being operated on three eight-hour shifts. It is probable that after the new installation has been completed the schedule can be cut to two eight-hour shifts cutting the labor cost considerably.

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7. UNDERGROUND: (CONT.)

j. Underground in General:

The underground workings of the mine are now in good condition but not as clean as they might be if more labor was available to clean main level tracks and ditches.

When the company took over the property it was decided that it would continue to use the present equipment of cars and motors, which are being operated on a 24-inch gauge track, until after the war which at that time was thought to be of short duration. The cars and motors were in very bad condition. The motors are now in very good condition after a thorough overhauling but most of the cars (rocker dump type - 2.3 tons capacity) are just about worn out beyond repair and it is possible that it will be necessary to purchase new cars in 1945. If new cars are purchased they will be similar to the four-ton rocker dump cars in use at the other Cleveland-Cliffs mines except that they will be built for a 24-inch gauge track. A great number of the underground timber trucks were repaired and four new ones built and put in operation.

All working conditions in the mine were very much improved during the year and are very much appreciated by the employees. With a raise for each contract there is no more argument among the men as to how much ore each gang put in as was the case when several gangs would be transferring ore to the same raise. It will also be noted that due to these many improvements the production and earnings of the miners has increased.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1944</u>	<u>(7 Months)</u> <u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Product	282,184	147,700	134,484	
Underground Costs	1.649	2.008		.359
Surface Costs	.358	.329	.029	
General Mine Expense	.320	.321		.001
Cost of Production	<u>2.327</u>	<u>2.658</u>		<u>.331</u>
Taxes	.177	.175	.002	
Depletion and Depreciation	.122	.055	.067	
Loading and Shipping	.069	.076		.007
Total Cost	<u>2.695</u>	<u>2.964</u>		<u>.269</u>
No. of Days Operated	278	180	98	
Total No. of Shifts Operated	1 & 2-8 Hr.	1, 2 & 3-8 Hr.		
Average Daily Product	1,067	821	246	

Cost of Production:

	<u>1944</u>	<u>Percent</u>	<u>1943</u>	<u>Percent</u>	<u>Increase</u>	<u>Decrease</u>
Labor	1.511	56.1	1.896	64.0		.385
Supplies	1.184	43.9	1.068	36.0	.116	
Total	<u>2.695</u>	100.0	<u>2.964</u>	100.0		<u>.269</u>

b. Detailed Cost Comparison:

(1) Days and Shifts:

<u>Year</u>	<u>Days Mine Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Shifts</u>
1944	278	1 & 2-8 Hr.	190	50,827 $\frac{1}{2}$
1943	180	1, 2 & 3-8 Hr.	212	34,562 $\frac{3}{4}$
Increase	98			16,264 $\frac{3}{4}$
Decrease			22	

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(2) Wages:

There was no increase in wages during 1944. The last increase was $5\frac{1}{2}$ cents per hour effective April 1, 1943, retroactive to July 13, 1942.

(3) Comparison of Production:

Production - 1944	282,184 Tons
Production - 1943 (7 Months)	147,700 Tons
Increase	134,484 Tons

(4) Comparison of Number of Men and Wages:

<u>Year</u>	<u>No. of Men</u>	<u>No. of Days</u>	<u>Amount</u>	<u>Rate per Day</u>
1944	190	50,827 $\frac{1}{2}$	388,539.72	7.76
1943 (7 Months)	212	34,562 $\frac{3}{4}$	263,856.11	7.63
Increase		16,264 $\frac{3}{4}$	124,683.61	.13
Decrease	22			

(5) Tons Per Man Per Day:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>
Surface	18.83	14.57	4.26
Underground	7.87	6.03	1.84
Total	5.55	4.27	1.28

(6) Cost of Production:

1944	\$ 760,394.11	Cost per Ton	\$ 2.695
1943 (7 Months)	\$ 437,785.12	Cost per Ton	\$ 2.964
Decrease			\$.269

	<u>Labor</u>	<u>Percent</u>	<u>Supplies</u>	<u>Percent</u>
1944	\$ 426,402.39	56.1	\$ 333,991.72	43.9
1943 (7 Mos.)	\$ 280,043.84	64.0	\$ 157,741.28	36.0
Increase				7.9
Decrease		7.9		

The main reason for the sharp increase in percentage of supplies was due to the fact that in closing off E. & A. Number CC-119 in December, \$9,614.96 was charged to electric tram equipment, \$3,296.33 to hoisting equipment and \$23,404.02 to mine buildings, or a total of \$36,315.31. Another contributing factor was the purchase of considerable new equipment necessary for the efficient operation of the mine.

(7) Detail of Accounts:

UNDERGROUND COSTS:

1. Exploring in Mine:

Increase due to more diamond drilling. There was 1,453 feet of drilling in 1944 as compared to 628 feet in the 7 months period of 1943.

3. Development in Rock:

Decrease due to less development in rock in the process of mining.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts:

	<u>1944</u>		<u>1943</u>		<u>Incr. or Decr.</u>
		<u>(7 Months)</u>			
Days Per Week	5		5 $\frac{1}{2}$		
Shifts and Hours	1-8-27		1-8-32		
	2-8-251		2-8-124		
	3-8-0		3-8-24		
Production, Tons	282,184		147,700		
Number of Days Worked	278		180		
	Per		Per		
	Ton		Ton		
<u>UNDERGROUND COSTS:</u>	<u>Amount</u>		<u>Amount</u>		<u>Per</u>
		<u>Ton</u>		<u>Amount</u>	<u>Ton</u>
1. Exploring in Mine	9,102.83	.032	3,168.61	.022	5934.22 .010
2. Sinking in Shaft					
3. Development in Rock	688.56	.003	1,064.28	.007	375.72 .004
4. Development in Ore	1,047.08	.004	5,750.55	.039	4,703.47 .035
5. Stopping	155,967.56	.553	108,920.54	.738	47,047.02 .185
6. Timbering	127,907.28	.453	79,816.68	.541	48,090.60 .088
7. Trammig	59,789.98	.212	36,095.47	.244	23,694.51 .032
8. Ventilation	8,584.05	.030	3,460.26	.023	5,123.79 .007
9. Pumping	25,739.49	.091	16,717.32	.113	9,022.17 .022
10. Compressors and Air Pipes	27,679.91	.098	16,889.55	.114	10,790.36 .016
11. Back Filling			86.40	.001	86.40 .001
12. Underground Superintendence	11,014.23	.039	5,978.55	.040	5,035.68 .001
13. Cave-in					
14. Maint: Compressors and P. D.	669.01	.002	906.76	.006	237.75 .004
15. Scraper Equipment	9,110.44	.032	7,177.94	.049	1,932.50 .017
16. Electr. Tram Eqt.	26,422.88	.094	8,740.83	.059	17,682.05 .035
17. Pumping Machinery	1,604.10	.006	1,829.65	.012	225.55 .006
Total Underground Costs	465,327.40	1.649	296,603.39	2.008	168,724.01 .359
<u>SURFACE COSTS:</u>					
18. Hoisting	21,530.58	.076	14,029.37	.095	7,501.21 .019
19. Stocking Ore	11,923.57	.042	10,025.35	.068	1,898.22 .026
20. Screening-Crushing at Mine					
21. Dry House	9,349.48	.033	8,984.01	.061	365.47 .028
22. General Surface Expense	13,138.16	.047	6,975.74	.047	6,162.42
23. Maint: Hoisting Equipment	12,935.66	.046	3,958.61	.027	8,977.05 .019
24. Shaft	1,915.76	.007	758.88	.005	1,156.88 .002
25. Top Tram Equipment	3,697.08	.013	2,042.26	.014	1,654.82 .001
26. Docks, Trestles & Pkts.	1,439.70	.005	1,782.12	.012	342.42 .007
27. Mine Buildings	25,014.05	.089	44.61		24,969.44 .089
Total Surface Costs	100,944.04	.358	48,600.95	.329	52,343.09 .029
<u>GENERAL MINE EXPENSES:</u>					
Supply Inventory Adjustment	596.31	.002	84.80	.001	511.51 .001
Group Annuity Premiums	1,019.97	.004	00.00	.000	1,019.97 .004
28. Insurance	2,519.21	.009	1,356.91	.009	1,162.30
29. Mining Engineering	4,141.65	.015	2,524.12	.017	1,617.53 .002
30. Mechanical & Electr. Engrg.	1,985.32	.007	1,091.04	.007	894.28
31. Analysis and Grading	10,649.69	.038	6,421.06	.043	4,228.63 .005
32. Personal Injury	6,594.18	.023	4,551.35	.031	2,042.83 .008
33. Safety Department	1,134.40	.004	607.26	.004	527.14
34. Telephones and Safety Devices	4,700.09	.016	1,201.60	.008	3,498.49 .008
35. Local and General Welfare	2,014.47	.007	1,428.94	.010	585.53 .003
36. Spec. Exp., Pensions & Allwms.	4,154.87	.015	2,448.12	.017	1,706.75 .002
37. Ishpeming Office	10,607.83	.037	6,279.25	.043	4,328.58 .006
Vacation Pay	11,537.52	.041	1,532.57	.010	10,004.95 .031
38. Social Security Taxes	8,957.55	.032	5,820.24	.039	3,137.31 .007
39. Mine Office	19,752.61	.070	12,091.96	.082	7,660.65 .012
Total General Mine Expenses	90,365.67	.320	47,439.22	.321	42,926.45 .001
<u>COST OF PRODUCTION</u>	<u>656,637.11</u>	<u>2.327</u>	<u>392,643.56</u>	<u>2.658</u>	<u>263,993.55</u> <u>.331</u>
40. Taxes	50,031.68	.177	25,889.43	.175	24,142.25 .002
<u>TOTAL COST</u>	<u>706,668.79</u>	<u>2.504</u>	<u>418,532.99</u>	<u>2.833</u>	<u>288,135.80</u> <u>.329</u>
Budget-Tons and Cost	259,830	2.533	000,000	0.000	

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison : (Cont.)

(7) Detail of Accounts: (Cont.)

4. Development in Ore:

No decided change.

5. Stoping:

Decrease in cost per ton due to a larger product in 1944 and more efficient operation.

6. Timbering:

Decrease due to increased production in 1944. The costs were above normal in 1943 on account of charging out the cost and sawing of undersized timber which was at the mine when the Cleveland-Cliffs took over.

7. Tramming:

Decrease due to elimination of labor operating transfer scrapers, one less trammer boss and a larger production.

8. Ventilation:

Increase due to driving a new drift to eliminate continuous repair of a portion of the old drift.

9. Pumping:

	Total Gallons Pumped	Gallons Per Minute
Year 1944	196,252,831	372
Year 1943 (7 Months)	134,676,000	439 (For Year)

10. Compressors and Air Pipes:

The cost per ton is less due to increased production.

11. Back Filling:

There was no back filling in 1944.

12. Underground Superintendence:

Increase due to adding two shift bosses in November.

13. Cave-In:

No charge to cave-in in 1944.

14. Compressors and Power Drills:

Two drill machines were charged to this account in 1943; none in 1944. Repairs to compressor belt, \$105.12 in 1944.

15. Scraper Equipment:

Increase due to purchase of four scraper-hoist motors and motor assemblies, cost \$2,000.04.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

16. Electric Tram Equipment:

Increase due to one set of stator coils for haulage set \$501.75; controller, \$219.89; rail and angle bars, \$257.00; heavy repairs to Jeffrey locomotives and charging off a portion of E. & A. Number CC-119, \$9,614.96.

17. Pumping Machinery:

No extraordinary expense.

18. Hoisting:

Decrease in cost per ton due to increased production.

19. Stocking Ore:

Decrease due to the purchase of less material for stocking trestles.

21. Dry House:

Decrease due to reduction of men from 3 to 2 and the expense in 1943 was far above normal due to extra labor during the rebuilding of the dry house.

22. General Surface Expense:

There was no change in cost per ton over that of 1943. This account is probably high due to the excessive amount of work required to make the surface presentable. All fences around caves were repaired and about 2,000 feet of new substantial fence was erected around the settling ground just West of the shaft.

23. Hoisting Equipment:

Increase due to purchase of three skip and cage ropes, \$3,047.31; repairs to skip-pit hoist, \$601.23; one motor bearing, \$160.06 and two pulley stand sheaves, \$91.96.

24. Shaft:

Increase due to more repairs to shaft dividers and casing.

25. Top Tram Equipment:

Increase due to purchase of one HU Hoist, very heavy larry-car repairs and erection of trolley stands on new trestle.

26. Docks, Trestles and Pockets:

Decrease due to erection of permanent trestle with steel members in previous year.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

27. Mine Buildings:

There were practically no charges to this account in 1943 as it was taken up in E. & A. Number CC-119. When closing off this E. & A. in December, \$23,404.02 was charged to operation. This, together with several other items charged to this account, made the operating costs rather high.

28. Insurance:

Same as last year.

29. Mining Engineering:

Decrease due to larger production and to the fact that more engineering was required last year after taking over operations to resurvey the mine.

30. Mechanical and Electrical Engineering:

The expense in this account was incurred by men in these two departments who inspected equipment on surface and underground and supervised the many repairs made during the year.

31. Analysis and Grading:

The cost to this account is made up as follows:

	<u>Sampling at Mine</u>	<u>Central Laboratory</u>	<u>Shipping Dept. Expense</u>	<u>Trucking Samples, Etc.</u>
1944	950.56	7785.28	1519.18	394.67
1943 (7 Months)	<u>724.86</u>	<u>4735.38</u>	<u>960.82</u>	<u> </u>
Increase per Ton				.001
Decrease per Ton	.001	.004	.001	

32. Personal Injury:

The detail of charges to this account were as follows:

	<u>Compensation & Doctors</u>	<u>Compensation Department</u>	<u>Hospital Loss</u>
1944	6,244.64	349.54	None
1943 (7 Months)	<u>4,346.60</u>	<u>204.75</u>	<u>None</u>
Decrease per Ton	.007	.001	

33. Safety Department:

Charges to this account were normal.

34. Telephones and Safety Devices:

The detail of charges to this account were as follows:

Lights for Shaft and Levels	\$ 3,305.53
Mine Telephones	311.10
Sign Boards and Signals	933.96
Fire Equipment	<u>149.50</u>
Total	\$ 4,700.09

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

35. Local and General Welfare:

The detail of charges to this account were as follows:

	<u>1944</u>	<u>(7 Months)</u> <u>1943</u>	<u>Decrease</u> <u>Per Ton</u>
General Welfare	\$ 1,656.09	\$ 1,178.07	.002
District Welfare	358.38	250.87	.001

36. Special Expense, Pensions and Allowances:

The detail of charges are as follows:

	<u>1944</u>	<u>(7 Months)</u> <u>1943</u>	<u>Increase</u> <u>Per Ton</u>	<u>Decrease</u> <u>Per Ton</u>
Pensions	\$ 574.26	\$ 465.49		.001
Legal	203.93	128.43		
Retirement Expense	1,454.19	825.63		.001
Saranac Invest.	1,026.81	713.80		.001
Weekly Wage Record	401.25		.001	
Other Expenses	494.43	314.77		
Total	\$ 4,154.87	\$ 2,448.12	—	.002

37. Ishpeming Office:

1944	\$ 10,607.83	Cost per Ton	.037
1943 (7 Months)	6,279.25	Cost per Ton	.043

Vacation Pay:

1944	\$ 11,537.52	Cost per Ton	.041
1943 (7 Months)	1,532.57	Cost per Ton	.010

Large increase was due to the fact that 1943 vacation pay was paid on the Republic Steel Corporation's plan which was not as liberal as the Cleveland-Cliffs' and also more men came in on the 10 years employment bracket.

38. Social Security Taxes:

The detailed charges in this account were as follows:

	<u>Unemployment</u> <u>Tax</u>	<u>Old Age</u> <u>Benefit Tax</u>
1944	\$ 5,062.97	\$ 3,894.58
1943 (7 Months)	3,289.86	2,530.38
Decreased Cost per Ton	.004	.003

39. Mine Office:

The detail of charges to this account were as follows:

	<u>Salaries</u> <u>Supt. & Clerks</u>	<u>Central</u> <u>Warehouse</u>	<u>Miscellaneous</u>	<u>Total</u>
1944	\$ 13,987.49	\$ 4,407.31	\$ 1,357.81	\$ 19,752.61
1943 (7 Months)	—	—	—	12,091.96
Decrease in Cost per Ton				.012

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

40. Taxes:

The cost per ton for taxes was practically the same in 1944 as in the 7 months period of 1943 there being an increase of only .002 per ton.

9. EXPLORATIONS AND
FUTURE EXPLORATIONS:

Quite an extensive drilling program was started in June and is being continued to explore to the South and West of the 7th Level haulage drift. No new ore deposits were found but the drilling did indicate that the known ore body was larger than had been estimated and that a portion of the ore North of the South dike was standard ore.

When drilling East of the main North-South fault is completed on the 7th Level the drill will be moved to the 5th Level to test the unexplored territory just South of the Shaft. On completion of this drilling it is proposed to drill to the South and West of the end of the 6th Level to try to locate the upward extension of the ore being developed by the Mather Mine near the Cambria-Jackson West boundary line. On last report the Mather Mine had a raise up to a point 100 feet below the 6th Level and was still in ore. The ore deposit as developed there is rising sharply to the East and in all probability will extend above the Cambria-Jackson 6th Level.

A record of the cost of drilling is given in the following tables, also the log of each hole:

Drilling Cost:

Labor	\$ 2,834.49
Supplies & Misc.	734.67
Bortz	4,591.05
Total	\$ 8,160.21

Overhead Expense:

Analysis	\$ 56.82
Geological Dept.	249.17
Total	\$ 305.99

Grand Total \$ 8,466.20

<u>Feet Drilled</u>	<u>Cost Per Foot</u>	<u>Total Cost</u>
1,453	\$ 5.83	\$ 8,466.20

The above tabulation is not a true cost of drilling as there is an outstanding credit for the salvage value of a great number of bits used in 1944 drilling which has not yet been received.

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9. EXPLORATIONS AND
FUTURE EXPLORATIONS: (CONT.)

Log of Holes Drilled:

<u>D. D. Hole No.</u>	<u>Location</u>	<u>Dip</u>	<u>Course</u>	<u>Date Started</u>	<u>Date Stopped</u>
159	7th Level	0°	S10°02'W	6/26/44	7/18/44

Material

	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
0' - 20' -	51.19	.181	.154
20' - 23' -	48.10	.136	.014
23' - 35' -	Ferruginous Dike		
35' - 37' -	54.50	.073	.233
37' - 39' -	Dike		
39' - 46' -	Soft Ore Jasper		
46' - 60' -	Dike		
60' - 65' -	45.25	.173	.042
65' - 70' -	50.17	.144	.051
70' - 90' -	Soft Ore Jasper		
90' - 102' -	58.60	.041	.060
102' - 306' -	Soft Ore Jasper		
306' - 316' -	Dike		
316' - 358' -	Soft Ore Jasper		

160	7th Level	0°	S 0°13'E	7/28/44	10/25/44
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Material

	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
0' - 8' -	56.25	.040	.013
8' - 10' -	45.00	.080	.015
10' - 15' -	55.10	.043	.021
15' - 130' -	62.41	.102	.320
130' - 132' -	61.30	.748	.034
132' - 142' -	Dike		
142' - 151' -	60.41	.174	.292
151' - 160' -	50.94	.161	.109
160' - 180' -	46.87	.137	.074
180' - 195' -	60.07	.079	.159
195' - 200' -	50.71	.130	.488
200' - 210' -	Ferruginous Dike		
210' - 215' -	58.83	.068	.224
215' - 270' -	Soft Ore Jasper		

161	7th Level	73°	S 0°24'W	11/2/44	12/4/44
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Material

	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
0' - 105' -	59.95	.119	.237
105' - 133' -	Dike		
133' - 138' -	59.00	.111	.040
138' - 147' -	49.90	.055	.029
147' - 151' -	52.99	.075	.017
151' - 190' -	61.60	.107	.023
190' - 206' -	Dike		
206' - 236' -	58.43	.079	1.178
236' - 245' -	48.48	.037	
245' - 259' -	Soft Ore Jasper		
259' - 270' -	47.10	.039	
270' - 275' -	Soft Ore Jasper		
275' - 281' -	47.88	.121	.029
281' - 285' -	Soft Ore Jasper		
285' - 290' -	49.06	.090	
290' - 347' -	Soft Ore Jasper		

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9. EXPLORATIONS AND
FUTURE EXPLORATIONS: (CONT.)

Log of Holes Drilled: (Cont.)

<u>D. D. Hole No.</u>	<u>Location</u>	<u>Dip</u>	<u>Course</u>	<u>Date Started</u>	<u>Date Stopped</u>
162	7th Level	1°56'	S0°03'W	12/8/44	12/31/44

Continued

Material

	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
0' - 17' - Dike			
17' - 38' - Soft Ore Jasper			
38' - 43' - Dike			
43' - 56' - Soft Ore Jasper			
56' - 58' - Dike			
58' - 59' - Soft Ore Jasper			
59' - 61' - Dike			
61' - 64' - Soft Ore Jasper			
64' - 71' - Dike			
71' - 80' - 47.75 .134 .012			
80' - 110' - 59.86 .152 .037			
110' - 115' - 51.84 .073 .029			
115' - 131' - Soft Ore Jasper			
131' - 150' - 46.46 .063			
150' - 165' - 60.40 .093 .032			
165' - 180' - 62.16 .078 .061			
180' - 187' - Soft Ore Jasper			
187' - 193' - Ferruginous Dike			
193' - 195' - Soft Ore Jasper			
195' - 205' - 47.95 .091 .071			
205' - 210' - Soft Ore Jasper			

To be continued in 1945.

10. TAXES:

	<u>1944</u>		<u>1943</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>Cambria Realty:</u>				
S1/2 of SW1/4 of Sec. 35, 48-27)				
Lots 7 & 8 of Sec. 35, 48-27)				
Lots 5, 6 & 7 of Sec. 36, 48-27)				
- 222.09 Acres)	150,000	6,265.38	150,000	5,717.88
<u>Jackson Strip:</u>				
N660' of NW1/2 of NW1/4 of Sec.)				
1, 47-27 - 40 Acres)	645,000	26,941.13	835,000	31,829.53
<u>Personal Property:</u>				
Stockpile, Supplies & Equipment	390,000	16,289.99	215,000	8,195.63
Total by Mich. State Tax Com.	1,185,000	49,496.50	1,200,000	45,743.04
Lillie Mine Location, 1 house	100	4.18	100	3.81
Hartford Location, 1 house			200	7.62
Total	1,185,100	49,500.68	1,200,300	45,754.47
Collection Fees		495.01		457.54
Total Taxes, Negaunee		49,995.69		46,212.01
<u>Division of Payments:</u>				
Cambria-Jackson Taxes,				
City of Ishpeming	1,000	35.99	1,000	34.33
Cambria-Jackson Taxes,				
City of Negaunee	1,185,100	49,995.69	1,200,300	46,212.01
Total	1,186,100	50,031.68	1,201,300	46,246.34

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10. TAXES: (CONT.)

	<u>1944</u>	<u>1943</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>
			<u>Taxes</u>
Republic Steel Corporation - 4/12 of 1943			
Taxes of Cambria-Jackson and Taxes paid on Stockpile April 1, 1943			20,356.91
Cleveland-Cliffs Iron Co. proportion	50,031.68		25,889.43
Total as above	50,031.68		46,246.34
 <u>Tax Rate per \$100 of Valuation:</u>			
		<u>1944</u>	<u>1943</u>
City of Negaunee		4.17692	3.81192
City of Ishpeming		3.59893	3.39926
 <u>Total Taxes, City of Negaunee:</u>		582,020.52	539,671.00
 <u>Cambria-Jackson Percent of Taxes:</u>			
City of Negaunee		7.94	8.57

11. ACCIDENTS AND PERSONAL INJURY:

Following is a list of the number of accidents classified as to time lost:

	<u>1944</u>	<u>1943 (7 Months)</u>
Fatal	0	0
Time Lost - Over Four Months	0	3
Time Lost - One to Four Months	5	4
Time Lost - Less Than One Month	7	5
Total Compensable Accidents	12	12

On December 31, 1944 payments were being made on two accidents which occurred prior to January 1, 1944; one being paid for total and the other partial disability.

