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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

A summary of shipments since the Inland Steel Company acquired the lease shows:

	Tons
Standard ore shipped 1933-1944	2,820,304
Silicious ore shipped 1933-1944	821,192
Total	3,641,496

c. Ore in Stock

The stockpile balance on December 31st, shown below, compares with 61,329 tons last year:

Grade	Tons
Morris Standard	28,315
Morris Silicious	12,036
Total	40,351

e. Production by Months

Month	Days	Morris Standard	Morris Silicious	Total Tons	Tons per Man per Day
January	21	19,768	5,208	24,976	5.40
February	21	21,924	3,312	25,236	5.51
March	23	21,323	6,755	28,078	5.60
April	20	17,159	9,005	26,164	6.00
May	21	19,267	7,750	27,017	6.18
June	24	20,526	9,280	29,806	6.06
July	22½	20,884	6,458	27,342	5.93
August	25	23,433	5,515	28,948	5.97
September	22½	15,866	11,050	26,916	6.23
October	24	17,288	7,003	24,291	5.33
November	23	14,557	5,974	20,531	4.90
December	22	14,956	4,692	19,648	4.90

The loss in men, from a total of 220 in January to 178 in December, and the reduced proportion of ore from sub level stoping operations, was reflected in the downward trend of efficiency and production in the table above. The tons per man figures compare with an average of 6.37 in 1943 and 6.22 in 1942.

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2. PRODUCTION SHIPMENTS & INVENTORIES (Cont.)

The production schedule was 2 shifts per day, 5 days per week January 1st to June 5th, with an eleventh mining shift added on the Saturday day shift thereafter. The men thus received 40 hours per week to June 5th, and 44 hours for the balance of the year.

f. Delays

There was a one day delay May 26th due to the breaking of a skip hoisting rope. The loaded skip dropped 200' to the shaft bottom, and one day's production was lost in removing it and placing the new rope and skip in service. Fortunately there was no accident to personnel, or damage to the shaft.

3. ANALYSIS

Shipments

The combined dried analysis of ores sampled and analyzed by the Inland Steel Company for 1944 follows:

	Tons	Iron	Phos.	Silica	Mang.	Alum.	Moist.
Morris Standard	236,764	59.39	.071	8.52	.53	2.74	11.67
Morris Silicious	83,169	51.60	.066	17.89	.39	4.09	10.92

Dried Analysis Ore in Stock Dec.31,1944

	Tons	Iron	Phos.	Sil.	Mang.	Moist.
Morris Standard	28,314	59.34	.070	8.14	.53	11.70
Morris Silicious	12,036	51.25	.059	18.85	.39	10.90

Analysis of Ore Reserves — Expected Natural Analysis

	Tons	Iron	Phos.	Silica	Mang.	Alum.	Sul.	Moist.
Morris Standard	3,989,324	52.10	.066	8.39	0.44	2.47	.013	11.70
Morris Hi-Sulphur	144,608	52.15	.092	7.25	0.40	2.26	.400	10.50

4. ESTIMATE OF ORE RESERVES

The estimated total ore reserve, using a factor of 12 cu.ft. per ton and allowing deductions for rock and loss in mining, stood at 4,133,932 tons on December 31, 1944. This compares with a total of

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4. ESTIMATE OF ORE RESERVES (Cont.)

3,071,595 tons for the previous year. The actual gain, however, amounted to 1,371,290 tons when 1944 production is considered. The estimate includes 144,608 tons of high sulphur ore on Chase Lease #24, leaving a net total of 3,989,324 tons of Morris Standard as of December 31, 1944.

The following table shows a summary of the estimate by leases with the changes that have occurred during the year. It brings out the fact that the ore reserve on the fee land has practically tripled by reason of the 1,024,600 ton increase over the former estimate of 573,815 tons.

Description	Estimate 12-31-43	1944 Product Standard	1944 Product Silicious	Estimate Deducting Product	Actual Est. Dec. 31,1944	Increase over 1943 Est.
Chase Lease #9	1,884,682	122,048	39,360	1,723,274	2,068,825	345,551
Chase Lease #24	409,077	54,423	28,613	326,041	327,180	1,139
Hi-Sul.Chase Lease #24	144,608	-	-	144,608	144,608	None
Chase Lease #25	33,273	-	-	33,273	33,273	"
Chase Lease #26	26,140	-	-	26,140	26,140	"
Total Lease	2,497,780	176,471	67,973	2,253,336	2,600,026	346,690
C.C.I.Co.Lands	573,815	50,480	14,029	509,306	1,533,906	1,024,600
TOTAL	3,071,595	226,951	82,002	2,762,642	4,133,932	1,371,290

5. LABOR & WAGES

The labor shortage that developed late in 1943 became more severe with each passing month in 1944, so that Inland, in company with all other operators in the district, found it impossible to maintain a full working crew for the two shift operation. The working force decreased approximately 20% in 1944, the heaviest losses occurring in May, August and October when men were drafted, or went to work in woods, shipyards or other war plants. This had the effect of reducing the number of mining contracts working underground from 21 in January to 17 in December. The attendant result on production may be noted in the table under Section 2 e of the report.

Wage schedules continued unchanged with a base rate of 78¢ per hour and overtime provisions, but under hearing by the WLB were demands by the union which may retroactively provide increased wages, shift differential premiums, additional vacation allowances and a number of other increases.

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6. SURFACE

There were no special changes or improvements to the surface plant during the year.

Surface Pumping:

Deep well pumps continued operating in hole Nos. 1,2,3A,4,5,6,8 and 9. Two small pumps also operated intermittently in the two caves. A new well, No. 10, was put down in a favorable location and started pumping on December 11th, to increase the overall rate considerably for that month. The average rate for the year, however, was practically the the same as 1943, although the operating expense was considerably greater as shown in the following comparative table:

	1943	1944
Average surface pumping rate	2,242.4 GPM	2,243.04 GPM
Capital Expenditures	$ 17,689.79	$ 5,139.00
Operating Expenditures	20,134.00	41,859.00
Total Cost	$ 37,823.79	46,998.00

The operating cost per ton of ore produced in 1944 amounted to $.135.

A detailed record of the pumping rates at the various wells by months in 1944 follows:

	Jan.	Feb.	March	April	May	June
Pump No. 1	270	240	240	180	Down	Down
2	110	104	98	88	94	103
3A	1120	1000	1120	661	661	680
4	Down	60	60	60	60	50
5	420	390	390	339	Down	Down
6	100	100	100	100	100	100
8	476	472	472	446	450	465
9	-	263	267	267	253	257
10	-	-	-	-	-	-
Cave #1	-	-	-	-	15	12
2	-	-	-	-	30	30
Average	2508	2566.2	2674.8	2266.6	2074.9	1658.2

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Pump No. 1	Down	400	400	Down	350	330
2	103	107	110	107	96	90
3A	680	Down	590	520	515	485
4	50	50	50	50	50	50
5	Down	Down	Down	285	285	285
6	100	100	100	100	100	100
8	475	475	475	475	440	440
9	238	250	137	200	228	242
10	-	-	735	730	Down	1095
Cave #1	12	12	12	12	12	-
2	30	30	30	30	30	-
Average	1651.6	1653.7	1801.0	2590.7	2689.6	2781.2

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6. SURFACE (Cont.)

The deep well pumping was effective in lowering the average ground water level 2'10-3/8", approximately the same amount as in 1943. The total average distance lowered since pumping started in August 1937 now amounts to 52'6-3/4" as measured in the test holes in the sand and gravel above rock ledge. There were four new test holes recorded in 1944 numbered 531 to 534 inclusive, and the following tabulation reviews the changes in water level during the year and for the entire period:

Test Hole	Drop in Water Level: Year 1944	Drop in Water Level: August 1937 to December, 1944	Depth Remaining to Ledge
504	11'4-3/4"	71' 2-3/8"	77' 7-1/4"
505	3'7-1/4"	44'10-3/4"	86' 2-3/8"
506	2'8-3/8"	51' 8-3/8"	35' 6"
507	-	123'10-3/4"	None
508	1' 1-1/4"	68' 7-1/4"	65' 00"
509	1'0"	73' 00"	116' 8-3/8"
510	2'8-3/8"	30' 7-1/4"	93'00"
511	0'2-3/8"	24' 9-5/8"	129' 3-5/8"
512	3'7-1/8"	39'00"	122' 1-1/4"
513	2'7-1/4"	25' 1-1/4"	141' 2-3/8"
514	0'3-1/2"	24' 9-5/8"	102' 1-1/4"
515	2'0"	19' 00"	109' 7-1/4"
516	0'6"	22' 2-3/8"	21' 3-5/8"
517	0'9-5/8"	19' 7-1/4"	92' 6"
518	4'6"	29' 2-3/8"	80' 4-3/4"
519	5'2-3/8"	59' 9-5/8"	98' 10-3/4"
520	-	50' 7-1/4"	None
521	-	32'00"	None
522	-	89'11"	7' 11"
523	-	68'00"	4' 8-3/8"
524	10'10"	34'10-3/4"	98' 1-1/4"
526	2'7-1/8"	15' 3-5/8"	98' 8-3/8"
527	3'3-5/8"	4' 8-3/8"	70' 3-5/8"
528	3'3-1/2"	1' 1-1/4"	100' 7-1/4"
531	1'3-5/8"	1' 3-5/8"	75' 4-3/4"
532	4'1-1/4"	4' 1-1/4"	80'00"
533	2' 10-3/4"	2' 10-3/4"	129' 2-3/8"
534	0'8-3/8"	0' 8-3/8"	94' 8-3/8"
Peronto Well	-	9' 4-3/4"	None
Average	2'10-3/8"	52' 6-3/4"	

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7. UNDERGROUND

a. Pumping

The water entering the Morris Mine reached a high of 1157 GPM in 1940, declined gradually to 844 GPM in 1942, rose to an average of 931 in 1943 and then dropped off again to 895.2 GPM in 1944. Decreases occurred on the 7th and 8th Levels which were partially offset by an increase on the 4th Level due probably to extension cracks in the ledge tapping additional surface water, and on the 9th Level due to extended mining and development.

A review of the gallons per minute on the various levels by months through 1944 follows:

	4th Level	6th Level	7th Level	8th Level	9th Level	Total
January	132.0	44.7	220.8	264.7	264.3	926.4
February	132.0	43.6	213.3	253.9	243.0	885.9
March	135.5	43.6	198.7	224.5	242.9	845.2
April	132.8	40.7	184.6	274.6	228.0	860.7
May	138.1	41.5	186.5	251.1	246.5	863.7
June	152.5	48.4	173.7	290.9	239.5	905.0
July	160.1	52.5	167.1	317.3	247.9	944.9
August	158.7	53.0	171.9	291.9	260.5	936.0
September	158.9	52.5	171.9	275.8	254.0	913.1
October	165.9	50.2	167.0	256.5	245.6	885.2
November	161.5	46.6	160.5	261.8	280.0	910.4
December	162.4	43.1	148.9	255.8	277.3	887.5

The underground pumping expense amounted to $59,219, and this added to the cost of operating the surface deep well pumps totalled $101,078, or a cost of 32.7¢ per ton of ore hoisted. These figures compare with a total expense of $96,345 and a cost per ton of 18¢ in 1943, the large differential in the latter resulting from the decreased 1944 ore production.

The average cost of pumping of 32.7¢ per ton exceeded normal figures, and compares with costs ranging from 3¢ to 11¢ for other mines in the district. A decrease is not presently indicated in the $8,400 monthly expense so a production of 25,000 tons per month will be necessary to avoid a still higher pumping cost in the coming year.

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7. UNDERGROUND (Cont.)

b. Development

During 1943 an average of four or five contracts were on development work underground. The loss of manpower was responsible for reducing this work to a minimum in 1944, and as a result, only two contracts continued during most of the year. Both of them were drifting on the 9th Level in standard or silicious ore so that for the greater part of the year, no rock was hoisted from development.

Development drifting on the 9th Level, as mentioned previously in other sections of the report, was responsible for a considerable increase in the Morris Mine ore reserve. The development by No. 11 contract west of the second cross-cut was in ore parallel to the south dike, and will be completed early in 1945. In normal sequence this will mean that the larger share of development during the coming year will be raising to prepare #33 deposit for mining between the 8th and 9th Levels.

The outstanding development in 1944, of course, was the drift easterly from the first 9th Level crosscut which had covered a distance in excess of 800' in ore by the end of the year. Three sections were cross-cut on this new ore body and a maximum width of 140' disclosed at the east end. Development drifting will be continued in 1945 with the expectation of extending ore outlines farther in this direction.

The footage of small drift and raise development in advance of sub-level stoping operations, was considerably below the average for the past several years. Nos. 4 and 9 contracts on Chase Lease #24 at times did a small amount of work in this connection, but both of these stopes had ceased operations prior to December, and No. 9 contract was then engaged in raising operations preparatory to top slicing the ore area west of their former stope.

c. Stoping

Mining operations continued on Chase Lease #24, Chase Lease #9 and the Fee Lands to the south and east. The vertical extent ranged from the 90' sub level to the -190' sub. The mine product, which averaged in excess of 25,000 tons per month, resulted from an average of less than 16 mining contracts, together with the ore resulting from the development work described above.

The mine product declined sharply during the last three months of the year as a result of discontinuing all sub level stoping operations. Three sub level stopes were being mined prior to this time, two of which

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7. UNDERGROUND (Cont.)

were on Chase Lease #24 and the third on Fee Land to the east. One of these stopes was mined out in August, the second one caved in September, and the third was discontinued in December as a result of dilution and difficult water conditions. A comparison in January 1944 showed 19 mining contracts, three of whom were stoping, and in December, 1944, there were but 14 contracts, all of which were using the top slicing method of mining.

A detailed description of mining operations follows:

Chase Lease No. 24

Four contracts were mining on this lease at the end of the year. The mining operations of No. 4 contract at the west end of #75 deposit extended from the 10' to the 90' sub levels. Stoping operations were conducted here during all but the last several months of 1944, and resulted in extending the mined opening a maximum distance of 70' to the west on the 50' sub. The jasper outline had been reached on all sub levels prior to the cave and after this occurred, No. 4 contract started top slicing operations under their former stope on the 10' sub, and this mining was in progress at the end of the year. No. 22 contract started top slicing operations east of No. 4 workings in September. Mining drifts were extended some 70' southwest of the raise on the 0' sub, and the ore lying between this elevation and the bottom of No. 4 stope was mined through these drifts. Farther east in the central portion of No. 75 deposit, No. 21 contract continued the mining of the narrow portion of the deposit on sub levels from the 80' to the 20'. This top slicing operation was in progress east of the raise in December, the mining drift having advanced 120' in this direction.

The stope operations of No. 9 contract in #82 deposit in the southerly portion of Lease #24, together with the No. 4 stope, were the two most productive mining areas in 1944. The operations of No. 9 contract, however, were under rather difficult conditions with water from the old mining areas to the east forming the largest problem. The stoping operation of No. 9 reached from the -10' sub under the jasper capping to the transfer on the -190' sub, a vertical height of 180', with the largest mined area occurring at the -90' elevation. Dilution from the jasper hanging wall forced abandonment of the stope in September, although the opening on upper subs at that time was not much more than 30' in diameter. Development work of this contract in November and December was then underway preparatory to starting top slicing west of the stope area.

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7. UNDERGROUND (Cont.)

A diamond drill station was cut on the north side of the main 8th Level drift centered on the 3600 W. coordinate line. From this station two holes were drilled, one southeast, and one southwest, to explore the west portion of Lease #24. The first of these holes, D.D.Hole #11, extended 970' southeast and passed through several favorable structure changes, including dikes and faults but continued mainly in soft ore jasper with the exception of one 4' run of ore from 580' to 586'. The second hole, #12, was drilled 950' to the southwest to cross the boundary line between Lots 24 and 25 at a depth of 900'. This hole was drilled in soft ore jasper with the last 200' entering the upper series of hard ore formation, including bands of specular hematite. The holes were a disappointment in showing that the ore formation does not extend from the east to west portions of this Lot, but this of course may not be the case at lower elevations.

Fee Lands

The vertical extent of mining operations on the fee lands was from the 0' sub to the -160' sub. The most productive single area during 1944 was the stoping operation of #23 contract east of Chase Lease #9 on subs from the 0' to the -60'. Mining was underway here during the first half of the year, and extended the stope opening a distance of 115' to the west on the -20' sub. The stope width varied from 40' at this elevation to 80' on the -60'. Mining was concluded here after reaching the jasper contact at the west end and the contract cut out the raise at the -70' elevation just before they were split up to take the place of men lost in then more productive contracts.

The radial slicing operations of two other contracts extended across the east boundary line of Chase Lease #9 on to the Fee Lands at various times during the year. This work was on the 0' and -10' subs.

Mining south of the boundary of Chase Lease #9 extended from the -70' sub to the -160' sub. The center of mining in this area was on the -130' and -140' subs where contracts 16, 25 and 20 mined on the Fee Lands during the greater portion of the year. The ore body between the dikes immediately south of the boundary line narrowed considerably, and future mining will probably be restricted to the wider portion of the deposit west of the 2400' coordinate line, thereby eliminating the use of the east branch raise from the 9th Level.

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7. UNDERGROUND (Cont.)

Chase Lease #9

Top slicing operations continued under way in the central portion of the deposit on this lease in three separate areas. The top workings were those of #14 contract in #75 deposit, which extended from the 20' sub to the -20' sub. Farther east in this same deposit, #15 contract mined a large area on the -40' sub.

Three contracts continued top slicing operations in the center of #33 deposit on the -80' and -90' subs, and at lower elevations in the westerly portion of this deposit where the most productive top slicing operation was centered on the -160' sub. Three contracts were mining here in December, two on the -170' sub and the third on the -180', the latter being the lowest mining sub at a distance of 150' above the 9th Level.

TILDEN MINE
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1. GENERAL

The Tilden Mine operated from May 1st to November 1st on a five-day-per-week, single-shift schedule, except for the necessary overtime required to fill boat cargoes for which there was not sufficient advance notification. The remainder of the year was occupied by a smaller crew in repairing, stripping, and drilling.

The total tonnage loaded from the various pits amounted to 214,824 tons, an increase of approximately 75,000 tons over 1943. 200,746 tons of this was shipped while the balance was placed on stockpile for late fall and early spring delivery. There was 24,348 tons of low phosphorus ore included in the above shipments, a decrease of approximately 11,000 tons from last year.

All of the various pits and benches were utilized in obtaining ore for this year's shipments, and by the end of the year there was very little broken ore remaining, except in the lower bench of the East Pit where most of it is necessary for supporting the floor of the upper bench and can not be removed until the face of the upper bench is blasted once more, thus making a solid floor accessible for loading. The ore lying at the extreme West end of the upper bench in the West Pit and some of the ore from the lower bench in the East Pit was transferred to the crusher by means of rail haulage, but the remainder was handled by Euclid 15-ton trucks, of which there are now five on the property, and by the end of the season all of the train equipment had been abandoned and offered for sale. The use of trucks made a much more flexible means of loading and transportation, and also effected a reduction in cost, of this part of the operation, of $ .055 per ton.

Five blasts were set off during the year and during the winter season an extensive drilling program will be in progress. It will be necessary to blast in all of the pits to provide sufficient ore and also maintain the iron content in the silica grade and the phosphorus content in the low phosphorus grade, it being anticipated that 1945 requirements will be comparable with 1944. The new Hercules powder E.P. 85 and Bag X were used throughout the year with very satisfactory results, the amount of broken ore exceeding the estimate in every case but one, and there was very little secondary blasting required.

Stripping was carried out during the early part of the year in the East half of the West Pit where sufficient overburden was removed to allow access to all the ore available to the upper bench. This loose ground remaining, after stripping, was washed from the ledge and drilling will be started early next year. It was decided, and authorization obtained, to do further stripping along the North side and East end of the East Pit, and after completing the washing from the previous stripping in this area, work was started here late in the fall, and will be completed in the spring of 1945. There should be very little more stripping necessary for several years unless a much larger yearly output is called for.

2. PRODUCTION, SHIPMENTS & INVENTORIES

a. Production by Grades

	1944	1943	Increase	Decrease
Tilden Silica	190,476	104,315	86,161	
Low Phosphorus	24,348	35,676		11,328
Total	214,824	139,991	74,833	

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2. PRODUCTION, SHIPMENTS & INVENTORIES

b. Shipments

	Pocket	Stockpile	Total	Total Last Year
Tilden Silica	152,143	24,255	176,398	116,801
Tilden Low Phos.	24,348		24,348	35,676
Total	176,491	24,255	200,746	152,477
Total Last Year	139,991	12,486	152,477	
Increase	36,500	11,769	48,269	

c. Stockpile Inventories

Grade	Balance on Hand Dec. 31, 1943	Stocked 1944	Shipped From Stockpile 1944	Balance on Hand Dec. 31, 1944
Tilden Silica	19,852	38,333	24,255	33,930
Tilden Low Phos.	13,815			13,815
Total	33,667	38,333	24,255	47,745

e. Product by Months

Month	Days Operated	Average Tonnage Per 8 Hr. Shift	Total Tons
May	12 - 8-hr. Shifts	1,855	22,304
June	21 - 8-hr. Shifts	1,675	35,212
July	18 - 8-hr. Shifts	2,212	39,823
August	21 - 8-hr. Shifts	1,915	41,182
September	19 - 8-hr. Shifts	1,806	33,827
October	23 - 8-hr. Shifts	1,840	42,476
Total	114 - 8-hr. Shifts	1,885	214,824

The average daily output shows a decided increase over the past three years, it being 1,680 tons in 1942 and 1,718 tons in 1943.

Distribution of Product by Pits

	1944	1943	Increase	Decrease
West Pit (Upper Bench)	66,244	74,127		7,883
West Pit (Lower Bench)	73,439		73,439	
East Pit	52,244	65,864		13,620
Summit Pit	22,897		22,897	
Total	214,824	139,991	74,833	

f. Ore Statement

	Tilden Silica	Tilden Low Phos.	Total	Total Last Year
On Hand January 1, 1944	19,852	13,815	33,667	46,153
Output for Year	190,476	24,348	214,824	139,991
Total	210,328	38,163	248,491	186,144
Shipments	176,398	24,348	200,746	152,477
Balance on Hand	33,930	13,815	47,745	33,667
Tons Stocked 1944	38,333			

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2. PRODUCTION, SHIPMENTS & INVENTORIES

f. Ore Statement (Cont.)

