

MAAS MINE
ANNUAL REPORT
YEAR 1953

5. LABOR AND WAGES

Labor Relations

In general, labor relations were good throughout the year. There was one incident early in the year when union officers created a disturbance over job assignments but they were quickly and firmly informed that they were completely out of order. Their reaction was very apologetic and they were very anxious to forget the whole matter. Since this time, relations between management and labor have been very good.

There was one grievance which started in 1952 following the job evaluation program. This grievance involved four men, one of whom worked at the Maas Mine. This was a carpenter who was slotted as intermediate and the union contended he had been previously paid the highest prevailing journeyman rate and therefore should be slotted as a standard carpenter. The grievance was carried to arbitration and the arbiter ruled in favor of the union.

Employment

No. Employed at Beginning of Year	392
Added During Year	37
Separations	53
No. Employed at End of Year	376

The Separations reported above were for the following reasons:

Quit	30
Transferred to other C.C.I. mines	6
Drafted or Enlisted	7
Retired for medical reasons	1
Retired at 65 years or more	4
Discharged	1
Deceased	4
Total	53

Of these, there were 14 men who had worked less than 3 months and 6 others who had worked less than a full year.

The mine was idle for vacation period during the week of August 16th to the 22nd. In addition, about 25% of the men took a week's vacation during deer hunting season. A total of 355 men received an average of 2.31 weeks vacation pay based on a 44 $\frac{1}{4}$ hour week.

The average age of the mine employees is 44 years. There are 17 men still employed who are 65 years of age or more.

Labor Statement - December 1953

Average No. Employed	378
Average Absenteeism	23
Average No. of Men Working	355

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5. LABOR AND WAGES - Continued

Statement of Wages

	<u>1953</u>	<u>1952</u>	<u>Increase</u>	<u>Decrease</u>
<u>Average Wages Per Day</u>				
Surface	15.49	15.22	0.27	--
Underground	19.94	17.54	2.40	--
Total	19.11	17.16	1.95	--
<u>Average Wages Contract Labor</u>	20.38	17.90	2.48	--

Average Wages Per Month
(20.7 Days Per Month)
(10 Shifts Per Week)

Surface	317.55	370.80	--	53.25
Underground	408.77	431.78	--	23.01
Total	391.76	421.48	--	29.72

Product Per Man Per Day

Surface	33.14	33.34	--	0.20
Underground	7.61	6.48	1.13	--
Total	6.19	5.42	0.77	--

Labor Cost Per Ton

Surface	.468	.449	0.19	--
Underground	2.619	2.714	--	0.095
Total	3.087	3.163	--	0.076

6. SURFACE

Construction

The erection of an addition to the underground dry building was started in July. The purpose of the new building was to provide adequate changing rooms for the Captain, Foremen, and Shift Bosses. The general contract was awarded to Kielinen & Sons of Ishpeming. At the end of the year, the erection of the building was completed and the electrical and plumbing fixtures were being installed. The project was covered by E & A CC-587.

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6. SURFACE - Continued

Construction - Continued

A small addition was built on the northwest corner of the mine office building. This will be joined with the former Captain's office and change room to form an enlarged general office room.

On June 19th, strong winds caused minor damage to the roof of the engine house and completely demolished the bailer storage house. The cost of repairs and the value of the bailer house totalled \$505.54 .

Equipment

A Caterpillar D-6 tractor was purchased and delivered during the year under E & A CC-570 . It was bought as a replacement for the International TD - 14 tractor which was over 9 years old.

Intrusion - Prepakt Inc. was engaged to reinforce and stabilize the foundation of the skip hoist which was showing signs of settling. The work was carried out by pumping quick setting concrete to the foundation base thru holes drilled in the foundation itself.

Drainage

The mine discharge water was carried to the settling area northwest of the Carp River throughout the year. At the end of the year the water still was being effectively cleaned before entering the river.

Purchase and Disposal of Dwellings

There were no houses moved from areas to be affected by Maas Mine during 1953. There was one purchase, that being the property on the N $\frac{1}{2}$ of Lot 1, Block 36 of the Pioneer Iron Co. Plat. This is in the area to be affected by mining following Phase I development.

7. UNDERGROUND

The year of 1953 saw an acceleration in the movements of mining contracts to lower levels as the production from 4th and 5th Levels amounted to 30.8% of the total compared with 41.0% in 1952. The 7th Level became a major production source during the year and was producing over one quarter of the total production at the year's end.

Sub level caving continued to be the main mining method, although block cave mining has started to replace it and will continue to do so where conditions are suitable on 7th Level. A small amount of top slicing was done in the 6100 Crosscut pillar where the old timber was found just above the back of the new sub level. The proportion of production attributable to the three methods was as follows:

Sub Level Caving	81.7%
Block Caving	13.4%
Top Slicing	4.9%

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7. UNDERGROUND - Continued

As in 1952, the maintenance of the 6th Level main haulage drifts and airways required the steady labor of four to six timber repair crews. Also a four-man crew was occupied throughout the year in maintaining the Negaunee Mine airway, through which comes the Maas Mine ventilation. Further progress was made as well in the rehabilitation of the #2 Negaunee Mine Air Shaft which is the intake of the ventilation system.

A substantial increase in tons produced per man shift, from 5.42 in 1952 to 6.19 in 1953, reflected the following factors throughout the year:

1. Stable labor conditions
2. Better distribution of mining areas on 6th Level
3. Greater proportion of block cave tonnage

A feature of production from the Maas Lease was an increase in sulphur content to .183% from .158% in 1952, and .095% in 1951, resulting from the movement of mining contracts from standard to sulphurous ore areas. Both iron and silica analyses were lower as considerable mining was done along the footwall in cleaning up various areas.

With the exception of two raises on 6th Level, all main level development was carried out on 7th Level. The original program of level development was completed and Phase I of the development of the western extension of the ore body was started. This program will prepare the level for mining as far west as the 3200 W coordinate.

During an average month of the year, there were 29 mining contracts working. 14 of these were engaged in production, 9 in sub level development, 3 in block cave development and 3 in main level development.

Mining, above 4th and 5th Levels, was carried out entirely in relatively small pillars of ore remaining along the north and east footwalls. Several of them were exhausted during the year, reducing the number of contracts above 5th Level from nine to four. Owing to the flat footwall, long transfer drifts are necessary in this section in order to reach the pillars without excessive main level development.

In the eastern section of the 6th Level, the 6100 Crosscut pillar provided excellent production throughout the year. In this section where mining was resumed after a lapse of several years, the pillar was found to have subsided so that the old mining timber was encountered just above the new sub level. For this reason a modified method of top slicing was carried out on the first sub level. The pillar contains all of the remaining reserves in the City of Negaunee Lease as well as tonnage in both the Maas and Race Course Leases. Pillars over the 6200 and 6300 Crosscuts in the Race Course Lease were mined out to the 6th Level during the year. There is remaining a small tonnage below the level in the Race Course Lease.

In the central section of the 6th Level, the remaining pillars over the 6400 Crosscut also were mined out to the 6th Level elevation. From the 6700 Crosscut, one new raise was driven to replace an old transfer and raise that would have required considerable repairing. Three areas were being mined in this section, all of them on the second sub level above the main level.

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7. UNDERGROUND - Continued

At the west end of the level, a new raise was driven from the 6800 Crosscut to permit mining along the north footwall. Four other areas are being mined on the third sub level above the 6800 Crosscut. In one portion, a very hard variety of hematite was found which retarded development in that area and which does not cave readily. It is expected that some sub level stoping will be necessary to obtain this ore.

Along the north footwall above 6th Level, three areas are being sub level caved. The whole of one and part of another of these are in the Race Course Lease. The contracts are at present on the last sub level available from 6th Level.

On the 7th Level, the first block cave, east of the 7200 Crosscut, was undercut early in the year and drawing continued until the middle of October. The results were not entirely satisfactory as only 60% of the estimated tonnage was recovered. However, in spite of constant repairing, the estimated cost per ton was about 50 cents less than on the total mine product. A continual distortion of the circular steel sets interfered with a steady pull from the block. Development was started on two more blocks above 7th Level, #2 Block being located west of the 7400 Crosscut and #3 being in the Mitchell Ave. pillar adjacent to the Pioneer & Arctic Lease. At the end of the year, development was completed on #2 Block and undercutting the block was well started.

Sub level caving on 7th Level was started by three contracts, two of them recovering pillars left in the #1 Block and the third located near the Race Course Lease under the 6400 Crosscut. A fourth crew was extending the 7106 Air Raise in order to sub cave another pillar just below 6th Level.

The main level development carried out on 7th Level consisted of the continuation of the 700 Drift west to a connection with the 7400 Crosscut and the extension of the 7000 Drift to the west to permit development of the 7500 and 7600 Crosscuts. A powder magazine room was excavated in the footwall north of the 7000 Drift. Two air raises and four mining raises were driven from the level also.

The amount of main level development carried out in 1953 is summarized below:

	<u>6th Level</u>	<u>7th Level</u>	<u>Total</u>
Drifting	- - ft.	1205 ft.	1205 ft.
Raising	125 ft.	412 ft.	537 ft.
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Total	125 ft.	1617 ft.	1742 ft.

Diamond Drilling

One hole was drilled in January to complete information regarding the position of the footwall in the developed area of the 7th Level. In November, a major drilling program was started to locate and evaluate the western extension of the main ore body through Phase I of the 7th Level western development program.

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7. UNDERGROUND - Continued

Diamond Drilling - Continued

U. H. #75 was drilled horizontally south from the turnout that will eventually serve the 7300 Crosscut. The hole showed about the same amount of 1st and 2nd class ore as in the 7200 Crosscut and in contrast to the 7400 Crosscut which produced only 15 feet of 2nd class ore. The log of the hole follows:

U. H. #75 Collar - 716.40 S and 2125.75 W Elev. -213.94
drilled S 1° -11' W at plus 3° .

0 - 10	1st class standard ore
10 - 32	2nd class high sulphur ore
32 - 43	1st class sulphur ore
43 - 55	2nd class standard ore
55 - 80	argillaceous iron formation
80 - 90	ferruginous argillite
90 - 133	2nd class standard argillaceous ore

The drilling program of Phase II of the western development is laid out to cross section the ore body at the 2700 W and 3000 W coordinates to a line approximately 450 feet south of the 7000 Drift. Extensions of the sections can be made by drilling at a later date from the 700 Drift. Two holes were drilled from the turnout for the 7500 Crosscut, the second being stopped early in January, 1954, and being reported here as completed.

The information gained from the two holes indicates that the cross section of the ore body is the same as along the 2300 W coordinate where the last complete section was made. Some standard ore was found corresponding to that in U. H. #66 approximately 100 feet to the east. The average sulphur analysis of the ore sections encountered in the two holes was 0.208% .

The logs of the holes follow:

U. H. #76 Collar - 709.00 S and 2691.13 W Elev. -201.44
drilled S 2° -29' E at plus 45° -30' .

0 - 48	ferruginous argillite
48 - 90	2nd class sulphur ore
90 - 127	1st class sulphur ore
127 - 135	intrusive
135 -	Mulvey - Maas boundary
135 - 180	rich cherty iron formation
180 - 241	1st class high sulphur ore
241 - 250	intrusive (dike #82)
250 -	Maas - Pioneer & Arctic boundary
250 - 315	1st class standard ore
315 - 333	iron formation

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7. UNDERGROUND - ContinuedDiamond Drilling - Continued

U. H. #77 Collar - 709.00 S and 2691.13 W Elev. -204.0
drilled S 2° -44' E at plus 17°

0 - 50 ferruginous argillite
50 - 120 argillaceous iron formation
100 - Mulvey - Maas boundary
120 - 130 2nd class argillaceous ore
130 - 137 intrusive
137 - 141 argillaceous iron formation
141 - 173 1st class sulphur ore
173 - 189 intrusive (dike #82)
183 - Maas - Pioneer & Arctic boundary
189 - 305 1st class high sulphur ore
305 - 330 1st class standard ore
330 - 400 1st class sulphur ore

The classification of ore in the preceding logs is according to the following table:

1st class ore - - over 57.50 iron (dried analysis)
2nd class ore - - 50.00% to 57.50% iron
standard ore - - - below .050% sulphur
sulphur ore - - - .050% to .250% sulphur
high sulphur ore - over .250% sulphur

Timber Statement

<u>Kind</u>	<u>Lineal feet</u>	<u>1953</u>		<u>1952</u>	
		<u>Avg Price Per ft.</u>	<u>Total Cost</u>	<u>Avg Price Per ft.</u>	<u>Total Cost</u>
Cribbing	66,211	.0948	\$ 6,276.34	.0873	\$ 7,703.01
Stulls	125,729	.2409	30,287.53	.2298	29,590.36
Lagging	1,270,734	.0216	27,447.38	.0217	31,553.15
Poles	502,481	.0392	19,682.09	.0390	16,841.91
Norm. Steel Sets	29,356	.8790	25,807.83	.8130	16,648.32
Circ. Steel Sets	5,526	1.9830	10,977.88	1.7770	9,860.43
Total			\$120,479.05		\$112,197.18

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7. UNDERGROUND - Continued

Explosives Statement

	<u>1953</u>		<u>1952</u>		
Quantity	Avg Price <u>Per Lb.</u>	Total <u>Cost</u>	Avg Price <u>Per Lb.</u>	Total <u>Cost</u>	
Gelamite IX (1½ x 8")	207,920	.1727	\$35,911.90	.1706	\$37,238.86
60% Gelatin (5" x 5")	14,400	.2303	3,317.00	.2241	1,288.75
Hercomite 2 (1½ x 24")	34,250	.1670	5,719.02	.1635	621.32
Total	256,570	.1752	\$44,947.92	.1719	\$39,148.93
Other Blasting Supplies			13,359.60		10,711.20
Total all Explosives			\$58,307.52		\$49,860.13
Cost Per Ton Product			.0993		.1001

Ventilation

The rehabilitation of #2 Air Shaft was started in 1952, was resumed this year. A series of 7 steel sets was installed bringing the concrete and steel supported section down to 140 feet below the collar. It was expected that revision of the existing timber from this point down would suffice to place the shaft in good repair. However, after repairing about 150 feet of timbered shaft, it was obvious that the remainder would require complete replacement. For that reason, the project was halted until steel sets could be ordered and fabricated for the 477' of shaft left supported by timber only.

The program of repairing the Negaunee Mine Airway drifts and raises was carried on by a four-man crew throughout the year. Steel sets are being installed in most cases as the timber had deteriorated from age rather than weight. It is expected that the program will be completed in 1954.

Two major changes were made in the Maas Mine ventilation system. The 7106 Raise was driven from the 7100 Crosscut and connected by a transfer to the west end of the 600 Drift. In this way, the fresh air supply from the Negaunee 14th Level reached the 7th Level through the 600 Drift instead of through a production crosscut to the 7102 Air Raise. The 703 Air Raise was driven from the 700 Drift to the south end of the 6800 Crosscut, thus bypassing the top timber connection from the 600 Drift. This latter connection was driven in ore and was very difficult to maintain.

The 600 Drift, which is the main air entry from the Negaunee Mine, was reinforced by steel lining sets throughout. The drift is in rock but the timbers were rotting badly and several breakdowns had already occurred.

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7. UNDERGROUND - Continued

Pumping

No changes were made in the pumping set-up during the year. However, repairs to the existing pumps were necessary at frequent intervals and it is obvious that some replacements must be made soon. The whole pumping system was under close study at the end of the year with this plan in view. The volume of water pumped from underground was reported as averaging 1,232 g.p.m. However, weir measurements, adjusted to this average, show the total drainage to be 1,010 g.p.m.

The one surface well pump operating at the start of the year was shut down in January as it was badly worn. A replacement from one of the other company mines is expected and will be placed in operation when received.

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

Comparative Mining Costs

	<u>1953</u>	<u>1952</u>
Product	587,016	497,867
Underground Costs	3.438	3.768
Surface Costs	.389	.315
General Mine Expense	.708	.692
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Cost of Production	4.535	4.775
Depletion - Original Cost	.024	.026
Depreciation		
Plant & Equipment	.041	.031
Development	.028	.024
Movable Equipment	.007	.005
Taxes	.287	.328
Loading and Shipping	.082	.067
	<hr/>	<hr/>
Total Cost At Mine	5.004	5.256
Budget - Estimated Cost Per Ton	5.349	5.065

Number of Days Operated

1-8 Hour	2	18
2-8 Hour	247	235
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Total	249	253

Proportion of Labor and Supplies

	<u>1953</u>	<u>%</u>	<u>1952</u>	<u>%</u>
Labor Cost Per Ton	3.310	66.1%	3.367	64.1%
Supplies	1.694	33.9%	1.889	35.9%
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Total Cost Per Ton	5.004	100.0%	5.256	100.0%

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8. COST OF OPERATINGDetailed Cost Comparison

	<u>1953</u>		<u>1952</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs:</u>				
Exploring in Mine	3,977.56	.007	7,188.89	.014
Wage Adjustment	30,116.22	.051	129,468.27	.260
Development in Rock	4,854.32	.008	26,225.15	.053
Development in Ore	4,231.23	.007	5,225.81	.010
Stoping	533,531.89	.909	528,020.16	1.061
Timbering	642,333.71	1.094	551,646.97	1.108
Tramming	208,528.75	.355	159,183.64	.320
Ventilation	63,077.71	.107	51,296.71	.103
Pumping	135,334.69	.231	115,768.96	.233
Compressors and Air Pipes	78,520.23	.134	60,657.62	.122
Underground Superintendence	116,816.52	.199	73,399.36	.147
Fire in Mine	- - -	- -	16.35	- -
Maintenance- Compr. and Drills	11,106.68	.019	6,310.18	.013
Scrapers and Mech. Loaders	89,140.80	.152	74,583.78	.150
Tramming Equipment	76,474.11	.130	56,666.49	.114
Pumping Machinery	20,207.93	.035	30,229.79	.060
Total Underground Costs	2,018,252.35	3.438	1,875,888.13	3.768
<u>Surface Costs:</u>				
Hoisting	82,050.64	.140	48,194.23	.097
Stocking Ore	29,632.30	.050	33,454.59	.066
Dry House	22,182.93	.038	23,896.63	.048
General Surface Expense	20,184.64	.034	14,755.69	.030
Maintenance - Hoisting Equipment	24,846.29	.042	14,803.07	.030
Shaft	35,041.95	.060	14,594.79	.029
Top Tram Equipment	3,440.42	.006	3,835.20	.008
Docks, Trestles, Pockets	4,990.42	.009	1,270.95	.003
Mine Buildings	5,759.33	.010	1,918.75	.004
Total Surface Costs	228,128.92	.389	156,723.90	.315
<u>General Mine Expenses:</u>				
Geological	1,760.53	.003	2,912.69	.006
Mining Engineering	21,071.28	.036	14,509.02	.029
Mechanical & Electrical Engineering	7,601.38	.013	4,441.74	.009
Analysis and Grading	42,630.81	.073	35,716.88	.072
Safety Department	5,638.31	.010	4,512.10	.009
Telephones and Safety Devices	7,269.56	.012	7,177.19	.014
Local and General Welfare	4,023.92	.007	4,665.03	.009
Sp. Exp., Pensions and Allowances	16,176.02	.028	14,224.47	.029
Ishpeming, Office	52,379.11	.089	41,372.60	.083
Mine Office	56,034.19	.095	58,703.69	.118
Insurance	34,487.60	.059	28,186.54	.057
Personal Injury	9,241.84	.016	24,900.84	.050
Social Security Taxes	38,975.63	.066	32,940.91	.066
Employees Vacation Pay	88,901.42	.151	70,390.00	.141
Holiday Pay	29,637.02	.050	- - -	- -
Research Laboratory	68.81	- -	25.40	- -
Inventory Adjustment	- - -	- -	23.43	- -
Total General Mine Expense	415,897.43	.708	344,702.53	.692
Total Cost of Production	2,662,278.70	4.535	2,377,314.56	4.775

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8. COST OF OPENING, EQUIPPING, DEVELOPING, AND OPERATING - Continued

Retroactive Pay Adjustment

The amount shown is the balance added to the amounts set aside in previous years necessary to complete the retroactive pay made in February, 1953, under the terms of the union contract signed in 1952.

Stoping

Reduction in the cost per ton is proportional to the increase in tons per man-shift.

Tramming

The necessity of increasing haulage facilities on 7th Level while maintaining existing haulage on upper levels caused an increase in total tramming charges.

Underground Superintendence

The increase per ton reflects a general increase in the bosses' salary rates.