<u>Accident No.</u>	<u>Date of Accident</u>	<u>Nature of Injury</u>	<u>Days Lost</u>
13	1-4-44	Foreign bodies both eyes	8
14	1-8-44	Compound fracture third finger, left hand	36
15	2-18-44	Puncture wound left foot	8
16	2-23-44	Third degree burn inner surface, left thigh	35
17	4-11-44	Bruised right shoulder and chest	7
18	5-20-44	Fracture right sixth rib	6
19	6-6-44	Bruised left hand	25
20	7-10-44	Fracture right middle finger	54
21	7-17-44	Fracture left thumb	23
22	10-4-44	Contusion right leg	10
23	10-5-44	Laceration third and fourth fingers, left hand	36
24	10-31-44	Bruised right side	29
	<u>Total Days Lost</u>		277

The severity rate for the Cambria-Jackson Mine was 0.56 for which it received the safety flag award to be held through 1945.

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12. NEW CONSTRUCTION AND
PROPOSED NEW CONSTRUCTION:

The following statement shows expenditures in the various accounts, E. & A. No. CC-119, Development Plant and Equipment, and for which E. & A. Supplement CC-119 was authorized to record the amount estimated to absorb the over-expenditure of original authorization to complete the project by December 31st, 1944. This E. & A. was closed on December 31st, 1944 and it might be noted that \$36,315.31 of this account was charged to operations in December. Comment will be made on items that were overexpended in 1944 and those where the over-expenditures last year were increased in 1944.

STATEMENT SHOWING EXPENDITURES ACCOUNT E.&A. NO. CC-119
DEVELOPMENT AND PLANT AND EQUIPMENT - CAMBRIA-JACKSON MINE

	<u>Amount</u> <u>Authorized</u>	<u>Expended</u> <u>1943</u>	<u>Expended</u> <u>1944</u>	<u>Unexpended</u>
<u>DEVELOPMENT:</u>				
Ore and Rock Drifting 2,000' @ 20.00	40,000.00	9,874.58	17,327.31	12,798.11
Ore and Rock Raising 2,500' @ 15.00	37,500.00	11,565.10	30,571.58	4,636.68
Increase Stockpile Capacity	8,000.00	1,048.46	7,925.29	973.75
Grading Pocket Tracks, Surface	500.00		392.15	107.85
Drainage	500.00	1,381.07		881.07
Line Underground Pockets	1,000.00	174.75	10.98	814.27
General Improvements	2,000.00	189.23	2,407.96	597.19
Total	<u>89,500.00</u>	<u>24,233.19</u>	<u>58,635.27</u>	<u>6,631.54</u>
10% For Contingencies	8,950.00			8,950.00
Total Development	<u>98,450.00</u>	<u>24,233.19</u>	<u>58,635.27</u>	<u>15,581.54</u>
<u>PLANT AND EQUIPMENT:</u>				
6-20 H.P. Double Drum Hoists	8,800.00	1,458.00	7,290.00	52.00
2-25 H.P. Double Drum Hoists	3,650.00	3,680.00		30.00
14 - Holcomb Scrapers	3,000.00	294.02		2,705.98
12 - Utility Hoists	5,750.00	5,700.00	1,425.00	1,375.00
2 - Stoper Drills - Wet	450.00	734.89		284.89
12 - Auger Drills	2,500.00	2,406.72		93.28
1 - Ventilating Fan, Installed	2,850.00		2,411.86	438.14
2 - Vent. Air Lock Doors, Installed	1,000.00			1,000.00
Modernizing Electrical Wiring	4,500.00	4,157.92	2,172.92	1,830.84
Repair Steel Headframe and Enclose from Shaft Collar	3,000.00	3,202.67	20,201.35	20,404.02
Repair Cages and Skips	2,500.00	2,825.86	470.47	796.33
Alterations to Surface Buildings	2,500.00	18,279.78	9,977.26	25,757.04
Repair Underground Locomotives	2,000.00	4,141.94	5,473.02	7,614.96
Total	<u>42,500.00</u>	<u>46,881.80</u>	<u>49,421.88</u>	<u>53,803.68</u>
10% For Contingencies	4,250.00			4,250.00
Total Plant and Equipment	<u>46,750.00</u>	<u>46,881.80</u>	<u>49,421.88</u>	<u>49,553.68</u>
Social Security Taxes		735.86	1,113.87	1,849.73
Grand Total	<u>145,200.00</u>	<u>71,850.85</u>	<u>109,171.02</u>	<u>35,821.87</u>
E.&A. Supplement CC-119	36,000.00			36,000.00
GRAND TOTAL	181,200.00	71,850.85	109,171.02	178.13

The total over-expenditure is accounted for by the increase in labor costs and supply items used in the construction. The estimate made in May 1943, while the mine was still being operated by the Republic Steel Corporation, was based on a visual inspection. After taking over the property and starting the repairs the necessary construction was much more extensive than first anticipated.

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

Ore and Rock Raising:

The overexpenditure in this item was due to an underestimate of the cost per foot for a complete raise which includes a steel loading disk, the lining of the dirt compartment with hardwood plank and the erection of ladders and a timber slide in the ladder compartment. The estimated cost per foot was \$15.00 whereas the actual cost in 1944 was \$20.07 per foot for completed raise.

Increase Stocking Capacity:

This estimate was made by just a visual inspection, there being no survey made of the actual amount of cut and fill necessary to enlarge and grade the stocking grounds. The completed areas have a capacity far more than the present production requires and will be further enlarged when time and money will permit.

General Improvements:

\$2,407.96 was charged to this account in 1944. The principal item of expense was vacating the old engine house which for some time was used as a place for storage and also housed an emergency generator set. The generator was moved and set up in the present engine house. Also charged to this account was the removal of the old concrete smoke stack which was in bad condition and had become a hazard.

12 - Utility Hoists:

Three utility hoists were purchased in 1944 at a cost of \$1,425.00 and were charged to this account making an overexpenditure of \$1,375.00.

Modernizing Electrical Wiring:

Practically all wiring both underground and on surface had to be renewed and put in to code specifications. Charges to this account in 1944 were \$2,172.92 making an overexpenditure of \$1,830.84. This job has been completed.

Repair Steel Headframe and
Enclose from Shaft Collar:

Details of the expensive repairs to the shaft house are given in sub-section "f" under the caption of "SURFACE".

Repair Cages and Skips:

Cages and skips required more repairs than were anticipated.

Alterations to Surface Buildings:

This account shows an overexpenditure of \$25,757.04. The amount charged to this account in 1944 was \$9,977.26 and was mostly spent for the completion of work started last year. The only new projects in 1944 were the revamping of the store house just West of the office and the construction of a sump at the Southeast corner of the dry house to collect all the sewerage and waste water from the office and dry from where it is pumped into the discharge line from the mine. A frame building was also constructed to house this sump and pumps.

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

Repair Underground Locomotives:

All the underground locomotives were in very bad condition and all have been overhauled except for the delivery of some parts to finish one which is now at the general shops in Ishpeming. The cost of repairs completed in 1944 was \$5,473.02 making an overexpenditure of \$7,614.96.

13. EQUIPMENT AND
PROPOSED EQUIPMENT:

a. Steam Shovels:

After completing the loading out of the stockpiles in September the steam shovel which was turned over to the Cleveland-Cliffs when operations were taken over was sent to the general shops at Ishpeming for repairs. When the shovel arrived at the shops the boom was immediately taken down and repairs started. During the middle of October there was a lull in shipping and the production of the week of the 16th of October was stocked. In November there was a shortage of ore for shipment and it was ordered that the ore that was stocked be loaded out. With the Cambria shovel dismantled another shovel that was in good repair was sent here. This shovel is here now and will be used for the 1945 shipping season.

b. Stocking Trestles:

All of the stocking trestles were dismantled when piles were being loaded out. After the pile Southeast of the shaft was loaded out the grounds were graded and six permanent bents of trestle were erected and one additional permanent bent added to the Northeast trestle. The customary stocking trestles were erected for the stocking season.

c. Scraper Hoists:

Following is a list of scraper hoists at the mine:

Company	Total Machines	1944		1943	
		Machines Repaired	Cost of Ea. Mach. Repaired	Total Machines Repaired	Cost of Ea. Mach. Repaired
Ing.-Rand 10 H.P.Elec.	0	0	0.00	1	23.14
" 15 " "	12	2	56.33	1	38.05
" 20 " "	2	1	21.86	0	0.00
Sullivan 10 " "	-	1	224.08	0	0.00
" 15 " "	4	4	211.28	1	123.93
" 20 " "	1	1	84.57	2	84.40
" 25 " "	6	2	53.09	0	0.00
Gard.-Denv. 7½ " "	1	0	0.00	0	0.00
Total	26	10	1,394.44	5	269.60

Five Ingersoll-Rand, 15 H.P. electric hoists were purchased in 1944 and charged to E.&A. No. CC-119. Four Sullivan, 20 H.P. electric hoists were converted to 25 H.P. The four motors for this conversion were purchased in 1944 at a cost of \$2,000.04.

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13. EQUIPMENT AND PROPOSED EQUIPMENT: (CONT.)

d. Underground Tram Cars:

All underground cars are rocker dump of 2.3 tons capacity and are in very bad condition. When the company took over it was planned to continue to use the present equipment for the duration of the war which it was thought would be over in a short time and then change the track gauge from 24-inch to 30-inch and either purchase or procure the standard 4-ton rocker dump cars from other company mines. The war is not over and the cars are in such condition that it may become necessary to purchase new cars in 1945. If cars are purchased at this time they will be the same type and capacity as the ones used at all the other Cleveland-Cliffs mines except that they will be constructed for 24-inch gauge track.

e. Timber Hoists:

During 1944 there were nine H. U. Utility Hoists purchased at a cost of \$475.00 each. Six of these were charged to operating and three to E. & A. No. CC-119.

f. Haulage Tracks:

The following is a detailed comparison of haulage track costs for 1944 and 1943:

	<u>1944</u>	<u>1943 (7 Months)</u>
40-Lb. Rail	891.48	304.00
Ties and Tie Plates	260.66	252.53
Frogs	None	26.08
Total	1,152.14	582.61

In addition to the above which was charged to operating, 40-lb. rail amounting to \$301.10 and ties and tie plates, \$244.15 were charged to E. & A. No. CC-119.

g. Mine Trucks:

The Cambria-Jackson Mine operates two trucks. This is made necessary because all timber, poles, lagging, cribbing and other supplies have to be hauled to the collar of the shaft. These trucks are old and the upkeep is increasing. Cost of operating these two trucks, omitting drivers wages, during 1944 was \$1,050.16.

14. MAINTENANCE AND REPAIRS:

Expenditures for maintenance and repairs in the accounts listed under "Underground Costs" were \$36,101.08 in 1944 as compared with \$18,655.18 in the 7-month period of 1943. The cost per ton for these charges was .128 in 1944 as compared with .126 in 1943.

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14. MAINTENANCE
AND REPAIRS: (CONT.)

The following is a list of purchases and repair costs for 1944:

	<u>1944</u>	<u>1943 (7 Months)</u>
6 - H. U. Timber Hoists	2,850.00	
5 - Timber Tracks (Shop Made)	351.95	
4 - 25 H.P. Scraper Hoist Motors	1,975.83	
1 - Grease Gun	215.62	
1 - Reversible Air Drill	176.58	
1 - Portable Sludge Pump	181.99	
49,760 ft. Wire Rope for Scraper Hoists	<u>5,163.65</u>	
Total Purchases	10,915.62	<u>14,281.30</u>
Repairs to Compressors and Power Drills	669.01	906.76
Repairs to Scraper Hoists	9,110.44	7,177.94
Repairs to Locomotives	4,220.28	
Repairs to Locomotives E.&A.No.CC-119	9,614.96	
Repairs to Trolley Wire	1,135.19	
Repairs to Track	4,879.80	8,740.83
Repairs to Haulage Cars	4,867.30	
Repairs to Pumping Machinery	<u>1,604.10</u>	<u>1,829.65</u>
Total Repairs	36,101.08	18,655.18

Expenditures for maintenance and repairs in accounts listed under "Surface Costs" amounted to \$45,002.25 in 1944 as compared with \$8,586.38 in the 7-month period of 1943. The cost per ton was .159 in 1944 as compared with .058 in the 7-month period of 1943.

The following is a list of the repair costs:

	<u>1944</u>	<u>1943 (7 Months)</u>
Three New Hoisting Ropes	3,047.31	
Repairs to Electric Hoists	2,646.03	
Repairs to Skips, Cages, Etc.	3,183.58	
Repairs to Sheaves and Pulley Stands	762.41	
E. & A. Number CC-119	3,296.33	
Repairs to Shaft	1,915.76	
Repairs to Larry-Cars and Tracks	3,493.03	
Trestle Trolley Line	204.05	
Repairs to Permanent Trestles	1,424.05	
Repairs to Pockets, Chutes, Etc.	15.65	
Repairs to Mine Buildings	1,610.03	
Mine Buildings E.&A. No. CC-119	<u>23,404.02</u>	
Total	45,002.25	<u>8,586.38</u>

It will be noted that items listed above in both "Underground Costs" and "Surface Costs" as E. & A. No. CC-119 amounting to \$36,315.31 were charged off from this E. & A. to operating when it was closed in December. This charge increased the cost per ton in 1944 by .128.

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15. POWER:

Following is a detail of electric current purchased in 1944 and the 7-month period of 1943, distribution of charges to various accounts and other data:

	1944 - 12 Months		1943 - 7 Months	
	Cost	Cost per Ton	Cost	Cost per Ton
Stoping	1,515.81	.005	2,247.05	.015
Timbering			188.82	.001
Tramming	365.42	.001	393.18	.003
Ventilation	791.79	.003	131.00	.001
Pumping	13,511.94	.048	9,873.47	.067
Compressors	14,534.52	.052	8,362.68	.057
Hoisting	11,486.97	.041	6,898.40	.046
Stocking Ore	787.02	.003	424.80	.003
Dry House	430.86	.001	280.70	.002
General Surface	241.01	.001	92.01	.000
Telephones & Safety Devices	1,843.85	.006	227.66	.002
Mine Office	79.77	.000	54.42	.000
Electric Haulage	3,673.83	.013	2,444.32	.017
Shops	462.01	.002	320.05	.002
Heating	370.97	.001	000.00	.000
Total	50,095.77	.177	31,938.56	.216
Main Line Meter - K. W.	3,440,000		2,267,200	
Separate Meter Readings	3,421,454		2,205,478	
Line Loss - K. W.	18,546		61,722	
Product - Tons	282,184		147,700	
K.W.Per Ton (Inc.Line Loss)	12.19		15.35	
Cost Per K. W. (Average)	.0146		.01409	
15 Min.Demand -K.W. (Average)	887		882	
Average Load Factor	44%		50%	

It will be noted that there was a very sharp decrease in line loss resulting in considerably less K.W. per ton of ore which was also due in some measure to increased production. The load factor was not quite as favorable in 1944, resulting in a slight increase in the cost per kilowatt.

17. CONDITION
OF GROUNDS:

There has been a great improvement in the general appearance of the surface plant, but there is still much work to be done. Some planting of lawns and shrubbery is essential, also improvement and relocation of roads, relocation and extension of the rock trestle, painting of buildings, etc. It is proposed that much of this work be done in 1945.

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18. NATIONALITY
OF EMPLOYEES:

The nationality record of employees is submitted in two forms, one as to parentage, the other as to country of birth:

<u>As to Parentage</u>	<u>1944</u>	<u>Percent</u>	<u>1943</u>	<u>Percent</u>
Finnish	69	38.5	85	38.6
Italian	32	17.9	32	14.5
English	26	14.5	36	16.4
Swedish	24	13.4	28	12.7
Denish	6	3.4	7	3.2
French (France)	5	2.8	7	3.2
French (Canadian)	5	2.8	5	2.3
German	4	2.2	5	2.3
Norwegian	3	1.7	4	1.8
Austrian	3	1.7	3	1.4
Irish	2	1.1	7	3.2
Croatian	-	-	1	.4
Total	179	100.0	220	100.0

<u>As to Birth</u>	<u>American Born</u>		<u>Foreign Born</u>	
	<u>1944</u>	<u>1943</u>	<u>1944</u>	<u>1943</u>
Finnish	41	54	28	31
Italian	10	10	22	22
English	18	25	8	10
Swedish	21	24	3	4
Danish	6	7	0	0
French (France)	5	7	0	0
French (Canadian)	4	4	1	1
German	4	5	0	0
Norwegian	2	3	1	1
Austrian	1	1	2	2
Irish	2	7	0	0
Croatian	0	0	0	1
Total	114	148	65	72
	63.7%	67.3%	36.3%	32.7%

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1. GENERAL:

There were no changes at this idle property during 1944.

6. SURFACE:

The fences around the open pits and old abandoned shafts were inspected early in the summer and necessary repairs made.

10. TAXES:

	<u>1944</u>		<u>1943</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Various Parcels	\$28,120.00	\$1,174.55	\$29,600.00	\$1,128.35
Collection Fees		11.74		11.28
Total	28,120.00	1,186.29	29,600.00	1,139.63

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

WRA/jl - 3
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MAAS MINE
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1. GENERAL

The Maas Mine operated on a 16-shift-per-week schedule until the first of July, when the shortage of man-power necessitated reducing to two shifts per day, and at the same time the extra shift on Saturday was cut out. Since that time there has been a further reduction in forces occasioned by approximately 60 men leaving. There was a net loss of 119 men who left the mine for various reasons during the year, and this figure includes 57 experienced miners.

The total hoist for the year was 578,307 tons, a decrease of 134,762 tons from 1943, due almost entirely to shortage of labor, with a consequent reduction in operating schedule, there being only 283 shifts worked, as compared with 306 in 1943. Rock work was reduced, and there was an average of only 15 men employed on this development, with a resulting tonnage of 42,540 tons, as compared with 35 men and 69,130 tons last year. There was a complete clean-up of the dry standard grade ore in stock, with only approximately 1,000 tons of ore, too wet to ship, on hand November 15th, but the special grade ore in stock on the same date amounted to approximately 24,000 tons, some of the orders for this grade having been cancelled. Stockpiling is so arranged that ore of either grade or royalty can be handled by either the larry car system or rope haulage and thus avoid any delay due to a possible break-down of the tramming facilities. The rock was all dumped as close as possible to the shaft and room made available by spreading the rock with the new International bull dozer purchased this spring.

Mining continued in a large number of scattered areas in order to produce as much ore of standard grade as possible. Standard ore is produced mostly from above the 4th Level, and as the various mining blocks are of small extent, it requires several of these to be worked to make room for the required number of contracts. The only other area where ore of this grade is produced is along the North footwall just below the 4th Level, and here also there are two separate areas. By the end of the year mining in the East footwall pillar had reached the 3rd Level, while in the blocks lying East of the Race Course Lease the lowest elevation being worked was the 100' Sub Level immediately below the 4th Level. Mining in the central part of the ore body and mostly in the Race Course Lease had reached the last sub level above the 5th Level by the end of the year. This area is large enough to take care of 75% of the contracts required for total production, but the ore is all of special grade, and it is also the wettest area, with consequently low efficiency. Therefore, to produce sufficient standard grade ore, it is necessary to operate on several levels and maintain a very large number of main drifts and raises to serve the different areas, and this increases the timbering cost very materially.

The development planned for the present on the 6th Level was completed in October of this year and there remains only a few more raises to be put up, and then any further opening of additional drifts can wait until more of the mining above has reached the 5th Level. Quite an extensive exploration has been carried out along the North footwall at the Western end of the 5th Level and above #6400 Cross-Cut on the 6th Level. In both cases the results have been very disappointing, as so far only small chimneys of ore have been developed in the hanging, and at least another six months' to a year's work will be necessary before the areas are sufficiently large to be mined

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1. GENERAL (Cont.)

efficiently. Considerable testing below the 6th Level was done with diamond drills in the hope that ore of standard grade could be found below the sulphur horizon. However, the pitch of the ore body to the West was found to be almost horizontal, instead of dipping at about 15°, which has been almost constant throughout the ore body, and therefore all the ore found was of special grade. Evidently the only possibility of developing any more ore of standard grade in the Maas ore body will be if the pitch is found to steepen again farther to the West and sufficient depth of ore can be found underlying the present sulphur horizon.

There were only two minor changes made on surface during the year, one being the building of a garage for the International bull dozer, inside the East end of the old boiler house and a small skip and pocket installation for removing the ashes from the present boiler situated in the East end of the change house.

Fortunately there were no major delays during the year, nor were there any very serious accidents to the men employed at the mine.

2. PRODUCTION, SHIPMENTS & INVENTORIES

<u>a. Production by Grades</u>	<u>1944</u>	<u>1943</u>
Maas	299,398	473,257
Maas Special	113,450	72,948
Race Course	77,398	74,811
Race Course Special	88,061	92,053
Total	578,307	713,069
Rock	42,540	69,130
Total Hoist	620,847	782,199

There was a decrease of 134,762 tons as compared with 1943. The large decrease of 171,272 tons in the standard grade, due both to curtailed operations and decrease in working places in the standard grade ore body, was partly offset by the increase of 36,510 tons in the special grade, due to more contracts having to mine the latter grade ore.

<u>b. 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	153,224	171,694	324,918	478,774
Maas Special	27,651	74,242	101,893	65,333
Race Course	34,706	41,520	76,226	81,217
Race Course Special	18,394	59,604	77,998	98,345
Total	233,975	347,060	581,035	723,669
Total Last Year	329,911	393,758	723,669	
Decrease	95,936	46,698	142,634	

<u>c. Stockpile Inventories</u>	<u>12-31-44</u>	<u>12-31-43</u>
<u>Grade of Ore</u>		
Maas	20,881	44,704
Maas Special	27,319	15,762
Race Course	8,364	7,681
Race Course Special	21,111	10,941
Total	78,175	79,088

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c. Stockpile Inventories (Cont.)

The decrease of 22,640 tons of standard grade was due to curtailment of operations, while increase of 21,727 tons of special grade was due to late cancellation of orders for that grade.

d. Division of Product by Levels

	<u>1944</u>	<u>%</u>	<u>1943</u>	<u>%</u>
Third Level	109,636	19.0	185,224	26.0
Fourth Level	150,523	26.0	212,494	29.9
Fifth Level	294,089	50.8	301,355	42.1
Sixth Level	24,059	4.2	13,996	2.0
Total	<u>578,307</u>	<u>100.0</u>	<u>713,069</u>	<u>100.0</u>

Ore mined on 3rd and 4th Levels was all standard grade.

Ore mined on 5th Level was 40% standard grade.

Ore mined on 6th Level was all special grade.

e. Production by Months

<u>Month</u>	<u>Maas</u>	<u>Maas Spcl.</u>	<u>Race Course</u>	<u>R. C. Spcl.</u>	<u>Total</u>	<u>Rock</u>
January	30,379	10,475	5,726	8,171	54,751	2,975
February	24,512	10,629	6,125	8,423	49,689	5,720
March	34,568	12,232	8,709	7,000	62,509	5,205
April	28,008	9,977	7,293	5,243	50,521	4,840
May	27,358	8,997	8,162	7,999	52,516	3,995
June	24,322	8,271	6,600	10,186	49,379	5,130
July	20,542	8,087	6,515	6,292	41,436	2,800
August	23,384	9,176	4,726	6,987	44,273	3,105
September	21,547	10,155	5,128	6,006	42,836	2,010
October	22,065	10,423	5,300	5,851	43,639	2,035
November	19,785	8,611	4,783	7,608	40,787	3,035
December	15,661	6,417	7,437	8,295	37,810	1,690
Total	<u>292,131</u>	<u>113,450</u>	<u>76,504</u>	<u>88,061</u>	<u>570,146</u>	<u>42,540</u>
1944 Stock- pile O'run	<u>7,267</u>		<u>894</u>		<u>8,161</u>	
Prev. Yrs.						
Overrun	<u>1,697</u>		<u>11</u>	<u>107</u>	<u>1,815</u>	
Gr. Total	<u>301,095</u>	<u>113,450</u>	<u>77,409</u>	<u>88,168</u>	<u>580,122</u>	

The product was distributed as follows:

	<u>1944</u>	<u>1943</u>
George Maas Lease	398,535	481,370
Catholic Cemetery Lease	11*	26,877
Adams Strip or N 1/6		
Right of Way	36*	5,081
C.C.I. Co. (Rt. of Way) N 1/3	47*	8,874
Race Course Lease	165,577	167,864
Baldwin Kiln Rd. Lease	15,916	23,003
Total	<u>580,122</u>	<u>713,069</u>

* No mining in these leases in 1944; tonnage shown is proportion of previous year's stockpile overrun.