Comparison of Working Schedules, 1942 to 1944

1944 - Pit idle January 1st to May 1st, small crew drilling, repairing, stripping etc. Operating May 1st to November 1st, 1 8-hour shift five days per week. Total operating shifts - 114. Idle November 1st to December 31st; small crew working same as first of the year.

1943 - 45½ - 1-8-hour shifts, 18 - 2-8-hour shifts. Total operating - 81½ shifts.

1942 - 91 - 1-8-hour shifts, 8 - 2-8-hour shifts, 11 - 3-8-hour shifts. Total operating - 140 shifts.

g. Delays

Year	Hours Delay	Total Shifts Operated	Time Lost Per Shift Worked
1944	17¼	114	.190 hrs.
1943	23 3/4	81½	.291 hrs.
1942	41½	140	.296 hrs.
1941	67½	149	.453 hrs.

The time lost was distributed as follows:

Equipment	Hours Delay
Crushing Plant	
Electrical	3½
Other Causes	9¼
Shovels	
Electrical	3
Other Causes	1½
Total	17¼

All of the delays were due to minor causes and were of short duration.

3. ANALYSIS

a. Average Mine Analysis on Output

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss on Ignition
Tilden Silica	39.30	.043	42.05	.07	.86	.25	.15	.009	.36
Tilden Low Phos.	35.71	.014	47.19	.07	.84	.15	.09	.009	.25

b. Average Analysis on Straight Cargoes

	Mine			Lake Erie	
	Iron	Phos.	Sil.	Iron	Moist.
Tilden Silica	39.15	.038	42,32	40.53	1.82
Tilden Low Phos.	35.51	.014	47.59	37.04	1.33

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3. ANALYSIS

c. Analysis of Ore in Stock

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Tilden Silica	39.45	.040	41.50	.09	.88	.27	.27	.010	.33	1.51
Til. Low Phos.	38.00	.018	44.25	.09	.46	.18	.10	.009	.20	1.26

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

1. West Pit - Above Floor at 1430'

Assumption: 13 cu. ft. equal one ton.

Total Stripped & Developed as of Jan. 1, 1944	1,768,572 Tons
*Developed by stripping, 1944	183,500 "
Total ore Developed as of Jan. 1, 1945	1,952,027 Tons
Total Mined during 1944	139,683 "
Total Remaining Jan. 1, 1945 above 1430'	1,812,344 Tons

*Balance not stripped under E & A CC 117 - 500,000 tons.

2. East Pit - Above Floor 1440'

Assumption: 14 cu. ft. equal one ton.

Total Stripped & Developed as of Jan. 1, 1944 above 1500'	1,543,535 Tons
Developed by Stripping, 1944	0 "
Mined during 1944	52,244 "
Total Remaining Jan. 1, 1945 above 1500'	1,491,291 Tons
Total Estimated 1440' to 1500'	1,028,570 "
Total Developed Ore in East Pit above 1440'	2,519,861 Tons

3. Summit Pit

Assumption: 14 cu. ft. equal one ton.

Total Stripped & Developed as of Jan. 1, 1944 above floor	228,000 Tons
Developed by Stripping 1944	0 "
Mined During 1944	22,897 "
Total Remaining Jan. 1, 1945	205,103 Tons

Total Developed Ore as of January 1, 1945:

West Pit	1,812,344 Tons
East Pit	2,519,861 "
Summit Pit	205,103 "
Total All Pits	4,537,308 Tons

Broken Ore in Pits included under Developed Ore

	East Pit	Summit Pit	West Pit Lower Bench	Total
Jan. 1, 1944	115,938 Tons	8,335 Tons*	1,261 Tons	125,534 Tons

*4,362 tons stocked in East Pit.

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4. ESTIMATE OF ORE RESERVES (Cont.)

Total Prospective Ore

West Pit
Balance of Contemplated Stripping in East Half 500,000 Tons

East Pit
North and East of Present Pit above 1500' 3,000,000 "

Total Prospective Ore 3,500,000 Tons

c. Estimated Analysis of Reserves

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Ign.	Moist.
1. West Pit										
Dried	39.17	.034	41.91	.09	.90	.20	.22	.009	.24	
Natural	38.50	.033	41.20	.09	.88	.20	.22	.009	.24	1.70
2. East Pit										
Dried	37.00	.020	45.00	.09	.54	.20	.17	.009	.34	
Natural	36.50	.020	44.40	.09	.53	.20	.17	.009	.34	1.34
3. Summit Pit										
Dried	36.00	.015	46.00	.09	.54	.20	.17	.009	.34	
Natural	34.50	.015	45.40	.09	.54	.20	.17	.009	.34	

f. Estimate of Production

The production from the Tilden Mine is naturally based on the sales, and the total possible amount is limited by the number of shifts operated. The bottleneck is the crusher, which limits the output to approximately 2,000 tons per shift and therefore, as the pit generally operates from May 1st to November 1st, the maximum production on a single shift of 8 hours is 250,000 tons. If necessary this amount can be increased, either by working a longer shift or by operating on a two-shift basis. At the present time the latter would be difficult on account of there not being men available, and also it would not be an efficient operation unless operating at full capacity, as there would not be sufficient extra work to keep the men busy when not loading.

It is possible to produce about 50,000 tons of low phos. from the Summit and East Pits, provided there is sufficient ore of Silica grade shipped to absorb approximately 15,000 tons which would be graded out as too high in phos. and yet would be too low in iron for the regular Silica grade. The analysis of this ore has to be regulated by single car samples, and this is also a more costly operation, as the haul is longer and the ore from the summit pit is generally dumped in the East Pit and reloaded on account of keeping the crusher up to full capacity.

Estimated Production on 1 8-hour Shift May 1st to November 1st.

Low Phos.	50,000 Tons
Silica	200,000 "
Total	250,000 Tons

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5. LABOR AND WAGES

a. Comments

The Tilden Mine crew, in the most part, carried over from last year, although a considerable number of the men worked at other Company mines during the winter. It was possible to maintain a full crew at all times and there was sufficient stripping, drilling, and stocking of ore to keep the crew busy when there was no loading for shipments. There were several occasions when the crew had to work overtime a few hours or on Saturday or Sunday to complete the loading for a particular boat, but in the most part the men worked only on a single shift, five days per week. The men who were eligible for vacation pay continued to work on account of the production schedule, but received pay for 86 hours if they had worked 10 years or more and for 43 hours if they had worked from 3 to 10 years.

17 men, or 55% of the total, received pay for 86 hours.
2 men, or 6½% of the total, received pay for 43 hours.

b. Comparative Statement of Wages and Product

	1944	1943	Increase
Product	214,824	139,991	74,833
Number of Days Operated	115	81½	33½
Number of Shifts & Hours:			
1-8-hour	115	45½	
2-8-hour	0	18	
Average Number of Men Working	31	28	3
Average Daily Wage	7.40	7.22	.18
Tons Per Man Per Day	46.70	45.38	1.32
Labor Cost Per Ton	.158	.170	.012
Total Number of Days	4,599 3/4	3,302½	1,297¼
Amount Paid for Labor	34,043.04	23,864.32	10,178.72

7. OPEN PIT OPERATIONS

a. Stripping

Stripping operations were resumed in May, in the East half of the West Pit, which was started last year. 20,300 yards were removed during 1944 under E & A CC 117, and most of the material was placed on the banks of the new road into the property. This road also forms a dam to hold back the run-off and supply water for hydraulicing. Rock was also placed on the surface of the road and on the banks to prevent their washing out. Although there remains in place approximately one-half of the yardage originally estimated in this E & A, there will be very little more work done here for the present, as the ledge dips to the North so rapidly that the majority of the ore will be removed from the lower bench. There will be a maximum height above the upper bench of only approximately 20', after the blast contemplated for 1945, which is insufficient for economical operations, and it will be several years before the lower bench reaches this area. An authorization was obtained late in the fall to use the unexpended balance from this E & A

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7. OPEN PIT OPERATIONS

a. Stripping (Cont.)

for additional stripping to the North and East of the East Pit. In this area the ledge slopes toward the pit and therefore with the previous stripping being so close to the edge of the pit, it has been impossible to avoid contaminating the ore when hydraulicing the gravel from the depressions in the ledge. This new work was started in November and will be completed next spring as soon as weather conditions permit. The stripping in the West Pit was done with #29 Shovel and the dirt transported by the Euclid trucks during the idle periods between cargoes. The area being stripped was quite close to the loading bench and therefore the shovel could be moved with very little delay. #46 Shovel was used in the East Pit after loading operations had ceased for the season.

E & A CC 117 - Tilden Mine Stripping West Pit

For stripping 192,000 yards Overburden at the East end of the West Pit to make available 920,000 tons of ore.

Detail	Amount	Amount Expended 1944	Expended To Date	Unexpended
192,000 yds. @ 12¢ per yd.	23,040.00	5,033.40	14,850.34	8,189.66
10% for Contingencies	2,304.00			2,304.00
Total	25,344.00	5,033.40	14,850.34	10,493.66

Yards Removed - 95,785
Cost Per Yard - .155

The actual cost per yard was .144, the additional .011 being due to diverting the total of $1,003.20 expended in hydraulicing in the East Pit under E & A 102, which was overexpended and closed off last year. The actual cost for this E & A will naturally be higher than the original estimate on account of the increase in wages and cost of supplies since the estimate was made.

f. Drilling, Blasting & Explosives

1. Drilling

There was less drilling in 1944 as compared with 1943, but there will,however, be a very extensive program carried out through the winter in order to provide sufficient broken ore for 1945 deliveries. In order to conserve the West Pit ore, which runs approximately 2% higher in iron content, it is necessary to mix the East and West Pit ores when shipping Tilden Silica, and sufficient East and Summit Pit ore has to be broken also to fill the low phosphorus requirements. As will be seen from the table of broken ore reserves, the only large amount lies in the East Pit, lower bench, and this is not available at the present time, as it forms part of the floor of the upper bench, which has to be blasted twice more before this broken ore can be removed. Drilling for the year was confined to two series of nine-inch holes along the West part of the lower bench in the West Pit, one row of nine-inch holes along the bench in the Summit Pit, drilling started in the East end of the West Pit, and several nine-inch holes along the North bank of the upper bench in the East Pit where some secondary blasting was necessary.

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7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives

1. Drilling (Cont.)

Cost of Operating 9-Inch Churn Drills in 1944

Total Footage Drilled 2,704'
Average Footage Per Hole 55'

Operating	Labor	Supplies	Total	Cost Per Foot
Drilling	$3,374.74	$ 180.85	$3,555.59	1.315
Sharpening Bits	508.82	253.84	762.66	.282
Pipe and Fittings	14.60	250.38	264.98	.098
New Bits		635.45	635.45	.234
New Tools		364.78	364.78	.135
New Rope		142.78	142.78	.053
Electric Power		289.33	289.33	.107
Truck and Tractor	902.53	467.14	1,369.67	.508
Total Operating	$4,800.69	$2,584.55	$7,385.24	2.732
Maintenance				
Drills	183.07	30.00	213.07	.079
Bit Dresser	1.85		1.85	.000
Total Maintenance	184.92	30.00	214.92	.079
Roads for Drills	90.83	26.60	117.43	.043
Grand Total	$5,076.44	$2,641.15	$7,717.59	2.854

Comparison of Footages and Costs

	1944			1943		
	Footage Drilled	Footage Per 8-hr. Shift	Cost Per Foot	Footage Drilled	Footage Per 8-hr. Shift	Cost Per Foot
West Pit, East End	62	15.50	2.896	2,018	16.01	2.285
West Pit, Lower Bench	2,022	20.19	2.038			
East Pit, Upper Bench	384	10.97	4.958	1,535	18.71	1.906
Summit Pit	236	12.42	6.567			
Total	2,704	17.00	2.854	3,553	17.08	2.272

As will be seen from the comparison tables above, there is considerable variation in the footage per shift and cost per foot in the different pits. Nearly all of the holes drilled in the West Pit were located on the floor of the upper bench which was level and therefore the time moving from one hole to another and setting up was almost negligible. There was also less trouble from cracks or broken material in the holes. The holes in the East Pit were drilled through more or less broken material, being drilled for secondary blasting, as explained elsewhere in this report. The locations were uneven, requiring considerable cribb work to set up, and the holes were shallow, necessitating more moves in comparison to total footage drilled. The cost

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7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives

1. Drilling (Cont.)

in the Summit Pit was extremely high due to having to make a road for the drills to travel in order to reach the pit, the locations had to be leveled by blasting as the hill was too steep to permit moving and setting up the drills, and there was also 40 feet in one hole lost on account of caving ground.

Footage Obtained from Bits

	1944		1943	
	Bits Used	Footage Per Bit	Bits Used	Footage Per Bit
West Pit, East End	5	12.40	324	6.22
West Pit, Lower Bench	169	11.96		
East Pit, Upper Bench	27	14.22	140	10.96
Summit Pit	19	12.42		
Total	220	12.27	464	7.65

The amount of footage per bit used during 1944 showed a decided increase over 1943, partly on account of the bulk of the drilling being done in the lower bench of the West Pit, where the ground is softer and there are less slips, but mostly on account of better sharpening and tempering being done by a new blacksmith this year.

Combined Drilling and blasting table showing cost per ton based on actual tonnage blasted:

	Tons Blasted	Cost Per Ton		
		Drilling	Blasting	Total
West Pit, Lower Bench	95,000	.0436	.0456	.0892
West Pit, Upper Bench	40,000	.0903	.0502	.1405
Summit Pit	24,000	.1075	.0546	.1621

There were two blasts in the West Pit, lower bench, as compared with one each in the others. The lower cost per ton for drilling in the lower bench of the West Pit was due to a large part of the holes bring drilled from the level floor of the upper bench, although some were holes drilled in 1942 along the South side of this bench and on uneven ground. The lower cost per ton for blasting was due to better back break from the holes with consequently greater tonnage. The costs in the Summit Pit would have been lower if it had been possible to recover all of the ore blasted, but unfortunately there was a large slip, afterwards exposed by the blast, that allowed a large mass to slide down with such velocity that the ore developed a rolling motion and continued over the South edge of the bench floor which was only 80' wide. It is estimated that approximately 5,000 tons were thus made unobtainable until such time as a lower bench might be worked, as it is scattered on the hillside some 60' below.

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7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives (Cont.)

2. Blasting

The practice put into effect last year, of using column loading of cheaper ammonium nitrate powder, rather than deck loading of gelatin, was carried out this year, and a still further saving in cost was introduced by using Hercomite or "Bag X" powder near the top of the column where less force was necessary to cause the required fragmentation. Very satisfactory results were obtained, and therefore the amount of secondary blasting was reduced. In every case there was more back break than had been anticipated, the faces of the bench broke clean and therefore the tons of ore per pound of powder were increased, with a subsequent saving in cost.

Five blasts were put off in 1944, one in the Summit Pit, one in the East Pit, one in the East half of the upper bench of the West Pit, and two in the lower bench of the West Pit. One of the latter included most of the holes drilled in 1942 along the South side of the lower bench. All of these were primary blasts, with the exception of the one in the East Pit, which was considered a secondary blast, as in developing the upper bench the blast set off in October, 1943, did not break properly on account of the burden of loose ore which had to be left from previous blasts to form a footing for this upper bench. It was therefore thought advisable to drill seven more holes and reblast, rather than to have the delays which would result in moving and breaking the large chunks. This of course greatly increased the cost of secondary blasting for 1944, as compared with 1943, but resulted in a total saving in cost of operations.

Primary Blasting

	Date	No. of Holes	Footage Blasted	Estimated Tonnage	Pounds Explosive	Estimated Tons Ore Per Pound Explosive
West Pit:						
South Face Lower Bench	4/26/44	34	1,423	32,300	14,050	2.30
West Face Lower Bench	4/26/44	7	470	19,000	8,627	2.39
East End Upper Bench	7/17/44	31	1,416	38,700	16.708	2.32
West Face Lower Bench	8/17/44	11	592	23,400	9,229	2.54
Summit Pit	6/7/44	12	742	24,200	9,800	2.47
Total		95	4,643	137,600	58,414	2.35

Secondary Blasting

East Pit, Upper Bench	4/11/44	7	384		6,000	

STATEMENT OF EXPLOSIVES USED FOR YEAR 1944

Primary Blasting

Kind		Quantity	Price	Amount
Hercomite 7½ x 24	lb.	14,664	10.50	1,539.73
E. P. #85 7½ x 24	"	43,750	11.00	4,812.50
Total Powder		58,414	10.87	6,352.23

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7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives

2. Blasting (Cont.)

Blasting Supplies		Quantity	Price	Amount
Primacord Bickford Fuse, regular	ft.	2,000	32.00M	64.00
Primacord Bickford Fuse, wire bound	"	6,500	40.50"	263.25
Total Blasting Supplies		8,500		327.25
Total All Explosives				6,679.48

	1944	1943
Total Ore Blasted (Actual)	157,600	51,046 (Estimated)
Tons of Ore per lb of Powder	2.70	2.38
Cost per Ton for Powder	.0403	.0455
Cost per Ton for Blasting Supplies	.0020	.0013
Cost per Ton for All Explosives	.0423	.0468
Average Price per lb. for Powder	.1087	.1084

Secondary Blasting

Kind		Quantity	Price	Amount
Hercomite	lb.	3,572	10.50	375.06
E. P. #85	"	2,450	11.00	269.50
60% Gelatin	"	6,950	11.50	799.25
Total Powder		12,972	11.13	1,443.81

Blasting Supplies

Primacord Bickford Fuse, Regular	ft.	2,000	32.00M	64.00
Primacord Bickford Fuse, Wire Bound	"	500	40.50"	20.25
Clover Fuse		10,210	5.17"	52.60
#6 Blasting Caps		1,800	12.20"	21.96
#7 Hot Wire Lighters		400		2.71
Total Blas ting Supplies				161.52
Total Secondary Explosives				1,605.33

	1944	1943
Product	214,824	139,991
Pounds of Powder per Ton of Ore	.0605	.011
Cost Per Ton for Powder	.0067	.0013
Cost Per Ton for Fuse, Caps, etc.	.0007	.0003
Cost Per Ton for All Explosives	.0074	.0016
Average Price Per Pound for Powder	.1113	.1150
Total All Explosives Used at Pit	$8,284.81	$2,613.89

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7. OPEN PIT OPERATIONS

f. Drilling, Blasting & Explosives (Cont.)

2. Blasting (Cont.)

Comparison of Blasting Costs

	Primary Blasting	Secondary Blasting
	Cost Per Ton Blasted	Cost Per Ton Produced
1944	.0423	.0074
1943	.0468	.0016
1942	.0493	.0035
1941	.0510	.0030
1940	.0540	.0040

g. Loading Operations

Loading, which started on May 8th, was carried out during 1944 in all of the various benches and pits with almost no delays due to shovel break-downs. There was a small amount of broken ore lying against the rock along the North face of the upper bench of the West Pit and this was removed and transported to the crusher by rail haulage, thus completing all operations in this area. Ore was also hauled by means of locomotives from the lower bench of the East Pit until the three additional 15-ton Euclid trucks arrived in July, and then this system of transportation was abandoned. Most of the ore to be removed in 1945 will be from the lower bench of the West Pit and upper bench of the East Pit, both of which are reached by a 10% grade from the crusher. However, even on the level the use of truck facilitates loading operations, as no track work, with its attendant delay, is required when making short moves to avoid areas where secondary blasting is necessary or to reach ore of a different grade for mixing. As the locomotives were quite old, they required considerable maintenance to keep them in operation and with the labor shortage, it was an advantage to be able to do away with track maintenance. There are two roads into the pits that have a macadam surface and the others were kept in very good shape by constant raking out of loose ground and using calcium chloride to cut down the dust, thus insuring less wear on trucks and tires. One of the older Storehouse trucks is being released, and after being transferred to the Tilden will be equipped with a sprinkler and used next year on the roads. The road leading to the Summit Pit had several bad curves and one very steep section, all of which have been eliminated by a new fill in place of the old coal dock, the material for which was taken from the banks of the present road along the curves.

In order to fulfill the low phosphorus requirements, ore was removed from the Summit Pit for the first time in several years. This pit is too far from the crushing plant for the present equipment to keep the plant running at full capacity, and therefore the ore was hauled to, and dumped in, the East Pit on the night shift and reloaded for the crusher on the day shift. This additional cost was offset by the premium on the lower phosphorus

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7. OPEN PIT OPERATIONS

g. Loading Operations, (Cont.)

content, the summit ore averaging .005 less in phosphorus than the East Pit. The Marion, or #46 Shovel, was used alternately in the Summit Pit and on the East side of the upper bench of the East Pit, as the move could be made with very little delay.

The broken ore lying on the upper bench of the East Pit was almost cleaned up and with the exception of about 10,000 tons of low phosphorus ore in the lower bench, all of the broken ore in the latter was removed except that needed to support the upper bench until another blast is made. When this second blast is cleaned up, the upper floor will be on solid ore and the remainder of the broken ore in the lower bench can be loaded. No. 31 Shovel remained in the lower bench throughout the entire year.

No. 29 Shovel rotated between cleaning up the ore left in the extreme West end of the West Pit, the East half of the West pit where some 45,000 tons were removed, and a small amount of stripping to the Northeast of this latter area. These moves were not very long and could be made during days when there was no loading. Loading will take place in the East half of the West Pit next year, after which no more work will be done here until the lower bench extends North to this area, as there will not be sufficient height to the ledge to warrant economical blasting and loading from the upper bench.

Two blasts were loaded along the West face of the lower bench in the West Pit, and a start was made to extend the face of the bench along the South side. Now that the tracks leading to the upper bench along the North side of the lower bench can be removed, holes will be drilled here and also in the Southwest corner, thus extending the face in a general Southwesterly direction, cutting out one tight corner and having a shorter haul to the crusher for 50% of the ore. No. 52 Shovel was loading here practically the entire season, with the exception of stockpile loading in the spring and fall.

