MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING:

a. Comparative Mining Costs:

Mining costs increased approximately $1.37 per ton over that of the previous year. An increase in depreciation accounted for $.09 per ton, the allowance under Section 309 accounted for $.28 per ton and the balance of $1.00 per ton increase was due to the lack of developed reserves and less favorable mining areas. Due to the lack of developed reserves, a large part of the mining crews were engaged in mining the interbedded ore above the 5th Level and the hard, high sulphur ore above the 3rd Level. As the height of ore averages less than 30' in thickness in the interbedded ore body and less than 50' in thickness in the 3rd Level high sulphur ore body, mining and development costs in these two areas were considerably higher than in the main standard body.

	1951	1950
Product	1,157,013	1,251,963
Underground Costs	3.003	2.098
Surface Costs	.298	.259
General Mine Expense	.573	.504
Cost of Production	3.874	2.861
Depreciation: Plant & Equipment	.183	.159
Development after 12/31/44	.007 .189	.164
Pre-Production Development	.023	.023
Movable Equipment	.189 .007	.007
Dwellings Defense Facilities	.043	Dwellings .006
Allowance under Section 309	.282	-
Taxes	.192	.206
Loading and Shipping	.047	.049
Total Cost at Mine	4.840	3.475
Budget - Estimated Cost Per Ton	4.277	3.286
Number of Shifts & Hours	278, 3-8 hr.	263, 3-8 hr.
Total 8 hr. Operating Shifts	834	789
Number of Operating Days	278, 3-8 hr.	263, 3-8 hr.
Average Daily Product	4,162	4,760

Proportion of Labor and Supplies

	Amount	Per Ton	Per Cent
Labor	$2,977,510.39	2.573	53%
Supplies	$2,621,888.52	2.267	47%
Total Cost at Mine	$5,599,398.91	4.840	100%

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

8. COST OF OPENING, EQUIPPING & DEVELOPING:

Capital account expenditures for the year amounted to $731,162.79, which brought the total at the end of the year to $7,452,973.18. This total figure does not include an additional $318,223.11 charged in a prior year to Negaunee Mine Company "Idle Expense". The inclusion of this amount brings the grand total to date to $7,771,196.29. "General Expense" and "Maintenance" for the past seven years have been charged into "Operating".

Total Charge-Offs.....	$841,235.77
Total Capital Account Charges as Above....	731,162.79
Actual Net Decrease in Capital Account....	$110,072.98

Shaft sinking, main level development, drifting and permanent ventilation connections accounted for approximately 80% of the capital account expenditures for the year, or approximately $594,000. The other large items were: $36,000 for a new larry car; $40,000 for two new bottom dump skips; $9,500 for the new FWD truck.

The average cost per foot of main level drifting was $69.89 for the year. This cost varied considerably, depending on ground conditions. Where the ground was poor and spiling ahead of the blast and additional sets for support were necessary, the cost ran over $100/ft. In normal ground, the cost per foot of drift averaged approximately $55.00.

8. COST OF OPENING, EQUIPPING AND DEVELOPING:

1. BUILDINGS AND EQUIPMENT:	E&A REFERENCE	TOTAL EXPENDITURES TO DECEMBER 31, 1951 TOTAL AUTHORIZED	GROSS EXPENDITURES	CREDITS A/C ORE MINED IN DEVELOPMENT	NET EXPENDITURES	UNEXPENDED BALANCE	1951 EXPENDITURES
a. Main Buildings	(10-10&19) (10-10&19A)	280,000.00	279,990.27	-	279,990.27	9.73	-
b. Change House & Shop Equip	10-26	60,000.00	60,000.00	-	60,000.00	-	-
c. Initial Shop Equi pment	(10-4/10-4A)	5,732.73	5,732.73	-	5,732.73	-	-
d. One 35 Ton Overhead Crane	(10-9/10-9A)	8,894.94	8,894.94	-	8,894.94	-	-
e. Temporary Equipment	10-18	15,000.00	14,079.62	-	14,079.62	920.38	-
f. Erecting & Equipping Storage Building	31	20,900.00	20,900.00	-	20,900.00	-	-
g. Compressor Plant	10-23/47	137,203.07	137,203.07	-	137,203.07	-	-
h. Hot Milling Equipment	43	2,871.20	2,871.20	-	2,871.20	-	-
i. Steam Boiler & Heating Equip	52	58,958.60	58,958.60	-	58,958.60	-	-
TOTAL BUILDINGS & EQUIPMENT		589,560.54	588,630.43	-	588,630.43	930.11	-
2. SURFACE:							
a. Equipment:							
1. Temporary Surface Plant	10-3	31,130.00	26,506.28	-	26,506.28	4,623.72	-
2. Truck and Tractor	10-1	18,575.00	18,289.42	-	18,289.42	285.58	-
3. Electric Shovel	18	85,000.00	85,000.00	-	85,000.00	-	-
4. Top Tram Equipment	(10-24/10-24A/70)	171,000.00	167,636.22	-	167,636.22	3,363.78	36,612.48
5. Timber Tunnel, Tracks, Pumphouse & Sump	(10-20/10-20A)	58,000.00	57,867.78	-	57,867.78	132.22	-
6. Timber Tunnel & Yards	29/29-1	124,800.00	122,522.95	-	122,522.95	2,277.05	7,772.75
7. Mechanical Additions - Headframe	32	27,500.00	27,500.00	-	27,500.00	-	-
8. Crawler Crane	51	12,000.00	12,000.00	-	12,000.00	-	-
9. F. W. D. Truck	53	7,500.00	7,497.72	-	7,497.72	2.28	-
10. Spare Armature for Hoist Motors & Generator	49	14,747.00	14,747.00	-	14,747.00	-	-
11. Crawler Crane	58	12,500.00	12,524.01	-	12,524.01	24.01	-
12. International 4-Ton Truck	64	6,000.00	6,381.41	-	6,381.41	381.41	-
13. Willys 3/4-Ton Truck	67	2,100.00	2,114.84	-	2,114.84	14.84	-
14. Euclid 20-Ton Truck-Used	68	6,342.08	6,342.08	-	6,342.08	-	-
15. Caterpillar Model D8 Tractor	78	17,804.66	17,841.26	-	17,841.26	36.60	-
16. F. W. D. Truck	80	7,665.96	9,665.96	-	9,665.96	2,000.00	9,665.96
Total		602,664.70	594,436.93	-	594,436.93	8,227.77	54,051.19
b. General:							
1. Diamond Drilling	9	81,000.00	80,965.78	-	80,965.78	34.22	-
2. Moving two houses	10-2	3,458.00	3,458.00	-	3,458.00	-	-
3. Drainage Well	10-11/56	36,896.00	28,852.93	-	28,852.93	8,043.07	-
4. Road Bldg., Paving Parking Lot, etc	25	23,760.00	23,736.73	-	23,736.73	23.27	-
5. Surface Test Hole	61	80,000.00	73,733.87	-	73,733.87	6,266.13	2,105.54
6. Mine Payroll Machine	75	5,024.40	5,166.60	-	5,166.60	142.20	5,166.60
7. Diamond Drilling	77	50,000.00	294.10	-	294.10	49,705.90	294.10
Total		280,138.40	216,208.01	-	216,208.01	63,930.39	7,566.24
TOTAL SURFACE		882,803.10	810,644.94	-	810,644.94	72,158.16	61,617.43
3. SHAFT, HEADFRAME AND TRESTLE:							
a. Sinking in Sand	(10-15/10-15A)	16,302.44	16,302.44	-	16,302.44	-	-
b. Sinking in Rock (2,870')	10-16/10-16A	440,000.00	435,677.44	2,559.15	433,118.29	6,881.71	-
c. Shaft Sets (2,870')	10-5/10-5A	160,975.45	159,754.21	-	159,754.21	1,221.24	-
d. Headframe Foundation & Ore Trestle	10-21/10-21A	78,000.00	77,417.73	-	77,417.73	582.27	-
e. Headframe and Trestle	10-7/10-7a	186,028.83	186,028.83	-	186,028.83	-	-
f. Extensions to Permanent Stocking Trestles	36/42/42-1/66	370,152.48	330,478.18	-	330,478.18	39,674.30	5,739.05
g. Headframe and Powerhouse Equipment	10-22/10-22A	225,000.00	224,451.51	-	224,451.51	548.49	-
h. Electric Equipment for Cage & Skip Hoists	10-8	221,783.00	221,783.00	-	221,783.00	-	-

8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Continued) -2-

	E&A REFERENCE	TOTAL EXPENDITURES TO DECEMBER 31, 1951 TOTAL AUTHORIZED	GROSS EXPENDITURES	CREDITS A/C ORE MINED IN DEVELOPMENT	NET EXPENDITURES	UNEXPENDED BALANCE	1951 EXPENDITURES
3. SHAFT, HEADFRAME AND TRESTLE: (Continued)							
i. 1 Cage Hoist & 1 Skip Hoist....	10-6	143,000.00	143,000.00	-	143,000.00	-	-
j. Elevator for Headframe.....	10-12/10-12A	4,853.00	4,853.00	-	4,853.00	-	-
k. Double Deck Cage - Spare.....	37	7,000.00	3,134.75	-	3,134.75	3,865.25	-
l. Pinion Brake for Cage Hoists...	45	4,000.00	4,000.00	-	4,000.00	-	-
m. Crushing & Screening Plant in Headframe.....	72	75,000.00	76,219.00	-	76,219.00	1,219.00	-
o. Bottom Dump Skips.....	76	40,000.00	40,000.00	-	40,000.00	-	40,000.00
TOTAL SHAFT, HEADFRAME & TRESTLE...		1,972,095.20	1,923,100.09	2,559.15	1,920,540.94	51,554.26	45,739.05
4. UNDERGROUND:							
a. Plant:							
1. Pumping - 3rd Level.....	10-25/10-25A	55,000.00	53,738.88	-	53,738.88	1,261.12	-
2. Pumping Plant-6th Level.....	39	227,823.06	227,823.06	-	227,823.06	-	-
Total.....		282,823.06	281,561.94	-	281,561.94	1,261.12	-
b. Equipment:							
1. Mining Equipment.....	19	44,550.00	44,550.00	-	44,550.00	-	-
2. Mining Equipment.....	28	51,700.00	51,700.00	-	51,700.00	-	-
3. Mining Equipment.....	40	61,710.00	61,710.00	-	61,710.00	-	-
4. Mining Equipment.....	41	28,050.00	28,050.00	-	28,050.00	-	-
5. Mining Equipment.....	55	23,870.00	23,870.00	-	23,870.00	-	-
6. Mining Equipment.....	62	30,000.00	29,596.10	-	29,596.10	403.90	9,559.00
7. Mining Equipment.....	65	60,000.00	60,000.00	-	60,000.00	-	5,416.38
8. Haulage Equipment.....	10-29/10-29A	110,000.00	110,000.00	-	110,000.00	-	-
9. Haulage Equipment.....	23	90,420.00	89,732.02	-	89,732.02	687.98	-
10. Haulage Equipment.....	46	84,755.00	84,755.00	-	84,755.00	-	-
11 . Haulage Equipment.....	59	46,000.00	44,372.88	-	44,372.88	1,627.12	-
12. Underground Substations.....	38	14,300.00	14,300.00	-	14,300.00	-	-
13. Main Ventilating Fan.....	48	24,200.00	17,536.23	-	17,536.23	6,663.77	-
14. Twelve Scraper Hoists.....	50	33,000.00	32,980.80	-	32,980.80	19.20	-
15. Scraper Hoist.....	54	49,500.00	49,500.00	-	49,500.00	-	-
16. Mining Equipment.....	78	40,000.00	14,396.82	-	14,396.82	25,603.18	14,396.82
Total.....		792,055.00	757,049.85	-	757,049.85	35,005.15	29,372.20
c. Development:							
1. Main Level Development:							
Plats and Pockets.....	10-28/10-28A/26 26A/27-27A/57/63 71/74	504,460.00	365,775.96	-	365,775.96	138,684.04	5,658.56
Drifting.....	10-27/24/26-26A 27B-27-27A/33/60 71/74/27C	1,659,911.20	1,811,460.25	80,404.67	1,731,055.58	71,144.38	213,517.77
Vent. & 2nd Outlet.....	26-26A/27-27A	53,900.00	40,955.57	-	40,955.57	12,944.43	-
Excav. & Hoist Install.....	57/63	3,000.00	6,751.02	-	6,751.02	3,751.02	-
290' Winze.....	57/63/74	25,750.00	38,788.01	-	38,788.01	13,038.01	-
Preparation of Skip Pit.....	57/63/74	31,400.00	16,042.44	-	16,042.44	15,357.56	-
Shaft Sinking.....	57/63/74	341,650.00	379,620.71	-	379,620.71	37,970.71	184,778.39
Loading & Discharge Ends.....	71	50,000.00	63,147.33	-	63,147.33	13,147.33	47,794.80
2500' Conveyor System.....	71	200,000.00	146,648.04	-	146,648.04	53,351.96	117,206.85
Pan, Screen, Crusher.....	71	50,000.00	42,933.91	-	42,933.91	7,066.09	16,011.02
Vent. Conn. 1000' @ $25.....	71	25,000.00	19,190.32	-	19,190.32	5,809.68	9,466.72
2. Development & Mining Above Levels.....	24/26-26A/27 27A/34	203,728.80	194,487.12	49,921.83	144,565.29	59,163.51	-
3. Underground Exploration.....	21	35,000.00	34,838.62	-	34,838.62	161.38	-
Total.....		3,183,800.00	3,160,639.30	130,326.50	3,030,312.80	153,487.20	594,434.11
d. Dewatering Hematite Workings....	30	66,000.00	64,232.28	-	64,232.28	1,767.72	-
Total Underground.....		4,324,678.06	4,263,483.37	130,326.50	4,133,156.87	191,521.19	623,806.31
GRAND TOTAL BEFORE CONTINGENCIES...		7,769,136.90	7,585,858.83	132,885.65	7,452,973.18	316,163.72	731,162.79
Plus 10% for Contingencies.....		228,217.26	-	-	-	228,217.26	-
GRAND TOTAL INCLUDING CONTINGENCIES		7,997,354.16	7,585,858.83	132,885.65	7,452,973.18	544,380.98	731,162.79

8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Continued) -3-

TOTAL EXPENDITURES TO DECEMBER 31, 1951

	E&A REFERENCE	TOTAL AUTHORIZED	GROSS EXPENDITURES	CREDITS A/C ORE MINED IN DEVELOPMENT	NET EXPENDITURES	UNEXPENDED BALANCE	1951 EXPENDITURES
TOTALS CARRIED FORWARD:		7,997,354.16	7,585,858.83	132,885.65	7,452,973.18	544,380.98	731,162.79
General Expense.....	10-13	-	271,716.98	-	271,716.98	-	1951 Expense
Maintenance.....	10-14	-	37,050.73	-	37,050.73	-	taken up in
Building Roads & Landscaping.....	10-17	-	9,455.40	-	9,455.40	-	"Cost of
Total to Negaunee Mine Company Idle Expense.....		-	318,223.11	-	318,223.11	-	Operating"
GRAND TOTAL.....		7,997,354.16	7,904,081.94	132,885.65	7,771,196.29	544,380.98	731,162.79

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

8. COST OF OPERATING: (Continued)

b. Detailed Cost Comparison:

	1951		1950	
	Amount	Per Ton	Amount	Per Ton
Exploring in Mine	37,643.63	.033	13,997.25	.011
Est. Wage Adjustment	126,842.90	.110	11,395.05	.009
Development in Rock	410,233.19	.355	198,889.08	.159
Development in Ore	18,743.73	.016	19,643.25	.016
Stoping	1,146,024.14	.991	1,084,462.02	.866
Timbering	837,727.73	.724	640,718.92	.512
Tramming	306,644.96	.265	285,595.81	.228
Ventilation	33,033.86	.029	27,735.28	.022
Pumping	40,774.63	.035	22,530.23	.018
Compressors & Air Pipes	93,475.39	.081	77,334.39	.062
Underground Superintendence	143,586.23	.124	129,335.48	.103
Cave-in	119.70	.000	96,892.58	.077
Maintenance:				
Compressors & Power Drills	9,767.08	.008	3,943.28	.003
Scrapers & Mechanical Loaders	197,048.80	.170	146,447.67	.117
Tramming Equipment	49,782.47	.043	49,536.64	.040
Pumping Machinery	22,059.99	.019	11,709.92	.009
Total Underground Costs	3,473,508.43	3.003	2,626,381.69	2.098
Hoisting	129,015.86	.112	118,257.92	.094
Stocking Ore	49,099.95	.042	38,267.95	.031
Screening-Crushing at Mine	17,707.16	.015	9,522.75	.008
Dry House	45,472.71	.039	37,878.18	.030
General Surface Expense	29,971.57	.026	30,124.88	.024
Maintenance:				
Hoisting Equipment	20,154.64	.018	48,553.57	.039
Shaft	10,771.48	.009	12,060.69	.010
Top Tram Equipment	21,316.87	.018	14,196.16	.011
Docks, Trestles & Pockets	7,875.37	.007	10,404.06	.008
Mine Buildings	13,857.87	.012	5,267.39	.004
Total Surface Costs	345,243.48	.298	324,533.55	.259
Geological	7,945.91	.007	6,901.25	.005
Mining Engineering	40,712.13	.035	35,542.11	.026
Mechanical & Electrical Engrg.	13,331.04	.012	8,461.14	.007
Analysis & Grading	71,405.38	.062	60,872.18	.049
Safety Department	8,226.90	.007	7,488.38	.006
Telephones & Safety Devices	43,504.54	.038	27,285.98	.022
Local & General Welfare	9,698.28	.008	9,386.18	.007
Sp. Expense, Pensions & Allowance	16,433.26	.014	19,934.47	.016
Ishpeming Office	69,833.67	.060	65,255.43	.052
Mine Office	110,193.00	.095	65,225.10	.052
Insurance	54,368.08	.047	62,143.87	.049
Personal Injury	50,968.00	.044	35,769.22	.029
Social Security Taxes	67,172.35	.058	67,041.92	.054
Employees Vacation Pay	99,223.28	.086	162,782.60	.130
Total General Mine Expense	663,015.82	.573	631,089.83	.504
COST OF PRODUCTION	4,481,767.73	3.874	3,582,005.07	2.861

8. COST OF OPERATING: (Continued)

b. Detailed Cost: (Idle Expense Due to Strike)

	1951 Amount
Exploring in Mine	28.60
Pumping	728.12
Compressors and Air Pipes	823.33
Underground Superintendence	4,204.62
Tramming Equipment	141.82
Pumping Machinery	73.50
Total Underground Costs	5,999.99
Hoisting	1,909.31
Dry House	521.33
General Surface Expense	552.38
Maintenance Hoisting Equipment	70.91
Total Surface Costs	3,053.93
Geological	256.00
Mining Engineering	1,147.00
Mechanical and Electrical Engineering	274.00
Analysis and Grading	1,857.75
Safety and Personnel Departments	224.00
Local and General Welfare	335.00
Special Expense, Pensions and Allowances	518.00
Ishpeming Office	2,312.00
Mine Office	2,217.50
Insurance	1,980.51
Personal Injury	1,015.47
Social Security Taxes	513.27
Employees Vacation Pay	2,535.00
Total General Mine Expenses	15,185.50
TOTAL COST AS ABOVE	24,239.42
Depreciation - Movable Equipment	283.00
Proportion of Taxes	6,840.00
Total Depreciation and Taxes	7,123.00
TOTAL IDLE EXPENSE	31,362.42

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

Underground exploratory drilling consisted of work in 26 holes; two on 3rd Level, four on or above 5th Level, ten on or above 6th Level and ten on or above the 7th Level. Holes numbered 17, 37, 38, 40, 42, 48 and 66 are in Section 1, 47-27 and are numbered in the Mather Mine "B" Shaft sequence, but were drilled by a Mather Mine "A" Shaft crew. U.N. #17 was started the previous year and completed during the year, 1951. All other holes were started and completed during 1951, with the exception of holes numbered 86, 88 and 89, which were still drilling at the end of the year.

3rd Level:
Hole #79 was drilled due south from the end of #2 Cross-cut. It was inclined at ∠30° to test for possible enrichment south of #1 Dike and to check the upward extension of the ore body encountered on the -225' sub-level, between #1 and #2 Cross-cuts. A total of 43' of high sulphur ore was encountered.