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2. PRODUCTION, SHIPMENTS & INVENTORIES

f. Ore Statement

	<u>Maas</u>	<u>Race Course</u>	<u>Maas Spcl.</u>	<u>R. C. Spcl.</u>	<u>Total</u>	<u>Total Last Year</u>
On Hand 1-1-44	44,704	7,681	15,762	10,941	79,088	89,688
Product for Year	292,131	76,504	113,450	88,061	570,146	712,954
Cur. Yrs. O'run	7,267	894			8,161	115
Prev. Yrs. O'run	1,697	11		107	1,815	
Total	345,799	85,090	129,212	99,109	659,210	802,757
Shipments	324,918	76,226	101,893	77,998	581,035	723,669
Balance on Hand	20,881	8,864	27,319	21,111	78,175	79,088

1944 3 8-hour shifts, 5 days per week and one 8-hour shift on Saturday from January 1st to July 1st, 2 8-hour shifts, 5 days per week from July 1st to December 31st, with only repair work on Saturday and Sunday.

1943 3 8-hour shifts, 5 days per week and 2 8-hour shifts on Saturday from January 1st to February 1st; same schedule with only 1 8-hour shift on Saturday from February 1st to December 31st.

g. Delays

Electrical

<u>Date</u>	<u>Shift</u>	<u>Duration</u>	<u>Loss In Product</u>	<u>Cause</u>
January 17	Aft.	1 Hour	100 Tons	No power for larry car.
April 24	Day	2 Hours	200 Tons	No power for larry car.

Non-Electrical

January 11	Aft.	4 Hours	400 Tons	Repairing skip.
April 3	Aft.	1 Hour	100 Tons	Cutting Skip rope.
April 24	Aft. & Night	18 Hours	1,800 Tons	Broken shaft connecting skip hoist motor and drum.
June 5	Day	2 Hours	275 Tons	Broken air line in shaft.
June 6	Day	1½ Hours	200 Tons	Broken air line in shaft.
July 10	Aft.	1 Hour	125 Tons	Changing Skip.

3. ANALYSIS

a. Average Mine Analysis on Output

<u>Grade</u>	<u>1944</u>				<u>1943</u>			
	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>
Maas	59.76	.110	8.38	.030	59.76	.099	8.48	.023
Maas Special	60.30	.099	7.10	.158	60.00	.098	7.33	.147
Race Course	59.87	.103	8.26	.033	60.00	.097	8.10	.021
Race Course Special	60.33	.102	7.14	.148	60.57	.089	7.33	.136

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3. ANALYSIS

b. Average Mine Analysis on Ore Shipped

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist
Maas & R.C. Non-Bess.	59.65	.110	8.73	.22	2.71	.65	.23	.032	1.60	12.00
Maas & R.C. Special	60.25	.109	6.80	.22	3.04	.76	.22	.160	1.85	12.50

d. Average Analysis of Ore in Stock - December 31, 1944

Average Natural Analysis

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas	20,881	51.95	.101	7.90	.19	2.37	.57	.20	.028	1.40	12.50
Maas Special	27,319	51.70	.089	6.55	.19	2.63	.66	.19	.130	1.60	13.41
Race Course	8,864	52.33	.092	7.27	.20	2.38	.50	.20	.026	1.30	12.53
Race Course Spl.	21,111	52.05	.090	6.24	.18	2.45	.41	.23	.123	1.70	13.55

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.

Location Standard	Race Course		R.C.Cem. Lease	B.M.Road N 1/3 City/Neg Rt./Way Lease C.C.I.Co.		Total Tons
	Lease	Maas Lease		Lease	C.C.I.Co.	
Above 3rd Level		94,465	7,000	596	2,688	104,749
3rd to 4th Levels	144,941	1,772,859	5,333	8,594	3,135	1,935,362
4th to 5th Levels	145,719	533,880				679,599
Gross Total 11-30-44	290,660	2,401,204	12,833	9,190	5,823	2,719,710
Net Total 11-30-44	235,435	1,944,976	10,395	7,444	4,717	2,202,967
Less Dec. 1944 Prod.	7,437	15,661				23,098
Total Standard Grade	227,998	1,929,315	10,395	7,444	4,717	2,179,869
<u>Special</u>						
4th to 5th Levels	533,052	1,030,323		33,351		1,596,726
5th to 6th Levels	871,850	1,962,160				2,834,010
Below 6th Level	18,542	805,208				823,750
Gross Total 11-30-44	1,423,444	3,797,691		33,351		5,254,486
Net Total 11-30-44	1,152,990	3,076,130		27,014		4,255,934
Less Dec. 1944 Prod.	8,295	6,048		369		14,712
Total Special Grade	1,144,695	3,070,082		26,645		4,241,222
Total All Grades	1,372,693	4,999,397	10,395	34,089	4,717	6,421,291
N 1/6 D.S.S. & A. Right of Way (Adams Strip)						1,048
Total Maas Group to be mined through shaft						6,422,339

In the Maas area leased to the Negaunee Mine there were 824,617 tons as of December 31, 1944, of which 47,790 tons were special grade.

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4. ESTIMATE OF ORE RESERVES

a. Developed Ore (Cont.)

INCREASE IN ORE RESERVES

	<u>Maas Etc.</u>	<u>Race Course</u>	<u>Total</u>
Above 3rd Level	0	0	0
3rd to 4th Levels	120,000	0	120,000
4th to 5th Levels	145,000	48,000	193,000
5th to 6th Levels	500,000	35,000	535,000
Below 6th Level	330,000	0	330,000
	<u>1,095,000</u>	<u>83,000</u>	<u>1,178,000</u>

Divided as to Grades:

<u>Maas</u>		<u>Race Course</u>	
<u>Standard</u>	<u>Special</u>	<u>Standard</u>	<u>Special</u>
90,000	1,005,000	23,000	60,000

The estimate of ore reserves continued to show an increase, both in the standard and special grades, amounting to approximately 123,000 tons in the standard grade and 1,065,000 tons in the special grade for 1944.

There was very little change above the 3rd Level, as mining there is almost completed. The Maas Lease between the 3rd and 4th Levels shows an increase of 120,000 tons due to the jasper to the East of the Race Course not extending in depth as far as had been anticipated. There was an increase of 175,000 tons in the special grade above the 5th Level due to the development above the 6400 Cross-Cut on the 6th Level, but this was partly offset by a 30,000 ton decrease in the standard grade along the North footwall in the extreme West end of the ore body where the hanging continued to be much steeper than expected. The increase of 48,000 tons in the Race Course Lease above the 5th Level was divided almost equally into standard and special grades and was due to a flattening of the hanging along the North footwall near the East boundary of the lease.

The remaining increase of 535,000 tons above the 6th and 330,000 tons below the 6th was all of special grade and proved up by the North footwall drift, which was extended to the West during the year for necessary ventilation purposes, and by diamond drilling below the 6th Level in an attempt to discover additional standard grade ore. All of the ore cut by the drills was of special grade, due probably to the flattening of the pitch of the ore body.

c. Estimated Natural Reserve 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 & Race Course Non-Bessemer	53.00	.092	7.30	.19	2.20	.57	.22	.025	1.70	12.00
Maas & Race Course Special	53.40	.088	6.60	.18	2.00	.52	.16	.180	1.40	12.50

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4. ESTIMATE OF ORE RESERVES

d. Estimated Production

December 1st, 1944 to December 1st, 1945

<u>Grade</u>	<u>Estimated Production</u>											
	<u>11 Shifts Per Week</u>											
Maas & Race Course Non-Bessemer	300,000											
Maas & Race Course Special	218,400											
Total	518,400											
Plus 4% overrun on ore stocked	8,000											
Grand Total	526,400											
												Iron
	<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>Nat'l</u>
Maas & Race Course Non-Bessemer		60.20	.105	8.30	.22	2.50	.65	.25	.025	1.90	12.00	53.00
Maas & Race Course Special		60.50	.100	7.50	.22	2.28	.60	.18	.200	1.60	12.50	53.40

5. LABOR & WAGES

a. Comments

1. Labor

There continued to be a labor shortage in this district and this became so acute by July 1st that the midnight shift was cut out and with the resulting decreased product, it was decided to work only five days per week, thus avoiding payment of time and one-half to a full crew on Saturdays. It was possible to hire only 20 men during the year and most of these quit after a short time, as they were not adapted to mining. At the end of the year the mine was so short about 60 men to complete two full shifts. The detail of the turnover is shown below:

	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>
Died	0	2	1	7
Fatal Accidents	0	0	0	1
Retired at age 65 or over	3	1	6	1
Unable to work on account of ill health	10	5	1	0
Transferred to other C.C.I.Co. Properties	17	28	22	14
In armed Services of U.S.	37	44	35	17
Quit for other occupations	69	65½	40	8
Discharges	3	3	2	0
Total	139	148	107	48
Hired or Transferred to Maas	20	116	123	79
Net Loss	119	32		
Net Gain			16	31
Experienced Miners Included in Total Loss	57	30	52	28

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5. LABOR & WAGES

a. Comments

1. Labor (Cont.)

The average age of the employees in 1944 was 42, as compared with 40 in 1943, as the loss in men was almost entirely in the younger age group. There were 38 men 60 years old or over, 15 who had served the Company 40 years and 85 for 25 years or over.

The men received their vacation pay but continued to work, as in the past three years. Those with 10 years' service or longer received pay for 86 hours, while those with from 3 to 10 years' service received pay for 43 hours.

209 men, or 47% of the payroll, received pay for 86 hours.
159 men, or 36% of the payroll, received pay for 43 hours.

Due possibly to not receiving vacation time and partly to indifference, the percentage of absenteeism has been more pronounced this year, especially during the summer months and in November on account of deer season. There was a drop, however, after July when the mine went on two shifts and the overtime on Saturday was stopped. The average for the year was 5.2%.

There was no increase in wages during 1944.

Proportion of surface to underground men:

<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
1 - 5.1	1 - 5.1	1 - 5.7	1 - 5.4	1 - 5.0

b. Comparative Statement of Wages & Product

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Product	578,307	713,069		134,762
Number of Shifts & Hours	283	306		23
1 8-hour	27	47		20
2 8-hour	128	5	123	
3 8-hour	128	254		126
 <u>AVERAGE NO. MEN WORKING</u>				
Surface	76	79		3
Underground	341	396		55
Total	<u>417</u>	<u>475</u>		<u>58</u>
 <u>AVERAGE WAGES PER DAY</u>				
Surface	6.88	7.09		.21
Underground	7.93	8.16		.23
Total	<u>7.73</u>	<u>7.97</u>		<u>.24</u>
 <u>AVERAGE WAGES PER MONTH</u>				
<u>16 Shifts per week 1943</u>				
<u>10 Shifts per week 1944</u>				
Surface	151.36	155.98		4.62
Underground	174.46	179.52		5.06
Total	<u>170.06</u>	<u>175.34</u>		<u>5.28</u>

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5. LABOR & WAGES

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

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
<u>PRODUCT PER MAN PER DAY</u>				
Surface	26.88	31.36		4.48
Underground	6.30	6.48		.18
Total	<u>5.10</u>	<u>5.37</u>		<u>.27</u>
<u>LABOR COST PER TON</u>				
Surface	.256	.226	.030	
Underground	1.259	1.259		
Total	<u>1.515</u>	<u>1.485</u>	<u>.030</u>	
<u>AVERAGE PRODUCT MINING</u>				
Stoping	18.29	17.17	1.12	
Ore Development	10.47	10.21	.26	
Total	<u>17.81</u>	<u>16.79</u>	<u>1.02</u>	
<u>AVERAGE WAGES CONTRACT LABOR</u>				
	8.46	8.34	.12	
<u>TOTAL NUMBER OF DAYS</u>				
Surface	21,510 $\frac{3}{4}$	22,741 $\frac{1}{2}$		1,230 $\frac{3}{4}$
Underground	91,843 $\frac{1}{4}$	110,085		18,241 $\frac{3}{4}$
Total	<u>113,354</u>	<u>132,826 $\frac{1}{2}$</u>		<u>19,472 $\frac{1}{2}$</u>
<u>AMOUNT FOR LABOR</u>				
Surface	148,098.28	161,169.89		13,071.61
Underground	728,122.37	897,863.34		169,740.97
Total	<u>876,220.65</u>	<u>1,059,033.23</u>		<u>182,812.58</u>
<u>AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL</u>				
Surface	162.25	170.01		7.76
Underground	187.00	188.94		1.94
Total	<u>182.30</u>	<u>185.80</u>		<u>3.50</u>

6. SURFACE

a. Buildings & Repairs

There were two small construction jobs done on surface during 1944, one of which was the building of partitions in the East end of the old boiler house to form a garage for the new International bull dozer purchased this year. A concrete floor and greasing pit were put in and also two unit heaters were installed. The change was made in the device for handling the ashes from the pit of the present boiler in the East end of the change house. This pit is about 12' below the ground and a small skip was installed last year to avoid having to carry the ashes up the steep stairs. This year this skip dump was extended and a pocket installed to enable the removal of the ashes by truck instead of allowing them to fall into an open wagon to be removed when full. This was first a labor-saving device and also a safety measure, and the change was made to cut out an unattractive set-up and protect the change house wall from injury by the wagon, it having to be so close to the wall to catch the ashes.

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6. SURFACE

b. Location Building and Repairs

There was a comparatively small crew employed on repairs to rented houses during 1944, and their time was divided between the Maas, Negaunee, and Athens houses. The majority of the work on Maas houses consisted of quite extensive repairs to House #191, purchased last year from Amanda Haupt. The two houses Nos. 193 and 194, also purchased last year from the McDonald Estate, required considerable work this year, and there were three houses repainted on the outside. The remainder of their time was spent on minor repairs to other houses.

There was one house sold and two houses purchased during 1944.

<u>House</u>	<u>Address</u>	<u>Lot</u>	<u>Block</u>	<u>Addition</u>	<u>Purchased From Or Sold To</u>	<u>Date</u>
154	965 Pine St.	30	2	C.C.I. Co.'s 2nd Addition	Sold to Gust Sundberg	6/1/44
195	216 Peck St.	Parts of 10 & 11	25	Pioneer Iron Co.'s Plat	Purchased from Maude Mattson	2/9/44
196	319 Cherry St.	5	2	Corbitt's	Purchased from Abel Wainio	7/1/44

As of December 31st, 1944, the Maas Mine owned 64 houses, stores, etc., as listed below:

Single Family Houses	54
Two " "	5
Four " "	1
Legion Club	1
Stores	2
Church	1
Total	<u>64</u>

c. Stockpiles

Shipments from stockpile this year ceased on November 9th and from the pocket on November 25th, leaving approximately 1,000 tons of standard ore, which was too wet to ship, and about 24,000 tons of special grade ore in stock. There were no trestles dismantled this year, it being possible to remove all of the ore without doing this extra work, and thus affecting considerable saving in both labor and cost. There is more than ample stocking room for all of the ore to be stocked during the winter season and the set-up is so arranged that both grades and both royalties can be stocked by either the larry car system or by the endless rope haulage tram car. This prevents delay, both from a possible break-down or when having to hoist consecutive skips of any one grade with too long a tram for the car to return in time. The stocking of rock was much improved by the purchase of a bull dozer so that the rock could be spread soon after hoisting and therefore enable dumping closer to the shaft.

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6. SURFACE

c. Stockpiles (Cont.)

There was not sufficient ore of special grade shipped to develop any overrun, but the engineer's estimate and the developed overrun in the standard grade is shown below. There was also 1,815 tons of previous year's overrun shipped in 1944.

	<u>Maas</u>	<u>Race</u> <u>Course</u>	<u>Maas</u> <u>Spcl.</u>	<u>R. C.</u> <u>Spcl.</u>	<u>Total</u>
Current Year Overrun	7,267	894			8,161
Estimated Overrun in Stock December 31, 1944			2,300	2,000	4,300
Total	7,267	894	2,300	2,000	12,461

d. Tracks, Roads, etc.

There was no change made in the track or road lay-out, but the maintenance of the latter was much easier by the use of the bull dozer.

e. Timber Yard

Despite the labor shortage in the woods, there has been a sufficient quantity of all of the various types of mining timber on hand throughout the year, and there are good reserves to carry over into 1945.

The timber was brought in both by railroad cars and by trucks, and with the curtailed operations starting July 1st, there was always enough framed ahead to have a reserve both on surface and underground in case of an emergency or a severe storm during the winter.

f. Drainage

There was no work done in connection with new test holes or surface wells during 1944. Nos. 1 and 2 Wells operated continuously through the year with a combined capacity of 925 gallons per minute and this water was used exclusively for all the necessary demands on surface. This not only affords an excellent drinking water but also effects a saving by not having to purchase water from the city. No further reduction was noticed in the underground pumping, but there is no doubt that this would increase if the wells were abandoned. No. 4 Well has operated only intermittently on account of sand trouble, but as this pump produces only about 75 gallons per minute, there is very little effect underground and hardly worth the operating cost.

7. UNDERGROUND

a. Shaft-Sinking

There was no shaft-sinking performed during 1944.

b. Development

The development for 1944 showed considerable decrease over 1943, there being an average of only 15 men employed on this type of work, as compared with 43 last year. With the exception of three raises and a small amount of rock development in the sub levels, the work was all confined to the 6th Level.

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7. UNDERGROUND

b. Development (Cont.)

5th Level

The only development on the 5th Level during 1944 was putting up three raises, one of which was in rock to serve as a permanent connection between 4th and 5th Levels for ventilation, while the other two were in ore for mining purposes.

6th Level

With the exception of a few more raises all the development outlined for the present was completed this year. The material in the main shaft Cross-cut consisted mostly of quartzite interbedded with seams of very hard slate for approximately 500' South of the shaft and therefore the advance was very slow, as it often required two complete shifts to drill a round. The North footwall drift was extended to the West some 600' in high sulphur ore to enable raises to be put up and afford ventilation to the Northwestern part of the ore body above. The South footwall drift was also advanced in slate and jasper to a point 100' to the West of the connection with the 6400 Cross-Cut. 15 raises in all were put up to the 5th Level and above.

The pockets at the shaft were excavated and equipment installed, the tail room track, a motor repair pit, and plat completed, and also an automatic Worthington electric pump installed just South of the winze, pumping the water to 5th Level and thus saving the cost of making a ditch for 1400' to the shaft on the 6th Level.

Table of Ore and Rock

<u>Location</u>	<u>Raising</u>		<u>Drifting</u>		
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>	
3rd Level				15'x20'	Pumphouse
150' Sub			40'		
4th Level			15'	86'	
90' Sub	39'		45'	48'	
5th Level	134'	163'*	20'	31'	
-40' Sub	43'				
6th Level	1,410'	429'***	597'	1,543'***	
Total	1,626'	592'	717'	1,708'	

* This includes 116' of rock raise charged to ventilation.

** 429' of rock raising and 1,543' of rock drifting on 6th Level charged to E & A CC 78.

c. Stopping
General

There was an average of 33 contracts employed in mining during 1944 and these had to spend about 20% of their time on repair work, as there were not enough timbermen available. Also in most cases there were not enough extra places available for placing the contracts while repairs were in progress and it is felt that the contract men will do the work faster in order to resume mining with its higher remuneration.

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7. UNDERGROUND

c. Stoping
General (Cont.)

The number of contracts mining in the East footwall pillar above the 3rd Level was reduced from 10 to 5 during the year, as the 3rd Level raises were abandoned in favor of those put up from 4th Level. This area is decreasing very rapidly in size on account of the flat footwall on the North and the vertical cave from former mining on the South. There was no ore mined from the Roman Catholic Cemetery Lease during the year, as this had to wait until the pillar to the West was removed and it would not pay to put up a 200' rock raise for the small amount remaining. Ore exists only on two more subs in this lease, and after they are completed in 1945 the lease can be cancelled except for a provision to maintain a connection for ventilation.

No further work was done in the attempt to open up the very wet area lying above the 4th Level on the North footwall, as the production would have been very low and with the shortage of men and good demand for special grade ore, it was decided to concentrate elsewhere. However, plans are under way to put up new raises and drifts along the footwall so as to remove the water and make this block of standard grade ore available.

One contract continued to mine in the small area lying between the dikes to the West of the shaft Cross-Cut where by the end of the year mining had almost reached the 4th Level and a new raise was in progress from the 5th Level.

Three contracts were mining continuously during 1944 in the block of ore controlled by the 4100 Cross-Cut, and here also there was a decided decrease in the size of the area due to a large horse of jasper which cut out almost one-third of the pillar. At the end of the year one contract was cutting out on the 150' Sub, or 40' above the 4th Level.

Two of the contracts released from 3rd Level were moved to the 2nd block East of the Race Course Lease, and these, together with three others, almost completed mining on the 4th Level elevation. Work here has been considerably handicapped by having to cross the old main level drifts, and conditions should be very much improved next year on the sub level below.

Four contracts mined continuously in 1944 in the first block East of the Race Course Lease, and by the end of the year were on the 50' Sub Level, or 65' above the 5th Level. The ore in this territory has averaged about 75% special grade.

The area on the North footwall above the 5th Level in the Western end of the ore body has proved very disappointing. This ore body was found, by drilling and exploration, much higher than had been expected from the indications to the East and it was expected from the drilling information that it would increase in size as mining descended. However, the jasper hanging wall to the South has remained almost vertical for 60', while the North footwall is naturally shortening the distance to mine to the North and the ore shown in the drill holes and test raises was only seams and did not open up. If it had not been for this erroneous information, it would have been possible to develop

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7. UNDERGROUND

C. Stoping
General (Cont.)

a stope here and exploration is being started to see if a like ore body lies to the South which can be stoped from the 6th Level. By the end of the year three contracts were mining on the 75' Sub about 90' above the 5th Level and the ore body has just started to widen out.

Two contracts have mined continuously in the small ore body lying between the main North dike and the footwall to the West of the main shaft cross-cut above the 5th Level, and almost completed two sub levels during the year.

The ore here is of standard grade, which will probably continue until close to the level.

The number of contracts mining in the main ore body above 5th Level and mostly in the RaceCourse Lease has varied during the year. The ore in this area is all of special grade, very wet and in some places quite hard, so as new places were developed or contracts disbanded on account of the manpower shortage, the decrease took place in this area. At the end of the year mining here had reached to just above the 5th Level and most of the ore was being handled through 6th Level raises.

A new area under the hanging was opened this year from raises put up in the 6400 Cross-Cut. The ore here is very irregular with some of the raises starting in jasper and alternate ones in ore, then passing through seams of jasper and again into ore before reaching the hanging which varies in height from two subs below the 5th Level to four subs above the 5th. Considerable exploratory work has been done and by the end of the year three contracts were mining in rather small areas. The ore is all of special grade but mining conditions are very favorable, as the area is dry and the ore consequently soft and easy to drill. By the middle of next year this territory should be large enough for efficient mining.

Detail

Subs Above the 3rd Level

East Footwall Pillar

345' Sub Level

Mining in the West end of this sub level was started late in 1943 and completed in May of this year. The drainage drift along the North footwall kept the remainder of the area fairly dry and the only difficulty experienced was in catching up loose rock to the South where the mining extended under new hanging.

335' Sub Level

Mining in the East end of this sub level, including the Roman Catholic Cemetery Lease, was completed last year, but was continuous to the West throughout 1944. A fairly large jasper horse exists in the center of this area.

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7. UNDERGROUND

c. Stoping

Detail (Cont.)

#5 Contract during January drifted South from #114 Raise on 3rd Level to #439 Raise put up from 4th Level and continued mining from the latter for the remainder of the year. In December they were removing the last of the ore in this area.

Contract #35 was mining from January to May to the East of #433 Raise put up from 4th Level and then was transferred to another territory, this raise having to be recribbed and replanked.

#49 Contract was moved to this sub level in March and after drifting from #103 Raise on 3rd Level to #429 and #431 Raises from 4th Level, continued mining for the balance of the year from #103 Raise. In December they were moved to #429 Raise, as the 3rd Level had crushed too much in the #100 Cross-Cut to allow access for motor trains.

#2 and #3 Contracts both started on this elevation in May at #429 and #431 Raises respectively and continued to mine here for the rest of the year. The ore pillars are limited on the West and South by old workings and on the East by a jasper pillar.

Contract #9 also started in May to remove the pillar South of the #113 Raise, completed mining in September, and moved to another territory.

325' Sub Level

This sub level was only worked by #9 Contract from February to the middle of April in driving 175' East of #111A Raise along the North footwall to drain off the water from the pillar to the South on the 335' elevation.

