

MAAS MINE
ANNUAL REPORT
YEAR 1949

5. LABOR & WAGES

c. Nationality of Employees

<u>As to Parentage</u>	<u>1949</u>	<u>%</u>	<u>1948</u>	<u>%</u>
Finnish	149	37.8	142	37.1
American	84	21.2	77	20.1
English	69	17.5	74	19.3
Italian	36	9.1	34	8.9
Swedish	24	6.1	22	5.7
French (Canadian)	17	4.3	17	4.5
Norwegian	7	1.8	6	1.6
German	5	1.3	5	1.3
Austrian	2	.5	3	.8
Danish	1	.2	2	.5
Irish	1	.2	1	.2
Total	395	100.0	383	100.0

<u>As to Birth</u>	<u>American Born</u>		<u>Foreign Born</u>	
	<u>1949</u>	<u>1948</u>	<u>1949</u>	<u>1948</u>
Finnish	111	102	38	40
American	84	77		
English	46	44	23	30
Italian	16	13	20	21
Swedish	20	18	4	4
French (Canadian)	17	17		
Norwegian	6	5	1	1
German	4	4	1	1
Austrian	1	2	1	1
Danish	1	2		
Irish	1	1		
Total	307	285	88	98

6. SURFACE

a. Buildings & Repairs

The steel gang worked intermittently on repairs to the Shaft House and pockets and also renewed the small roof over the West entrance to the Engine House to protect the men from falling ice. A small enclosed entrance was also added to the office building to keep the Captain's change room warmer and cleaner.

When mining at the Negaunee Mine was completed it was decided to move the district saw mill to the Maas and at the end of the year the new building had been completed and it should be ready for operation soon after the first of next year.

During the vacation week the old 700 h.p. induction motor was removed from the skip hoist and transferred to the Cambria Mine. An 835 h.p. D.C. motor and generator set purchased from War Surplus was installed at the Maas in its place and the former liquid rheostat control eliminated. Using the new motor, which, although slower starting, operated at a faster speed in the shaft, decreases the overall time of hoisting slightly, and also greatly decreases the overloads on the electric system and has worked satisfactorily since its installation.

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6. SURFACE

b. Location Buildings & Repairs

There were no major repairs to any of the rented houses during 1949 but a small crew were kept busy on ordinary maintenance and decoration. Four houses were painted during the summer.

There were no houses sold or purchased this year and those remaining were classified as follows:

Single-Family Houses	38
Two-Family Houses	5
Legion Club	1
Stores	1
Church	1
Total	46

c. Stockpiles

Loading from stockpile started on April 5 and the No. 45 Caterpillar and No. 67 Electric Shovels were used during the season. After resuming work on November 14th all the pocket ore was stocked but a few days were spent in loading ore from the West steel trestle. There was still some ore left in all the grades at the end of shipping season and no overruns were developed. There was, however, an underrun apparent in the Race Course standard ore and sufficient skips of this grade will be deducted from the daily hoist to make up this shortage.

The Southwest wooden trestle was dismantled and probably will not be erected for this winter's stocking as there is sufficient room on the steel trestles for a 5-day per week operation.

e. Timber Yard

There was no shortage of any of the various types of mining timber during the year and the only new arrangement in the timber yard was the renting of the Hydro-crane from the Cambria Mine to assist in unloading and stacking of timber occasionally. The treating plant was not operated in 1949 as steel sets were used entirely where long life was desired and there would be no extraordinary weight.

f. Drainage

The only surface well which was in operation was No. 1 and this water was used exclusively for cooling the compressor and in the Surface Dry while the remainder of the mine was furnished by the City water system. There has been very little change in the amount of water being pumped from underground by the shutting down of No. 2 Well and therefore it will be abandoned.

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7. UNDERGROUND

a. Shaft-Sinking

There was no main shaft sinking in 1949 but it was decided to continue the auxiliary winze near the ore body from the 6th to the 7th Level and preparation for this was continued intermittently, when it would not interfere with production, throughout the year. A hoist room was excavated on the 5th Level with hoist, sheaves, and controls being installed about the middle of the year. On the 6th Level it was necessary to strip about 100' to make room for an additional track as it is planned to have two cages in balance. The two sets just above the level had to be enlarged to take the additional cage and a rock raise was put up near the winze to carry the pipes and cables from 5th Level, which had formerly been in the old pipe apartment which will now be part of the cage apartment. As the main track passes close to the winze all of the rock excavation had to be done when it would not interfere with the mining of the ore and steel supports with a solid steel plate fence had to be installed to guard against a derailment allowing a train to fall into the winze.