Holiday Pay

This is shown as a separate account whereas, previously, it had been prorated to the other accounts.

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8. COST OF OPENING, EQUIPPING, DEVELOPING, AND OPERATING - Continued

E & A CC-285 - December Summary

The original program, for which this E & A was authorized, was completed in July, 1953. An appropriation for a new E & A to cover Phase I development in the Pioneer & Arctic and Maas Leases was requested but approval was postponed until an agreement on operations in Pioneer & Arctic was reached. However, authority was obtained to initiate the program, charging it to CC-285. This accounts for the over-expenditure shown below.

The present intention is to request a supplement to this E & A covering the over-expenditure and the remaining Phase I development in the Maas Lease, and to charge only Pioneer & Arctic development on the new E & A, when approved.

The December, 1953, statement of E & A CC-285 follows:

<u>Detail</u>	<u>Amount Authorized</u>	<u>Labor</u>	<u>Supplies & Expense</u>	<u>Total</u>	<u>Total To Date</u>	<u>Unexpended Balance</u>
Strip 6th Level at Winze	10,500.00	- - - -	- - - -	- - - -	5,902.04	4,597.96
3 sheaves and bearings	2,500.00	- - - -	- - - -	- - - -	766.72	1,733.28
2 cages	7,000.00	- - - -	- - - -	- - - -	7,309.04	309.04
Installation of Hoists	7,600.00	- - - -	- - - -	- - - -	7,822.29	222.29
Sinking Equipment	2,000.00	- - - -	- - - -	- - - -	233.46	1,766.54
100' dble Compartment Winze	27,500.00	- - - -	- - - -	- - - -	25,446.45	2,053.55
Rock Drifting - 7th Level						
4,000 feet	191,000.00	4,669.05	1,743.69	6,412.74	234,616.02	43,616.02
Rock Raising - 7th Level						
1,000 feet	16,500.00	- - - -	- - - -	- - - -	25,172.24	8,672.24
Sump	12,000.00	- - - -	- - - -	- - - -	12,113.03	113.03
Powder House	1,250.00	- - - -	- - - -	- - - -	4,364.58	3,114.58
Rails, Frogs, Switches etc.	10,000.00	- - - -	- - - -	- - - -	8,318.99	1,681.01
Trolley, Clamps, etc.	4,000.00	- - - -	197.94	197.94	3,846.64	153.36
Air and Water Lines	6,000.00	- - - -	8.05	8.05	10,630.36	4,630.36
Mining Engineers	- - - -	91.06	59.25	150.31	494.34	494.34
Social Security Taxes (1)	7,500.00	- - - -	102.56	102.56	5,278.36	2,221.64
Total	305,350.00	4,760.11	2,111.49	6,871.60	352,314.56	46,964.56

(1) Charged To:

Cost of Production (Social Security Taxes)	102.56	5,278.36
Development Account		91,579.78
Development Section 309	10,618.98	233,957.70
Plant and Equipment	3,277.84	21,498.72
Total	13,999.38	352,314.56
Balance in Uncompleted construction	7,127.78	- - - -
Total	6,871.60	352,314.56

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8. COST OF OPENING, EQUIPPING, DEVELOPING, AND OPERATING - Continued

<u>Analysis of Supplies Used</u>	<u>1953</u>		<u>1952</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Supplies	\$77,483.66	.132	\$97,017.09	.195
Iron and Steel	61,244.48	.104	36,672.45	.074
Oil and Grease	6,032.05	.010	6,385.16	.013
Machinery and Supplies	58,453.49	.100	57,815.38	.116
Explosives	58,099.59	.099	53,320.67	.107
Lumber and Timber	97,513.73	.166	95,490.88	.192
Fuel	14,842.42	.025	15,149.28	.030
Electric Power	164,145.82	.280	139,784.59	.281
Inventory Adjustment	40.37	- -	23.43	- -
Total	\$537,855.61	.916	501,658.93	1.008

9. TAXES

	<u>1953</u>		<u>1952</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Maas Mine	\$2,765,000	\$128,157.75	\$2,920,000	\$145,854.00
Race Course	300,000	13,905.00	415,000	20,729.25
Stockpile & Equipment	525,000	24,333.75	395,000	19,730.25
Miscellaneous Parcels	11,930	553.00	17,750	886.68
Total Oprtg. Maas Mine	\$3,601,930	\$166,949.50	\$3,747,750	\$187,200.18
Collection Fees		1,669.50		1,872.00
Total		\$168,619.00		\$189,072.18
Tax Rate		4.635		4.995
Total City of Negaunee		\$833,573.05		\$856,059.08
Maas Mine % of City Tax		20.0%		21.9%
Maas Mine Rented Houses	\$99,575	\$4,615.34	\$109,725	\$5,480.83
Mineral Lands etc.	13,310	616.93	13,230	660.85
Total Houses and Lands	\$112,885	\$5,232.27	\$122,955	\$6,141.68
Collection Fees		52.32		61.42
Total		\$5,284.59		\$6,203.10

MAAS MINE
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10. ACCIDENTS AND PERSONAL INJURY

There were 19 compensable accidents reported in 1953 compared with 17, including one fatality, in 1952. Brief descriptions of each follow:

<u>Date</u>	<u>Employee Injured</u>	<u>Injury</u>
Feb 7	Robert LaMeare	Twisted back
Feb 10	John Stolnack	Kink in back
Feb 19	Ransom Corkin	Twisted right knee
Feb 27	Arne Maki	Fractured toe
Mar 18	Joseph Barabe	Sprained left ankle
Apr 30	John Hemmila	Fractured thumb
Jul 1	Walfred Lehtinen	Fractured right leg
Jul 15	Eino Mustamaa	Cut on leg. Infected
Jul 27	Arne Pesola	Twisted back
Jul 23	Howard Maloney	Deep cut on right leg
Aug 13	Andrew Hemmila	Kink in back
Aug 18	Henning Blomquist	Fractured rib
Sept 9	Arne Pesola	Twisted back
Oct 2	Leonard Pellow	Strained back
Oct 3	Isaac Hulkoff	Fractured left leg
Nov 19	Donald Soli	Lacerations of forehead and jaw
Nov 30	Uno Pruiska	Bruised right thigh
Dec 8	Eino Tammelin	Fractured finger
Dec 28	Theo. Nelson	Lacerated finger

The accident statistics compiled by the Safety Department show the following rates for the Maas Mine:

<u>Year</u>	<u>Frequency</u>	<u>Severity</u>
1953	31.83	.731
1952	47.24	8.547
1951	39.56	.379
1950	45.57	7.743

11. POWER

The total Kwh used during the year amounted to 9,936,000. Total cost including the fuel adjustment amounted to \$157,073.17. The resulting average rate per Kwh is \$0.01581.

The rate for power is 4.1 cents per Kwh for the first 72 Kwh per KW of demand, 0.96 cents per Kwh for all additional Kwh.

The demand used for billing purposes is the lowest of the average KW supplied during the three fifteen minute periods of maximum use during the billing month.

To the rate above is added a fuel adjustment which is applied to that portion of the Kwh taken during the month by consumer determined by multiplying the total Kwh taken during the month by the ratio of total Kwh generated by fuel burning equipment and purchased to the total Kwh furnished to the company's system from all sources.

The rate applied to the fuel adjustment is \$.00018 per Kwh for each 1 cent above 29 cents in company's cost per million British Thermal Units of fuel.

MATHER MINE "B" SHAFT
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1. GENERAL:

Production from the Mather Mine "B" Shaft for 1953 was very gratifying, as this was the first year the mine produced over a million tons. This was attained in spite of two major shutdowns entailing a loss of nearly one month's production while repairs were made on the ore hoist.

The production for the year totaled 1,080,150 tons. Of this tonnage 47% came from 6th Level; 52% from 7th Level and 1% from the 8th Level.

During April two production records were achieved. The high hoist for twenty-four hours of 6,031 tons was attained on the 17th and the record hoist for one shift of 188 skips was made on the 24th.

Due to very favorable weather, the shipping season started on March 31st and continued until the middle of November. Shipments from the stockpile and pocket totaled 1,059,004 tons.

Absenteeism which was abnormally high during the month of August affected both production and development.

With the exception of three grievances initiated by the Union, labor relations during the year were satisfactory. Two of the three grievances were dropped by the Union after having reached Step 4 and the third is now in Step 4.

A shortage of experienced miners existed throughout the year. Unskilled labor, though scarce during the first part of the year, was plentiful at the end of the summer.

The ore reserves were increased sizeably in 1953 as exploration and development work progressed on 5th, 7th and 8th Levels. The 5th and 8th Level reserves were each increased by a half million tons and approximately two million additional tons were proven for 7th Level during the year. Ore structures outlined on 8th Level during the year indicate that large tonnages should be proven on this level in 1954. Development work which was nearly completed in 1953 should permit the outlining of ore structures for both 9th and 10th Levels in 1954.

There was an increase in the amount of steel sections used for ground support as the economy in favor of steel became more evident.

The Mather Mine "A" Shaft crew continued driving the 5th Level main heading toward "B" Shaft. A short drift driven on the 5th Level from the "B" Shaft will be enlarged for a supply plat after the "A" Shaft crew makes the connection between the two headings. On this level, 1,715' of main level was driven during the year.

The main line on the 7th Level between Mather Mine "A" and "B" Shafts was connected in May, which greatly improved the ventilation for both properties. A total of 1,409' was driven on this level during the year.

MATHER MINE "B" SHAFT
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1. GENERAL: (Cont'd)

Drifting on the 8th Level was carried on with two crews. One crew was drifting toward "A" Shaft and one crew was driving cross-cuts. The main line was 395' on the "A" Shaft side of the boundary at the end of the year. The total drifting for the year on this level was 4,848'.

On the 10th Level, the drifting was begun in August and 575' was driven with one crew on a one shift basis. Work in the 10th Level pumphouse consisted of installing one 500 gallon Worthington pump, connecting the pump with the shaft discharge line and concreting the floor of the pumpstall.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1953

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grade and Months:

	<u>Standard</u>	<u>Special</u>	<u>Total Tons</u>	<u>Rock</u>
January	22,872	51,824	74,696	16,082
February	34,396	34,741	69,137	14,409
March	41,786	27,238	69,024	9,552
April	49,769	43,306	93,075	8,166
May	77,273	34,015	111,288	11,388
June	87,494	26,267	113,761	11,520
July	76,051	38,829	114,880	12,204
August	50,015	35,250	85,265	15,432
September	49,419	49,314	98,733	14,952
October	48,912	45,678	94,590	14,795
November	32,405	41,841	74,246	7,385
December	35,052	46,403	81,455	17,616
Total	<u>605,444</u>	<u>474,706</u>	<u>1,080,150</u>	<u>153,501</u>
After Stockpile Transfer	<u>-20,402</u>	<u>+20,402</u>		
Total	<u>585,042</u>	<u>495,108</u>	<u>1,080,150</u>	

b. Shipments:

	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total 1952</u>	<u>Increase or Decrease</u>
Mather Standard	345,316	300,391	645,707	185,712	459,995
Mather Special	<u>144,467</u>	<u>268,830</u>	<u>413,297</u>	<u>436,874</u>	<u>23,577</u>
Total	<u>489,783</u>	<u>569,221</u>	<u>1,059,004</u>	<u>622,586</u>	<u>436,418</u>

c. Ore Statement:

	<u>1953</u>	<u>1952</u>
On Hand January 1, 1953	157,895	94,343
Output For Year	1,080,150	620,718
Overrun	-	<u>65,421</u>
Total	<u>1,238,045</u>	<u>780,482</u>
Shipments	<u>1,059,004</u>	<u>622,587</u>
Balance on Hand	179,041	157,895
Increase in Output	459,432	207,896
Increase in Ore on Hand	21,146	63,552

MATHER MINE "B" SHAFT
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YEAR 1953

2. PRODUCTION,
SHIPMENTS &
INVENTORIES: (Cont'd)

c. (Cont'd)

Working Schedule:

1953 - Five 3-8 hr. shifts from January 1, 1953 to December 31, 1953.

1952 - Five 3-8 Hr. and one 2-8 hr. shifts per week from January 1, 1952 to May 31, 1952. Five and one-half 3-8 hr. shifts per week from June 1, 1952 to November 16, 1952. Five 3-8 hr. shifts per week from November 17, 1952 to December 31, 1952.

1951 - Five 3-8 hr. and one 2-8 hr. shifts per week from April 1, 1951 to December 31, 1951.

1950 - Five 3-8 hr. shifts per week from July 1, 1950 to August 20, 1950.
Six 3-8 hr. shifts per week from August 21, 1950 to December 31, 1950.

d. Division of Product by Levels and by Months:

Months	6th Level		7th Level		8th Level	Total Tons		
	Standard	Special	Standard	Special	Standard	Standard	Special	
January	10,302	32,275	10,703	19,549	1,867	22,872	51,824	
February	11,040	24,130	22,575	10,611	781	34,396	34,741	
March	17,640	21,207	24,091	6,031	55	41,786	27,238	
April	17,103	33,800	32,536	9,506	130	49,769	43,306	
May	20,933	34,015	55,807	-	533	77,273	34,015	
June	20,056	26,267	66,243	-	1,195	87,494	26,267	
July	10,880	38,829	61,828	-	3,343	76,051	38,829	
August	-	35,250	48,880	-	1,135	50,015	35,250	
September	-	41,468	48,768	7,846	651	49,419	49,314	
October	-	40,797	47,285	4,881	1,627	48,912	45,678	
November	-	30,701	31,358	11,140	1,047	32,405	41,841	
December	-	36,101	34,694	10,302	358	35,052	46,403	
Total	107,954	394,840	484,768	79,866	12,722	605,444	474,706	
After Stockpile Transfers						-20,402	495,108	495,108
Total						585,042	495,108	495,108

e. Production Delays:

The production of 3 2/3 full days plus an additional 11 days of approximately two-third production was lost from March 19th to April 9th when the welds at the gusset plates on the south drum of the ore hoist failed. The drum was removed and shipped to the Nordberg factory in Milwaukee for repairs. During the above mentioned 11 days of approximately two-third production, ore from the 6th Level was hoisted through the Mather "A" shaft.

MATHER MINE "B" SHAFT
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2. PRODUCTION,
SHIPMENTS &
INVENTORIES: (Cont'd)

e. Production Delays: (Cont'd)

Two production shifts were lost on August 28th when broken wires necessitated the removal of the east skip rope. This rope was replaced with the cage rope and a new rope was installed on the cage.

Five full days production were lost in November when the ore hoist was shut down to install a new through shaft and a new drum.

MATHER MINE "B" SHAFT
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3. ANALYSIS:a. Average Mine Analysis on Output: (Incl. Stockpile)

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>
Mather Standard	57.90	.098	9.85	.205
Mather Special	57.52	.092	8.72	.664

b. Average Analysis of Shipments: (Total Average)

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>	<u>Moist.</u>	<u>Iron Nat'l</u>
Mather Standard	57.80	.101	10.18	.082	9.46	52.33
Mather Special	57.15	.094	9.12	.764	9.46	51.74

c. Average Analysis of Ore in Stock:

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>	<u>Moist.</u>
Mather Standard	119,333	57.61	.107	10.38	.36	2.55	.70	.60	.112	2.42	9.45
Mather Special	59,708	56.87	.097	9.38	.36	2.35	1.50	.30	.763	2.60	9.45

MATHER MINE "B" SHAFT
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4. ESTIMATE AND
ANALYSIS OF
ORE RESERVES:

The net ore reserves reported to the Tax Commission on December 31, 1953 were 16,157,304 tons. This shows an increase of 1,905,951 tons. Diamond drilling increased the 5th Level reserves by 585,121 tons. Diamond drilling and mine development increased the 7th Level reserves by 1,881,000 tons. The 8th Level reserves were increased 478,018 tons by diamond drilling. This gives a total increase of 2,281,031 tons for the year. The difference between this total and the net increase shown above is accounted for by deducting production and 10% for mining loss and rock. Actually, diamond drilling towards the end of the year increased the 8th Level reserves considerably more than the 487,018 tons shown above. However, due to the large tonnage reported in the August estimate, the estimate was not revised at the end of the year.

Of the estimated reserve of 16,000,000 tons, approximately 14,000,000 tons are available to present underground development. The remaining 2,000,000 tons are estimated from surface diamond drill holes.

	<u>Mather Standard</u>	<u>Sulphurous</u>	<u>Total Tons</u>
Above 5th Level		2,518,558	2,518,558
Between 5th and 6th Levels	623,920	1,872,434	2,496,354
Between 6th and 7th Levels	8,269,951		8,269,951
Between 7th and 8th Levels	2,986,125		2,986,125
Below 8th Level	205,208		205,208
Sec. 1 Diamond Drill Hole Estimate	<u>2,046,873</u>		<u>2,046,873</u>
Total Gross as of July 31, 1953	14,132,077	<u>4,390,992</u>	18,523,069
Less Prod. July 31 to Dec. 31, 1953			<u>521,985</u>
Total Gross as of Dec. 31, 1953			18,001,084
Less 10% for Mining and Rock			<u>1,843,780</u>
Net Total as of Dec. 31, 1953			16,157,304

Expected Average Natural Analysis of Ore Reserves as of December 31, 1953:

<u>Grade</u>	<u>Total Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>	<u>Moist.</u>
By Surface											
Diamond Drilling..	1,842,186	54.40	.081	5.08	.10	2.62	.58	.60	.017	2.20	11.50
By Underground											
Development	<u>14,743,311</u>	51.50	.090	8.85	.45	2.62	2.50	.50	.300	2.00	10.50
	16,585,497										

MATHER MINE "B" SHAFT
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5. LABOR AND WAGES:

a. Comments:

Skilled and experienced miners were in short supply throughout the year. Considerable juggling of crews was required to keep all contracts working at maximum efficiency. General unskilled labor was plentiful during the last six months of the year.

Labor relations were satisfactory throughout the year. Three minor grievances were started during the year but two were dropped by the Union after the 4th Step meeting. The first, which was later dropped in Step 4, concerned James Dove, Frank Guizetti and Lloyd O'Neill who were given lay-offs for coming up early on a weekend shift. The second, which was also dropped in Step 4, concerned Martin Duffy who had been given a three day lay-off for violation of safety rules and since Duffy was on the Grievance Committee he claimed discrimination. A third grievance involved Joseph and Donald Umbrelle who had been given a lay-off for failure to follow orders. This grievance has gone to Step 4 and is pending a decision on the part of the Union as to whether or not it will go to arbitration.

Union membership increased from 82% in January to 92% in December.

Employment Record:-

At the end of the year 658 men were employed at the mine. There was a net gain of 53 employees for the year.

Number of Men 1/1/53	605
Added to Roll During the Year	<u>227</u>
Total	832
Separations	<u>174</u>
Total on Payroll 12/31/53	658
Net Gain	53

Only a very small percentage of the new hires were men with previous mining experience. The most predominate reasons for separations were to take other employment and to enter the military service.

Vacations and Holidays:-

Due to the excessive production delay caused by the ore hoist breakdown, no regular vacation period was scheduled during the year. The postponement of some of the hoist repairs to the second week of the deer hunting season eliminated much absenteeism which normally would have occurred at that time.

The men benefited by six paid holidays, New Years, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas, in accordance with the provisions of the labor contract.

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5. LABOR AND WAGES: (Cont'd)

Promotions:-

Nine men were promoted to the following positions during the year.

Underground Foreman

L. Delongchamp

Shift Bosses

E. Kiiskala
J. Roberts
A. Moore
E. Mattson
J. Vercoe

Dispatchers

P. Peterson
J. Henfors
E. Maki

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5. LABOR AND WAGES: (Cont'd)

b. Comparative Statement of Wages and Product:
(Operating Only - Not Including E&A Work)

	<u>1953</u>	<u>1952</u>	<u>Increase or Decrease</u>
<u>Average Wages Per Day:</u>			
Surface	\$ 16.96	\$ 15.98	\$.98
Underground	<u>19.49</u>	<u>18.09</u>	<u>1.40</u>
Total	\$ 18.98	\$ 17.65	\$1.33
<u>Average Wages Contract Miner:</u>	\$ 20.82	\$ 18.38	\$2.44
<u>Wages Per No. of 20 2/3 Days: (1952 based on 19 3/4 Days)</u>			
Surface	\$350.56	\$315.60	\$34.96
Underground	<u>402.86</u>	<u>357.28</u>	<u>45.58</u>
Total	\$392.32	\$348.59	\$43.73
<u>Tons Per Man Per Day:</u>			
Surface	40.81	32.86	7.95
Underground	<u>10.33</u>	<u>8.63</u>	<u>1.70</u>
Total	8.25	6.84	1.41
<u>Labor Cost Per Ton:</u>			
Surface	\$.416	\$.486	\$.070
Underground	<u>1.886</u>	<u>2.096</u>	<u>.210</u>
Total	\$ 2.302	\$ 2.582	\$.280

MATHER MINE "B" SHAFT
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6. SURFACE:

Buildings:-

The buildings continued in excellent condition with a minimum of maintenance.