3rd Level - East Footwall Pillar

There was no work done on the 3rd Level main drifts outside of maintenance during 1944, but as mining progressed, this level acted as the next sub level below the 335' Sub and was opened by #6 Contract at #433 Raise in June. In December, after completing a connection to #439 Raise, from which the ore remaining in the Roman Catholic Cemetery Lease will be removed, they continued mining North of their own raise.

All of the contracts mentioned above mined standard grade ore exclusively from the Maas Lease. The entire area is fairly dry and relatively good production resulted.

Subs Between 3rd and 4th Levels

245' Sub Level

During January #29 Contract was working at #418 Raise, continuing the attempt made last year to drain the water from the area on the North footwall above the 4th Level, but this was also unsuccessful, and due to the shortage of men it was decided to abandon this work for the present. At some later date new

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7. UNDERGROUND

c. Stoping - Detail

245' Sub Level (Cont.)

raises will be put up in rock in the footwall and a drainage drift will be driven East and West along the footwall just below the 270' Sub, which was the last sub level mined in this area several years ago, and small raises will be put up to tap the water.

195' Sub Level

Contracts #7 and #20 continued mining at this elevation in the area controlled by the #4100 Cross-Cut, until February when #7 started to cut out in #4109 Raise on the 185' Sub. #20 continued mining until April when they in turn moved to the sub below.

185' Sub Level

#7 and #20 Contracts were working on this sub level for the balance of the year and in December had just about completed mining all the available ore. The size of this area was very materially decreased from that on the 195' Sub by a large jasper horse lying between #4109 Raise and #4111 Raise.

160' Sub Level

Two contracts continued mining at this elevation in the area immediately Southeast of that mentioned above and also controlled by the 4100 Cross-Cut on the 4th Level. Here also the jasper horse mentioned above cuts out considerable of the ore. The area became too small for two contracts and #14 was removed in February while #48 remained for the balance of the year. In December #48 had started to cut out on the sub below. All four of the above contracts were mining standard grade ore in the Maas Lease.

140' Sub Level

This area lies between the dikes on the North footwall just West of the shaft cross-cut, and was opened on this sub level by #27 Contract in October of last year. They completed mining in August and moved to the sub level below, which will be the last elevation where the ore is handled through 4th Level raises.

130' Sub Level

#27 Contract cut out in #305 Raise in August and after connecting with #306 started mining to the Southeast. In December they were slicing to the West and had reached the dike which forms the South mining limit. A new raise from 5th Level is being put up to this territory, which is in the Race Course Lease and where the ore has all been of standard grade.

In the 5300 Block, which is the 2nd mining block East of the Race Course Lease, and which was opened on this elevation late in 1942, the mining was completed in the early part of this year near the Northern boundary of the Maas area which has been transferred to the Negaunee Mine.

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7. UNDERGROUND

C. Stoping - Detail (Cont.)

4th Level

There was no development on the 4th Level during 1944, and outside of maintenance of the main level drifts and raises, all of the operations consisted of mining at this elevation in the 5300 Block East of the Race Course Lease and along the North footwall to the West of the Race Course Lease. Both operations produced ore of standard grade.

In the 5300 Block, opened about the middle of last year, six contracts have been mining more or less continuously. Progress has been fairly slow here on account of the ore on the footwall side of the raises being very hard, requiring the use of wet machines and jackbits to drill, and even then often taking a shift or more to complete a round. On the hanging side it has been necessary to cut through the old main level cross-cut on almost every slice. Mining operations in December were as follows:

#31 Contract, mining at 5322 Raise, completed two slices to the mining limit on the East.

#9 Contract at #5324 Raise was also slicing to the East.

At #5326 Raise #35 Contract completed a slice to the South limit of mining at the Maas area boundary, but was considerably handicapped by runs of loose rock and mud washed down from above by the abundance of water in this area.

#15 Contract concentrated on the pillar lying Southeast of #5327 Raise, upon the completion of which they will have to cut through the old 4th Level cross-cut and mine the pillar to the West of #35 workings.

All of the work mentioned above in the 5300 Block was in the Maas Lease and the ore was of standard grade.

4th Level and Above

West end of North Footwall

This area lying West of the Race Course Lease is a long narrow ore body between the footwall and a very steep jasper hanging which latter has just started to flatten out and increase the size of the ore body. Several short drill holes were put in during the year to determine whether or not rolls in the hanging would allow ore to reach this elevation farther to the South, but all the information was negative.

It was possible to open two small stopes above the 4th Level, one at #52 Raise and one at #54A Raise and these both extended approximately 50' in height. After these were completed, slicing was carried out on the 4th Level and the two contracts moved to the 100' Sub below in May and June.

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7. UNDERGROUND

c. Stoping - Detail (Cont.)

100' Sub Level

West End North Footwall

This sub level lying in the area mentioned above was opened at #52 Raise in May, #19 Contract moved here in June at #514 Raise, and #14 started at #5022A Raise to the East in September. All of the ore was removed by the end of September and work was in progress on the sub below.

5300 Block

#25 Contract started to cut out at #5318 Raise and after drifting to the Northwest 140' to make a traveling and ventilation connection with 4th Level above, drove to #5320 Raise and in December were mining on the hanging side of #5318. This was in the Maas Lease and the ore was of standard grade.

90' Sub Level

West End North Footwall

Three contracts completed mining the ore in this small area from July to November between #56 Raise and #5022A, which is a transfer lying just West of the Race Course Lease.

75' Sub Level

West End North Footwall

Mining was started in this territory immediately below that mentioned above in October, and in December three contracts were mining standard grade ore in the Maas Lease.

#14 finished cutting out in #5022A Transfer Raise and started drifting to the North.

#18 was drifting to the East from #52 Raise after making a connection between #54 and #52 Raises in jasper and lean ore. This roll in the hanging has now almost cut off the ore lying on the footwall between the two raises and as yet has shown no sign of flattening out to the East. In the West end, however, #19 Contract was able to drift South from #54 Raise 90' before encountering the jasper. As it is intended to drill from this point in an endeavor to develop a riser in the hanging that can be stoped from 6th Level, the contract then moved to #56 Raise and at the end of the year were starting to the Southwest in the hope that here also the ore might extend far enough to the South to develop a good-sized pillar for mining.

65' Sub Level

The mining on this elevation was in the territory controlled by the 5400 series of 5th Level raises and covered three leases, namely the Maas, City of Negaunee, or Baldwin Kiln Lease, and a small amount of the Eastern side of the Race Course. The ore here was about 50% special grade, as this elevation

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7. UNDERGROUND

c. Stoping - Detail

65' Sub Level (Cont.)

is apparently the top of the sulphur horizon. The first mining in this block was done in November, 1943, and the final pillar was removed in October of this year and the last contract moved to the 50' Sub Level below.

50' Sub Level

This sub level was opened in July of this year and in December four contracts were mining this block of ore.

#32 Contract, mining from #5410 Raise in the North end of the area, was slicing toward the North footwall in the City of Negaunee Lease.

#37 Contract, at #5420 Raise, completed two slices to the old workings to the South in the Race Course Lease.

At #5424 Raise #21 Contract also was slicing in the pillar to the South in the Race Course Lease.

#16 Contract connected #5426 and #5432 Raises in the City of Negaunee Lease and started to mine the pillar to the Southeast.

In the area lying on the North footwall to the West of the shaft cross-cut and in the Race Course Lease a sub level was opened at this elevation in July of last year and operations were continuous until August, 1944, when mining was completed. The contracts in this territory experience a great deal of trouble from water and loose jasper on the hanging side near the dike and also find the ore very hard on the footwall side.

40' Sub Level

This elevation was first opened, in the territory last mentioned above, in May of this year and in December two contracts were mining here.

#28 Contract completed two slices to the Northwest toward the footwall from #5028 Raise.

#23 completed a second slice to the dike in the South from #5019 Raise under terribly wet conditions and then moved to #5021 Raise in the hope that the water would continue to flow in their former slices and leave the balance of the pillar fairly dry. Both of these contracts were mining ore of standard grade.

Two small pillars were removed between #5515 and #5516 Raises in the Race Course Lease in the first two months of the year, completing all the mining at this elevation in the main ore body in this lease, except for a small strip along the Eastern boundary where mining is going on at a higher elevation.

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7. UNDERGROUND

c. Stoping - Detail

40' Sub Level (Cont.)

In the new area under the hanging controlled by the 6400 Cross-Cut on the 6th Level a connection was made between #6409 and #6410 Raises in August, but the jasper was found to cut off all of the ore except for a small area around #6410 Raise. #1 then cut out in #6409 on the 25' Sub and #30 was started at #6410. In December they completed a slice to the Northeast, a short distance across the Race Course boundary, encountering the jasper hanging, and started a second slice to the North. Although the area is small, the ore, which is special grade, is soft and dry and results here are very good.

25' Sub Level

As mentioned above, #1 cut out in #6409 Raise late in the fall and were able to drift West 110' to a mining limit in ore, with the exception of a 15' seam of jasper. This jasper was also encountered to the South of the raise, but it would appear from the information obtained in drifting, and also from #41 diamond drill hole, that there is a considerable area of ore at this elevation and once a matt is established that very good results should be attained below. In December this contract was slicing to the South in the Maas Lease and producing special grade ore.

In the Northern part of the main ore body in the Race Course Lease, #41 Contract has been mining continuously since early spring, at #5515 Raise. This area is quite wet and the contract is also handicapped by low covering near the end of their slices, caused by the crushing of the 5600 Cross-Cut on the 5th Level.

In December this contract was slicing in special grade ore toward the South to make a traveling and ventilation connection with #12 at #6308 Raise.

No. 12 Contract cut out at this elevation in #6308 Raise, put up from the 6th Level in November, and in December were drifting to the Southeast to make a connection with #6312 Raise, being cut out on the sub level below. #12 will remove the pillar left when the 5600 Cross-Cut on 5th Level had to be abandoned on account of crushing.

Raise #6305 was put up to this elevation from the 6th Level to remove the pillar lying to the West of #41's workings mentioned above, but when they were ready to cut out, the top of the raise caved and it was considered unsafe to work there. Accordingly a new raise, #5612, was started from the 5th Level and upon reaching this elevation #4 Contract was started here in November, and in December had almost reached #6305 Raise, which can be safely taken up and mining resumed. Thus far the ore here has been of standard grade.

10' Sub Level

The majority of the operations at this elevation have been confined to the main ore body in the Race Course Lease, where four to five contracts have been mining continuously throughout the year. The area is very wet and the

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7. UNDERGROUND

c. Stoping - Detail

10' Sub Level (Cont.)

ore is of special grade and quite hard to drill. In December the following contracts were mining as follows:

#44 Contract completed mining at #6210 Raise, put up from 6th Level, and moved to the sub below.

#51 Contract, at #6208 Raise, also from 6th Level, completed two slices to the mining limit on the North.

At #6312 Raise #26 Contract was cutting out in the pillar that had to be abandoned when the 5600 Cross-Cut crushed.

In the Maas Lease, South and West of the Race Course Lease, two contracts completed the mining early in the year. The area to the South of the dike was found to be greatly reduced in size with very little ore and after sufficient testing was abandoned.

00' Sub Level

Work was started at this elevation, which is the last sub level above the 5th Level, in May of this year from the new raise put up in the 6200 Cross-Cut on the 6th Level. By December #22 and #46 Contracts had removed all of the ore to the East of the raises and were starting to mine to the West #44 Contract moved to this elevation at #6212 Raise late in the month.

In the new area controlled by the 6400 Cross-Cut on the 6th Level, considerable exploration and some mining took place during 1944. A drift was put in early in the year to the West of #6406 Raise on the -40' elevation and a test raise put up in ore to the 10' Sub. As several seams of jasper had been cut in the various raises, it was thought that a stope could be started above the -40' Sub, but a drift to the West from #6407 Raise encountered nothing but jasper and therefore this idea had to be abandoned. A drift to the South, however, found ore, but as this is part of the ore body now being mined above by #1 Contract, it could not be removed at the present time. A connection was made to the East with #6406 Raise so that there would be a direct ventilation through this area, and this drift was also partly in the hanging. By drifting to the East from #6406 it was possible to develop a small stope in a riser in the hanging from the 5th Level and in December #17 Contract was slicing to the North towards this stope which was completed in October.

The area lying between the small dike and the South footwall was opened early in the year from #630 Raise from 6th Level, and after a connection was made with #632 Raise, another contract was started to the West where the ore extended some 100' under the jasper hanging encountered above.

In December #8 at #632 Raise and #38 at #630 Raise were slicing to the North, the ore being about 50% special grade and all in the Maas Lease.

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7. UNDERGROUND

c. Stoping - Detail (Cont.)

5th Level

With the exception of the small amount of mining done at this elevation in the stope East of 6404 Raise, the only work for the year was the putting up of three raises and the diamond drilling mentioned earlier in this report. A raise was put up from the main shaft cross-cut near the winze to the 4th Level for a permanent rock airway to improve ventilation. #5015 Raise, on the North footwall, was nearly completed to the 4th Level to handle the ore being mined too close to the 4th Level to make further use of the 4th Level raises. In December #42 Contract advanced 58' in ore to a total height of 128', or 12' below the 4th. #5612 Raise was put up to the 40' Sub from the 5600 Cross-Cut as mentioned earlier.

A connection was made with #6065 Raise from 6th Level at the West end of the 5000 Drift on 5th for ventilation purposes. A connection was also made from the South end of the 5700 Cross-Cut and #6404 Raise to improve the ventilation, and it was found that this cross-cut had stopped in 1942 just short of the ore contact after cutting 65' of jasper South of the dike. At that time there was so much rock work in progress that it was decided to stop this cross-cut and wait for the 6th Level raises to be put up.

-40' Sub Level

When Raises #6404 and #6406 were put up from 6th Level, they encountered what was thought to be the hanging jasper and therefore this sub level was cut out to start exploration work in this new area to the West of any previous mining. A connection was made between the raises and a drift extended 90' West of #6406 to the jasper. A test raise was then put up at the end of this drift and did not encounter the jasper until up 53'. This information, together with the fact that #6402 Raise had extended to the 5th Level, caused doubts as to whether or not the jasper in #6404 and #6406 was the true hanging. Accordingly these were extended and after passing through approximately 15' of jasper again went into ore and continued to the 00' Sub. There the true hanging was encountered. Therefore no more work can be done at this elevation until mining above is completed.

6th Level

All of the development work on the 6th Level contemplated for the present was completed during the year, and the rock contracts were split up to replace ore miners who had left the mine. The South footwall, or 600 Drift, was driven 378' in slate and jasper, holed to the 6400 Cross-Cut, and continued 100' beyond for tail track when switching cars.

The 6000, or North footwall drift, was extended 600' in ore to the West in order to put up raises and connect between the 6th and 5th Levels in the extreme Northwest end of the ore body for ventilation. The main shaft cross-cut was advanced 389' North from the winze in hard slate with seams of quartzite. Then it was thought advisable to start from the shaft where the rock could be scraped directly into the pocket, thus cutting out transportation by rail and also relieving the congested situation at the winze

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7. UNDERGROUND

c. Stoping - Detail

6th Level (Cont.)

where considerable ore was being hoisted. In October, after drifting through 500' of extremely hard quartzite and slate, a connection was made and by the first of December ore was being hoisted at the main shaft on the 6th Level. While the drifts were in progress, the tail track North of the Shaft had been put in, the pockets excavated, mechanical equipment installed and the plat stripped to make room for double track for handling timber trucks. Fifteen raises in all were put up to the 5th Level or above during the year and in December two contracts were on this type of work.

#26 was cutting out in #6312 Raise on the 25' Sub.

#39, raising in #6204 Raise, was up 45' in jasper at the end of the month.

An automatic electric plunger pump was installed near the sump South of the winze, discharging the water to 5th Level, and thus avoiding the excavation of a 1400' ditch on 6th Level.

d. Timbering

TIMBER STATEMENT FOR THE YEAR 1944

<u>Kind</u>	<u>Lineal Ft.</u>	<u>Avg. Price Per Ft.</u>	<u>Amount 1944</u>	<u>Amount 1943</u>
6" x 8" Cribbing Timber	189,363	.0579	10,972.64	9,418.68
8" x 10" Stulls	77,916	.0814	6,339.69	8,680.65
10" x 12" Stulls	121,144	.1308	15,842.99	18,518.66
12" x 14" Stulls	67,662	.1811	12,252.20	16,050.87
Treated Timber	250	.3500	87.50	262.08
Total 1944	456,335	.0997	454,495.02	
Total 1943	635,472	.0833		52,930.94
		<u>Per 100 Ft.</u>		
7' Lagging	1,856,452	1.442	26,772.19	25,460.98
9½' Poles	1,345,863	2.084	28,042.05	32,698.81
Total 1944	3,202,315	1.712	54,814.24	
Total 1943	4,149,136	1.402		58,159.79
Wire Fencing - Sq. Ft.	20,625	.0152	313.20	522.60
Grand Total 1944			100,622.46	
Grand Total 1943				111,613.33

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7. UNDERGROUNDd. Timbering (Cont.)

	<u>Amount</u> <u>1944</u>	<u>Amount</u> <u>1943</u>
Product, Tons	578,307	713,069
Feet of Timber per Ton of Ore - Stulls & Cribbing	.7891	.8911
Feet of Stull Timber only per Ton of Ore	.4616	.4601
Feet of Lagging per Ton of Ore	3.2100	3.3300
Feet of Poles per Ton of Ore	2.327	2.484
Feet of Wire Fencing per Ton of Ore	.0357	.0482
Cost per Ton for Timber	.0787	.0742
Cost per Ton for Lagging	.0463	.0357
Cost per Ton for Poles	.0485	.0459
Cost per Ton for Wire Fencing	.0005	.0007
Cost per Ton for All Timber	.1740	.1565

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

<u>Year</u>	<u>Amount</u>	<u>Cost per Ton</u>
1944	100,622.46	.1740
1943	111,613.33	.1565
1942	93,785.17	.1063
1941	75,111.73	.0908
1940	62,856.72	.0898

There was an increase in the price of timber purchased in 1944, and the further increase in the cost per ton was due to the necessity of continued repairing on the very extensive layout of main level drifts, although the tonnage was very much reduced from last year.

f. Explosives, Drilling and BlastingEXPLOSIVES STATEMENT FOR THE YEAR 1944

<u>Kind</u>		<u>Quantity</u>	<u>Stopping and Ore Development</u>		
			<u>Average Price</u>	<u>Amount 1944</u>	<u>Amount 1943</u>
1 $\frac{1}{4}$ " 60% Amonia Gel. Powder	lbs.	1,400	.1150	161.00	28.75
1 $\frac{1}{4}$ " Gelamite #1	"	218,673	.1150	25,147.41	27,751.02
Total Powder 1944		220,073	.1150	25,308.41	
Total Powder 1943		241,563	.1150		27,779.77
Fuse	M Ft.	897,910	5.143	4,618.38	6,256.20
#6 Blasting Caps	M	130,392	12.09	1,576.98	2,028.72
Electric Blasting Caps	"	3,739	12.04	450.22	668.88
Powder Bags	ea.	54	3.45	186.30	497.05
Tamping Bags	M	10,000	4.99	49.90	123.70
Fuse Lighters	M	25,000	6.75	168.80	253.18
#18 - 2-Cond. Blasting Wire	M Ft.	4,000	16.25	65.00	
Miscellaneous				19.25	34.20
Master Fuse Lighters		500	2.00	10.04	10.34
Total Fuse, Caps, Etc.				7,144.87	9,872.27
Total All Explosives				32,453.28	37,652.04

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7. UNDERGROUND

f. Explosives, Drilling and Blasting (Cont.)

Product, Tons	578,307	713,069
Pounds Powder per Ton of Ore	.3805	.3387
Cost per Ton for Powder	.0438	.0390
Cost per Ton for Fuse, Caps, etc.	.0124	.0138
Cost per Ton for All Explosives	.0562	.0528

Rock Development

<u>Kind</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1944</u>	<u>Amount 1943</u>
1 1/4" 60% Gel. Powder lbs.				345.00
1 1/4" Gelamite #1 "	3,870	.1150	445.05	5,455.60
Total Powder 1944	3,870	.1150	445.05	
Total Powder 1943	50,440	.1150		5,800.60
Fuse M Ft.	5,120	5.144	26.34	230.12
#6 Blasting Caps M	600	12.20	7.32	63.40
Powder Bags				24.15
Electric Blasting Caps	161	12.30	19.80	237.23
Total Fuse, Caps, Etc.			53.46	554.90
Total All Explosives			498.51	6,355.50
Total Explosives Used at Mine			32,951.79	44,007.54
Average Price per Pound for Powder				.1150

Statement showing cost per ton for explosives, exclusive of rock development, for the period 1940 to 1944:

<u>Year</u>	<u>Cost Per Ton</u>	<u>Production</u>
1944	.0562	578,307
1943	.0528	713,069
1942	.0555	882,399
1941	.0581	827,369
1940	.0568	699,977

h. Mining & Loading

Practically all of the ore removed during 1944 was mined by the top slicing method; however, there were three small stopes opened under new hanging where there was a riser or chimney of ore extending above the general jasper horizon. It is hoped that a larger stope can be developed to the West above the 6th Level during 1945.

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7. UNDERGROUND

H. Mining & Loading (Cont.)

The water presented its usual problems in all of the mining areas except above the 6400 Cross-Cut on the 6th Level, which territory will probably be dry until sufficient hanging is broken to allow the subsequent caving to join that above the 5600 Cross-Cut on 5th Level. A new scheme to handle the wet ore was introduced this year, namely the putting up of an intermediate raise 40' above the level and connecting two of its main raises. Thus the wet ore, which formerly could not be scraped into the raise until there were cars available, can accumulate on this lower sub level and be scraped into the cars without interfering with the progress of the miners above. A considerable amount of the water also drains off, making better loading conditions.

A larger proportion of the ore mined during 1944 was hard enough to require the use of wet drilling with jackbits and jacklegs, and six more of these latter were purchased during the year.

With the abandoning of the 3rd Level for the transportation of ore and being able to use the extra shift on Saturday for clean up, it was possible to keep the tracks and therefore the rolling equipment in much better shape than has been possible for some time. A considerable section of the tracks have been welded at all the joints, making a continuous rail, which is both a better conductor and gives less trouble in maintenance. Several of the main switches have concrete beds, and this also greatly improves transportation.

i. Ventilation

The ventilation of the Maas Mine was ample in volume throughout most of the areas, but there is considerable annoyance on account of smoke, caused by the burning fuse when blasting in the Negaunee Mine, being forced through the Maas, and this is particularly bad on the 4th Level. Water sprays have been introduced to cut this smoke, and this, together with short-circuiting the air to the Negaunee shaft when conditions are worst, helps to relieve the situation somewhat.

With the completion of the 6th Level the exhaust is now on that level and connections have been made between the 5th and 6th at the extreme end of the workings, which have improved ventilation in these areas which formerly had to depend on auxiliary fans. A permanent rock raise was put up from 5th to 4th and this also results in a more uniform distribution of the air especially when some of the working places are crushing.

j. Pumping

There has been very little change in the last two years in the amount of water being pumped from the mine. There is water in all of the areas being mined, except to the West above the 6th Level, and the worst area is that on the North footwall above the 4th Level. Nos. 1 and 2 Wells operated almost continuously during 1944, but No. 3 was abandoned due to caving and No. 4 has been very intermittent. The latter pumps only about 100 gallons

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7. UNDERGROUND

j. Pumping (Cont.)

per minute and there is little or no effect from this pump on the underground water. There has been nothing done on surface this year in testing for new well locations, as it is felt that the area has been pretty well explored with very negative results. If a location could be found, however, with sufficient depth of gravel to allow a flow of 500 or more gallons per minute, there would be a material reduction underground.

The number of gallons per minute pumped during 1944, 1943, 1942, 1941, and 1940 are shown below, as calculated by the Mechanical Department from the power consumption of the pumps:

<u>Month</u>	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
January	1,196	1,050	997	1,347	1,370
February	1,045	1,056	1,004	1,187	1,339
March	1,141	1,072	1,017	1,126	1,382
April	1,151	1,042	1,029	1,105	1,386
May	1,115	1,082	1,035	1,105	1,411
June	1,083	1,056	1,068	1,096	1,434
July	1,074	1,117	1,095	1,106	1,380
August	1,108	1,175	1,111	1,104	1,321
September	1,082	1,141	1,069	1,157	1,245
October	1,054	1,138	1,065	1,148	1,276
November	1,064	1,129	1,046	1,150	1,280
December	1,052	1,126	1,051	998	1,318
Total Average	1,097	1,099	1,049	1,136	1,345

Following is the average number of gallons per minute as calculated from the underground weir readings and from the surface pumping for 1942, 1943, and 1944.