Sinking to the 7th Level was started on September 15th and at the end of the year 65 feet had been excavated. There were 6 men working on a single shift and the mucking was done with a Hydro-mucker similar to that used in the Mather "B" shaft. Holes were drilled in the rock at 50' below the 6th Level and reinforcements and concrete put in to form a bearer set. The winze will be extended about 10' below the 7th Level and then development of the new level will be started and continue during 1950.

b. Development

There was very little main level development required this year. The North footwall drift on the 5th Level was straightened West of the Race Course Lease to afford drainage and ventilation which had been cut off by the crushing of the former section to the South. A few raises were also put up.

Table of Main Level Development

<u>Location</u>	<u>Drifting</u>		<u>Raising</u>	
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>
5th Level	201	0	0	78
6th Level	0	0	73	0
Total	201	0	73	78

c. Stoping
General

There was an average of 34 contracts, engaged in mining in 1949, of which 4 were in sub level stopes and the remainder sub caving. A proportion of their time was spent in sub level development, including considerable rock or lean ore and also about 15% of their work was in connection with timber repairs.

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7. UNDERGROUND

c. Stoping
General (Cont.)

Mining was continuous in practically all of the ore areas in the mine with the exception of the 5300 Block above the 5th Level in which the existing raises were cut off by the footwall. The ore to the West will be mined from new raises to be put up later from the 6th Level in 6100 Cross-cut. A small sub level stope was completed in the Race Course Lease above the 4th Level and two contracts then started to develop to the East preparatory to sub caving the remainder of the pillar.

About the middle of the year Contract #6 started to develop a modified system of block caving in the old winze footwall pillar above 4th Level. Eight grizzly sub drifts will be required, cutting the ore body from foot to hanging and it is estimated that this block will produce about 150,000 tons.

There were four contracts engaged in sub level stoping, three on the North footwall and one at the South end of the 6700 Cross-cut above 6th Level. The water constitutes a considerable handicap in the stopes on the footwall and the ore also tends to break in large chunks but there were ideal conditions in the other stope and very good results were obtained.

The largest concentration of contracts was in the central part of the main ore body between the dikes in the Race Course and Maas Leases. The ore produced was all trammed on the 6th Level and was 95% special grade.

Detail

245' Sub Level

Two contracts were engaged in mining in the small footwall pillar above 4th Level in the Race Course Lease from January to April. This territory was then abandoned until the ore to the West could be stoped out. Raises were put up from the 150' transfer and mining resumed late in the year on the 215' Sub Level.

215' Sub Level

Mining was continuous in the Northeast footwall at this elevation during the entire year with four and later 3 contracts, all of which were sub caving. There is considerable water coming off the footwall and the ore is too wet to hold in the shaft pocket and therefore has to be sent to surface at the rate of only one car per skip. This area is in the Maas Lease and all the ore is transferred on the 150' Sub Level. In the Race Course Lease, one contract resumed mining in the small footwall pillar in December.

160' Sub Level

One contract was sub caving above the 4200 Cross-cut from January to September when mining was completed and the contract moved elsewhere as the cross-cut and raise were too badly crushed to warrant reopening. The ore below will be removed from the 150' transfer.

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7. UNDERGROUND

c. Stoping

Detail (Cont.)

150' Sub Level

Two transfer drifts were driven at this elevation, both in the footwall. Contract #5 extended their drift to the East in the Race Course Lease and two raises were put up to the 215' Sub Level. Contract #12 completed their raise in December. Contract #6 connected #418 and #412 Raises in the North foot-wall near the old winze preparatory to opening this area for a modified system of block caving. They opened up on top timber for two of the grizzly subs in December.

130' Sub Level

This mining block in the Maas Lease just above the 4th Level has been in production the entire year with from 2 to 6 contracts sub caving in groups of two each to a transfer as the footwall is too flat to allow drifting and raising in rock on the 5th Level. Although some delay is experienced in keeping the transfers empty, the results have been very good and the men are satisfied to work together as one contract.

75' Sub Level

A transfer was driven in the early part of the year in the 5200 Block and raises put up to the 130' Sub Level.

65' Sub Level

This transfer in 5200 Block was also driven and raises to the 130' Sub Level put up during the first half of the year.

Both of the above mentioned transfers were driven to develop the area described under the 130' Sub Level.

50' Sub Level

The only mining at this elevation was in the Maas Area pillar which was returned to the Maas Mine when the Negaunee Mine completed mining in March. Two raises were put up in the South end of the 5300 Cross-cut and two contracts drifted Northeast and Southwest, respectively, from their raises to the foot-wall and then started to cave the pillar up to the 14th Level, Negaunee Mine at the 75' elevation. Considerable trouble has been experienced from mud runs caused by the water backed up in the old Negaunee drifts. Both contracts were mining here in December and the ore has all been of standard grade although situated in the general sulphur horizon.