New Installations and New Equipment:-

A magnet was placed at the end of the 48" belt in the headframe to eliminate "tramp" iron from the conveyor system.

A new improved belt tripper was installed on the north stocking trestle belt.

The west extension stocking conveyor was completed and went into operation during July.

Heating units were installed in each of the three stocking trestles.

A sawdust collector was installed in the carpenter shop which resulted in a considerable saving in cost of sawdust removal.

A tractor, mounting a fork lift, was placed into service for general loading in the timber field.

A cribbing framer was purchased jointly by the Mather Mine "A" and "B" Shafts, which greatly speeds the cutting of raise cribbing.

A new Ingersoll-Rand drill sharpener was installed in the drill shop. This replaced one of the old sharpeners which was moved into the blacksmith shop where the need for a machine of that type existed.

Engine House:-

In March the welds between the hub and gusset plates on the south drum of the ore hoist failed. The drum was removed and shipped to the Nordberg plant in Milwaukee for repairs. While the south drum was being repaired, the north drum, which was defective, was replaced with a new drum furnished by the Nordberg Company. During the summer the rebuilt drum began to show failure of the repaired welds. These were reinforced temporarily but replacement was necessary. In November a new south drum was installed and a new through shaft was placed in the hoist.

Headframe and Stocking:-

There were no major production delays in the headframe and stocking trestles during the year. The biggest single delay that did occur was a 14' rip in the 48" headframe conveyor belt. The rip was repaired with belt clips which later pulled loose, ripping the belt further. The belt was changed on a weekend with no loss of production.

MATHER MINE "B" SHAFT
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YEAR 1953

6. SURFACE: (Cont'd)

Road Building:-

The road between Mather Mine "A" and "B" Shaft properties, which was started late in 1952, was completed during the year. This road is proving to be a great convenience and time saver in transporting materials and equipment between the two properties.

Real Estate:-

There were a number of real estate purchases transacted during the year as a continuation of the long range program for eventually clearing the area southeast of the shaft, which is over future mining areas. Five houses and two lots were purchased at a total cost of \$34,500.00.

25% COTTON FIBRE
GILBERT BOND
U.S.A.

MATHER MINE "B" SHAFT
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7. UNDERGROUND:

a. General:

Ore production increased from an average of 57,000 tons per month in 1952 to 90,000 tons per month in 1953.

Production increased from 686,139 tons in 1952 to 1,080,150 tons in 1953. This being the first year that a million tons was surpassed at Mather "B".

Of the yearly tonnage, 502,794 tons or 47% came from the 6th Level and 564,634 tons or 52% came from 7th Level. The remaining 12,722 tons or 1% came from development work on the 8th Level.

5th Level:-

The main heading was advanced 1,715' by Mather "A" during the year. An additional 1,025' must be driven before the 5th Level is connected through to the Mather "B" Shaft. A small drift was driven from the Mather "B" Shaft in order to protect the shaft steel when the main line heading connects through. Because of the limited production schedule of sulphurous ore, development work on the ore pass between the 5th and 6th Levels was stopped temporarily.

6th Level:-

Sub-level stoping combined with long-hole stoping were employed entirely in mining 394,840 tons of sulphurous ore from the 6th Level. These mining methods were necessary because of the extreme hardness of the ore. Although development costs are comparatively high in sub-level stoping, a clean product, with little contamination from the hanging wall, is obtained once mining begins.

Because of the softness of the standard ore bodies on the 6th Level, the less expensive block caving system was used in mining the remaining 107,954 tons.

Area Between 6000 and 6100 Cross-cuts: Sub-level stoping of a 400,000 ton sulphurous ore body produced 189,000 tons of ore during the year.

A 55,000 ton standard ore body north of No. 25 Dike was mined by the block caving method.

Area Between 6100 and 6200 Cross-cuts: A 160,000 ton high sulphur ore body which was developed for mining by long-hole stoping with grizzly subs began producing in September and 33,000 tons were mined from this stope by the end of the year.

MATHER MINE "B" SHAFT
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YEAR 1953

7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

Area Between 6200 and 6300 Cross-cuts: Sub-level stoping was continued throughout the year in the area north of No. 22 Dike. A total of 119,000 tons of sulphurous ore was mined from this stope.

Development was started in December on the sulphurous ore body along the footwall.

Area Between 6700 and 6800 Cross-cuts: An isolated standard ore body produced 52,000 tons of ore by the block cave method of mining during 1953.

7th Level:-

The block caving system of mining is adaptable to all of the standard ore bodies on the 7th Level.

In order to maintain a balance in ore reserves, between the two shafts, approximately 1,000,000 tons of "B" Shaft ore was developed by "A" Shaft during the year. This standard ore is found between the 7600 Xcut and the boundary line.

Area Between 7000 and 7100 Cross-cuts:

Block #70-A: Mining was completed in the eastern portion of the block cave area and development of the western portion was started in September. This block produced 38,000 tons of standard ore.

Block #70-B: Block caving was started in September and 11,000 tons were produced from a 300,000 ton standard ore body above the 7000 Xcut.

Block #71-A: Development of this 600,000 ton standard ore body was near completion at the end of the year. Block caving in the southern portion began in January and 221,000 tons of standard ore has been produced to date.

Area Between 7100 and 7200 Cross-cuts:

Block #72-A: A ventilation drift was driven between the two cross-cuts.

Area Between 7200 and 7300 Cross-cuts:

Block #73-A: The south portion of this standard ore body was mined during the year and the north portion was being developed. This block cave area produced 80,000 tons of standard ore.

Block #73-B: In November, this 100,000 ton standard ore body was undercut and 20,000 tons were mined from the area by the end of the year.

MATHER MINE "B" SHAFT
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7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

Area Between 7400 and 7500 Cross-cuts:

Block #75-A: Development of a 40,000 ton standard ore body north of #22 Dike began in July and was nearly completed by the end of the year.

Area Between 7500 and 7600 Cross-cuts:

Block #76-A: Block caving continued during the year in the portion of the standard ore body north of No. 22 Dike. This block has produced 220,000 tons of ore.

Block #76-B: A 150,000 ton standard ore body, which is north of No. 22 Dike and along the footwall, was being developed at the end of the year.

Area Between 7600 and 7700 Cross-cuts:

Block #77-A: A ventilation connection was driven between the two cross-cuts.

Area Between 7700 and 7800 Cross-cuts: The 7800 Xcut was completed in June. A total of 155' of standard ore was encountered in the drift.

Mather Mine "A" Shaft crews developed and undercut the south portion of this standard ore body. This area has produced approximately 80,000 tons of ore.

Area Between 7800 and 7900 Cross-cuts: The 7900 Xcut was completed in July. Because of being off set by the Cambria-Jackson fault, this standard ore body is above the cross-cut. No ore was encountered while advancing the cross-cut. Development work by the Mather Mine "A" Shaft was started at the end of the year in the western end of this standard ore body.

Area of 7th to 8th Level Ore Pass: At the end of the year development work was started on the ore pass drift from the main line near the 7000 Xcut. Upon completion of the ore pass, the 7th Level ore will be dropped to the 8th Level storage trench, crushed, conveyed to the shaft and hoisted from the 8th Level.

8th Level:-

The standard ore bodies encountered in the cross-cuts and diamond drill holes appear to be very adaptable to a block caving system of mining. Although nearly another year of development work is required to complete the main line and cross-cut headings, this level is expected to be producing ore early in 1954.

With the exception of the 8000 Xcut, which was driven for exploration purposes, the next three cross-cuts were not advanced because of a massive intrusive which cuts off the ore in this portion of 8th Level.

MATHER MINE "B" SHAFT
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7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

Area Shaft Plat and Underground Crusher Plant: The east skip plat was being developed at the end of the year.

Development work on the crushing plant, which will, upon completion, handle all of the 7th and 8th Level ore, was started in June. The crusher storage trench was excavated and the conveyor belt drift was in the early stages of development by the end of the year.

Area Main Line: By the end of the year, the main drift heading was 395' west of the Mather Mine "A" and "B" Shaft boundary. Approximately 2,000' of drift must be driven before the 8th Level is connected through to the Mather "A". Only switching room was driven in the 8900 and 8910 Xcuts as the main line was advanced.

Area 8000 Cross-cut: The 8000 Xcut, which was advanced southward to explore the 9th and 10th Level ore bodies, was completed in February. A total of 145' of standard ore, which represents the top of the 9th level ore body, was encountered in the drift. From the end of the cross-cut a small drift was driven for diamond drill stations, which will be used in exploring 9th and 10th Level ore.

Area Above 8400 Cross-cut: The 8400 Xcut was completed in April. Development work was started in May on the 1,500,000 ton ore body which lies 100' above the level. Because of the texture and height of the ore the block cave system with grizzly subs will be readily adaptable for mining this ore body.

Because of a flattening in the footwall, the footwall-ore contact is above level elevation and no ore was encountered while advancing the cross-cut.

Area Above 8500 Cross-cut: The 8500 Xcut was completed in June. The drift encountered 120' of standard ore. This drift was advanced an additional 250' southward to explore the 9th and 10th Level ore bodies.

Development work was started in July on the 1,000,000 ton standard ore body, the footwall-ore contact of which lies 50' above the level.

A ventilation raise to the 7th Level was completed in August.

Area Between 8500 and 8600 Cross-cuts: The 8600 Cross-cut, which encountered 60' of ore, was completed in October.

Development work was started at the end of the year on a standard ore body which lies just above the level.

A ventilation drift to the 8500 Xcut was also driven during the year.

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7. UNDERGROUND: (Cont'd)

a. General: (Cont'd)

Area 8700 Cross-cut: The 8700 Xcut was only partly completed at the end of the year.

Area 8800 Cross-cut: The 8800 Xcut was advanced 375' during the year.

A ventilation connection, which will be driven to the 8700 Xcut, was started in December.

10th Level:-

The main line, which was started in August, is 575' west of the shaft. The experimental Joy combination drilling and loading jumbo was used to advance this heading.

The Worthington pump was assembled in June and the #1 pumpstall was completed by the end of the year.

The 260' rock pass between the 10th Level trench and the 9th Level, which was started in March, was 245' above the level at the end of the year. As all development rock from the 9th Level will go through this rock pass the development of a storage trench and skip pocket for the 9th Level will be eliminated.

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7. UNDERGROUND: (Cont'd)

b. Exploration:

An extensive diamond drill program was carried out at Mather Mine "B" Shaft during 1953. The major portion of the drilling was done from 7th Level with the remainder being distributed among 4th, 5th, 6th and 8th Levels. The program was planned to cover four major objectives. These were as follows:

1. 4th Level geophone installation.
2. Outlining 5th Level ore.
3. Outlining and detailing 7th Level ore.
4. Outlining and detailing 8th Level ore.

This program will be carried into 1954 with four diamond drills operating. The exploration will be concentrated on 8th Level with holes being drilled from 8th to explore for 9th and 10th Level contacts. Some additional test drilling is anticipated for 7th Level and a few more holes are needed for 5th Level ore outlines.

4th Level:

One hole was drilled from 4th Level for future subsidence studies. The hole was drilled so that it would be above the immediate mining areas. One geophone was installed in the hole during the year.

The subsidence hole No. 170 was drilled S. 62° W. from the 4th Level shaft cut-out. It encountered the contacts as expected and a small amount (7') of 1st Class Ore was cored. The hole bottomed in the large sill above 6th Level.

5th Level:

A total of five holes were drilled by Mather Mine "A" Shaft to explore the "B" Shaft side of 5th Level.

Hole No. 145 was drilled between the 5500 and 5600 Xcuts and proved less tonnage in this area than anticipated.

Holes No. 171 and 182 were drilled in the 5400 Xcut area. Hole No. 171 showed the orebody to extend through the area with Hole No. 182 proving it cut-off up the dip at the Jackson Strip boundary.

Holes No. 215 and 216 were drilled from the 5200 Xcut to locate contacts above the cross-cut. Hole No. 215 proved less tonnage, caused by a hanging wall nose; however, Hole No. 216, drilled at a steeper angle proved the orebody to regain full size and extend up the dip.

In general, 5th Level tonnages were increased considerably by the above drilling.

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7. UNDERGROUND: (Cont'd)

b. Exploration: (Cont'd)

6th Level:

Four holes were drilled from 6th Level during the year. Of this drilling, one hole was drilled for 5th Level contacts, one for 6th Level contacts and two for 7th Level contacts.

Hole No. 226 was drilled in the 6400 Xcut area to test for 5th Level ore contacts. By the end of the year the drilling was proving the large tonnage of high sulphurous ore expected in this area.

Hole No. 176, drilled from the 6800 Xcut showed no ore, proving the orebody not to extend up the dip.

Two holes were drilled from the 6800 Xcut to test for 7th Level ore. Holes No. 168 and 175 proved the indicated ore section above the 7800 Xcut.

7th Level:

A total of twenty-six holes were drilled from 7th Level during the year. The drilling was concentrated more on detailing ore outlines prior to mining than testing ore structures. Four down holes were drilled for 8th Level contacts. As stated above, two down holes were drilled from 6th Level to determine the ore section in the 7800 Xcut area. The 7th Level drilling continued to increase the standard ore available to 7th Level mining.

Five holes were drilled in the 7000 Xcut area. Holes No. 178, 169 and 174 were drilled to test the orebody found above the large intrusive which abuts the south end of the cross-cut. Hole No. 174 proved the relationship of the intrusive to the slope for needed mining contacts. Hole No. 169, with 87' of 1st Class Ore, showed the orebody to extend west. Hole No. 178, drilled from the same station, proved the orebody to have approximately 100' of height.

Only one hole, No. 153, was drilled from the 7100 Xcut. It proved only limited ore available above this portion of the cross-cut.

Holes No. 150 and 187 were drilled between the 7100 and 7200 Xcuts. Both holes proved the indicated plunge to the west of the orebody. This is the orebody found in the footwall trough on 7th Level.

A total of five holes were drilled in the 7300 Xcut area. Just east of the cross-cut, Hole No. 164 was drilled to substantiate Hole No. 80. The latter had proven a steep build-up but due to the inability to core the material the analyses were based on sludge. Hole No. 164 was cased and accurate sludge samples taken. The drilling proved approximately the same ore section as Hole No. 80. Holes No. 208, 190, 199 and 188 were drilled from a station just west of the cross-cut. Holes No. 190 and 199 were drilled for 7th Level information and proved that little ore exists above the level

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1953

7. UNDERGROUND: (Cont'd)

b. Exploration: (Cont'd)

in this area. Holes No. 188 and 208 were drilled for 8th Level information. Hole No. 208 picked up what appears to be the top of the 8th Level ore in this area and Hole No. 188 proved it's cut-off up the dip.

Two holes were drilled in the 7400 Xcut area to determine 8th Level ore and footwall contacts. Hole No. 203 showed 145' of 1st Class Ore and Hole No. 200 proved 120' of 1st Class Ore. The drilling proved an increase in tonnage in the 8500 Xcut area.

In the 7500 Xcut area, three holes were drilled. Two holes No. 159 and 162 were drilled for ore and hanging contacts. Hole No. 158 was drilled south from the cross-cut and picked-up 102' of 1st Class Ore at level elevation. This represents the top or maximum height for 8th Level ore in this area.

Two holes were drilled from between the 7500 and 7600 Xcuts to test the ore section for block cave area 76-A and B. Hole No. 165 located ore and stope contacts while Hole No. 166 proved a good section, 78' of 1st Class Ore, to carry up the dip.

One hole, No. 160, was drilled from the 7600 Xcut and proved an 82' section of 1st Class Ore to carry to 6th Level elevation. This information was for Blocks 76-A and B.

Holes No. 177 and 186 were drilled from the same station between the 7600 and 7700 Xcuts. The results were as anticipated with a footwall roll being proven.

One hole was drilled from the 7800 Xcut to test for an extension of the ore found in Hole No. 123. Hole No. 196 proved 65' of 1st Class Ore to carry to approximately the -700 elevation. Although on the "B" Shaft side, this area is being mined by "A" Shaft.

Two holes were drilled on the "A" Shaft side by Mather Mine "B" Shaft during the year. Hole No. 151, a flat hole, proved ore on level elevation. Hole No. 157 was drilled to test the height of this ore but failed to prove an extensive build-up above the level. It appears that the ore cored in Hole No. 151 represents the top of 8th Level ore.

8th Level:

On 8th Level, the diamond drill activity increased considerably towards the end of the year. A total of twelve holes were drilled. The drilling was confined to the main line and cross-cuts. It both preceded and followed development so that accurate planning could be had for future mining. A considerable increase in tonnage for 8th Level was realized during the year as a result of this drilling.

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7. UNDERGROUND: (Cont'd)

b. Exploration: (Cont'd)

One hole was drilled from the 8400 Xcut to test for an extension to the south of the ore found in Hole No. 144. Hole No. 201 proved the ore cut-off to the south along a major fault.

A total of three holes were drilled from the 8500 Xcut. Hole No. 209 located the fault contact and ore cut-off in the south end of the cross-cut. Hole No. 214, drilled farther north, picked up the expected ore section. Hole No. 198, a down hole from the end of the cross-cut proved 57' of 1st Class Ore and a footwall flattening in the area.

A drill station between the 8500 and 8600 Xcuts was the site of two holes that tested between the cross-cuts. Holes No. 204 and 213 proved the ore section as expected.

Two holes were drilled from the 8600 Xcut for indicated structural changes and ore contacts. A reverse in the footwall caused by a drag along a major fault was indicated in the cross-cut. Hole No. 218 proved this and showed only small runs of ore. Hole No. 221 was drilled farther north and showed the ore to extend 63' above the cross-cut. A slight reduction in tonnage was realized in the south portion of the cross-cut by this drilling.

Prior to the driving of the 8700 Xcut, Hole No. 202 was drilled due south. It was drilled through the orebody known on the north side of the Cambria-Jackson fault and continued south in attempts to pick up a possible orebody indicated by surface and 7th Level drilling farther west. The hole located this new orebody with 248' of ore being proven on level elevation. It is cut-off to the south by what is believed to be the Negaunee Shaft fault.

After the 8800 Xcut was driven beyond the Cambria-Jackson fault, Hole No. 224 was drilled to locate the above mentioned orebody. By the end of the year, the hole had advanced 178' into the orebody with approximately another 100' of ore indicated.

The 8910 Xcut was the site of two holes which were drilled at the "B" Shaft west boundary. The first hole, No. 220, tested the ore shown in surface hole 142-A and B and proved 293' of 1st Class Ore on level elevation. Hole No. 225 was drilled to test for height above the level and proved 67' of 1st Class Ore. It appears that this ore extends to 7th Level elevation. This is the same orebody drilled from the 8700 and 8800 Xcuts. It plunges eastward and is cut-off in the 8600 Xcut area.

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7. UNDERGROUND: (Cont'd)

b. Exploration: (Cont'd)

The following table shows the drilling for the year.