Hole #88 was drilled S.7°12'E. from a drill station S.625.67 x 11535.86 N. at an inclination of ∠2°. The purpose was to test for enrichment along #4 Dike. The results of this drilling were disappointing as no ore was encountered along the dike this far to the east.

5th Level:
Hole #73 was drilled from the 5700 Cross-cut at an inclination of -25° 31'. This hole tested the thickness of ore encountered in the cross-cut. A total of 135' of ore was encountered.

Hole #84 was drilled S.20°E. from a station located on the -410' elevation above #7 Cross-cut. This hole was inclined at ∠21° and was stopped at a depth of 25' when it was determined that a hole, more steeply inclined, would obtain a better crossing of the formation.

Hole #85 was drilled from the same station and along the same course as Hole #84, but was inclined at ∠36°. This drilling was done in an effort to determine the pitch of the ore pipe above #7 Cross-cut. 28' of ore was encountered in this hole.

Hole #86 was drilled to supplement the information obtained in Hole #85. It was drilled on the -410' elevation in an effort to determine the extension of ore up the pitch from #7 Cross-cut. This is part of the ore pipe being mined above #7 Cross-cut on the 6th Level. Results of this exploration were disappointing and it is felt that the ore pipe is more steeply inclined than was at first supposed. More exploration is warranted.

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

6th Level:

Hole #77 was drilled from the end of #7 east Cross-cut on a course S.29°E.26' and at an inclination of -40°. This hole was designed to test the structure below the 6th Level. The hole had to be abandoned at a depth of 170' due to caving conditions.

Hole #78 was drilled from a station located approximately 1635S. and adjacent to the #2 Cross-cut. This hole was inclined at ∠35° on a course S.53°E. The purpose of this hole was to outline the possible extensions of the ore body above and between the #2 and #3 Cross-cuts.

Hole #83 was drilled to re-explore the area that was partially tested by Hole #77. This hole was drilled along the same course and inclination as was Hole #77. The structure, being tested, is north of #9 Dike, between 6th and 7th Levels. A total of 198' of ore was encountered in this hole. Actual thickness of the ore in this structure remains to be determined as Hole #83 had poor crossing of the formation.

Hole #17 is located in Section 1 and was drilled down vertically from the end of #9 Cross-cut, very close to the Cambria-Jackson fault. This hole crossed the fault at depth of 254' and entered the interbedded formation again on the east side of the fault. 18' of ore was found in the main formation, west of the fault. This hole was drilled to a depth of 331' during 1950 and was completed to a depth of 341' at the beginning of 1951.

Hole #37 is located in Section 1 and was drilled N.51°23'E. from a drill station located on the -725' sub-level, above #9 Cross-cut. This hole was drilled to explore for the extension of the ore encountered on the -725' sub-level. No ore was encountered in this drilling.

Hole #38 is located in Section 1 and is the second hole drilled from the -725' sub-level above #9 Cross-cut. This hole was drilled N.52°E. at an inclination of ∠30° and is exploring for the extension of ore found on the -725' sub-level. Only 10' of ore was encountered and the ore outlines, of the structure in question, were changed only slightly as the result of this drilling.

Hole #40 is located in Section 1 and is a third in the series located on the -725' sub-level above #9 Cross-cut. This hole was drilled S.38°E. at an inclination of ∠28°. 22' of ore was encountered in this hole and again the ore outlines of the structure could be altered only slightly to conform to the results of the drilling.

9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

6th Level: (Continued)
Hole #42 is located in Section 1 at the end of #9 Cross-cut. This hole was drilled N.76° 44'E. at -56° and was exploring for the extension, down the dip, of ore located by #9 Cross-cut. 70' of ore was encountered in this hole and will be available for mining from the 7th Level.

Hole #48 is located in Section 1 and was drilled from a station located on the -675' sub-level above #9 Cross-cut. This hole was drilled due north at an inclination of ∠60°. Hole #48 was planned to test for possible concentration adjacent to #10 Dike and the footwall slate north and above the 6th Level. No ore concentration was found.

Hole #66 was drilled in Section 1 from the -725' sub-level, above #9 Cross-cut, to test for the position of the footwall and the bottom of the ore body north of #11 Dike in the area of the Cambria-Jackson fault. 28' of ore was encountered above the footwall.

7th Level:
Hole #71 was drilled due south at an inclination of ∠18° above #4 Cross-cut. This hole was planned to test to the south in the area above #4 Cross-cut. The only concentration encountered in this hole was the interbedded ore. The hole was first stopped at a depth of 300' but was later re-entered and drilled to a depth of 549'. Valuable structural information was obtained in spite of the fact that no enrichment was found in the main formation.

Hole #72 was drilled due south at an inclination of ∠1° 30' directly below Hole #71. This hole was drilled on the basis of structural information obtained in Hole #71. A total of 65' of ore was cut in the main formation in this hole. In addition, 39' of interbedded ore was encountered.

Hole #74 was drilled south above #3 Cross-cut at an inclination of ∠45°. This hole was exploring for an extension of the ore found in Hole #69. 52' of ore was cut in the main formation and an additional 31' of ore was drilled in the interbedded formation.

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

7th Level: (Continued)
Hole #75 was drilled south above #2 Cross-cut from a drill station located approximately 2180 S. This hole was planned to test for ore in the main formation above #2 Cross-cut. Some indications of structural complexity, involving faulting and/Or folding, was obtained from Hole #72. Hole #75 also indicated that structural complexity exists to the south of the present development on the 7th Level. A total of 47' of ore was found in this hole.

Hole #76 was drilled south, directly below Hole #75. The purpose of this drilling was to test the extension of the ore found in Hole #75. A total of 41' of ore was encountered after which the hole re-entered slate of the footwall formation, thus again confirming the presence of faulting.

Hole #80 was drilled S.38°E. at ∠2° from a drill station located in #4 Cross-cut. This drilling was planned to determine the possible concentration of ore adjacent to the Mather Fault along the southwest side. In addition, it was testing for the extension of ore found in Surface Hole #40. A total of 52' of ore was encountered in the main formation and 54' of interbedded ore was found. Little height can be anticipated above #4 Cross-cut as Hole #80 encountered numerous runs of hanging jasper between the ore runs in the main formation.

Hole #81 was drilled from the -900' sub-level above #2 Cross-cut. The drilling proceeded due south at an inclination of ∠24° and was designed to test for the continuation of ore found in Holes #75 and #76. Only 15' of 1st class ore was encountered.

Hole #82 was drilled due south along the 12700 W. meridian at an inclination of ∠2°. This hole was testing the eastward extension of ore found in the end of #2 Cross-cut. 40' of ore was encountered.

Hole #87 was drilled south from the end of #2 Cross-cut at ∠2° to explore for ore in the main formation on the southwest side of the fault, encountered in #2 Cross-cut. 52' of ore was encountered.

Hole #89 was drilled at ∠15° above Hole #87 to explore for the height of the ore which was found in Hole #87.

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

7th Level: (Continued)
The discontinuity of the ore bodies encountered to date, west of the fault on the 7th Level, together with known and indicated faulting and folding, forecast major structural changes in the footwall south of our present development on the 7th Level. An expanded exploration program is, therefore, indicated for the 7th Level and the lower levels, as they are developed.

Surface exploration was confined to the drilling of two shallow holes from a station located 1472' south and 550' west of the shaft. These holes were planned to test for high grade ore formation lying on the greenstone sill in an anticipated structure between the sill and an inferred fault scarp.

Hole #66, Section 2, 47-27, was drilled at -90° from S.2772 x 15200 W. The hole bottomed in greenstone at a depth of 757'. No ore was encountered in the hole.

Hole #67, Section 2, 47-27, was drilled south at an inclination of -45° from the same drill station as Hole #66. This hole bottomed in greenstone at a depth of 56'. No ore was encountered.

Excessive water, entering the mine through the stope openings above the 6700 Cross-cut, was found to be entering the stopes from D.D.H. #37 and #39, Section 2, 47-27. These holes were, therefore, re-entered and filled with concrete. This relieved the water problem almost immediately.

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

SURFACE DRILLING:

NO.	LOCATION	DIRECTION	DIP	STARTED	FINISHED	MATERIAL	FINISHED DEPTH
66	Surface	15200W. x 2772S.	-90°	11/2/51	12/16/51	0' - 39' Sand & Gravel 39' - 44' Jasper 44' - 58' Greenstone 58' - 169' Jasper 169' - 172' Dike 172' - 200' Jasper 200' - 205' Dike 205' - 511' Jasper 511' - 512' Dike 512' - 513' Jasper 513' - 516' Dike 516' - 520' Dike & Jasper 520' - 522' Jasper 522' - 527' Dike 527' - 566' Jasper 566' - 710' Greenstone 710' - 718' Jasper 718' - 757' Greenstone	757'
67	Surface	15200W. x 2772S.	-45°	11/10/51	11/13/51	0' - 40' Sand & Gravel 40' - 56' Greenstone	56'

MATHER MINE "B" SHAFT:

17	6th Level (2200') #9 Cross-cut		-90°	11/24/50	1/4/51	331' - 341' Slate	341'
37	6th Level (2200') -725' sub	N.51° 23'E.	∠2°	4/16/51	4/19/51	0' - 10' Lean Ore 10' - 42' Jasper	42'

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

MATHER MINE "B" SHAFT:

NO.	LOCATION	DIRECTION	DIP	STARTED	STOPPED	MATERIAL	FINISHED DEPTH
38	6th Level (2200') -725' sub	N.52°E. S.1215 x 9975W.	∠30°	4/20/51	4/25/51	0' - 10' Ore 10' - 57' Jasper	57'
40	6th Level (2200') -725' sub	S.38°E.	∠28°	4/26/51	4/30/51	0' - 22' Ore 22' - 53' Jasper	53'
42	6th Level (2200') #9 Cross-cut	N.76° 44'E.	-56°	5/2/51	6/19/51	0' - 49' Jasper 49' - 109' Jasper 109' - 120' Jasper & Rock 120' - 190' Ore 190' - 200' Ore & Rock 200' - 298' Rock	298'
48	6th Level (2200') #9 Cross-cut	N.-675' sub	∠60°	7/2/51	8/18/51	0' - 104' Slate & Jasper 104' - 222' Jasper	222'
66	6th Level (2200') #9 Cross-cut -725' sub	S.38°E.	-60°	11/9/51	12/14/51	0' - 28' Ore 28' - 170' Slate 170' - 230' Jasper 230' - 290' Slate	290'

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

NO.	LOCATION	DIRECTION	DIP	STARTED	STOPPED	MATERIAL				FINISHED DEPTH
71	7th Level (2400') #4 Cross-cut	S.0°19'E.	∠18°	1/15/51	1/30/51	0'	- 72'	Slate		300'
						72'	- 76'	Slty. Lean Ore		
						76'	- 110'	Ore		
						110'	- 129'	Slate		
						129'	- 256'	Jasper		
						256'	- 268'	Lean Ore		
						268'	- 300'	Jasper		
71	7th Level (2400') #4 Cross-cut	S.0°19'E.	∠18°	5/25/51 Re-entered	6/23/51	300'	- 340'	Jasper		549'
						340'	- 396'	Jasper		
						396'	- 398'	Dike		
						398'	- 459'	Slate & Jasper		
						459'	- 479'	Jasper		
						479'	- 509'	Jasper		
						509'	- 513'	Dike		
						513'	- 549'	Jasper		
72	7th Level (2400') #4 Cross-cut	Due South	∠1°30'	2/1/51	3/8/51	0'	- 116'	Slate		751'
						116'	- 155'	Ore (Interbedded)		
						155'	- 163'	Slate		
						163'	- 164'	Dike		
						164'	- 184'	Slate		
						184'	- 190'	Dike		
						190'	- 194'	Slate		
						194'	- 308'	Slate & Jasper		
						308'	- 388'	Soft Ore Jasper		
						388'	- 399'	Dike		
						399'	- 430'	Soft Ore Jasper		
						430'	- 444'	Ore		
						444'	- 454'	Jasper		
						454'	- 494'	Ore		
						494'	- 499'	Slate		
						499'	- 659'	Slate & Jasper		
						659'	- 670'	Lean Ore		
						670'	- 709'	Slate & Jasper		
						709'	- 710'	Dike		
						710'	- 751'	Slate & Jasper		

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

NO.	LOCATION	DIRECTION	DIP	STARTED	FINISHED	MATERIAL	FINISHED DEPTH
73	5th Level (2050') #7 Cross-cut	N.29°58'W.	-25°31'	3/14/51	3/24/51	0' - 10' Lean Ore 10' - 35' Ore 35' - 95' Soft Ore Jasper 95' - 135' Ore 135' - 145' Dike 145' - 215' Ore 215' - 267' Slate & Jasper	267'
74	7th Level (2400') -948' elevation	Due south	∠45°	3/30/51	4/14/51	0' - 105' Slate & Gypsum 105' - 136' Ore 136' - 161' Slate 161' - 193' Slate & Jasper 193' - 245' Ore 245' - 267' Jasper 267' - 270' Dike 270' - 304' Jasper	304'
75	7th Level (2400') #2 Cross-cut	0°06'	∠23°	4/16/51	5/24/51	0' - 10' Slate & Dike 10' - 25' Slate & Jasper 25' - 72' Ore 72' - 79' Dike 79' - 213' Slate & Jasper 213' - 220' Dike 220' - 228' Slty. Lean Ore 228' - 234' Dike 234' - 262' Slate & Jasper 262' - 272' Jasper 272' - 284' Jasper & Rock 284' - 295' Jasper 295' - 413' Jasper 413' - 513' Jasper	513'
76	7th Level (2400') #2 Cross-cut	Due south	∠2°	5/16/51	5/26/51	0' - 13' Slate 13' - 50' Slate & Jasper 50' - 91' 1st class S. ore 91' - 140' Slate	140'

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

NO.	LOCATION	DIRECTION	DIP	STARTED	FINISHED	MATERIAL			FINISHED DEPTH
77	6th Level (2200') #7 Cross-cut	S.29°E.26'	-40°	6/19/51	7/30/51	0' - 70'	Jasper		170'
						70' - 90'	Lean Ore		
						90' - 170'	Standard Ore		
78	6th Level (2200') #2, #3 Cross-cuts	S.53°E.	∠35°	7/31/51	9/5/51	0' - 18'	Slate		232'
						18' - 50'	Ore		
						50' - 90'	Slate		
						90' - 115'	Slate & Jasper		
						115' - 128'	Slate		
						128' - 140'	Slate & Jasper		
						140' - 180'	Jasper		
						180' - 232'	Jasper		
79	3rd Level (1750') #2 Cross-cut	Due south	∠30°	7/30/51	8/16/51	0' - 21'	Slate		205'
						21' - 27'	Lean H.S. Ore		
						27' - 45'	Slate		
						45' - 100'	Slate & Jasper		
						100' - 130'	H. S. Ore		
						130' - 135'	Dike		
						135' - 140'	H. S. Ore		
						140' - 144'	Dike		
						144' - 152'	H. S. Ore		
						152' - 189'	Jasper		
						189' - 197'	Lean H.S. Ore		
						197' - 205'	Jasper		

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

NO.	LOCATION	DIRECTION	DIP	STARTED	FINISHED	MATERIAL	FINISHED DEPTH
80	7th Level (2400') #4 Cross-cut	S.38°E.	∠2°	8/20/51	10/4/51	0' - 130' Slate 130' - 184' Ore 184' - 204' Slate 204' - 233' Standard Ore 233' - 239' Slate 239' - 242' Lean Soft Ore 242' - 244' Slate 244' - 249' Dike 249' - 258' Slate & Jasper 258' - 273' 2nd class Ore 273' - 278' 1st class Ore 278' - 314' Jasper 314' - 348' Lean Ore 348' - 353' 1st class Ore 353' - 364' Jasper 364' - 379' 1st class Ore 379' - 394' Lean Ore 394' - 404' Jasper 404' - 409' 1st class Ore 409' - 423' Dike 423' - 439' 2nd class Ore 439' - 472' Jasper 472' - 494' Ore 494' - 514' Jasper 514' - 620' Jasper 620' - 630' Dike 630' - 700' Jasper	700'
81	7th Level (2400') -900' Sub-level	Due south	∠24°	9/6/51	10/6/51	0' - 11' Slate & Jasper 11' - 13' Dike 13' - 62' Slate & Jasper 62' - 72' Slty. Lean Ore 72' - 76' 2nd class Ore 76' - 92' Dike 92' - 97' 2nd class Ore 97' - 112' Ore 112' - 251' Jasper 251' - 269' Jasper	269'

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

NO.	LOCATION	DIRECTION	DIP	STARTED	FINISHED	MATERIAL (Interbedded)	FINISHED DEPTH
82	7th Level (2400') #2 Cross-cut	Due south	∠2°	10/7/51	11/6/51	0' - 25' Standard Ore 25' - 100' Slate 100' - 130' Slate & Jasper 130' - 160' Ore & Lean Ore 160' - 180' Jasper & Slate 180' - 190' Lean Ore 190' - 230' Standard Ore 230' - 250' Jasper 250' - 255' Dike 255' - 275' Jasper 275' - 283' Dike 283' - 290' Jasper 290' - 310' Slate	310'
83	6 & 7th Levels #7 Cross-cut N. #9 Dike	S.34°E.	-40°	10/8/51	11/30/51	0' - 100' Jasper & Lean Ore 100' - 248' Standard Ore 248' - 255' Dike 255' - 285' Standard Ore 285' - 305' Slty. Ore 305' - 315' Slate 315' - 345' Dike 345' - 375' Slate	375'
84	5th Level (2050') #7 Cross-cut	S.20°E.	∠21°	10/18/51	10/24/51	0' - 25' Jasper	25'
85	5th Level (2050') #7 Cross-cut	S.20°E.	∠36°	10/25/51	12/1/51	0' - 60' Jasper 60' - 70' Jasper & Dike 70' - 127' Jasper 127' - 137' Lean Ore 137' - 140' Dike 140' - 168' Ore	168'

MATHER MINE "A" SHAFT EXPLORATION
YEAR 1951

NO.	LOCATION	DIRECTION	DIP	STARTED	FINISHED	MATERIAL	FINISHED DEPTH
86	5th Level (2050') -410' sub-level	N.59°E.06'	∠45°	12/6/51	12/31/51	0' - 108' Jasper	108'
87	7th Level (2400') #2 Cross-cut	S.0°31'E.	∠2°	11/30/51	12/19/51	0' - 71' Slate 71' - 123' 1st class Ore 123' - 163' Dike 163' - 193' Slate 193' - 263' Jasper & Slate 263' - 288' Jasper	288'
88	3rd Level (1750')	S.7°12'E.	∠2°	12/15/51	12/31/51	0' - 10' Slate & Jasper 10' - 30' Dike 30' - 120' Slate & Jasper	120'
89	7th Level (2400')	Due south	∠15°	12/19/51	12/31/51	0' - 86' Slate	86'

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

10. TAXES:

Taxes for the year at the Mather Mine "A" Shaft totaled $229,418.60 and the tax rate for 1951 was practically the same as for 1950.

	VALUATION	RATE	TAXES	VALUATION	RATE	TAXES
Section 2, 47-27 Except the N 600' NE of NE and the Rights of Way						
Real	$5,115,000		$192,352.64	$4,350,000		$164,570.94
Personal	985,000		37,041.52	950,000		35,940.78
Total	$6,100,000	$37.6056	$229,394.16	$5,300,000	$37.8324	$200,511.72
Coll. Fee	-	-	-	-	-	-
Total	$6,100,000	$37.6056	$229,394.16	$5,300,000	$37.8324	$200,511.72
Mather Mine Pipe Line, parcel in Section 3, 47-27	$ 650	$37.6056	$ 24.44	$ 650	$37.8324	$ 24.59
Total Mather Mine "A" Shaft (Sec. 2, City of Ishpeming)	$6,100,650	$37.6056	$229,418.60	$5,300,650	$37.8324	$200,536.31
Jackson, Sec. 1, 47-27						
Real	-	-	-	$ 980,000		$ 46,501.00
Personal	-	-	-	215,000		10,201.75
Total	-	-	-	$1,195,000	$47.4500	$ 56,702.75
Coll. Fee 1%	-	-	-	"	.4745	567.03
*Total Mather Mine "B" Shaft (Sec. 1, City of Negaunee)	-	-	-	$1,195,000	$47.9245	$ 57,269.78
GRAND TOTAL	$6,100,650	$37.6056	$229,418.60	$6,495,650		$257,806.09

* Taxes for Section 1 ("B" Shaft) taken up in the Mather Mine "A" Shaft cost sheet in 1950 were taken up in the Mather Mine "B" Shaft cost sheet for 1951.