The localities and shifts worked by the power shovels during the season are noted below:

Unit	Shifts	Locality
No. 29 Shovel	22	Loading ore East End, West Pit
	33	Loading ore West End, West Pit
	21	Stripping East End, West Pit
No. 31 Shovel	41	Loading ore Lower Bench, West Pit
	12	Loading Summit Pit Low Phos. Ore
	4	Loading Rock for Coal Dock
No. 46 Shovel	29	Loading Ore Second Bench, East Pit
	7	Loading Summit Pit Low Phos. Ore In the East Pit
	1	Stripping East Pit
	47	Loading Ore in Summit Pit & Stocking In the East Pit
	5	Stripping Summit Pit Ore for Low Phos.

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7. OPEN PIT OPERATIONS

g. Loading Operations (Cont.)

Unit	Shifts	Locality
No. 52 Shovel	13	Loading from Tilden Silica Stockpile
	66	Loading ore From Lower Bench West Pit
	21	Loading ore East End West Pit
	1	Loading Rock
	6	Loading Ore West End, West Pit
Total	339	

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8. COST OF OPERATING

a. Comparative Mining Cost

	1944	1943
Production	214,824	139,991
Operating Cost	.330	.343
General Mine Expense	.046	.071
Idle & Winter Expense	.162	.191
Stocking Ore	.014	
Cost of Production	.552	.605
Depreciation - Plant & Equipment	.070	.070
Depreciation - Motorized Equipment	.080	.023
Depletion - Original Cost	.002	.027
Amortization of Development	.003	.003
Amortization ofStripping	.020	.020
Taxes	.039	.056
Loading Ore	.003	.001
Total Cost At Mine	.769	.805
Budget Cost	.760	
Average Daily Product	1,867	1,718
Tons Per Man Per Day	46.70	45.38
Number of Days Operated	115	81½
Number of Shifts & Hours:		
1 8-hour	115	45½
2 8-hour	0	18

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8. COST OF OPERATING

b. Detailed Cost Comparison

4. Open Pit Costs

PIT OPERATING	1944		1944	
Direct Ore	Amount	Per Ton	Amount	Per Ton
1. Drilling & Blasting	25,689.13	.120	15,013.37	.107
2. Power Shovels, Operating	6,608.70	.030	4,900.52	.036
3. Power Shovels, Maintenance	2,114.82	.010	2,331.46	.017
4. Locomotives & Cars, Operating	3,364.87	.016	5,069.23	.036
5. Locomotives & Cars, Maintenance	477.35	.002	265.34	.002
6. Track Expense	1,120.79	.005	2,858.00	.020
6A. RD Tractor, Operating	669.11	.003	164.22	.001
6B. RD Tractor, Maintenance	196.15	.001	183.75	.001
7. Euclid Trucks, Operating	3,331.33	.016	449.30	.003
7A. Euclid Trucks, Maintenance	898.42	.004	345.45.	.003
TOTAL DIRECT ORE	44,470.67	.207	31,580.64	.226
General Pit Expense				
8. Water Supply	10.23	.000	39.31	.000
9. Buildings			108.46	.001
10. Crushing & Screening	14,717.16	.069	9,548.24	.068
11. General Open Pit Expense	10,130.59	.047	5,062.43	.036
13. Open Pit Superintendence	1,474.52	.007	1,655.88	.012
14. Waste Pile Expense	24.06	.000		
TOTAL GENERAL PIT EXPENSE	26,356.56	.123	16,414.32	.117
TOTAL PIT OPERATION	70,827.23	.330	47,994.96	.343
Stocking Tilden Crushed Ore	2,906.04	.014		
GRAND TOTAL	73,733.27	.344	47,994.96	.343
General Mine Expense				
16. Mining Engineering	631.41	.003	947.64	.007
16A. Geological	688.35	.003	57.74	.000
17. Mechanical & Electrical Engineering	150.79	.001	91.85	.001
18. Analysis & Grading	2,240.75	.010	2,679.88	.020
19. Safety Department	113.87	.000	85.03	.001
20. Local & General Welfare	179.00	.001	136.00	.001
21. Special Expense	303.23	.001	349.41	.002
22. Ishpeming Office	786.00	.004	453.57	.003
23. Mine Office	2,053.61	.009	1,875.14	.013
24. Insurance	183.79	.001	168.85	.001
25. Personal Injury	199.71	.001	741.66	.005
26. Social Security Taxes	820.68	.004	632.53	.005
27. Employees' Vacation Pay	1,686.97	.008	1,743.74	.012
TOTAL GENERAL MINE EXPENSE	10,038.16	.046	9,963.04	.071
IDLE & WINTER EXPENSE	34,879.56	.162	26,710.93	.191
COST OF PRODUCTION	118,650.99	.552	84,668.93	.605
Taxes	8,393.54	.039	7,908.36	.056
TOTAL COST AT MINE	127,044.53	.591	92,577.29	.661

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

Cost of Production

Operating Pit	1944 Cost Per Ton	%	1943 Cost Per Ton	%
Labor	.180	46.2	.195	47.1
Supplies	.210	53.8	.219	52.9
Total	.390	100.0	.414	100.0

* Does not include idle and winter expense.

The decrease in cost per ton for both labor and supplies was due to the larger product in 1944 and less maintenance for locomotive haulage system.

Days & Shifts Operating

	1944	1943
1 8-hour	115	45½
2 8-hour	0	18
Total Shifts Operated	115	81½

There were more shifts operated during 1944 on account of the larger tonnage produced, but it was possible to meet the boat deliveries without working on a double shift.

Production	1944	1943	Increase
Tons Produced	214,824	139,991	74,833
Tons Shipped	200,746	152,477	48,269
Tons Stocked	38,333		38,333
Average Product per 8-hr. Shift	1,867	1,718	149

Detail of Accounts

There was a decrease of .053 per ton in the cost of production in 1944 over 1943, and this was due mostly to the increase in tonnage, reducing the cost per ton for idle and winter expense and also the general mine expense. The detail of accounts, where there was an unusual expense in either year, or a different explanation for the change, are listed below.

1. Drilling & Blasting

	Amount	Cost Per Ton
1944	25,689.13	.120
1943	15,013.37	.107
Increase	10,675.76	.013

There was less drilling in 1944, but considerable more blasting of holes drilled previously, especially on the South side of the lower bench of the West Pit.

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8. COST OF OPERATING

b. Detailed Cost Comparison

Detail of Accounts (Cont.)

Rather than detailing the various accounts under locomotives and truck haulage, the following table is inserted to show the interesting comparison between the two types of haulage. As will be noted, there was a saving of approximately .05 per ton hauled in favor of the trucks

		Trucks	Locomotives
Tons Hauled		157,832	56,992
Operating:			
Labor		2,845.15	2,421.23
Supplies		486.18	943.64
Total		3,331.33	3,364.87
Cost per Ton Hauled		.021	.059
Maintenance:			
Labor		269.08	357.96
Supplies		629.34	119.39
Total		898.42	477.35
Cost per Ton Hauled		.0057	.0084
Operating Tractor to Facilitate Truck Haulage, As Compared to Track Maintenance for Locomotives	Amount	865.26	1,120.79
	Cost/Ton	.0055	.0198
Total Cost per Ton Hauled		.0322	.0872

General Open PitExpense

	Amount	Cost Per Ton
1944	10,130.59	.047
1943	5,062.43	.036
Increase	5,068.16	.011

Considerable work was done in 1944 in connection with making an approach to the crusher from the East so that the trucks could dump on that side. This necessitated the building of a concrete retaining wall to hold the material to be filled in on theSouth slope, and also some changes in the interior of the crusher building. An addition to the garage was also buildt during 1944 to take care of the three new Euclid trucks.

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8. COST OF OPERATING

b. Detailed Cost Comparison

Detail of Accounts (Cont.)

Stocking Ore

	Amount	Cost Per Ton
1944	2,906.04	.014
1943	.00	.000
Increase	2,906.04	.014

There was no ore stocked in 1943, as it was felt that there was enough in reserve. There was, however, an early order in 1944 for approximately 12,000 tons, and this necessitated the stocking of 38,333 tons of Silica ore during 1944 to make available sufficient ore for late fall or early spring deliveries when it would not be economical to open the pit.

The actual cost of stocking the 38,333 tons was only .016 per ton, as compared with .049 in 1941. There was also 25,785 tons of low phosphorus ore loaded from the Summit Pit and stocked in the East Pit to make a shorter haul to the crusher and thus keep this unit at full capacity when shipping. This showed a cost of .088, but some of this was due to slower loading in the Summit Pit on account of large chunks and secondary blasting and this was offset considerable by the speed of reloading when it was dumped into the East Pit.

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

4. Open Pit Costs

Idle and Winter Expense

	Labor	Supplies	Total
January	2,951.44	9,599.12	12,550.56
February	2,879.12	2,204.96	5,084.08
March	2,094.93	847.34	2,942.27
April	2,161.71	1,486.49	3,648.20
November	2,865.11	2,526.55	5,391.66
December	3,731.36	1,531.43	5,262.79
Total	16,683.67	18,195.89	34,879.56

	1944		1943	
	Amount	%	Amount	%
Labor	16,683.67	47.8	20,496.45	70.8
Supplies	18,195.89	52.2	8,486.23	29.2
Total	34,879.56	100.0	28,982.68	100.0

Idle And Winter Expense Detail

Pit Operating	1944	1943
Direct Ore		
Drilling & Blasting	163.18	193.43
Power Shovels, Maintenance	4,935.78	5,755.29
Locomotives & Cars, Maintenance	198.58	1,386.93
Track Expense	50.30	523.00
RD Tractor, Maintenance	1,667.70	742.16
Euclid Trucks, Maintenance	487.37	120.55
Total Direct Ore	7,502.91	8,721.36
General Pit Expense		
Water Supply		3.16
Buildings	13.25	106.02
Crushing & Screening	13,671.65	6,477.13
General Open Pit Expense	7,657.57	5,429.81
Open Pit Superintendence	1,468.18	1,372.50
Total General Pit Expense	22,810.65	13,388.62
Total Pit Operating	30,313.56	22,109.98
General Mine Expense		
Mining Engineering	390.23	422.92
Mechanical & Electrical Engineering	64.95	25.94
Analysis & Grading	285.29	681.32
Safety Department	54.56	49.62
Special Expense	136.65	195.42
Ishpeming Office Expense	569.46	503.20
Local & General Welfare	123.28	102.59
Mine Office Expense	1,865.24	1,870.42
Insurance	149.40	167.40
Personal Injury Expense	359.45	133.67
Social Security Taxes	520.26	650.19
Geological	47.23	47.44
Total General Mine Expense	4,566.00	4,582.79
Inventory Loss		18.16
TOTAL COST AT MINE	34,879.56	26,710.93

TILDEN MINE
ANNUAL REPORT
YEAR - 1944

8. COST OF OPERATING

b. Detailed Cost Comparison

Idle and Winter Expense (Cont.)

The labor cost during the months when the pit was idle showed a decrease for 1944, due to being able to make the necessary repairs with a smaller crew than last year, but the supplies were greater, mostly on account of replacements for the crusher and tractor. The East 10" crusher required a new frame, mantle, and spider cap before starting the 1944 season. The RD Tractor was completely overhauled and necessary parts replaced.

This fall, after shipping was completed, the three crushers wereagain overhauled, and it was found necessary to place new concaves in the 42" crusher and the East 10" crusher, change the spider and mantles and gear in the West 10" crusher and change the layout of the crushing building around the 42" crusher to make it possible to dump the trucks from three sides.

Although the total amount spent during 1944 was greater, the cost per ton was smaller, due to the much larger product for this year.

10. TAXES

Tilden Township
Tilden Mine

	1944		1943	
	Valuation	Taxes	Valuation	Taxes
N½ of Sec. 26, 47-27	305,000	5,894.61	335,000	6,397.73
Personal Supplies & Equip.	125,000	2,415.83	75,000	1,432.33
Total	430,000	8,310.44	410,000	7,830.06
Collection Fees		83.10		78.30
Total Tilden Mine	430,000	8,393.54	410,000	7,908.36

11. PERSONAL INJURY

There were no lost-time accidents during 1944.

12. NEW CONSTRUCTION AND
PROPOSED NEW CONSTRUCTION

As was mentioned earlier in the report, the road leading to the Summit Pit and upper bench of the East Pit was straightened and improved.

Additional garage space for the new Euclid trucks was added to the garage which now has six compartments, five for the trucks and one for the tractor. One of these is insulated and heated, allowing the men to do the repair work during the winter season.

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

A concrete retaining wall was put up on the East side of the crusher and a fill made so that the trucks will have access to the crusher from the East and thus cut out having to turn around twice each trip. The apparatus for dumping the cars has also been removed so that it will be possible for the trucks to dump from the North side also, as a more uniform distribution of the broken ore in the crusher insures a better operation.

A small change was made in the office building so as to put the door on the East end rather than on the South side where it was considered unsafe on account of the trucks passing so close to the building. It is also intended to build a new oil house next year, as the present one is too small and constitutes a fire hazard, being so close to the combined dry, shop, and office building.

13. EQUIPMENT AND PROPOSED NEW EQUIPMENT

E & A CC-130

The purpose of this E & A was the purchase of three additional 15-ton Euclid trucks to take the place of the locomotives and cars, as the grade from the upper bench of the East Pit and the lower bench of the West Pit was too steep for rail haulage.

Total Estimated	$37,148.00
Total Expended in 1944	37,538.78
Total Expended 12-31-44	390.78

The increased cost was due to equipping one truck with the new hydraulic breaking device called "Hydrotarder." This E & A was closed in 1944.

The locomotives and cars were abandoned late in the summer and the equipment offered for sale, as it is intended to depend entirely on trucks for the life of the pit.

Three 15-ton Euclid trucks were purchased in 1944, one of which was equipped with a new braking device called a "Hydrotarder" which actuates on the drive shaft and thus insures duplicate braking facilities, as well as saving on brake lining. There are now five trucks at the property, and there should be one more purchased to make possible a continued operation of 250,000 tons per single shift without delays, as the trucks could be rotated for greasing and repairs without tying up necessary equipment.

The equipment that now limits the production is the crushing plant, which can not handle over 2,000 tons per shift and not even that much continuously over the season. The small crushers give the most trouble by choking when the primary crusher is worn or feeding too fast. With a new and larger plant the size of the dippers on the shovels could be increased and therefore speed up the loading.

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13. EQUIPMENT AND PROPOSED NEW EQUIPMENT (Cont.)

On account of having to load from two or more pits at the same time in order to maintain the proper grade, it is necessary to have a larger crew and maintain more shovels, but these latter are all in very good shape and can be moved readily from one location to another in their respective pits. This accounts for the fact that it is necessary to have four shovels on a property which does not produce more ore. It is also necessary to have one of the smaller shovels available for stripping when required.

18. NATIONALITY OF EMPLOYEES

	American Born	Foreign Born	Total
English	10	4	14
Swedish	2		2
Norwegian	2		2
Finnish	5	4	9
Irish	4		4
Total	23	8	31

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1. GENERAL:

The Athens Mine operated on a schedule of three shifts per day, five days per week and one shift on Saturday from January 1st to June 26th, a total of 16 shifts per week. Due to the loss of a large number of men to the armed forces, the mine reduced the working schedule on June 26th to two shifts per day and five days per week, making a total of ten shifts per week. This schedule was maintained for the balance of the year.

Production in 1944 of 421,153 tons was 96,661 tons less than that of 1943, which was 517,814 tons. The decrease was due mainly to the reduced operating schedule and also to the shortage of labor. The effects of the loss of the area in which the fire occurred are still apparent and development of areas to replace it continued throughout the year. General conditions in the mine were unfavorable in that the mining territories were small and scattered over a wide area. This condition is not conducive to efficient mining.

Total shipments decreased 70,159 tons in 1944 which was due to a decrease in production. Shipments from the mine continued until the later part of November and at that time only a very small amount of wet ore remained on the stocking grounds. There was a great demand for ore this year and consequently practically all the wet ore was shipped. Fortunately the weather was mild and this ore was handled without to much difficulty.

It was decided in April to abandon mining in the most productive area above 4th Level in order to protect the Southeast stocking trestle area against caving. Due to the shortage of men it was not possible to complete development for some time to provide working places for all of the contracts moved down from 4th Level. Consequently, in July a decision was made to abandon a portion of the Southeast stocking trestle and mining was resumed in this territory along the North footwall.

The shaft crew continued rebolting steel sets and alligning the runners and by March the skip speed was increased to 1,340 feet per minute. In July this speed was again increased to 1,420 feet per minute, and continued to operate that way throughout the year.

The accident record in 1944 was good with 21 compensable accidents, as compared with 26 in 1943. There were no fatal accidents during the year and only two accidents incurred a loss of time over four months. Seven caused loss of time from one to four months, and 12 caused loss of time less than one month.

The area of the surface cave remained about the same during the year. The only change was continuous settling inside previous cracks especially along the South and East sides. Two houses which are owned by private parties and are involved in the settlement of the surface material still remain unpurchased. A more than fair offer has been made to purchase them but the parties are holding out for an unreasonable price. When a mutual agreement is reached the property will be purchased.

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2. PRODUCTION SHIPMENTS AND INVENTORIES:

a. Production by Grades:

	1944	1943	Increase	Decrease
Athens Ore	346,842	360,067		13,225
Mitchell Lease Ore	74,311	154,650		80,339
Corbit Lease Ore	0	3,097		3,097
Total Ore	421,153	517,814		96,661
Rock	30,725	22,485	8,240	
Total Hoist	451,878	540,299		88,421

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	1944 Total Tons	1943 Total Tons
Athens Ore	200,350	167,939	368,289	360,758
Mitchell Lease Ore	33,389	50,009	83,398	157,991
Corbit Lease Ore				3,097
Total	233,739	217,948	451,687	521,846
Total Last Year	330,580	191,266	521,846	
Increase		26,682		
Decrease	96,841		70,159	

c. Stockpile Inventories:

Grade of Ore	Dec. 31, 1944	Dec. 31, 1943	Decrease
Athens Ore	21,386	42,103	20,717
Mitchell Lease Ore	5,458	14,545	9,087
Total	26,844	56,648	29,804

d. Division of Product by Levels:

	1944		1943	
	Tons	Percent	Tons	Percent
4th Level	158,522	37.6	174,418	33.7
6th Level	2,135	.5	19,218	3.7
7th Level	67,583	16.1	112,852	21.8
8th Level	145,735	34.6	131,820	25.5
9th Level	43,111	10.2	79,435	15.3
10th Level	4,067	1.0	71	0.0
Total	421,153	100.	517,814	100.

Production from 4th Level is increasing steadily as the areas become enlarged and a timber mat is established. Also, more contracts were transferred to this level during the year.

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2. PRODUCTION SHIPMENTS AND INVENTORIES: (CONT.)

e. Production by Months:

Month	Athens	Mitchell	Corbit	Total	Rock
January	33,695	9,990		43,685	1,970
February	33,193	11,683		44,876	3,315
March	34,366	9,619		43,985	3,155
April	30,871	5,301		36,172	3,820
May	34,102	2,637		36,739	3,910
June	34,960	2,977		37,937	3,250
July	23,467	3,158		26,625	2,990
August	25,302	3,879		29,181	3,040
September	20,374	5,245		25,619	1,455
October	24,070	6,320		30,390	965
November	22,509	4,979		27,488	985
December	20,113	5,458	———	25,571	1,870
Total 1944	337,022	71,246		408,268	30,725
Current Year's Stockpile Overrun	9,820	3,065		12,885	
Total 1944	346,842	74,311		421,153	30,725
Total 1943	360,067	154,650	3,097	517,814	22,483
Increase					8,242
Decrease	13,225	80,339	3,097	96,661	

f. Ore Statement:

	Athens	Mitchell	Corbit	Total	Total 1943
On Hand Jan. 1, 1944	42,103	14,545		56,648	60,680
Product for Year	346,842	74,311		421,153	510,105
Prior Year's Stockpile Overrun	730		———	730	7,709
Total	389,675	88,856		478,531	578,494
Shipments	368,289	83,398	———	451,687	521,846
Balance on Hand	21,386	5,458		26,844	56,648
Decrease in Output				88,952	
Decrease Ore on Hand				29,804	

g. Delays:

January 10th - 3 Hours Delay - Loss of Product 220 Tons

Two hours delay due to necessary repairs on the skip road, and one hour delay because of changing a broken sheave on a pulley stand.

February 2nd - 1½ Hours Delay - Loss of Product 100 Tons

Broken skip runner in skip dump.

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2. PRODUCTION SHIPMENTS AND INVENTORIES: (CONT.)

g. Delays: (Cont.)

March 14th - 10 Hours Delay - Loss of Product 800 Tons

Break down in skip pit and skip road.

August 28th - 2½ Hours Delay - Loss of Product 160 Tons

Skip repaired at General Shops was not lined up right when returned to mine.

October 13th - 2½ Hours Delay - Loss of Product 220 Tons

Fire started at the compressor and was carried to the air receiver where the gaskets in the air line and 60 feet of air line below the air receiver were burned out.

Summarizing all the delays, shows that the total production was an estimated 1700 tons less than if there were no delays, as compared to 18,710 tons in 1943 and 23,115 tons in 1942.

h. Delays from Lack of Current:

October 2nd - 1½ Hours Delay - Loss of Product 200 Tons

Break down on 4th Level which caused electric power failure due to broken electric power lines in the main drift.

3. ANALYSIS:

a. Average Mine Analysis on Output:

	1944				1943			
Grade	Tons	Iron	Phos.	Sil.	Tons	Iron	Phos.	Sil.
Athens	337,022	59.54	.113	7.59	355,269	59.93	.113	7.62
Mitchell	71,246	59.59	.113	7.53	151,739	59.77	.111	7.49

The average mine alalysis was lower for the second consecutive year due to opening new areas under jasper capping as well as a projection of lean ore from the South footwall extending a considerable distance into the ore body. This formation prevails from the top of mine down through to the lower levels in the ore body South of the fault dike. The formation itself consists of ferruginous slate and dike mixed with bands of ore.