<u>Holes Drilled From 4th Level For Geophone Installation</u>	<u>Drilled From</u>	<u>Footage Drilled</u>	<u>1st Class Ore Drilled</u>	<u>Total Depth</u>
Hole Number: 170	0'	1,400'	7'	1,400'
<u>Holes Drilled From 5th Level To Explore 5th Level</u>				
145	0'	439'	50'	439'
171	0'	329'	115'	329'
182	0'	289'	20'	289'
215	0'	273'	87'	273'
227	0'	227'	85'	227'
<u>Holes Drilled From 6th Level To Explore 5th Level</u>				
226	0'	125'	21'	125'
<u>Holes Drilled From 6th Level To Explore 6th Level</u>				
176	0'	132'	0'	132'
<u>Holes Drilled From 6th Level To Explore 7th Level</u>				
168	0'	120'	50'	120'
175	0'	160'	50'	160'
<u>Holes Drilled From 7th Level To Explore 7th Level</u>				
150	10'	50'	10'	60'
151	28'	772'	112'	800'
153	0'	97'	10'	97'
157	0'	322'	28'	322'
158	0'	261'	102'	261'
159	0'	85'	20'	85'
160	0'	179'	82'	179'
162	0'	84'	36'	84'
164	0'	269'	185'	269'
165	0'	145'	50'	145'
166	0'	125'	78'	125'
169	0'	331'	87'	331'
174	0'	160'	75'	160'
177	0'	259'	51'	259'

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7. UNDERGROUND: (Cont'd)

b. Exploration: (Cont'd)

<u>Holes Drilled From 7th Level To Explore 7th Level (Cont'd)</u>	<u>Drilled From</u>	<u>Footage Drilled</u>	<u>1st Class Ore Drilled</u>	<u>Total Depth</u>
Hole Number: 178	0'	252'	31'	252'
186	0'	274'	67'	274'
187	0'	195'	84'	195'
189	0'	181'	41'	181'
190	0'	77'	35'	77'
196	0'	215'	65'	215'
197	0'	190'	47'	190'
199	0'	118'	10'	118'
<u>Holes Drilled From 7th Level To Explore 8th Level</u>				
188	0'	97'	40'	97'
200	0'	131'	120'	181'
203	0'	155'	145'	155'
208	0'	425'	285'	425'
<u>Holes Drilled From 8th Level To Explore 8th Level</u>				
201	0'	326'	0'	326'
202	0'	837'	248'	837'
204	0'	235'	121'	235'
209	0'	271'	5'	271'
213	0'	556'	249'	556'
214	0'	305'	53'	305'
218	0'	247'	11'	247'
220	0'	513'	293'	513'
221	0'	242'	63'	242'
224	0'	374'	144'	374'
225	0'	235'	67'	235'
<u>Holes Drilled From 8th Level To Explore 9th Level</u>				
198	0'	123'	57'	123'
Totals....	48	13,207'	3,177'	
Less Footage Drilled By "A" Shaft.....	-5	-1,557'	-357'	
Total "B" Shaft Drilling.....	43	11,650'	3,534'	

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7. UNDERGROUND: (Cont'd)c. Timbering:Statement of Timber Used Under Operating Account "Timbering"

	<u>Lineal Feet</u>	<u>Avg. Price Per Foot</u>	<u>Amount</u>
Cribbing	138,467	.13094	\$ 18,131.84
Stulls (8' timber)	36,312	.29951	10,876.15
Total	<u>174,779</u>	<u>.16596</u>	<u>\$ 29,007.99</u>
Lagging	1,030,039	.022279	\$ 22,948.94
Poles	238,472	.041216	9,828.93
Total	<u>1,268,511</u>	<u>.025839</u>	<u>\$ 32,777.87</u>
I Beams (6½x8)	1,483 pcs.	14.44608	\$ 21,423.55
H Beams (4x4)	5,761 pcs.	7.43697	42,844.43
H Beams (6x6)	822 pcs.	8.87128	7,292.20
Arch Caps (4x4)	334 pcs.	12.87173	4,299.16
Arch Caps (6x6)	292 pcs.	14.76886	4,312.51
Cir. Sets	3,392 pcs.	11.92547	40,451.20
Arch Steel	102 pcs.	14.9049	1,520.30
Cir. Caps	89 pcs.	14.46471	1,287.36
Hat Sections	1,289 pcs.	2.84214	3,663.53
Galbestos	6 pcs.	5.82	34.92
Minecrete Blocks	62 pcs.	.25	15.50
Minecrete Back Poles	102 pcs.	1.52245	155.29
Set Bolts (¾x1½)	30,500 pcs.	.075578	2,305.13
Set Bolts (1x2)	5,800 pcs.	.19422	1,126.51
Angle Iron	106,677 lbs.	.066535	7,097.80
Ref. Rod	23,480 ft.	.038047	893.36
Cement (Bags)	6,107 per bag	1.10316	6,737.03
Cement (Bulk)	17,640 lbs.	.011218	197.89
Sand	1,263,000 lbs.	.0010705	1,352.15
Gravel	1,880,660 lbs.	.001654	3,112.10
			<u>\$150,121.92</u>
Grand Total Including Steel and Concrete Materials			\$211,907.78

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7. UNDERGROUND: (Cont'd)c. Timbering: (Cont'd)Statement of Timber Used - All Operations

	<u>Lineal Feet</u>	<u>Avg. Price Per Foot</u>	<u>Amount</u>
Cribbing	163,027	.130731	\$ 21,312.75
Timber	<u>36,672</u>	<u>.299578</u>	<u>10,986.15</u>
Total	<u>199,699</u>	<u>.161737</u>	<u>\$ 32,298.90</u>
Lagging	1,515,507	.022232	\$ 33,693.91
Poles	<u>334,756</u>	<u>.039419</u>	<u>13,196.05</u>
Total	<u>1,850,263</u>	<u>.025342</u>	<u>\$ 46,889.96</u>
	<u>No. Pcs.</u>	<u>Price Ea.</u>	
Beams (4x4)	8,196	7.1949	\$ 58,969.50
Beams (6x6x9)	1,194	10.1137	12,075.81
Beams (4x8x9)	23	9.1934	211.45
Beams (6½x8)	2,323	14.63509	33,997.32
I Beams	4	32.4575	129.83
Arch Caps (4x4)	326	13.2666	4,324.93
Arch Caps (6x6)	292	14.7688	4,312.51
Cir. Caps (15.5#)	1,425	12.7213	18,127.98
Cir. Legs (15.5#)	1,792	12.5741	22,532.90
Cir. Sills	852	9.6717	8,240.30
Cir. Legs (25#)	276	17.6798	4,879.63
Cir. Caps (25#)	181	19.3760	3,507.07
Cir. Caps (18.9#)	34	16.4205	558.30
Cir. Legs (18.9#)	10	15.58	155.80
Arch Legs	<u>262</u>	<u>13.90</u>	<u>3,641.80</u>
Total	<u>17,190</u>	<u>10.21903</u>	<u>\$175,665.13</u>
Galbestos	645 pcs.	5.8026 ea.	\$ 3,742.68
Hat Sections	7,924 pcs.	2.8726 ea.	22,763.27
Minecrete Back Poles	1,116 pcs.	1.5069 ea.	1,681.80
Minecrete Blocks	1,567 pcs.	.2248 ea.	352.39
Cement Bags	11,689	1.1291 ea.	13,198.78
Cement (Bulk)	187,082 lbs.	.011125 lb.	2,081.35
Gravel	3,093,390 lbs.	.001473 lb.	4,556.91
Sand	4,521,284 lbs.	.001019 lb.	4,610.03
Angle Iron	244,038 lbs.	.065278 lb.	15,930.50
Set Bolts (½x1½)	55,000 pcs.	.075572 ea.	4,156.49
Set Bolts (1x2)	9,600 pcs.	.194237 ea.	1,864.68
Total			<u>\$ 74,938.88</u>

Grand Total Including Steel and Concrete Materials

\$329,792.87

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7. UNDERGROUND: (cont'd)

d. Explosives:

The following table includes the type, quantity and price of blasting supplies used on all operations.

	<u>Pounds</u>	<u>Average Price</u>	<u>Amount</u>
Gelamite (1-1/8x8)	148,150	17.40906 CWT	\$ 25,791.53
Gelamite (1 1/2x8)	194,974	17.56841 CWT	34,253.85
Gelatin	234,075	23.39284 CWT	54,756.80
Hercomite (1 1/2x24)	266,752	16.58769 CWT	44,248.01
Hercomite (2x24)	<u>41,976</u>	<u>16.96169 CWT</u>	<u>7,119.84</u>
Total Powder	885,927	18.75662 CWT	\$166,170.03

Explosives Used in Breaking 1,080,150 Tons of Ore
In Stopping and Development in Ore

	<u>Quantity</u>	<u>Average Price</u>	<u>Amount</u>
Gelamite (1 1/2x8)	48,173 lbs.	17.43 CWT	\$ 8,400.54
Gelamite (1-1/8x8)	55,637 lbs.	17.06 CWT	9,497.10
Hercomite (2x24)	40,368 lbs.	16.98 CWT	6,856.32
Hercomite (1 1/2x24)	263,872 lbs.	16.58 CWT	43,754.08
Gelatin	<u>222,595 lbs.</u>	<u>23.38 CWT</u>	<u>52,047.43</u>
Total	630,645 lbs.	19.1162 CWT	\$120,555.47

Dry Fuse	594,169'	10.4439 M	6,205.50
Powder Bags	109	4.549 ea.	495.85
Fuse Lighters	16,500	9.09 M	150.00
Blasting Caps	82,547	1.671 C	1,379.66
Primacord	1,041,625'	34.096 M	35,515.25
Elec. Caps	18,768	2.607 C	4,893.24
Tamping Plugs	31,500	4.74 C	1,493.13
Lead Wire	37,700'	19.98 M	753.59
Ignitacord	8,000'	7.55 M	60.40
Ignitacord Conn.	7,000	2.00 C	140.00
Connector Wire	4 lbs.	1.00 per. lb.	4.00
Thermoplastic Wire	4,000'	74.75 M	299.00
Total			<u>\$51,389.62</u>

Grand Total Explosives and Blasting Supplies \$171,945.09

Pounds of Powder Per Ton of Ore	.58384
Tons of Ore Per Pound of Powder	1.71277
Cost Per Ton For Powder	.11160
Cost Per Ton For Fuse, Caps, etc.	.04757
Cost Per Ton For All Explosives	.15918

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7. UNDERGROUND: (Cont'd)

e. Pumping:

All the shaft water is collected and stored behind the 4th Level dam and used as drilling water. All the mine water at "B" Shaft flows to "A" Shaft along the 6th Level footwall drift. During the year, the average flow from 6th Level was 102 G.P.M., 7th Level 58 G.P.M. and 8th Level 17 G.P.M. The water from 7th Level and 8th Level flows towards the shaft where it is pumped up to the 6th Level.

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

a. Comparative Mining Costs:

	<u>1953</u>	<u>1952</u>
Product	1,080,150	686,139
Underground Costs	\$ 2.764	\$ 3.066
Surface Costs	.371	.373
General Mine Expense	.681	.713
Cost of Production	\$ <u>3.816</u>	\$ <u>4.152</u>
Less Transfer to Mather "A" Shaft	<u>.007</u>	
Cost of Production	\$ <u>3.809</u>	\$ 4.152
Allowance Under Section 309	\$.561	\$.984
Amortization of Defense Facilities	\$.359	\$.457
Depreciation:		
Plant and Equipment	\$.134	\$.172
Development After 12/31/44	.166	.151
Pre-Production Development	.014	.023
Movable Equipment	.011	.021
Taxes	.163	.184
Loading and Shipping	<u>.049</u>	<u>.044</u>
Total Cost at Mine	\$ <u>5.266</u>	\$ <u>6.188</u>
Budget-Estimated Cost Per Ton	\$ 5.076	\$ 5.601
Number of Shifts and Hours	4 1-8 Hr. 1 2-8 Hr. 246 3-8 Hr.	12 1-8 Hr. 30 2-8 Hr. 213 3-8 Hr.
Total 8 hr. Operating Shifts	744	711
Number of Operating Days	248	237
Average Daily Product	4,361	2,895

Proportion of Labor and Supplies

	<u>Amount</u>	<u>Per Ton</u>	<u>Per Cent</u>
Labor	\$2,746,598.22	\$2.543	59%
Supplies	<u>1,948,256.24</u>	<u>1.803</u>	<u>41%</u>
Total Cost at Mine	\$4,694,854.46	\$4.346	100%

MATHER MINE "B" SHAFT
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8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

Comments:-

In spite of increased labor and supply costs the total cost at the mine decreased \$.922 per ton over that of the previous year. Cost of Production decreased \$.343 per ton. Of this item Surface Costs decreased \$.002, Underground Costs decreased \$.302 and General Mine Expense decreased \$.032. A decrease in Depreciation amounted to \$.042 per ton and Section 309 combined with Amortization for Defense Facilities decreased \$.521 per ton. Taxes decreased \$.021 and Loading and Shipping increased \$.005.

These favorable costs are a reflection of increased production and of the increase in areas being mined by the less expensive block caving system.

MATHER MINE "B" SHAFT
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8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

b. Detailed Cost Comparison (Operating):

	1953		1952	
	Amount	Per Ton	Amount	Per Ton
Estimated Wage Adjustment	\$ 6,623.14	.006	\$ 175,522.57	.256
Exploring in Mine	6,716.96	.006	9,763.49	.014
Development in Rock	326,437.65	.302	147,435.98	.215
Development in Ore	229,459.93	.213	283,194.65	.413
Stoping	921,865.41	.854	556,367.39	.811
Timbering	529,885.13	.491	407,947.45	.595
Tramming	484,626.26	.449	228,306.56	.333
Ventilation	24,170.90	.022	10,021.59	.015
Pumping	5,811.03	.005	5,018.88	.007
Compressors & Air Pipes	74,935.21	.069	48,092.82	.070
Underground Superintendence	160,898.10	.149	89,260.51	.130
Maint: Comp. & Power Drills	10,662.02	.010	1,013.18	.001
Scrapers & Mech. Loaders	159,829.47	.148	108,364.52	.158
Tramming Equipment	31,382.86	.029	26,304.21	.038
Pumping Machinery	11,939.12	.011	7,176.16	.010
Total Underground Costs	\$2,985,243.19	2.764	\$2,103,789.96	3.066
Hoisting	\$ 136,481.88	.126	\$ 92,489.71	.135
Stocking Ore	40,318.44	.037	35,199.93	.051
Screening-Crushing at Mine	33,265.09	.031	23,982.96	.035
Dry House	40,439.30	.037	36,774.69	.054
General Surface Expense	70,734.50	.066	35,046.11	.051
Maint: Hoisting Equipment	49,842.68	.047	15,013.45	.022
Shaft	6,626.96	.006	5,111.21	.007
Top Tram Equipment	14,238.97	.013	3,782.11	.006
Docks, Trestles & Pockets	3,940.34	.004	3,152.65	.005
Mine Buildings	4,342.65	.004	5,065.07	.007
Total Surface Costs	\$ 400,230.81	.371	\$ 255,617.89	.373
Geological	\$ 11,407.22	.010	\$ 8,424.66	.012
Mining Engineering	46,448.17	.042	39,897.14	.058
Mechanical & Electrical Eng.	10,476.33	.010	7,918.15	.012
Analysis & Grading	94,652.50	.088	55,388.94	.081
Safety & Personnel Departments	9,283.67	.009	5,327.15	.008
Telephones & Safety Devices	52,007.81	.048	35,727.01	.052
Local & General Welfare	6,314.30	.006	6,399.98	.009
Spec. Exp., Pensions & Allow.	24,431.82	.023	15,657.24	.023
Ishpeming Office	81,993.64	.076	46,547.97	.068
Mine Office	113,272.68	.105	84,102.62	.123
Insurance	50,694.48	.047	37,614.79	.055
Personal Injury	19,906.02	.018	21,395.88	.031
Employees Vacation Pay	104,832.85	.097	78,307.28	.114
Social Security Taxes	61,657.49	.057	47,672.03	.069
Holiday Pay	48,729.11	.045		
Rental of Training Facilities			1,050.00	.002
Total General Mine Expenses	\$ 736,108.09	.681	\$ 489,330.84	.713
COST OF PRODUCTION	\$4,121,582.09	3.816	\$2,848,738.69	4.152
Less Transfer to Mather "A" Shaft	7,299.71	.007		
COST OF PRODUCTION	\$4,114,282.38	3.809	\$2,848,738.69	4.152

MATHER MINE "B" SHAFT
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8. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd)

Capital account expenditures for the year amounted to \$1,137,353.63, which brings the cumulative expenditures in E&A-44 to \$11,806,203.58.

Capital Expenditures for Year	\$ 1,137,353.63
E&A NM-44 to Dec. 31, 1953	\$11,806,203.58
E&A 79 to Dec. 31, 1953	<u>4,922.49</u>
Total E&A to Dec. 31, 1953	\$11,811,126.07

Following are comments on E&A expenditures for 1953:

	<u>Percentage of Total E&A Expenditures</u>
E&A 44-F Purchased and installed new drum and shaft on ore hoist.	3.7
E&A 44-G Sawdust collector installed in carpenter shop; new drill sharpener in drill shop.	1.4
E&A 44-J All equipment purchased previous year; installation cost only in 1953.	3.6
E&A 44-L Less main level development and plat construction than previous year.	57.0
E&A 44-O New Item-Construction of crusher trench and conveyor tail pulley.	6.1
E&A 44-T West extension conveyor completed during year.	14.2
E&A 44-U Purchase of scrapers and hoists for expanding mining operations.	11.6

The average cost per foot of main level drifting for the year was \$77.10. All drifting done during the year required ground support.

Total Charge Offs 1953	\$1,344,546.28
Total Capital Expenditures 1953	<u>1,137,353.63</u>
Net Decrease in Capital Account.....	\$ 207,192.65

AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT:	TOTAL AUTHORIZED	EXPENDITURES TO DEC. 31, 1953	UNEXPENDED BALANCE	1953 EXPENDITURES
<u>44-A GENERAL EXPENSE:</u>				
a. Insurance		17,562.12		-
b. Engineering		71,134.33		-
c. Analysis		6,794.35		-
d. Mine Office		62,315.02		-
e. Ishpeming Office		29,169.57		-
f. Superintendence		51,406.92		-
g. Legal		635.30		-
h. Personal injury		12,886.13		-
j. Taxes - Social Security		63,001.40		4,257.98
k. Vacation expense		20,861.52		-
m. Safety Department		5,174.54		-
n. Geological		6,959.32		-
o. Policing		30,531.18		-
p. Compensation Department		1,541.87		-
q. General surface and miscellaneous		28,683.37		-
r. General and district welfare		5,019.24		-
s. Special expense		1,298.92		-
t. Pensions and retirements		8,339.95		-
u. Hospital loss		9,383.22		-
v. Examinations		540.00		-
TOTALS	480,000.00	433,238.27	46,761.73	4,257.98
<u>44-B PREPARING SITE:</u>				
a. Building roads		54,454.45		1,004.88
b. Grading for site		55,558.76		186.85
c. Purchase and moving of dwellings		22,273.72		-
d. Landscaping		19,432.19		-
e. Drainage		13,794.20		-
f. Water meter		1,818.75		-
p. Prop'n of Distribution Expense		2,122.21		-
TOTALS	176,000.00	169,454.28	6,545.72	1,191.73
<u>44-C TEMPORARY BUILDING & TEMPORARY EQUIPMENT:</u>				
a. Tool shed		413.64		-
b. Office and Dry		19,591.30		-
d. Engine house		12,735.46		-
e. Head frame		4,876.01		-
f. Shop building		3,146.57		-
g. Heating Plant		3,418.70		-
h. Rotary dump and cars		3,631.75		-
i. Ventilating fans		1,093.31		-
j. Sinking hoists and accessories		22,843.75		-
k. Compressors and accessories		14,863.38		-
l. Air lines		2,915.96		-
m. Power lines		2,460.47		-
n. Water lines		1,623.47		-
o. Sewer lines		1,460.70		-
p. Electricians shed		137.01		-
r. Machine shop		1,054.47		-
s. Lamp room		1,025.32		-
t. Rock trestle		258.38		-
TOTALS	97,575.00	97,540.65	34.35	-