	1951		
	TAXES	PER TON PRODUCED	PER TON SHIPPED
Total	$229,418.60	$0.198	$0.198

	1950		
	TAXES	PER TON PRODUCED	PER TON SHIPPED
Total	$257,806.09	$0.206	$0.202

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

11. ACCIDENTS AND PERSONAL INJURY

There were 28 compensable injuries during the year, which occasioned lost time of 4,215 days. There were also 63 non-compensable injuries, which added 150 days lost time, for a grand total of 4,365. This resulted in a severity rate of 2.748 days lost per thousand man hours, and a frequency rate of 57.31 injuries per million man hours, compared with Company averages for underground mines of 2.975 and 47.85. The total hours worked were 1,587,986 as compared with 1,523,599¾ last year, an increase of approximately 4%. The following is a brief summary of the compensable accidents:

DATE	NAME	NATURE OF INJURY
1-4-51	Theodore Kantola	Swelling of left ankle joint.
1-23-51	Charles Delangelo	Abrasions of left thigh and calf.
1-25-51	Kenneth Koski	Laceration of 4th finger right hand.
2-25-51	Leslie Lawrence	Sprained left wrist.
3-21-51	John Judici	Contusion of left foot.
4-17-51	Vernie LaCosse	Amputation of left leg, 8 inches below knee.
5-11-51	Arthur Jacobson	Contusion, left foot, fracture 2nd and 3rd toes.
5-15-51	Joseph Mattila	Incomplete fracture of left leg.
5-19-51	Lauri Poutanen	Strained back, lower lumbar, right side.
5-22-51	Toivo Niemisto	Fracture, 5th metacarpal - left.
5-23-51	Robert Nelson	Contusion and laceration, tip of left thumb.
6-25-51	Glen Veale	Ligamentous injury - right shoulder.
6-30-51	Kenneth Ball	Fractured wrist - right.
7-17-51	Donald Hakala	Laceration of scalp, back injuries, broken ribs.
7-25-51	Fred Berg	Severe laceration between thumb and index finger.
8-1-51	Lawrence Nault	Severe contusion and abrasion - right lumbar region.
8-5-51	Charles Townsend	Severe contusion and abrasion - lower lumbar region.
8-24-51	Walter Anttonen	Bruised right knee.
9-10-51	Irving Gustafson	Bruised right foot.
9-17-51	Willis Medlyn	Lacerated left foot.
9-25-51	Reuben Rysso	Laceration and severe fracture, middle right finger.
9-29-51	Felix Dozzi	Laceration of left thumb.
10-24-51	John Herman	Punctured dorsum, right hand.
10-29-51	John Lindroos	Fracture of right ankle.
11-1-51	Lauri Poutanen	Fracture, five ribs; possible compression fractures first lumbar vertebra.
11-11-51	Robert Delago	Bruised left instep; fracture, 4th, 5th metatarsals.
12-10-51	Glen Veale	Cut left shin, right side of heel.
12-17-51	Hjalmer Mattson	Fractured ribs, left side; 7th, 8th, 9th.

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

There was no new construction of major importance during the year.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

The major items of new equipment purchased during the year were:

(1) One top tram larry car.

(2) Two, 240 cu. ft. bottom dump skips.

(3) One concrete placer.

(4) One Lull loader.

(5) One FWD truck.

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

14. MAINTENANCE AND REPAIRS:

Maintenance and repairs for both surface and underground were mainly of a routine nature.

15. POWER:

	CONSUMPTION K.W. HOURS	AVERAGE MAX. DEMAND	AVERAGE DEM. FACTOR	COST OF CURRENT	AVERAGE PRICE PER K.W. HOUR
1951	16,213,000	3,130 K.W.	60%	$248,362.70	$.0153
1950	15,053,000	3,100	56%	235,302.80	.0156
1949	11,384,000	2,460	53.5	171,034.60	.0150
1948	11,217,000	2,355	54	155,508.80	.0139
1947	10,059,000	2,160	53	140,078.60	.0139
1946	5,570,000	1,530	48	80,677.20	.0144

The total consumption of electric power was approximately 1,160,000 kilowatt hours over that of the previous year.

16. WATER SUPPLY:

	CONSUMPTION	COST	THOUSAND GAL. COST PER
1951	18,859,100	$2,382.51	$0.126
1950	15,321,480	1,910.76	0.124
1949	16,013,100	1,993.74	0.124
1948	20,068,100	1,662.64	0.082
1947	17,241,600	1,436.52	0.083
1946	10,620,100	928.41	0.086

The consumption of City water increased only slightly as compared with the previous year.

Practically all of the water used underground for mining operations was all obtained from the 960' Level.

MATHER MINE "A" SHAFT
ANNUAL REPORT
YEAR 1951

18. NATIONALITY OF EMPLOYEES:

	American Born	Per Cent	Foreign Born	Per Cent	Total	Per Cent
Finnish	277	38.8	30	4.2	307	43.0
English	98	13.7	11	1.6	109	15.3
French	93	13.0	1	.1	94	13.1
Swedish	63	8.8	5	.7	68	9.5
Italian	48	6.7	13	1.8	61	8.5
German	21	2.9	-	-	21	2.9
Norwegian	18	2.5	1	.1	19	2.6
Irish	15	2.1	-	-	15	2.1
Danish	1	.1	-	-	1	.1
Dutch	2	.3	-	-	2	.3
Polish	4	.6	-	-	4	.6
Swiss	1	.1	-	-	1	.1
Austrian	7	1.0	-	-	7	1.0
Belgian	4	.6	-	-	4	.6
Croatian	1	.1	-	-	1	.1
Czech	1	.1	-	-	1	.1
Russian	1	.1	-	-	1	.1
	655	91.5	61	8.5	716	100.0

MORRIS MINE
ANNUAL REPORT
YEAR 1951

1. GENERAL:

Production from the Morris Mine increased from 312,801 in 1950 to 363,521 for the current year. Most of this difference was due to the increased working schedule from five to six days per week effective late in 1950. Of the total production, 95,952 tons, or 26%, came from Fee Lands. Shipments for the year totaled 353,704 tons as compared with 307,357 tons the previous year.

As a result of exploration and development in 1951, 398,843 tons were added to the engineer's estimate of ore reserves, with total estimated reserves of 4,004,985 tons. Most of this added tonnage was on Chase Lease #9, with 64,226 tons on Fee Lands.

No work was done during the year on the surface deep well program. At the end of the year, seven wells were operating. Surface pumping averaged 1315 G.P.M. as compared with 1528 in 1950.

Underground pumping increased from 1342 G.P.M. in 1950 to an average of 1589 for the current year.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production

	Grade	Tons
1951	Morris	363,521
1950	"	312,801

The 1951 production came from fee and leased lands in the following proportions:

	Fee	Lease	Total
	95,952	267,569	363,521
Percentage	26%	74%	100%
Percentage 1950	27%	73%	100%

A summary of the total production, fee and lease, since the Inland Steel Company took over the Morris Mine lease is listed below:

	Tons	Percent
Lease Ore Production 1933-1951	4,220,064	74.6
Fee Ore Production 1933-1951	1,434,276	25.4
	5,654,340	100.0

MORRIS MINE
ANNUAL REPORT
YEAR 1951

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Shipments

Grade	Pocket	Stockpile	Total
Morris	205,203	148,501	353,704

Grade	Fee	Lease	Total
Morris	93,263	260,441	353,704

The following table shows the shipments for the past five years:

Year	Total
1951	353,704
1950	307,357
1949	256,749
1948	347,134
1947	278,916

Total shipments since Inland acquired lease in 1933 - 5,612,522 tons.

c. Ore in Stock

Grade	Tons
Morris	41,816

d. Production by Months

	Days Worked	Average Number of Men	Tons Per Man Per Day	Production
January	26	187	6.48	30,276
February	24	185	7.05	30,036
March	27	185	7.62	36,076
April	25	172	8.86	37,730
May	26	183	7.03	30,548
June	26	181	6.58	27,617
July	25	179	6.19	24,305
August	26	184	7.31	30,650
September	23	175	6.23	23,151
October	27	173	7.46	31,547
November	25	176	7.18	27,805
December	20½	181	6.40	23,490
Average	25	180	7.03	
Average 1950	21	185	6.59	

12 months production	353,231
Current year overrun	10,290
Total 1951 Production	363,521

MORRIS MINE
ANNUAL REPORT
YEAR 1951

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

e. Working Schedule

The working schedule continued at six days per week.

f. Delays:
On August 31st the Cliffs Power and Light Company transformer station burned down. The 11-hour loss of power made it necessary to shut down the mine for four days to pump out the dammed-up water and repair flood damage.

3. ANALYSIS:

a. Shipments

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Sul.	Moist.
Morris	353,704							
Dried		55.90	.077	12.97	.54	2.95	.022	11.97
Natural		49.21	.068	11.42	.46	2.60	.019	11.97

b. Ore in Stock (Natural)

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Moist.
Morris	41,816	49.49	.061	11.18	.43	2.29	12.25

c. Ore Reserves - Expected Natural Analysis

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum	Sul.	Moist.
Morris	3,510,121	49.26	.075	11.30	.47	2.86	.013	12.00
Hi-Sul	494,864	50.00	.094	10.00	.40	2.26	.398	11.00

4. ESTIMATE OF ORE RESERVES:
Exploration and development in 1951 added 398,843 tons to the engineers' estimate after allowance for ore mined during the year. This compares with an increase of 111,538 tons in 1950. Chase Lease #9 showed the greatest gain, with 298,081 tons, due to increases in the ore outlines from development work, particularly between the 8th and 9th Levels in Deposits #33 and #87.

	Estimate 10-1-50	Production 10-1-50 to 10-1-51	Estimate Deducting Product	Actual Estimate 10-1-51	Incr. or Decr. From 1950 Est.
Chase Lease #26	26,140	-	26,140	26,140	-
Chase Lease #25	33,273	-	33,273	33,273	-
Chase Lease #24	191,902	11,872	180,030	180,017	13
Chase Lease #24 Hi-Sul.	448,330	29,536	418,794	455,343	36,549
Chase Lease #9	2,162,207	232,114	1,930,093	2,228,174	298,081
Total Chase Leases	2,861,852	273,522	2,588,330	2,922,947	334,617
CCI Lands	1,065,187	86,896	978,291	1,042,517	64,226
CCI Lands Hi-Sul.	39,521	-	39,521	39,521	-
Total CCI Lands	1,104,708	86,896	1,017,812	1,082,038	64,226
GRAND TOTAL	3,966,560	360,418	3,606,142	4,004,985	398,843

MORRIS MINE
ANNUAL REPORT
YEAR 1951

5. LABOR & WAGES:

The average number of men decreased from 185 the previous year to 180 for the current year.

There were no changes in the general wage structure except for the 8½¢ commitment for job evaluation made in December 1, 1950. None of these new job rates had been resolved by the end of the year.

6. SURFACE:

Considerable work was done replacing the old bent and corroded steel members on the headframe. Weak points were reinforced and all of the steel was given two coats of Rust-oleum.

Work was started on enlarging and refinishing the surface dry, and all shop interiors and the tunnel were painted.

Surface Pumping

Surface pumping averaged 1315 G.P.M. as compared with 1528 in 1950. The following comparison shows the pumping at the several wells at the beginning and end of 1951:

Well No.	G.P.M. Dec. 1950	G.P.M. Dec. 1951
1	200	170
2	Down	Down
3	80	124
3A	361	439
5	167	167
8	275	275
9	74	45
10	480	383
	1637	1603

	G.P.M. Surface Pumping	Drop in Test Holes Feet
January	1591	1.0
February	1542	0.5
March	1235	0.2
April	1148	0.02
May	1118	1.3
June	1085	0.01
July	897	1.19
August	1208	0.23
September	1092	0.38
October	1586	1.00
November	1662	0.5
December	1607	0.35
Average 1951	1315	0.01
Total 1951		0.16
Average 1950	1528	0.2
Total 1950		2.0

MORRIS MINE
ANNUAL REPORT
YEAR 1951

6. SURFACE:
(Continued)

Surface Pumping (Continued)
The average drop in the water level in the surface material above ledge since pumping started in 1937 to December 28, 1951 amounts to 41.6' as shown below:

Test Hole	Drop 8/25/37 to 12/28/51	Depth Remaining To Ledge
501	67.2	25.9
503	92.2	107.6
504	61.2	88.9
505	81.0	49.2
506	57.2	30.1
507	(123.3)	
508	(60.4)	(100.4)
509	96.5	90.2
510	31.6	91.7
511	34.1	120.3
512	42.2	119.5
514	26.7	99.5
515	16.5	112.1
517	24.5	87.6
518	50.8	57.6
519	55.3	102.2
520	(42.5)	
521	(28.5)	
522	31.8	85.8
523	(36.3)	
524	76.7	23.0
526	17.6	96.4
527	46.5	28.4
528	(1.7)	(101.2)
531	2.2	67.4
532	(5.8)	(78.2)
533	28.1	103.9
534	3.9	97.4
Peronto Well	(9.4)	
Total	872.4	1684.7
Average Drop to December 28, 1951	41.6	80.2

Operating expenses for surface drainage amounted to $19,137.00 as compared with $18,954.00 in 1950, or $0.054 per ton in 1951 as compared with $0.061 the previous year.

MORRIS MINE
ANNUAL REPORT
YEAR 1951

7. UNDERGROUND:

a. Pumping

The amount of underground water continued to increase, reaching a peak of 1663 G.P.M. in September. By the end of the year, the flow had decreased slightly to 1623, with an average for the year of 1589 G.P.M. as compared with 1342 the previous year.

The average quantities by levels are shown below:

	4th	6th	7th	8th	9th	Total
1946	157.3	44.1	153.4	254.9	278.8	888.5
1947	149.9	34.7	144.7	287.3	352.8	969.4
1948	140.5	25.1	122.2	274.3	514.5	1076.6
1949	95.0	24.5	88.6	316.4	667.8	1192.3
1950	86.6	30.5	94.3	379.0	751.7	1342.1
1951	107.8	36.3	67.4	431.5	945.8	1588.8

The 7th Level Goulds pump was moved to the 9th Level for additional standby capacity and work was started on the foundations for a 1200 G.P.M. automatic system to pump to surface from the 9th Level.

Once again the increased flow of water into the mine raised the underground pumping costs to a new high of $155,184.00, with a cost per ton of $0.439, as compared with $111,232.00 and $0.3613.

The total pumping cost, surface and underground, amounted to $174,321.00, an increase of $44,135.00 over the previous year.

Year	Surface	Underground	Total	Cost Per Ton
1951	$ 19,137	$ 155,184	$174,321	$0.493
1950	18,954	111,232	130,186	.4228
1949	14,733	93,782	108,515	.423
1948	19,137	73,168	92,305	.265
1947	16,612	65,862	82,474	.308
1946	13,960	46,143	60,103	.324

MORRIS MINE
ANNUAL REPORT
YEAR 1951

7. UNDERGROUND

b. Development

Work was continued on the water control project during the early part of the year. The dam on the 6th Level was completed.

Chase Lease #24

As a result of development work on the sub-levels above the 9th Level, the Hi-sulphur area showed a net gain in ore reserves of 36,549 tons in Deposit #79 between the 8th and 9th Levels.

The loading cross-cut at 2950 W. on the 9th Level was extended south to develop a new stope south of Contract #10's stope. By the end of the year, opening of the new stope was being started and stope development was being continued.

Fee Lands

Development work on the 9th Level proved an addition to the ore reserves of approximately 60,000 tons in Deposit #84.

The turn-off drift on the 9th Level under Contract #24 was completed and a single-compartment raise was put up to the 300' transfer on the -290' Sub-level. This raise will reduce the scraping distance by 50%.

A new turn-off drift was driven north on the 9th Level at 350 W. in the development of a new stope. A raise was put up to the -290' Sub-level and at the end of the year stope development was being continued.

Chase Lease #9

Raising from the 9th Level to the -220' Sub-level and development work on the -220' Sub-level increased the ore reserves in Deposit #87 by 113,302 tons.

Mining operations on the 8th Level increased the ore outlines in Deposit #33, proving a net gain in ore reserves of 141,124 tons.

MORRIS MINE
ANNUAL REPORT
YEAR 1951

7. UNDERGROUND

c. Stoping - Caving

Mining operations continued on Chase Lease #24, Fee Lands and Chase Lease #9, with mining ranging from the -30' Sub-level in Deposit #76 to the -290' Sub-level in Deposit #84. Chase Lease #9 continued to be the major producer. An average of thirteen contracts accounted for the production, divided as follows: six stoping and seven sub-level caving.

Chase Lease #24

An average of two contracts were mining on this lease during the year. Contract #10, mining in Deposit #79, was again the most productive. By the end of the year, a new stope had been started in this area south of the old stope.

A small amount of mining was done in Deposit #33S on this lease.

Fee Lands

An average of four contracts continued mining on the Fee Lands. Contracts #6, #24 and #30 continued work in the highly productive area near the east boundary of the Morris Mine in Deposit #84. A new stope was being developed in this area at the end of the year.

Sub-level caving was continued by Contract #7 in Deposit #87.

Chase Lease #9

On this lease, there was an average of seven contracts mining during the year, from the -30' Sub-level in Deposit #76 to the -230' Sub-level in Deposit #33.

Deposit #33 continued to be the major producer on this lease, with a considerable amount of production coming from Deposit #75C.

Sub-level caving was continued in Deposit #87A on the -110' Sub-level, and stoping was continued in Deposit #76 on the -100' Sub-level.

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

1. GENERAL

Operations at the Tilden Open Pit Mine were not started until August 16th of this year on account of cleaning up the ore in stock at the Lake Mine. The Euclid trucks from the Tilden were used at the Lake and therefore no production was possible at the Tilden and any cargoes of Tilden that were required were loaded from stockpile. The working schedule of 6 days per week, single shift, was continuous from August 16th to October 31st except for the two strikes, one of 4 days which occurred in June and the other of 10 days in July.

The total product for the year was 103,022 tons as compared with 107,465 tons in 1950. There were 68,056 tons stocked during the year including 16,275 tons of Low Phos. grade to provide for early shipments in 1952 before the Pit is in production. On account of the small requirements of Tilden ore in the latter years, it was decided to increase the size of the stocking ground and stock both grades so that the Pit would only have to be operated for about four months.

The churn drilling for the year was mostly in the Summit Pit, where a second bench is being established and the Western entrance to the Lower Bench enlarged. The drilling was continued there after the Pit shut down and then the drills were moved to the West Pit where a row of holes was drilled in readiness for a blast when operations are resumed in 1952.

There were two blasts set off during the year, one in the Upper Bench of the Summit Pit and the other in the Lower Bench of the West Pit and the results of both blasts were very satisfactory.

The only new equipment purchased in 1951 was the two tractors to replace worn out units; one, a Caterpillar RD-8, to be used for bulldozing and stocking ore, and the other, an International TD-6 for hauling supplies around the Pit.

2. PRODUCTION, SHIPMENTS & INVENTORIES

a. Production by Grades

	1951	1950	Increase
Tilden Silica	86,747	72,955	13,792
Tilden Low Phos.	16,275	34,510	18,235
Total	103,022	107,465	4,443

b. Shipments

	Pocket	Stockpile	Total	Total Last Year
Tilden Silica	34,967	43,660	78,627	91,510
Tilden Low Phos.		9,959	9,959	23,926
Total	34,967	53,619	88,586	115,436
Total Last Year	53,734	61,702	115,436	
Decrease in Shipments	18,767	8,083	26,850	

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

2. PRODUCTION, SHIPMENTS & INVENTORIES

c. Stockpile Inventories

Grade	Balance on Hand Dec. 31, 1950	Stocked 1951	Shipped from Stockpile 1951	Balance on Hand Dec. 31, 1951
Tilden Silica	48,960	51,781	43,661	57,080
Tilden Low Phos.	10,095	16,275	9,959	16,411
Total	59,055	68,056	53,620	73,491

e. Product by Months

Month	Days Operated	Average Tonnage Per 8-Hr. Shift	Total Tons
August	10	2,021	20,205
September	21	1,725	36,227
October	26	1,791	46,577
November	0	-	13
Total	57	1,807	103,022

The tons per shift showed a decrease due to stocking 66% of the product as compared with only 50% in 1950. Some of the Euclid trucks have to be taken off of production and used for stocking, thus causing some delay at the shovel and crusher.