B. Average Analysis on Straight Cargoes:

Grade	Mine	Lake Erie
Athens Ore.	None	None
Mitchell Lease Ore	None	None

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3. ANALYSIS: (CONT.)

c. High Sulphur Ore:

No high sulphur ore was encountered in the mine during 1944.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12:75 Cubic feet equals one ton
10 percent for rock
10 percent for loss in mining
Percent of Bessemer - None

	Athens Lots 1,7,10 & 12	Mitchell Lease Lots 8, 9, 11	Corbit Lease Lot 13	Total Tons
4th Level and above	568,746	306,696	502,380	1,377,822
4th to 6th Level	711,251	629,184	27,356	1,367,791
6th to 7th Level	229,678	85,075		314,753
7th to 8th Level	454,296	10,647		464,943
8th to 9th Level	304,936			304,936
9th to 10th Level	441,600			441,600
Below 10th Level	70,490			70,490
Total Gross Tons as of Nov. 30, 1944	2,780,997	1,031,602	529,736	4,342,335
Less Dec. Production	20,113	5,458		25,571
Total Gross Tons as of Dec. 31, 1944	2,760,884	1,026,144	529,736	4,316,764
Less 10% for mining	278,100	103,160	52,974	434,234
	2,482,784	922,984	476,762	3,882,530
Less 10% for Rock	250,290	92,844	47,676	390,810
Net Tons 1944	2,232,494	830,140	429,086	3,491,720
Net Tons 1943	2,024,973	968,572	416,761	3,410,306
Decrease		138,432		
Increase	207,521		12,325	81,414

There was an increase of 81,414 tons in the estimated ore reserves as compared with the previous year. Adding this figure to the product of 421,153 tons in 1944 shows that 502,567 tons of additional ore was developed in 1944. Part of the area adjacent to the fire which was considered unavailable and was omitted from last years estimate has been included in this year. This accounts for approximately 175,00 tons increase in the estimated reserves. Also the limits of the ore body on 6th Level were increased as the result of the main level development. Additional ore was also developed above 4th Level during the year due to extension of ore beyond limits used in previous estimates.

b. Prospective Ore:

All the ore in the mine is developed.

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4. ESTIMATE OF ORE RESERVES: (CONT.)

c. Estimated Analysis:

Ore Reserves:			Approximate Expected Natural Analysis								
	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist
Athens	3,491,720	51.85	.104	6.53	.348	2.75	.490	.760	.009	1.31	13.00
Ore in Stock:			**Average Dried Analysis**								
Athens	21,386	59.27	.121	7.90	.40	3.16	.56	.87	.010	1.50	
Mitchell	5,458	59.43	.114	7.73	.42	3.04	.66	.80	.010	1.55	

5. LABOR AND WAGES:

a. Comments:

The average number of employees in 1944 was 358 as compared with 402 in 1943, a decrease of 44. During the year 24 men were hired; 9 from Negaunee Mine, 3 who returned from military service and 12 others. Of the men that left our employ, 45 quit, 41 entered the armed forces, 3 were retired, 2 died and 8 were transferred to other mines making a total of 99 men. Deducting from this the 24 that were hired we have a net loss of 75 men during the year.

There is now a definite shortage of labor in the mine, particularly in the semi-skilled class. They include motormen, brakemen, chutemen, timber hoisters, etc.. These men were in the younger age group and consequently a large number have been drafted for military service.

The average monthly wages of employees in 1944 was $172.74 as compared with $177.62 in 1943. The decrease was due mainly to less overtime on account of discontinuing Saturday day shift on June 26th.

b. Comparative Statement of Wages and Product:

	1944	1943	Increase	Decrease
PRODUCT	421,153	517,814		96,661
No. Shifts & Hours	1-8 26	1-8 48		22
	2-8 133	2-8 3	130	
	3-8 124	3-8 249		125
Average No. Men Working				
Surface	72	75		3
Underground	286	327		41
Total	358	402		44
Average Wages Per Day:				
Surface	6.95	7.13		.18
Underground	7.93	8.16		.23
Total	7.72	7.95		.23

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5. LABOR AND WAGES: (CONT.)

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

Average Wages Per Month: (Based on Mine Payroll including Captain & Clerks)

	1944	1943	Increase	Decrease
Surface	163.43	168.20		4.77
Underground	175.09	179.78		4.69
Total	172.74	177.62		4.88
Product Per Man Per Day				
Surface	20.74	24.40		3.66
Underground	5.56	5.99		.43
Total	4.38	4.81		.43
Labor Cost Per Ton				
Surface	..335	.292	.043	
Underground	1.427	1.363	.064	
Total	1.762	1.655	.107	
Average Product Mining				
Stoping	21.44	21.81		.37
Development in Ore	9.00	13.85		4.85
Total	20.51	21.40		.89
Average Wages for Labor	7.72	7.95		.23
Total Number of Days				
Surface	20,310	21,218		908
Underground	75,779	86,502		10,723
Total	96,089	107,720		11,631
Amount For Labor				
Surface	141,202.60	151,384.52		10,181.92
Underground	600,898.40	705,460.17		104,561.77
Total	742,101.00	856,844.69		114,743.69

Average Wages Per Month as Per Labor Statement - Less Captain & Clerks:

Surface	163.12	168.11
Underground	174.51	179.29
Total	172.34	177.32

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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 3.97

5 3-8 hr. shifts and one 2-8 hr shift January 1st to June 26th.
5 2-8 hr. shifts June 26th to December 31st, 1944.

1943 - 1 to 4.36

5 3-8hr. shifts and one 2-8 hr shift January 1st to February 1st.
5 3-8 hr. shifts and one 1-8 hr. shift February 1st to December 31, 1943.

c. Operating Schedules - 1944:

Month	Days Mine Worked per Week	Days Per Month	Days Men Worked Per Week	Avg. Shifts Worked Per Month By Each Man
January	6	25	5 & 6	23
February	6	25	5 & 6	23
March	6	27	5 & 6	25
April	6	25	5 & 6	23
May	6	26	5 & 6	23
June	6	26	5 & 6	23
July	5	20	5	20
August	5	23	5	23
September	5	21	5	21
October	5	22	5	22
November	5	22	5	22
December	5	21	5	21
Total		283		269
Average for year mine operated		23.58		
Average for year worked by each man				22.42

6. SURFACE:

a-1. Buildings:

A new hoist rope shelter was built just South of the shaft house. The building will house three rope reels together with the air driven engine which is used to facilitate the changing of the skip and cage ropes.

In August work was started in remodeling the old laboratory building into a dry and office for the mining captain as well as offices for the surface foreman and mine mechanic. It was necessary to build a partial basement to accommodate the heating plant which was transferred from the main office building. This plant now heats both buildings. The building was completely rewired for 110 volt electric circuit and new lighting fixtures were installed. A shower bath and wash bowl were put

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6. SURFACE: (CONT.)

a-1. Buildings: (Cont.)

in the dirty clothes room, and all the rooms were refinished. This work was completed late in the year and the Captain moved in January 2, 1945.

Other work on mine buildings consisted of minor repairs and maintenance.

a-2. Docks, Trestles and Pockets:

A number of repairs were made in the storage and railroad loading pockets in the shaft house mainly installation of new planking and wearing plates.

A new wood stocking trestle was constructed late in the year between the two permanent steel trestles. This was necessary as it was decided to abandon the greater part of the South steel trestle because mining underground will eventually cause this area to cave.

A new rock trestle was also constructed in order to shorten the tramming distance. A portion of the rock pile was moved by the bulldozer, and the trestle was erected on top of the pile. This shortened the rock tram about 600 feet.

b. Stockpiles:

(1) Ore:

Shipments from stock pile were started in April and were continued on into November with only 1,866 tons of ore remaining in stock. This was not loaded and shipped because it was too wet to handle.

(2) Rock:

In order to shorten the rock tram so that the rock car could complete the trip between skips, a portion of the old rock pile near the South steel trestle was moved away by the tractor and a new trestle about 16' high was constructed. The rock will be moved away from under the trestle by the bulldozer as needed.

c. Cave to Surface:

The limits of the cave to surface remained about the same in 1944. There were no new cracks and about the only change was the extension of old cracks until they connected from one to the other. There was continued settlement however, of the area within the cracks. Negotiations are still pending on the purchase of two properties involved in the cave. As soon as a satisfactory price is agreed upon the property will be purchased.

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6. SURFACE: (CONT.)

d. Deep Wells:

No. 1 Deep Well continued operating throughout 1944 with an average of 45 gallons per minute being pumped. The only maintenance necessary to the pump was a daily visit by the watchman in order to fill the oil cups.

No. 2 Deep Well operated only once or twice during the year and that was for a very short while. Apparently there is no water supply in the well and if none appears this Spring the pump will be taken out.

Breitung Shaft

Pumping was continued from the Breitung Shaft during 1944. Repairs to the shaft consisted of installing a timber and some planking at the collar. Also, some repairs were made on the shanty which incloses the top of the shaft.

e. Water Purchased for Heating, Cooling, etc.:

The cost of water purchased from the City of Negaunee the last three years is as follows:

	1944		1943		1942	
	Gallons	Amount	Gallons	Amount	Gallons	Amount
1st Quarter	4,428,000	312.96	2,818,000	207.94	3,118,000	207.94
2nd Quarter	4,206,000	297.42	3,195,000	233.92	3,195,000	233.92
3rd Quarter	3,964,000	280.48	3,111,000	229.07	3,111,000	229.07
4th Quarter	3,742,000	264.84	3,492,000	247.44	3,083,000	226.40
Total	16,340,000	1155.70	12,616,000	918.37	12,507,000	897.33
Product - Tons	421,153		517,814		681,748	
Cost per ton	.002744		.001774		.001316	

The total cost of water used in 1944 was greater than in 1943. This was partly due to the installation of a new meter on the main line to replace the individual meters on the lines to the various buildings. Very often these meters were out of order and it was necessary to estimate the water used. It is thought that these estimates were lower than the actual amount used.

f. Grounds and Fences:

The grounds at the mine were kept in good condition throughout the year. In June, the Lombardy poplar trees located West of the main office were taken down as most of them were dead. They were replaced with a lilac hedge.

Fences around the caving area were inspected regularly and all necessary repairs were made.

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7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1944.

b. Development, General Remarks:

Development to provide mining areas to replace that area lost as a result of the fire was still being carried on in 1944. Drifting and raising was continued on 4 main levels but toward the end of the year this program had slowed up considerable as much of it was completed. Areas under new hanging above 4th Level were still being enlarged and developed so that this is now one of the most productive levels. Development of the 5th Level in the South footwall area was continued and mining should be started in May or June 1945. Development of the North footwall ore body from 5th Level must wait until mining approaches the 4th Level.

Toward the end of the year it was decided to develop for sub level caving the block of ore South of the fault dike and West of the fire area. Last year this area was considered unavailable due to the fire but it was not necessary to leave such a large pillar. Most of the development in this area was previously completed and raises were already up but it was impossible to cut the raises due to large amounts of water. By cutting out at a lower elevation and driving a transfer drift, development of this area will be made possible. All of this development is in ore.

In addition to the development of ore bodies for mining it was also necessary to carry on some development for ventilation.

b-1. Development in Ore:

4th Level

Some development work was done on the -275' and -315' sub levels North of No. 416 Raise. A transfer drift was driven North toward the footwall. A short raise was put up from the end of the transfer and a drift was advanced about 80' to the Northwest. It was originally planned that this drift be for drainage purposes but when ore was encountered North of a small dike located near the raise further exploration to locate the footwall is necessary so a drift was planned directly North of the raise.

A single compartment ore raise was put up from the end of a drift on the -355' sub level to the -315' sub level to provide a ventilation and traveling connection between the areas mining from the 400 Cross-cut, and those mining above the 410 Cross-cut.

No. 408A Raise was put up from the 4th Level to the -365' sub-level where mining was being carried on early in 1944. This raise replaced No. 408 Raise which had crushed so badly that it was beyond repair.

5th Level

Contract No. 9 working on the -460' sub level completed a drift West of No. 608A Raise and from the end of this drift put up No. 608B Raise to the 4th Level elevation. About 20' of drift was also driven on 4th Level to provide a ventilation connection between 5th and 4th Levels.

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7. UNDERGROUND: (CONT.)

b-1. Development in Ore (Cont.)

6th Level

The only ore development on 6th Level consisted of a portion of the main cross-cut to the Southeast which was driven through the East end of the ore body at this elevation.

7th Level

Ore development on 7th Level consisted of drifting and raising in the area South of the fault dike and West of the fire area. Early in 1943 a traveling and ventilation drift was driven East from No. 814 Raise along the 7th Level main drift which had crushed. In addition, some drifting was done Southwest of No. 814 Raise in order to drain the water which occurs along the old workings. This project was abandoned when a break thru of mud and water made it impossible to advance any further.

No. 751 Raise located at the switch of No. 730 Cross-cut was put up to the -625' sub level. No mining was done however as the drift crushed and it was decided to abandon this portion of 7th Level because repair costs were toogreat.

No. 752 Raise located about 30' East of No. 814 Raise was put up to the -635' sub level. This was a single compartment raise and a drift was advanced about 35' to the South. It was planned that this drift would take up No. 816 Raise and development of this block of ore West of the fire pillar would be continued. This was abandoned when a break through of mud and water occurred. Development of this area will be carried on from transfer drift between 7th and 8th Levels.

A single compartment ore raise was put up from the end of a drift located East of No. 701 Raise on the -645' sub level. This raise was extended to the -625' sub level for ventilation purposes.

8th Level

Ore development on this level was confined entirely to raising. A total of 476' of ore raise was advanced being divided between five different raises. Three of the raises were put up from the No. 860 Cross-cut and two were developed from No. 810 Cross-cut.

9th Level

Two drifts were driven Southwest from No. 1031 Raise in order to drain the water which occurs along the South footwall.

10th Level

On the 955' sub level above 10th Level a drift was driven 68' South west from No. 1031 Raise. This drift was for drainage along the footwall.

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7. UNDERGROUND: (CONT.)

b-1. Development in Ore (Cont.)

10th Level (Cont.)

10th Level ore development consisted of 5' of ore drift and 136' of ore raise. The ore in the drift was encountered about 90' from the turn out of No. 1030 Cross-cut. Two raises were put up from 10th Level and they encountered ore above the 10th Level after advancing through footwall material.

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

Location	Drifting	Raising	Total
-275' Sub	55		55
-315' Sub	25	26	51
-330' Sub	107		107
-355' Sub		30	30
4th Level		30	30
-460' Sub	40		40
5th Level		50	50
6th Level	89		89
-645' Sub		25	25
7th Level	426	103	529
8th Level		476	476
-955' Sub	68		68
10th Level	5	136	141
Total 1944	726	876	1,602
Total 1943	870	1,022	1,892
Decrease	144	146	290

b-2. Development in Rock

4th Level

The North footwall drift was extended 72' in footwall slates to a point about 15' East of the Athens - Corbit Lease boundary line. This development was discontinued until it becomes necessary to develop the Corbit Lease.

5th Level

Development on 5th Level along the North footwall consisted of drifting Southeast from No. 650 Raise to connect with the drift which was driven Northwest from No. 608 Raise. This provides another ventilation connection between 5th and 6th Levels.

Development along the South footwall was started late in the year and a transfer drift Southwest of No. 651 Raise was completed in December. A raise was then started to the South and will be put up to the 4th Level where mining will be started. Additional raises will be put up from this transfer to provide new mining places, and to replace a 4th Level raise where mining is approaching the 4th Level.

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7. UNDERGROUND: (CONT.)

b-2. Development in Rock (Cont.)

6th Level

Development on 6th Level was carried on throughout the year with the drifting being completed in August. The first drift East of the Southeast Cross-cut was completed to a point 30' East of the Athens Lot 10 and Mitchell Lease Lot 11 boundary line. No. 650 Raise was then started to the North and was completed to 5th Level in March. Upon completion of the second drift East to the West boundary of Mitchell Lease Lot 11, No. 652 Raise was started and will be extended in the South footwall to 4th Level for ventilation. The Southeast cross-cut was extended almost to the 3500' coordinate and No. 651 Raise was started to the Southwest and is being used for the development of the 5th Level along the South footwall.

7th Level

There was no rock development work done on 7th Level in 1944.

8th Level

In April work was started on a drift to the Northeast from the end of No. 860 Cross-cut. This drift was completed in August after a total advance of 293'. In addition, three raises were put up; one for drainage purposes and two for mining the area South of the fault dike and East of the fire pillar. These raises also serve as ventilation connections between 8th and 7th Levels.

In December a diamond drill station located at the Athens Lot 7 - Mitchell Lease Lot 8 boundary line was started. Drilling will soon be started to explore the structure North of the large diorite dike.

9th Level

There was no rock development on 9th Level in 1944.

10th Level

In January a new drift was started on 10th Level at about the 1300' West coordinate and extended South and Southwest to a point about 70' Southwest of the 1600' West coordinate. This drift will be used to recover the remaining ore on and below 9th Level in Block 2. Raises No. 1031 and 1032 were put up to 9th Level, the first to be used for drainage and the latter for mining. Further raise development was stopped as it was decided to temporarily abandon this territory in order to centralize the mining on upper levels and reduce some of the maintenance costs.

The following is a summary of the rock development in 1944.

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7. UNDERGROUND: (CONT.)

b-2. Development in Rock (Cont.)

Location	Drifting	Raising	Total
355' Sub	10	33	43
4th Level	72		72
5th Level	145	7	152
6th Level	459	440	899
8th Level	313	113	426
10th Level	535	102	637
Total 1944	1,534	695	2,229
Total 1943	1,500	305	1,805
Increase	34	390	424

c. Stoping

(1) General:

The product in 1944 came from Blocks 2, 3, 4, 5 and 6, and by Levels from 10th, 9th, 8th, 7th, 6th, and 4th. Seventy-two percent of the total product for the year came from 4th and 8th Levels. In September mining was temporarily stopped in Block 2 above 9th Level in order to centralize the mining on the upper levels and reduce the maintenance on 9th and 10th Levels. During the year it was decided to abandon a portion of the Southeast steel stocking trestle and by this the North portion of Blocks 5 and 6 above 4th Level is immediately available for mining. This area was previously developed for mining and 5 contracts are now working in this block along the North footwall.

The locations of the mining contracts at the end of the year 1944 and 1943 are shown below:

1944		1943	
13	above 4th Level	10	above 4th Level
2	above 6th Level	3	above 6th Level
2	above 7th Level	8	above 7th Level
9	above 8th Level	1	above 8th Level
0	above 9th Level	4	above 9th Level
0	on 10th Level	1	on 10th Level
Total 26		Total 27	

There were 26 contracts working in December 1944 as compared with 27 a year ago. They were divided as follows:

1944	1943
Mining - 21 Contracts	Mining - 22 Contracts
Developing - 3 Raising	Developing - 2 Raising
- 2 Drifting	- 3 Drifting
Total - 26 Contracts	Total - 27 Contracts

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7. UNDERGROUND: (CONT.)

c. Stoping (Cont.)

(1) General (Cont.)

Above the 4th Level ore was mined in 1944 on the -200', -210', -220', -245', -260', -260', -275', -290', -300', -315', -330', -340', -355', -365', and -375' Sub-levels.

In the area between the 4th and 6th Levels drifting was done on the -460', and -500' Sub-levels. In addition ore was mined on the -565' and -575' Sub-levels.

Between the 6th and 7th Levels ore was mined on the -615', -625', -635', -645', -660', -675' Sub-levels, and on the 7th Level.

Between 7th and 8th Levels ore was mined on the -710' and -720' Sub-levels. In addition, some ore was obtained from raising above 8th Level.

Between 8th and 9th Levels ore was mined on the -855', -865' and -875' Sub-levels. Also, some ore was mined in drifting operations on 9th Level.

Between 9th and 10th Levels ore was mined on the -955' Sub-level where some drifting was done.

During the year 1944, ore was mined on 31 different sub-levels, as compared with 27 in 1943.

(2) Detail of Stoping

The following is a detailed description of mining in the various blocks beginning with the highest areas in Blocks 5 and 6 above 4th Level.

Blocks 5 and 6 Above 4th Level

In July a decision was made to abandon a portion of the Southeast steel stocking trestle in order to release for mining an ore area along the North footwall. This area had previously been explored and developed and some mining had been started but was temporarily abandoned to protect the trestle against caving. Mining was then continued in that portion of Mitchell Lease Lot 11 and Athens Lot 12, which lies along the North footwall.

Mining was completed on the -200' and -210' Sub-levels in the narrow ore area in Athens Lot 12 along the North footwall. Considerable water was encountered along the small dike which extends East and West adjacent to the footwall slate and as a result progress was retarded considerably. This area is very narrow but as mining progresses to lower sub-levels it will enlarge to the South and East as the jasper capping dips in this direction. As soon as the ore area is large enough another contract will be moved here in an effort to mine the area down as rapidly as possible so it will be on the same elevation as the adjoining ore area to the South which is now being mined on the -260' sub-level.

In the area referred to in the latter part of the above paragraph, mining was started on the -260' Sub-level. By the end of the year only a small amount of ore remained to be mined and development of the next lower sub-level will soon be underway. This ore body occurs as a riser in the jasper capping and this is the first sub-level of any accountable size that has been mined.

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7. UNDERGROUND: (CONT.)

c. Stoping (Cont.)

(2) Detail of Stoping (Cont.)

To the West in the ore area around No. 401 Raise, mining was completed on the -245' and -260' Sub-levels. On the -260' Sub-level this ore body is about 125' North and South by 110' East and West. On the next lower sub-level where mining is now in progress the North and South dimension has reduced to approximately 75'. This is due to a roll in the jasper capping which reduces the South limit of the ore area. As mining progresses to lower sub-levels the jasper dips to the South and the area will become larger.

In Mitchell Lease Lot 11 mining was completed on the -260' sub-level North of No. 416 Raise. At the end of the year mining was nearly completed on the -275' sub-level. Also No. 414 Raise was cut out and mining was being done to the West and North of the Raise. Directly to the North an exploratory drift was driven Northwest from No. 416 Transfer Raise between the footwall and the small dike which extends East and West along the footwall. Mining will be started at the -275' elevation.

Along the South footwall in Athens Lot 12 mining was completed on the -290' Sub-level, and except for a very small pillar in the Northeast corner was completed on the -300' Sub-level. At the end of the year mining was near completion on the -315' Sub-level. This area is one of the most productive areas above 4th Level. The southern most part of the ore area is intersected with dikes and lean material so at times the analysis of the product was somewhat low but by careful supervision the general product from the 4th Level was kept up to standard. Due to the fact that the jasper capping is dipping to the East the ore area is enlarging in this direction on each succeeding lower sub-level. On the -315' Sub-level No. 418 Raise was cut out and considerable mining was done, some of which was under new jasper hanging requiring careful work.