<u>AUTHORIZATIONS AND EXPENDITURES</u> <u>MATHER MINE "B" SHAFT DEVELOPMENT:</u>	<u>TOTAL</u> <u>AUTHORIZED</u>	<u>EXPENDITURES TO</u> <u>DEC. 31, 1953</u>	<u>UNEXPENDED</u> <u>BALANCE</u>	<u>1953</u> <u>EXPENDITURES</u>
<u>44-D INITIAL EQUIPMENT:</u>				
a. Tractor, trailbuilder and Athey wagon		13,449.28		-
b. $\frac{1}{2}$ yard combination crane and clamshell		12,960.89		-
c. 5 ton truck		6,091.58		-
d. $\frac{1}{2}$ ton pickup truck		2,689.96		-
e. Shop equipment		17,489.30		-
f. Fuel tanks		123.15		-
h. Water main		327.49		-
j. Hopper		1,817.14		-
k. Concrete mixer		3,676.93		-
l. Pumperete		9,512.00		-
m. Ford dump truck		2,604.55		-
TOTALS	70,747.27	70,747.27	-	-
<u>44-E SINKING SHAFT:</u>				
a. Equipment		31,478.31		-
b. 1 - Shaft Sinking		659,732.43		-
2 - Stocking Rock		1,136.07		-
3 - Temporary Air Lines		1,786.80		-
c. Steel sets, sheathing and skip guides		272,322.43		1,170.67
d. Installing sets, sheathing and skip guides		104,182.76		-
e. Concreting and guniting		93,484.59		-
f. Ventilating seal		52,466.23		-
g. Discharge line		27,794.71		-
h. Counterweight pipe		32,878.21		-
i. Air lines		19,312.67		-
j. Power cables		27,688.80		-
k. Water lines		847.39		-
l. Cage guides		21,259.70		-
m. Signal cables		8,191.80		-
TOTALS	1,379,000.00	1,364,562.90	14,437.10	1,170.67
<u>44-F ENGINE HOUSE:</u>				
Contract adjustment		2,634.44		-
a. Foundations		41,114.96		-
b. Main buildings		194,139.46		461.91
c. Heating, plumbing and wiring		32,994.12		-
d. Traveling cranes		29,576.93		-
e. Skip hoist - foundation		10,675.73		-
f. Skip hoist - mechanical		193,553.76		42,335.16
g. Skip hoist - electrical		57,192.92		-
h. Cage hoist - foundations		9,148.54		-
i. Cage hoist - mechanical		137,071.47		-
j. Cage hoist - electrical		26,868.06		-
k. Compressors - foundations		11,923.03		-
l. Compressors - mechanical		67,185.49		-
m. Compressors - electrical		6,069.24		-
n. Compressors - air lines		1,917.83		-
o. Main switchboard and P.C.		31,605.88		-
q. Bell lines and signals		5,683.00		1,703.50
r. Motor generator sets		169,770.34		1,102.06
TOTALS	1,049,425.00	1,029,125.20	20,299.80	42,195.63

<u>AUTHORIZATIONS AND EXPENDITURES</u> <u>MATHER MINE "E" SHAFT DEVELOPMENT:</u>	<u>TOTAL</u> <u>AUTHORIZED</u>	<u>EXPENDITURES TO</u> <u>DEC. 31, 1953</u>	<u>UNEXPENDED</u> <u>BALANCE</u>	<u>1953</u> <u>EXPENDITURES</u>
<u>44-G SHOPS, OFFICE AND DRY BUILDING:</u>				
a. Shop wing		373,111.09		10,805.14
b. Dry wing		412,412.36		2,177.97
c. Office wing		176,686.56		3,122.02
d. Heating plant wing		221,967.85		-
<u>TOTALS</u>	<u>1,188,000.00</u>	<u>1,184,177.86</u>	<u>3,822.14</u>	<u>16,105.13</u>
<u>44-H HEAD FRAME:</u>				
a. Head frame foundations		11,086.02		-
b. Main structure		161,781.82		-
c. Shaft house foundations		13,052.37		-
d. Shaft house		83,511.02		-
e. Shaft house ore handling machine		129,687.30		540.37
f. Hold down and idler sheaves		40,123.69		-
g. Shaft air heating equipment		14,927.82		-
h. Dust collection equipment		9,829.72		805.57
<u>TOTALS</u>	<u>464,000.00</u>	<u>463,999.76</u>	<u>1,346.24</u>	<u>1,345.94</u>
<u>44-I SERVICE TUNNELS:</u>				
a. Shops to shaft		23,312.43		-
b. Shaft to timber yard		90,423.16		-
c. Shaft to engine house		29,675.65		-
d. Ore conveyor tunnel		514.21		-
e. Heating tunnel		1,520.79		-
<u>TOTALS</u>	<u>148,500.00</u>	<u>145,446.24</u>	<u>3,053.76</u>	<u>-</u>
<u>44-J PUMPING PLANT:</u>				
a. Pumphouse and sump		160,184.90		30,690.10
b. Pumps and erecting		99,865.96		10,010.38
<u>TOTALS</u>	<u>260,000.00</u>	<u>260,050.86</u>	<u>50.86</u>	<u>40,709.48</u>
<u>44-K ELECTRIC HAULAGE:</u>				
a. Locomotive		239,098.95		367.85
b. Cars		175,862.80		12,614.24
c. Timber trucks		61,311.94		11,007.35
d. Signals		5,848.19		2,255.09
e. Motor generator set		7,660.93		-
f. Trolley line		11,850.18		11,850.18
<u>TOTALS</u>	<u>514,720.00</u>	<u>489,782.81</u>	<u>24,937.19</u>	<u>13,658.65</u>
<u>44-L MAIN LEVEL DEVELOPMENT:</u>				
b. Pockets, trenches and equipment		869,548.55		45,844.42
c. Timbering		476,551.14		81,364.37
d. Drifting		1,429,692.38		338,664.42
e. Drifting equipment		138,709.72		-
f. Installed drift equipment		352,771.79		70,047.21
g. Sub-station		27,753.66		3,919.47
h. Battery station		9,739.89		13.59
i. Repair station		1,132.04		1,132.04
j. Exploration		310,122.36		86,032.12
k. Raise above level		79,985.22		431.28
l. Drift above level		30,654.48		14,995.30
m. Pumping station		63,641.60		29.35

AUTHORIZATIONS AND EXPENDITURES MATHER MINE "B" SHAFT DEVELOPMENT:	TOTAL AUTHORIZED	EXPENDITURES TO DEC. 31, 1953	UNEXPENDED BALANCE	1953 EXPENDITURES
44-L MAIN LEVEL DEVELOPMENT: -continued-				
n. Pumping equipment		3,310.78		-
q. Fan station		5,436.05		-
r. Fan and construction equipment		15,883.32		3,352.32
s. Skip pit		43,676.38		-
t. Pumping		17,183.59		-
u. Communication systems		21,004.75		1,721.92
w. Social Security Taxes		2,200.23		692.24
TOTALS	3,835,000.00	3,900,997.93	65,997.93	648,240.03
44-M MOVABLE EQUIPMENT:				
a. Tractor and bulldozer		24,918.56		-
b. Sno-go		11,422.79		-
c. Pickup truck		1,105.00		-
TOTALS	44,105.00	37,446.35	6,658.65	-
44-N CEMENT PLANT:	24,610.00	24,608.90	1.10	602.22
44-O UNDERGROUND CRUSHING PLANT:				
a. Crusher, pan feeder and grizzly		27,037.89		6,505.02
b. Belt and starting equipment		5,965.24		15,991.04
c. Steel support for belt, crusher, feeder		1,620.58		99.00
d. 200' of belt drift		1,386.00		-
e. Trench and loading and excavation		27,160.18		10,115.99
f. Discharge and excavation and steel		252.04		-
g. Social Security Taxes		374.39		182.22
TOTALS	170,000.00	51,865.84	118,134.16	12,297.65
44-O-B UNDERGROUND CRUSHING PLANT - 8TH. LEVEL:				
a. Crusher		11,756.68		11,756.68
b. Belt and starting equipment		7,541.94		7,541.94
c. Steel support for belt, starter and feeder		778.81		778.81
d. 450' of belt drift		6,464.59		6,464.59
e. Trench and loading and excavation		27,781.55		27,781.55
g. Crusher trench drift		14,312.40		14,312.40
h. 7th. level ore pass		151.87		151.87
TOTALS	220,000.00	68,787.84	151,212.16	68,787.84
44-Q SEWERS:				
a. Sanitary		5,403.82		-
b. Storm		8,712.45		-
TOTALS	25,000.00	14,116.27	10,883.73	-
44-R CONVEYOR AND POCKETS:				
a. Trestles		163,331.27		-
b. Conveyor		62,308.65		-
c. Heating Equipment		772.89		-
d. Pockets and equipment		28,448.65		-
e. Heating equipment		11,552.14		334.80
TOTALS	272,000.00	266,413.60	5,586.40	1,794.24
				2,129.04

<u>AUTHORIZATIONS AND EXPENDITURES</u> <u>MATHER MINE "B" SHAFT DEVELOPMENT:</u>	<u>TOTAL</u> <u>AUTHORIZED</u>	<u>EXPENDITURES TO</u> <u>DEC. 31, 1953</u>	<u>UNEXPENDED</u> <u>BALANCE</u>	<u>1953</u> <u>EXPENDITURES</u>
<u>44-S TIMBER YARD:</u>				
a. Tunnel		22,809.20		-
b. Tracks		11,865.99		-
c. Haulage equipment		8,533.94		-
d. Timber handling and framing equipment		42,217.43		13,283.18
e. Lighting		158.49		-
TOTALS	85,000.00	85,585.05	585.05	13,283.18
<u>44-T STOCKING AND LOADING:</u>				
a. Haulage equipment		35,612.20		-
b. Electric shovel		139,482.98		-
c. Weightometer		3,075.44		-
d. 30' conveyor belt		704,760.05		161,992.06
TOTALS	900,000.00	882,930.67	17,069.33	161,992.06
<u>44-U MINING EQUIPMENT:</u>				
a. Drill machines and accessories		121,790.16		40,162.20
b. Scrapers, hoists and accessories		461,822.84		67,611.15
c. Exploratory drill equipment		39,859.05		1,948.77
d. Miscellaneous equipment		59,984.03		21,666.23
TOTALS	669,000.00	683,456.08	14,456.08	131,388.35
<u>44-V FIRE PROTECTION EQUIPMENT:</u>				
a. Surface hydrants, mains and hoses		3,164.30		475.44
b. Portable fire extinguishers		3,332.82		-
c. Underground fire protection equipment		4,133.77		2,117.91
TOTALS	18,000.00	10,630.89	7,369.11	2,593.35
<u>44-W SKIPS, CAGES AND HOISTING ROPES:</u>				
a. Skips		28,614.21		-
b. Cages		13,044.83		-
c. Hoisting ropes		29,579.02		-
TOTALS	119,000.00	71,238.06	47,761.94	-
GRAND TOTAL E&A MM-44	\$12,209,682.27	\$11,806,203.58	\$403,478.69	\$1,137,353.63

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9. TAXES:

Mather Mine "B" Shaft, including Stockpile, Supplies and Equipment as placed by State Tax Commission:

	1953			1952		
	<u>Valuation</u>	<u>Rate</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Rate</u>	<u>Taxes</u>
Section 1, 47-27						
Real	\$2,445,000		\$113,325.75	\$2,100,000		\$104,895.00
Personal	1,325,000		61,413.75	800,000		39,960.00
Total	\$3,770,000	46.3500	\$174,739.50	\$2,900,000	49.9500	\$144,855.00
Coll. Fee		.4635	1,747.40		.4995	1,448.55
Total Mather Mine "B" Shaft (Sec. 1 City of Negaunee)	\$3,770,000	46.8135	\$176,486.90	\$2,900,000	50.4495	\$146,303.55

	1953		
	<u>Taxes</u>	<u>Per Ton Produced</u>	<u>Per Ton Shipped</u>
Operating	\$176,486.90	\$0.163	\$0.167
Idle Expense	-	-	-
Total	\$176,486.90	\$0.163	\$0.167

	1952		
	<u>Taxes</u>	<u>Per Ton Produced</u>	<u>Per Ton Shipped</u>
Operating	\$126,393.55	\$0.184	\$0.203
Idle Expense	19,910.00	0.029	0.032
Total	\$146,303.55	\$0.213	\$0.235

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10. ACCIDENTS AND PERSONAL INJURY:

There were twenty-two compensable injuries during the year. The twenty-two compensable injuries occasioned lost time of 1,057 days. There were also fifteen non-compensable injuries which added 41 days lost time, for a grand total of 1,098 days. This resulted in a severity rate of .909 days lost per thousand man hours and a frequency rate of 30.63 injuries per million man hours, compared with Company averages for underground mines of 1.708 and 29.11. The total hours worked were 1,207,945 as compared with 1,016,955 for 1952.

The following is a brief summary of the compensable accidents:

<u>Date</u>	<u>Name</u>	<u>Nature of Injury</u>
1 - 8-53	Lester Miron	Cut under right eye.
2 -10-53	Tydo Aho	Bruised hips.
3 - 3-53	Hugh Lamirand	Compound fracture of left little finger.
3 -14-53	Sam Roberts	Tip of right thumb amputated and laceration on right index finger.
3 -22-53	Arthur Gagnon	Large bruise on left leg above knee.
3 -28-53	Harold Pearce	Fractured both ankles.
3 -27-53	John Fomish	Broken bone in instep of right foot.
4 -10-53	Lawrence Jandron	Broken bone in right arm.
4 -16-53	Robert Koch	Fractured bone in right foot.
4 -23-53	Edwin Koski	Broken bone in right ankle.
5 -12-53	William Thexton	Bruise on left elbow and left knee.
5 -18-53	Eugene Anderson	Broken bone in instep of left foot.
5 -26-53	Samuel Sexton	Bruise on left side of chest.
5 -26-53	Paul Rantanen	Fractured left scapula.
7 -15-53	Lester Juchemich	Broken bone in arch of right foot.
7 -14-53	Paul Cody	Back injury.
9 -29-53	Donald Nurmi	Broken left wrist.
10-13-53	Sulo Pohjala	Fractured bone in right foot.
10-27-53	Robert Johnson	Puncture wound in right foot.
11-10-53	Wendell Talbot	Sore and swollen left leg above ankle.
12-16-53	Erland Hill	Bruised and swollen right leg above ankle.
12-11-53	Lyle Reiten	Lacerated and swollen left hand.

MATHER MINE "B" SHAFT
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11. POWER:

	<u>CONSUMPTION K.W. HOURS</u>	<u>AVERAGE MAX. DEMAND</u>	<u>AVERAGE DEM. FACTOR</u>	<u>COST OF CURRENT</u>	<u>AVERAGE PRICE PER K.W. HOUR</u>
1953 -	13,519,000	2,780 K.W.	55.513%	\$217,415.82	\$0.016082241

MEGAUNEE SHAFT
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1. GENERAL:

The year 1953 was one of considerable activity both underground and on surface. All departments were engaged in completing the Negaunee Shaft underground and surface plant for the Athens Mine changeover.

The underground development work consisted mainly of drifting towards the Athens and Bunker Hill ore bodies on the 12th level and cutting out of the 14th level plat and skip pit. Sumps and pump rooms were opened on the 14th and 6th levels, and a pump room on 1st level. The new pumping system is expected to be in operation by the early part of 1954.

Erection and covering of the headframe and conveyor galleries was completed in the 3rd quarter of the year. New idler stands were erected for the skip and cage hoist. The cage hoist and new cage were placed in operation during the year and bottom dump skips were installed in the shaft preparatory to ore hoisting.

5. LABOR AND WAGES:

Labor Relations:

The labor group as a whole was cooperative with supervision. This is indicated by the fact that no grievances were advanced to Step 2. The December Labor Statement indicates 140 men employed, or an average of 138 men actually working.

Employment:

Number of Men Beginning of the Year	104
Added During the Year	73
Separation	37
Total End of Year Before Changeover	140
No. of Men Who Worked All of December, but Were Laid off 12/30 On Account of the Athens Changeover	16
Total End of Year After Changeover	124

Fourteen men quit during the year and three were discharged. The remainder of the separations were due to retirements, transfers, and military service, with seven men returning to college and sixteen laid off because of the Athens changeover.

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5. LABOR AND WAGES: (Cont'd.)

Employment: (Cont'd.)

The following tables give data pertinent to paid vacations and holidays:

Vacations 1953

	<u>Number of Men</u>	<u>Number of Hours</u>	<u>Amount</u>	<u>Rate Per Hour</u>
One Week	38	1729	\$ 4,162.35	\$2.407
Two Weeks	25	2275	6,033.05	2.652
Three Weeks	26	3549	8,600.15	2.423
Total:	89	7553	\$18,795.55	\$2.488

Paid Holidays 1953

	<u>Number of Men</u>	<u>Number of Hours</u>	<u>Amount</u>	<u>Rate Per Hour</u>
New Years Day	75	600	\$ 1,359.24	\$2.265
Memorial Day	104	829	1,772.48	2.138
July 4th	106	848	1,918.64	2.262
Labor Day	116	928	1,981.04	2.135
Thanksgiving				
Day	121	968	2,113.84	2.184
Christmas	116	920	2,011.86	2.187
Total:	638	5093	\$11,157.10	\$2.191

Statement of Wages:

The following tables indicate the average wage per day and per month as compared with the previous year. The increase in wages is due to the June 12th agreement between the Cleveland-Cliffs Iron Company and the U.S.A. C.I.O.

<u>Average Wages Per Day:</u>	<u>1953</u>	<u>1952</u>	<u>Increase</u>	<u>Decrease</u>
Surface & Underground	\$19.57	\$17.82	\$1.75	

<u>Average Wages Per Month:</u>	<u>1953</u>	<u>1952</u>	<u>Increase</u>	<u>Decrease</u>
Surface & Underground	\$469.68	\$455.85	\$13.83	

Average Days Worked Per Month:

1953 - 23.92
1952 - 25.58

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6. SURFACE:

The Bethlehem Steel Crew returned in January to complete the erection of the headframe. By the end of June the steel had been completely erected and the H. H. Robertson Co. started the covering and insulating of the headframe and conveyor galleries. This work was completed in the 3rd quarter of the year. The mechanical and electrical crews were engaged in the assembly of the conveyor equipment.

A considerable amount of work was done on the surface track system. New tracks were laid to service the loading pockets and a track was laid on the south side of the west stocking ground. Some of the existing tracks were rehabilitated.

Two idler stands were erected for the cage hoist and two for the skip hoist ropes. The cage hoist was placed in operation and a new aluminum cage was installed in the shaft and two bottom dump skips were placed in service.

During the latter part of November and a few days of December, a small amount of ore was hoisted through the Negaunee Shaft for experimental purposes. This ore was primarily hoisted to obtain a skip factor and also to observe the behavior of the Athens ore on the conveyor system.

By the end of December the Negaunee Shaft surface facilities were completed for ore handling.

The mine discharge water is directed with a pipe line to the east of the property where it combines with the Athens water into a stream which has a gradient to the east.

7. UNDERGROUND:

Shaft Sinking:

Shaft sinking was discontinued in the early part of 1952; however, all of the shaft equipment was not installed at that time and work had continued during the year to complete the installation.

During the first quarter of the year, the spillage was cleaned from the bottom of the shaft and work commenced on cutting out of the skip pit. The skip pit and raise to the 14th level were completed and placed in operation by the end of the year.

Plat Development:

The 14th level plat development was carried on throughout the year. The plat is approximately 90% completed with some work to be done on the skip side of the plat.

A minor amount of work was done on the 6th, 10th and 12th level plats, such as installing scraper hoists, tail sheaves and bumper blocks; also, some work was done on the pockets.

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7. UNDERGROUND: (Cont'd.)

Drifting:

The main line drift on 12th level continued as a single heading up to the 1000 co-ordinate; from the 1000 co-ordinate to the west, a north and south branch was driven to service the north and south ore bodies. In the south drift, the turnout for the 2100 cross-cut was driven and the 2300 cross-cut was started as the year ended. The material encountered was mainly slate, Graywacke and Diorite Dike. The dike and slate contact zones were especially difficult to drift through as this material is highly altered and broken. Drifting equipment consisted of three machine Jumbo drill rigs, and Eimco 40 shovel loaders. The drifts were unsupported except where broken material was encountered; in these areas the drifts were supported with steel sets or roof bolts. Electric blasting with 60% gelamite powder was used. A raise was driven from the 12th level drift to the Athens shaft skip pit for ventilation and to be used for drainage in the future.

The drifting on 10th level was terminated in 1952. However, two sets of mechanical air doors were installed in the drift during the year.

Explosives:

The following table shows the cost of various blasting supplies for plats and drifting:

Cost of Various Blasting Supplies for Plats & Drifting-1953

<u>Item</u>	<u>Quantity</u>	<u>Amount</u>
Electric Blasting Caps	31,602	\$ 7,365.65
Lead Wire	55,180'	1,104.58
60% Gelatin Dynamite	130,010#	25,456.28
80% Gelatin Dynamite	500#	105.76
Hercomite 2X	600#	98.10
Total:		<u>\$34,130.37</u>

Pumping:

The old Negaunee pumping system is still in operation. However, the automatic centrifugal system should be operating in 1954.

The 1st level plat was stripped for a pump room and a dam constructed. The 6th and 14th level pump rooms and sumps were completed except for driving of the west sump on the 14th level.

The 1st, 6th, and 14th level pumps were installed, but a considerable amount of mechanical and electrical work remained to be done.

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7. UNDERGROUND: (Cont'd.)

Pumping: (Cont'd.)