Distribution of Product by Pits

	1951	% Used in Silica grade	1950	% Used in Silica grade
West Pit (lower bench)	58,279	67	50,504	69
East Pit (upper bench)	32,591	33	26,753	31
Summit Pit (lower bench)	12,152		30,208	
Total	103,022		107,465	

f. Ore Statement

	Tilden Silica	Tilden Low Phos.	Total	Total Last Year
On hand January 1, 1951	48,960	10,095	59,055	67,026
Output for Year	86,747	16,275	103,022	107,465
Total	135,707	26,370	162,077	174,491
Shipments	78,627	9,959	88,586	115,436
Balance on hand December 31, 1951	57,080	16,411	73,491	59,055
Increase in Output	13,792	18,235	4,443	

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

3. ANALYSIS

a. Average Mine Analysis on Shipments

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss by Ignition	Moist.
Tilden Silica	39.90	.037	41.06	.07	.87	.23	.20	.010	.16	2.38
Tilden Low Phos.	36.00	.012	47.10	.07	.73	.05	.05	.011	.21	2.19

b. Average Analysis on Straight Cargoes

	Mine			Lake Erie	
	Iron	Phos.	Sil.	Iron	Moist.
Tilden Silica	39.80	.037	41.15	40.33	2.79
Tilden Low Phos.	36.10	.013	47.08	36.08	2.12

c. Analysis of ore in Stock

	Iron	Phos.	Silica	Sul.	Moist.
Tilden Silica	40.48	.040	40.57	.017	2.30
Tilden Low Phos.	36.54	.017	46.27	.012	2.19

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

1. West Pit - Above floor at 1430'

Assumption: 13 Cu. Ft. equals one ton.

Total Stripped & Developed as of January 1, 1951		1,375,629 Tons
Mined during 1951		58,292
Total Remaining December 31, 1951		1,317,337 Tons

2. East Pit - Above floor at 1440'

Assumption: 14 Cu. Ft. equals one ton.

Total Stripped & Developed as of Jan. 1, 1951 1440' to 1500'		1,278,320 Tons
Total Stripped & Developed as of Jan. 1, 1951 above 1500'	1,721,290	
Mined during 1951	32,578	
Total Remaining above 1500' as of Dec. 31, 1951		1,688,712 Tons
Total Remaining above 1440' as of Dec. 31, 1951		2,967,032 Tons

3. Summit Pit - Above floor at 1620'

Assumption: 14 Cu. Ft. equals one ton.

Total Stripped & Developed as of Jan. 1, 1951	371,546 Tons
Mined during 1951	12,152
Total Remaining as of Dec. 31, 1951	359,394 Tons

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

4. ESTIMATE OF ORE RESERVES

a. Developed Ore (Cont.)

Total Developed Ore as of Dec. 31, 1951

West Pit	1,317,337 Tons
East Pit	2,967,032
Summit Pit	359,394
Total All Pits	4,643,763 Tons

Broken ore in pits is included in the above reserves.

	West Pit Lower Bench	East Pit	Summit Pit	Total
December 31, 1951	0*	28,454	9,290	37,744 Tons

* There is some broken ore in the West Pit but it is all overrun from estimated tonnage on previous blasts.

Total Prospective Ore

West Pit
Balance remaining to be stripped in East half of Upper Bench 500,000 Tons

East & Summit Pits
Total above 1500' lying North & East of the East Pit 2,235,500

Total Prospective Ore as of December 31, 1951 2,735,000 Tons

c. Estimated Analysis of Reserves

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss.	Moist.
1. West Pit										
Dried	39.17	.050	41.91	.09	.90	.20	.22	.009	.24	
Natural	38.50	.049	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	

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

4. ESTIMATE OF ORE RESERVES

f. Estimate of Production

Production in the latter years has had to be limited by the amount required to be shipped plus the amount that could be stocked, and the maximum capacity of the present stockpile ground is approximately 75,000 tons. The maximum production possible, however, is as follows:

	5 Days Per Week	6 Days Per Week
Single Shift	224,000 Tons	282,000 Tons
Double Shift	400,000 Tons	500,000 Tons

It would be possible to obtain from 50,000 tons on single shift to 100,000 tons on double shift of Low Phosphorus ore grading .015.

5. LABOR & WAGES

a. Comments

There was no vacation period during the summer on account of the loss of production due to the strike but the men received their vacation pay based on 48 hours per week.

6 men, or 21.3% received pay for three weeks.
12 men, or 42.7% received pay for two weeks.
1 man, or .4% received pay for one week.
10 men, or 35.6% were ineligible, having worked less than one year.

There were several changes in the Supervisory personnel during the year. Mr. John Dawe, who had been Foreman for several years, became ill and had to stop work. He died on February 8th and was replaced by Mr. Harry Scarffe, a former Captain at the Spies Mine. His health also soon started to fail and Mr. Clifford Drake, who had been substitute foreman, took over the supervision. Mr. Scarffe was retired as of October 1st and at about the same time Mr. Drake's services were required at the Ohio Mine on account of his long experience at the Tilden Open Pit. Mr. Russell Drake, who had also been at the Pit for a considerable length of time, was then promoted to Foreman and continued in that capacity to the end of the year.

b. Comparative Statement of Wages and Product

	1951	1950	Incr.	Decr.
Product	103,022	107,465		4,443
Number of Days Operated	57	54	3	
Average Number of Men Working	23	23		
Average Hourly Rate	1.948	1.566	.382	
Tons Per Man Per Hour	7.136	6.881	.255	
Labor Cost Per Ton	.273	.228	.045	
Amount Paid for Labor	28,126.13	24,457.37	3,668.76	

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

5. LABOR & WAGES

c. Nationality of Employees

	American Born	Foreign Born	Total
Finnish	10	1	11
English	6	1	7
Irish	3		3
Italian	3		3
Swedish	2		2
French Canadian	2		2
German	1		1
	27	2	29

7. OPEN PIT OPERATIONS

a. Stripping

No stripping was done in 1951 nor will any be necessary before 1953 unless a much larger tonnage is required than has been the case in the last few years.

b. Drilling, Blasting & Explosives

A series of churn drill holes was drilled in the West Pit late in 1951 in preparation for a blast when the mine is opened next year. Preceeding blasts in the Summit Pit had developed an opening that was inefficient both from a blasting and loading standpoint and therefore short holes were drilled along the sloping hillside to the West. It will be necessary to blast only a few of these holes at a time so as not to put too much burden on the bottoms of those at a higher elevation.

The cost per foot for drilling the Summit Pit was quite high on account of making roads, moving and setting up drills on the very steep slope.

Cost of Operating 9-Inch Churn Drills in 1951

Total Footage Drilled 2,127

Operating	Labor	Supplies	Total	Cost Per Foot
Drilling	$5,381.13	$354.39	$5,735.52	2.697
Sharpening Bits	687.23	557.58	1,244.81	.585
Electric Power		206.65	206.65	.097
Truck & Tractor	1,737.12	145.26	1,882.38	.885
Total Operating	$7,805.48	$1,263.88	$9,069.36	4.264
Maintenance				
Drills	96.11	47.22	143.33	.067
Bit Dresser	159.83	18.76	178.59	.084
Total Maintenance	255.94	65.98	321.92	.151
Grand Total	$8,061.42	$1,329.86	$9,391.28	4.415

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

7. OPEN PIT OPERATIONS

b. Drilling, Blasting & Explosives

1. Drilling (Cont.)

Camparison of Footages and Costs

	1951			1950		
	Footage Drilled	Footage Per 8-Hr. Shift	Cost Per Foot	Footage Drilled	Footage Per 8-Hr. Shift	Cost Per Foot
West Pit, Lower Bench	458	19.08	2.595			
Summit Pit, Upper Bench	1,669	15.45	4.915	475	18.27	4.032
Total	2,127	16.11	4.415	475	18.27	4.032

Footage Obtained from Bits

	1951		1950	
	Bits Used	Footage Per Bit	Bits Used	Footage Per Bit
West Pit, Lower Bench	33	13.88		
Summit Pit, Upper Bench	150	11.13	42	11.31
Total	183	11.62	42	11.31

2. Blasting

Primary Blasting

Location	Date	No. of Holes	Footage Blasted	Estimated Tonnage	Pounds Explosives	Estimated Tons Ore Per Pound Explosive
West Pit, Lower Bench	8/29/51	13	816	32,040	14,400	2.23
Summit Pit, Upper Bench	9/5/51	10	468	17,430	7,200	2.42

STATEMENT OF EXPLOSIVES USED FOR YEAR 1951

Kind		Quantity	Price	Amount
Gelamite "D" 8 x 50#	lbs.	12,600	.1725	$2,173.50
Hercomite "X" 8 x 50#	"	9,000	.1550	1,395.00
Total Powder		21,600	.1652	3,568.50
Blasting Supplies				
Primacord Bickford Fuse, Regular M'		500	34.00	17.00
Primacord Bickford Fuse, Reinf. Plastic		1,500	43.50	65.25
No. 20 Connecting Wire	lb.	4	1.00	4.00
No. 18 B & S Thermoplastic Wire	Ft.	1,000		23.00
Total Blasting Supplies				109.25
Total All Explosives				$3,677.75

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

7. OPEN PIT OPERATIONS

b. Drilling, Blasting & Explosives

2. Primary Blasting (Cont.)

	1951	1950
Tons of Ore Blasted	49,470	86,900
Tons of Ore Per Lb. of Powder	2.29	2.16
Cost Per Ton for Powder	.0721	.0689
Cost Per Ton for Blasting Supplies	.0022	.0021
Cost Per Ton for All Explosives	.0743	.0710
Average Price Per Lb. for Powder	.1652	.1491

There was an increase of approximately 10% in the price of explosives and this accounted for the difference in cost per ton for the two years.

Approximately 15,000 more tons were loaded from the West Pit than had been estimated and therefore an actual factor of 3.25 tons per pound of powder was obtained.

The blasts were very satisfactory and required very little secondary blasting, although the slips in the formation always develop a certain amount of large chunks.

Secondary Blasting

Kind		Quantity	Price	Amount
60% Gelatin	lbs.	866	.1878	$162.60
60% H.P. Gelatin 5 x 5"	"	1,810	.2191	396.60
Total Powder		2,676	.2090	$559.20
Blasting Supplies				
Fuse	M'	5,605	9.25	51.83
#6 Blasting Caps	M	835	15.74	13.14
7" H.P. Fuse Lighters	M	500	9.00	4.50
Total Blasting Supplies				69.47
Total Secondary Explosives				$628.67

	1951	1950
Product	103,022	107,465
Pounds of Powder Per Ton of Ore	.0260	.0223
Cost Per Ton for Powder	.0054	.0045
Cost Per Ton for Fuse & Caps	.0007	.0006
Cost Per Ton for All Explosives	.0061	.0051
Average Price Per Lb. for Powder	.2090	.2012
Total All Explosives Used at Pit	$4,306.42	$6,721.89

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

7. OPEN PIT OPERATIONS

b. Drilling, Blasting & Explosives

2. Secondary Blasting (Cont.)

Comparison of Blasting Costs

	Primary Blasting	Secondary Blasting
	Cost per Ton Blasted	Cost per Ton Produced
1951	.0743	.0061
1950	.0710	.0051
1949	.0654	.0086
1948	.0575	.0057
1947	.0715	.0042
1946	.0494	.0098

g. Loading Operations

Both shovels were worked continuously with very little delay for repairs and the No. 46, or Marion, was kept on the Upper Bench of the East Pit while the 120-B loaded in the Summit Pit, West Pit and from the stockpile.

The locality and tonnages for the two shovels loading during 1951 was distributed as follows:

Unit	Tons	Locality
No. 120-B Shovel	53,619	Stockpile
	12,152	Summit Pit
	58,279	West Pit, Lower Bench
Total	124,050	
No. 46 Shovel	32,591	East Pit, Upper Bench

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

8. COST OF OPERATIONS

a. Comparative Mining Cost

	1951	1950
Production	103,022	107,465
Operating Cost	.770	.732
General Mine Expense	.209	.184
Stocking Ore	.019	.010
Cost of Production	1.000	.926
Depreciation - Movable Equipment	.000	.001
Depreciation - Plant & Equipment	.070	.070
Depreciation - Motorized Equipment	.007	.006
Depletion - Original Cost	.003	.003
Amortization of Development	.003	.003
Amortization of Stripping	.020	.020
Taxes	.066	.057
Loading from Stockpile	.008	.004
Total Cost at Mine	1.177	1.090
Average Daily Product	1,807	1,990
Tons per Man per Day	57.09	55.05
Number of Days Operated (1 8-hr. Shift)	57	54

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

8. COST OF OPERATING

b. Detailed Cost Comparison

PIT OPERATING (Combined operating & Idle Expense)

	1951		1950	
Direct Ore	Amount	Per Ton	Amount	Per Ton
Drilling & Blasting	13,035.37	.127	19,341.73	.180
Power Shovels, Operating	6,503.08	.063	5,186.04	.048
Power Shovels, Maintenance	4,077.83	.040	5,574.04	.052
Euclid trucks, Operating	4,284.47	.041	3,920.45	.037
Euclid trucks, Maintenance	5,759.41	.056	4,566.35	.042
Cletrac tractor, Maintenance	163.63	.002	508.33	.005
D-8 tractor, Maintenance	128.22	.001	533.25	.005
Total Direct Ore	33,952.01	.330	39,620.19	.369
General Pit Expense				
Pumping & Drainage	51.83	.000	702.41	.006
Water Supply	82.04	.001	267.12	.003
Crushing & Screening	19,281.31	.187	15,377.37	.144
General Open Pit Expense	15,722.44	.153	15,063.65	.140
Open Pit Superintendence	7,026.21	.068	7,583.00	.070
Estimated Pay Adjustment	3,272.59	.032	187.68	.002
Total General Pit Expense	45,436.41	.441	38,993.55	.363
TOTAL PIT OPERATION	79,388.42	.771	78,613.74	.732
Stocking Ore	1,917.85	.018	1,124.61	.010
GRAND TOTAL	81,306.27	.789	79,738.35	.742
General Mine Expense				
Mining Engineering	942.38	.009	693.01	.006
Mechanical & Electrical Engineering	145.45	.001	193.27	.002
Analysis & Grading	1,302.98	.012	1,109.66	.010
Safety Department	299.51	.003	255.92	.002
Special Expense	430.16	.004	542.62	.005
Ishpeming Office Expense	2,078.67	.020	1,717.36	.016
Local & General Welfare	256.65	.002	259.05	.002
Mine Office Expense	6,906.52	.067	6,055.04	.057
Insurance	3,719.41	.036	3,348.85	.031
Personal Injury Expense	1,028.11	.010	913.19	.009
Social Security Taxes	1,328.82	.013	1,304.18	.012
Geological	30.44	.000	283.30	.003
Employees' Vacation Pay	3,268.68	.032	3,120.00	.029
Total General Mine Expense	21,737.78	.211	19,795.47	.184
COST OF PRODUCTION	103,044.06	1.000	99,533.82	.926
Taxes	6,796.44	.066	6,182.62	.057
TOTAL	109,840.50	1.066	105,716.44	.983

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

The increase in cost per ton was due almost entirely to the increase in wages effective in December, 1950 and the estimated pay adjustment to cover inequities. The product and shifts were almost identical for the two years. There were more repairs to the crushers and Euclid trucks during the idle period in 1951 but the power shovels required less attention and therefore the total maintenance was almost identical for 1950 and 1951.

Cost of Production

	1951				1950			
	Labor	%	Supplies	%	Labor	%	Supplies	%
Cost per Ton, Operating	.290	58	.214	42	.243	47	.274	53
Cost per Ton, Idle	.346	70	.150	30	.303	74	.106	26
Total	.636	64	.364	36	.546	59	.380	41

The cost per ton for labor increased due to the increase in wages while the total cost per ton while operating showed a decrease due to more maintenance during the longer idle period.

Idle & Winter Expense

This expense is combined with the operating costs under the separate accounts but the following table is inserted as a matter of record.

	Labor	Supplies	Total
January	$5,017.43	$1,085.30	$6,102.73
February	4,165.64	2,030.05	6,195.69
March	4,173.87	2,259.90	6,433.77
April	3,394.75	1,328.22	4,722.97
May	3,896.72	1,496.97	5,393.69
June	2,041.20	4,132.99	6,174.19
July	2,760.61	1,143.75	3,904.36
August	816.00	426.00	1,242.00
November	5,721.35	2,869.50	8,590.85
December	5,179.99	461.86	4,718.13
Total	$35,535.56	$15,458.82	$50,994.38

TILDEN MINE
ANNUAL REPORT
YEAR - 1951

10. TAXES

Tilden Township

Tilden Mine

	1951		1950	
	Valuation	Taxes	Valuation	Taxes
N½ of Sec. 26, 47-27 320 Acres	155,000	3,144.62	120,000	2,432.50
Personal Supplies & Equipment	180,000	3,651.82	185,000	3,750.12
Collection Fees		67.96		61.83
Total	335,000	6,864.40	305,000	6,244.45

11. PERSONAL INJURY

There were no lost time accidents at the Tilden Mine during 1951.

13. EQUIPMENT AND PROPOSED NEW EQUIPMENT

There were two tractors purchased in 1951---One Caterpillar D-8 for $18,661.60 authorized by E & A, CC-426; one International Harvestor TD-6 for $4,400.00 authorized by E & A, CC-480.

Both of the former units had been in service for over ten years and the repair cost would have been prohibitive.

OHIO MINE
ANNUAL REPORT
YEAR 1951

1. GENERAL:

Opening and equipping of the Ohio Mine was started in May 1951 with the letting of contracts for the construction of an Office and Shop building and an access road to the area from US-41.

This was followed closely by the erection of power and telephone lines and of the concentrate plant together with its associated facilities.

Following delivery and erection in September of a 54-B Bucyrus-Erie shovel and four 46-TD Euclid Trucks, stripping began on the East (Webster) Pit and continued to date.

Construction of the railroad grade was contracted by the Duluth South Shore & Atlantic Railroad and a skeleton track is now in place.

A temporary water supply and pumping system was established to be used if a test run of the mill could be accomplished before winter set in but unseasonably cold weather forestalled this plan. One cut had been made in the ore formation and approximately 5,000 tons of crude ore placed on the surge pile in anticipation of this test run.

A Bucyrus-Erie 29-T Churn Drill was delivered and placed in operation in the East Pit in December.

All necessary facilities are well on their way toward completion and should be ready for operation as soon as weather will permit.

During construction periods, two 9 & 10-hour shifts were worked per day. This was changed to three 8-hour shifts per day and six days per week when stripping began, later going to three 8-hour shifts and five days per week for a winter schedule.

There were 54 men on the payroll as of December 31st.

2. OFFICE AND SHOP BUILDING:

This building was designed by Mr. Carl Benson, of the C.C.I.Co. It is designed to house the repair and maintenance shops, oil storage room, normal maintenance supplies, electrical shop, change room and showers, and clerks, Engineers, and Superintendent's office. It is of frame and paper construction with concrete footings, floors and curb walls. Construction began in May and was completed in July by Keilinen & Sons, Ishpeming contractors who were low bidders on the job.

To this building, but not included under the contract, has been added a water supply system, exhaust equipment for shop ventilation, a complete heating system including the addition of a boiler room and coal storage, and all of the lighting and power facilities.

The Clerk's office has been furnished with surplus furniture and equipment from other operations but as yet none of the other offices are equipped for use.