40' Sub Level

Mining was completed at this elevation in the 5300 Block in February and the contracts moved to the sub level below.

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7. UNDERGROUND

c. Stoping

Detail (Cont.)

10' Sub Level

Two contracts were mining in the 5300 Block from February to September when this pillar was completed and the miners moved elsewhere. As the footwall is quite flat and had crossed to the West of the raises, it was decided to mine the ore below and to the West at some future date from the 6th Level and thus eliminate having to drift through rock. Contract #27 opened up the very small pillar in the Race Course Lease between the North footwall and the dike in November and had completed one drift along the dike by the end of December.

00' Sub Level

After the new connection was made on the North footwall on the 5th Level, two raises were put up to this elevation and mining started in the pillar left between the old top slicing to the East and the sub level stope to the West. Both contracts were sub caving here in December, one in the Race Course and one in the Maas Lease.

All of the ore mentioned above was of standard grade and transported to the shaft on the 4th or 5th Levels.

5th Level

During the first part of the year there was a small amount of development done when two raises were put up in the 5200 Cross-cut to be used as transfer raises for the 65' and 75' Sub Levels respectively. There was also a connection made on the North footwall to replace a section that had crushed too badly to warrant repair. An opening had to be maintained here for drainage of the water to the West and also for ventilation of the stopes along the footwall between 5th and 6th Levels. Two raises were put up to the 00' Sub Level from this drift. The only mining at this elevation was from sub caving on the -25' Sub Level in the Race Course Lease just South of the dike.

-25' Sub Level

Mining at this elevation has been continuous throughout the year in various areas above the 6th Level in the Race Course and Maas Leases. All of the contracts with one exception were sub caving and the results obtained in this area at the various elevations were the best in the mine. There is less water in this area and the ore is of a softer nature requiring less time for drifting and blasting chunks. One contract was developing along the South mining limit where a small riser in the hanging had occurred. In December, four contracts were mining here.

-40' Sub Level

The South end of the 6200 Block in the Race Course Lease was mined by sub caving from January to June. The ore in this area is being diminished very rapidly by the very flat South footwall which cuts off about 50 feet per sub level. There was no mining on this elevation in December.

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7. UNDERGROUND

c. Stoping

Detail (Cont.)

-50' Sub Level

All of the mining done on this sub level during the year was in the area to the West of the Race Course Lease where some 3 to 5 contracts were sub caving all year and in December there were three contracts still remaining.

-65' Sub Level

The pillar above the 6200 Cross-cut in the Race Course Lease was opened up in June and sub caving has been continuous, with four contracts, to the end of the year. A limit was set to the East and the ore beyond to the footwall will be mined later from the 6100 Cross-cut yet to be developed.

-75' Sub Level

One contract started mining at #6407 Raise in June driving a short transfer to the West and then connecting the various raises North to the dike. In December they were caving near the dike.

-100' Sub Level

There are 9 transfer drifts on this sub level, 4 of which were driven during 1949. They are cut out at the elevation of the back of the 6th Level drift so the ore can be pulled directly into the cars and thus obtain the maximum height to the top of the sub level stopes which they all serve.

Stoping has been in progress in the three North footwall stopes, but in #30 which is the most easterly rock runs from the old workings above were so prevalent that the method of mining was changed to sub caving thus having less back exposed for a given time. There is considerable water in this area and the ground breaks in large slabs requiring a lot of block holing to reduce the ore in size sufficient to pass the mouth of the mills. There is also quite a delay breaking up the smaller chunks, which are very hard, at the grizzlies. The stopes in the South end of #67 Cross-cut have been much better producers and two were completed late in the year. In December raising was started to develop on the West end of two others. All of these stopes reached a height about 85' or about the elevation of the 5th Level with some portions extending slightly above the 5th.

6th Level

The only development on the 6th Level was the extension of #67 Cross-cut to allow for two stopes between the dike and the South Mining Limit. This short extension was driven in ore. The sinking of the winze to the 7th Level was started on the 6th Level and has been described in an earlier paragraph.