The number of gallons per minute for each month for the past four years is indicated in the following table:

	<u>1953</u>	<u>1952</u>	<u>1951</u>	<u>1950</u>
January	970	1327	1075	1090
February	995	1227	966	1086
March	996	1168	911	1063
April	1019	1119	933	1084
May	1040	1175	1031	1201
June	1073	1044	1015	1359
July	1074	1048	1097	1407
August	1188	1067	1168	1400
September	1131	878	1198	1323
October	1130	910	1254	1162
November	1108	1005	1307	1165
December	1149	930	1285	1210
Average	1073	1075	1095	1212

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

<u>Year</u>	<u>Gallons per Minute</u>
1953	1073
1952	1075
1951	1095
1950	1212
1949	880
1948	757
1947	745
1946	682
1945	681
1944	713

NEGAUNEE SHAFT
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8. COST OF OPENING, EQUIPPING, AND DEVELOPING:

Shaft Sinking Costs:

The table below lists the detailed costs for 1953 and the costs since sinking commenced in 1951:

E&A CC-345 REHABILITATING NEGAUNEE SHAFT

<u>J - Sinking Shaft</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total for</u> <u>Year 1953</u>	<u>Total Cost</u> <u>12/31/1953</u>	<u>Cost Per</u> <u>Ft. to Date</u>
a. Shaft Equipment				\$37,742.34	\$ 25.80
b. Sinking Shaft					
Year 1953-None					
1463' Total Completed		\$ 1,476.41	\$ 1,476.41	373,870.65	255.55
Stocking Rock				13,646.83	9.33
Temp., Air & Water Lines				6,501.08	4.44
Cleaning Steel				3,195.57	2.18
c. Steel Sets, Sheathing & Guides	\$ 429.85	1,606.75	2,036.60	94,314.30	64.47
d. Installing					
Steel Sets	455.83		455.83	19,488.42	13.32
Sheathing	3,551.12	658.89	4,210.01	15,212.36	10.40
Ladders	56.52	370.12	426.64	542.08	.37
Bearers				3,995.28	2.73
Runners	1,644.90	1,012.97	2,657.87	8,971.05	6.13
e. Concreting					
Concrete		116.36	116.36	26,601.56	18.18
Forms				4,576.42	3.13
f. Ventilation Steel				1,681.08	1.15
g. Discharge Line	5,950.56	17,974.85	23,925.41	25,046.77	17.12
h. Counterweight Pipe					
Pipe	420.19	680.01	1,100.20	15,483.02	10.58
Counterweight				1,046.92	.72
i. Air Lines	341.46	3,441.63	3,783.09	14,473.44	9.89
j. Power Cables	3,334.24	20,834.56	24,168.80	36,135.69	24.70
k. Signal Cables	854.22	939.65	1,793.87	11,710.48	8.01
l. Permanent Water Lines	192.02	2,362.63	2,554.65	5,069.71	3.47
m. Skip Pit-See Detail	45,105.76	17,809.85	62,915.61	62,915.61	43.00
Total:	\$62,336.67	\$69,284.68	\$131,621.35	\$782,220.66	\$534.67
Steel Sets Charged Out But Not Yet Used				35,705.79	
Total As Per E&A CC-345 Statement				\$817,926.45	

NEGAUNEE SHAFT
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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Shaft Sinking Costs: (Cont'd.)

The table below shows the detailed cost of the skip pit and skip pit raise. The figures in this table are also included in the shaft sinking cost:

Detailed Cost of Skip Pit - E&A CC-345

	<u>Labor</u>	<u>Supplies</u>	<u>Total for</u> <u>1953</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total to</u> <u>Date</u>
Drifting & Raising	\$28,429.33	\$ 3,754.08	\$32,183.41	\$29,090.98	\$ 5,174.38	\$34,265.36
Explosives		1,516.69	1,516.69		1,594.89	1,594.89
Pipe Fittings & Repairs	1,580.67	2,258.39	3,839.06	1,580.67	2,450.04	4,030.71
Carbide Bits		1,009.80	1,009.80		1,009.80	1,009.80
Sharpen Bits	275.02	35.13	310.15	275.02	35.13	310.15
Handling Rock & Supplies	4,003.43	108.38	4,111.81	4,003.43	108.38	4,111.81
Prop. Hoist. Compressor & Dry Underground	4,074.23	5,438.58	9,512.81	4,074.23	5,438.58	9,512.81
Supervision	3,429.73		3,429.73	3,429.73		3,429.73
Concreting	2,651.70	1,998.65	4,650.35	2,651.70	1,998.65	4,650.35
Total:	\$44,444.11	\$16,119.70	\$60,563.81	\$45,105.76	\$17,809.85	\$62,915.61

Cost of Plat Development:

The following table shows the cost of plat development:

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	<u>Labor</u>	<u>Supplies</u>	<u>Total for</u> <u>Year 1953</u>	<u>Total Cost</u> <u>12/31/53</u>
<u>6TH LEVEL:</u>				
Plats	\$ 353.86	\$ 3,108.37	\$ 3,462.23	\$26,233.89
Pockets	931.45	33.42	964.87	19,750.83
Trenches (1)	1,847.44	8,215.59	10,063.03	52,845.15
Total:	\$3,132.75	\$11,357.38	\$14,490.13	\$98,829.87

(1) One 40 H.P. Joy Slusher \$6,116.70 and 1 Holcomb Scraper \$520.16 Included.

10TH LEVEL

Plats	\$1,962.81	\$ 2,925.70	\$ 4,888.51	\$ 49,099.62
Pockets	1,185.15	412.95	1,598.10	17,225.03
Trenches (1)	6,205.14	10,196.47	16,401.61	60,162.82
Total:	\$9,353.10	\$13,535.12	\$22,888.22	\$126,487.47

(1) One 40 H.P. Joy Slusher \$6,107.00 and 1 Holcomb Scraper \$520.16 Included.

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Plat Development: (Cont'd.)

E&A AM-31

	<u>Labor</u>	<u>Supplies</u>	<u>Total for Year 1953</u>	<u>Total Cost 12/31/53</u>
<u>12TH LEVEL:</u>				
Plats	\$3,402.81	\$ 2,396.73	\$ 5,799.54	\$ 67,881.46
Pockets	757.59	197.13	954.72	16,608.11
Trenches (1)	2,834.87	14,483.04	17,317.91	70,578.59
Total:	<u>\$6,995.27</u>	<u>\$17,076.90</u>	<u>\$24,072.17</u>	<u>\$155,068.16</u>

(1) Two 40 H.P. Joy Slushers \$12,214.00 and 2 Holcomb Scrapers \$1,040.32 Included.

<u>14TH LEVEL:</u>				
Plats	\$ 55,703.83	\$27,157.99	\$ 82,861.82	\$ 84,743.22
Pockets	13,054.57	7,019.43	20,074.00	23,975.46
Trenches	45,735.03	45,398.51	91,133.54	91,133.54
Total:	<u>\$114,493.43</u>	<u>\$79,575.93</u>	<u>\$194,069.36</u>	<u>\$199,852.22</u>
Grand				
Total:	\$133,974.55	\$121,545.33	\$255,519.88	\$580,237.72

Labor 52% of Total Cost.

Supplies 48% of Total Cost.

The above costs represent only the charges originating at Negaunee Shaft and hence cannot be reconciled with E&A AM-31, which includes all charges for underground development including work done at both the Athens and Negaunee Shaft.

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Drifting:

The table below lists the cost of the 10th level drift. No drifting was done. The charges listed for 1953 are for the installation of the mechanical air doors:

<u>10th Level Main Drift</u>	<u>E&A AM-31</u>					
	<u>Labor</u>	<u>Supplies</u>	<u>Total for Year 1953</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total To Date</u>
Drifting to Date 791'	\$1,492.90	\$2,938.01	\$4,430.91	\$23,880.76	\$ 8,477.62	\$32,358.38
Explosives		109.70	109.70		6,555.93	6,555.93
Carbide Bits to Date- 1 1/2-68 - 1 5/8-32					1,622.50	1,622.50
Drill Steel		429.55	429.55		582.31	582.31
Sharpen Bits & Drills	141.68	37.18	178.86	1,096.93	80.56	1,177.49
Ventilation	32.01	5.25	37.26	385.44	556.19	941.63
Repairs, Piping, Etc.	250.27	313.89	564.16	1,578.47	2,461.85	4,040.32
Prop. Hoisting, Com- pressor & Dry	154.06	937.75	1,091.81	3,098.74	3,680.85	6,779.59
Hauling Rock & Supplies	229.88	8.16	238.04	4,148.12	48.50	4,196.62
Underground Supervision	95.30		95.30	3,327.14		3,327.14
Fire Doors				695.25		695.25
Total:	\$2,396.10	\$4,779.49	\$7,175.59	\$38,210.85	\$24,066.31	\$62,277.16
Footage						791'
Cost per Foot				\$48.31	\$30.42	\$78.73

The costs of the 12th level drift are shown in the table below. This cost is that part of the drift that extends from the shaft to the point where the north and south branches began. The drift is unsupported except for a minor amount of roof bolting at various locations.

<u>12th Level Main Drift</u>	<u>E&A AM-31</u>					
	<u>Labor</u>	<u>Supplies</u>	<u>Total for Year 1953</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total To Date</u>
Drifting To Date 1924' Year 1481'	\$45,839.94	\$ 7,963.24	\$ 53,803.18	\$59,571.28	\$10,425.79	\$ 69,997.07
Explosives		10,224.31	10,224.31		14,479.17	14,479.17
Carbide Bits to Date- 1 1/2-490 - 1 5/8-325		6,216.90	6,216.90		8,355.65	8,355.65
Drill Steel		3,188.82	3,188.82		3,664.27	3,664.27
Sharpen Bits & Drills	1,385.86	179.63	1,565.49	2,008.56	405.59	2,414.15
Ventilation	155.58	5.25	160.83	203.98	479.91	683.89
Repairs, Piping, etc.	4,994.06	4,894.06	9,888.12	6,677.73	7,178.92	13,856.65
Prop. Hoisting, Compres- sor, & Dry	6,047.38	7,757.00	13,804.38	7,910.06	10,239.96	18,150.02
Hauling Rock & Supplies	5,626.49	221.76	5,848.25	7,373.04	248.74	7,621.78
Underground Supervision	4,225.99		4,225.99	5,512.93		5,512.93
Tinken Drill Bits 2"-50		25.85	25.85		25.85	25.85
Total:	\$68,275.30	\$40,676.82	\$108,952.12	\$89,257.58	\$55,503.85	\$144,761.43
Footage						1924'
Cost per Foot				\$46.39	\$28.85	\$75.24

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Drifting: (Cont'd.)

The preceding cost represents only the charges originating at Negaunee Shaft and hence cannot be reconciled with E&A AM-31, which includes all charges for underground development, including work done at both the Athens & Negaunee Shaft.

The table below shows the cost of the 12th level drift, North Branch. This drift was driven through broken and fractured ground using steel sets and roof bolts for support.

E&A AM-31

Drifting Started in September, 1953

<u>12th Level Drift-North</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total 1953</u>
Drifting to Date - 250'	\$15,215.94	\$ 1,662.36	\$16,878.30
Explosives		1,894.43	1,894.43
Carbide Bits to Date		399.45	399.45
Drill Steel			
Sharpen Bits & Drills	492.13	45.27	537.40
Repairs, Piping, Etc.	1,880.99	1,493.67	3,374.66
Prop. Hoisting, Compressor & Dry	2,840.97	4,564.92	7,405.89
Hauling Rock & Supplies	2,536.03	385.48	2,921.51
Underground Supervision	1,439.46		1,439.46
Total:	\$24,405.52	\$10,445.58	\$34,851.10
Footage			250'
Cost per Foot	\$97.62	\$41.78	\$139.40

The following table lists the costs of driving the 12th level drift, South Branch. This drift was driven through broken ground and heavy steel sets were used for support.

E&A AM-31

Drifting Started in September, 1953

<u>12th Level Drift-South</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total 1953</u>
Drifting to Date - 490'	\$27,502.57	\$ 6,482.15	\$33,984.72
Explosives		2,175.30	2,175.30
Carbide Bits to Date		1,425.25	1,425.25
Drill Steel		100.71	100.71
Sharpen Bits & Drills	432.53	8.80	441.33
Repairs, Piping, etc.	1,180.92	2,290.98	3,471.90
Prop. Hoisting, Compressor & Dry	4,647.00	4,564.94	9,211.94
Hauling Rock & Supplies	1,736.66	433.71	2,170.37
Underground Supervision	3,228.30		3,228.30
Total:	\$38,727.98	\$17,481.84	\$56,209.82
Footage			490'
Cost per Foot	\$79.04	\$35.68	\$114.72

The above cost represents only the charges originating at Negaunee Shaft and hence cannot be reconciled with E&A AM-31, which includes all charges for underground development, including work done at both the Athens & Negaunee Shaft.

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

The 2100 and 2300 cross-cut costs are listed in the following tables.
Both of these cross-cuts are being driven in broken ground with steel sets.

E&A AM-31

Charges to Athens 2100 Cross-cut - 12th Level

<u>12th Level Cross-cut-2100</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u> <u>Year 1953</u>
Drifting to Date - 112'	\$5,888.40	\$4,838.79	\$10,727.19
Explosives		655.16	655.16
Carbide Bits		496.20	496.20
Drill Steel			
Sharpen Bits & Drills	105.38		105.38
Repairs, Piping, etc.	206.82	209.74	416.56
Prop. Hoisting, Compressor & Dry	1,075.61	1,026.67	2,102.28
Hauling Rock & Supplies	477.86	19.12	496.98
Underground Supervision	886.81		886.81
Total:	<u>\$8,640.88</u>	<u>\$7,245.68</u>	<u>\$15,886.56</u>
Footage			112'
Cost per Foot	\$77.15	\$64.69	\$141.84
Carbide Bits Used - 1 3/8-11 - 1 1/2-27 - 1 5/8-12			
Cross-cut Started September, 1953			

E&A AM-31

Charges to Athens 2300 Cross-Cut - 12th Level

<u>12th Level Cross-cut-2300</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u> <u>Year 1953</u>
Drifting to Date - 35'	\$1,400.87	\$349.56	\$1,750.43
Explosives			
Carbide Bits			
Drill Steel			
Sharpen Biys & Drills			
Repairs, Piping, etc.			
Prop. Hoisting, Compressor & Dry	284.36		284.36
Hauling Rock & Supplies	86.50		86.50
Underground Supervision	195.12		195.12
Total:	<u>\$1,966.85</u>	<u>\$349.56</u>	<u>\$2,316.41</u>
Footage			35'
Cost per Foot	\$56.19	\$9.99	\$66.18
2300 Cross-cut Started in December, 1953			

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Raising:

The cost of the raise driven from the 12th level to the Athens skip pit is listed in the following table:

E&A AM-31

Cost of 12th Level Raise

<u>12th Level Raise</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u> <u>Year 1953</u>
Raising - To Date 149'	\$5,108.95	\$ 431.15	\$5,540.10
Explosives		597.03	597.03
Prop. Hoisting, Compressor & Dry	764.02	557.63	1,321.65
Underground Supervision	606.58		606.58
Handling Rock & Supplies	506.76	27.25	534.01
Pipe Fittings & Repairs	256.28	58.40	314.68
Total:	<u>\$7,242.59</u>	<u>\$1,671.46</u>	<u>\$8,914.05</u>
Footage			149'
Cost per Foot	\$48.61	\$11.22	\$59.83
Raise Started in May, 1953, through July, 1953.			

Cost of Sumps and Pump Rooms:

The following tables list the costs of opening and equipping the sumps and pump rooms:

Cost of Revamping 1st Level Negaunee Sump

<u>Labor</u>	<u>Supplies</u>	<u>Total 1953</u>
\$15,250.05	\$8,730.50	\$23,980.55

E&A AM-31

Cost of 6th Level Sump

	<u>Labor</u>	<u>Supplies</u>	<u>Total 1953</u>
Cutting Out Sump	\$32,475.18	\$11,237.84	\$43,713.02
Underground Supervision	3,343.10		3,343.10
Sharpen Bits & Drills	256.93	73.29	330.22
Handling Rock & Supplies	2,760.67	140.80	2,901.47
Prop. Hoisting, Compressor & Dry	4,255.62	5,673.40	9,929.02
Explosives		3,720.15	3,720.15
Carbide Bits		2,674.75	2,674.75
Drill Steel		149.76	149.76
Pipe, Fittings & Repairs	2,883.19	1,971.98	4,855.17
Total:	<u>\$45,974.69</u>	<u>\$25,641.97</u>	<u>\$71,616.66</u>

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8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Cont'd.)

Cost of Sumps and Pump Rooms:

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Cost of 14th Level Sump

<u>14th Level Sump</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total 1953</u>
Cutting Out Sump	\$42,828.32	\$ 5,628.79	\$48,457.11
Underground Supervision	4,544.53		4,544.53
Sharpen Bits & Drills	784.29	193.19	977.48
Handling Rock & Supplies	4,047.03	290.64	4,337.67
Prop. Hoisting, Compressor & Dry	5,825.56	5,414.04	11,239.60
Explosives		4,403.49	4,403.49
Pacific Scrapers - 2-48"		1,040.00	1,040.00
Pipe Fittings & Repairs	1,881.21	3,030.36	4,911.57
Carbide Bits		2,612.50	2,612.50
Total:	\$59,910.94	\$22,613.01	\$82,523.95

Carbide Bits Used - 1 3/8-5--1 1/2-176--1 5/8-79
Sump Started in May, 1953.

Ground support was attained by the use of roof bolts and steel ties in this sump, which was excavated in highly sheared intrusive.

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Charges to Pumping Equipment

<u>Labor</u>	<u>Supplies</u>	<u>Total</u> <u>Dec. 31, 1953</u>
\$3,512.45	\$108,314.12	\$111,826.57

9. TAXES:

The following is a statement of taxes for 1952 and 1953:

<u>E&A CC-345, Negaunee Shaft</u>	<u>1953</u>		<u>1952</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
That part of NW 1/4, Sec. 5, 47-26	\$250,000	\$11,587.50	\$250,000	\$12,487.50
E 1/2 of NE 1/4 of Sec. 6, "				
SW 1/4 of Sec. 32, 48-26				
as described and assessed by Mich. State Tax Commission, 235 acres Personal Property-Stock-piles, Supplies & Equipment.	160,000	7,416.00	115,000	5,744.25
Total:	\$410,000	\$19,003.50	\$365,000	\$18,231.75
Collection Fee		190.04		182.32
Total Negaunee Shaft:	\$410,000	\$19,193.54	\$365,000	\$18,414.07

The tax rate in 1953 was \$46.35 per \$1,000.00. In 1952, the rate was \$49.95 per \$1,000.00.

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10. ACCIDENTS AND PERSONAL INJURY:

The Negaunee Shaft severity rating was 24.079. This high rating was due to the unfortunate fatality of Otterino Catto, Acting Captain at the Negaunee Shaft.

The compensable injuries for 1953 are listed in the table below:

NEGAUNEE SHAFT

Fatal	1
Time lost over 4 months	0
1 to 4 months	1
Less than 1 month	2
Total:	4

<u>Acc. No.</u>	<u>Date of Accident</u>	<u>Name</u>	<u>Injury</u>	<u>Days Lost</u>
10	6/ 8/53	Clifford Johnson	Fracture 2nd and 3rd fingers, left hand, severe laceration of palm.	89
11	7/20/53	John E. Ketola	Contusion, left foot.	11
12	8/20/53	Otterino Catto	Fatal	6,000
13	9/21/53	Francis Dighera	Fracture, right great toe.	12

11. POWER:

Power is furnished according to the standard schedule defined as follows:

\$.041 per k.w.h. for the first 72 k.w.h. of demand and \$.0096 per k.w.h. for all additional k.w.h. The demand is the lowest average k.w. of the three fifteen minute periods of maximum use during the month.

The fuel adjustment is in addition to the above and is a factor depending on the cost of coal as delivered. That is \$.00018 per k.w.h. for each \$.01 above \$.29 in company's cost per million B.T.U. This adjustment does not apply to the total k.w.h., as part of the power is furnished by hydro-electric plants.

The following table lists the cost of power for the year 1953:

Compressor	\$29,513.52
Hoisting	11,836.05
Pumping	37,930.34
Change House	1,966.39
Office	86.36
Other Mines - (Maas)	8,395.39
Total:	\$89,728.05

5,264,800 k.w.h. were used for the year at an average of \$.0168 per k.w.h.

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1. GENERAL

The production for 1953 was 212,344 tons, including overrun, which is a decided increase as compared to the 155,010 tons for 1952. The increase was realized because there were no strikes in 1953, and the development program on our only operating level was completed and all efforts were concentrated on production. Shipments for 1953 were 177,406 tons, as compared to 126,727 tons in 1952.