Equipment purchased for the shop includes:

2 Portable electric welders
3 Acetylene torch outfits
2 Electric hand drills

RT

OHIO MINE
ANNUAL REPORT
YEAR 1951

2. OFFICE AND SHOP BUILDING: (Cont'd)

Equipment purchased for the shop includes: (Cont'd)

Tungar Battery Charger
Cleanmaster Cleaning Unit
Fleet Fueler
Alemite Lubrication Equipment
Garage Type Compressor
Toledo Pipe Threader
Bench Grinder
Tube Vulcanizing Equipment
Tire Mounting Dolly
Silent Glow Heater
Anvil - Vises - Roll Cabinet Bench
Tap and Die Sets
Miscellaneous hand and bench tools

3. CONCENTRATION PLANT:

The crushing and screening section of the plant consists of the following equipment:

30 Ton Crude Bin	
Pioneer Oro Feeder	48" x 12'-3"
Pioneer HD Scalping Screen (4")	4' x 10'
Pioneer Apron Feeder	30" x 10'
Pioneer Jaw Crusher	30" x 42"
Pioneer Apron Feeder	30" x 8'
A-C T.D. Ripl-flo Screen	5' x 12'
A-C #848 Hydrocone Crusher	48"

This equipment is mounted on steel structurals on concrete piers and footings, all outside of the mill building.

The heavy media separation section consists of a Western-Knapp No. 4 modified mobile mill supplemented with forty 5-turn and twenty 3-turn Humphrey spirals. The Mill building is of steel and reinforced concrete construction with galvanized iron covering. Capacity is rated at 200 LT per hour to the combined heavy media and spiral circuit.

Equipment consists of:

A-C Double-deck Low-head screen	5' x 12'
Wemco H.D. Drum Separator	8' x 8'
A-C Single-deck Low-head drain screen	6' x 12'
A-C Single-deck Wash screen	6' x 12'
Wemco media circ. pump	5"
Wemco wash water pump	5"
Primary magnetic separator (Dings)	48"
Secondary magnetic separator (Dings)	36"
Wemco HMS Densifier	36" x 18'-10"
Demagnetizing coil (Dings)	6"
Wemco Clean-up elevator w/bucket	8" x 5"
Wemco Hydroseparator	20'
Wemco Classifier	48" x 26'-3"
Wemco Middling pump	4"
Wemco Tailing pump	8"
Wemco Recirculating Pump	5"
I.R. Air Compressor	194 CFM

3. CONCENTRATION PLANT: (Cont'd)

A separate building houses the air compressor and is of the same type of construction as the mill.

The spiral section is built as a part of the mobile mill building using the same type of construction, and houses forty 5-turn Humphrey spirals with two distributors for primary separation and twenty 3-turn Humphrey spirals with one distributor for secondary separation.

Conveyors, their sizes and drive horse-power, are as follows:

Type - Pioneer SWS		
#1	30" x 300'	75 H.P.
#2	24" x 288'	15 H.P.
#3	24" x 58'	7½ H.P.
#4	24" x 61'	7½ H.P.
#5	24" x 85'	7½ H.P.
#6	24" x 50'	5 H.P.
#7	24" x 242'	15 H.P.

All bents and necessary supports were furnished under contract with the exception of the last listed, for which bents were fabricated on the job.

A 30 ton pocket receives the crude ore from the pit and a 90 ton pocket with air-operated gates is used for loading the concentrate into railroad cars.

Erection of the mill and mechanical and electrical installations were on a one and two-shift per day, and six and seven-day per week schedule, depending on delivery of material and equipment.

Foundation and other concrete work was done under contract by Straits Construction Company of St. Ignace, with mill erection and mechanical installations being made by C.C.I.Co. employees under supervision of a per diem superintendent from Western Knapp Engineering Company.

Water supply for mill operation is obtained from a pond formed by a combination dam and haul road from the West Pit, and is pumped to the mill by one A-C centrifugal pump of 2500 GPM capacity driven by a 125 H.P. electric motor. This water supply can be maintained by one I-R centrifugal pump of 500 GPM capacity and 25 H.P. drive located at the Beaufort River and pumping to the pond through a 6" victaulic pipe line.

4. ROADS:

The access road from US-41 to North of the stocking area was built by Le Brecque & Pierce under contract to Baraga County, who also placed two 10' culverts at the Beaufort River. This portion of the road was paid for by Baraga County with some assistance from the C.C.I.Co.

The road from the end of the county road to the mill pocket tracks was built by Le Brecque & Pierce and paid for by the C.C.I.Co.

Stripping from the East (Webster) Pit was used to build the road grade to the stripping dump and the main haul road to the mill. No gravel being available in this area, a small deposit was purchased outside of the property and used for surfacing until the supply was exhausted. Extremely wet weather and lack of material for surfacing made road building difficult.

Road grading is near completion in the shop area and will be completed after the Spring break-up along with final grading and surfacing in the mill area.

OHIO MINE
ANNUAL REPORT
YEAR 1951

5. RAILROAD:

Construction of 10,000 feet of railroad grade to service the mine was contracted by the Duluth South Shore & Atlantic Railroad to A. Lindberg & Sons of Ishpeming, who are well on their way to completion of the rough grade. A Skeleton track has been laid by the Railroad Company and is in servicable shape with only ballasting and final grading to be done after the Spring break-up.

All fill material going into this grade is being taken from the stripping area of the West (Norwood) pit.

6. POLE LINES:

A 33,000 volt transmission line was constructed by the Cliffs Power & Light Company from their Champion switching station to their main sub station at the Ohio Mine.

From this point the Mining Co. erected 2300 volt service lines to the East Pit, West Pit, return water pump house, make-up water pump house at the Beaufort River, and the mill sub-station.

The major part of the pole line construction was done under contract by A&G Electric Co. of Escanaba, but C.C.I.Co personnel installed all surface lights, both portable and permament and service sub-stations at the pits, mill, and pump houses, including switching and protective equipment.

Two miles of telephone line were erected by the Michigan Bell Telephone Company to connect the mine with their Michigamme exchange.

7. WATER SUPPLY:

Water for heating, washing and sanitary facilities is being obtained from the area of the original Ohio Mine workings and is of satisfactory quality for these uses. However, no known source of supply of drinking water exists within piping distance of the Ohio Mine and this must be hauled by truck from Michigamme.

8. EQUIPMENT PURCHASED:

Motorized equipment purchased is made up of:

1 - Caterpillar Diesel #12 Motor Grader.
1 - 2-Ton Ford Model F-6 Platform body truck upon which we installed a 30,000# pull winch and a demountable A-Frame.
1 - ¾-Ton Ford Model F-1 Pick-up Truck
1 - Turnadozer Model Super-C
4 - 22-Ton Euclid Model 46-TD Rear dump Trucks.

Mining equipment purchased consists of:

1 - Bucyrus-Erie Model 54-B Ward Leonard Electric Powered Shovel
1 - Bucyrus-Erie Model 29-T Electric Blast Hole Drill and 15 Bits
2 - I-R Pit Pumps - 500 GPM
2 - Jaeger Model 3XP Portable Pumps - 250 GPM
1 - Signal Corps Power Unit PE-197 - 5 KW Portable Light Plant Complete

OHIO MINE
ANNUAL REPORT
YEAR 1951

9. EAST (WEBSTER) PIT:

Clearing:

In this area it was necessary to clear about 22 acres of heavy second growth in order to open up the pit, dump road, and start of the stripping dump. All trees and brush were cut and burned, with stumps going to the dump with stripping operations.

Stripping:

Early in September the 54-B shovel was moved in and stripping began at the West end of the pit. An average of about six feet of over burden of which 10% consisted of boulders of from one-half to ten cubic yards in size made up the bulk of this stripping.

Four 46-TD Euclid dump trucks of 22 ton capacity were used as haul units. As much of this stripping as was necessary was used to build approximately 3000 feet of rough grade of haul road back to the mill and the remainder placed on a stripping dump North of the pit.

During 1951 a total of 112,335 Cu yds of stripping was removed from this pit, leaving an estimated 20,000 cu yds for completion.

Mining:

Late in October when it appeared a test run of the concentration plant would be possible, the shovel was moved to the center of the pit and one cut was made in ore. No blasting was necessary in this top 6 feet to 8 feet of soft ore and 5,060 tons were hauled to the mill, run through the primary crushing section and placed on the surge pile in 45 hours of operation. The weather preventing operation of the mill, no further mining was done during the year.

The 29-T Churn Drill has drilled seven 9" holes to a depth of 60 feet into the hanging wall. These holes will be used for the combined purpose of exploration and blast holes.

10. WEST (NORWOOD) PIT:

Clearing:

A small amount of clearing of heavy hardwood second growth was done by mine crews as this was not a part of any agreement between the C.C.I. Co. and/or the D.S.S.&A. Ry and/or A. Lindberg & Sons.

Stripping:

No stripping has as yet been done by the C.C.I. Co. in this Area.

To complete the access road and furnish backfill for the mill Le Brecque & Pierce removed 4678 cu yds from the East end of this pit, and A. Lindberg & Sons are at present using this stripping area for borrow to complete the D.S.S.&A. Ry. Grade.

STRIPPING REPORT
EAST (WEBSTER) PIT

	AUGUST Shift			SEPTEMBER Shift			OCTOBER Shift			NOVEMBER Shift			DECEMBER Shift			YEAR TO DATE Shift	
	No. Days	Per Day	Total Shifts	No. Days	Per Day	Total Shifts	No. Days	Per Day	Total Shifts	No. Days	Per Day	Total Shifts	No. Days	Per Day	Total Shifts	No Days	Per Day
TRUCK & SHOVEL																	
Working Schedule - Month				7	1&2	9	8	1&2	14	20	1&2&3	40	19	2&3	49		
Program to date				7	1&2	9	15	1&2	23	35	1&2&3	63	54	1&2&3	112	54	1&2&3

	Month Program	Month Program	Month Program	Month Program	Month Program	To Date
PRODUCTION (Cu. Yds)						
Total Scheduled Program E&A CC-430:						
Actual Stripping		7140	11820	39990	53385	112335
Average Per Shift		793	844	1000	1089	1003
Est. Cost Per Cu. Yd.		.30	.30	.30	.30	.30
Act. Cost Per Cu. Yd.		1.121	.637	.394	.404	.4853
E&A Cost - East Pit.	$1,510.72	$5,902.86	$5,409.76	$12,930.61	$16,162.41	$41,916.36
Depreciation		2,096.50	2,131.26	2,857.46	5,516.35	12,601.57
TOTAL COST	$1,510.72	$7,999.36	$7,541.02	$15,788.07	$21,678.76	$54,517.93

126 F

OHIO MINE
ANNUAL REPORT
YEAR 1951

11. LABOR AND WAGES:

Due to above average rainfall preventing logging and woods work which normally furnishes the livehood of the majority of men in this area, an ample supply of labor was available throughout the construction period.

A 'Notice of Election' was received from the National Labor Relations Board, and on November 6, 1951 the men voted to have as their bargaining agent the United Steelworkers of America (C.I.O.). The vote was 39 for, 15 against, and one not voting.

Men employed were of the following nationalities:

Nationality	American Born	Foreign Born	Total
French-German	3		3
Irish	3		3
English	3		3
Polish	1		1
Swedish	3	1	4
Swedish-French	1		1
Norwegian	1		1
French	5		5
Finnish	28	3	31
English-French	1		1
Irish-French	1		1
English-Finnish	1		1
German-Dutch-Swedish	1		1
Croatian	1		1
Total	53	4	57

Number of Days Operated	119
Average No. of Men Working	50¼
Total hours (mine payroll)	48,849
Average wage (Mine payroll rate)	1.543 per hr.
Amount paid for labor:	
Mine Payroll	75,422.59
Office	7,345.12
Other Mines	13,154.54
Total	95,922.25
Average wage per hr.	1.627

Monthly Schedule:

	No. Men	No. Days Worked	Men Absent
August	55	26	13
September	54	24	37
October	55	27	22
November	55	25	105 (85 deer hunting)
December	53	17	14

12. ACCIDENTS:

Six accidents were reported during the year, two of which resulted in lost time and one compensable.

No.	Type	Days Time Lost
1	Back Strain	5
1	Side Strain	0
1	Knee & Back Bruise	0
1	Axe Cut	9
2	Slag Burn	0

ATHENS MINE
Annual Report
1951

The Athens Mine operated on a schedule of six days per week on a full two-shift basis throughout the entire year. In addition to the regular two-shift basis a skeleton crew of men worked on a three-shift schedule. All night shift mining was confined to areas contributory to the 10th Level with the exception of one gang which was mining in the Corbit Lease just below the 4th Level. The mining of the Corbit Lease Ore was completed on December 28th. The production from the Corbit Lease in 1951 was 32,106 tons making a grand total of 529,351 tons that has been mined from this lease. Of this amount the 3,715 tons which is in stock at the present time should produce an overrun of about 200 tons.

The production from the Athens Mine in 1951 was 630,804 tons as compared with 612,000 tons in 1950. During the year the heavy production shifted from the 8th Level to the 10th Level where the ore in the deposit north of the large E-W dike is being block caved. The 1951 production would have been approximately 50,000 tons higher if the two week walkout in July had not occurred. Not only the two weeks production was lost but the long shut-down caused breakdowns throughout the whole mine and the development of a portion of the block broke down entirely. It took about six weeks after the walkout to get back to normal production.

During the year the 6th Level main haulage drift was advanced from the Athens Mine to the Negaunee Shaft, holing to the cage compartment of the Negaunee Shaft. The 10th Level main haulage drift was advanced 343 feet west in rock the last 303 feet being in the Bunker Hill property and at a point 40 feet west of the east boundary of the Bunker Hill a drift was advanced 204 feet due north at top timber elevation at the end of which a drill station was prepared for the exploration of the ore body north of the main E-W dike on the Bunker Hill Property. A cross-cut was also advanced to the south for the development and mining of the west end of the old Athens Mine ore body. This cross-cut is also on the Bunker Hill property and will be utilized for the mining of both Athens and Bunker Hill ores.

A transfer sub was advanced at the elevation of the top of the 10th Level timber and two raises, put up to the 9th Level for the development and mining of the east end of the old Athens ore body. At the end of the year the mining on the 9th Level had been completed and the first sub below the 9th Level is being mined.

The cost of timbering and repairing throughout the mine was very heavy as usual, the Athens Mine undoubtedly having the heaviest working conditions in the entire Marquette Range. Despite the large increase in wages and material the cost is just slightly greater than in 1950. The reason for this being that a greater proportion of production in 1951 was obtained from block caving than in the previous year.

There was considerably more development work done in 1951 than in 1950. In 1951 there was 5,127 feet of ore development and 5,040 feet of rock development as compared with 4,930 feet of ore and 2,231 feet of rock development in 1950. Developments consisted of main level haulage drifts, transfer drifts, working raises, ventilation drifts and raises and a great amount of block caving developments.

The year 1951 was the most profitable year in the history of the Athens Mine despite the heavy expenses incurred because of subsidence, such as erecting a temporary dry building at a cost of $32,000, repairing water mains, sewer lines, steam pipes, air lines, installing a new stoker fired boiler in the shops to heat the shops, garage and oil house, shore up the partitions in the shops to keep them from falling down, building a new road to the timber yard, keeping the rock trestle and coal dock blocked up to grade and much other work in the old dry building before it was abandoned. The shop building is moving and breaking up

so fast at the present time that it may not hold up till next summer. The crack that developed about a year ago in the east wall of the office is now opened up about two inches. The fortunate thing about the subsidence of the hill on which the engine house is located is that it is going down on a level keel. This hill has settled about four inches during the year.

ATHENS MINE
ANNUAL REPORT

2. PRODUCTION SHIPMENTS AND INVENTORIES:

a. Production By Grades:

	1951	1950	Increase	Decrease
Athens Ore	515,622	369,792	145,830	
Mitchell Lease Ore	79,950	113,082		33,132
Corbit Lease Ore	32,106	129,126		97,020
Bunker Hill Ore	3,126		3,126	
Total Ore	630,804	612,000	18,804	
Rock	38,675	22,870	15,805	
TOTAL HOIST	669,479	634,870	34,609	

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	1951 Total Tons	1950 Total Tons
Athens Ore	276,188	222,274	498,462	356,398
Mitchell Lease Ore	51,381	23,943	75,323	112,790
Corbit Lease Ore	11,152	22,840	33,992	140,046
Bunker Hill Ore	2,758	55	2,813	
Total	341,479	269,112	610,590	609,234
Total Last Year	377,176	232,058	609,234	
Increase		37,054	1,356	
Decrease	35,697			

c. Stockpile Inventories:

Grade of Ore	Dec. 31, 1951	Dec. 31, 1950	Increase	Decrease
Athens Ore	55,520	38,360	17,160	
Mitchell Lease Ore	11,774	7,147	4,627	
Corbit Lease Ore	3,715	5,601		1,886
Bunker Hill Ore	313		313	
Total	71,322	51,108	20,214	

d. Division of Products by Levels:

	1951 Tons	1951 Percent	1950 Tons	1950 Percent
4th Level			117,247	19.16
6th Level	228,226	36.2	232,451	37.98
7th Level				
8th Level	62,977	10.0	197,099	32.21
9th Level	29,786	4.7	65,203	10.65
10th Level	309,815	49.1		
Total	630,804	100.	612,000	100.

e. Production by Months:

Month	Athens	Mitchell	Corbit	Bunker Hill	Total	Rock
January	45,245	4,954	4,500		54,699	3,305
February	37,086	3,399	3,157		43,642	4,355
March	42,884	6,589	4,416		53,889	3,650
April	46,727	6,976	3,383	264	57,350	4,155
May	51,735	6,167		159	58,061	3,830
June	43,060	7,616	489		51,165	3,155
July	24,124	4,300	530		28,954	3,145
August	45,200	8,373	2,358	381	56,312	3,315
September	42,099	5,876	2,248	1,315	51,538	2,830
October	40,878	8,613	1,176	518	51,185	2,895
November	34,312	8,621	2,766	176	45,875	1,325
December	32,266	7,482	3,630	313	43,691	2,715
Total	485,616	78,966	28,653	3,126	596,361	38,675

ATHENS MINE
ANNUAL REPORT

2. PRODUCTION SHIPMENTS AND INVENTORIES: (Cont'd)

e. Production by Months: (Cont'd)

	Athens	Mitchell	Corbit	Bunker Hill	Total	Rock
Current Year's Stockpile Overrun	30,006	984	3,453		34,443	
Total 1951	515,622	79,950	32,106	3,126	630,804	38,675
Total 1950	369,792	113,082	129,126		612,000	22,870
Increase	145,830			3,126	18,804	
Decrease		33,132	97,020			

f. Ore Statement:

ORE STATEMENT - DECEMBER 31st 1951

	Athens	Mitchell Lease	Corbit Lease	Bunker Hill	1951 Total	1950 Total
On Hand January 1, 1951	38,360	7,147	5,601		51,108	48,342
Out-put for year	485,616	78,966	28,653	3,126	596,361	588,292
Prior Year Stockpile Overrun					0	0
Current Year's Overrun	30,006	984	3,453		34,443	17,253
Total	553,982	87,097	37,707	3,126	681,912	660,342
Shipments	498,462	75,323	33,992	2,813	610,590	609,234
Balance on Hand	55,520	11,774	3,715	313	71,322	51,108
Increase in Output	124,324			3,126	8,069	55,545
Decrease in Output		21,902	97,479			
Increase in Ore on Hand	17,160	4,627		313	20,214	2,766
Decrease in Ore on Hand			1,886			

SHIPMENTS FOR YEAR 1951

Grades	Pocket	Stockpile	1951 Total	1950 Total
Athens	276,188	222,274	498,462	356,398
Mitchell Lease	51,381	23,943	75,323	112,790
Corbit Lease	11,152	22,840	33,992	140,046
Bunker Hill	2,758	55	2,813	
Total	341,479	269,112	610,590	609,234
Total Last Year	377,176	232,058	609,234	
Increase in Shipments		37,054	1,356	
Decrease in Shipments	35,697			

g. Delays:

	Date	Hours		Tons Lost
Jan.	3	1½	Shaft Inspection	150
	10	12	Skip stuck in shaft	1200
	11	1½	Shaft Inspection	150
	17	1½	Shaft Inspection	150
	24	1	Measuring pocket hanging	100
	24	1½	Shaft Inspection	150
	29	2½	Frozen cars on landing	250
	31	2	Cars freezing on landing	200
Feb.	1	1½	Shaft Inspection	150
	7	1½	Shaft Inspection	150
	14	1½	Shaft Inspection	150
	17	2	Breakdown in Skip Pit	200

ATHENS MINE
ANNUAL REPORT

2. PRODUCTION SHIPMENTS AND INVENTORIES: (Con'd)

g. Delays: (Cont'd)