On the -315' Sub-level a transfer drift was driven North from No. 416 Raise. This is used to carry on some exploration on the -275' Sub-level and later will be used to transfer ore from mining operations on the -275' Sub-level along the North footwall.

Some drifting was done on the -330' Sub-level in Athens Lot 12 to provide ventilation and traveling connections between some of the raises. Also, on the -340' Sub-level a short drift was driven for ventilation and traveling.

Mining was started on the -355' Sub at No. 404 Raise early in the year. A drift was driven 85' Northeast of the raise in lean ore and jasper. From the end of this drift a single compartment raise was put up to the -315' Sub-level to serve as a ventilation and traveling connection. A connection was then completed to No. 403 Raise and mining was carried on to the Southwest where the jasper hanging wall was encountered. Mining operations on this sub-level were completed in June and the miners were transferred to No. 406 Raise on the -375' Sub-level.

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7. UNDERGROUND: (CONT.)

c. Stoping (Cont.)

(2) Detail of Stoping (Cont.)

In the area around No. 408 Raise mining was completed on the -365' Sub-level in May. The contract then moved down to the -375' Sub-level. As the mining proceeds to lower sub-levels the ore area is increasing to the West so that at the -365' Sub it measures 175' East and West by 125' North and South. On the -375' Sub-level there were 2 gangs of miners working but progress was slowed up considerably due to necessary repairs on raises and on the level below. Mining is now being carried on 25' above 4th Level so development from 5th Level is being carried on to replace the 4th Level raises which have very little storage capacity.

4th Level

There was no mining at 4th Level elevation during the year and the development has previously been discussed.

Between 4th and 6th Level
Block 4, South of Fault Dike, Adjacent to South Footwall

There was very little mining between 4th and 6th Levels as indicated by the product which amounted to 1/2 of 1% of the total. Mining was completed around No. 703 Raise on the -565' and -575' Sub-levels. This completed the recovery of all the ore in this block as the footwall dips to the West cutting off the ore on the -575' Sub-level.

6th Level

There was no mining on the 6th Level elevation during the year and the development has been discussed earlier in this report.

North Side of Fault Dike, Block 4 Above 7th Level

In this narrow ore area, which is bounded by the footwall on the North and the fault dike on the South, mining was completed on the -615', -625', and -635' Sub-levels. Towards the end of the year mining operations were on the -635' Sub-level, and only a small pillar of ore remained to be mined to complete this sub-level. On the next lower sub-level, namely the -660', operations will extend about 60' farther East to another mining limit.

South Side of Fault Dike, West Half of Block 4 Above the 7th Level

Work was continued in this area throughout 1944 and mining was completed on the -635', -645' and -660' Sub-levels. Toward the end of the year mining was being done on the -675' Sub-level from 8th Level raises which were put up to replace No. 701 and No. 702 Raises. Two contracts worked in this area until the -660' Sub-level was completed and then one contract was transferred to another territory as this area is becoming too small for two contracts, due to the Northward dip of the South footwall.

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7. UNDERGROUND: (CONT.)

c. Stoping (Cont.)

(2) Detail of Stoping (Cont.)

North Side of Fault Dike, Block 3 Above 7th Level

There was a very small amount of mining done on the -675' Sub-level East from No. 862 Raise to complete the sub-level. Mining was also completed on the next lower sub-level namely the 7th Level elevation, and nearly completed on the -710' Sub-level. This is the most productive single area in the mine and it measures 300' long with an average width of 150'. Five contracts worked in the area until operations reached the -720' Sub-level and then one contract was transferred to a new territory. This area is becoming smaller due to slate which appears along the North side of the fault dike and dips to the North.

8th Level

There was no mining on the 8th Level elevation during the year and the development has been discussed earlier in this report.

Ore Area North of Fault Dike, Block 2 Above the 9th Level

Four contracts were mining in Block 2 during most of the year completing the -855', and -865' Sub-levels. Operations were retarded somewhat due to water which occurs along the South footwall and along the large dike to the North. It was very difficult to handle this wet ore especially in the loading pockets at the shaft. In September it was decided to quit mining temporarily in this area and transfer the contracts to the 4th Level in order to centralize the mining and reduce maintenance of the 9th and 10th Levels. This proved to be a wise move and as larger areas are developed above 4th Level this area will probably be reopened sometime in 1945.

9th Level

There was no mining on the 9th Level elevation during the year and the development consisted of drainage drifts Southwest from No. 1031 Raise.

10th Level

Operations on this level consisted of drifting and raising which has previously been discussed under "Development."

d. Timbering

The total cost for timbering, labor and supplies decreased $20,829.83 in 1944, and increased $.113 in cost per ton. The cost per foot for cribbing and stull timber decreased about 7% in 1944, while the cost per foot of lagging and poles increased about 19%. The total amount of timber, lagging and poles used in 1944 decreased due to less production. The high timbering costs are due to the large amount of repair work which is necessary to

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7. UNDERGROUND: (CONT.)

d. Timbering (Cont.)

to maintain raises and main levels. Heavy pressure cause the timber to break and crush, and also the short life of the timber and cribbing make it necessary to continually replace them as they rot. A large part of this repair work is done on week ends when the men are paid overtime and therefore the labor costs for this type of work is high.

The greater portion of the repair work on 4th Level consisted of raise repairs and repairs on the level at the bottom of raises. Nearly all the raises which were in ore required repairs during the year. Some of them had to be repaired twice during the year. Considerable repairs were necessary in the 701 and 702 Cross-cuts. Extremely heavy pressure was present in the 701 Cross-cut but toward the end of the year this diminished somewhat and the area became more stable.

6th Level repair work was confined mainly to that portion of the cross-cut between No. 608 and No. 613 Raises. Toward the end of the year this part of the cross-cut was abandoned so no further repairs were necessary and the drift was kept open as far as No. 608 Raise which connects to 5th Level for ventilation. Repairs were also made in the connection between No. 700 Raise and the 6th Level main drift.

Continuous repairs were necessary in the 7th Level main drift between 710 switch and 730 switch. At times during the year there were two repair crews working in this section and the pressure was so great that they had difficulty in keeping it up. In September it was decided to abandon this length of drift as mining in the area East of the fire pillar was approaching 7th Level and would eventually cave the 7th Level drift between No. 701 and No. 702 Raises. A break down near No. 713 Raise was repaired in October and when this was completed repairing was started in No. 713 Raise.

There was a normal amount of repair work on 8th Level to maintain the drifts for haulage. In addition, some repairs were made to raises where it was necessary to replace rotted cribbing.

Considerable repairs were necessary on 9th Level to maintain the haulage drift into the area being mined above the level in Block 2. Toward the end of the year mining was abandoned in this area so further repairs were not necessary.

Repairs on 10th Level were confined to the new cross-cut where it intersected an old drift South from the main drift.

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7. UNDERGROUND: (CONT.)

d. Timbering (Cont.)

Statement of Timber Used:

	Lineal Feet	Avg. Price Per Foot	Amount 1944	Amount 1943
6" to 8" Cribbing	152,370	.0581	8,852.83	6,667.92
8" to 10" Stulls	14,283	.0813	1.161.86	487.42
10" to 12" Stulls	115,200	.1287	14,829.13	19,366.29
12" to 14" Stulls	45,065	.1850	8,339.47	10,107.74
14" to 16" Stulls	16,664	.2177	3,627.80	4,989.04
Total 1944	343,582	.1071	36,811.09	
Total 1943	362,479	.1148		41,618.41
		Per 100'		
7' Lagging	1,319,171	1.4119	18,625.38	16,541.86
9½' Poles	1,127,379	1.9919	22,457.04	23,936.46
Total 1944	2,446,550	1.6792	41,082.42	
Total 1943	2,865,890	1.4124		40,478.32
Wire Netting	660		41.76	208.44

	1944	1943
PRODUCT FOR YEAR - TONS	421,153	517,814
Ft. Timber per Ton of Ore	.8158	.7000
Ft. Lagging per Ton of Ore	3.1323	3.0398
Ft. Poles per Ton of Ore	2.6769	2.4948
Ft. Lagging per Ft. of Timber	3.8395	4.3425
Cost per Ton for Timber	.0874	.0804
Cost per Ton for Lagging	.0442	.0319
Cost per Ton for Poles	.0533	.0462
Cost per Ton for Wire Netting	.0001	.0004
Cost per Ton for Timber, Lagging, Poles & Netting	.1850	.1589
Equivalent of Stull Timber to Board Measure	811,489	801.719
Ft. of Board Measure per Ton of Ore	1.9268	1.5483
Lin. Ft. of Netting per Ton of Ore	.0015	.0067
Sq. Ft. of Netting per Ton of Ore	.0065	.0279

		AMOUNT	Cost Per Ton
Total Cost of Tbr., Lagging, Poles, Etc. for Year	1944	77,935.27	.1850
do	1943	82,305.17	.1589
do	1942	82,410.65	.1209
do	1941	67,589.93	.1041
do	1940	59,589.66	.1155
do	1939	47,153.85	.1164
do	1938	35,920.27	.1340
do	1937	49,763.66	.1123
do	1936	35,719.77	.1149
do	1935	22,585.11	.1173

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7. UNDERGROUND: (CONT.)

e. Drifting and Raising

The following table gives a comparison of total feet of drifting and raising in ore and rock in 1944 and 1943.

	Drifting		Raising		
Year	Ore	Rock	Ore	Rock	Grand Total
1944	806'	1,534'	796'	695'	3,831'
1943	870'	1,500'	1,017'	305'	3,692'
Increase		34'		390'	139'
Decrease	64'		221'		

Note* 53' stripping ventilation raise in rock and 78' in ore not included in above footages.

f. Explosives, Drilling and Blasting

The cost per pound for powder has remained the same for the past four years, namely $.115 per pound. The expenditure for powder decreased $6,914.58 and the cost per ton of ore decreased $.0029. The total cost per ton for fuse, caps, etc., was $.007 lower than in 1943. The cost per ton for all explosives was $.0523 in 1944, as compared with $.0559 in 1943.

All employees that handled explosives were licensed in 1944 according to the rules and regulations. Inspections were made during the year of the underground powder magazines by the Bureau of Mines representative. Blasting inspections of each contract were made every 60 days by the shift boss and a full report was made out on a printed form. There was no change in blasting practices, with the two methods being used, namely, fuse and electric. Electric blasting was used mainly in raises to allow the men to be in the clear when firing.

Statement of Explosives Used: (Ore Development and Stoping)

	Quantity	Average Price	Amount 1944	Amount 1943
No. 1. Gelamite Powder, lbs.	151,143	11.50	17,381.43	22,897.06
Fuse - feet	620,637	5.14	3,192.35	4,164.14
Caps	86,497	12.20	1,055.28	1,366.11
Electric Caps & Delays	1,525	11.55	176.17	189.90
Tamping Bags	32,500	2.15	69.88	131.80
Fuse Lighters	19,000	6.75	128.29	135.04
Connecting Wire, lbs.	46	.55	25.30	35.20
Shot Firing Cord - feet				24.03
Total Fuse, Caps, Etc.			4,647.27	6,046.22
Total Cost All Explosives			22,028.70	28,943.28
PRODUCT			421,153	517,814
Pounds Powder per Ton of Ore			.3589	.3845
Tons of Ore per Lb. of Powder			2.7865	2.6007
Cost per Ton for Powder			.0413	.0442
Cost per Ton for Fuse, Caps, Etc.			.0110	.0117
Cost per Ton for All Explosives			.0523	.0559

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7. UNDERGROUND: (CONT.)

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

Statement of Explosives Used: (Cont.) (Sinking, Rock Development, Etc.)

	Quantity	Average Price	Amount 1944	Amount 1943
60% Am. Gelatin Powder - lbs.	12,498	11.50	1,437.27	287.50
No. 1 Gelamite Powder - lbs.	9,859	11.50	1,133.80	1,569.19
Herculite	150	10.00	15.00	
Total Powder 1944	22,507	11.49	2,586.07	
Total Powder 1943	16,145	11.50		1,856.69
Fuse - feet	54,363	5.14	279.58	254.95
Caps	7,503	12.20	91.52	85.69
Electric Caps & Delays	2,500	11.84	296.01	34.62
Tamptite Paper Shells	1,200	.60	7.20	1.20
Total Fuse, Caps, Etc.			674.31	376.46
Total All Explosives			3,260.38	2,233.15
Total Explosives Used at Mine			25,289.08	31,176.43
Average Price Per Pound For Powder			.1150	.1150

g. Mining and Loading

There was a decrease in tramming costs of $.018 in 1944. Tramming was continued until October on 5 levels at which time mining was abandoned in the 9th Level area so two tramming crews were transferred to the upper levels. Tramming crews were maintained for the balance of the year on 4th, 7th and 8th Levels, with a small crew on 6th Level to take care of the development work. Tramming on 7th Level will be completed early in 1945 but it is planned to start tramming on 10th Level again in 1945 so there will continue to be 4 levels in operation.

There was no change in mining practice in 1944. Late in the year plans were made to introduce the sub-level caving system of mining in certain areas. Development of one of these areas was started in December. This decesion was brought about in an attempt to increase production and lower the timber costs. A study of this system as used in some of the mines on the Gogebic Range was made and we will attempt to apply it here with some variation. The use of timber bulkheads continued during the year with excellent results, especially near the raises. Also, in order to maintain traveling and ventilation connections in heavy ground, timber bulkheads were built along one side. This reduced the size of the drift but it was maintained considerably longer than if no bulkheads were used.

h. Ventilation

In general ventilation was good throughout 1944. After the mine fire it was decided to reduce the total volume of air being circulated in the mine so that the pressures would be less which would tend to cut down the supply of oxygen to the fire area. This was done by putting on a smaller pulley on the fan motor. The fan then delivered approximately

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7. UNDERGROUND: (CONT.)

h. Ventilation (Cont.)

60,000 cubic feet per minute but late in 1944 the larger pulley was again put on and the fan now delivers about 80,000 cubic feet per minute. No longer is there any danger of supplying air to the fire area as the drifts have crushed and everything is down tight. No. 700 Raise between 7th and 6th Levels was stripped and cribbed in order to enlarge it to full size. This now provides a permanent ventilation connection between the 6th and 7th Levels. One more permanent rock raise is planned between the above two levels and it will be put up in 1945. Our objective is to have at least two permanent rock raises to serve as ventilation and traveling connections between each level in the mine. In September a raise was started from 6th Level in the South footwall slates. This will be put up to the 4th Level elevation, and a connection will be made to the 4th Level Southeast cross-cut for ventilation. When this is completed it will greatly improve conditions on 4th Level where some of the contracts are quite warm at the present time. Ventilation costs in 1944 were $314.45 less than in 1943 although the cost per ton increased $.005 due to a smaller product.

i. Pumping

The water pumped at the Athens Mine in 1944 averaged 308 gallons per minute as compared with an average of 372 gallons per minute in 1943. This is a decrease of 64 gallons per minute which is a notable amount. It is difficult to account for this decrease as rainfall and other factors effecting the total water has remained about the same.

The following table gives data on pumping at the Athens and Breitung Shafts:

Period	Avg.K.W. Per Day - Athens	K.W.Per Month Breitung Pump	Avg. Gal. Per Min. - Athens	Total Cost Both Mines From Athens Cost Sheet
January	3957	900	315	$2,385.67
February	3564	480	297	2,273.53
March	3519	270	296	2,211.79
April	3500	570	295	2,231.39
May	3684	1630	307	2,369.71
June	3752	2900	312	2,343.88
July	3771	3110	314	2,594.91
August	3727	2420	313	2,567.21
September	3717	2020	311	2,591.74
October	3729	1950	312	2,997.30
November	3747	2160	316	3,338.13
December	3683	1840	308	2,438.18
1937 Avg.	3003	3282	257	1,749.12
1938 "	3767	3433	314	2,350.42
1939 "	3991	4391	331	2,291.90
1940 "	4141	858	351	2,381.69
1941 "	4008	1883	354	2,351.56
1942 "	4435	2258	388	2,668.91
1943 "	4351	3358	372	2,701.08
1944 "	3696	1688	308	2,528.62

Average cost in 1934 prior to pumping at the Breitung $2,611.79

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7. UNDERGROUND: (CONT.)

i. Pumping (Cont.)

Saving in 1935 when expense was heavy account of installing	$2,600.59
Saving in 1936	10,148.52
Saving in 1937	10,352.04
Saving in 1938	3,135.96
Saving in 1939	3,838.65
Saving in 1940	2,761.20
Saving in 1941	2,922.76
Saving in 1942	685.44*
Saving in 1943	1.071.50*
Saving in 1944	83.17

(*) Above the cost, prior to pumping at the Breitung.

The number of gallons pumped per minute at the Athens Mine in each month of the year for the past seven years is given in the following statement:

Month	1944	1943	1942	1941	1940	1939	1938
January	315	359	399	330	325	297	266
February	297	334	388	327	318	282	273
March	296	330	373	324	322	297	277
April	295	356	374	334	318	293	305
May	307	404	402	334	340	338	343
June	312	411	402	367	380	357	364
July	314	431	393	386	420	382	341
August	313	419	394	363	350	375	333
September	311	390	384	363	369	360	336
October	312	364	397	360	373	348	311
November	316	337	379	365	343	334	307
December	308	328	368	397	348	329	309
Average	308	372	388	354	351	331	314

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1944	1943	Increase	Decrease
Product	421,153	517,814		96,661
Underground Costs	2.087	1.962	.125	
Surface Costs	.258	.202	.056	
General Mine Expense	.322	.302	.020	
Cost of Production	2.667	2.466	.201	
Taxes	.284	.205	.079	
Total Cost	2.951	2.671	.280	
No. of Days Operated	283	300		17
No. Shifts & Hours	26-1-8	48-1-8		22
	133-2-8	3-2-8	130	
	124-3-8	249-3-8		125
Average Daily Product	1,488	1,726		238

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8. COST OF OPERATING: (CONT.)

a. Comparative Mining Costs: (Cont.)

COST OF PRODUCTION	1944	Percent	1943	Percent	Inc.	Dec.
Labor	1.829	68.6	1.725	70.0	.104	
Supplies	.838	31.4	.741	30.0	.097	
Total	2.667	100.0	2.466	100.0	.201	

b. Detailed Cost Comparison:

(1) Days and Shifts

Year	Days Mine Worked	Shifts & Hours	Men Employed	Total Shifts Worked
1944	283	5-3-8 Hr. to 6/26 5-2-8 Hr. 6/26 to 12/31/44	358	96,089
1943	300	5-3-8 Hr. 1-1-8 Hr.	402	107,720
Decrease	17		44	11,631

(3) Comparison of Production:

Production - 1944	421,153 Tons
Production - 1943	517,814 Tons
Decrease	96,661 Tons

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate Per Day
1944	358	96,089	742,101.00	7.72
1943	402	107,720	856,844.69	7.95
Decrease	44	11,631	114,743.69	.23

(5) Tons Per Man Per Day:

	1944	1943	Decrease
Surface	20.74	24.40	3.66
Underground	5.56	5.99	.43
Total	4.38	4.81	.43

(6) Cost of Production:

	Total	Cost Per Ton
1944	1,123,215.34	2.667
1943	1,276,725.53	2.466
Increase		.201
Decrease	153,510.19	

	Labor	Percent	Supplies	Percent
1944	770,123.37	68.6	353,091.97	31.4
1943	893,306.71	70.0	382,617.05	30.0
Increase				1.4
Decrease	123,183.34	1.4	29,525.08	

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8. COST OF OPERATING: (CONT.)

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

		1944		1943	
	Days Per Week	6 & 5		6	
	Shifts & Hours	1 & 2 & 3-8 hr.		1 & 2 & 3-8 hr.	
	Production - Tons	421,153		517,814	
	Average Daily Product - Tons	1,488		1,726	
	Number of Days Worked	283		300	
	UNDERGROUND COSTS:	AMOUNT	PER TON	AMOUNT	PER TON
1.	Exploring in Mine	297.15	.001	583.97	.001
2.	Sinking in Shaft				
3.	Development in Rock	30295.22	.072	22188.63	.043
4.	Development in Ore	13830.71	.033	15788.29	.030
5.	Stoping	215830.47	.512	266710.44	.515
6.	Timbering	348122.88	.826	368952.71	.713
7.	Tramming	97727.75	.232	129329.44	.250
8.	Ventilation	12162.59	.029	12477.04	.024
9.	Pumping	30343.44	.072	32413.00	.063
10.	Compressors and Air Pipes	42371.43	.101	45497.95	.088
11.	Fire and Damage			12694.00	.024
12.	Underground Superintendence	34783.86	.082	34114.43	.066
13.	Cave-in	74.79	.000	135.37	.000
14.	Maint: Compressors and Power Drills	2032.15	.005	4431.54	.009
15.	Scrapers and Mechanical Loaders	22325.61	.053	35206.81	.068
16.	Electric Tram Equipment	25219.73	.060	23656.50	.046
17.	Pumping Machinery	3625.02	.009	11595.99	.022
	Total Underground Costs	879042.80	2.087	1015776.11	1.962
	SURFACE COSTS:				
18.	Hoisting	39504.45	.094	43749.58	.084
19.	Stocking Ore	9702.36	.023	9260.61	.018
20.	Screening-Crushing at Mine				
21.	Dry House	10524.12	.025	10023.51	.019
22.	General Surface Expense	12098.65	.029	12794.65	.025
23.	Maint: Hoisting Equipment	15474.09	.037	14812.84	.029
24.	Shaft	5879.57	.014	5372.04	.010
25.	Top Tram Equipment	2759.59	.006	1791.97	.003
26.	Docks, Trestles and Pockets	7408.70	.017	4909.85	.010
27.	Mine Buildings	5330.92	.013	1832.31	.004
	Total Surface Costs	108682.45	.258	104547.36	.202
	GENERAL MINE EXPENSES:				
28.	Mining Engineering	3765.15	.009	4199.97	.008
29.	Mechanical and Electrical Engineering	2146.38	.005	2877.39	.006
30.	Analysis and Grading	16830.19	.040	18504.87	.036
31.	Safety Department	2156.08	.005	2619.97	.005
32.	Telephones and Safety Devices	2233.15	.005	2701.13	.005
33.	Local and General Welfare	3847.28	.009		
34.	Spc. Exp., Pensions & Allowances	8519.57	.020	36173.01	.070
35.	Ishpeming Office	20259.11	.048	11659.67	.022
36.	Mine Office	20598.97	.049	20841.06	.040
37.	Insurance	3348.81	.008	4752.94	.009
38.	Personal Injury	13736.26	.033	13788.32	.027
39.	Social Security Taxes	17509.99	.042	20380.90	.039
40.	Employees Vacation Pay	17902.93	.043	17902.83	.035
41.	Group Annuity Premiums	2634.72	.006		
	Total General Mine Expenses	135488.59	.322	156402.06	.302
	COST OF PRODUCTION	1123213.84	2.667	1276725.53	2.466
42.	Taxes	119599.84	.284	106103.23	.205

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

1. Exploring in Mine:

Covers a proportion of Geological Department expense. The amount charged to Athens Mine decreased $286.82, while the cost per ton remained the same.