<u>Year</u>	<u>1st Level</u>	<u>2nd Level</u>	<u>3rd Level</u>	<u>4th Level</u>	<u>5th Level</u>	<u>Total Undg.</u>	<u>Surface</u>
1942	66	13	269	346	228	922	950
1943	93	15	274	378	260	1,020	710
1944	67	57	285	344	270	1,023	925

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8. COST OF OPERATING

a. Comparative Mining Cost

	<u>1944</u>	<u>1943</u>
Product	578,307	713,069
Underground Cost	1.967	1.841
Surface Cost	.182	.159
General Mine Expense	.319	.282
Cost of Production	<u>2.468</u>	<u>2.282</u>
Depletion - Original Cost	.115	.100
Increment	.000	.000
Depreciation - Plant & Equipment	.050	.050
Development	.070	.050
Movable Equipment	.000	.000
Taxes	.241	.142
Loading & Shipping	.059	.058
Total Cost at Mine	<u>3.003</u>	<u>2.682</u>
Budget, Estimated Cost Per Ton	2.970	2.412
Number of Days Operated	283	306
Number of Shifts & Hours:		
1-8-hr.	27	47
2-8-hr.	128	5
3-8-hr.	128	254
Average Daily Product	2,043	2,330

Cost of Production

	<u>1944</u>	<u>%</u>	<u>1943</u>	<u>%</u>
Labor	1.613	65.4	1.527	66.9
Supplies	.855	34.6	.755	33.1
Total	<u>2.468</u>	<u>100.0</u>	<u>2.282</u>	<u>100.0</u>

MAAS MINE
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YEAR 1944

8. COST OF OPERATING

b. Detailed Cost Comparison

	<u>1944</u>		<u>1943</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs</u>				
1. Exploring in Mine	11,839.25	.021	3,139.95	.004
2. Development in Rock	1,397.44	.002	31,580.65	.044
4. Development in Ore	27,394.69	.047	25,123.31	.035
5. Stopping	331,933.75	.574	414,243.74	.581
6. Timbering	413,705.84	.715	437,823.22	.614
7. Tramming	102,423.77	.177	119,743.18	.168
8. Ventilation	17,902.22	.031	17,967.65	.025
9. Pumping	62,216.30	.108	60,539.21	.085
10. Compressors & Air Pipes	61,690.26	.108	73,767.87	.104
12. Underground Superintendence	34,150.65	.059	35,457.69	.050
13. Cave-In	3.45		52.72	
14. Maintenance, Compr. & Drills	2,690.34	.005	5,160.28	.007
15. Scrapers & Mechanical Loaders	38,049.87	.066	43,853.07	.062
16. Electric Tram Equipment	27,606.18	.047	36,326.16	.051
17. Pumping Machinery	4,461.87	.008	7,895.47	.011
Total Underground Costs	<u>1,137,465.88</u>	<u>1.967</u>	<u>1,312,674.17</u>	<u>1.841</u>
<u>Surface Costs</u>				
18. Hoisting	41,082.97	.071	44,502.54	.062
19. Stocking Ore	16,246.22	.028	18,771.83	.026
21. Dry House	14,220.89	.025	16,414.25	.023
22. General Surface	11,052.78	.019	10,642.49	.015
23. Maintenance Hoisting Equipment	12,637.23	.022	11,599.73	.016
24. Shaft	4,583.38	.008	7,005.64	.010
25. Top Tram Equipment	2,086.35	.004	2,799.38	.004
26. Docks, Trestles, & Pockets	1,030.04	.002	432.96	.001
27. Mine Buildings	2,260.15	.004	1,388.39	.002
Total Surface Costs	<u>105,200.06</u>	<u>.182</u>	<u>113,557.21</u>	<u>.159</u>
<u>General Mine Expense</u>				
28. Insurance	5,440.32	.009	6,402.73	.009
29. Mining Engineering	5,237.98	.009	4,831.48	.007
30. Mechanical & Electrical Engineering	2,374.29	.004	2,817.82	.004
31. Analysis & Grading	35,497.66	.061	40,606.54	.057
32. Personal Injury	16,217.78	.028	19,562.42	.027
33. Safety Department	2,550.60	.004	2,933.99	.004
34. Telephones & Safety Devices	2,631.74	.006	3,639.72	.005
35. Local & General Welfare	4,542.64	.008	6,135.75	.009
36. Sp. Exp., Pens. & Allowances	10,285.10	.018	12,407.60	.017
37. Ishpeming Office	23,920.75	.041	25,548.46	.036
39. Mine Office	27,214.72	.047	27,266.65	.038
Social Security Taxes	20,411.81	.035	23,992.73	.034
Employees Vacation	25,173.65	.044	25,003.38	.035
Group Annuity Premiums	2,190.03	.004		
Total General Mine Expenses	<u>184,689.07</u>	<u>.319</u>	<u>201,149.27</u>	<u>.282</u>
Cost of Production	<u>1,427,355.01</u>	<u>2.468</u>	<u>1,627,380.65</u>	<u>2.282</u>
40. Taxes	139,085.11	.241	101,712.75	.142
Total Cost	<u>1,566,440.12</u>	<u>2.709</u>	<u>1,729,093.40</u>	<u>2.424</u>

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8. COST OF OPERATINGb. Detailed Cost Comparison (Cont.)(1) Days and Shifts

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1944	283	1, 2 & 3-8	417	113,354
1943	306	1, 2 & 3-8	475	132,826 $\frac{1}{2}$
Decrease	23		58	19,472 $\frac{1}{2}$

Total Men Employed in December of Each Year

	<u>1944</u>	<u>1943</u>	<u>1942</u>
Surface	66	77	74
Underground	305	430	466
Total	371	507	540

(2) Wages

There was no change in the wage rates during 1944.

(3) Comparison of Production

<u>Year</u>	<u>Production</u>	<u>Average Daily Product</u>
1944	578,307	2,043
1943	713,069	2,330
Decrease	134,762	287

(4) Comparison of Number of Men & Wages

<u>Year</u>	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1944	417	113,354	876,220.65	7.73
1943	475	132,826 $\frac{1}{2}$	1,059,033.23	7.97
Decrease	58	19,472 $\frac{1}{2}$	182,812.58	.24

(5) Tons Per Man Per Day

	<u>1944</u>	<u>1943</u>	<u>Decrease</u>
Surface	26.38	31.36	4.48
Underground	6.30	6.48	.18
Total	5.10	5.37	.27

(6) Cost of Production

<u>Year</u>	<u>Total Cost</u>	<u>Per Ton</u>
1944	1,427,355.01	2.468
1943	1,627,380.65	2.282
Increase		.186
Decrease	200,025.64	

	<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>
1944	945,968.76	54.5	790,433.09	45.5	1.636	1.367	3.003
1943	1,088,922.28	66.9	538,458.37	33.1	1.527	.755	2.282
Increase			251,974.72	12.4	.109	.612	.721
Decrease	142,953.52	12.4					

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

(7) Detail of Accounts

	<u>1944</u>	<u>1943</u>	<u>Decrease</u>
Average Days Per Week	5 $\frac{1}{2}$	6	
Shifts & Hours	1, 2 & 3-8	1, 2 & 3-8	
Production, Tons	578,307	713,069	134,762
Avg. Daily Product, Tons	2,043	2,330	287
Number of Days Worked	283	306	23

GENERAL

There was an increase of .08 in the cost per ton for labor and .04 for supplies in the total underground costs, and this was mostly due to the fact that pumping and maintenance timbering remained the same while the product decreased. Surface costs per ton naturally increased as, with the exception of the top landers and hoisting engineers, the same crew is required for a two-shift as for a three-shift operation.

So many of the general mine expense accounts remain fairly constant that there was a reduction of only approximately \$16,500, with a tonnage loss of nearly 135,000 tons. Both the valuation and the tax rate were increased for 1944.

As so many of the accounts show an increase in cost per ton due purely to the decreased operations, only those with some unusual change, necessitating an explanation, are listed below.

UNDERGROUND COSTS

3. Development in Rock

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost Per Foot</u>
1944	165'	47'	212'	6.59
1943	1,051'	1,063'	2,114'	14.94
Decrease	886'	1,016'	1,902'	8.35

There was very little development in rock during 1944, except on the 6th Level, which was charged to the E & A No. CC-78. High rock raises and timbered rock drift on the 4th Level contributed to the high cost per foot in 1943.

4. Development in Ore

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost Per Foot</u>
1944	717'	1,626'	2,343'	11.68
1943	1,119'	972'	2,091'	12.01
Increase		654'	252'	
Decrease	402			.33

Practically the only ore drifting in 1944 was the North footwall drift on the 6th Level, but there were 15 raises put up from the 6th to the 5th Level and above.

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

(7) Detail of Accounts (Cont.)

5. Stoping

	<u>Labor</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>Cost Per Ton</u>	<u>Total</u>
1944	284,661.37	.492	47,272.38	.082	.574
1943	364,051.17	.511	50,192.57	.070	.581
Increase				.012	
Decrease	79,389.80	.019	2,920.19		.007

Decrease in labor cost per ton was due to eliminating the third shift, more efficient operations on two shifts. Increase in supply cost per ton due to increase in purchase price.

6. Timbering

	<u>Labor</u>	<u>%</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>%</u>	<u>Cost Per Ton</u>	<u>Total Cost Per Ton</u>
1944	293,042.30	70.8	.507	120,663.54	29.2	.208	.715
1943	309,816.72	70.6	.434	128,006.50	29.4	.180	.614
Increase		.2	.073			.028	.101
Decrease	16,774.42			7,342.96	.2		

Increase in both labor and supply cost per ton was due to the necessity of maintaining main level drifts and raises the same amount as would have been required with a larger product.

9. Pumping

	<u>Surface Gallons Pumped</u>	<u>Gals. Per Min.</u>	<u>Underground Gallons Pumped</u>	<u>Gals. Per Min.</u>	<u>Total Cost for Power</u>
1944	486,180,000	925	578,254,701	1,090	44,495.20
1943	373,176,000	710	569,868,620	1,087	42,525.46
Increase	113,004,000	215	8,386,081	3	1,969.74

There was very little difference in the amount of water pumped from underground during 1944 as compared with 1943, but there was more pumped from the deep wells on surface due to No. 1 and 2 Wells operating continuously throughout the year at 375 and 550 gallons per minute respectively. No. 3 and 4 Wells were idle.

10. Compressors & Air Pipes

	<u>Cu. Ft. Air Compressed</u>
1944	1,542,835,000
1943	1,916,100,000
Decrease	373,265,000

The decrease in the amount of air compressed was due to eliminating the third shift and Saturday on July 1st.

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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts (Cont.)

12. Underground Superintendence

	Cost	Cost Per Ton
1944	34,150.65	.059
1943	<u>35,457.69</u>	<u>.050</u>
Increase		.009
Decrease	1,307.04	

Three bosses would ordinarily have been demoted when curtailing from three to two-shift operations, but at that time it was decided to have a boss on each shift in the new 6th Level territory.

17. Pumping Machinery

	Cost	Cost Per Ton
1944	4,461.87	.008
1943	<u>7,895.47</u>	<u>.011</u>
Decrease	<u>3,433.60</u>	<u>.003</u>

There was considerably less maintenance to the underground pumps in 1944, due to less use of the centrifugal pumps for emergencies.

SURFACE COSTS

18. Hoisting

	Total Ore & Rock	Power Cost	Cost Per Ton For Power	Cost Per Ton
1944	620,847	26,678.53	.0430	.071
1943	<u>782,199</u>	<u>28,339.88</u>	<u>.0362</u>	<u>.062</u>
Increase			.0068	.009
Decrease	161,352	1,661.35		

The increase in power cost per ton was due to hoisting from the 6th Level an additional 102'.

21. Dry House Expense

	1944	1943	Incr.	Decr.
Coal Used in Heating Plant, Tons	1,145	1,301 $\frac{1}{2}$		156 $\frac{1}{2}$
Cost Per Ton for Coal	6.45	6.28	.17	
Cost of Coal	7,388.78	7,810.86		422.08

There was less coal used in 1944 due to the winter being considerably milder than in 1943.

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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts (Cont.)

23. Hoisting Equipment

	<u>Cost</u>	<u>Cost Per Ton</u>
1944	12,637.28	.022
1943	11,599.73	.016
Increase	<u>1,037.55</u>	<u>.006</u>

The increase in cost was due mostly to the large increase in the price of hoisting ropes, which were 100' longer due to hoisting from 6th Level, and also the price per foot went up. Also, the skip hoist motor had to be repaired at a cost of approximately \$1000.

24. Shaft

	<u>Cost</u>	<u>Cost Per Ton</u>
1944	4,583.38	.008
1943	7,005.64	.010
Decrease	<u>2,422.26</u>	<u>.002</u>

The cost in 1943 was high due to accident in the shaft when the skip rope broke.

26. Docks, Trestles, & Pockets

	<u>Cost</u>	<u>Cost Per Ton</u>
1944	1,030.04	.002
1943	432.96	.001
Increase	<u>597.08</u>	<u>.001</u>

1944 cost is normal, 1943 cost was unusually low.

27. Mine Buildings

	<u>Cost-</u>	<u>Cost Per Ton</u>
1944	2,260.15	.004
1943	1,388.39	.002
Increase	<u>871.76</u>	<u>.002</u>

The increase this year was due mostly to building a garage for the new tractor.

28. Insurance

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Property	2,271.82	3,154.82		883.00
Group	2,384.15	2,354.85	29.30	
Catastrophe	784.35	893.06	108.71	108.71
Total	<u>5,440.32</u>	<u>6,402.73</u>		<u>962.41</u>

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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts (Cont.)

GENERAL MINE EXPENSES

31. Analysis & Grading

	No. <u>Determinations</u>	Lab. Expense Cost Per <u>Determination</u>	<u>Analysis & Grading</u>
1944	94,970	.571840	.373777
1943	73,251	.388694	.445019
Increase	21,719	.183146	
Decrease			.071242

There were more sulphur determinations during the year and also another sampler was placed at pocket on 6th Level.

32. Personal Injury

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Compensation Department	788.21	879.22		91.01
Hospital Loss	4,606.68	8,347.27		3,740.59
Reserve & Catastrophe, Com- pensation Set-Up & Medical Service	10,822.89	10,335.93	486.96	
Total	16,217.78	19,562.42		3,344.64

36. Special Expense, Pensions & Allowances

	<u>1944</u>	<u>1943</u>	<u>Decrease</u>
Saranac Investment	2,307.58	3,064.97	757.39
Legal	459.87	551.46	91.59
Pension	1,294.98	1,998.78	703.80
Miscellaneous	5,131.19	6,792.39	1,661.20
	9,193.62	12,407.60	3,213.98

Analysis of Supplies Used

	<u>1944</u>		<u>1943</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
41. General Supplies	28,958.08	.050	26,914.24	.037
42. Iron & Steel	12,945.96	.022	12,653.15	.017
43. Oil & Grease	3,501.63	.006	3,067.29	.004
44. Machinery Supplies	8,507.53	.015	13,133.30	.018
45. Explosives	33,851.49	.059	44,133.90	.060
46. Lumber & Timber	111,358.42	.193	121,176.03	.166
47. Fuel	7,388.78	.013	7,779.27	.011
48. Electric Power	140,607.00	.243	150,372.49	.205
49. Sundries	39,468.20	.068	47,335.31	.065
50. Other Mines & Accounts	585.75	.001	868.59	.001
Total	385,551.34	.667	425,696.39	.581

MAAS MINE
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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts, (Cont.)

The total amount paid for supplies was naturally much less in 1944 due to the curtailed production, but as a considerable quantity of these supplies are reflected in the overhead, especially timber for maintenance of drifts and electric power for pumping, the cost per ton shows an increase. Increase in General Supplies is almost entirely due to increase in cost price, while decrease in machinery supplies is due to purchasing head sheaves and bearings for shaft house and two ventilation fans in 1943.

9. EXPLORATIONS AND FUTURE EXPLORATIONS

There was one diamond drill hole drilled to the South on the 130' Sub on the West end of the ore body above the 5th Level to determine if any ore existed beyond the outline of the jasper hanging. Several small risers of ore had been found in this area, and it was thought best to make a further test, but no ore was found.

The detail of the diamond drilling authorized under E & A CQ-132, mentioned earlier in this report, will be covered in the Geological Department's report, but a short resume of the holes is listed below. These holes all bottomed at approximately 2100 West and span 440' from North to South.

No. 57, or the most Northerly hole, encountered the lean ore on the footwall at 60' below 6th Level.

No. 58 encountered the lean ore on the footwall at 68' below 6th Level.

No. 56 encountered the lean ore on the footwall at 45' below 6th Level.

No. 59 encountered the lean ore on the footwall at 20' below 6th Level.

The analyses of all the ore showed the sulphur to be too high for standard grade and the reason for this is very apparent. When comparing with holes drilled on the 1600 West section, it is seen that the pitch of the ore body is slightly above the horizontal, where heretofore it has been at -15° all the way from the East footwall in the Negaunee Mine. If the -15° pitch had continued, the footwall would have been 140' deeper on the 2100' section, and then it might have been possible to encounter ore of standard grade below the sulphur horizon, which has so far been nearly horizontal.

There is very little drilling anticipated for 1945, but there may be some short holes to test local areas.

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10. TAXES

	<u>1944</u>		<u>1943</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Maas Mine	\$ 1,785,000	74,558.02	\$ 2,640,000	100,634.69
Race Course	750,000	31,326.90	640,000	24,396.29
Adams Strip	175,000	7,309.61	165,000	6,289.67
Stockpile & Equipment	595,000	24,852.67	735,000	28,017.61
Miscellaneous Parcels	10,805	451.35	8,860	337.84
Total Mine	3,315,805	138,498.55	4,188,860	159,676.10
Collection Fees		1,384.98		1,596.76
Total Oprtg. Maas Mine		139,883.53		161,272.86
Maas Area Leased to Negaunee Mine*			1,382,000	53,207.54
Adams Strip Charged to Negaunee Mine	175,000	7,382.70	165,000	6,352.57
Total Charged to Negaunee Mine	175,000	7,382.70	1,547,000	59,560.11
Bal. Oprtg. Maas Mine	3,140,805	132,500.83	2,641,860	101,712.75
Total As Above	3,315,805	139,883.53	4,188,860	159,676.10

*Maas area included in Negaunee Mine valuation in 1944.

	<u>1944</u>		<u>1943</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Tax Rate		4.17692		3.81192
Total City of Negaunee Tax		582,020.52		539,671.30
Maas Mine % of City Tax		22.8%		29.5%
Maas Mine Rented Houses	107,225	4,426.20	108,100	4,120.61
Mineral Lands, Etc.	17,860	746.01	18,800	716.66
Total Houses & Lands	125,085	5,172.21	126,900	4,837.27
Collection Fees		51.72		48.38
Total		5,223.93		4,788.89

11. ACCIDENTS AND PERSONAL INJURY

	<u>1944</u>	<u>1943</u>
Fatal	0	0
Time Lost, over 4 months	2	2
Time Lost, 1 to 4 months	7	5
Time Lost, less than 1 month	5	10
Total Compensable Accidents	14	17

On December 31, 1944 payments were being made on five accidents which occurred prior to January 1st, 1944. Two are death claims and three are receiving full compensation.

The amount paid in compensation for injuries received during the year was \$1,897.00, as compared with \$1,905.68 in 1943.

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11. ACCIDENTS AND PERSONAL INJURY

The following is a brief description of the more serious of the lost-time accidents.

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Description of Accident</u>
2-29-44	Joseph Annear	Annear is a miner, and while trimming the side was bruised on hips and legs by a fall of ground. He claimed an injury to his back also, but his partner did not think he was hit in the back at all. Annear stayed home till May 29th, worked at odd jobs until October 25th when he again complained of his back and has been home since.
9-29-44	Jack Lintula	Lintula is also a miner, and while poling down was hit by a falling piece of ore, breaking his right ankle, which was wedged between the poles so he could not move quickly. He lost the remainder of the year, but came back to work January 15th.
10-2-44	Carl Lind	Lind was unloading a timber, rolling it from the truck to the pile on a truck pin. He had his foot underneath and when the pin slipped, the timber rolled on his toe, fracturing the same. He also was home until January 15th.
12-29-44	George Olds	Olds is a timberman and was sending up timber to men repairing in a raise. While changing their staging, a plank slipped and fell through the ladder opening alongside the safety door and struck Olds in the side, as he was too near the raise. Six ribs were fractured and his lung collapsed. Although this might have been a very serious injury, he is coming along nicely and will be back to work soon.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

E & A No. CC-78

The purpose of this E & A was the development of the 6th Level by sinking an auxiliary winze near the ore body, and the main shaft from 5th Level, together with the necessary drifting and raising. The work under this E & A was completed in 1944, and most of the over-expenditures were due to raise in wages and increase in the cost of supplies. In October of this year there was requested an approval for an additional \$42,000 to be added to this E & A to cover the over-expenditures. In the detail of account this additional amount is not used, as it has not been proportioned.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

E & A No. CC-78 (Cont.)

Total Estimate				\$ 187,660.00	
Additional Amount				42,000.00	
New Total				229,660.00	
Total Expended to 12-31-43		\$ 157,847.29			
Total Expended in 1944		67,112.14			
Total Expended to 12-31-44				224,959.43	
Balance 12-31-44				\$ 4,700.57	
<u>Detail of Accounts</u>	<u>Total Estimate</u>	<u>Expended to 12-31-43</u>	<u>Expended in 1944</u>	<u>Total Expended</u>	<u>Balance 12-31-44</u>
Sinking Shaft	18,000.00	22,640.82	296.09	22,936.91	4,936.91
Plat & Pocket, Skip Pit*	15,500.00	17,929.69	11,085.80	29,015.49	13,515.49
Sump & Pumphouse	5,000.00	1,973.57	2,360.85	4,334.42	665.58
Rock Drift - 1400'					
Shaft to Winze*	25,200.00	8,635.30	26,100.70	34,736.00	9,536.00
Raise at Winze	3,000.00	1,186.44		1,186.44	1,813.56
Sinking Winze - 102'	17,850.00	13,472.28		13,472.28	4,377.72
Rock Drift - 5th Level					
250' Est., 450' Actual	4,500.00	6,415.98		6,415.98	1,915.98
Rock Drift - 2400'**	45,000.00	53,567.69	9,667.86	63,235.55	18,235.55
Rock Raising - 1000'	12,000.00	2,930.23	8,486.33	11,416.56	583.44
Powder House***	300.00		702.65	702.65	402.65
Hoist Room	1,600.00	3,028.33		3,028.33	1,428.33
Rails, Frogs & Switches	4,500.00	2,164.43	2,764.90	4,929.33	429.33
Trolley Wire & Rail Bonds	4,000.00	1,132.81	649.43	1,782.24	2,217.76
Cage (Rebuilt)	1,000.00	864.02		864.02	135.98
Electric Cables	1,500.00	2,790.54	28.49	2,819.03	1,319.03
Air & Water Lines	2,500.00	1,451.25	1,933.21	3,384.46	884.46
New Equipment****	7,150.00	13,493.34	2,029.07	15,522.41	8,372.41
Rental of Equipment	2,000.00	1,584.04		1,584.04	415.96
Social Security Taxes		2,586.83	1,000.86	3,587.69	3,587.69

* These accounts show a large over-expenditure on account of the very hard quartzite encountered in drifting, in addition to increase in wages and cost of supplies.

** The extra increase in expenditure to this account was the necessity of timbering nearly all of the rock drifts South of the winze on account of the slabby nature of the material.

*** The powder house required more excavation than had been anticipated to make it conform to the U. S. Bureau of Mines standard.

**** A "Jumbo" drilling rig and an automatic Worthington Pump were purchased, although not estimated originally.

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12. NEW CONSTRUCTION AND PROPOSED NEWCONSTRUCTION

E & A No. CC-128

The purpose of this E & A was the installation of an Aldrich plunger pump on the 3rd Level to replace an Alberger centrifugal pump which is worn out. The additional room has been excavated, and installation will take place in 1945.

Total Estimate		\$ 12,734.00
Total Expended to 12-31-43	\$ 477.81	
Total Expended in 1944	<u>7,938.46</u>	
Total Expended to 12-31-44		8,416.27
Balance 12-31-44		<u>\$ 4,317.73</u>

E & A No. CC-129

The purpose of this E & A was the purchase of an International TD-40 Tractor to replace the old Cletrac, which is obsolete. This E & A was completed in 1944.