Date		Hours		Tons Lost
Feb.	18	8	Breakdown in Skip Pit	800
	19	24	Breakdown in Skip Pit	2400
	20	17	Breakdown in Skip Pit	1700
	28	1½	Shaft Inspection	150
Mar.	5	1½	Repair Bell Signals	150
	7	1½	Shaft Inspection	150
	14	1½	Shaft Inspection	150
	21	1½	Shaft Inspection	150
	21	2½	Changing Skip	250
	28	1½	Shaft Inspection	150
	29	1½	Chunks in Measuring Pocket	150
	30	½	Chunks in Measuring Pocket	50
	30	1	Repair Pocket on Landing	100
	31	9	Broken Stringers in Shaft	900
Apr.	4	1½	Shaft Inspection	150
	5	1	Repair water line in shaft	100
	11	1½	Shaft Inspection	150
	18	1½	Shaft Inspection	150
	25	1½	Shaft Inspection	150
May	2	1½	Shaft Inspection	150
	8	1	Repairing Sheave Wheels	100
	9	1½	Shaft Inspection	150
	14	2	Change hose & blow pipe 10th Level	200
	16	1½	Shaft Inspection	150
	17	1½	Fix water pipe in shaft & change skip pit rope	150
	21	1½	Cutting Rope	150
	23	1½	Shaft Inspection	150
	23	1	Cutting skip rope	100
	24	1	Fix water pipe in shaft	100
	24	1	Cleaning and repairing in skip pit	100
	29	1	Putting liner bolts in shaft	100
June	6	1½	Shaft Inspection	150
	21	1	North skip stuck in shaft	100
	27	1½	Shaft Inspection	150
	28	½	Repair water pipe in shaft	50
July	18	1½	Shaft Inspection	150
Aug.	2	1½	Shaft Inspection	150
	7	1½	Skip stuck in shaft	150
	8	1½	Shaft Inspection	150
	22	1½	Shaft Inspection	150
	29	1½	Shaft Inspection	150
Sept.	5	1½	Shaft Inspection	150
	12	1½	Shaft Inspection	150
	19	1½	Shaft Inspection	150
	26	1½	Shaft Inspection	150
Oct.	3	1½	Shaft Inspection	150
	10	1½	Shaft Inspection	150
	17	1½	Shaft Inspection	150
	23	1½	Repair roller north skip	150
	24	1½	Shaft Inspection	150
	26	1	No air - engine house	100

ATHENS MINE
ANNUAL REPORT

2. PRODUCTION SHIPMENTS AND INVENTORIES: (Cont'd)

g. Delays: (Cont'd)

Date		Hours		Tons Lost
Nov.	1	1½	Shaft Inspection	150
	2	2	Top tram cars froze	200
	7	1½	Shaft Inspection	150
	12	3½	Repair skip rope - engine house	350
	14	1	Repair skip rollers	100
	15	1½	Shaft Inspection	150
	20	1½	Shaft Inspection	150
	21	1	Repair Skip	100
	28	1½	Shaft Inspection	150
Dec.	5	1½	Shaft Inspection	150
	10	1	Putting strips on shaft runners	100
	10	1	Repair butterfly cylinder	100
	12	1½	Shaft Inspection	150
	15	1½	Top tram cars froze	150
	19	1½	Shaft Inspection	150
	26	2½	Cutting north skip rope	250
Totals		179 Hours		17,900 Tons

3. ANALYSIS:

a. Average Mine Analysis on Output:

	1951				1950			
Grade	Tons	Iron	Phos	Sil	Tons	Iron	Phos	Sil
Athens & Corbit Ore	550,854	58.45	.115	9.06	498,918	58.89	.116	9.20
Mitchell Ore	79,950	58.89	.119	8.67	113,082	58.76	.113	9.29

b. Average Analysis on Straight Cargoes:

There were no straight cargo shipments in 1951.

c. High Sulphur Ore:

There was no high sulphur ore encountered in the Athens Mine during 1951.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12.75 Cubic feet equals one ton
10 per cent for rock & loss in mining Per cent of Bessemer - None

	Athens Lots	Mitchell Lease	Corbit Lease	Total Tons
4th Level and Above				
4th to 6th Level	227,234	317,144	7,135	551,513
6th to 7th Level	6,000	77,082		83,082
7th to 8th Level	99,858			99,858
8th to 9th Level	322,555			322,555
9th to 10th Level	456,829			456,829
Below 10th Level	555,490			555,490
Total Gross Tons as of July 31, 1951	1,667,966	394,226	7,135	2,069,327
Less Aug. Production	45,200	8,373	2,358	55,931
Total Gross Tons as of Aug. 31, 1951	1,622,766	385,853	4,777	2,013,396

ATHENS MINE
ANNUAL REPORT

4. ESTIMATE OF ORE RESERVES: (Cont'd)

a. Developed Ore: (Cont'd)

	Athens Lots	Mitchell Lease	Corbit Lease	Total Tons
Less Production Aug. 31 to Dec. 31, 1951	149,555	30,592	9,820	189,967
Total Gross as of Dec. 31, 1951	1,473,211	355,261	0	1,828,472
Less 10% For Mining and Rock	162,277	38,585		200,862
Net Tons 1951	1,310,934	316,676	0	1,627,610
Net Tons 1950	1,564,999	386,089	20,460	1,971,548
Decrease	254,065	69,413	20,460	343,938

The above tabulation shows a decrease of 343,938 tons in the estimate of ore reserves on Dec. 31, 1951 as compared with that of Dec. 31, 1950. Deducting the 343,938 tons from the 1951 production of 630,804 tons shows that 286,866 tons were developed in 1951. Comparing these figures with production which was 630,804 tons shows that 261,557 tons of Athens Ore, 10,537 tons of Mitchell Ore, and 11,646 tons of Corbit Ore was developed in 1951. The bulk of the Athens increase was due to an extention of the South Ore Body 100 feet more below 10th Level, and mining operations between 4th and 6th Levels proved up the increase in the Mitchell and Corbit Leases.

b. Prospective Ore:
All the ore in the mine is considered developed.

c. Estimated Analysis:

Ore Reserves: — Approximate Expected Natural Analysis

Tons	Iron	Phos	Sil	Mang	Alum	Lime	Mag	Sul	Loss	Moist
	51.00	.100	8.00	.30	2.75	.40	.76	.010	1.40	13.50

Ore in Stock

	Tons	Iron	Phos	Sil	Mang	Alum	Lime	Mag	Sul	Loss	Moist
Athens	55,520	57.36	.112	10.93	.53	3.10	.43	.81	.012	1.67	13.44
Mitchell	11,774	58.61	.121	9.27	.53	3.05	.43	.81	.012	1.65	13.34
Corbit	3,715	57.36	.112	10.93	.53	3.10	.43	.81	.012	1.65	13.44
Bunker Hill	313	57.36	.112	10.93	.53	3.10	.43	.81	.012	1.65	13.44

Complete Analysis of Ores Shipped in 1951

Tons	Iron	Phos	Sil	Mang	Alum	Lime	Mag	Sul	Loss	Moist
610,590	58.40	.120	9.09	.53	3.10	.43	.81	.015	1.67	13.44

5. LABOR AND WAGES:

a. Comments:

The average number of statistical employees in 1951 was 333 as compared with 346 in 1950, a decrease of 13 men. During the year there were 48 men hired and there were 52 separations. The separations consisted of 18 quits, 5 discharges, 15 transferred to other mines, 3 entered military services, 4 died and 7 were retired.

The average wages per month including the captain and clerks increased from $282.75 in 1950 to $293.21 in 1951. The increase was due to an increase in wage rates and salaries and an increased working schedule.

ATHENS MINE
ANNUAL REPORT

5. LABOR AND WAGES: (Cont'd)

b. Comparative Statement of Wages and Product:

	1951	1950	Increase	Decrease
Product	630,000	612,000	18,000	
No. Shifts & Hours	2 - 1/8 Hour	3 - 1/8 Hour		1
	288 - 2/8 Hour	266 - 2/8 Hour	22	
Average No. Men Working:				
Surface	69	73		4
Underground	264	273		9
Total	333	346		13
Average Wages Per Day:				
Surface	13.51	11.27	2.24	
Underground	14.91	12.89	2.02	
Total	14.61	12.59	2.02	
Average Wages Per Month:	(Based on Mine Payroll Including Captain & Clerks)			
Surface	323.27	255.23	68.04	
Underground	360.48	289.34	71.14	
Total	352.77	282.75	70.02	
Product Per Man Per Day:				
Surface	31.79	31.09	.70	
Underground	8.22	8.32		.10
Total	6.53	6.57		.04
Labor Cost Per Ton:				
Surface	.425	.371	.054	
Underground	1.813	1.546	.267	
Total	2.238	1.917	.321	
Average Product Mining:				
Stoping	27.37	26.69	.68	
Development in Ore	9.73	7.10	2.63	
Total	25.32	24.11	1.21	
Average Wages Per Day:				
For Contract Miners	14.88	13.54	1.34	
Total Number of Man Days:				
Surface	19,814 3/4	19,686 1/2	128 1/4	
Underground	76,655 1/4	73,518 1/2	3,136 3/4	
Total	96,470	93,205	3,265	
Amount For Labor:				
Surface	267,671.24	226,978.27	40,692.97	
Underground	1,142,005.14	946,125.30	195,879.84	
Total	1,409,676.38	1,173,103.57	236,572.81	
Average Wages Per Month as Per Labor Statement - Less Captain & Clerks:				
Surface	304.69	235.85	50.84	
Underground	358.72	288.50	70.22	
Total	347.52	282.12	65.40	

ATHENS MINE
ANNUAL REPORT

5. LABOR AND WAGES: (Cont'd)
b. Comparative Statement of Wages and Product: (Cont'd)

Proportion of Surface to Underground Man:
1951 - - - - - - - - - 1 to 3.83
6 - 2/8 Hr. Entire Year
1950 - - - - - - - - - 1 to 3.74
5 - 2/8 Hr. Jan. 1st to August 26th
6 - 2/8 Hr. August 26th to Dec. 31st

c. Operating Schedules - 1951:

Month	Days Mine Worked Per Week	Days Per Month	Days Men Worked Per Week	Avg. Shifts Worked Per Month By Each Man
January	6	26	6	26
February	6	23	6	23
March	6	27	6	27
April	6	25	6	25
May	6	26	6	26
June	6	22	6	22
July	6	16	6	16
August	6	27	6	27
September	6	23	6	23
October	6	27	6	27
November	6	25	6	25
December	6	23	6	23
Total		290		290
Av. For Year Mine Operated		24		
Av. For Year Worked By Each Man				24

6. SURFACE:
a-1 Buildings:

All mine plant buildings except the new temporary dry building are settling and cracking due to subsidence. The old dry building, being nearest to the cave moved and broke up to such an extent that it was abandoned on the 21st of September. The moving of the contents of the old dry to a temporary erected on the lawn east of the office at a cost of $32,000 was completed on the 23rd of September. The new dry measures 48 feet by 132 feet and is of very cheap construction but is very comfortable and will serve its purpose until such time as the change-over is made to the Negaunee Mine Plant.

The shop building is rapidly settling and breaking up and it is probable that it will have to be abandoned next summer. The loss of the heating plant in the old dry building necessitated the installation of a stoker fed boiler in the shop building to heat the shop, garage and oilhouse.

The engine house has settled four inches during the year but on a level plane and unless a crack should develop in the rock underneath the building it should not interfere with hoisting operations before the change-over is made to the Negaunee Mine Plant.

ATHENS MINE
ANNUAL REPORT

6. SURFACE: (Cont'd)

a-2 Docks, Trestles and Pockets

The usual wood trestle for stocking ore was erected between the two steel trestles.

The south steel trestle shows some movement caused by subsidence.

A portion of the trestle for stocking rock was rebuilt and brought up to grade.

The railway loading pockets were kept in good repair with the usual replacement of worn plates

a-3 Stocking Grounds:

After the shipping season ended the stocking grounds were leveled off and wood slabs were placed at short intervals to designate where the rock solar is when the pile is being loaded next year.

b. Stockpiles:

(1) Ore:

Ore at the Athens Mine was stocked in three piles in the 1950-1951 stocking season. The Athens Ore commingled with the Corbit Lease Ore was stocked from the north steel and the central wood trestle, and the Mitchell Lease Ore from the south steel trestle.

(2) Rock:

The rock was stocked under the wood trestle extending southwest from the shaft on caving ground. As it accumulated under the bents it was bulldozed into the cave.

c. Cave to Surface:

Much of this subject has been covered under a-1 Buildings. It might also be mentioned that several small holes broke through to surface, one south of the old dry which necessitated the abandoning of the road to the timber yard, one inside the blacksmith shop and two in the west end of the timber yard and that the south railway track in the timber yard had to be abandoned because of settling.

c. Deep Wells:

No. 1 Deep Well continued to be operated throughout the year. A daily inspection of the pump was made to keep it properly lubricated and in good operating condition.

d. Breitung Shaft:

Pumping was continued throughout the year from the Breitung Shaft. This pump is visited daily to take care of lubrication and to see that it is in good working condition.

ATHENS MINE
ANNUAL REPORT

6. SURFACE: (Cont'd)

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

	1951		1950		1949	
	Gallons	Amount	Gallons	Amount	Gallons	Amount
1st Quarter	8,342,000	586.94	7,188,000	506.16	8,019,000	564.33
2nd Quarter	10,832,000	761.24	7,835,000	551.45	7,481,000	526.67
3rd Quarter	7,497,000	527.79	8,476,000	596.32	6,787,000	478.09
4th Quarter	8,768,000	616.79	8,403,000	591.21	5,357,000	377.99
Total	35,439,000	2,492.76	31,902,000	2,245.14	27,644,000	1,947.08

Product - Tons	630,804	612,000	555,000
Cost Per Ton	.003952	.002726	.002824

f. Ground and Fences:

All roads, fences, lawns and grounds were kept in good condition throughout the year. The grounds east of the office was utilized for the erection of a temporary dry building.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1951.

b. Development, General Remarks:

The Nos. 1 and 2 transfer areas of Block #3 were mined out during the year and drawing was completed on February 12, 1951 with a total of 116,196 tons being drawn from the two transfer drifts. The No. 3 transfer was caved back without the use of grizzly drifts as the height of the ore at that point did not warrant the use of grizzly drifts. This transfer was also mined out during the year.

In the Block #4 area, which includes the New Ore Body between the 8th and 10th Levels a total of 4 transfer drifts were driven. The Nos. 1 and 2 transfer drifts with 3 grizzly drifts were caved as one block cave. The extreme pressure in this area caused the collapse of the grizzly and transfer drifts. At present the No. 1, on north, transfer is being reopened to permit further caving operations. The No. 3 transfer and two grizzly drifts were driven this year and caving operations are continueing at the present time. The No. 4 transfer and two grizzly drifts were also completed during the year and at present the finger raises from the grizzly drifts are being put in and the undercutting of the area has been started.

A ventilation rock raise No. 1016 is at present being put up from the 10th Level to the 8th Level to provide for better ventilation in the west end of the tenth level and for mining operations in this area.

The 10th Level main drift was extended west into the Bunker Hill and turned south through the Old Athens Ore Body. The drift will facilitate the mining of the Old Athens Ore Body up to the Bunker Hill Boundary and also the Bunker Hill ore body above the 10th Level south of the big E-W dike.

ATHENS MINE
ANNUAL REPORT

7. UNDERGROUND: (Cont'd)

b. Development, General Remarks: (Cont'd)

A dog drift connection was put through from the pump house on 10th Level to the sump drift which greatly improved the ventilation and cooling of the pump house as it was very hot and humid prior to putting in the connection drift.

The connecting drift between the Athens and the Negaunee Shaft on the 6th Level was completed during the year and the connection between the two shafts on the 10th Level was started, but temporarily stopped as the mining gang was put in the Bunker Hill for further exploration drifting.

Development Work Sheet

Location	Feet of Drifting		Feet of Raising		Total Feet	
	Ore	Rock	Ore	Rock	Ore	Rock
-440 Sub-level	67	200		16	67	216
-460 Sub-level		29				29
-470 Sub-level		19				19
6th Level		1445				1445
-720 Sub-level		30				30
-760 Sub-level		14		22		36
-780 Sub-level	79	74	32	25	111	99
-855 Sub-level				13		13
-915 Sub-level	1117	257	436	157	1553	414
-940 Sub-level	339	204	351	138	690	342
-965 Sub-level	965	199	274	5	1239	204
-990 Sub-level	537	655	762	758	1299	1413
10th Level	168	601		179	168	780
Total	3272	3727	1855	1313	5127	5040

b-1 Development In Ore:

Practically all of the ore drifting development was done in the block caving areas. A short drift was driven on the -440 Sub-level and part of the No. 3 transfer of Block #3 was driven during the year. A portion of the 10th Level Bunker Hill drift was driven in ore. The remainder of the development drifting was done in the Block #4 area on the -915', -940', -965', and -990' Sub-levels.

All of the development ore raises were put up in the block caving areas. A small portion being done in Block #3 area and the remainder in the Block #4 area as mill raises and finger raises.

b-2 Development in Rock:

The rock drifting during the year was about equally divided between the main levels and the sub-levels. The rock drifting on the main levels was on the 6th and 10th Levels with the 6th Level connection to the Negaunee having the longer portion of the rock drifting. Most of the sub-level rock drifting was done on the -990 Sub-level in connection with the block caves and the Bunker Hill exploration. The remainder of the sub-level rock drifting was done in the block and in ventilation and traveling connections on the various sub-levels.

ATHENS MINE
ANNUAL REPORT

7. UNDERGROUND: (Cont'd)

b-2 Development in Rock: (Cont'd)

A rock raise ventilation and traveling connection was put up from the -440 sub-level to the 4th Level. A ventilation rock raise is at present being put up from the 10th to the 8th Level. The remainder of the rock raising was done in connection with the Block #3 and Block #4 block caving areas.

c. Stoping:

(1) General:

The production for 1951 was obtained principally from the 6th and 10th Levels which accounted for 85.3% of the total tonnage. The increase of the production from the 10th Level was due to the block caving that was done in the New, or north, Ore Body, which accounted for 49.1% of the years production. There was no production from the 4th and 7th Levels during the year. The production from the 8th Level decreased from 32.2% in 1950 to 10.0% in 1951 due to the completion of block caving above the 8th Level. The production from the 9th Level decreased from 10.65% in 1950 to 4.7% in 1951 due to completion of mining operations on the east end of the Old, or south, Ore Body during the year.

The mining operations in the Corbit Lease were completed on December 28, 1951 with the completion of caving operations on the -460' sub-level. This depletes all the known ore reserves contained in the Corbit Lease Lot 13.

The Block Cave No. 3 above 8th Level was completed during the year and the Block Cave Transfer Nos. 1 and 2 of Block #4 above the 10th Level was completed except for some scramming operations continuing at the present time. The major portion of transfer No. 3, Block #4 has been completed during the year with block caving operations continuing at present. The transfer #4 area is practically all developed with the exception of putting up a few fingers and some undercutting. The remainder of the mining was done by top-slicing, sub-level caving, and by combinations of top slicing and sub-level caving.

The location of the mining contracts at the end of 1951 and 1950 are shown as follows:

	1951	1950
	0 above 4th Level	0 above 4th Level
	10 above 6th Level	12 above 6th Level
	0 above 8th Level	5 above 8th Level
	0 above 9th Level	3 above 9th Level
	13 above 10th Level	6 above 10th Level
Total	23	26

ATHENS MINE
ANNUAL REPORT

7. UNDERGROUND: (Cont'd)
c. Stoping: (Cont'd)
(1) General: (Cont'd)

The contracts are divided as follows:

1951		1950	
Mining - 9 top-slicing		Mining - 13 top-slicing	
Mining - 3 sub-caving		Mining - 5 sub-caving	
Developing - 2 raising		Developing - 3 raising	
Developing - 3 drifting		Developing - 2 drifting	
Repairing - 4		Repairing - 0	
Long Hole Drilling - 2		Long Hole Drilling - 3	
Total	23	Total	26

Above the 4th Level ore was mined from the following sub-levels: -365', -375', -385', and 4th Level.

Between 4th and 6th Levels, ore was mined from the following sub-levels: -405', -415', -430', -440', -460', and -470'.

Between the 6th and 8th Levels, ore was mined from the following sub-levels: -710', -720', -735', -745', -760', -780' and 8th Level.

Between the 8th and 10th Levels ore was mined from the following sub-levels: -800', -815', -830', -840', -855', -865', -875', 9th Level, -915', -920', -940', -965', and -990'.