3. Development in Rock:

Total feet of drifting and raising in rock, 2,229 feet in 1944 as compared with 1,902 feet in 1943. Increase in expense $8,106.59 and in cost per ton $.029. Drifting in 1944, 1,534 feet; in 1943, 1,592 feet. Raising in 1944, 695 feet; in 1943, 310 feet.

4. Development in Ore:

There were 184 feet less ore drifting and 157 feet less ore raising in 1944. The decrease in expense was $1957.59 and the cost per ton increased $.003.

5. Stoping:

The decrease in expense was $50,879.97 and in cost per ton $.003. The decrease in expense was due to smaller product account of less shifts operating.

6. Timbering:

The decrease in expense was $20,829.83, while the cost per ton increased $.113. The cost of timber, lagging and poles increased $.0261 per ton.

7. Tramming:

There was a decrease of 96,661 tons in production due to less shifts operating and a decrease in men employed. A large number of men were drafted and could not be replaced.

8. Ventilation:

The decrease in expense was $314.45 and the cost per ton increased $.005. The decrease in expense was due to less repairs to ventilation fans and doors. The cost for electric power increased $753.37.

9. Pumping:

Expense decreased $2,069.56 and cost per ton increased $.009.
Gallons of water pumped in 1944 - 161,935,952
Gallons of water pumped in 1943 - 195,041,792
Gallons decrease 33,105,840
Average gallons per minute in 1944 - 308
Average gallons per minute in 1943 - 372
Gallons decrease 64
The cost for electric power was $3,994.99 less than in 1943.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

10. Compressors and Air Pipes:

Expenditures decreased $3126.52 and cost per ton increased $.013.
Cubic feet air compressed in 1944 - 900,765,000
Cubic feet air compressed in 1943 - 1,013,220,000
Decrease 112,455,000

Cost of electric power in 1944 - $29,140.13
Cost of electric power in 1943 - 31,205.04
Decrease 2,064.91

11. Fire and Damage:

Expense in 1944 - None
Expense in 1943 - $12,694.00, cost per ton .024.

12. Underground Superintendence:

The increase in expense was $669.43 and cost per ton $.016. Increase due to the fact that the shift bosses added in 1943 was on for only 9 months.

13. Cave-in:

Expense in 1944 - $74.79, cost per ton $.000.
Expense in 1943 - 135.37, cost per ton .000.
Decrease 60.58 .000

14. Compressors and Power Drills:

The decrease in expense was $2399.39 and cost per ton $.004. There was only one R-58 Wet Stoper machine bought in 1944 as compared with seven RB-12 Jackhammer drill machines, three D.A. Drifter machines, one R-48 Wet Stoper machine and eight Ingersoll-Rand Jack Legs in 1943. 60 feet of 6" main air line was replaced in 1944.

15. Scrapers and Mechanical Loaders:

The expense in 1944 decreased $12,881.20 and cost per ton $.015. There were no electric hoists or scrapers bought in 1944. In 1943, four new 25 H.P. Ingersoll-Rand electric hoists costing $7,360.00 and four Holcomb scrapers for $813.70 were bought. There were 58,193 feet of scraper rope used in 1944 as compared with 70,400 feet in 1943 due to smaller product.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

16. Electric Tram Equipment:

The increase in expense was $1563.23 and cost per ton $.014.

Detail:

	Generators	Locomotives	Wiring	M.L.Track	M.L.Cars
1944	418.74	7124.15	1131.98	9119.30	7425.56
1943	723.26	7114.22	1195.14	9259.78	5363.80
Increase		9.93			2061.76
Decrease	304.52		63.16	140.48	

Decrease in expenditures to generators, wiring and main line tracks due to less repairs. The increase in expense to main line cars due to more repairs.

17. Pumping Machinery:

Expenditures decreased $7,970.97 and cost per ton $.013. Decrease in expense due to charging out the expenditures to E. & A. Account A.M.-12, sinking wells and installing pumps amounting to $6,349.15 in 1943 and less repairs to electric pumps.

SURFACE COSTS:

18. Hoisting:

	Ore	Rock	Total
Product 1944 - Tons	421,153	30,725	451,878
Product 1943 - Tons	517,814	22,485	540,299
Decrease-Tons	96,661		88,421
Increase-Tons		8,240	

Expenditures decreased $4,245.13 and cost per ton increased $.010. The electric power charge was $3,093.65 less than in 1943.

19. Stocking Ore:

Tons stocked in 1944 - 174,529
Tons stocked in 1943 - 179,525
Decrease-Tons 4,996

The increase in expense was $441.75 and cost per ton $.005 due to taking down wood stocking trestle.

21. Dry House Expense:

The expenditures increased $500.61 and cost per ton $.006 due to more expense for heating.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

22. General Surface Expense:

Expense decreased $696.00 and cost per ton increased $.004. The decrease in expense was due to less repairs to fences and roads, and less expense removing snow.

23. Hoisting Equipment:

	Electric Hoists	Hoisting Ropes	Skips and Skip Roads	Sheaves
1944	3,382.04	4,060.75	7,506.69	524.61
1943	3,459.23	2,852.25	7,915.70	585.66
Increase		1,208.50		
Decrease	77.19		409.01	61.05

The increase in expenditures was $661.25 and cost per ton $.008.

The decrease in expense to electric hoists and skips and skip roads were due to less repairs and the decrease to sheaves was account of less replacements.

In 1944 two 1-3/8" skip ropes costing $2852.27 and one 1¼" cage rope costing $1208.48 were charged out as compared with two 1-3/8" skip ropes costing $2852.25 in 1943.

24. Shaft:

There was an increase in expense of $507.53 and cost per ton $.004.

	Steel Sets	U.G. Pockets
1944	1,024.37	4,855.20
1943	1,617.25	3,754.79
Increase		1,100.41
Decrease	592.88	

There were more repairs to underground pockets and less expense for repairs to steel sets.

25. Top Tram Equipment:

There was an increase in expense of $967.62 and cost per ton $.003.

	Engines & Motors	Wire Rope	Sheaves Rollers, Etc.	Tracks & Cars
1944	127.13	489.33	522.89	1620.24
1943	230.52		334.84	1226.61
Increase		489.33	188.05	393.63
Decrease	103.39			

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison: (Cont.)

(7) Detail of Accounts: (Cont.)

25. Top Tram Equipment: (Cont.)

In 1944 174,529 tons were stocked as compared with 179,525 tons in 1943. A new rope was put on one side of the tram in 1944, while in 1943 there was no charge for rope due to the fact that the ropes had been replaced in the later part of 1942. There was more expense for replacements of rollers and sheaves and an increase in repairs to cars.

26. Docks, Trestles and Pockets:

The increase in expenditures was $2,498.85 and cost per ton $.007.

There were seven bents of permanent ore stocking trestle and twelve bents of temporary trestle erected between the North and Southeast steel stocking trestle. Part of the Southeast steel trestle is close to caving area and it will be necessary to abandon this part of the trestle. Therefore a wood stocking trestle was erected to provide enough stocking room.

There was also more expense for replacing ties on the steel stocking trestle.

27. Mine Buildings:

The expenditures increased $3,498.61 and cost per ton $.009.

Office	199.07	Building storm shed. New floor and alterations in Superintendents room. Making gables over two entrances.
Shops	479.61	Building cupboards and new doors.
Shaft House	60.38	Repairing steel members. Repairing windows.
Engine House	131.03	Repairing windows, making new doors, inside painting.
Heating Plant Bldg.	4.07	Repairing windows.
Dry House	135.04	Repairing doors and windows and piping.
Laboratory	3645.63	Remodeling and installing heating plant to convert into change room and office for Captain and surface foreman.
Timber Tunnel	13.31	Repairing doors.
Storage Building	33.92	Making partition.
Top Tram Bldg.	40.92	Replacing windows.
Hoisting Rope Storage	571.74	Erecting new building for storing hoisting ropes.
Cooling Tank	16.20	Repairing sprays.
Total	5330.92	

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison (Cont.)

(7) Detail of Accounts (Cont.)

GENERAL MINE EXPENSE:

28. Mining Engineering:

Covers time and expense of mining engineer and helper. The expense of this account decreased $434.82 and the cost per ton increased $.001.

29. Mechanical and Electrical Engineering:

The decrease in expense to this account was $731.01 and cost per ton $.001.

The charge to this account covers the time spent by mechanical and electrical department men on inspections and repairs.

30. Analysis and Grading

	Sampling At Mine	Central Laboratory exp.	Shipping Dept. Exp.	Trucking Samples, Etc.
1944	3,903.86	9,391.37	2,901.37	633.59
1943	4,574.79	9,662.14	3,309.19	958.75
Decrease	670.93	270.77	407.82	325.16

Determinations 1944 - 34,390 - cost per determination .273084
Determinations 1943 - 25,404 - cost per determination .380339

There was a decrease in expenditures to this account of $1,674.68 and the cost per ton increased $.004.

31. Safety Department:

	First Aid Supplies	First Aid & Helmet Practice	Ishpeming Office Charge
1944	133.90	95.20	1,926.98
1943	684.61	171.60	1,763.76
Increase			163.22
Decrease	550.71	76.40	

The expense to this account decreased $463.89 while the cost per ton remained the same.

32. Telephones and Safety Devices:

Expenditures to this account decreased $467.98 and the cost per ton remained the same.

	1944	1943	Increase	Decrease
Lights at Shaft & Levels	1,778.78	2,103.91		325.13
Mine Telephone	176.99	232.50		55.51
Safety Gates	18.93	29.18		10.25
Sign Boards & Signals	130.99	293.55		162.56
Fire Equipment	127.46	41.99	85.47	

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison (Cont.)

(7) Detail of Accounts (Cont.)

33. Local and General Welfare

The expense to this account was $3,847.28 and cost per ton $.009.

34. Special Expense, Pensions and Allowances:

	Legal	Saranac Investigation	Retirement	Wage Adjustment 1942	Other Expense	Pensions & Allowances
1944	756.70	1,794.95	2,777.25		2,093.92	1,096.75
1943	687.44	2,364.09	1,665.84	28,310.43	3,145.21	
Inc.	69.26		1,111.41			1,096.75
Dec.		569.14		28,310.43	1,051.29	

There was a decrease in expenditures of $27,653.44 and cost per ton $.050. In the item Wage Adjustments, 1943, there was a payment made for wage adjustments of five and one-half cents per hour for hours worked from July 15th 1942, to January 1st, 1943.

35. Ishpeming Office:

Ishpeming Office expense is pro-rated to various mines on basis of labor costs.

There was an increase in expense of $8,599.44 and cost per ton $.026.

36. Mine Office:

	Salaries	Central Warehouse Exp.	Miscellaneous
1944	15,152.68	4,348.57	1,097.72
1943	14,893.57	4,460.95	1,486.54
Increase	259.11		
Decrease		112.38	388.82

The decrease in expenditures was $242.09 and the cost per ton increased $.009

37. Insurance:

	Property	Group	Catastrophe
1944	1,814.90	1,024.96	508.95
1943	2,454.32	1,694.70	603.92
Decrease	639.42	669.74	94.97

The expense to this account decreased $1,404.13 and cost per ton $.001.

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8. COST OF OPERATING: (CONT.)

b. Detailed Cost Comparison (Cont.)

(7) Detail of Accounts (Cont.)

38. Personal Injury

	Compensation And Doctors	Compensation Department	Hospital Loss
1944	10,471.54	667.55	2,597.17
1943	8,045.68	705.17	5,037.47
Increase	2,425.86		
Decrease		37.62	2,440.30

There was a decrease in expense of $52.06 and the cost per ton increased $.006.

39. Social Security Taxes

	Unemployment Insurance Tax	Old Age Benefit Tax
1944	9,896.96	7,613.03
1943	11,522.12	8,858.78
Decrease	1,625.16	1,245.75

The decrease in expense was $2870.91 and the cost per ton increased $.003.

40. Employees Vacation Pay

The expense to this account increased $.10 and the cost per ton increased $.008.

In 1944 employees with three years service received one weeks vacation pay and those with ten years service received two weeks vacation pay. The employees worked during the vacation period and received vacation checks and regular checks on the pay day for the first half of August.

41. Group Annuity Premiums

Expenditures to this account was $2,634.72 and cost per ton $.006.

Effective December 31, 1943 the Contributory Retirement Plan, which was adopted by the Board of Directors in 1940 for employees whose salaries are at the rate of $3000.00 or more per year, was extended to all salaried employees regardless of the amount of their salaries, who have completed at least five years of service.

42. Taxes

There was an increase in taxes levied of $13,496.61 and cost per ton $.079. Tax rate per $100.00 valuation in the City of Negaunee increased in 1944.

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9. EXPLORATIONS AND FUTURE EXPLORATIONS:

There was no diamond drilling on surface or in the mine in 1944. However, diamond drilling from an underground station on 8th Level was planned for 1945. E. & A. No. AM-16 was opened in December when the drill station was being cut out. Two holes are planned from a station off the main drift from shaft located about half way between the shaft and the center of the ore body on 8th Level. These holes will explore the structure North of the large diorite dike. We believe this structure is the same as that which contains the ore encountered in the Athens shaft.

10. TAXES:

	1944 Valuation	1944 Taxes	1943 Valuation	1943 Taxes
Realty (State Tax Commission)	2,365,000	98,784.16	2,310,000	88,055.35
Ore in Stock, Equip. Supplies	470,000	19,631.52	440,000	16,772.45
Sterling Addition			4,600	175.35
Harvey Plat			1,300	49.55
Total	2,835,000	118,415.68	2,755,900	105,052.70
Collection Fees		1,184.16		1,050.53
Total Optg. Athens Mine	2,835,000	119,599.84	2,755,900	106,103.23
Rented Buildings				
Harvey Plat	6,655	277.97	5,700	217.29
Sterling Addition	26,895	1,123.37	23,700	903.46
Total	33,550	1,401.34	29,400	1,120.75
Collection Fees		14.02		11.21
Total Rented Buildings	33,550	1,415.36	29,400	1,131.96
Total Athens Iron Mining Co.	2,868,550	121,015.20	2,785,300	107,235.19
Total Taxes City of Negaunee		582,020.52		539,671.30
Tax Rate Per $100.00 of Valuation		4.17692		3.81192
Athens Iron Mining Co. Percent of Taxes		20.8		19.87

The valuation of realty set by the State Tax Commission was increased $55,000 in 1944. The valuation of personal property increased $30,000 giving a total increase of $85,000. The tax rate increased in 1944 and together with the increased valuation it made a total increase of approximately $14,000 in total taxes.

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11. ACCIDENTS AND PERSONAL INJURY

The following table gives number and time lost from compensable accidents in the past six years.

	1944	1943	1942	1941	1940	1939
Fatal	0	0	0	0	1	0
Time Lost - Over 4 months	2	4	2	1	1	0
- 1 to 4 months	7	4	9	7	4	5
- Less than 1 month	12	18	5	10	5	3
Total compensable accidents	21	26	16	18	11	8
Number of cases paid compensation for accidents prior to Jan. 1st each year	4	4	4	4	4	5
Number of cases paid difference in wages (included in above total.)	2	1	2	2	3	2

Nature and Classification of Compensable Accidents:

Date	Remarks	Days Lost
1-7-44	Fracture right scapula	49
1/12/44	Fracture left great toe	12 *
1/26/44	Fracture 3 ribs, right side	60
1/28/44	Fracture 4th toe, right foot	67
2/26/44	Puncture wound left foot	7
3/16/44	Bruised right leg and ankle	9
4/17/44	Fracture bone right foot	23
5/12/44	Fracture left leg	111
5/27/44	Fracture left scapula, Fracture left arm Bruised neck	Home
5/18/44	Strained abdominal muscles	14
5/30/44	Fracture right thumb	46
6/5/44	Bruised right thigh	35
6/30/44	Bruised left leg	10
8/11/44	Fractured jaw	32
8/17/44	Bruised right shoulder	20
8/28/44	Fracture 3 ribs - left side	51
9/8/44	Contusion calf muscles right leg	13
9/30/44	Fracture little toe, left foot	24
10/4/44	Laceration middle finger, right hand	4 *
10/10/44	Puncture wound, left foot	10
10/16/44	Puncture wound left foot with fracture of small bone	24

* These cases were also paid for partial disability.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

Following is a list of E. & A's that were authorized in 1944:

E. & A. No. AM-15 - Shaft House Repairs - Approved December 26th, 1944.

	Amount Authorized	Expended	Unexpended
Angles and Plate	$ 900.00	None	$ 900.00
Rivets, Acetylene Gas, Etc.	1,200.00	"	1,200.00
Labor	3,960.00	"	3,960.00
	6,060.00	"	6,060.00

This work will be started in 1945.

E. & A. No. AM-16 - Diamond Drill Exploration

1,600' Diamond Drilling	10,000.00	"	10,000.00

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Power Shovels

The Athens Iron Mining Company does not own a power shovel. No. 43 Steam Shovel owned by the Cleveland Cliffs Iron Company loaded the ore shipped from stockpiles in 1944. Rent for each day this shovel operated was paid by the Athens Iron Mining Company.

b. Scraper Hoists

Following is a list of scraper hoist equipment at the mine:

Company		Machines	1944 Total Cost of Machines Repaired	1944 Total Cost of Each Mach. Repaired	1943 Total Cost of Machines Repaired	1943 Total Cost of Each Mach. Repaired
Sullivan	15 H.P. Elec.	18	9	$199.33	9	$204.68
Sullivan	20 H.P. Elec.	3			1	194.11
Sullivan	25 H.P. Elec.	1			0	0
Ing.-Rand	15 H.P. Elec.	6			3	158.82
Ing.-Rand	20 H.P. Elec.	7	3	508.20	4	155.50
Ing.-Rand	25 H.P. Elec.	4			0	0
Total		39	12	276.55	17	184.45

There were no new scraper hoists purchased in 1944. In 1943 six 25 H.P. Hoists were purchased, two of which were sold to the Cambria Jackson Mine the same year.

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13. EQUIPMENT AND PROPOSED EQUIPMENT: (CONT.)

c. Drill Machines

Purchases in 1944 and 1943 are listed below:

1944	1943
1 - R-58 Ing.-Rand Wet Stoper Machine	7 - RB-12 Ing.-Rand Auger Drill Machine *
	3 - D.A.-35 Ing.-Rand Drifter Machine
	1 - D.A.-48 Ing.-Rand Stoper Machine
	8 - Ing.-Rand Jack Legs.

One RB-12 Ing.-Rand Auger Drill Machine sold to Cambria Jackson Mine.

d. Motor Haulage Cars

No new cars were purchased in 1944. In 1943 there were four new cars bought. Twenty-two of the underground haulage cars were overhauled at the mine in 1944. In 1943 eight were sent to the General Shops at Ishpeming for overhauling. The cost of repairs in 1944 was $7,425.56 as compared with $5,363.80 in 1943.

e. Timber Hoists

During the year two H.U. Utility Air Hoists were purchased. It is necessary to continue replacing the old timber hoists as they are worn out. The old ones are obsolete and parts are no longer available.

14. MAINTENANCE AND REPAIRS:

a. Steel Trestles

The only steel work done on the trestles consisted of a new gusset plate on one of the main members near the shaft where the old one had broken. Some new decking was put on the steel trestles to replace rotted ones.

b. Comparison of Costs - 1944 with 1943

Maintenance and repairs listed under underground costs:

	Amount	Cost Per Ton
1944	$53,202.51	$.127
1943	74,800.84	.144
Decrease	21,598.33	.017

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14. MAINTENANCE AND REPAIRS: (CONT.)

b. Comparison of Costs - 1944 with 1943 (Cont.)

Maintenance and repairs listed by the four accounts as shown on the cost sheet:

	1944	1943	Increase	Decrease
Comp. & Power Drills	2,032.15	4,431.54		2,399.39
Scraper Equipment	22,325.61	35,206.81		12,881.20
Elec. Tram Equipt.	25,219.73	23,656.50	1,563.23	
Pumping Machinery	3,625.02	11,505.99		7,880.97
Total	53,202.51	74,800.84		21,598.33

Purchases 1944

Power Drills: 1 - R58 Ingersoll Rand Wet Stoper Machine $400.00

Scraper Hoists and Scrapers: None

Pumping Machinery: 1 Ingersoll Rand Air Pump 10X7X13 $651.32

Maintenance and repairs listed under surface costs:

	Amount	Cost Per Ton
1944	36,852.87	$.087
1943	28,719.01	.056
Increase	8,133.86	.031

The total cost of maintenance and repairs on surface were higher due to extra charges for remodeling laboratory and a new wood trestle was put up.