Total Estimate		\$ 7,446.00
Total Expended to 12-31-44		<u>7,778.89</u>
Balance 12-31-44		332.89
Less Allowance for old Tractor	\$ 1,046.00	
Net Balance 12-31-44		<u>\$ 713.11</u>

E & A No. CC-132

The purpose of this E & A was for drilling below the 6th Level to determine the grade of the ore. The work on this E & A was completed in 1944, but there is still a charge outstanding on account of credit to bits. On account of the flattening of the pitch of the ore body, the drill holes were not as deep as had been anticipated.

Total Estimate		\$ 12,500.00
Total Expended to 12-31-44		<u>4,546.06</u>
Balance 12-31-44		<u>\$ 7,953.94</u>

There is no new construction anticipated for the year 1945.

13. EQUIPMENT AND PROPOSED EQUIPMENT

a. Steam Shovels

Nos. 27 and 45 Shovels were used at the Maas Mine during 1944. No. 45, the caterpillar type shovel, remained at the mine and was repaired there, while the No. 27, or railroad type shovel, was sent to Ishpeming in the winter. There was very little delay during the year due to shovel break-down.

b. Tractor

Early in the year an International bull-dozer tractor was purchased from the Bark River Culvert & Equipment Co.. This tractor, which is Diesel-powered, also has a winch mounted on the rear for hoisting material, which should be

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13. EQUIPMENT AND PROPOSED EQUIPMENT

b. Tractor, (Cont.)

invaluable when erecting trestles. Formerly the only service by bull-dozer was with a district "Caterpillar", and this was not very satisfactory, as often its services were desired by two or more mines at once. With the new equipment it has been possible to keep the rock moved on the rock pile sufficiently to stock near the shaft and thus avoid delays due to long tramping. Delays due to accumulation of snow have been avoided and the roads have been kept in much better shape. A garage was built in the Northeast corner of the old boiler house, which building is now being used mostly for supplies.

c. Stocking Trestles

There was very little work done on stocking trestles during 1944 as all of the ore was removed without dismantling any of the trestles. With the use of the International bull dozer tractor purchased this year, it was possible to clean up all of the ore without removing the trestle timber. Early in the spring the tops of the ore piles were drilled and blasted before starting to load and very satisfactory results were obtained. Formerly the blasting had only been performed in an individual place where the ore was hanging up and this caused a delay at the shovel, as well as being dangerous. This new method was developed by the engineers at the Lloyd Mine and proved to be an excellent method, as the ore was sufficiently shaken to make easy loading and avoid any hanging up along the crest.

d. Scrapers Hoists

There was no new equipment of this nature purchased during 1944, as the reduction in the number of contracts had relieved a number of units to be used when others were being repaired.

c. Skips & Cages

There was no new development in either cage or skip design, only the necessary maintenance being carried on, and the ropes changed when necessary. The estimated skip weight of 5.5 was used throughout the year.

15. POWER

The following is the rate charged per K.W. hour by months during 1944.

January	\$.0132
February	.0132
March	.0128
April	.0130
May	.0130
June	.0130
July	.0138
August	.0138
September	.0140
October	.0140
November	.0140
December	.0140
Average 1944	.0135
Average 1943	.013067

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15. POWER

The increase was due to heavier load in eight hours due to increasing number of contracts when reducing to two shifts and also less total consumption with reduced output.

The reducing of the operations to two shifts did not allow any saving in the maximum demand, as it is necessary to pump 24 hours per day, and the water cannot be accumulated and pumped on the off shifts, as is possible at some of the other mines.

17. CONDITION OF PREMISES

There was nothing done along these lines in 1944, except the regular upkeep of the grounds.

18. NATIONALITY OF EMPLOYEES

<u>As to Parentage</u>	<u>1944</u>	<u>%</u>	<u>1943</u>	<u>%</u>
Finnish	154	39.5	200	39.5
English	82	21.0	96	19.1
American	55	14.1	87	17.2
Italian	37	9.5	43	8.5
Swedish	22	5.7	30	5.9
French (Canadian)	22	5.7	27	5.3
German	6	1.5	8	1.6
Norwegian	5	1.3	6	1.2
Danish	3	.8	3	.6
Austrian	1	.2	2	.4
Irish	1	.2	1	.2
Polish	1	.2	1	.2
Jugoslavian	0	.0	1	.2
Swiss	1	.2	1	.2
Total	390	100.0	506	100.0

<u>As to Birth</u>	<u>Total</u>		<u>American Born</u>		<u>Foreign Born</u>	
	<u>1944</u>	<u>1943</u>	<u>1944</u>	<u>1943</u>	<u>1944</u>	<u>1943</u>
Finnish	154	200	97	140	57	60
English	82	96	47	60	35	36
American	55	87	55	87	0	0
Italian	37	43	12	15	25	28
Swedish	22	30	18	25	4	5
French (Canadian)	22	27	22	27	0	0
German	6	8	5	6	1	2
Norwegian	5	6	4	5	1	1
Danish	3	3	3	3	0	0
Austrian	1	2	0	1	1	1
Irish	1	1	1	1	0	0
Polish	1	1	1	1	0	0
Jugoslavian	0	1	0	1	0	0
Swiss	1	1	1	1	0	0
Total	390	506	266	373	124	133
Percentage			68.1%	73.7%	31.9%	26.3%

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1. GENERAL:

The Negaunee Mine operated on a 16-shift per week schedule of 3-8 hour shifts five days, and 1-8 hour shift Saturdays from January to May 15th. At that time the schedule was reduced to 11 shifts per week with the elimination of the midnight shift. On June 30th a straight 40-hour or 5-8 hour shifts per week schedule was adopted and continued throughout the remainder of the year. This schedule is considerably more efficient as it allows all repairs including shaft maintenance to be made on Saturday. The reduction of the working schedule during the year was necessary due to the gradual depletion of the ore reserves which has reduced the number of mining places as well as a general shortage of manpower.

Production in 1944 was 757,677 tons. All ore in stock had been shipped by the close of navigation November 26th with the exception of a small tonnage of Negaunee lump ore. The accumulated overrun resulting from 1943 as well as the current year amounted to 28,665 tons. The total production during the war period of 1941, 1942, 1943 and 1944 was 3,852,581 tons, or a yearly average of 963,145 tons. This heavy schedule has rapidly depleted the ore reserves of the Negaunee Mine. Shipments in 1944 were 858,021 tons, a decrease of 39,513 tons as compared with 1943.

Production in the area under lease from the Maas Mine increased approximately 10% during the year to a total of 34% for 1944. The product resulting from the Negaunee Lease was 64% and that from the South Shore Right of Way 2%. Development of the Western end of the Maas Lease was continued throughout the year. This area will provide working places for five contracts and is the last known mining area which can be opened in the Negaunee Mine.

There was very little exploration work carried on during the year. At the present time practically all ore areas have been developed and their limits and boundaries are known in a general way. During the coming year exploration work will be carried on in a small ore area at the Southwest end of the 14th Level. This area lies adjacent to the Maas Boundary and is divided by the Main Negaunee dike. It is evident that there is no great extent of ore upwards and only that ore which lies 25 feet or more above the level can be mined.

During 1944 there was an average of about eight months' supply of all kinds of mining timber on hand. A portion of this is a carry-over from 1943 when a large inventory was stocked due to the anticipated manpower shortage in the woods.

2. PRODUCTION:
SHIPMENTS &
INVENTORIES

a. Production by Grades:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Negaunee Ore	481,070	729,040		247,970
South Shore R. Of Way Ore	18,320		18,320	
Negaunee-Maas Ore	258,287	225,950	32,337	
Rock	23,260	23,085		175
Total Hoist	<u>780,937</u>	<u>978,075</u>		<u>197,138</u>

Skip capacity reduced from 5.5 tons to 5.3 tons on 11/10/43.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES: (CONT.)

b. <u>Shipments:</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>	<u>Total Tons</u> <u>Last Year</u>
Negaunee Ore	271,632	291,055	562,687	689,867
South Shore R. of Way	9,663	1,032	10,695	
Negaunee-Maas Ore	147,687	136,952	284,639	207,667
Total 1944	428,982	429,039	858,021	897,534
Total 1943	573,549	323,985	897,534	
Increase		105,054		
Decrease	144,567		39,513	

Shipments decreased 4.6% in 1944 and were 100,344 tons more than the product for the year.

c. <u>Stockpile Inventories:</u>	<u>Dec. 31, 1944</u>	<u>Dec. 31, 1943</u>	<u>Increase</u>	<u>Decrease</u>
Negaunee Ore	31,774	112,249		80,475
South Shore R. of Way Ore	7,625		7,625	
Negaunee-Maas Ore	13,817	39,133		25,316
Total	53,216	151,382		98,166

Including estimated overrun there were approximately 55,500 tons in stock at the end of the year.

d. <u>Division of Product by Levels:</u>	<u>1944</u>	<u>Percentage</u>	<u>1943</u>	<u>Percentage</u>
9th Level	142,445	18.8	250,335	26.2
10th Level	10,154	1.3	15,523	1.6
12th Level			29,039	3.0
13th Level	284,884	37.6	632,154	66.2
14th Level	320,194	42.3	27,939	3.0
Total	757,677	100.0	954,990	100.0

Production from the 9th Level decreased approximately 100,000 tons during 1944 due to the reduced mining areas in the No. 1 Shaft Pillar as well as the reduced working schedule. Mining was completed on the 10th and 13th Levels early in the year with the result that approximately 80% of the product was hoisted from the 14th Level. It should be noted that the comparatively large tonnage on the 13th Level was actually mined above the Level, but trammed on the 14th Level.

e. Production by Months:

<u>Month</u>	<u>Negaunee</u>	<u>S.S.R/W.</u>	<u>Maas</u>	<u>Total Ore</u>	<u>Rock</u>
January	44,883	6,138	23,720	74,741	1,825
February	44,614	5,026	24,140	73,780	1,815
March	49,497	4,668	25,330	79,495	1,495
April	38,295	5,340	21,933	65,568	1,155
May	35,462	6,407	22,110	63,979	2,180
June	35,758	4,315	22,123	62,196	1,885
July	28,904	5,845	15,465	50,214	1,525
August	33,733	5,516	17,864	57,113	2,395
September	20,500	3,403	21,906	45,809	2,435
October	38,092	3,436	17,577	59,105	1,850
November	32,450	5,538	16,043	54,031	2,200
December	25,151	5,928	14,080	45,159	2,500

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2. PRODUCTION
SHIPMENTS &
INVENTORIES: (CONT.)

e. Production by Months: (Cont.)

<u>Month</u>	<u>Negaunee</u>	<u>S.S.R/W.</u>	<u>Maas</u>	<u>Total Ore</u>	<u>Rock</u>
Total	427,339	61,560	242,291	731,190	23,260
Stockpile Overrun				26,487*	
Total 1944	427,339	61,560	242,291	757,677	23,260
Total 1943	729,040		225,950	954,990	23,085
Increase		61,560	16,341	*26,487	175
Decrease	301,701			197,313	

The product by leases was distributed as follows:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Negaunee Mine Company	438,957	663,392		224,435
So. 1/2 R. of Way	61,575	65,648		4,073
Maas Lease	229,465	197,654	31,811	
N 1/3 R. of Way	21,387	19,496	1,891	
N 1/6 R. of Way	8,471	8,800		329
Total	759,855*	954,990		195,135

*(2,178 tons prior year's stockpile overrun included.)

f. Ore Statement:

	<u>Negaunee</u>	<u>S.S.R/W</u>	<u>Maas</u>	<u>Total</u>	<u>Total</u>
	<u>Ore</u>	<u>Ore</u>	<u>Lease</u>	<u>1944</u>	<u>1943</u>
On Hand Jan. 1, 1944	112,249		39,133	151,382	93,926
Product for Year	427,339	61,560	242,291	731,190	954,990
Stockpile Overrun	11,618	15	17,032	28,665*	---
Total	551,206	61,575	298,456	911,237	1,048,916
Shipments	519,432	53,950	284,639	858,021	897,534
Balance on Hand	31,774	7,625	13,817	53,216	151,382
Decrease in Output	301,701	61,560	16,341	223,800	137,772
Decrease in Ore on Hand	80,475	7,625	25,316	98,166	57,456

*(2,178 tons prior year's stockpile overrun included.)

g. Delays:

March 4th - 1 hr. delay - Loss of Product - 150 tons

This delay resulted from changing the dumping wheel on the South skip.

March 17th - 2 hours delay - Loss of Product - 160 tons

The measuring pocket connecting rod was broken and had to be replaced.

April 7th - 2 hours delay - Loss of Product - 265 tons

Measuring pocket rod on 14th Level broken.

April 28th - 1 hour delay - Loss of Product - 132 tons

North measuring pocket door out of commission.

May 12th - 2 hours delay - Loss of Product - 200 tons

Breakdown in Raise on 14th Level which prevented the use of two motors on account of ore on tracks.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES: (CONT.)

g. Delays: (Cont.)

June 6th - 1½ hours delay - Loss of Product - 243 tons
Butterfly in dump. out of order.

July 5th - 3½ hours delay - Loss of Product - 442 tons
1½ hours a/c chunk in measuring pocket; 2 hrs. a/c air line broken
in shaft.

July 7th - 3 hrs. delay - Loss of Product - 494 tons
Chunks in 14th Level measuring pocket.

July 10th - 1 hour delay - Loss of Product - 100 tons
Cutting hoisting rope on account of stretching.

August 30th - Loss of Product - 100 tons - 1 hour delay
Chunk between skip and casing plank at 14th Level Pocket.

September 9th - 1½ hours delay - Loss of Product - 164 tons
Chunk lodged between skip and shaft below 14th Level pocket.

November 9th - 2 hours delay - Loss of Product - 265 tons
Chunk in measuring pocket at 14th Level.

December 27th - 2½ hours delay - Loss of Product - 300 tons
1½ hour delay due to unwinding rope on drum while changing skip;
1 hour delay due to chunks in measuring pocket on the 14th Level.

The total loss of product for the year on account of delays amounted to 3,015 tons as compared with 1,964 tons in 1943. It will be noted that there were six delays caused by chunks lodging in the measuring pocket or between the skip and the shaft below the 14th Level. These delays were the result of the handling of lump ore from the stoping area. This ore is extremely hard and at times is somewhat of a problem to handle. Due to the small midnight crew it was possible in a number of cases to overcome the loss of product resulting from these delays by hoisting overtime.

h. Delays from lack of Current:

There were no delays from lack of current during the year.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	1944				1943			
	Tons	Iron	Phos.	Sil.	Tons	Iron	Phos.	Sil.
Negaunee	427,339	59.66	.092	8.43	729,040	59.67	.097	8.08
Maas	242,291	59.31	.093	8.15	225,950	60.03	.100	8.88
S.S.R/W.	61,560	58.43	.079	11.34				

b. Average Mine Analysis on Straight Cargoes:

Grade	Mine			Lake Erie	
	Iron	Phos.	Silica	Iron	Moisture
Negaunee Ore	59.44	.101	8.40		
Negaunee - Crushed	60.28	.114	7.15	60.69	10.76

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

Assumption:

12 Cubic Feet equals one ton
10% deducted for rock
10% deducted for loss in mining

Area	Negaunee Lease	Leased from Maas Mine				Special Grade	Total Tons
		S $\frac{1}{2}$ R of W or $\frac{3}{4}$ of Adams Strip	N 1/6 R of W or $\frac{1}{2}$ Adams Strip	N 1/3 R of W or C.C.I.Co. Strip	Maas Area		
Above 9th Level	141,047						141,047
12 to 13th Level	36,849						36,849
13 to 14th Level	342,760	127,460	38,579	80,342	857,331		1,446,472
Below 14th Level	15,781	6,667		563	38,192	59,000	120,203
Total Gross Tons 11/30/44	536,437	134,127	38,579	80,905	895,523	59,000	1,744,571
Less December 1944 Production	25,151	5,928		414	13,666		45,159
Total Gross 12/31/44	511,286	128,199	38,579	80,491	881,857	59,000	1,699,412
Less 10% for Loss in Mining	53,644	13,413	3,858	8,090	89,552	5,900	174,571
Net Total 12/31/44	457,642	114,786	34,721	72,401	792,305	53,100	1,524,955
Less 10% for Rock	48,279	12,071	3,472	7,282	80,597	5,310	157,011
Total Developed Ore - 1944	409,363	102,715	31,249	65,119	711,708	47,790	1,367,944*

*Includes 47,790 tons of special grade also unavailable from Negaunee Mine; actual available ore equals 1,320,154 tons.

Total Available Ore as of December 31st, 1943 - 1,796,243 tons
Total Available Ore as of December 31st, 1944 - 1,320,154 "
Decrease - 476,089 "
Less 1944 Production - 757,677 "
Total Ore Developed in 1944 - 281,588 "

There was a decrease of 50,000 tons in the amount of ore developed in 1944 as compared with 1943. This is a natural reduction resulting from the smaller remaining ore areas as well as the lack of prospective undeveloped areas.

The 281,588 tons of developed ore is located entirely between the 13th and 14th Levels. In the Southwest portion of the Negaunee Mine the ore areas are cut up by a number of dikes which make the outlines or boundaries very irregular. These pockets frequently show up during stoping operations. Additional developed ore was also found in the area under lease from the Maas Mine adjacent to the old workings and along the jasper capping.

b. Prospective Ore:

All ore in the mine is developed.

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4. ESTIMATE OF ORE RESERVES: (CONT.)

c. Estimated Analysis:

<u>Grade</u>	<u>Ore Reserves:</u>		<u>Approximate Expected Natural Analysis</u>								
	<u>Tons</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>
Neg. Ore	543,327	52.80	.090	7.00	.194	2.48	.700	.290	.014	1.80	12.00
Neg-Maas Ore	776,827	52.80	.088	7.50	.194	2.08	.503	.160	.016	1.33	12.00
Total	1,320,154										

The Negaunee Ore includes all ore from the Negaunee Lease and the South one-half Right of Way; the Negaunee-Maas Ore includes Parcels No. 1, 2, and 3, otherwise known as the Maas Strip, the North 1/3 and North 1/6 Right of Way.

<u>Grade</u>	<u>Tons</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 Special	47,790*	52.80	.070	7.50	.180	2.00	.520	.160	.200	1.10	12.50

*Included in estimates but not available.

Ore in Stock - Average Natural Analysis

<u>Grade</u>	<u>Tons</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>
Neg. Ore	31,774	51.96	.085	8.45	.190	2.68	.610	.250	.015	1.62	11.69
Neg-Maas Ore	13,817	52.41	.081	7.95	.160	2.46	.610	.290	.014	1.44	11.64
S 1/2 R of W	7,625										

5. LABOR
AND
WAGES:

a. Comments:

There were 331 employees on December 31st, 1944, as compared with 461 on December 31st, 1943, a decrease of 130 men. The average number of employees in 1944 was 411 men. The maximum during the year was 467 men, with a decrease from the maximum of 56 men. During the year 59 men quit to work elsewhere, 55 men were transferred to other Company mines, 25 were drafted into the armed forces, 8 men were retired on account of age or disability, 4 were discharged, two enlisted in the Army, Navy or Seabees, and one man died. During the year 23 men were hired. This comparatively small number reflects the general shortage of manpower which was prevalent throughout the year. In 1943, 95 men were hired at the mine. This great difference was largely due to the drafting of all young men between the ages of 18 and 26 into the armed services as their deferments expired. The loss of men throughout the year has not affected the Negaunee Mine as seriously as it has other mines. With the gradual depletion of mining areas it would have been necessary to reduce the working force even in normal times. Despite this condition the jobs which normally require younger men are now being held by older employees.

Throughout the year conditions between the United Steel Workers or CIO Union and the Supervisory force have been very satisfactory. There have been no grievances between the Union and management since the original election in 1943. From time to time various employees, not necessarily union members, have asked for minor improvements or changes in working conditions which have always been reasonable, and their requests have been granted whenever possible.

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5. LABOR
AND
WAGES: (CONT.)

b. Comparative Statement of Wages and Product:

	1944	1943	Increase	Decrease
Product	757,677	954,990		197,313
No. of Shifts and Hours	1-8 26 2-8 162 3-8 95	1-8 48 2-8 5 3-8 255	2-8 157	1-8 22 3-8 160
<u>Average No. Men Working:</u>				
Surface	76	81		5
Underground	335	417		82
Total	411	498		87
<u>Average Wages Per Day:</u>				
Surface	6.90	7.16		.26
Underground	8.14	8.25		.11
Total	7.90	8.06		.16
<u>Average Wages Per Month:</u>				
Surface	152.29	167.57		15.28
Underground	164.90	178.19		13.29
Total	162.57	176.47		13.90
<u>Product per Man Per Day:</u>				
Surface	37.65	41.98		4.33
Underground	9.31	8.83	.48	—
Total	7.46	7.30	.16	—
<u>Labor Cost Per Ton:</u>				
Surface	.183	.170	.013	
Underground	.875	.934	—	.059
Total	1.058	1.104	—	.046
<u>Average Product Mining:</u>				
Stoping	23.98	20.70	3.28	
Development in Ore	7.68	5.62	2.06	
Total	22.80	19.97	2.83	
Average Wages Contract Labor	8.76	8.45	.31	
<u>Total Number of Days:</u>				
Surface	20,123 $\frac{3}{4}$	22,746 $\frac{3}{4}$		2,623
Underground	81,415	108,114 $\frac{1}{4}$		26,699 $\frac{1}{4}$
Total	101,538 $\frac{3}{4}$	130,861		29,322 $\frac{1}{4}$
<u>Amount for Labor:</u>				
Surface	138,891.88	162,881.48		23,989.60
Underground	662,904.88	891,684.32		228,779.44
Total	801,796.76	1,054,565.80		252,769.04
<u>Average Wages Per Month as Per Labor Statement - Less Captain & Clerks:</u>				
Surface	151.67	167.51		15.84
Underground	164.27	177.16		12.89
Total	162.06	176.14		14.08

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5. LABOR
AND
WAGES: (CONT.)

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

Proportion of Surface to Underground Men:

1944 1 to 4.41

1943 1 to 5.14

6. SURFACE:

a. Buildings and Repairs:

Throughout 1944 and particularly during the summer months minor repairs or maintenance were made to all mine buildings where necessary. There were no major improvements or additions to any buildings.

There were two small fires in the clean clothes locker room during 1944 for which several claims were made by employees. The first fire occurred in lockers which were practically empty during the off-shift period. However, in the case of the second fire three employees lost all their street clothing with the result that larger claims were made. In as much as the Company carries only a small amount of insurance on the contents of each locker, the claims were referred to the employees' personal insurance agents. Such a loss is covered by the individual's Personal and Household Effects Policy. These fires were probably started by either leaving a lighted pipe in clothing, from lighted cigarettes, or possibly by the lighted end of a match flying into the lockers. In an effort to prevent the re-occurrence of these fires the clean-clothes locker room has been kept locked during the off-shift periods and the dryman as well as the policemen make frequent trips through the locker room.

b. Fences:

Minor repairs were made to all fences on the mine property and those which enclose the caved area to the North and East between the Maas and Negaunee Mines.

c. Tracks and Roads:

Regular maintenance was continued on all tracks and roads throughout the year. The use of the bulldozer has greatly facilitated the clearing of snow from all roads during and after snowstorms.

d. Stockpiles:

The loading of ore from the stockpiles started on the 27th of April, or just one month ahead of 1943. Loading was completed on the same date as in 1943; November 26th. Just prior to this date only a small tonnage remained and it was necessary to move this ore to complete a cargo.

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6. MSURFACE: (CONT.)

d. Stockpiles: (Cont.)

d-1. Ore & Rock Trestles:

The present rock trestle has now been in use for approximately four years and the bulldozer has been used to push the rock away from the trestle in an effort to prolong its life. However, due to the general deteriorated condition of the legs and stringers, it will be necessary during the coming year to relocate the rock trestle North and West of its present position.