(2) Detail of Stoping:

Above 4th Level - Mitchell Lots 8, 9, 11; Athens Lots 10, 12; Corbit Lot 13:
The mining above 4th Level was confined to Athens Lot 12 and Corbit Lot 13. The ore removed above 4th Level in these lots was those pillars that were caved by sub-levels operated below 4th Level.

Between 4th and 6th Levels - Mitchell Lots 8, 9, 11; Athens Lots 10, 12; Corbit Lot 13:
The mining in this area was carried out by contract Nos. 1, 3, 4, 8, 10, 12, 17, 20, 22, 25, and 30 on the -405', -415', -430', -440', -460', and -470' sub-levels. Both top-slicing and sub-level caving were used in the extraction of ore from this area.

Between 6th and 8th Levels:
In the New, or north, Ore Body, contract Nos. 5, 11, 21, and 24 were caving on the -720', -760', and -780' sub-levels. Also in the New Ore Body block caving operations from the -760' and -780' subs were completed.

There were no mining operations in the Old Ore Body in this area during the year.

Between 8th and 9th Levels:
In the area south of the big E-W dike contract Nos. 2, 19, and 27 completed caving operations on the -865', -875', and 9th Level, with the exception of some remaining pillars to be mined out from below 9th Level.

The block cave from above 10th Level removed part of the New, or north, Ore Body from between 8th and 9th Levels.

ATHENS MINE
ANNUAL REPORT

7. UNDERGROUND: (Cont'd)
c. Stoping: (Cont'd)
(2) Detail of Stoping: (Cont'd)

Between 9th and 10th Levels:
In the New, or north, Ore Body block caving operations were carried out from the -915', -965', and -990' sub-levels. These caving operations extended up through and above 9th Level.

The only mining done in the Old, or south, Ore Body was the sub-level caving done by contract Nos. 2 and 19 on the -915' sub-level.

d. Timbering:
There was an increase of $27,109.90 in the cost of timbering or $.023 per ton in 1951 over that of 1950. The higher costs were due to increased production, higher wages, increased cost of materials and excessive repairs due to the two week walkout or strike.

In addition to timber a considerable amount of steel was used for supports. Steel used was the 4 inch and 6inch "H" section and 8 inch "I" beams.

Statement of Timber Used:

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31ST. 1951

KIND	LINEAL FEET	AVG. PRICE PER FOOT	AMOUNT 1951	AMOUNT 1950
6" to 8" Cribbing	85,423	.0768	6,562.70	7,252.05
8" to 10" Stulls	14,426	.1199	1,729.16	1,643.56
10" to 12" "	52,387	.2042	10,698.86	10,163.07
12" to 14" "	34,979	.2836	9,920.85	9,756.13
14" to 16" "	23,504	.4880	11,469.11	4,663.69
Special Squared Timber-Block Mining				200.00
Total 1 9 5 1	210,719	.1916	40,379.68	
Total 1 9 5 0	198,303	.1698		33,678.50
		Per 100'		
7' Lagging	823,130	1.6956	13,956.88	12,651.11
9½' Poles	469,332	3.1416	14,744.36	17,824.21
Total 1 9 5 1	1,292,462	2.2207	28,701.24	
Total 1 9 5 0	1,459,651	2.0878		30,475.32
Wire Netting	1,155'		128.10	90.42

ATHENS MINE
ANNUAL REPORT

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

TIMBER STATEMENT FOR THE YEAR ENDING DECEMBER 31ST. 1951 (CONT'D)

	1951	1950
PRODUCT FOR YEAR	630,000	612,000
Ft. Timber per Ton of Ore	.3345	.3240
Ft. Lagging per Ton of Ore	1.3066	1.4061
Ft. Poles per Ton of Ore	.7450	.9789
Ft. Lagging per Ft. of Timber	3.9063	4.3395
Cost per Ton for Timber	.0641	.0550
Cost per Ton for Lagging	.0222	.0207
Cost per Ton for Poles	.0234	.0291
Cost per Ton for Wire Netting	.0002	.0001
Cost per Ton for Timber, Lagging, Poles & Netting	.1099	.1050
Equivalent of Stull Timber to Board Measure	485,621	431,814
Ft. of Board Measure per Ton of Ore	.0771	.0706
Lin. Ft. of Netting per Ton of Ore	.0018	.0015
Sq. Ft. of Netting per Ton of Ore	.0076	.0062

		AMOUNT	PER TON
Total Cost of Timber, Lagging, Poles, Etc. for Year	1951	69,080.92	.1097
	1950	64,244.24	.1050
	1949	68,774.33	.1250
	1948	79,243.23	.1564
	1947	78,082.59	.1537
	1946	53,734.65	.1463
	1945	72,844.22	.1661
	1944	77,935.27	.1850
	1943	82,305.17	.1589
	1942	82,410.65	.1209

e. Drifting and Raising:

The following table gives a comparison of total feet of drifting and raising in ore and rock in 1951 and 1950:

	Drifting		Raising		Grand
Year	Ore	Rock	Ore	Rock	Total
1951	3272	3727	1855	1313	10,167
1950	2917	656	1755	261	5,589
Increase	355	3071	100	1052	4,578

ATHENS MINE
ANNUAL REPORT

7. UNDERGROUND: (Cont'd)
f. Explosives, Drilling and Blasting:
Statement of Explosives Used: (Ore Development and Stoping)

KIND		QUANTITY	AVERAGE PRICE	AMOUNT 1951	AMOUNT 1950
No. 2-X Hercomite Powder	Lbs.	125,915	16.00	20,146.40	22,702.31
No. 2 Hercomite Powder	"	3,750	16.00	600.00	7.75
No. 1-X Gelamite Powder	"	25,710	16.75	4,306.44	5,364.21
No. 2-X Gelamite Powder	"				83.75
No. 1 Gelamite	"	250	16.75	41.88	
60% H. Pr. Gelatin, 5 x 5#	"	24,100	22.00	5,302.00	5,265.00
80% Gelatin, Extra	"	8,750	20.00	1,750.00	
Ditching Dynamite	"	100	21.75	21.75	
Total Powder 1 9 5 1		188,575	17.06	32,168.47	
Total Powder 1 9 5 0		210,888	15.85		33,423.02
Fuse	Ft.	569,835	9.28	5,287.20	5,998.16
Caps	Ea.	69,185	15.70	1,085.78	1,239.58
Electric Caps & Delays	"	964	21.50	207.29	364.30
Primacord Fuse	Ft.	249,000	34.00	8,466.00	6,549.00
Shot Firing Cord	"	1,500	11.60	17.40	
Connecting Wire	Lbs.	12	.80	9.60	25.60
Fuse Lighters	M.	19,900	9.00	179.10	202.50
Tamptite Shells	M.	2,510	7.97	20.00	6.29
Master Lighters	M.	500	20.02	10.01	
Canvas Powder Bags	Ea.	4	4.58	18.32	
Total Fuse, Caps, Etc.				15,300.70	14,385.43
TOTAL ALL EXPLOSIVES				47,469.17	47,808.45
PRODUCT				630,000	612,000
Pounds Powder per Ton of Ore				.2993	.3446
Tons of Ore per Lb. of Powder				3.3408	2.9020
Cost per Ton for Powder				.0511	.0546
Cost per Ton for Fuse, Caps, Etc.				.0243	.0235
Cost per Ton for All Explosives				.0754	.0781

SINKING, ROCK DEVELOPMENT, ETC.:

No. 1-X Gelamite Powder	Lbs.	4,955	16.75	829.96	390.99
No. 2-X Hercomite Powder	"	4,335	16.00	693.60	194.78
Total Powder 1 9 5 1		9,290	16.40	1,523.56	
Total Powder 1 9 5 0		3,751	15.62		585.77
Fuse	Ft.	62,090	9.18	569.83	169.20
Caps	Ea.	7,810	15.70	122.63	37.13
Electric Caps & Delays	"	50	23.45	10.69	102.34
Tamptite Shells	M.				2.82
Total Fuse, Caps, Etc.				703.15	311.49
TOTAL ALL EXPLOSIVES				2,226.71	897.26
TOTAL EXPLOSIVES USED AT MINE				49,695.88	48,705.71
Avg. Price Per Pound for Powder				.1703	.1584

7. UNDERGROUND: (Cont'D)
i. Pumping:

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

Period	Avg. KW Per Day - Athens	KW Per Month Breitung Pump	Avg. Gal. Per Min. - Athens	Total Cost Both Mines From the Athens Cost Sheet
January	4265	4520	348	3702.06
February	4213	2500	341	3430.91
March	4100	1950	338	4198.29
April	4439	5220	355	3589.43
May	5827	4900	466	4394.96
June	6217	5500	498	4876.22
July	6335	3600	501	4945.08
August	5770	3000	525	3999.97
September	5497	4850	495	4180.09
October	5590	4930	494	4186.30
November	5700	4980	499	4113.75
December	5438	4970	473	4157.32
1939 Avg.	3991	4391	331	2291.90
1940 Avg.	4141	858	351	2381.69
1941 Avg.	4008	1883	354	2351.56
1942 Avg.	4435	2258	388	2668.91
1943 Avg.	4351	3358	372	2701.08
1944 Avg.	3696	1688	308	2528.62
1945 Avg.	3951	2853	332	2356.83
1946 Avg.	3909	1839	320	2456.08
1947 Avg.	3958	3665	340	2599.82
1948 Avg.	3823	1887	320	2834.89
1949 Avg.	4029	3130	334	3032.33
1950 Avg.	4584	4960	381	3679.59
1951 Avg.	5283	4243	444	4147.86

The Number of Gallons pemped per minute at the Athens Mine in each month of the year for the past nine years is given in the following statement:

Month	1951	1950	1949	1948	1947	1946	1945	1944	1943	1942
January	348	346	294	331	297	303	306	315	359	399
February	341	341	291	329	290	331	302	297	334	388
March	338	324	296	307	287	282	293	296	330	373
April	355	324	299	307	292	327	342	295	356	374
May	466	422	324	327	363	366	365	307	404	402
June	498	471	336	329	385	330	359	312	411	402
July	501	450	337	323	376	321	359	314	431	393
August	525	409	356	331	374	314	355	313	429	394
September	495	387	396	323	368	316	338	311	390	384
October	494	375	373	321	357	316	329	312	364	397
November	499	367	361	310	346	304	325	316	337	379
December	473	350	350	307	346	302	307	308	328	368
Average	444	381	334	320	340	320	332	308	372	388

ATHENS MINE
ANNUAL REPORT

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1951	1950	Increase	Decrease
Product	630,000	612,000	18,000	
Underground Costs	2.439	2.163	.276	
Surface Costs	.349	.269	.080	
General Mine Expense	.444	.485		.041
Cost of Production	3.232	2.917	.315	
No. of Days Operated	290	269	21	
No. Shifts & Hours	2 - 1/8 Hr.	3 - 1/8 Hr.		1
	288 - 2/8 Hr.	266 - 2/8 Hr.	22	
Average Daily Product	2172	2275		

COST OF PRODUCTION	1951	Percent	1950	Percent	Increase	Decrease
Labor	2.319	71.75	1.984	68.0	.335	
Supplies	.913	28.25	.933	32.0		.020
Total	3.232	100.00	2.917	100.0	.315	

b. Detailed Cost Comparison:

(1) Days and Shifts:

Year	Days Mine Worked	Shifts & Hours	Men Employed	Total Shifts Worked
1951	290	6 - 2/8 Hr.	333	578
1950	269	5 - 2/8 Hr. to 8-1-50	346	535
		6 - 2/8 Hr. to 12-31-50		
Increase	21			43
Decrease			13	

(2) Comparison of Production:

Production - 1951	630,000 Tons
Production - 1950	612,000 Tons
Increase	18,000 Tons

(3) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate Per Day
1951	333	96,470	1,409,676.38	14.62
1950	346	93,205	1,173,103.57	12.59
Increase		3,265	236,572.81	2.03
Decrease	13			

(4) Tons Per Man Per Day:

	1951	1950	Increase	Decrease
Surface	31.79	31.09	.70	
Underground	8.22	8.32		.10
Total	6.53	6.57		.04

(5) Cost of Production:

	Total	Cost Per Ton
1951	2,035,892.07	3.232
1950	1,785,448.90	2.917
Increase	250,443.17	.315

ATHENS MINE

ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(5) Cost of Production: (Cont'd)

	Labor	Percent	Supplies	Percent
1951	1,460,768.87	71.75	575,123.20	28.25
1950	1,214,060.66	68.00	571,388.24	32.00
Increase	246,708.21		3,734.96	

(7) Detail of Accounts:

COST OF PRODUCTION

	1951		1950	
UNDERGROUND COSTS:	Amount	Per Ton	Amount	Per Ton
1. Exploring in Mine	3225.64	.005	1185.01	.002
1-A. Est. Wage Adjustment	62121.21	.099	5281.56	.009
2. Development in Rock	37959.17	.060	18984.29	.031
3. Development in Ore	59996.19	.095	55837.94	.091
4. Stoping	405951.44	.644	387462.54	.633
5. Timbering	432399.96	.686	405290.06	.663
6. Tramming	198368.29	.315	143989.57	.236
7. Ventilation	31692.09	.050	20475.89	.033
8. Pumping	48307.22	.077	49725.61	.081
9. Compressors and Air Pipes	72464.15	.115	63323.30	.103
10. Back Filling				
11. Underground Superintendence	77492.78	.123	64343.46	.103
12. Cave-in, or Fire in Mine			560.42	.001
13. Maint: Compressors and Power Drills	2851.19	.005	3641.84	.006
14. Scrapers and Mech. Loaders	56806.21	.090	55906.88	.091
15. Tramming Equipt.	38737.73	.062	39789.11	.065
16. Pumping Machinery	8467.42	.013	7971.48	.013
Total Underground Costs	1536840.69	2.439	1323768.96	2.163
SURFACE COSTS:				
17. Hoisting	69840.70	.111	62645.14	.102
18. Stocking Ore	20914.76	.033	15001.79	.025
19. Dry House	16584.81	.027	15853.60	.026
20. General Surface Expense	20257.68	.032	18532.46	.030
21. Maint: Hoisting Equipment	26972.86	.043	25767.20	.042
22. Shaft	9790.89	.016	10303.66	.017
23. Top Tram Equipment	5866.75	.009	8640.28	.014
24. Docks, Trestles & Pockets	10036.05	.016	5897.35	.010
25. Mine Buildings	39243.19	.062	1886.88	.003
Total Surface Costs	219507.69	.349	164528.36	.269
GENERAL MINE EXPENSES:				
26. Geological	2819.75	.004	1880.22	.003
27. Mining Engineering	10733.79	.017	12151.09	.020
28. Mechanical and Electrical Engineering	3833.71	.006	3503.86	.006
29. Analysis and Grading	29797.84	.047	26800.48	.044
30. Safety and Personnel Depts.	6864.63	.011	5414.48	.009
31. Telephones and Safety Devices	10133.80	.016	7405.99	.012
32. Local and General Welfare	4691.16	.008	4686.60	.008
33. Special Expense, Pensions, & Allowances	7708.98	.012	9055.04	.015
34. Ishpeming Office	33239.09	.053	30589.10	.049

ATHENS MINE

ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

	1951		1950	
GENERAL MINE EXPENSES: (Cont'd)	Amount	Per Ton	Amount	Per Ton
35. Mine Office	34515.34	.055	29736.03	.048
36. Insurance	27613.80	.044	32030.12	.052
37. Personal Injury	15656.45	.025	17801.96	.029
38. Society Security Taxes	31756.54	.051	29098.54	.048
39. Employees Vacation Pay	59965.72	.095	86960.50	.142
40. Research Laboratory	213.09	.000	37.57	.000
Total General Mine Expenses	279543.69	.444	297151.58	.485
COST OF PRODUCTION----------	2035892.07	3.232	1785448.90	2.917

1. Exploring in Mine:
The increase in expense was $2,040.63 and cost per ton $.003.

1-A. Est. Wage Adjustment:
The expense for 1951 was $62,121.21 and cost per ton $.099. This job evaluation wage adjustment is retroactive to December 1, 1950. The charge for December 1950 was $5,281.56.

2. Development in Rock:
The increase in expense was $18,974.88 and cost per ton $.029. the total feet of drifting and raising in rock was 5,040 feet in 1951 as compared with 917 feet in 1950. Drifting in 1951,3727 feet; in 1950, 656 feet. Raising in 1951, 1,313 feet; in 1950, 261 feet.

3. Development in Ore:
The increase in expense was $4,158.25 and cost per ton $.004. There were 3,856 feet more drifting and 1,381 feet more raising in 1951. The increase in cost was cue to increased cost of labor and materials and the increase in development work.

4. Stoping:
The increase in expense was $18,488.90 and cost per ton $.011. Increase due to larger product and an increase in wages and higher cost of material.

5. Timbering:
The increase in expense was $27,109.90 and cost per ton $.023. The increase was due to larger product, increase in wages effective December 1, 1950 and increase in cost for timber. The average cost per foot for stull timber in 1951 was $.1916 as against $.1698 in 1950.

Cost per ton for timber in 1951 was $.1099 as compared with $.1050 in 1950. Cost per ton for steel beams in 1951 was $.0163 and in 1950, $.0187.

6. Tramming:
The increase in expense was $54,378.72 and cost per ton $.079. There was an increase in product of 18,000 tons of ore and 15,805 tons of rock. Also an increase in wages and higher cost of materials.

ATHENS MINE

ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

7. Ventilation:

The increase in expense was $11,216.20 and cost per ton $.017. The charge for electric power was $117.63 more in 1951. Two 3 -H.P. Joy Blowers costing $1,529.00 were bought in 1951 as compared with none in 1950. There was also an increase in the amount of work required, increase in wages, and higher cost of materials.

8. Pumping:

Expense decreased $1,418.39 and cost per ton decreased $.004.

Gallons of water pumped in 1951 -	233,856,740
Gallons of water pumped in 1950 -	199,518,654
Gallons increased	34,338,086
Average Gallons per minute in 1951	436
Average Gallons per minute in 1950	381
Increase in gallons per minute	55

The cost for electric power was $31,412.17 in 1951 as compared with $27,886.30 in 1950.

The decrease was due to fewer occasions when pumpmen helpers were required.

9. Compressors and Air Pipes:

Expenditures increased $9,140.85 and cost per ton increased $.012.

Cubic feet air compressed in 1951 -	1,261,065,000
Cubic feet air compressed in 1950 -	1,161,045,000
Increase	100,020,000

Cost of electric power in 1951 -	$41,936.99
Cost of electric power in 1950 -	$39,898.42
Increase	$2,038.57

Increase due to increase in wages, higher cost of materials and increase in production.

10. Back Filling:

There was no expense to this account in 1951.

11. Underground Superintendence:

The increase in expense was $13,149.32 and cost per ton $.020. Two more shift bosses were added in 1951.

12. Cave-in and Fire in Mine:

The decrease in expense was $560.42 and cost per ton $.001. There was no expense to this account in 1951.

13. Compressors and Power Drills:

The decrease in expense was $790.65 and cost per ton $.001. During 1951 two J-50 jack-hammer drill machines were purchased at a cost of $730.00 as compared with eight pick-hammers costing $1,310.00 in 1950.

ATHENS MINE
ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

14. Scrapers and Mechanical Loaders:
The increase in expense was $899.33 and cost per ton decreased $.001. There were no scraper hoists purchased in 1951 or in 1950. Seven Holcomb scrapers were bought in 1950 as compared with none in 1951.

15. Electric Tram Equipment:
The decrease in expense was $1,051.38 and cost per ton $.003.
Detail:

	Generators	Locomotives	Wiring	M. L. Track	M. L. Cars
1951	728.30	8498.10	2848.23	19456.75	7206.35
1950	1492.25	7840.41	3343.28	18636.11	8477.06
Increase		657.69		820.64	
Decrease	763.95		495.05		1270.71

Increase in expense to locomotives due to more repairs and to main line tracks to increase in extensions. Decrease to generators, wiring, and main line cars due to less repairs.

16. Pumping Machinery:
The increase in expense was $495.94 and cost per ton stayed the same. Increase in expense due to more repairs to electric pumps.

SURFACE COSTS:
17. Hoisting:

	Ore	Rock	Total
Product - 1951 tons	630,000	38,675	668,675
Product - 1950 tons	612,000	22,870	634,870
Increase	18,000	15,805	33,805

The increase in expense was $7,195.56 and cost per ton $.009. The electric power charge was $3,237.00 more in 1951.