Maintenance and repairs listed in the five accounts as shown on the cost sheet:

	1944	1943	Increase	Decrease
Hoisting Equipment	15,474.09	14,812.84	661.25	
Shaft	5,879.57	5,372.04	507.53	
Top Tram Equipment	2,759.59	1,791.97	967.62	
D. T. & Pockets	7,408.70	4,909.85	2,498.85	
Mine Buildings	5,330.92	1,832.31	3,498.61	
Total	36,852.87	28,719.01	8,133.86	

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15. POWER:

Detail of electric current purchased compared with 1943:

	1944 - 12 Mos. Optg. Cost	1944 - 12 Mos. Optg. Per Ton	1943 - 12 Mos. Optg Cost	1943 - 12 Mos. Optg Per Ton
Stoping	2,804.72	.007	3,217.84	.006
Ventilation	9,158.78	.022	8,405.41	.016
Pumping	19,958.69	.047	22,336.60	.043
Hoisting	26,197.49	.062	29,291.14	.057
Stocking Ore	832.01	.002	824.20	.002
Dry House	809.36	.002	762.19	.001
Lights at Levels	781.87	.002	881.62	.002
Compressors	29,140.13	.069	31,205.04	.060
Electric Haulage	2,532.75	.006	2,845.05	.005
Shops	339.63	.001	350.94	.001
Heating Plant	17.27	.000	16.43	.000
Office	41.89	.000	30.71	.000
Storage Battery Loco.	32.50	.000	29.11	.000
Surface Lights	414.80	.001	394.32	.001
Total	93,061.89	.221	100,591.60	.194
Main Line Meter - K. W.	6,668,019		7,536,000	
Separate Meter Readings	6,503,548		7,356,987	
Line Loss	164,471		179,013	
Product	421,153		517,814	
K.W. Per Ton (Inc. Line Loss)	15.438		14.553	
Cost Per K.W. (Avg.)	.014313583		.01334814	
15 Min. Demand (Avg.)	1433		1407	
Load Factor (Avg.)	52.75%		61.2%	

17. CONDITION OF PREMISES:

a. The grounds around the mine buildings were kept in good condition during the year. The Poplar trees West of the office were removed because they were dead and a lilac hedge was planted to replace them.

b. Athens Mine Houses

The following statement gives the total cost of repairs and the average cost per house for 1944 and 1943:

Year	No. Houses	Amount Repairs	Avg. Cost Per House	Rental Income	Taxes and Insurance	Net Income
1944	30	$5,514.73	$183.82	$5,005.00	$1,536.80	2,046.53
1943	30	3,441.44	114.71	5,053.85	1,269.90	342.51

The chimneys on several houses were repaired and extended from the first floor down to the basement. Many of them were supported by the walls of the house which allowed the chimney to sag and crack the plaster, etc..

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18. NATIONALITY OF EMPLOYEES

The following statements show, first, the nationality by parentage, and secondly, a separation of nationalities into American and foreign born.

As to Parentage	1944	Percent	1943	Percent
Finnish	148	40.9	161	40.1
Italian	64	17.7	72	17.9
English	53	14.6	62	15.4
French (Canadian)	42	11.6	46	11.5
Swedish	29	8.0	31	7.7
French (France)	1	0.3	1	.2
Scotch	1	0.3	1	.2
German	6	1.7	7	1.8
Austrian	4	1.1	5	1.2
Norwegian	7	1.9	7	1.8
Irish	4	1.1	4	1.0
Greek	1	0.3	1	.2
Polish	2	0.5	2	.5
Yugoslavian	0	0	2	.5
Total	362	100.0	402	100.0

	American Born		Foreign Born	
As to Birth	1944	1943	1944	1943
Finnish	107	115	41	46
English	41	52	12	10
Italian	31	36	33	36
French (Canadian)	40	45	2	1
Swedish	23	25	6	6
French (France)	1	1	0	0
Scotch	1	1	0	0
German	6	7	0	0
Austrian	3	4	1	1
Norwegian	7	7	0	0
Irish	4	4	0	0
Greek	0	0	1	1
Danish	0	0	0	0
Polish	2	2	0	0
Yugoslavian	0	2	0	0
Total	266	301	96	101
Percent	73.5%	74.9%	26.5%	25.1%

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1. GENERAL:

The Cambria-Jackson Mine operated on an eleven shift per week schedule, two shifts for the first five days of the week and one shift on Saturday, during the first six months of the year and on a two shift, five days per week basis the balance of the year. One shift on Saturdays throughout the year was used to take down supplies. The problem of taking down supplies such as timber, lagging, poles, plank and cribbing is the controlling factor in the amount of ore that can be produced. Due to the fact that the cage is only four feet square every piece has to be handled by hand and upended in the cage. With this arrangement all supplies are handled five times before they reach their destination and while hoisting supplies no ore can be hoisted as the cage is attached above the skip. It is estimated that about 35% of the operating time is utilized in taking down supplies in addition to eight hours every Saturday. This would indicate that under present working conditions and with normal manpower the maximum production that could be expected would be about 25,000 tons per month.

Production in 1944 was 270,541 tons to which should be added 11,643 tons, the current year's stockpile overrun, making a total of 282,184 tons.

Development is underway for mining the ore between the Sixth and Seventh Levels in the West Deposit which is located about 400 feet West of the Main Deposit. A small portion of this ore is on the Cambria Lease.

During the latter part of the year it became apparent that more underground supervision was required for repair work, proper and efficient distribution of supplies, closer observance of separation of ore and rock, better enforcement of safety rules and mining in general. In October two more shift bosses were employed. The men hired were transferred from the Negaunee Mine where they had been shiftbossing for some time and where due to curtailment they were no longer required. These young men are very capable and full of energy and since they were put on the job the grade of ore has improved and things are running much smoother throughout the whole mine.

There were numerous breakdowns of equipment in 1944 causing a considerable loss in tonnage. There should be a considerable decrease in the number of breakdowns next year as all equipment is in fairly good repair at the present time.

The ditching of the territory West of the shaft which was completed last year to divert the surface water from entering the several pits and caves seems to have borne results as there was hardly any fluctuation in the amount of water pumped during the spring season. This in part was due to the decreased precipitation last winter as compared with former years but from observation the ditches did collect and carry off a tremendous amount of water which would otherwise have run into the mine.

Due to the lack of data for the first five months of 1943 when the mine was operated by the Republic Steel Corporation this report will show a comparison with the last seven months of 1943 except where such data is available.

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2. PRODUCTION SHIPMENTS & INVENTORIES:

a. Production by Grades:

	1944	1943	Increase	Decrease
Cambria Lease Ore	67	13,132		13,065
Jackson Strip Ore	282,117	274,032	8,085	
Rock	16,220	9,520	6,700	
Total Hoist	298,404	296,684	1,720	

The above figures include a stockpile overrun of 21,883 tons of which 11,643 were credited to 1944 production and 10,240 to 1943.

b. Shipments:

	Pocket Tons	Stockpile Tons	Total Tons	Total Tons Last Year
Cambria Lease	67	635	702	19,519
Jackson Strip	157,669	183,982	341,651	215,371
Total 1944	157,736	184,617	342,353	234,890
Total 1943	103,358	131,532	234,890	
Increase	54,378	53,085	107,463	

Shipments increased 45.75% in 1944 and were 60,169 tons more than the product for the year.

c. Stockpile Inventories:

	Dec. 31, 1944	Dec. 31, 1943	Decrease
Cambria Lease		566	566
Jackson Strip	22,575	71,938	49,363
Total	22,575	72,504	49,929

d. Division of Product by Levels:

	1944	Percentage	1943	Percentage
6th Level	63,491	22.50	45,429	15.82
7th Level	218,693	77.50	241,735	84.18
	282,184	100.00	287,164	100.00

The increase in production from the 6th Level was due to adding two mining gangs in the territory above the 6th Level.

e. Production by Months:

Month	Cambria Lease	Jackson Strip	Total Ore	Rock
January		24,479	24,479	1,632
February		23,887	23,887	1,504
March		27,280	27,280	1,524
April		20,843	20,843	1,492
May		21,467	21,467	1,400
June		25,570	25,570	1,904
July		20,289	20,289	1,232
August		23,342	23,342	1,224
September	67	24,014	24,081	1,072
October		22,777	22,777	936
November		17,915	17,915	1,280
December		18,611	18,611	1,020
Total	67	270,474	270,541	16,220
Current Year's Stockpile Overrun		11,643	11,643	
Total	67	282,117	282,184	16,220
Total 1943	13,132	274,032	287,164	9,520
Increase		8,085		6,700
Decrease	13,065		4,980	

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2. PRODUCTION SHIPMENTS & INVENTORIES: (CONT.)

f. Ore Statement:

	Cambria Lease	Jackson Strip	Total 1944	Total 1943
On Hand January 1, 1944	566	71,938	72,504	30,469
Product for Year	67	270,474	270,541	276,925
Stockpile Overrun	69	21,814	21,883	
Total	702	364,226	364,928	307,394
Shipments	702	341,651	342,353	234,890
Balance on Hand		22,575	22,575	72,504
Increase in Output	13,065	8,085	4,980	
Increase in Ore on Hand	566	49,363	49,929	42,035

1944 Five 2-8 hr. Shifts and 1 1-8 hr. Shift from 1-1-44 to 7-1-44
Five 2-8 hr. Shifts 7-1-44 to 12-31-44

1943 Five 3-8 hr. Shifts and 1 2-8 hr. Shift from 1-1-43 to 6-12-43
Five 3-8 hr. Shifts and 1 1-8 hr. Shift from 6-12-43 to 7-6-43
Five 2-8 hr. Shifts and 1 1-8 hr. Shift from 7-6-43 to 12-31-43

g. Delays:

January 14, 5-1/4 hours delay - Loss of Product - 358 tons
Trouble with motor on Larry car.

January 15, 1-1/2 hours delay - Loss of Product - 100 tons
Broken trolley pole on Larry car.

January 17, 6-1/2 hours delay - Loss of Product - 427 tons
Car off track and broken trolley stand on rock trestle.

January 24, 6-1/2 hours delay - Loss of Product - 500 tons
Trouble with motor on Larry car.

January 28, 3/4 hour delay - Loss of Product - 40 tons
Larry car off track - broken bearing.

January 29, 1-1/2 hours delay - Loss of Product - 75 tons
Broken journal box on Larry car.

February 1, 2 hours delay - Loss of Product - 108 tons
Broken skip runner at landing.

February 2, 3 hours delay - Loss of Product - 264 tons
Broken catch on skip - Broken skip runner.

February 16, 1 hour delay - Loss of Product - 150 tons
Changing Larry cars on landing.

February 19, 4-3/4 hours delay - Loss of Product - 305 tons
Repaired trip device at dump in headframe.

April 8, 2-1/2 hours delay - Loss of Product - 136 tons
Repaired skip dump in headframe.

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2. PRODUCTION SHIPMENTS & INVENTORIES:

g. Delays: (Cont.)

April 18 & 19, 16 hours delay - Loss of Product - 872 tons
When changing skip rope one of the workmen put a cloth over the Lilly overwind device to keep the dirt out and forgot to take it off when running the hoist to move the skip rope drum into position to fasten the rope. The cloth got tangled up in the mechanism and broke a couple of bevel gears. As the spotting indicator on the hoist is operated from the same shafting that runs the overwind device it was impossible to use the hoist until repairs were completed.

May 1, 4 hours delay - Loss of Product - 100 tons
Repaired broken skip runner.

May 3, 2-1/2 hours delay - Loss of Product - 100 tons
Repaired broken skip runner.

May 27 to 31, 40 hours delay - Loss of Product - 3600 tons
Installing new dump plates. The dump plates were in bad condition when the company took over the mine and were being patched up from time to time. Early in the year it was decided to put in new ones. To lose as little hoisting time as possible the work was done on the week-end of May 27, taking advantage of a holiday on May 30. The steel erecting crew worked Saturday and Sunday, May 27 and 28, on two 10-hour shifts and on Monday, Tuesday and Wednesday on two 12-hour shifts. It had been expected that the work would be completed on May 30 and accordingly the men had been ordered to report for work on the morning of May 31, as it was estimated that the work would be completed at the latest by noon, but hoisting could not be resumed until 8 A.M. June 1.

June 23, 1-1/2 hours delay - Loss of Product - 150 tons
Trouble with air pressure.

July 19, 1-1/4 hours delay - Loss of Product - 50 tons
Repaired arc shields on ore hoist switchboard.

August 10, 3/4 hour delay - Loss of Product - 50 tons
Burned out cable on motor-generator set.

August 16, 1/2 hour delay - Loss of Product - 50 tons
Switchboard in engine house.

September 20, 6 hours delay - Loss of Product - 382 tons
For some reason or other the skip was pulled too high in the dump, got out of the guards and turned upside down.

December 28, 1/2 hour delay - Loss of Product - 50 tons
Skip hoist motor coils burned out.

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2. PRODUCTION SHIPMENTS & INVENTORIES:

g. Delays: (Cont.)

December 29 & 30, 24 hours delay - Loss of Product - 1158 tons

Several coils burned out on skip hoist motor. It was found necessary to remove the motor and send it to the general shops for repair. It was fortunate that this breakdown occurred near a week-end with New Year's Day coming up on Monday otherwise it would have caused a long delay. The coils burned out at 11:00 o'clock Friday, December 28, a half-hour before the end of the shift making it necessary for all the men to climb to surface. All men were paid overtime for the time required to climb up. The repairing and replacing of the motor was completed on New Year's Day.

The total loss of product from the 22 delays listed above amounted to 9,025 tons. It will be noted that all delays were attributed to failures in the engine house, the larry cars and the headframe. The larry cars and headframe have been put in good condition and from now on should cause very little delay.

h. Delays Due to Lack of Current:

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

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Tons	Iron	Phos.	Silica	Sulphur
Cambria Jackson	282,184	58.63	.078	9.37	.017

b. Average Mine Analysis on Straight Cargoes:

All ore shipped was mixed with other grades.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption:

12.00 cubic feet equals one ton
10% deducted for rock
10% deducted for loss in mining

Percentage of Bessemer - None

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore: (Cont.)

Area	Cambria Lease	Jackson Strip	Total Standard Ore	High Sul. Ore
Above 6th Level	2,667	399,269	401,936	
Between 6th & 7th Levels	7,875	1,505,119	1,512,994	398,704
Below 7th Level		2,500	2,500	159,115
Total Gross Tons 11-30-1944	10,542	1,906,888	1,917,430	557,819
Less December 1944 Production		18,611	18,611	
	10,542	1,888,277	1,898,819	557,819
Less 10% for Loss in Mining	1,054	190,689	191,743	55,782
	9,488	1,697,588	1,707,076	502,037
Less 10% for Rock	949	171,620	172,569	50,203
Net Total December 31, 1944	8,539	1,525,968	1,534,507	451,834

b. Total Developed Ore:

	Cambria Lease	Jackson Strip	Total
1943 Estimate	8,268	1,495,690	1,503,958
Increase - 1944	271	30,278	30,549

The ore estimated at this mine is divided between the Cambria Lease and the Jackson Strip. The product in 1944 was 282,184 tons, which amount must be added to the increase in ore reserves shown at the end of 1944 making a total of 312,733 tons developed in 1944. The increase is due to diamond drilling on the Seventh Level which indicated a larger area of ore than was formerly estimated. This drilling also proved that there was some standard ore at the elevation of the level.

Including probable ore (approximate estimate) 500,000 tons in the developed portion of the mine and ore that may be found on the North 1/2 of the Northeast 1/4 of Northeast 1/4 of Section 2-47-27, there is a possibility of developing over 1,000,000 tons of additional ore. The Mather Mine is now developing in ore on the West boundary of the Jackson Strip.

c. Expected Average Natural Analysis:

Tons	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
1,534,507	51.62	.073	8.40	.18	2.22	0.55	.23	.018	1.61	12.50

d. Ore in Stock: Average Natural Analysis:
Cambria-Jackson Ore:

Tons	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
22,575	51.767	.071	7.24	.074	2.53	0.44	.20	.016	2.01	12.60

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5. LABOR AND WAGES:

a. Comments:

There were 225 men on the payroll on December 31st, 1943 and 179 on December 31st, 1944 showing a decrease of 46 men. During the year 11 men were drafted, 23 men quit to take other jobs, 2 men were discharged for cause, 5 men were retired due to age, 12 men were transferred to other properties, 10 men were suspended and 18 men were hired making a net loss of 46 men.

With most of the repairs and improvements to the surface plant completed the number of men on surface has gradually been reduced. During the forepart of the year there were 65 men employed on surface as compared with 46 on January 1st, 1945.

The shortage of underground labor is becoming critical and any further loss of men will cause a reduction in production. At the present time cleanliness and repairs are being badly neglected and the amount of overtime being worked is increasing and necessarily is reflected in higher costs.

Several grievances were presented by the union during the year and all were settled in the lower steps. The cooperation between the men and bosses has been very good with few exceptions and the efficiency has been greatly increased.

b. Comparative Statement of Wages and Product:

	1944	7 Months 1943	Increase	Decrease
Product:	282,184	147,700	134,484	
No. Shifts and Hours	1-8 27	1-8 32		5
	2-8 251	2-8 124	127	
	3-8	3-8 24		24
Average No. Men Working:				
Surface	54	62		8
Underground	136	150		14
Total	190	212		22
Average Wages Per Day:				
Surface	6.97	7.11		.14
Underground	7.93	7.85	.08	—
Total	7.76	7.63	.13	
Average Wages Per Month:				
Surface	161.10	163.42		2.32
Underground	174.11	182.65		8.54
Total	170.41	177.80		7.39
Product Per Man Per Day:				
Surface	18.83	14.57	4.26	
Underground	7.87	6.05	1.82	
Total	5.55	4.27	1.28	
Labor Cost Per Ton:				
Surface	.370	.488		.118
Underground	1.007	1.298		.291
Total	1.377	1.786		.409

Average Product Mining:

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5. LABOR AND WAGES: (CONT.)

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

	1944	7 Months 1943	Increase	Decrease
Average Product Mining:				
Stoping	20.89	17.53	3.36	
Development in Ore	2.88	3.94		1.06
Total	20.75	16.63	4.12	
Average Wages Contract Labor:	8.68	8.50	.18	
Total Number of Days:				
Surface	14,984	10,138-1/4	4,845-3/4	
Underground	35,843-1/2	24,424-1/2	11,419	
Total	50,827-1/2	34,562-3/4	16,264-3/4	
Amount for Labor:				
Surface	104,389.60	72,069.57	32,320.03	
Underground	284,150.12	191,786.54	92,363.58	
Total	388,539.72	263,856.11	124,683.61	
Average Wages per Month as per Labor Statement-Less Captain and Clerks:				
Surface	160.66	166.07		5.41
Underground	173.39	182.13		8.74
Total	169.95	177.63		7.68

Proportion of Surface to Underground Men:

1944 1 to 2.52

Five 2-8 hour Shifts and 1 1-8 hour shift 7-6-43 to 7-1-44
Five 2-8 hour shifts 7-1-44 to 12-31-44

1943 (7 Months) 1 to 2.42

Five 3-8 hour shifts and 1 2-8 hour shift 1-1-43 to 6-12-43
Five 3-8 hour shifts and 1 1-8 hour shift 6-12-43 to 7-6-43
Five 2-8 hour shifts and 1 1-8 hour shift 7-6-43 to 12-31-43

6. SURFACE:

a. Buildings:

Dry House:

All the walls and ceilings of the old dry house were washed and painted and new clothes hangers and benches installed. The lockers in the clean clothes room were also re-arranged and set on benches eighteen inches above the floor. All the lockers were repaired as the bottoms had rusted out after which they were given a thorough cleaning and a two-coat paint job. All the old wiring and piping was renewed and re-arranged and the shift bosses' and Mining Captain's rooms were remodelled and thoroughly renovated making them very convenient and pleasant. The only remaining work to complete the dry is the sheeting of the new addition with imitation brick sheet iron to conform with the old portion. This sheet iron is out of production at the present time but when it is again obtainable it will be put on all the new construction that has been done on the property.

6. SURFACE: (CONT.)

b. Waste Water and Sewerage Sump:

Excavation was made and a concrete sump built to receive all the waste water and sewerage from the dry and office. The waste water and sewerage is pumped from this tank into the mine discharge water line by two bilge pumps. Formerly only the waste water from the main dry room was pumped into the discharge line and the water and sewerage from the main toilet room, the captain and shift bosses room and the office building was discharged into a septic tank the overflow of which spread all over the timber yard making it very wet and unsanitary. The new sump is located on the East side of the dry house near the South end. To enclose the sump and pumps a frame building 12 feet by 18 feet was constructed being attached to the dry with an entrance from outside. This is a frame building with a corrugated galvanized sheeting roof and the outside walls covered with asphalt roofing. When labor is available the inside walls will be covered with metal lath and given a coat of concrete plaster.

c. Garage Building:

The foundation for this building was constructed in October, 1943 but due to more pressing work the building was not started until January. This is a frame building 24 feet by 26 feet to house one truck and a tractor and is being heated by steam from the dryhouse which is close by. The interior walls are covered with metal lath and concrete plaster and the roof and exterior walls with asphalt roofing material. When metal sheeting is available this building will be made to conform with other buildings on the property.

d. Storage Shed (Iron and Pipe):

The foundation and part of the framework for this building was erected last year. Work on this building was resumed in the latter part of February and completed in March. This is a frame building 24' x 24' in which racks were installed to store pipe and bar steel and provision was also made for storing plate steel. At the present time the outside walls are only wood sheathed but later on will be covered with imitation brick metal siding when it becomes available.

e. Storage Shed (West of Office):

Twenty feet of the East end of the storage shed located just West of the office building was dismantled and rebuilt at the West end of the storage building. This change was made to make room for a roadway as it is planned to close the present road located between the office and the dry building.

f. Shaft House:

The overhauling and inclosing of the shaft house was completed on December 19th. This has been a large and costly job. A crew of four steel men were employed on this work almost continuously since November, 1943. During the year new railroad pockets and the entire steel structure that carries the pocket were rebuilt. The shaft and space under the pocket was inclosed from the ground to the top landing. Doors and windows were installed on the East and West sides of the top landing inclosure. A new fireproof transfer shed

6. SURFACE: (CONT.)

f. Shaft House: (Cont.)

was built on the top landing. New stairways were erected and numerous steel members in the general structure were renewed and new dump plates were also installed. The entire structure is now in very good shape and no major repairs should be required for many years.

g. Ore Trestle and Stocking Grounds:

Grading of the Southeast stocking grounds was started May 31st by Lindberg Brothers, contractors. These grounds were as much as three feet low on the West end and three feet high on the East end. The area was first graded ten inches below the regular grade and then filled with ten inches of mine rock which was taken from the rock pile directly in front of the office. A ditch was also cut and rocked along the south side of the stocking ground. The completed area is 200 feet wide and about 600 feet long with a one percent grade to the East. The grading of the stockpile grounds has eliminated the water which at the time of spring thaws and after heavy rains covered the stocking grounds and in one area was nearly two feet in depth. Formerly this water had to be removed by pumps.