In August work was started in reinforcing the upper joints which support the box girders of the permanent steel trestle. The entire eighteen piers and supporting members were repaired and the work was completed in November.

e. Shaft House:

Intermittent repairing of the shafthouse was continued during the year by the replacement of plates in the pockets as well as the maintenance of the dump and ore chutes to the surface pockets. There were no major repairs necessary.

f. Water Supply:

The cost of water purchased from the City of Negaunee and used at the Mine for the last four years is as follows:

	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>
1st Quarter	318.00	496.85	203.17	140.27
2nd Quarter	352.65	389.82	341.84	266.62
3rd Quarter	433.90	678.64	602.21	392.20
4th Quarter	357.90	407.74	425.32	224.55
Total	<u>1,512.45</u>	<u>1,973.05</u>	<u>1,572.54</u>	<u>1,023.64</u>
Product - Tons	757,677	954,990	1,106,694	1,033,220
Cost Per Ton	.001996	.002066	.001421	.000954

g. Grounds:

The grounds around the mine were kept clean and in good condition throughout the year. The shrubbery in the immediate vicinity of the office, dry, and engine house were pruned and cleaned out during the year and in November were tied up to prevent injury from ice and snow during the winter months.

h. Truck:

The new 1 1/2 ton Chevrolet truck which was received in November 1943 was used throughout the year and no repairs outside of the usual maintenance were necessary.

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6. SURFACE: (CONT.)

i. District Sawmill Plant:

The sawmill, located in the Western portion of the timber yard, was in intermittent operation during the entire year. Due to the general shortage of manpower and material the sawmill was used to supply special timber, particularly 4 1/2 foot ties to all Company mines both in the Ishpeming as well as the Negaunee Districts. In addition to this, timber was sawed for mine timber trucks, hardwood strips for skip runners, trolley poles and charging sticks. The hardwood slabs which have resulted from these operations have been used in the mine in combination with tamarack poles for covering down. The sawmill crew, which consists of four men, has greatly facilitated general surface work with respect to the unloading of timber where additional men were needed for short periods.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1944. The work of sinking from the 13th to the 14th Level was completed in 1939.

b. Development:

There was a slight increase in the total amount of developing comprising drifting and raising in 1944 as compared with 1943. The following table gives a comparison of the total drifting and raising in rock for the years 1944 and 1943:

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>		<u>Grand Total</u>
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>	
1944	2357'	1276'	1701'	151'	5485'
1943	1567'	903'	2015'	758'	5243'

Approximately 80% of the development footage resulted from two items, the first being the development of stopes in the Southwest portion of the ore body, and the second the driving of three long ventilation connections on and above the 13th Level.

There was no development carried on in the 9th Level area as all ore areas have been outlined and no further development is anticipated.

On the 14th Level development was carried on throughout the year in the Central and Southwest portions of the Maas Area Lease. This work completes the development of all available ore above the 14th Level and during the coming year development both in drifting and raising should show a marked decrease.

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7. UNDERGROUND: (CONT.)

b. Development: (Cont.)

b-1. Rock Development:

The following table gives a summary of the rock drifting and raising in 1944 and 1943:

<u>Location</u>	<u>Drifting</u>	<u>Raising</u>	<u>Total 1944</u>	<u>Total 1943</u>
Above 12th Level				706
270' Sub-level	100		100	
260' Sub-level	185		185	
13th Level	295		295	352
185' Sub-level	120		120	
170' Sub-level	162	11	173	
140' Sub-level	105		105	
14th Level	309	140	449	603
Total 1944	1276	151	1427	1661
Total 1943	903	758	1661	

There was a slight decrease in rock drifting and raising during the year. This decrease was largely due to the fact that no major development program was in effect in as much as the main Negaunee Ore Body has already been completely developed. The increase in rock drifting only, resulted from the driving of a number of ventilation and traveling roads from the active workings to openings on the 13th Level. As the ore body continues to recede to the Southwest the active workings become farther away from the 13th Level ventilation drifts. This condition requires rock drifts to be driven into the footwall from which raises are extended to ventilation and traveling drifts above. On the 14th Level the extension of the 1450 and 1430 Crosscuts were started in the footwall and later contacted the ore through which the remaining drifts were driven.

During the coming year the majority of the rock drifting will be carried on in the Southwest portion of the ore body, where a small amount of development will be required to explore this area.

b-2. Ore Development:

The following is a summary of the ore development in 1944 and 1943:

<u>Location</u>	<u>Drifting</u>	<u>Raising</u>	<u>Total 1944</u>	<u>Total 1943</u>
Above 12th Level				523
13th Level	339	83	422	2112
185' Sub-level	274	95	369	
160' Sub-level	595	308	903	
140' Sub-level	798	623	1421	
115' Sub-level	95		95	
14th Level	256	592	848	947
Total 1944	2357	1701	4058	3582
Total 1943	1567	2015	3582	

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7. UNDERGROUND: (CONT.)

b. Development: (Cont.)

b-2. Ore Development: (Cont.)

The increase in ore development over 1943 was confined largely to the stope area between the 13th and 14th Levels. Prior to the opening of 44, 20, and 17 stopes, a considerable amount of ore drifting and raising was necessary to outline the ore, particularly between the intersecting dikes and the East footwall. On the 14th Level the ore development included approximately 256 feet of Main ore drifts and 592 feet of double-compartment cribbed raise. Later in the year drifting operations were started in the 1450 Cross-cut and this drift as well as raises will be continued during the early months of 1945. It is likely that there will be a sharp decrease in ore development during 1945.

c. Stoping:

The product from the mine was obtained from the same areas as in previous years. However, during 1944 the 10th and 13th Levels were abandoned as far as tramming ore was concerned. Approximately 80% of the product came from the Main Ore Body North of the dike where an average of about 22 contracts were engaged in mining operations on three different sub-levels. At the present time there are no additional available ore areas from which to mine and as operations continue downward the contracts located along the North and East footwalls must be moved as a result of the pinching out of the ore.

The sub-levels on which mining was carried on during the year are given below. Above the 9th Level: 747', 733', 720', 700', 630', 620', & 605' Sub-levels were active, while immediately below the 9th Level the 595' & 580' Sub-levels were mined out early in the year.

Above the 13th Level mining was carried on on the 250', 235', 220', and 210' Sub-levels. Near the end of the year the above were completed and no further ore remains.

Between the 13th and 14th Levels mining operations were carried on on all the sub-level intervals listed as follows: 185', 160', 170', 150', 140', and 115' Sub-levels.

In summarizing the above data, ore was mined on 19 different elevations in 1944 as compared with 31 in 1943. This marked decrease reflects the general trend of the centralization of mining operations during recent years as the smaller outlying ore bodies have been depleted.

The proportion of ore mined from Parcels No. 1, 2 and 3 in the Maas Lease amounted to 33% while the product coming from the Negaunee Mine proper amounted to 67%. With continued mining the Negaunee proportion will decrease, while the total product from the Maas will increase.

The locations of the mining contracts at the end of the years 1944 and 1943 are listed below:

	<u>1944</u>	<u>1943</u>
5 Above 9th Level		7 Above 9th Level
0 Above 10th Level		2 Above 10th Level
0 Above 12th Level		0 Above 12th Level
4 Above 13th Level		11 Above 13th Level
25 Above 14th Level		16 Above 14th Level
Total	<u>34</u>	Total
		<u>36</u>

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

It will be noted from the above table that there were less contracts working at the end of the year as compared with 1943. Of the 34 active contracts an average of 5 were carrying on development work in 1944. This development work included the driving of the 1430 and 1450 Crosscut extensions, the developing of stope areas in the Southwest portion of the ore body just above the 14th Level, and the driving of ventilation drifts on and above the 13th Level.

The following table shows the changes in contracts due to the loss of mines in 1944. The table does not, however, indicate the actual loss of men as vacancies in a number of the contracts were filled by men from the third shift or from the Company Account classification. In spite of the reduction of the working schedule on May 15, 1944, to two eight-hour shifts per day instead of three, a general labor shortage was felt throughout the year.

	<u>1944</u>	<u>No. Miners</u>	<u>1943</u>	<u>No. Miners</u>
Three shift contracts	0	0	33	198
Two shift contracts	31	124	2	8
One shift contracts	<u>3</u>	<u>6</u>	<u>1</u>	<u>4</u>
Total Contracts and miners	34	130	36	210

In December 1943 and 1944 the number of Company Account miners remained at 27. This figure does not include a number of employees who are now on the motor crews, but were originally Company Account miners. In other words, as the younger men are being called into the armed services, their places are being filled by older men.

(2) Detail of Stoping:

Subs Above the Ninth Level

No. 2 Shaft Pillar

Mining operations were continued in the West portion of the No. 2 Shaft Pillar throughout the entire year. This small ore body lies Southwest of the dike which separates this territory from the large, mined-out area to the Northwest. During the year mining was carried on by one contract in an area which is approximately 70 feet wide and 160 feet long. Mining operations were completed on the 747' Sub-level in May, where the size of the ore body was enlarged under the jasper capping Southwest of the Raise. The general trend of the ore was toward the Southwest and against the boundary dike. In may operations on the 733' Sub-level were started to the Northeast and continued to swing to the North and West. It is apparent that one more sub-level will deplete this area with the South footwall flattening out toward the dike.

In December No. 35 Contract continued slicing West of No. 914 Raise, completing two slices to the dike and jasper. Approximately two months of mining remain before the completion of this Sub-level.

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

No. 1 Shaft Pillar - Adjacent Pillars and Stopes

This mining area, which lies on both sides and Northwest of the old No. 1 Shaft, was mined on the three sub-levels during 1944. Five Contracts were engaged in mining in this territory from Nos. 910, 908, 903-A, 901-A, and 901 Raises. Early in January mining operations were completed on the 747' Sub-level from Raise No. 910. At that time the four other contracts were well underway in the mining of the 733' Sub-level. The ore body is approximately 400' in length and an average of 120' in width. This size has remained about the same for the last three Sub-levels. The outline of the ore body on the East footwall continues to recede to the Northwest and the jasper hanging wall on the other hand increases in size in the direction of the mined-out area to the North. Therefore the actual outline of this territory remains approximately the same. In the extreme North end of this territory between two bounding dikes, the ore completely pinched out on the 720' Sub-level, with the result that in May one contract mining from No. 903 Raise was moved to another territory. In November mining operations were completed on the 720' Sub-level also in the North end, and No. 903 Raise was opened on the 700' Sub-level. Generally speaking mining operations throughout the year in this territory have been favorable, however, as new sub-levels are opened there has been an increasing amount of old timber encountered from the old square-set stopes. This condition will no doubt continue throughout the remainder of mining above the 9th Level.

In December No. 1 Contract completed a connecting drift between Raises No. 903 and 901. This drift was driven parallel to and along the lean ore footwall. After completing this connection the contract drove a small drift to the Northeast where a ventilation connection was made with the old 6 1/2 Level drift. No. 24 Contract finished two slices under jasper capping Northwest of 901-A Raise. Only a small pillar remains to the Southwest before this contract moves to the 700' Sub-level. No. 12 Contract completed two slices to the South and West of Raise 909 where a considerable amount of old timber and caving jasper was encountered. No. 43 Contract continued mining to the Northwest under crushed jasper capping where it was found that the ore was making further to the Northwest. Late in December mining operations were resumed to the South where a comparatively small pillar remains before completing the mining of this area.

No. 1 Shaft Pillar - North of the Dike

This ore area lies North of the main dike and Southeast of the old No. 1 Shaft Pillar mining limit. During the past two years this area, which is approximately 130' square, has been mined on five Sub-levels, bounded on the North and East by the lean ore footwall and on the South and West by old mined-out workings. One contract was engaged in the mining of this area from Raise No. 920-A on the 633' and 620' Sub-levels, the latter being only eleven feet above the 9th Level elevation. In April, all available ore was mined in this area and the contract was moved.

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

Subs Above the Tenth Level

One contract was engaged in mining a small ore area adjacent to the old workings on and below the 9th Level elevation. This area lies to the Northeast and Southwest of Raises No. 1005 and 1004. At the time the Raises were extended to this elevation it was evident that very little ore lay below the level elevation. This condition was later borne out when mining was started at Raise No. 1005 on the 580' Sub-level. Three short slices were completed to old workings North and East of the Raise and late in June all available ore on the 580' Sub-level had been mined and the contract was temporarily disbanded.

10th Level

With the exception of the usual cleaning and maintaining of traveling and ventilation drifts, there was no work done on the 10th Level during 1944.

11th Level

There was no mining carried on above this level during 1944 as the ore body had been entirely depleted in this territory several years ago.

12th Level

There were no mining operations carried on above this elevation during 1944. All ventilation drifts and raises which conduct the air to Sub-levels below as well as to the Maas Mine were maintained during the year.

Subs Above the 13th Level

Footwall Area North of Main Dike

In May an inclined ventilation drift was extended to the East on the 270' Sub-level from No. 1364 Raise. This drift was driven approximately 110 feet, and holed to the 12th Level drift which connects with the Maas Mine to the West. The original ventilation drift had been driven near a mining area on the 12th Level elevation and due to the heavy pressure it was impractical to continue its maintenance. The completion of this new ventilation drift greatly increased the volume of air entering the active workings at the North end of the Maas Area Strip.

Footwall Area South of the Main Dike

Early in October, in an effort to improve general conditions on the lower sub-levels, work was started on the 260' Sub-level toward driving a new ventilation connection East of No. 1369 Raise toward the 12th Level. At the present time the major portion of the ventilating air is being carried down the 11th Level winze to the 12th Level where it is distributed largely to the Northern-most mining operations adjacent to the Maas Boundary. As a result of this the mining operations in the central portion of the Negaunee Lease have been dependent on the air delivered from the North end of the 13th Level. The proposed connection on the 260' Sub-level will greatly

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

Subs Above the 13th Level

Footwall Area South of Main Dike

facilitate the ventilation of this central mining territory

In December No. 46 Contract had advanced the ventilation drift in transition slate and jasper 191 feet; approximately 10 feet remain to be driven. The completion of this work will allow the air to pass between the 12th and 13th Levels through two large independent rock drifts and raises.

Main Ore Body - North Footwall Pillar

The mining of the North end of the Negaunee Ore Body adjacent to the Negaunee Mine Boundary was completed in September. Earlier in the year two contracts were engaged in mining this area from No. 1357-A Raise and No. 1359 Raise on the 235' Sub-level. The North and East footwalls at this point flattened to such an extent that the ore body has been reduced in size as much as 60 feet in a sub-level height of 12 feet. Mining operations on the 235' Sub-level were completed in March and shortly thereafter one contract was moved as a result of reduction in the mining area size. On the 220' Sub-level the area had been reduced to approximately 140' in length by 75 feet in width, being bounded on the South and West by the old mining areas and on the Northeast by the lean ore footwall. In as much as this Sub-level is less than 20 feet above the 13th Level, some difficulty was experienced in maintaining the raise and drift through which the ore was being mined and trammed. Late in September all available ore had been mined and the contract was temporarily disbanded. It might be added that during the progress of mining a number of floor samples were taken to determine the possible extent of ore below. However, the results indicated that again the flat footwall was pinching the area entirely out. This operation marked the end of the 13th Level as an ore producing level and its further use will be for the ventilation of and traveling to the active subs in the Maas and Main Negaunee Leases.

The major portion of the production in 1944 was mined on three Sub-levels, the 210' Sub-level, the 13th Level, and the 185' Sub-level. This area lies on the Northeast footwall which dips to the West toward the Maas Mine and constitutes what has been termed as the main ore body. The actual size as mining continues on the various subs is reduced by approximately 40 feet on each Sub-level. In some instances it has been considerably more and in others somewhat less, due to the very irregular nature of the lean ore footwall. Frequent jasper "horses" have reduced the actual size, particularly in the central portion of this large ore body. These jasper intrusions seem to project up from or out of the slate footwall and often decrease the size of what appears to be a regular ore body. During the year all ore in this territory was mined from 14th Level raises, and for the most part all timber and supplies were likewise handled through the 14th Level. Five main ventilation and traveling drifts delivered air to the sixteen active contracts engaged in mining operations.

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

Main Ore Body - North Footwall Pillar: (Cont.)

Six contracts were engaged in mining on the 210' Sub-level adjacent to the North and East footwalls. As previously mentioned the outlines were very irregular, with some active workings extending fifty to sixty feet further into the foot than others where small pockets of ore protruded. This Sub-level was completed in April, at which time the mining contracts moved to the 13th Level elevation to continue operations. Due to the encroachment of the North and West footwalls one contract was eliminated from No. 1405 Raise with the result that five mining contracts were active during most of the year. In the Maas Area two of the five contracts were mining toward the North footwall and during the course of these operations it was necessary to continually provide a ventilation and traveling connection to the 13th Level. The air which enters this territory also ventilates the immediate mining areas to the South and East. The three remaining contracts, located at Raises 1409, 1407 and 1406 near the East footwall and adjacent to the Negaunee-Maas Boundary, likewise had to maintain a ventilation and traveling drift with the 13th Level. In August it was necessary to abandon Raise No. 1407 due to its rotted and crushed condition, and the mining area was taken over by the adjacent contract. Early in November the 185' Sub-level was opened at Raise No. 1406 where a ventilation connection was driven to the 1330 Crosscut on the 13th Level.

In December No. 9 Contract completed three slices South of Raise No. 1406 to the footwall on the 185' Sub-level with mining continuing to the West. On the 13th Level elevation the four remaining contracts were all nearing the end of mining at this elevation. Contract No. 18 finished two slices to the footwall North of Raise No. 1413. Contract No. 27 completed the repairing over Raise No. 1411 and thereafter mined one slice to the North footwall and late in the month were advancing a second slice in the same direction. Contract No. 14 finished the mining of a small pillar by completing two slices South and West of Raise No. 1409. Late in the month it was necessary to repair over the Raise before starting mining operations to the Northeast where a comparatively small pillar remains to be mined.

Main Ore Body - Maas Lease:

This territory comprises an area approximately 250 feet in width and 450 feet in length, lying between the original Negaunee Boundary and the Maas Mine, with the Southwest Boundary lying along the old Maas workings and to the Northeast bounded by the lean ore and slate footwall. An average of 11 contracts were engaged in mining throughout the year on the 13th Level elevation. Early in February mining had advanced to the halfway point in the Northeast portion of the area while in the Southwest end the Raises were opened in preparation for mining. Due to this heavy concentration of mining contracts it was very difficult to maintain traveling and ventilation drifts. In an effort to give all contracts sufficient air, it was necessary to use a number of auxiliary fans on the 14th Level. This concentration of mining likewise increases the pressure to such an extent that continuous repairs are necessary both to the traveling and ventilation drifts as well as over the active mining areas. In August mining operations on the 13th Level were

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

Main Ore Body - Maas Lease: (Cont.)

completed and the 185' Sub-level was opened soon after in the Southwest end of the Area. Earlier in the year a new crosscut was driven into the Maas Lease on the 14th Level from which four raises were extended to provide additional working places as the area was enlarged to the Southwest against the old Maas workings. Generally speaking mining conditions were approximately the same on the 185' Sub-level as compared with the 13th Level elevation. However, it has been possible to reduce the mining areas to the Southwest in an effort to speed up mining and open new sub-levels in the Maas Strip in advance of the areas further to the Northeast. In this way ventilation can be more readily controlled and it is hoped that the pressure can partially be reduced.

In December the following progress was made on the 185' Sub-level: Contract No. 25 finished one slice to the Maas Boundary North of Raise No. 1414 and later started a second in the same direction toward the mining limit. Contract No. 6 completed a ventilation and traveling drift between Raises No. 1412 and 1414. Late in December slicing operations were continued to the Southwest. Contract No. 31 advanced two slices to the original Negaunee Boundary South of Raise No. 1410. This mining was divided between the Maas Area Parcels No. 2 and 3. Contract No. 28 continued slicing to the Northwest where two slices were completed to old workings. Contract No. 45 completed a traveling and ventilation drift Southwest of Raise No. 1423. Contract No. 23 advanced one slice to the Northwest of Raise No. 1438 approximately 50 feet, or ten feet short of the jasper boundary. It was necessary to stop this slice due to a caving high back which made operations unsafe to continue. The contract later completed two short slices to old workings South of the Raise and near the end of December moved to their original location at Raise No. 1424 where mining operations will continue. Contract No. 36 finished the mining of a small pillar North and East of Raise No. 1426 by completing four slices with the last one serving as a ventilation and traveling drift. Contract No. 22 advanced one slice which will be used for traveling and ventilation Southwest of Raise No. 1422 and toward Raise No. 1435. Later in the month a second traveling drift was started toward Raise No. 1426. Contract No. 37 completed a short slice Southeast of Raise No. 1436 for ventilation and traveling. Later in December the re-timbering of the Raise was necessary before resuming mining operations to the Southwest. Contract No. 30 completed two slices West and South of Raise No. 1435 which mined all available ore in the Area. Contract No. 15 commenced opening the 170' Sub-level by timbering over Raise No. 1434 and later the contract was advancing a connecting drift to the North toward Raise No. 1436.

Main Ore Body North of the Dike - Negaunee Lease:

This mining territory is divided into two separate areas designated as North and South. The mining of this South Area has lagged behind due to the extension of the ore, particularly to the Southwest, as well as the hard blue steel ore which is prevalent in the area and has generally slowed mining operations. Three contracts are located and were active during the year in this South Area. Mining operations on the 220' Sub-level was completed after mining the last remaining pillar Northeast of Raise No. 1443. At this time mining operations were already underway on the 210' Sub-level in the vicinity of Raise No. 1432. Work was continued

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

Main Ore Body North of the Dike - Negaunee Lease:

on this Sub-level, which is bounded on the North by old Maas workings and on the South by the main Negaunee dike, throughout the remainder of the year.

In December Contract No. 8 completed four slices and were nearing the end of the fifth South of Raise No. 1443. This mining will finish the 210' Sub-level and early in January Contract No. 8 will commence operations on the 13th Level elevation.

As a result of the additional mining areas gained by the elimination of Raise No. 1430 in the footwall, it was necessary in July to extend a third raise, No. 1431, to the 13th Level. Two contracts were therefore engaged in mining on this elevation during the last half of the year.

In December Contract No. 21 finished three slices to the West and the old Maas workings. Late in the month due to the rotted condition of this raise, No. 1432, the contract commenced repairing the top of the raise as well as the upper crushed portion. Contract No. 7 completed two slices South of Raise No. 1431 to the dike. It will be necessary then to drive a new traveling and ventilation drift to the 13th Level.

In the North portion of the Central Negaunee Ore Body, three mining contracts were in operation during the year. In January the 13th Level elevation had been opened and mining was continued from Raises No. 1433, 1404 and 1420. This area is bounded on the North and West by the workings of active contracts and on the South and East by the footwall. In the vicinity of Raise No. 1420 a considerable portion of the regular mining territories was cut out due to the presence of a jasper horse which apparently lies on the footwall. Mining was completed at this elevation in August and the 185' Sub-level was opened soon after. At the present time the jasper horse has persisted at approximately the same size; however, it has been necessary to drift through it for ventilation and traveling. At the end of the year this sub-level was nearly mined out and it is apparent that due to the encroachment of the footwall, one contract must be moved.

In December Contract No. 32 completed two slices and a traveling and ventilation drift West and North of Raise No. 1420. A small ore pillar still remains to be mined to the Northeast before completion of the sub-level. Contract No. 40 finished two traveling and ventilation drifts through the jasper horse North of Raise No. 1404 toward Raise No. 1420, and West toward Raise No. 1432. Contract No. 33 finished two slices West of Raise No. 1433 to the Negaunee Boundary; approximately three months of mining remain near this raise before moving to the 170' Sub-level.

South of the Main Dike - Negaunee Lease:

This area is bounded on the North and South by the split of the main dike and on the West by jasper capping. To the East the dikes come together and leave a small lean ore pillar between. In January, one

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

South of the Main Dike - Negaunee Lease: (Cont.)

contract was mining in this area on the 13th Level elevation from Raise No. 1441. Mining operations continued to the East and West, or parallel to the two bounding dikes. In as much as the mining has caved portions of the 13th Level, it was necessary to continually maintain a connection between the 13th Level to the Southeast and the active contracts to the Northwest. In May all mining had been completed and the contract commenced opening the 185' Sub-level. Slicing was continued to the South parallel to and between the two bounding dikes.

Late in November a new drift was driven to the 13th Level for ventilation and traveling and in December after the completion of this work the contract was temporarily moved to prevent the possibility of caving the ventilation connection with continued mining to the East.

In April due to the need of additional mining places, Raise No. 1453 was cut out on the 185' Sub-level. This area is West of the area mentioned above, being bounded on the North and South by a split of the main dike, on the East by a small cross dike, and on the West by the jasper capping. According to the information gained at the time this raise was put up, there was apparently a jasper floor pillar which divided the ore area above and below. This jasper pillar intersects the raise at approximately the 185' Sub-level. It was therefore necessary to explore this territory to determine the extent of the ore at this elevation. One Contract continued mining throughout the remainder of the year and at the present time the ore outline is fairly well defined. In May mining was started to the Northeast and after advancing to the dike sufficient ore was found in the back to mine by transfer on the 13th Level elevation to the East and North. In September all available ore had been mined on the 13th Level elevation and the contract continued slicing on the 185' Sub-level. Later in the year a drift was driven to the West to the Maas Boundary where a small ore area was located. From this drift two small raises were extended to a height of 35 feet above the floor.