The operating schedule at the Spies Mine was on a two shift per day, five-day per week basis for the entire year.

A diamond drill program was conducted on surface and underground throughout the year. There were a total of twelve underground holes drilled, two from the 6th level and ten from the 8th level. Twelve surface holes were drilled, including two holes on the McDermott property, one on the Allen Forty and three on the Grossbusch property.

Underground holes no. 63 and no. 73 tested the main Spies East deposit at 300 feet and 650 feet, below 8th level, respectively. This drilling indicated that the orebody retained nearly the same width at depth as on 8th level. A slight flattening to the West is evident. Underground hole no. 65 drilled minus 45° to the West of the Spies East deposit below 8th level and intercepted some oxidized iron-formation mixed with ore. This hole, along with the other Westward drilling above 8th level, indicated a tightly folded repeating hangingwall to footwall sequence to the West of the Spies East deposit.

Underground holes no. 68 and no. 70 were drilled from the 8th level cutout approximately midway between the shaft and the Spies East deposit. They were aimed at possible enrichment in the tops of tight folds which proceed West from the Spies East deposit. Only unoxidized iron-formation was found by these holes.

Underground holes no. 67 and no. 72 were directed to the South and West of the South tip of the present Spies East deposit in order to detect the general strike of the iron-formation in this area. These holes indicated the formation is trending to the West.

Underground holes no. 64, no. 66, no. 69, no. 71 and no. 74 have tested the faulted and folded area West of the Spies East deposit and have proved a possible sulphurous orebody which enlarges from 8th level up to 6th level and widens to the South. This program will continue drilling to the South and West for ore available above 8th level.

Surface drilling on Section 24, 43-35 began with diamond drill hole no. 83. This was part of a program for locating a connecting limb of oxidized iron-formation between the Spies East deposit and diamond drill hole no. 79 to the South. Diamond drill hole no. 83 encountered 100 feet of oxidized iron-formation starting at ledge. It was believed that this iron-formation limb was striking South from the Spies East deposit toward diamond drill hole no. 79. In an effort to locate the oxidized limb between diamond drill hole no. 83 and diamond drill hole no. 79, the following holes were drilled - diamond drill holes no. 84, 85, 87 and 88. These holes proved to be drilling entirely in hanging material and some unoxidized iron-formation, therefore, a different interpretation of the area tended to resolve itself. Further drilling

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1. GENERAL (Continued)

of the Spies South area was discontinued and drilling was initiated on the Allen Forty to the West.

The McDermott drilling consisted of two holes - drill hole no. 86 drilled due South at minus 60° from the South edge of Section 24 and hole no. 1 and 1-A was drilled in Section 25. The McDermott property is the W $\frac{1}{2}$ of the E $\frac{1}{2}$ of Section 25, 43-35. Diamond drill hole no. 1 and 1-A, located 400 feet South of diamond drill hole no. 86, cut 100 feet of oxidized iron-formation beginning near 1221 feet. The hole was drilled due South at minus 60°. Further activity in the McDermott ledge trough to the South of the present drilling will continue.

Diamond drill hole no. 89 is testing the E-W limb of iron-formation believed to be running through the Allen Forty in Section 24, 43-35. This iron-formation might be connected with the oxidized iron-formation of diamond drill hole no. 83.

Diamond drill holes no. 10, 11 and 12, on the Grossbusch in Section 13, 43-35, all drilled in hangingwall material and unoxidized iron-formation. This drilling supports former belief that the unoxidized iron-formation is dipping North and is faulted up successively to the North by parallel E-W faulting. Some ferruginous staining was seen in diamond drill hole no. 12.

Production for 6th level for 1953 was 3,301 tons of ore. This ore was realized from the no. 10 shrinkage stope. The reason for abandoning this last-producing place on 6th level was because of a high-sulphur and a low-iron count of the ore. Rock development on 6th level amounted to the excavation of a new pumphouse at shaft. This pumphouse provided a flooded suction for the two new stainless-steel four-stage Barrett-Haentjens pumps. During the latter part of the year, acid water from the old no. 6 stope above 6th level began seeping through to 8th level due to caving of the floor pillar between the 6th level and 595 foot sub-level. When this occurred, the pumping setup on the inside of 6th level was abandoned.

During 1953, development of all the 8th level stopes was completed. No. 1, no. 2 and no. 6 stopes were developed for sub-level stoping operations; no. 3 and no. 5 stopes were developed for long-hole shrinkage stope method of mining. No. 1 stope carried on mining operations throughout the year. No. 2 stope completed mining operations in the latter part of October. No. 3 stope, which is a long-hole shrinkage stope, proved very disappointing in that the ore actually narrowed down to an unmineable width. This stope was abandoned the first part of November. The no. 4 stope never did show any mineable width, so no operations were carried on in this area. The no. 5 long-hole shrinkage stope was undercut and at the end of the year, ten long-hole blasts had been fired. This amounts to approximately 60 per-cent of the mining in this area. The no. 6 stope development was completed and opening-up operations were initiated in the latter part of December.

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1. GENERAL (Continued)

New equipment that had been purchased for the operation of the 8th level was as follows: two, 25 h. p. scraper hoists with D. C. motors, two drilling machines and two pavement breakers. These items replaced equipment that has been worn out.

Several adjustments were made to wages in 1953. On June 12, a general increase of eight and one-half cents per hour was made, and on July 1st an additional one-cent increment per job class was instituted. As of July 1, 1953, the readjustment was made in the evaluation program for the incentive miners. The back pay for all hourly rate employees, under the new classification system, was paid on February 15, 1953.

2. PRODUCTION

a. Production by Grade and Months

<u>Month</u>	<u>Days</u>	<u>Spies Grade Tons</u>	<u>Total Rock Tons</u>	<u>Tons Per Man Per Day</u>
January	21	17,405	556	6.96
February	20	16,283	184	7.01
March	22	16,178	276	6.51
April	22	13,240	280	5.65
May	21	15,081	44	6.38
June	22	17,158	244	7.22
July	22	19,189	84	8.35
August	16	14,281		7.76
September	21	18,814	124	8.59
October	22	15,798		7.11
November	19	15,064		7.39
December	<u>21</u>	<u>14,792</u>		<u>6.55</u>
Total	249	193,283	1,792	7.79
Overrun for Year		<u>19,061</u>		
Grand Total		212,344		

b. Shipments

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

<u>Year</u>	<u>Pocket</u>	<u>Stockpile</u>	<u>Total</u>
1953	80,786	96,620	177,406
1952	59,642	67,085	126,727
1951	156,988	93,135	250,123
1950	120,240	137,598	257,838
1949	53,839	34,614	88,453

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2. PRODUCTION (Continued)

b. Shipments (Continued)

There was an increase in shipments from the Spies Mine in 1953 as compared to 1952. The reason for the increase was probably due to the fact that there were no strikes in 1953, as there had been in 1952. Of shipments, 96,620 tons were shipped from the stockpile and 80,786 tons were shipped from the pocket. No Spies Mine ore was loaded at the LS&I dock at Marquette in 1953. At the Escanaba dock, 57,766 tons of ore were shipped as Straight Cargo and 119,640 tons of ore were shipped as Cliffs Group.

c. Ore Statement

	<u>Spies Grade</u>	<u>Total</u>	<u>Total Last Year</u>
On hand January 1, 1953	63,273	63,273	34,900
Output for year	193,283	193,283	155,010
Overrun	<u>19,061</u>	<u>19,061</u>	
Total	275,617	275,617	<u>190,000</u>
Shipments	<u>177,406</u>	<u>177,406</u>	<u>126,727</u>
Balance on hand	98,211	98,211	63,273
Increase in output	38,273		
Increase in shipments	50,679		
Increase in ore on hand	34,938		

The operating schedule for the past five years is as follows:

- 1953 - Hoisting and mining operations: two eight hour shifts per day, five days per week.
- 1952 - Hoisting and mining operations: two eight hour shifts per day, five and one-half days per week January 1 to November 15. Effective November 16, two eight hour shifts per day, five days per week.
- 1951 - Hoisting and mining operations: two eight hour shifts per day, six days per week January 1 to February 1. Effective February 1, two eight hour shifts per day, five and one-half days per week.
- 1950 - Hoisting and mining operations: two eight hour shifts per day, four days per week January 1 to May 15. Schedule increased to five days per week effective May 15 and later to six days per week effective August 21.
- 1949 - Hoisting and mining operations: two eight hour shifts per day, six days per week January 1 to June 27. Schedule decreased to five days per week effective June 27 and later to four days per week effective September 1.

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2. PRODUCTION (Continued)d. Division of Product by Levels and Months

<u>Month</u>	<u>8th Level</u>	<u>6th Level</u>	<u>Total</u>
January	15,499	1,906	17,405
February	14,888	1,395	16,283
March	16,178		16,178
April	13,240		13,240
May	15,081		15,081
June	17,158		17,158
July	19,189		19,189
August	14,281		14,281
September	18,814		18,814
October	15,798		15,798
November	15,064		15,064
December	14,792		14,792
Total	189,982	3,301	193,283

e. Production Delays

There were a number of minor delays to operations which were of no serious consequence. The only delay, that caused a definite loss in production, is listed below.

In October, it was necessary to tear the 400 H.P. skip hoist motor down to repair and tighten 84 loose coils. This amounted to a sixteen-hour delay to hoisting or a loss of approximately 800 tons of ore.

3. ANALYSISa. Average Mine Analysis on Output

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Sul</u>
Spies	212,344	56.98	.243	8.73	.063

b. Average Analysis of Shipments

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sul</u>	<u>Loss</u>	<u>Moist</u>
Spies	177,406	56.90	.239	8.52	.19	1.82	.17	.30	.070	7.01	8.95

c. Average Analysis of Ore in Stock

<u>Grade</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sul</u>	<u>Loss</u>	<u>Moist</u>
Spies Dried	56.94	.243	8.88	.19	1.95	.10	.30	.086	6.43	
Spies Nat'l	51.80	.221	8.08	.17	1.77	.09	.24	.078	5.85	9.03

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3. ANALYSIS (Continued)d. Analysis of Straight Cargo Shipments

	<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Mang</u>	<u>Sul</u>	<u>Moist</u>
Spies Dried		57,766	57.09	.236	8.22	.18	.070	9.12

4. ESTIMATE AND ANALYSIS OF ORE RESERVESa. Estimated Reserves

The following is an estimate of reserves submitted to the Michigan State Tax Commission as of December 31, 1953, using a factor of 12 cubic feet per ton.

	<u>Spies</u>	<u>Total</u>
Between 6th and 8th levels	222,490	222,490
Total Gross as of July 31, 1953	222,490	222,490
Less August, 1953 production	14,281	14,281
Total Gross as of August 31, 1953	208,209	208,209
Less production Aug. 31, 1953 to Dec. 31, 1953	67,438	67,438
Total Gross as of December 31, 1953	140,771	140,771
Less 10% for Mining loss and Rock	20,821	20,821
Net total as of December 13, 1953	119,950	119,950

The reserves were considerably less than a year ago due to the mining which was done in 1953. The tonnage shown as reserves included only ore that is available for mining. Excluded from these figures is a substantial unavailable tonnage that must be left as supporting pillars. A comparison between the 1952 and 1953 estimates shows a decrease of 96,504 tons of mineable ore, thus illustrating the fact that approximately 115,000 additional tons of ore were developed during the current year. This increase in estimated reserves is due to the outlining of the ore limits more completely by mining.

b. Expected Analysis of Ore Reserves as Submitted to the Michigan State Tax Commission

	<u>Grade</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sul</u>	<u>Loss</u>	<u>Moist</u>
Spies Dried		56.50	.256	9.00	.23	2.67	.24	.21	.100	7.78	
Spies Nat'l		50.85	.230	8.10	.21	2.40	.22	.19	.090	7.00	10.00

5. LABOR AND WAGESa. Labor Relations

As in the past, the Spies Mine has had 100 per-cent employee membership in the union. The relationship between the company and the union has been good, which is demonstrated by the fact that there were no grievances submitted in 1953. However, on afternoon shift, December 23, the entire crew took it upon themselves to walk out an hour earlier, thus forfeiting their holiday pay. Grumblings were heard because of the action taken by management, however, no repercussion occurred.

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5. LABOR AND WAGES (Continued)

b. Employment

The following is a table of employment statistics:

Number of men on payroll beginning of year	116
Number of men added during year	4
Number of separations during year	<u>20</u>
Number of men on payroll end of year	100
Average number of men as per December labor statement	105½

The percentage of absenteeism in 1953 was 5.6 per-cent.

There were 100 employees on the payroll at the end of 1953 compared with 116 employees a year ago. Four new men were hired and there were twenty separations, resulting in a decrease of sixteen men. Of the twenty separations, fifteen were quits, three were retirements, one transfer and one man deceased.

c. Statement of Wages

<u>Average Wages per Day</u>	<u>1953</u>	<u>1952</u>	
Surface	17.85	16.63	
Underground	20.56	18.68	
Total	<u>19.66</u>	<u>18.04</u>	
<u>Average Wages per Month</u>			<u>Decrease</u>
Surface	369.50	382.49	12.99
Underground	425.59	429.64	4.05
Total	<u>406.96</u>	<u>414.92</u>	<u>7.96</u>
<u>Tons per Man per Day</u>			
Surface	23.37	20.83	
Underground	<u>11.69</u>	<u>9.53</u>	
Total	7.79	6.54	
<u>Labor Cost per Ton</u>			
Surface	.764	.798	
Underground	<u>1.760</u>	<u>1.961</u>	
Total	2.524	2.759	

6. SURFACE

The West stocking trestle was replaced for this winter's stocking of ore. This trestle had been standing since 1948 and the legs were in need of replacement because they were found to be punky. The question of the new settling sump on Spies surface was abandoned because it was proven to the Representatives of the Water Resources Commission that our settling sumps underground were effectively doing the job of settling out solids before discharging the water from the Spies Mine.

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6. SURFACE (Continued)

Arrangements were made for the transfer of the Bucyrus Erie 54-B electric shovel from the Lloyd Mine and actual transfer was completed in March, 1953.

7. UNDERGROUND

a. General

Little rock development was done at the Spies Mine in 1953. The pumphouse was excavated on 6th level and several diamond drill cutouts were enlarged. The ore produced above 6th level amounted to 3,301 tons, which was pulled from the no. 10 shrinkage stope. Due to fire, this area became too foggy and hot for safe working conditions, the sulphur analysis became too high and the iron count was too low, so the stope was abandoned and sealed off.

On 8th level, development of no. 1 and no. 2 stopes had been begun in 1952. Both stopes came into full production early in 1953. The footwall in no. 1 stope caved in during the year making it necessary to leave supporting pillars to isolate the caved and burning footwall material. At the end of the year, developing and opening-up operations were started in the remaining 40 foot pillar of ore in this stope. No. 2 stope was completely mined out by the latter part of October. This stope was a very good producing stope and no trouble was encountered during the mining of this area. In the no. 3 long-hole shrinkage stope, the undercutting was completed in February and several long-hole blasts were fired. It was found that the ore in this stope narrowed down to an unmineable width and mining was discontinued because of the poor analysis of ore from this stope. Some of the broken ore that was left was used as a mixing grade with the ore from no. 1 sublevel stope. In the no. 4 stope area, it was found that there was no mineable width of ore and plans for development were abandoned. The undercut in no. 5 long-hole shrinkage stope was completed in September, 1953. At the end of the year, ten long-hole blasts had been fired which constituted 60 per-cent of the ore that had been mined in this area. Development and opening-up operations were completed in the no. 6 stope in the latter part of 1953. The ore outline in no. 6 stope is very disappointing. Several fingers of footwall slates have showed up projecting into the orebody which will make for very bad mining conditions and possible dirty mining.

Two underground drill rigs have been employed at the Spies Mine throughout the year in exploring for additional ore at depth below the 8th level and the outlining of the sulphurous ore found West of the present East deposit. The current program will be carried on in 1954 to better outline the ore West of and below the 8th level orebody.

b. Timbering

Regular wood stall timber was used for support in the transfer drifts. Very little additional support is needed underground other than repair and replacement of timber in the transfers.

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7. UNDERGROUND (Continued)

b. Timbering (Continued)

The following is the comparative timber statement:

<u>Kind</u>	<u>Lineal Feet</u>	<u>Avg. Price</u>	<u>1953 Amount</u>	<u>1952 Amount</u>
Lagging	105,744	.145 pc.	1918.08	883.07
Poles	43,377	.2805 "	1280.91	369.09
Stull Timber	3,728	.225 ft.	838.85	402.32
Steel Sets				<u>2715.93</u>
Total			4037.84	4370.41

c. Explosives

Electric blasting is being continued in all types of work and advantages offered by this method of detonation from a safety and ventilation standpoint warrant its continuance in preference to the conventional fuse blasting.

The following is the comparative explosives statement:

<u>Type</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>1953 Amount</u>	<u>1952 Amount</u>
No. 2 Gelex	17.29 Cwt	137,750 lb	23,819.51	22,909.32
Spec. Gel. 40%	18.19 Cwt	4,800 "	873.20	
H. Velocity 40%	19.40 Cwt	150 "	29.10	
Electric Caps	22.42 C	47,988	10,759.50	11,042.29
Wire - Feet	6.19 M	342,220	2,118.94	1,784.14
Fuse - Feet	29.47 M	30,000	884.17	153.86
Other			<u>445.84</u>	<u>318.13</u>
Total Explosives			38,930.26	36,207.74

d. Pumping

The problem of pumping highly acid water from the Spies Mine in the past year has been somewhat alleviated by the fact that three new stainless-steel Barrett-Haentjens pumps were put into operation, two on the 6th level and one on the 8th level. A new eight-inch rubber lined discharge pipe was installed during the year from 6th level to surface, replacing the old regular steel discharge pipe that had previously been used with the Prestcott and Aldrich plunger pumps on 6th level and 8th level. This old discharge line was in very bad shape when it was removed. The only pumping problems that were encountered throughout the year were motor break-downs.

The new flooded-suction pumphouse on 6th level was completed and the two, four-stage Barrett-Haentjens pumps were installed and put into operations. This new setup has been working out very satisfactorily.

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7. UNDERGROUND (Continued)d. Pumping (Continued)

Good ventilation has been maintained in the mine by the Aerodyne fan at the Collar of the ventilation shaft. Only minor repairs have been required to this system.