18. Stocking Ore:

Tons Stocked in 1951	355,971
Tons Stocked in 1950	211,267
Increase	144,704

The increase in expense was $5,912.97 and cost per ton $.008. Increase due to increased wages and cost of materials and greater tonnage stocked.

19. Dry House Expense:
The increase in expense was $731.21 and cost per ton $.001. Due to increased wages, higher cost of materials and higher maintainence costs due to subsidence.

20. General Surface Expense:
The increase in expense was $1,725.22 and cost per ton $.002. Increase due to wage increase December 1, 1950 and higher maintainence costs due to subsidence.

ATHENS MINE
ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

21. Hoisting Equipment:

	Electric Hoists	Hoisting Ropes	Skips and Skip Roads	Sheaves
1951	4,140.01	6,217.28	16,223.77	391.80
1950	9,235.75	5,437.90	10,775.43	318.12
Increase		779.38	5,448.34	73.68
Decrease	5,095.74			

The increase in expense was $1,025.66 and cost per ton $.001. Increase in expense to skips and skip roads and sheaves due to more repairs. There were two 1 3/8" skip ropes charges in 1951 as compared with one 1 3/8" skip rope and one 1¼ cage rope charged in 1950. Decrease to electric hoists due to overhauling and rewinding skip hoist generator set in 1950. Also the increase in wages and the higher cost of materials contributed to the increase in costs of this item.

22. Shaft:
The decrease in expense was $512.77 and cost per ton $.001.
Detail:

	Steel Sets	U. G. Pockets
1951	1,980.35	7,810.54
1950	2,369.34	7,934.32
Increase		
Decrease	388.99	123.78

23. Top Tram Equipment:
The decrease in expense was $2,773.53 and cost per ton $.005.

	Engines & Motors	Wire Rope	Sheaves Rollers, Etc.	Track & Cars
1951	352.14	1444.93	928.94	3140.74
1950	1192.74	1196.80	1065.05	5185.69
Increase		248.13		
Decrease	840.60		136.11	2044.95

Increase in expense to wire rope due to more rope replacements.

Decrease to engines and motors and tracks and cars due to less repairs.

24. Docks, Trestles, and Pockets:
The increase in expense was $4,138.70 and cost per ton $.006. Increase due to repairing steel trestle and building wood trestle.

25. Mine Buildings:
The increase in expense was $37,356.31 and cost per ton $.059.
The detail of expense is as follows:

Office	9.05	Repair door and light fixture.
Warehouse	2.31	Repair Wall. (Subsidence)
Shops	980.11	Install separate heating unit. (subsidence)
Shaft House	122.31	Repair structual steel.
Engine House	111.91	Repair Windows & Painting. (Subsidence)
Heating Plant	24.34	Repairs on account of subsidence.

ATHENS MINE
ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

25. Mine Buildings: (Cont'd)

Dry House	37,878.73	Building Temp. Dry Bldg. due to subsidence.
Coal Dock	31.19	Replacing rotted timber.
Timber Tunnel	7.37	Repair Covering.
Top Tram Bldg.	2.12	Repair windows.
Storage	42.85	Alterations.
Garage	30.90	Alterations.
Total	39,243.19	

Practically all of the above expenses were incurred because of subsidence.

GENERAL MINE EXPENSE:

26. Geological:
The increase in expense was $939.53 and cost per ton $.001.

27. Mining Engineering:
The decrease in expense was $1,417.30 and cost per ton $.003. Covers time and expense of engineers and helpers.

28. Mechanical and Electrical Engineering:
The increase in expense was $329.85 and cost per ton remained the same. The charge to this account covers the time spent by mechanical and electrical departments on inspections and repairs.

29. Analysis and Grading:

	Sampling At Mine	Central Laboratory Exp.	Shipping Dept. Exp	Trucking Samples, Etc.
1951	6574.96	17538.62	3818.76	1865.50
1950	5093.84	16451.47	3750.52	1504.65
Increase	1481.12	1087.15	68.24	360.85

Determinations	1951	.71798	Cost per Det. .2442773
"	1950	.76826	Cost per Det. .2141394

The increase in expense was $2,997.36 and cost per ton $.003.

30. Safety Department:

	First Aid Safety Supplies	Safety Goggles Hats, respirators	First Aid and Helmet Practice	Misc.	Ishp. Office Charge
1951	437.22	1,442.15	354.95	1098.15	3491.28
1950	206.46	826.03	165.25	637.14	3569.60
Increase	230.76	606.12	189.70	461.01	
Decrease					78.32

The increase in expense was $1,450.15 and cost per ton $.002

Increased wages and higher cost of materials.

ATHENS MINE
ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

31. Telephones and Safety Devices:

	1951	1950	Increase	Decrease
Lights at shaft & Levels	3763.36	2893.43	869.93	
Mine Telephone	1288.69	499.48	789.21	
Safety Gates	752.11	1041.74		289.63
Sign Boards & Signals	2004.38	1227.01	777.37	
Fire Equip. & Fire Patrol	2325.26	1744.33	580.93	
Total	10133.80	7405.99	2727.81	

The increase in expense was $2,727.81 and cost per ton $.004
Increased wages and higher cost of materials.

32. Local and General Welfare:
The increase in expense was $4.56 and cost per ton remained the same.

33. Special expense, Pensions and Allowances:

	Legal	Examination	Retirement	Wage Adjustment	Other expense	Pensions & allowances	Employment Office
1951	700.85	557.00	5093.27			155.89	1201.97
1950	609.39	322.50	6705.77			304.81	1112.57
Increase	91.46	234.50					89.40
Decrease			1612.50			148.92	

The decrease in expense was $1,346.06 and cost per ton $.003.

34. Ishpeming Office:
Ishpeming office expense is pro-rated to the various mines on the basis of labor costs. The increase in expense was $2,649.99 and cost per ton $.004.

35. Mine Office:

	Salaries	Central Warehouse Expense	Miscellaneous
1951	21,230.69	11,323.31	1,961.34
1950	20,366.89	7,240.46	2,128.68
Increase	863.80	4,082.85	
Decrease			167.34

The increase in expense was $4,779.31 and cost per ton $.007.

36. Insurance:

	Property	Group	Catastrophe	Group Annuity
1951	1,857.49	17,946.01	623.53	7,186.77
1950	1,834.89	23,692.46	406.68	6,096.09
Increase	22.60		216.85	1,090.68
Decrease		5,746.45		

The decrease in expense was $4,416.32 and cost per ton $.008.

37. Personal Injury:

	Compensation and Doctors	Compensation Department	Hospital Loss
1951	4,709.80	1,471.00	9,475.65
1950	8,398.05	1,512.38	7,891.53
Increase			1,584.12
Decrease	3,688.25	41.38	

The decrease in expense was $2,145.51 and cost per ton $.004
Decrease due to a better safety record.

ATHENS MINE
ANNUAL REPORT

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts: (Cont'd)

38. Social Security Taxes:
The increase in expense was $2,658.00 and cost per ton $.003.

	Unemployment Insurance Tax	Old Age Benefit Tax
1951	13,561.46	18,195.08
1950	13,510.05	15,588.49
Increase	51.41	2,606.59

39. Employees Vacation Pay:
The decrease in cost was $26,994.78 and cost per ton $.047. Decrease due to setting up a reserve for the following years vacation liability in 1950.

40. Research Laboratory:
The increase in expense was $175.52 and cost per ton remained the same, $.000.

9. EXPLORATIONS:
The following is an account of exploration drilling in 1951:

	LOCATION				FOOTAGE & PERCENTAGE				
Hole	Lev.	Coordinate	Dip	Course	ORE	INT.	I.-FM.	ARG.&GY.	TOTAL
33	8th	S 3255.56 X 1467.33W.	1°30'	N.0°28'E.	0	9'4%	193'80%	39'16%	241'
45	-780	S 3026.11 X 1304.32W.	1°50'	N.44°36'W.	47'21%	24'11%	113'50%	40'18%	224'
46	-780	S 3026.11 X 1304.32W.	1°00'	N.57°00'W.	10'12%		72'88%		82'
BUNKER HILL:									
5	10th	S 3296.80 X 2084.03W.	2°00'	N.60°10'W.		47'49%	49'51%		96'
6	-990	S 3112.00 X 1899.60W.	-90°		150'46%	60'19%	115'35%		325'
7	-990	S 3101.36 X 1900.83W.	2°30'	N. 0°32'W	35'11%	25' 8%	181'81%		311'
8	-990	S 3126.6 X 1901.1 W.	-53°30'	N.69°00'W.			157'100%		157'

Holes 33,45,46 were drilled in an attempt to find the extension of the ore body lying north of the Athens East-West dike.

Bunker Hill Hole 5 was drilled to find what lay to the north of the main 10th level drift after it ran out of the dike.

Holes #6 and #8 were drilled to determine the thickness and depth of ore.

Hole #7 was drilled to determine the structure and possible ore to the north of the given coordinates.

ATHENS MINE
ANNUAL REPORT

10. TAXES:

COMPARATIVE STATEMENT OF TAXES FOR THE YEARS 1951 AND 1950

DESCRIPTION	1951 VALUATION	1951 TAXES	1950 VALUATION	1950 TAXES
ATHENS MINE				
Including Stockpiles, Supplies & Equipment as placed by the State Tax Commission				
Real Estate	1,880,000	85,446.00	1,770,000	83,986.50
Personal Property	350,000	15,907.50	300,000	14,235.00
Collection Fee		1,013.54		982.22
Total Athens Mine	2,230,000	102,367.04	2,070,000	99,203.72
HARVEY ADDITION				
Proportion of Lots:				
1	400	18.18	400	18.98
2	200	9.09	200	9.49
5 & 6 .33A Cederblade	1,100	50.00	1,100	52.20
6 .366A	1,750	79.54	1,750	83.04
7 Lehman, Liber 20-82	1,250	56.81	1,250	59.31
7 Liber 28-81	1,600	72.72	1,600	75.92
STERLING ADDITION				
Lot 1 W 13' Lot 2 & W 6½' Lot 3	1,850	84.08	1,850	87.78
Lot 9, Bjornberg	1,350	61.36	1,350	64.06
Lot 10, Delarye	1,450	65.90	1,450	68.80
Lot 11, Two Houses	2,950	134.08	2,950	139.98
Lots 12 & 12	3,450	156.80	3,450	163.70
Lot 14 Wick	1,750	79.54	1,750	83.04
Lot 15 Johnson	1,600	72.72	1,600	75.92
Lots 16 & 17, Roma	1,700	77.27	1,700	80.67
Lot 18 C.C.I. Co.	1,750	79.54	1,750	83.04
Lot 19 Turpinen	2,150	97.72	2,150	102.02
Lot 20 Savola	1,250	56.81	1,250	59.31
Lot 22 Pachette	1,600	72.72	1,600	75.92
Lots 23 & 24 C.C.I. Co.	1,800	81.81	1,800	85.41
Lot 25 Farmland	1,600	72.72	1,600	75.92
Lot 26 C.C.I. Co.	1,550	70.45	1,550	73.55
Lot 27 Maki	1,500	68.18	1,500	71.18
Lot 28 C.C.I. Co.	1,700	77.27	1,700	80.67
Lot 29 Mattson	1,750	79.54	1,750	83.04
Lot 30 Rund	1,850	84.08	1,850	87.78
Lots 31 to 38 Incl. C.C.I. Co.	5,450	247.70	5,450	258.60
Lot 72 Lehman	100	4.55	100	4.75
Lots 73, 74 and 75	300	13.63	300	14.23
Collection Fee		21.24		22.17
Total Rented Buildings	46,750	2,146.05	46,750	2,240.48
TOTAL ATHENS IRON MINING COMPANY	2,276,750	104,513.09	2,116,750	101,444.20

ATHENS MINE

ANNUAL REPORT

11. ACCIDENTS AND PERSONAL INJURY:

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

	1951	1950	1949	1948	1947	1946	1945	1944	1943
Fatal	0	0	0	0	0	0	0	0	0
Time lost over 4 mos.	0	2	2	1	3	1	0	2	4
1 to 4 Mos.	5	5	5	5	6	2	7	7	9
Less Than 1 Mo.	4	12	8	7	16	8	7	12	18
Total Compensable Accidents	9	19	15	13	25	11	14	21	26
Number of cases paid compensation for accidents prior to Jan. 1st of each year.		5	4	4	2	1	4	4	4
Number of cases paid difference in wages. (Included in above total)		1	1	1	2	0	2	2	1

Nature and Classification of Compensable Accidents:

On December 31, 1951 payments were being made on four cases which occurred prior to January 1, 1951. One receives partial compensation and three are occupational disease cases.

Acc. No.	Date of Accident	Name	Injury	Days Lost
560	1-3-51	Bruno Zanetti	Severed extensor tendon right foot.	33
561	3-7-51	Oscar Maki	Fracture Left Ankle	48
562	3-15-51	Louis E. Lajoie	Bruised lower back.	9
563	3-16-51	Tony Arrieri	Fracture 2 bones left hand.	37
564	5-17-51	Vaino Karppinen	Bruised back and thigh.	32
565	10-8-51	Norman W. Heikkila	Sprain left knee.	17
566	10-19-51	Archie Vecellio	Contusion left hand.	72
567	11-4-51	Theodore Lundstrom	Fracture 7th to 12th ribs R. side.	61
568	11-7-51	Richard Wills	Occupational disease case	
569	12-27-51	Andrew Niemi	Puncture wound right foot	11

#568 Richard Wills - This hernia case was classed as an occupational disease case and not included in accident statistics.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

A new temporary dry building, 48 feet by 132 feet was erected east of the office and fully equipped to replace the old dry building which was completly wrecked by subsidence. Changing the location of the dry necessitated the building of a waiting room for the men at the collar of the shaft, installing a separate heating plant for the shop buildings and a revamping of practically all pipe lines.

ATHENS MINE
ANNUAL REPORT

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Tractors:

The Athens Mine has a fully equipped D-6 Caterpillar Tractor with bull-dozer and a crane that attaches to the rear end. This equipment is in good repair.

b. Power Shovels:

The electric shovel for loading out stockpile was given the usual overhaul and is in good repair.

b-1. Power Crane:

The Athens Mine has a 3-ton Hydro-crane, equipped with a 3/8 yard digging clam and a 3-tine grapple for handling timber, mounted on a 2-ton Chevrolet Truck. This equipment is in good repair.

b-2. Trucks:

The Athens Mine has a 2-ton Ford Truck with a dump platform and a ¾-ton Ford pick-up truck, both in good condition.

c. Scraper Hoists:

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

	1951			1950	
	Machines	Total Cost Of Machines Repaired	Each Mach. Repaired	Total Cost Of Machines Repaired	Each Mach. Repaired
Sullivan 40 HP Elec.	3	1	927.66	2	346.10
" 15 HP Elec.	17	6	547.45	11	430.13
" 20 HP Elec.	3	1	1359.32	4	335.93
" 25 HP Elec.	5	1	87.47	5	362.42
Ing Rand 15 HP Elec.	5	2	711.05	0	0
Ing Rand 20 HP Elec.	7	2	519.58	5	352.17
Ing Rand 25 Hp Elec.	8	7	419.51	5	453.20
Total	48	20	552.85	32	393.95

d. Drill Machines:

Purchases in 1951 and 1950 are listed below:

1951	1950
2 - J-50 Jackhammer Drills	None

e. Motor Haulage Cars:

None bought in 1951.

f. Timber Hoists:

None bought in 1951.

ATHENS MINE

ANNUAL REPORT

14. MAINTENANCE AND REPAIRS:

a. Steel Trestles:

Very little work was required in 1951 to maintain the steel stocking trestles.

b. Comparison of Costs - 1951 with 1950:

Maintenance and repairs listed under underground costs:

	Amount	Cost per Ton
1951	106,862.55	.170
1950	107,309.31	.175
Decrease	446.76	.005

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

	1951	1950	Increase	Decrease
Comp. & Power Drills	2,851.19	3,641.84		790.65
Scraper Equipment	56,806.21	55,906.88	899.33	
Electric Tram Equip.	38,737.73	39,789.11		1,051.38
Pumping Machinery	8,467.42	7,971.48	495.94	
Total	106,862.55	107,309.31		446.76

Maintenance and repairs listed under surface costs:

	Amount	Cost per Ton
1951	91,909.74	.146
1950	52,495.35	.086
Increase	39,414.39	.060

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

	1951	1950	Increase	Decrease
Hoisting Equipment	26,972.86	25,767.20	1,205.66	
Shaft	9,790.89	10,303.66		512.77
Top Tram Equipment	5,866.75	8,640.28		2,773.53
D.T. & Pockets	10,036.05	5,897.33	4,138.72	
Mine Buildings	39,243.19	1,886.88	37,356.31	
Total	91,909.74	52,495.35	39,414.39	

15. POWER:

Detail of electric current purchased compared with 1950:

	1951 - 12 Mos. Optg.		1950 - 12 Mos. Optg.	
		Per Ton		Per Ton
Stoping	5605.11	.008	4349.42	.007
Ventilation	12315.13	.019	12597.50	.021
Pumping	30388.80	.048	27886.30	.046
Hoisting	39919.70	.063	36748.34	.060
Stocking Ore	918.12	.001	925.18	.001
Dry House	977.32	.001	967.92	.002
Lights At Levels	1688.71	.002	1253.65	.002
Compressors	41896.83	.066	39898.42	.065
Electric Haulage	7111.65	.011	6379.51	.010

ATHENS MINE
ANNUAL REPORT

15. POWER:

Detail of electric current purchased compared with 1950: (Cont'd)

	1951 - 12 Mos. Optg.	Per Ton	1950 - 12 Mos. Optg.	Per Ton
Shops	453.00	.007	520.50	.001
Heating Plant	82.30	.000	44.71	.000
Office	54.36	.000	47.00	.000
Storage Battery Loc.	203.62	.000	38.71	.000
Electric Shovel	699.74	.001	701.30	.001
Surface Lights	775.58	.001	749.72	.001
Idle Expense	1568.37	.002		
Total	144658.34	.230	133108.18	.217

Main Line Meter - K.W.	9,819,365		8,881,192
Separate Meter Readings	9,573,961		8,618,695
Line Loss	245,404		262,497
Product	630,000		612,000
K.W. Per Ton (Inc Line Loss)	15.58629		14.5118
Cost Per K.S. (Avg.)	.01510956		.014987648
15 Min. Demand (Avg.)	1689		1844
Load Factor (Avg.)	59.18		54.98

17. CONDITION OF PREMISES:

The grounds and premises were kept in good condition throughout the year.

b. Athens Mine Houses:

The following statement gives the total cost of repairs and the average cost per house for 1951 and 1950:

Year	No. House	Amount Repairs	Av. Cost Per House	Rental Income	Taxes and Insurance	Net Income
1951	25	463.03	18.52	5,663.00	2,991.21	2,671.79
1950	28	1,306.06	46.65	6,157.75	2,600.45	2,251.24

ATHENS MINE
ANNUAL REPORT

18. NATIONALITY OF EMPLOYEES:

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

As to Percentage	1951	Percent	1950	Percent
Finnish	125	37.54	135	39.02
Italian	57	17.11	63	18.21
English	51	15.32	66	19.08
French (Canadian)	51	15.32	38	10.98
Swedish	24	7.21	23	6.65
French (France)	1	.30	1	.29
Danish	1	.30	1	.29
German	7	2.10	4	1.15
Austrian	3	.90	6	1.73
Norwegian	6	1.80	4	1.15
Irish	5	1.50	2	.58
Greek	0	0	1	.29
Polish	1	.30	1	.29
Scotch	1	.30	1	.29
Totals	333	100.00	346	100.00

	American Born		Foreign Born	
As To Birth	1951	1950	1951	1950
Finnish	103	110	22	25
English	47	59	4	7
Italian	33	36	24	27
French (France)	1	1	0	0
French (Canadian)	49	35	2	3
Swedish	21	20	3	3
Scotch	1	1	0	0
German	7	4	0	0
Austrian	3	6	0	0
Norwegian	6	4	0	0
Irish	5	2	0	0
Greek	0	0	0	1
Danish	1	1	0	0
Polish	1	1	0	0
Total	278	280	55	66
Percent	83.5	80.9	16.5	19.1