In December Contract No. 34 commenced caving the ore in the back. The actual width of the ore was approximately 20 feet between the dike on the North and the jasper capping or floor pillar to the South.

North of the Main Dike Adjacent to the Maas Boundary:

Mining operations were continued in a small area above the 1460 Crosscut and North of the main dike and adjacent to the Negaunee Boundary. Mining was continued on the 150' Sub-level and later on the 140' Sub-level. The actual slicing width is approximately 65 feet, and the length 120 feet. The mining of this area has been greatly retarded by a large amount of water which causes runs and breakdowns. This condition was made worse by the irregular jasper capping which cuts out and in on the various sub-levels

In December slicing operations were continued West of Raise No. 1463 and toward the Maas Boundary. Approximately two months of mining remain before the sub-level is completed.

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

Stope Territory South of Main Dike:

Throughout 1944 a considerable amount of the exploring and development was concentrated in this Southwest territory. Due to the general hardness of the ore as well as the extremely hard jasper capping it has been possible to continue stoping operations, and intermittent development was in progress throughout the year. Four stope transfers were driven from Raises No. 1473, 1474 and 1475 on the 140' Sub-level, which is just below the ore horizon on the South footwall. Late in 1943 the main transfer from Raise No. 1475 was completed to a distance of 180' Southeast of the Raise. Mill raises were then extended on the North side of the transfer to the 235' Sub-level, or a vertical height of 95 feet. At intervals of 20 feet traveling drifts were driven from the mills and connected with a main traveling drift. Actual stoping operations were started in March near the South footwall which is composed of comparatively soft gray slate. These operations were continued throughout the year and in December practically all available ore had been mined. It should be noted that this stope is East of and adjacent to the original hard ore stope which was mined and completed in 1943. Two dikes have served as the North and West boundaries, although the latter was found to pinch out at a point approximately 30 feet above the transfer. This condition made it possible to connect the new and old stopes for a distance of about 60 feet. With the exception of the extremely hard ore, general conditions have been very satisfactory, and the back or jasper capping was sufficiently hard to prevent any falls or slabbing which might cause dilution of the ore.

In December plans were underway to develop a small remaining ore pillar North of the old stope and above the dividing dike.

Work in opening a second stope from Raise No. 1474 was continued throughout 1944. This stope is adjacent to the above-mentioned hard ore stope and is divided by two dikes which run in a Southeasterly direction. The transfer was completed Southeast of Raise No. 1474 on the 140' Sub-level in January. A mill raise was then extended to the 160' Sub-level, and a second transfer was driven Southeast into the slate footwall. A series of mill raises were then extended to the 13th Level elevation (35 feet above) and in May stoping was started. Due to the flatness of the slate footwall two transfers were necessary and continued in operation throughout the remainder of the year. This stope is bounded on the North by jasper and lean ore and on the South by a dike. The actual stoping width was approximately thirty feet and the height 42 feet.

In December Contract No. 20 had continued stoping to a point where it will be possible to eliminate the second transfer. In other words, the stope is about half worked-out, and about 80 feet length remains to be mined before the completion of the stope.

As a result of diamond drill hole No. 49, which was drilled Northwest of the connecting drift on the 160' Sub-level a third stope was started with the transfer being extended to the North of Raise No. 1473. This transfer was driven to the South branch of the main Negaunee dike, where development was continued by small drifts and raises to the 195' Sub-level. The stope length and width was approximately 60 feet, and it was found that the

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

Stope Territory South of Main Dike: (Cont.)

ore was very irregular, with the jasper capping cutting in and out on both East and West sides. Late in November stoping operations were completed, and Contract No. 17 was moved to a new location.

A fourth transfer, which was largely exploratory, was driven from the 140' Sub-level Northeast of Raise No. 1474. This drift was driven 75 feet to the jasper and mill raises were extended on either side to explore a small area adjacent to the main intersecting dike which divided the two active stopes to the Southeast. After a considerable amount of exploring by drifting and raising, operations were stopped. It was found that the jasper continued along the dike with the ore rising only a few feet above the back of the transfer. Some time in the future further exploration will be made at a lower elevation.

d. Timbering:

The total cost of timbering increased slightly in 1944 as compared with 1943. As indicated in the cost statement the total expenses of timbering is slightly less than the total cost of stoping or mining. The actual increase of timbering cost amounted to approximately .01 per ton in 1944, or .457 as compared with .446 in 1943. This slight increase can be attributed to a reduced tonnage in 1944 as well as general mining conditions during the year. As previously mentioned in this report, about 60% of the product for the year was mined on one sub-level. In this situation raises are comparatively close to one another and the pressure greatly increases, requiring frequent repairs. Possibly another reason for the slight increase is the speed with which mining has been carried forward. In other words, the timber mat does not have sufficient time to come to rest **Before** mining commences on the sub-level below.

During this war period, when forestry products of all kinds are in such demand, the mining timber has become generally poorer, with the result that the mine is using some timber which ten years ago would have been considered unfit for mining. This condition as well as the increased cost would also result in high timbering charges. During the year there was an ample supply of all types of timber and no serious shortage can be foreseen at this time.

The district sawmill, located at the Negaunee Mine, has greatly facilitated the supplying of special timber for the entire district. The mill has cut a large number of tamarack ties, sills, uprights, and two-inch plank, together with a small quantity of special timber stock for trucks and top-tram spools.

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

	<u>Lineal Feet</u>	<u>Avg. Price Per Foot</u>	<u>Amount 1944</u>	<u>Amount 1943</u>
6" to 8" Cribbing	64,715	.0515	3,332.35	8,974.58
8" Stulls	101,231	.0911	9,221.59	12,531.52
10" Stulls	131,726	.1293	17,034.24	21,469.45
12" Stulls & Over	<u>99,756</u>	<u>.1950</u>	<u>19,452.60</u>	<u>21,083.79</u>
Total	397,428	.1234	49,040.78	64,059.34
Lagging - 7 ft.	2,044,055	.0136	27,907.25	26,800.93
Poles - 9 $\frac{1}{2}$ ft.	<u>1,691,592</u>	<u>.0185</u>	<u>31,248.32</u>	<u>38,682.28</u>
Total	3,735,647	.0158	59,155.57	65,483.21
Wire Fencing - Feet	4,620	.0634	<u>292.86</u>	<u>176.31</u>
Grand Total			108,489.21	129,718.86

	<u>1944</u>	<u>1943</u>
Product	757,677	954,990
Feet timber per ton of ore	.525	.636
Feet of lagging per ton of ore	2.698	2.533
Feet of poles per ton of ore	2.233	2.233
Feet of lagging per foot of timber	5.143	3.985
Feet of wire fencing per ton of ore	.0061	.0029
Cost per ton for timber	.0647	.0671
Cost per ton for lagging	.0368	.0280
Cost per ton for poles	.0412	.0405
Cost per ton for wire fencing	.0004	.0002
Total Cost Per Ton	.1431	.1358

Total Cost for Timber, Lagging, Poles, Etc.

<u>Year</u>	<u>Product</u>	<u>Amount</u>	<u>Cost Per Ton</u>
1944	757,677	108,489.21	.1431
1943	954,990	129,718.86	.1358
1942	1,106,694	123,588.82	.1117
1941	1,033,220	96,802.32	.0937
1940	865,689	79,331.40	.0916
1939	551,362	57,608.66	.1045
1938	412,000	43,788.52	.1061

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7. UNDERGROUND: (CONT.)

e. Drifting and Raising:

The following list gives a comparison of the total footage of drifting and raising for the years 1944 and 1943:

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>		<u>Grand Total</u>
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>	
1944	2357'	1276'	1701'	151'	5,485'
1943	1567'	903'	2015'	758'	5,243'
Increase	790'	373'			242'
Decrease			314'	607'	

As indicated above there was an increase in drifting in ore and rock in 1944 with a reduction in raising in ore and rock. A major portion of the footage in drifting and raising was incurred in developing the sub-level stopes between the 13th and 14th Levels.

f. Explosives, Drilling and Blasting:

The total cost of all explosives decreased 24.6% in 1944 while the production decreased 20.6%. As the cost of powder was the same in 1943, the difference in the above percentages indicates that there were less explosives used in mining a ton of ore in 1944. This slight reduction is the result of a generally softer ore found in the lower elevations of the Maas Area. Possibly another contributing cause toward this reduction is that more ore was mined by the sub-level stoping method in 1944 as compared with 1943. This mining method generally requires less powder per ton of ore mined; however, this might possibly be offset in the developing of the stoping areas where more powder is used in driving small drifts and raises. The explosives for this development cost approximately \$1.00 per foot in the harder ore areas.

The supervision of blasting practices was continued during the year by the shift bosses at regular intervals. Following the fatal blasting accident at the Negaunee Mine in 1943, which resulted from a violation of the rule that miners must leave when one hot wire fuse lighter burns out, the time interval for inspection reports was reduced to two months. During 1944, 447 inspections were made on 35 mining contracts of four men each, or 70 individual crews. In other words each crew was inspected slightly more than once every two months. These reports not only keep the miners conscious of blasting dangers but also the supervisory force in checking over all phases of the handling of explosives.

The present auger steel drills in use in the mine and manufactured in the United States are of poorer quality than those of several years ago which were made of Swedish steel. Throughout the year complete tests were made on various types and grades of auger steel. In cooperation with the manufacturer, it can be definitely said that these tests have resulted in some improvement. They will be continued throughout 1945 and it is believed that a definite improvement will result.

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7. UNDERGROUND: (CONT.)f. Explosives, Drilling and Blasting: (Cont.)

The following statement gives a comparison of powder costs, etc., for the past ten years:

<u>Year</u>	<u>Cost per lb. For Powder</u>	<u>Lbs. Powder Per Ton of Ore</u>	<u>Cost Per Ton For Powder</u>	<u>Cost Per Ton Fuse & Caps</u>	<u>Total Cost</u>
1944	.1150	.4723	.0543	.0107	.0650
1943	.1150	.4918	.0566	.0115	.0681
1942	.1150	.4788	.0551	.0117	.0668
1941	.1150	.4792	.0551	.0118	.0669
1940	.1151	.4485	.0516	.0111	.0627
1939	.1176	.4584	.0539	.0113	.0652
1938	.1225	.4320	.0530	.0102	.0632
1937	.1195	.4270	.0510	.0110	.0620
1936	.1104	.4320	.0475	.0105	.0580
1935	.1168	.4270	.0498	.0102	.0600

Statement of Explosives Used: (Ore Development and Stopping)

	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1944</u>	<u>Amount 1943</u>
Gelamite #1	312,900	11.50	35,983.51	50,823.74
60% Gelatin	44,950	11.50	5,169.25	3,194.45
Total Powder 1944	357,850	11.50	41,152.76	54,018.19

Fuse - feet	1,139,711	5.15	5,863.71	7,936.19
#6 Blasting Caps	154,732	12.20	1,887.75	2,643.07
Tamping Bags	30,000	5.00	149.75	174.08
Fuse Lighters	27,800	6.75	187.70	279.05
Total Fuse, etc. 1944			8,088.91	11,032.39

Total Cost All Explosives 49,241.67 65,050.58

Product - Tons			757,677	954,990
Pounds Powder per ton of ore			.4723	.4918
Cost per ton for powder			.0543	.0566
Cost per ton for fuse, caps, etc.			.0107	.0115
Cost per ton for all explosives			.0650	.0681

(Sinking, Rock Development, etc.)

Gelamite #1	5,250	11.50	603.75	508.30
60% Gelatin	3,600	11.50	414.00	1,569.75
Total Powder 1944	8,850	11.50	1,017.75	2,078.05

Fuse - feet	27,340	5.14	140.47	226.78
#6 Blasting Caps	4,050	12.20	49.43	66.46
Tamptite Paper Shells				1.20
Total Fuse, etc. 1944			189.90	294.44

Total Cost All Explosives 1944 Rock Development 1,207.65 2,372.49

Grand Total All Explosives Used 1944 50,449.32 67,423.07

Average Price per Pound for Powder in 1944 .115 .115

Explosives Used for Stopping and Development	50,449.32
Explosives Used for Other Work	782.81
<u>Total as per Cost Sheet</u>	<u>51,232.13</u>

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7. UNDERGROUND: (CONT.)

g. Mining and Loading:

There were no changes in 1944 in the top slicing mining system which has been followed at the Negaunee Mine for a number of years. During the past two years several stopes have been developed and mined in the Southwest portion of the ore body. This area is divided from the main slicing territory by a large dike with the result that there is no ground pressure in the vicinity of the stoping area. The jasper capping is extremely hard with the result that stoping can be carried on with practically no dilution. The original ore was located by diamond drilling and a number of small cross dikes intersect the area with ore rising on either side of the dikes. By using the stoping method the ore limits can be definitely outlined by small drifts and raises so that a high percentage of recovery can be made.

There were no changes in scraping practices in 1944. The use of the 42-inch box type scraper was continued throughout the year and it has proven very satisfactory. These scrapers are made in the mine shops and require very little maintenance. On the main sub-levels where traveling and ventilation drifts are difficult to maintain, small, 28-inch, hoe type scrapers have been used to keep the loose ore from building up on the floor of the sub-level. These scrapers are semi-portable and have proved of great benefit in maintaining these openings. Relative to transfer scrapers, it was found that a heavier, 48-inch, hoe type scraper was more satisfactory where long distances must be scraped and where the ore is extremely hard and blocky. These scrapers can be broken down to three pieces and easily moved.

h. Ventilation:

The new Aerodyne Fan which was put into operation at the No. 2 Shaft in February, 1942 operated constantly during the year with the exception of a short interval in December, when the 125 horsepower motor burned out. During the interval the spare fan was put in service until a replacement motor could be installed. The heating plant was in operation approximately four months during the more severe winter weather. The general ventilation system has for the most part remained unchanged as far as the Negaunee and Maas Mines are concerned. Semi-annual inspections by the Safety and Engineering Departments continue to show good results in the ventilation of these two mines. These inspections showed an intake of approximately 98,000 cubic feet per minute, which was distributed between the various levels, of which the 9th, 13th and 14th are the only Levels active. The connection between the Negaunee 12th and the Maas 3rd Levels allow approximately 18,000 cubic feet of fresh air to pass into the Maas Mine and be distributed at different elevations. On the 14th Level there are three connections with the Maas Mine which carry approximately 60,000 cubic feet per minute to the active levels in the Maas Mine. It should be noted that there is a partial leakage on each of the Negaunee Mine levels and it is frequently necessary to open doors on the 13th and 14th Levels to prevent blasting smoke from entering the Maas Mine. In November of this year, due to the severe weather, the blade position on the Aerodyne Fan was changed to reduce the total volume to 84,000 cubic feet per minute. This, together with the heating plant, prevents the shaft from freezing and does not greatly affect general mining conditions. As previously mentioned in this report, approximately 900 feet of rock drifts and raises were driven during 1944 on and above the 13th Level to increase and better distribute the air from the 12th Level. An 18,000 cubic foot

NEGAUNEE MINE
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7. UNDERGROUND: (CONT.)

h. Ventilation: (Cont.)

booster fan was also put in service in the 1420 Crosscut near the Maas connection. This installation has greatly improved the ventilating of this concentrated area. During the year an average of eight small auxiliary fans were used in various segregated mining locations where added ventilation was necessary. Early in 1945 it is hoped that these fans can be replaced by a second 18,000 cubic foot fan which will ventilate the central portion of the large mining sub-level just below the 13th Level.

i. Pumping:

The average number of gallons of water pumped per minute in 1944 were 713, or a decrease of 57 gallons per minute from the previous year's average. It is difficult to account for this decrease in as much as there was no particular change in the rainfall during the summer months. Generally speaking a very small proportion of this water enters the mine through active workings. Approximately one-half of the total gallons pumped entered the mine above the 9th Level and have little or no effect on mining conditions.

The number of gallons pumped per minute in each month of the year for the past six years are shown in the following table:

<u>Month</u>	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>	<u>1939</u>
January	740	668	671	612	892	947
February	712	660	636	591	857	938
March	690	713	635	584	768	944
April	673	671	627	582	700	963
May	679	726	641	824*	747	995
June	787	794	659	838	678	1085
July	804	843	666	602	679	1177
August	805	858	662	613	685	1112
September	732	849	662	612	657	1067
October	654	833	667	605	644	1033
November	642	860	671	629	640	979
December	634	761	675	646	618	947
Total Average	713	770	656	645	714	1015

(*) Athens Mine water diverted to Negaunee Mine for the months of May & June.

The following statement shows the average number of gallons pumped per minute for the past ten years:

<u>Year</u>	<u>Gallons Per Minute</u>
1944	713
1943	770
1942	656
1941	645
1940	714
1939	1015
1938	1015
1937	1069
1936	914
1935	918

NEGAUNEE MINE
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7. UNDERGROUND: (CONT.)

i. Pumping: (Cont.)

The deep well on Section 32, located several hundred feet from the cave North of #2 Shaft, operated throughout the entire year. The average number of gallons per minute pumped amounted to 164, which is considerable less than the total in 1943. This reduction is likely the result of changing water ledges which result from the large caved area to the West. It is evident, however, that this well has greatly lessened both the volume of water and cost of underground pumping.

j. Underground in General:

The production in 1944 was 757,677 tons of ore produced by an average of 35 contracts working slightly more than 10 shifts per week. The production shows a decrease of 197,313 tons as compared with 1943. This reduction in tonnage corresponds with the loss of approximately 100 men. The gross estimate of 1,700,000 tons would, at the present rate of production, indicate that the life of the Negaunee Mine is slightly in excess of two years. However, some prospective ore will be doubtless developed which will extend the life of the mine possibly another year or more. Actually the life of the mine will be considerably lengthened as it will be impossible to continue this high rate of production as the ore areas are reduced in size.

NEGAUNEE MINE
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8. COST OF
OPERATING:

a. Comparative Mining Costs:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Product - Tons	757,677	954,990		197,313
Underground Costs	1.361	1.357	.004	
Surface Costs	.133	.115	.018	
General Mine Expenses	<u>.202</u>	<u>.224</u>		.022
Cost of Production	1.696	1.696		
Taxes	.151	.139	.012	
Depl. & Depreciation	.150	.148	.002	
Loading & Shipping	.044	.036	.008	
Adm. & Gen. Expense	.051	.055		.004
Miscellaneous Income	<u>.001</u>	<u>.007</u>	<u>.006</u>	
Total Cost	2.091	2.067	.024	
Budget Estimate	2.192	2.142		
No. of Days Operated	283	308		25
Total No. Shifts Operated	635	823		188
No. Shifts & Hours	1, 2, & 3-8 hr.	1, 2, & 3-8 hr.		
Average Daily Product	2,677	3,101		424

Cost of Production:

	<u>1944</u>	<u>Percent</u>	<u>1943</u>	<u>Percent</u>	<u>Increase</u>	<u>Decrease</u>
Labor	1.101	65.0	1.153	68.0		.052
Supplies	<u>.595</u>	<u>35.0</u>	<u>.543</u>	<u>32.0</u>	.052	
Total	1.696	100.0	1.696	100.0		

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1944

8. COST OF OPERATING:

b. Detailed Cost Comparison:

(1) Days and Shifts:

<u>Year</u>	<u>Days Mine Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Shifts Worked</u>
1944	283	1, 2 & 3-8 hr.	411	101,539
1943	<u>308</u>	1, 2 & 3-8 hr.	<u>498</u>	<u>130,861</u>
Decrease	25		87	29,322

(2) Wages:

There was no increase in wages during 1944.

(3) Comparison of Production:

Production - 1944	757,677 tons
Production - 1943	<u>954,990 tons</u>
Decrease	197,313 tons

(4) Comparison of Number of Men and Wages:

	<u>No. of Men</u>	<u>No. of Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1944	411	101,539	801,796.76	7.90
1943	<u>498</u>	<u>130,861</u>	<u>1054,565.80</u>	<u>8.06</u>
Decrease	87	29,322	252,769.04	.16

(5) Tons Per Man Per Day:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Surface	37.65	41.98		4.33
Underground	<u>9.31</u>	<u>8.83</u>	<u>.48</u>	
Total	7.46	7.30	.16	

(6) Cost of Production:

1944	\$1,284,789.87	Cost Per Ton	1.696
1943	<u>1,620,239.37</u>	Cost Per Ton	<u>1.697</u>
Decrease	335,499.50		.001

	<u>Labor</u>	<u>Percent</u>	<u>Supplies</u>	<u>Percent</u>
1944	834,083.76	65.0	450,706.11	35.0
1943	<u>1,110,074.05</u>	<u>68.0</u>	<u>519,103.18</u>	<u>32.0</u>
Decrease	275,990.29		68,397.07	

NEGAUNEE MINE
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8. COST OF OPERATING: (CONT.)

YEAR 1944

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

	1944		1943
Days Per Week	5 & 6		6
Shifts and Hours	1-8-26 2-8-162 3-8-95		1-8-48 2-8-5 3-8-255
Production, Tons	757,677		954,900
Average Daily Production, Tons	2,677		3,101
Number of Days Works	283		308

UNDERGROUND COSTS:

	Amount	Per Ton	Amount	Per Ton
1. Exploring in Mine	2731.79	.004	2183.49	.003
3. Development in Rock	9486.49	.013	15479.13	.016
4. Development in Ore	26766.73	.035	25790.02	.027
5. Stopping	358545.59	.473	498749.46	.522
6. Timbering	346330.13	.457	427179.10	.446
7. Tramming	91803.99	.121	130149.49	.136
8. Ventilation	22887.34	.030	17780.14	.019
9. Pumping	36627.13	.048	37226.64	.039
10. Compressors and Air Pipes	48382.87	.064	49581.75	.052
11. Back Filling			332.90	---
12. Underground Superintendence	34952.52	.047	36390.03	.038
14. Maint: Compressors-Power Drills	1946.99	.003	1781.85	.002
15. Scraper Equipment	22929.57	.030	22381.71	.024
16. Electric Tram Equipment	24564.69	.032	27751.51	.029
17. Pumping Machinery	3044.51	.004	3647.05	.004
Total Underground Costs	<u>1031000.34</u>	<u>1.361</u>	<u>1296404.27</u>	<u>1.357</u>

SURFACE COSTS:

18. Hoisting	40362.50	.053	47375.56	.050
19. Stocking Ore	11849.20	.016	12259.00	.013
21. Dry House	13418.33	.018	12003.64	.013
22. General Surface Expense	14496.20	.019	14775.05	.015
23. Maint: Hoisting Equipment	7700.08	.010	10393.23	.011
24. Shaft	4277.73	.006	4977.29	.005
25. Top Tram Equipment	2385.43	.003	3448.16	.004
26. Docks, Trestles, & Pockets	5435.39	.007	2848.66	.003
27. Mine Buildings	1196.16	.001	1344.02	.001
Total Surface Costs	<u>101121.02</u>	<u>.133</u>	<u>109424.61</u>	<u>.115</u>

GENERAL MINE EXPENSES:

Employees Vacation Pay	21751.30	.029	22183.98	.023
28. Insurance	5266.63	.007	6426.84	.007
29. Mining Engineering	2643.05	.003	3215.49	.003
30. Mechanical & Elec. Engineering	2496.80	.003	2867.98	.003
31. Analysis and Grading	20746.49	.027	24479.57	.026
32. Personal Injury	15071.85	.020	24641.44	.026
33. Safety Department	2217.66	.003	2263.93	.002
34. Tel. and Safety Devices	3785.67	.005	5016.65	.005
35. Local & General Welfare	4156.67	.005	6094.90	.006
36. Special Exp., Pensions, All.	9928.11	.013	46135.04	.049
37. Ishpeming Office	21888.28	.029	22375.20	.024
38. Soc. Security Taxes	20882.80	.028	24979.95	.026
39. Mine Office	21833.20	.029	23779.72	.025
Total General Mine Expenses	<u>152668.51</u>	<u>.202</u>	<u>214460.49</u>	<u>.225</u>
COST OF PRODUCTION	<u>1284789.87</u>	<u>1.696</u>	<u>1620289.37</u>	<u>1.697</u>

40. Taxes	114695.60	.151	132710.85	.139
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