8. COST OF OPERATING

a. <u>Comparative Mining Costs</u>	<u>1953</u>	<u>1952</u>	<u>Increase</u>	<u>Decrease</u>
Production	212,344	155,010	57,344	
Underground Costs	2.907	3.198		.291
Surface Costs	.514	.567		.053
General Mine Expense	.709	.798		.089
Cost of Production	4.130	4.563		.433
Depreciation	.816	.658	.158	
Taxes	.083	.100		.017
Loading and Shipping	.107	.121		.014
Total Cost at Mine	5.136	5.442		.306
Budget: Estimated Cost	5.344	5.635		.291
Number of Shifts and Hours	2-8	2-8		
Number of operating days	249	235	14	
Average Daily Hoist	853	660	193	

b. Comparison of Labor and Supplies

	<u>1953</u>	<u>Per-Cent</u>	<u>1952</u>	<u>Per-Cent</u>
	<u>Amount</u>		<u>Amount</u>	
Labor	578,052.62	53.0	467,903.32	55.5
Supplies	512,544.70	47.0	375,672.74	44.5
Total	1,090,597.32		843,576.06	

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8. COST OF OPERATING (Continued)c. Detailed Cost Comparison

	1953		1952	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs</u>				
1. Exploring in Mine	276.88	.001	261.24	.002
2. Additional Wage Adjustment	9,594.03	.045	39,322.03	.254
3. Development in Rock	107.20	.000	4,386.24	.028
4. Development in Ore	135,773.79	.640	105,522.02	.681
5. Stopping	141,787.44	.668	77,097.32	.497
6. Timbering	26,958.68	.127	24,501.93	.158
7. Trammig	53,797.28	.253	34,500.92	.223
8. Ventilation	8,839.27	.042	13,180.58	.085
9. Pumping	31,217.04	.147	41,415.98	.267
10. Compressor and Air Pipes	26,115.92	.123	21,873.56	.141
11. Underground Superintendence	48,739.56	.230	33,763.71	.218
12. Compressor and Power Drills	3,447.91	.016	1,000.35	.006
13. Scrapers and Mechanical Loaders	59,477.48	.280	47,830.10	.309
14. Trammig Equipment	21,692.39	.102	22,829.59	.147
15. Pumping Machinery	49,404.91	.233	28,174.82	.182
Total Underground Costs	<u>617,229.78</u>	<u>2.907</u>	<u>495,660.39</u>	<u>3.198</u>
<u>Surface Costs</u>				
16. Hoisting	32,354.64	.152	24,365.00	.157
17. Stocking Ore	18,712.54	.088	13,470.79	.087
18. Screening and Crushing at Mine	11,042.74	.052	9,489.80	.061
19. Dryhouse	8,110.75	.038	5,430.63	.035
20. General Surface Expense	17,134.78	.081	15,426.51	.100
21. Hoisting Equipment	13,666.19	.065	11,272.45	.073
22. Shaft	2,531.22	.012	2,748.14	.018
23. Top Tram Equipment	3,215.95	.015	1,388.74	.009
24. Docks, Trestles and Pockets	670.57	.003	1,566.42	.010
25. Mine Buildings	1,711.61	.008	2,679.32	.017
Total Surface Expense	<u>109,150.99</u>	<u>.514</u>	<u>87,837.80</u>	<u>.567</u>
<u>General Mine Expense</u>				
26. Geological	2,186.62	.010	507.60	.003
27. Insurance	12,269.91	.058	9,950.50	.064
28. Mining Engineering	8,611.91	.041	8,970.59	.058
29. Mech. and Elect. Engineering	2,298.12	.011	2,325.12	.015
30. Analysis and Grading	10,700.39	.050	9,296.41	.060
31. Personal Injury	3,914.75	.018	10,770.10	.069
32. Safety & Personnel Departments	2,642.28	.012	3,175.32	.021
33. Telephone and Safety Devices	4,139.76	.019	2,907.13	.019
34. Local and General Welfare	1,403.80	.007	1,615.49	.010
35. Spec. Expense, Pensions, Allows.	4,350.99	.021	3,476.42	.022
36. Ishpeming Office	15,221.94	.072	14,220.77	.092
37. Social Security Taxes	11,733.96	.055	10,888.63	.070
38. Mine Office	41,300.73	.195	30,709.85	.198
39. Employees Vacation Pay	21,935.54	.103	14,986.64	.097
40. Holiday Pay	7,908.94	.037		
Total General Mine Expense	<u>150,619.64</u>	<u>.709</u>	<u>123,800.57</u>	<u>.798</u>
COST OF PRODUCTION	877,000.41	4.130	707,298.76	4.563

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8. COST OF OPERATING (Continued)

c. Detailed Cost Comparison (Continued)

	1953		1952	
	Amount	Per Ton	Amount	Per Ton
41. General and Electrical Supplies	30,462.33	.143	29,300.23	.189
42. Iron and Steel	21,606.77	.102	14,099.81	.091
43. Oil and Grease	2,375.89	.011	2,321.65	.015
44. Machinery Supplies	62,341.96	.294	35,257.58	.227
45. Explosives	37,706.66	.178	26,160.65	.169
46. Lumber and Timber	9,773.62	.046	7,311.81	.047
47. Fuel	4,727.01	.022	6,758.05	.044
48. Electric Power	70,903.50	.334	65,502.18	.423
49. Other Items of Expense	20,241.52	.096	15,157.35	.098
Total per Cost Sheet	<u>260,139.26</u>	<u>1.226</u>	<u>201,869.31</u>	<u>1.303</u>

The following are explanations of operating costs that show significant variations compared with last year.

There is a general decrease in the majority of the expenditures for this year because of a larger annual hoist as compared with 1952.

2. Additional Wage Adjustment

The large decrease in this expenditure is due to the fact that in 1952, the deferred wage adjustment increased to 25 cents per ton, whereas, in 1953, this item is back to a normal figure.

5. Stoping

The increase in the stoping expenditure was due to the greater stoping activities that were carried on during 1953. This increase also reflects the fact that the large portion of the early stoping activities were in the shrinkage stopes where the realization of production from these areas will not be noticed until 1954.

9. Pumping

The pumping costs were decreased twelve-cents a ton during 1953, which reflects the fact that the Spies Mine pumps are all automatically controlled, thus cutting down labor on operating costs.

15. Pumping Machinery

There is an increase in the Pumping Machinery expenditure because two new stainless-steel pumps were purchased and installed during 1953.

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8. COST OF OPERATING (Continued)

31. Personal Injury

It can be said that this item reflects the improved safety record at the Spies Mine in 1953. This expenditure was approximately \$7,000 less than 1952, due to the fewer number of accidents during the year.

43. Machinery Supplies

There was an increase in this expenditure due to the purchase of several pieces of mining equipment and also the increased repairs on older equipment.

To summarize, it should again be pointed out that the overall decrease in the majority of the expenditures was due to the increase in the annual production.

9. TAXES

There was an increase in taxes in the Iron River Township due to the higher valuation of the personal property item of the Virgil Mine Lease No. 51. This is also reflected in the Spies Mine valuation in the Village of Mineral Hills. In the Village of Mineral Hills, the tax rate was decreased but the personal property item, stockpile in particular, has been increased. In the City of Iron River, the Spies-Johnson Fee valuation was reduced \$75,500 while the tax rate remained the same as 1952. In the Mineral Lands valuation in the City of Iron River, there was an overall decrease even though the McDermott Lease, which is the W $\frac{1}{2}$ of the E $\frac{1}{2}$ of Section 25, 43-35, was added to this list of Mineral Lands. With these changes in valuation and tax rates, the overall picture reflected a slight decrease in the total taxes for the Spies Mine for 1953.

The following is a comparison of the taxes in the past two years in Iron County.

<u>Description</u>	<u>1953</u>		<u>1952</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>VILLAGE OF MINERAL HILLS</u>				
<u>SPIES MINE</u>				
NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.)				
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.)				
<u>VIRGIL MINE LEASE NO. 51</u>				
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.	35,000	255.33	35,000	259.32
Pers. Prop., Stkpile, Supplys, Equip.	<u>400,000</u>	<u>2,918.04</u>	<u>220,000</u>	<u>1,630.03</u>
Total Spies Mine	435,000	3,173.37	255,000	1,889.35
Spies Dwellings	<u>1,250</u>	<u>9.12</u>	<u>1,250</u>	<u>9.26</u>
TOTAL VILLAGE OF MINERAL HILLS	436,250	3,182.49	256,250	1,898.61
 Tax Rate		.729509		.74091972

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9. TAXES (Continued)

<u>Description</u>	<u>1953</u>		<u>1952</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>CITY OF IRON RIVER</u>				
<u>SPIES-JOHNSON FEE</u>				
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.	50,000	1,950.00	127,500	4,972.50
NE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.	50,000	1,950.00	127,500	4,972.50
<u>Mineral Lands</u>				
W $\frac{1}{2}$ of E $\frac{1}{2}$ of Sec. 25, 43-35 (McDermott)	4,000	80.00		
NE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35 40 A.	2,000	78.00	2,000	78.00
NW $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35 40 A.	1,600	62.40	1,600	62.40
NW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 24, 43-35 40 A.	1,600	62.40	1,600	62.40
NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.	1,400	54.60	1,400	54.60
Mineral Lands	6,120	159.70	13,350	520.99
Collection Fees		44.36		107.24
TOTAL CITY OF IRON RIVER		4,441.46		10,830.63
Paid in August, 1953		2,176.63		5,553.99
Paid in January, 1954		2,264.83		5,276.64
TOTAL CITY OF IRON RIVER	116,720	4,441.46	274,950	10,830.63
Tax Rate		3.90		3.90
<u>IRON COUNTY</u>				
<u>IRON RIVER TOWNSHIP</u>				
<u>Spies Mine</u>				
NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35 40 A.				
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35 40A.				
<u>VIRGIL MINE LEASE NO. 51</u>				
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40 A.	35,000	840.00	35,000	840.00
Pers. Prop., Stkpile, Suppls, Equip.	400,000	9,600.00	220,000	5,280.00
TOTAL SPIES MINE	435,000	10,440.00	255,000	6,120.00
Mineral Lands	4,525	108.63	5,225	125.43
Spies Dwellings and Mineral Lands	1,250	30.00	1,250	30.00
TOTAL IRON RIVER TOWNSHIP	440,775	10,578.63	261,475	6,275.43
Tax Rate		2.40		2.40
<u>BATES TOWNSHIP</u>				
<u>Mineral Lands:</u>				
Lot 3, SW $\frac{1}{4}$ of SW $\frac{1}{4}$ Sec. 18, 43-34 23.70 A.	250	8.58	250	8.58
Tax Rate		3.400		3.400
<u>CRYSTAL FALLS TOWNSHIP</u>				
Mineral Lands	5,600	197.33	5,600	197.33
Tax Rate		3.70		3.70

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10. ACCIDENTS AND PERSONAL INJURY

a. Compensable Injuries

Following is a list of compensable injuries for 1953:

May 26 - Lionel Garrett - Right Inguinal Hernia
Sept. 30 - Thomas Today - Left Inguinal Hernia

b. Accident Statistics

	<u>Frequency Rate</u>	<u>Severity Rate</u>
1953	19.13	.225
1952	30.68	2.550

It might be noted here that the Spies Mine placed second in the safety-flag competition on the Michigan Range. Our severity rate was .023 above the first place winner.

11. POWER

There was less electric power consumed in 1953 than in 1952, because in 1952 the development program was operating on three shift per day five and one-half days per week basis, whereas, in 1953 a strict two shift per day five days per week schedule was in force. The decrease in costs per ton also reflects the fact that the annual hoist for 1953 was considerably greater than for 1952. The maximum demand for 1953 was increased and this can possibly be attributed to the fact that more pumps were put into operation. There were no major delays due to power failure, although there were several short interruptions that were of no serious consequence.

<u>Year</u>	<u>Average Maximum Demand</u>	<u>Rate Per K.W.H.</u>	<u>Total K.W.H.</u>	<u>Cost Per Ton</u>
1953	974	.0140	5,140,400	.340
1952	938	.0140	5,502,900	.498

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1. GENERAL

Mining operations were carried forward from the first of the year to October 12 on a 2-shift, 5-day-week basis. On October 12, the operation was put on a 3-shift, 5-day-week basis. This was done to develop the lower ore body faster in order that more information could be obtained for analysis and tonnage estimates. Estimates and mining plans could not be made until more information was available. The Oliver has been contacted for its reaction on taking out our milling pit ore next to the Hull line. Our mining plans will also be governed by their reaction to this proposition.

Ore was placed in stockpile from January 2 to April 1. Loading of direct ore into cars from the pocket started on April 1 and continued until November 9, at which time stockpiling was resumed for the balance of the year. The direct ore stockpile was loaded out as cars were available from April 1 to April 27.

The M. A. Hanna Company loaded ore intermittently all through the season under the Agnew-South Agnew cross mining agreement.

It became apparent during the last half of November that it would be difficult to grade off the ore encountered in developing the lower ore body. A lean ore stockpile was established. The lean ore encountered in development drifts was sorted out and placed on the lean ore stockpile all during the month of December. This sorting process is continuing at the present time.

USA
COTTON FIBRE
GILBERT BOND

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2. PRODUCTION, SHIPMENTS, INVENTORIES

a. Production - Crude Ore

	<u>Tons</u>
Agnew Crude	34,562
<u>Concentrates</u>	
Agnew Bessemer	4,326
Agnew Non Bessemer	20,626
	<u>24,952</u>
<u>Direct Ore</u>	
Agnew Non Bessemer Shaft	54,285
Agnew Bessemer Direct	5,763
Agnew Non Bessemer Direct	24,383
	<u>84,431</u>

b. Shipments

Agnew Bessemer Concts.	4,326
Agnew Non Bess Concts.	20,626
Agnew Non Bess Shaft	51,163
Agnew Bessemer Direct	5,763
Agnew Non Bess Direct	24,383
	<u>106,261</u>

c. Stockpile Inventories

Agnew Shaft	9,681
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d. Production by Months - Crude Ore

May	3,307
June	8,402
July	13,447
August	9,406
	<u>34,562</u>

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e. Production by Months

<u>Month</u>	<u>Agnew Concentrates</u>	<u>Agnew Direct</u>	<u>Agnew Shaft</u>	<u>Agnew Total</u>
January			3,975	3,975
February			2,809	2,809
March			2,999	2,999
April			5,244	5,244
May	2,427		5,526	7,953
June	5,918	8,476	5,709	20,103
July	9,843	9,056	4,152	23,051
August	6,764	12,614	4,370	23,748
September			3,704	3,704
October			4,942	4,942
November			6,291	6,291
December			4,564	4,564
	<u>24,952</u>	<u>30,146</u>	<u>54,285</u>	<u>109,383</u>

3. ANALYSIS

a. Tonnage and Analysis

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Agnew Crude	34,562	52.96	.051	15.27

b. Tonnage and Analysis of Ore Produced

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Moist.</u>
Agnew Bess Concts.	4,326	58.03	.040	9.82	.37	.91	10.93
Agnew Non Bess Concts.	20,626	56.37	.052	10.58	.52	1.38	12.14
Agnew Non Bess Shaft	54,285	55.69	.068	10.48	.98	1.93	16.91
Agnew Bess Direct	5,763	55.34	.035	14.97	.41	1.27	13.11
Agnew Non Bess Direct	<u>24,383</u>	<u>56.41</u>	<u>.053</u>	<u>9.90</u>	<u>.66</u>	<u>1.28</u>	<u>12.95</u>
	109,383	56.05	.059	10.58	.77	1.61	14.69

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c. Tonnage and Complete Analysis of Ore Shipped

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulf</u>	<u>Ign Loss</u>	<u>Moist.</u>
Agnew Bess Conct.	4,326	58.03	.040	9.82	.37	.91	.34	.20	.010	5.13	10.93
Agnew Non Bess Conct.	20,626	56.37	.052	10.58	.52	1.38	.24	.20	.012	6.30	12.14
Agnew Non Bess Shaft	51,163	56.17	.071	9.88	1.02	2.03	.12	.12	.008	5.90	17.13
Agnew Bess Direct	5,763	55.34	.035	14.97	.41	1.27	.30	.20	.011	3.46	13.11
Agnew Non Bess Direct	<u>24,383</u>	<u>56.41</u>	<u>.053</u>	<u>9.90</u>	<u>.66</u>	<u>1.28</u>	<u>.30</u>	<u>.20</u>	<u>.011</u>	<u>6.58</u>	<u>12.95</u>
	106,261	56.30	.060	10.29	.78	1.65	.20	.16	.010	5.15	14.73

d. Mine Analysis of Ore in Stockpile

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Moist</u>
Agnew Shaft	9,681	53.59	.053	13.31	.61	1.35	15.65

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

<u>Merch</u>	
Cubic Feet Per Ton	14
Rock Deduction	0
Per Cent Recovery	100

b. Ore Reserves as of December 31, 1953

<u>Agnew Lease</u>	<u>Reserve 12-31-52</u>	<u>Mined 1953</u>	<u>Balance After Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-53</u>
NE-NE, 11-57-21	334,783	118,994	225,789	---	225,789

c. Estimated Analysis of Reserves

<u>NE-NE, 11-57-21</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>
Non Bess Merch Ore	225,789	57.08	.054	9.53	.67	1.40

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5. LABOR and WAGES

a. Comments

The labor supply was ample throughout the year. Local labor relations continued satisfactorily. The number of gangs producing ranged from three to six gangs during the year. The crew used on the third shift was obtained from the Sargent mine when that mine was shut down. A general increase of \$0.085 was granted increasing the minimum for Job Class-1 from \$1.435 per hour to \$1.52 per hour. A 1-cent increment between job classes was granted on July 1, 1953. The general increase of \$0.085 and the 1-cent increment between job classes set a new minimum rate of \$2.235 for Job Class-14 (Miners). The increment between job classes is now \$0.055.

b. Comparative Statement of Production and Wages

<u>Production</u>	1953 <u>Agnew</u>	1953 <u>Alworth</u>	<u>Combined</u>
Direct Ore	54,285	119,209	173,494
Number of Days Operated	257	257	257
Average Daily Production	211.23	466.32	137.75
<u>Tons Per Man</u>			
Per Miner			11.484
Total Underground			7.013
Total Mine			5.490
<u>Average Rate Per Day</u>			
Surface			15.70
Underground			20.27
Contract Miners			21.28
Total Mine			19.46
Amount Paid for Labor			614,990.16
Labor Cost Per Ton			3.545

6. SURFACE

a. Buildings and Repairs

Minor maintenance repairs to buildings were carried on throughout the year. The 6-stall garage has been converted into a

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a. Building and Repairs (con't)

combination blacksmith and electric shop. The dryhouse was re-arranged to accommodate a new lamp room and more lockers were installed. An addition was built to the south end of the dryhouse and made into a supply room.

b. Roads and Water Lines

The access road to the mine via the old road on the Hanna property has been discontinued and a new access road over the Alworth property is now being used. The wooden bridge over the Oliver approach has been completed.

A total of 2600 feet of new 4-inch clear water line was installed on the Alworth property. A new discharge system from the Agnew and South Agnew mines was completed in June. All discharge water will now bypass Kelly Lake except during repairs to the line.

7. UNDERGROUND MINES

a. Shaft

Minor maintenance repairs to the shaft were carried on throughout the year. A spill from the surge pocket damaged the shaft and the measuring pocket, thereby causing a 3-day loss in production. The shaft and measuring pocket were repaired and air cylinders were installed on the surge pocket gates.

b. Development

The winze that was started last year to develop the ore below the present bottom level was completed; a second winze was also completed during the year. An incline drift was driven from the bottom level to the 560 elevation. A drift was driven on the 590 sublevel (intermediate sub) and connected with the incline drift. The drift on the 590 sub will be used as a timber drift. Drifts are now being driven north on both the 560 and 590 subs. A drift is also being driven east from the north drifts so that a blanket formation lying east of the trough ore

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b. Development (con't)

may be explored. Considerable high silica ore has been encountered in the development drifts at times. Cross drifts and raises were made in an attempt to establish the shore lines of the ore body and to get some idea of the grade of ore to be expected. Conveyors have been installed in the incline drift and in the north drift on the 560 sublevel.

c. Mining

Mining was carried on during the year with an average of five gangs employed—one gang mined by caving, three gangs drifted, and one gang repaired, completed a winze, and made raises. Most of the caving was done in 14-foot high blocks. This low mining height and development work was not conducive to high production. Heavy rains hampered operations somewhat. During one of the heavy rains, all of the workings below the present main level were flooded. A new air raise was put up into the South Agnew pit to replace the one that was dug out by the South Agnew operations.

The M. A. Hanna Company operated intermittently during the year. They mined both direct and wash ore from the Agnew-South Agnew line under the cross mining agreement. A total of 55,098 tons of direct ore and concentrates were produced.

d. Timber, Explosives, Etc.

The supply of timber was sufficient and of good quality. The timber inventory was kept to a minimum in case the Sargent mine shut down with excess timber on its inventory. The timber that was left at the Sargent mine was taken to the Agnew mine.

Lineal Feet of Timber Used Per Ton of Ore	\$0.836
<u>Cost Per Ton</u>	
Timber	0.199
Lagging, Poles, Boards	0.196
Wire	0.007
Pounds of Explosives (Combined)	0.717
Explosives	0.124

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e. Pumping and Drainage

The water coming into the underground from the South Agnew pit became just a trickle this fall, and at times no water came in at all; however, considerable water has been encountered in the lower development work. A common discharge system for both the Agnew and South Agnew water was completed in June. Now, all discharge water bypasses Kelly Lake except when repairs are made to the line.

8. BENEFICIATION

	<u>Tons</u>	<u>Iron</u>
Crude Ore Through Plant	34,562	52.96
Concentrates Produced	24,952	56.59
Screen Rejects*	3,280	36.11
*To Dump #2	2,512	
To Dump #5	208	
To Roads	560	
	<u>3,280</u>	

9. MAINTENANCE and REPAIR

A continuous program of maintenance and repair was carried on during the year as the need arose. A spill from the surge pocket damaged the shaft and the measuring pocket, thereby causing a 3-day loss in production. The shaft and measuring pocket were repaired and air cycliners were installed on the surge pocket gates.

10. COST of PRODUCTION

a. Comparative Cost Statement

	<u>Budget</u>	<u>Year</u>	<u>Year</u>
	<u>1953</u>	<u>1953</u>	<u>1952</u>
Direct Ore	33,000	53,573	129,815
Stockpile Overrun		712	564
	<u>33,000</u>	<u>54,285</u>	<u>130,379</u>
South Agnew Boundary Ore		55,098	104,093
	<u>33,000</u>	<u>109,383</u>	<u>234,472</u>