On the Northeast trestle one more permanent bent was erected and the others shifted a little to increase the radius of the top tram track and also bring the centerline of the stocking trestle ten feet further away from the pocket track. Seventeen bents of stocking trestle were erected on this trestle.

The Southeast trestle was entirely rebuilt with six permanent bents and fourteen bents for stocking.

The present stocking capacity of the two stocking grounds at the present time with single trestle on each one is about 130,000 tons but could be greatly increased if and when the proposed new layout of mine tracks is constructed.

h. Railroad Tracks:

The track situation and service at the Cambria-Jackson Mine is deplorable. The Duluth, South Shore and Atlantic Railway maintain the tracks, the Chicago and Northwestern Railway Company does the hauling and the Lake Superior and Ishpeming Railway Company furnish the cars. Last fall all tracks except the main track and pocket track were removed so that the stocking grounds could be graded and grades made for the proposed new tracks. All subgrades for the proposed layout were completed early in November and it was expected that construction would be completed before winter but because of long litigation as to who was to build the track nothing was done. The last information I have is that the Duluth, South Shore and Atlantic Railway will start construction early in the spring. It is very necessary that this work be completed before shipping season opens. It would be very much appreciated if this controversy were settled and something definite be decided.

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6. SURFACE: (CONT.)

h. Railroad Tracks: (Cont.)

The track formerly used for switching empty ore cars above the pocket was abandoned because of about a three foot settlement of the ground over which it crossed. During all of the shipping season all empty ore cars were switched in from the East being pushed under the shaft pockets.

i. Fences and Caves:

No new open caves were developed during the year but the long crack just South of and parallel with the main highway has lengthened and opened up a little more. Some of the ground, 700 feet West of the shaft, over which the main line to the old Cambria Mine and the Cambria-Jackson pocket track crosses shows a settlement of as much as three feet at one point.

All fences around the numerous caves West of the shaft were repaired and put in good condition and a new fence of good substantial contruction was constructed around the settling and caving ground just West of the shaft. This 2,100 feet of fencing is constructed of ten-foot cedar posts placed at 10-foot intervals with a heavy five foot net fencing on the bottom and three strands of barbed wire stretched above the netting.

j. Water Supply:

All water for cooling the compressors is obtained from a sump on a sub-level 325 feet below the collar of No. 1 shaft. This water is being pumped by a 40-gallon capacity automatic electric pump. During the spring season and when heavy rains occur this water is not fit for drinking purposes so that all water except that used for the compressors is furnished by the City of Negaunee. These two systems are connected and should an emergency arise the city water can be used for cooling purposes.

Under the Republic Steel management water was obtained at intervals from the City of Negaunee but the water was never metered and when the Cleveland-Cliffs started to use a regular amount the City of Negaunee decided to install a large capacity water meter. This meter was installed on May 6th on the main line near the main highway and the Cleveland-Cliffs built a concrete pit for the meter with an opening on top for an entrance to read the meter.

k. Timber Yard:

The breakup in April made it necessary to rock the roads into the new timber yards as the constant trucking of timber, lagging and poles cut the roads up so badly that the tractor was often required to pull the trucks out.

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6. SURFACE: (CONT.)

k. Timber Yard: (Cont.)

Later in the summer the entire area between the timber yard and Southeast stocking ground was graded and a heavy layer of rock spread over it. Before grading several cesspools that had been used for sewerage disposal had to be uncovered and filled. The upper yard just West of the timber track where lumber, lagging and poles are stored was also graded and covered with mine rock.

The improvements completed this year have greatly improved the efficiency of handling the timber supplies as they arrive and again when they are hauled to the shaft.

l. Grounds:

There has been a marked improvement in the appearance of the surface plant and grounds during the year. There is however many more improvements to be made to this property to make it comparable to other Cleveland-Cliffs Iron Company's surface plants.

If labor is available next summer it is probable that a new road will be built from the main highway to the office starting at a point just West of where the old engine house stood and running on a straight line to a point between the office and storage shed. This will bring the road further away from the shaft and also further away from the line of the hoisting ropes which are constantly throwing off hematite mud. It is also planned to do some landscaping around the office and dry by putting concrete walks along the dry building and in front of the office, eliminating the road between the office and dry and putting in a lawn and some shrubbery. Consideration has also been given to the grading of the area along the main highway after the removal of the old engine house has been completed.

On October 14th, under the supervision of Messrs. Niss, McNeil and Adams of the Hercules Powder Company, the old smoke stack which was used when the mine was operated by steam was blasted down. This stack which was of reinforced concrete construction was nine feet in diameter and one hundred and fifteen feet high and had to be felled in one certain direction because of the main highway and surrounding buildings. These men did a very good job and it fell exactly as planned.

The old engine house which for several years has been used for a storage place and also housed an emergency generator set has been emptied and sold. The bill of sale for this building stipulates that it shall be removed within 120 days from the date of execution of the sale which was November 13th, 1944.

The generator set formerly located in the old engine house was moved and set up in the East end of the present engine house where it is giving excellent service.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1944.

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7. UNDERGROUND: (CONT.)

b. Development:

The following table gives the total footage of drifting and raising for 1944 as compared with the seven-month period in 1943:

	Drifting		Raising		Grand
Year	Ore	Rock	Ore	Rock	Total
1944	58'	1,103'	1,117'	517'	2,795'
1943 (7 Months)	766'	535'	860'	473'	2,634'

Proportionately the footage of development work was greater during the seven-month period of 1943 than in 1944. This was due to the fact that during the seven months operations in 1943 there was an average of five gangs on development work whereas in 1944 there were four gangs the first three months of the year and three gangs the balance of the year.

All development work in 1944 was extended to all known deposits. Two raises representing 385' of ore and 22' of rock raising were put up in the South Riser Deposit from the 6th Level to the top working sub, one from the 7th Level to the 60' sub and two from the 7th Level to the 35' sub in the Main Deposit representing 433' of raising, 225' of which was in rock. In the Southwest Deposit there were four raises put up from the 7th Level representing 573' of raising, 90' of which was in rock. Three of these raises extended from the 7th Level to the 50' Sub and one from the 7th Level to the elevation of the 35' Sub.

Development work on the 7th Level consisted of extending the main footwall drift 845 feet Westerly to the large North-South fault line. This drift was driven to develop the West Deposit and eventually will be extended to connect with the Mather Mine. A connection with the Mather Mine will furnish both mines with a second outlet, give the Cambria-Jackson Mine a supply of air for ventilation and an emergency air line could be installed. This drift will also serve to explore and develop the territory West of the fault, a distance of approximately 1,000 feet. In all probability there is considerable ore in this area as the Mather Mine is at the present time developing in an ore deposit on the West boundary line of the Cambria-Jackson Strip. This work is being done on the Mather 1600' Level which at this point is about 30 feet below the extension of the Cambria-Jackson 7th Level. Developments so far have proved this ore to be about 130 feet wide and a raise 65 feet from the boundary line is now up 140 feet and is still in ore. The ore thus far developed is of a high sulphur grade but will probably in its upward extension turn to standard ore. This opens a very promising outlook for a large increase in ore reserves for the Cambria-Jackson Mine as it is possible that this ore extends to a considerable height. It is proposed to do some diamond drilling in this territory in the near future from the West end of the 6th Level. I feel confident that this ore extends above the 6th Level and probably much higher.

Work has been started to develop the West Deposit between the 6th and 7th Levels. At the present time a raise is being put up from the 7th Level and is now 120 feet above the floor of the Level, all in rock. When this raise encounters ore which is expected at about 160 feet a drift will be driven Northerly to a point underneath the main drift of the 6th Level from which a raise will be put up to hole to the Level to furnish ventilation and a travelling way.

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7. UNDERGROUND: (CONT.)

b. Development: (Cont.)

Developments at the Cambria-Jackson Mine have progressed to the point where every contract has its own raise and all transferring or double scraping of ore has been eliminated. The results of these developments have been very gratifying in that it has greatly improved working conditions. When the Cleveland-Cliffs first started operating this mine all ore was transferred two or three times through wet drifts before it reached the haulage level which resulted in a product of which only about 50% could be shipped direct from the railroad pocket, the other 50% had to be put on stockpile and let stand to dry. This has entirely been eliminated.

b-1. Rock Development:

The following table gives the total footage of rock drifting and raising for 1944 and the seven-month period of 1943:

	Drifting	Raising	Total 1944	Total 1943 (7 Months)
6th Level	161'	22'	183'	148'
7th Level	942'	495'	1,437'	648'
Total 1944	1,103'	517'	1,620'	796'
Total 1943 (7 Months)	470'	326'	796'	
Increase	633'	191'	824'	

Practically all the drifting on the 6th Level (151 feet) was the driving of a crosscut from the most Northerly East-West drift to the old main ventilation drift to bypass a portion of the old ventilation drift which was in very bad ground and which required the continuous services of two men to keep it in repair. The other 10 feet of rock drifting was the crossing of a 10-foot dike in one of the subs in the South Riser Deposit above the 6th Level.

Of the 942 feet of drifting shown for the 7th Level, 845 feet was the extension of the main footwall drift to the West for the exploration of the West Deposit. The balance, or 97 feet, was drifting done in rock on various subs between the 6th and 7th Levels.

The following table gives the number, location, total footage of each raise and the footage of ore and rock raising done in 1944:

Number	Location	Total Footage	Ore Footage	Rock Footage	Total 1944
No. 620	6th Level	235'(6' in 1943)	229'		229'
No. 622	6th Level	221'(43'in 1943)	156'	22'	178'
No. 701	7th Level	136'	26'	110'	136'
No. 703	7th Level	125'	100'	25'	125'
No. 715	7th Level	130'	130'		130'
No. 717	7th Level	151'	151'		151'
No. 732	7th Level	144'	109'	35'	144'
No. 734	7th Level	148'	93'	55'	148'
No. 745	7th Level	172'	82'	90'	172'
No. 747	7th Level	110'		110'	110'
Grand Total		1,572'	1,076'	447'	1,523'

In addition to the footages tabulated above, which is of loading raises only, there were 41 feet of ore and 70 feet of rock raising done on the various subs for testing and ventilation purposes.

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7. UNDERGROUND: (CONT.)

b-2. Ore Development:

The following is a summary of ore development in 1944 and in the seven-month period of 1943:

	Drifting	Raising	Total 1944	Total 1943 (7 Months)
6th Level		405'	405'	305'
7th Level	58'	712'	770'	316'
Total 1944	58'	1,117'	1,175'	621'
Total 1943 (7 Months)	172'	449'	621'	
Increase		668'	554'	
Decrease	114'			

c. Stoping:

(1) General:

The change in system of mining from sub-level caving to top-slicing was completed in June. At the end of last year there were ten gangs top-slicing and three sub-level caving and on December 31st there were sixteen gangs top-slicing.

The product from the territory above the Sixth Level was increased in 1944. In the seven-month period of last year 15.82% of the total product was mined from the South Riser Deposit above the 6th Level whereas this year it was 22.5%. The mining in this area is still 200 feet above the level and is being mined as rapidly as possible. The fact that this deposit is so high and that it extends over a portion of the Main Deposit, holding up the mining of a large block of the Main Deposit, makes it necessary that the mining of this area be worked to full capacity.

The year 1944 has been a year of developments and improvements to make the Cambria-Jackson Mine comparable to all other Cleveland-Cliffs mines and I think that this has been accomplished. At the present time each contract has its own individual raise and all transferring of ore has been eliminated which in turn has changed the product from about a 60% wet to a 100% dry.

The only great handicap under which the mine is now operating is its shaft. The production of the mine is now limited to the amount of timber and supplies that can be taken down with the present shaft arrangement. This condition could be somewhat improved if more men were available but at best is a very inefficient and costly way of handling supplies. It is hoped that in the near future ore reserves may be increased enough to warrant a new standard shaft and a greatly increased production.

The location and number of mining contracts at the end of 1944 and 1943 are as follows:

Location of Contracts	December 31, 1944	December 31, 1943
Sixth Level and Above		
325' Sub-Level		3
300' Sub-Level	5	
Sixth Level	1	2
Seventh Level and Above		
70' Sub-Level		7
60' Sub-Level	4	
50' Sub-Level	3	4
35' Sub-Level	4	
Seventh Level	2	2
Total	19	18
Increase	1	

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(1) General: (Cont.)

Occupation of Contracts were divided as follows:

	December 31, 1944	December 31, 1943
Mining	16 Contracts	13 Contracts
Raising	2 Contracts	3 Contracts
Drifting	1 Contract	2 Contracts
Total	19 Contracts	18 Contracts

(2) Detail of Stoping:

325' Sub - South Riser Ore Body:

Mining in this sub was started in May, 1943 and was completed in August, 1944. Mining in this territory was very difficult and expensive as this area was interspersed with several dikes and had become very heavy which caused constant repairing. Due to the fact that this sub was 215 feet above the level the taking up of timber and supplies required considerable time.

310' Sub - South Riser Ore Body:

This sub which was 200 feet above the 6th Level was started in February and was completed in October. Five gangs were employed on this sub. The mining of the central portion of this area was never completed due to excessive weight and the impossibility of keeping the place up. The cost of reopening this place would have been prohibitive so it was decided to cave and extract this pillar from the next sub. This is now in progress.

300' Sub - South Riser Ore Body:

Mining on the 300' sub was started in September and is still in progress. Five gangs are employed on this sub but the progress is slow because of excessive weight and numerous dikes and the shortage of men to keep the places supplied with timber, lagging and poles. A great deal of the timber and supplies is now being hoisted by the miners which reduces the hours of mining and is reflected in the production.

200' Sub - South Riser Ore Body:

The only work done for the year on the 200' sub was the driving of a connecting drift between No. 620 Raise and No. 622 Raise for ventilation and travelling.

70' Sub - Main Deposit and Southwest Riser:

This sub consists of three separate ore areas, the East end, Main Deposit and the Southwest riser. The mining of the East end was completed last year, the Main Deposit in September and the Southwest riser in June.

The mining of the 70' Sub in the Main Deposit was started prior to the taking over of operations by the Cleveland-Cliffs and therefore a portion of the sub was mined on the sub-level caving system. Immediately on taking over the system was changed to top-slicing. The progress of top-slicing was very slow as every slice had to be double-poled and covered with wire netting. As each slice was taken and covered down the back was taken down to recover the eight-foot layer of ore which it was necessary to leave to get under the old workings. The recovery was probably 100% or better as the ore was slightly contaminated by runs of rock.

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7. UNDERGROUND: (CONT.)

c. Stoping: (Cont.)

(2) Detail of Stoping: (Cont.)

70' Sub - Main Deposit and Southwest Riser: (Cont.)

The 70' Sub in the Southwest Deposit, a riser of ore from the Main Deposit, was mined entirely by the sub-level caving system. This sub which was the first one underneath the hanging in this area was started just before the Cleveland-Cliffs took over. The same system was continued because of the fact that the hanging was very irregular and sub-level caving lends itself very well to such conditions.

60' Sub - Main Deposit:

This sub was started in June and at the end of the year there were four gangs slicing in this area. The progress on this sub has been very good and the quality of the product much improved over that of the sub above. The covering on the sub above was very well laid as none of the rock above got through except in a few places between slices. This area is ideal for top-slicing and the quality of the ore excellent.

50' Sub - Southwest Riser and East Riser:

The sub in the Southwest riser was started in January on the top-slicing method and at the end of the year was about 80% completed. The elevation of this sub is 22 feet below that of the sub above. The normal interval between subs in top-slicing is 12 feet but due to the fact that the sub above had been mined on the sub-level caving system and therefore was not closely covered down it was necessary to leave some ore in the back to make it possible to get under the old workings. The ore in the back was recovered as each slice was taken and covered down. There were three gangs working in this area at the end of the year.

The 50' Sub in the East riser was started last year and completed in September of this year. This ore is being mined West to an established mining limit to leave a pillar to support the 6th Level main haulage drift to the South riser and also because of the fact that the top of the ore in the South riser extends out over this pillar. It is estimated that the ore at the elevation of this sub connects with that of the Main Deposit. The aforementioned pillar is 250 feet wide and extends from foot to hanging. All of this sub was mined by top-slicing.

35' Sub - Southwest Riser and East Riser:

Mining on the 35' Sub in the Southwest riser was started in July and at the end of the year there were two gangs slicing under cover in this area.

Mining on the 35' Sub in the East riser was also started in July and at the end of the year there were two gangs slicing under cover.

25' Sub - Southwest Riser:

A little mining was started in the Southwest corner of the Southwest riser but due to the fact that the raise was surrounded by jasper and that the ore was close to the hanging it was decided to abandon this place until such time as the mining of the surrounding territory was further advanced.

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7. UNDERGROUND: (CONT.)

d. Timbering:

Prior to the time the Cleveland-Cliffs took over the operation of the Cambria-Jackson Mine considerable developing for sub-level caving was done consisting of a large footage of transfer drifts and mill raises. The timber used in this development was very small and has been installed for some time and is now rotting and breaking requiring considerable re-timbering and especially of a section of the Sixth Level drift in which the ventilation fan is installed. It has also been found very difficult to keep raises in repair as they are very long and the ore is hard and rough, wearing out the lining and cribbing in a very short time. This fact has caused a considerable loss of product over that which might have been expected if the ore was softer and less abrasive.

Statement of Timber Used: (1944 and 7 Months of 1943)

	Lineal Feet		Average Price Per Foot		Amount 1944	Amount 1943
	1944	1943	1944	1943		
6" Stulls	488	10,240	.0589	.0722	28.76	739.20
8" Stulls	20,008	9,846	.0868	.0908	1,736.90	893.83
10" Stulls	43,759	23,770	.1342	.1214	5,872.28	2,884.98
12" Stulls	19,994	6,767	.1798	.1748	3,594.73	1,182.66
14" Stulls(& over)	971	2,237	.2242	.1829	217.71	409.16
Total	85,220	52,860	.1344	.1156	11,450.38	6,109.83
Lagging - 7'	697,558	333,851	.0142	.0098	9,936.63	3,291.83
Poles - 9½'	504,795	254,107	.0217	.0170	10,966.85	4,328.34
Total	1,202,353	587,958	.0174	.0130	20,903.48	7,620.17
Wire Fencing-Feet	8,085	7,425	.0633	.0638	511.56	469.80
Grand Total					32,865.42	14,199.80

	1944	7 Months - 1943
Product	282,184	147,700
Feet of Timber per Ton of Ore	.302	.358
Feet of Lagging per Ton of Ore	2.472	2.260
Feet of Wire Fencing per Ton of Ore	.029	.050
Cost per Ton for Timber	.0406	.0414
Cost per Ton for Lagging	.0352	.0223
Cost per Ton for Wire Fencing	.0018	.0032
Cost per Ton for Poles	.0389	.0293
Total Cost per Ton	.1165	.0962

The cost per ton for timber shows an increase over that of the seven-month period of 1943 due to an increase in the amount of ore that was mined by the top-slicing system and also because of the increased cost of timber.

e. Drifting and Raising:

The following table gives a comparison of total feet of drifting and raising in ore and rock in 1944 and the seven-month period of 1943:

	Drifting		Raising		Grand Total
Year	Ore	Rock	Ore	Rock	
1944	58'	1,103'	1,117'	517'	2,795'
1943 (7 Months)	766'	535'	860'	473'	2,634'
Increase		568'	257'	44'	161'
Decrease	708'				

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7. UNDERGROUND: (CONT.)

e. Drifting and Raising: (Cont.)

The average footage per month in 1944 was less than the average footage per month in the seven months of 1943 because of the fact that in the 1943 period there were 3 gangs raising and 2 drifting whereas in 1944 the average was 1 gang drifting and 2-1/4 gangs raising. Each gang is now provided with its own individual raise and the two raises which are now being put up, one from the Sixth Level and the other from the Seventh Level, are for new working places.

f. Explosives, Drilling and Blasting:

Supervision of blasting practices was continued during 1944. At least one report per month for every gang of miners was made by each shift boss and any faulty practices brought to the attention of the miners.

The breakage of drill steel has been considerable due to the hardness of the ore. The ore in some sections of the mine is too hard to drill with auger steel and here jackrods with jackbits are used.

Year	Cost per Lb. For Powder	Lbs. Powder Per Ton of Ore	Cost Per Ton For Powder	Cost Per Ton Fuse & Caps	Cost Per Ton Total
1944	.115	.3305	.0380	.0082	.0462
1943	.115	.3551	.0408	.0098	.0506

Statement of Explosives Used: (Ore Development and Stoping)

	Quantity	Average Price	Amount 1944	Amount 1943 (7 Months)
Gelamite #1 - Lbs.	93,274	11.50	10,726.51	2,643.83
Gelamite #2 - Lbs.				2,985.55
60% Gelatin - Lbs.				402.50
Total Powder	93,274	11.50	10,726.51	6,031.88
Fuse - Feet	318,350	5.15	1,639.50	986.70
Caps - #6	45,321	12.20	552.92	329.13
Tamping Bags	3,000	4.99	14.97	49.67
Fuse Lighters - Hot Wire	13,300	6.75	89.78	60.75
Fuse Lighters - Master	500	20.64	10.32	20.64
Connecting Wire - Lbs.	6	.55	3.30	.55
Total Fuse, Etc.			2,310.79	1,447.44
Total All Explosives			13,037.30	7,479.32
Product			282,184	147,700
Pounds of Powder per Ton of Ore			.3305	.3551
Cost per Ton for Powder			.0380	.0408
Cost per Ton for Fuse, Caps, Etc.			.0082	.0098
Cost per Ton for All Explosives			.0462	.0506

Statement of Explosives Used: (Sinking, Rock Development, Etc.)

Gelamite #1 - Lbs.	650	11.50	74.75	28.75
Gelamite #2 - Lbs.				5.75
60% Gelatin - Lbs.				11.50
Total Powder	650	11.50	74.75	46.00
Fuse - Feet	2,429	5.15	12.51	14.18
Caps - #6	333	12.20	4.06	2.49
Total Fuse, Etc.			16.57	16.67