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7. UNDERGROUND

d. Timbering

TIMBER STATEMENT FOR THE YEAR 1949

<u>Kind</u>	<u>Lineal Ft.</u>	<u>Avg. Price Per Ft.</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
6" x 8" Cribbing Timber	74,962	.0717	5,371.94	4,899.47
8" x 10" Stulls	31,066	.1296	4,027.43	5,699.78
10" x 12" Stulls	58,293	.1995	11,629.29	19,737.01
12" x 14" Stulls	38,686	.3194	12,356.23	7,684.77
Treated Timber				841.06
9' Steel Sets	6,454	.0736	4,750.06	1,570.16
Total 1949	209,461	.1645	38,134.95	
Total 1948	242,108	.1605		40,432.25
		Per 100 Ft.		
7' Lagging	1,199,135	1.656	19,862.22	28,970.11
9½' Poles	640,835	3.107	19,908.56	27,608.17
Mine Crete Back Poles	208	13.400	278.72	
10' Steel Spiling Poles	5,988	.655	3,920.57	2,938.53
Total 1949	1,846,166	2.332	43,970.07	
Total 1948	2,640,250	2.143		59,516.81
Grand Total 1949			82,105.02	
Grand Total 1948				99,949.06
Product, Tons			603,306	673,126
Feet of Timber per Tons of Ore - Stulls & Cribbing			.3472	.3597
Feet of Stull Timber Only per Ton of Ore			.2229	.2557
Feet of Lagging per Ton of Ore			1.988	2.590
Feet of Poles per Ton of Ore			1.072	1.330
Feet of Lagging per Foot of Timber			5.724	7.2072
Feet of Poles per Foot of Timber			3.089	3.6980
Cost per Ton for Timber			.0632	.0601
Cost per Ton for Lagging			.0329	.0430
Cost per Ton for Poles			.0400	.0454
Cost per Ton for All Timber			.1361	.1418

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

<u>Year</u>	<u>Amount</u>	<u>Cost per Ton</u>
1949	82,105.02	.1361
1948	99,949.06	.1485
1947	81,240.99	.1125
1946	70,147.24	.1473
1945	85,769.70	.1535

This statement includes the steel that has been used to replace the wood and despite the increase in the price for the larger sizes of wood and the much greater cost for steel the total cost per ton shows a slight decrease. This is mostly due to the fact that there was practically no top slicing during the year and also less retimbering of main levels and travel ways.

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7. UNDERGROUND

f. Explosives, Drilling and Blasting

EXPLOSIVES STATEMENT FOR THE YEAR 1949

Stoping and Ore Development

<u>Kind</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
1 1/4" Gelamite #1	173,300	.1528 lb.	26,481.15	2,616.90
1 1/4" 60% Hi-pressure Gelatin				20.00
1 1/4" 60% Gelatin	1,950	.2000 lb.	390.00	97.00
1 1/4" Hercomite 2X	88,700	.1450 lb.	12,861.50	40,899.41
1 1/4" Hercomite 5X	100	.1450 lb.	14.50	
Hercomite 2 x 24	2,250	.1494 lb.	336.25	
Total Powder 1949	266,300	.1505	40,083.40	
Total Powder 1948	310,869	.1403		43,623.31
Fuse	895,400	8.40 M'	7,521.24	8,897.95
#6 Blasting Caps	103,745	15.65 M	1,623.60	1,845.97
Electric Blasting Caps	804	18.04 C	145.05	24.42
Powder Bags	29	4.50 Ea.	130.50	182.90
Tamping Bags				9.90
Fuse Lighters	20,500	9.27 M	190.01	265.02
Primacord	43,000	32.00 M'	1,376.00	1,024.00
#20 Connecting Wire	52	7.90	41.10	38.40
Total Fuse, Caps, Etc.			11,027.50	12,288.56
Total All Explosives			51,110.90	55,911.87
Product, Tons			603,306	673,126
Pounds Powder per Ton of Ore			.4414	.4618
Cost per Ton for Powder			.0664	.0648
Cost per Ton for Fuse, Caps, Etc.			.0183	.0183
Cost per Ton for All Explosives			.0847	.0831

Rock Development

Hercomite 2X	600	.1725 lb.	103.50	2,277.54
Total Powder 1949	600	.1725	103.50	
Total Powder 1948	16,557	.1376		2,277.54
Fuse				315.78
Electric Blasting Caps	262	.1750	45.84	
#6 Blasting Caps				63.42
Total Fuse, Caps, Etc.			45.84	379.20
Total All Explosives			149.34	2,656.74

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7. UNDERGROUND

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

Statement showing cost per ton for explosives, exclusive of rock development, for the period 1945 to 1949, is as follows:

<u>Year</u>	<u>Cost per Ton</u>	<u>Production</u>
1949	.0647	603,306
1948	.0831	673,126
1947	.0685	722,401
1946	.0632	476,348
1945	.0624	558,633

There was very little change in the type of drilling and blasting in 1949 over last year and the slight increase in cost per ton was due entirely to the increase in the price of the powder, etc.

h. Mining & Loading

As has been mentioned previously, there was practically no top slicing in 1949 and the following table shows the proportion of the product obtained from sub level caving and sub level stoping.

	<u>Percentage Based on</u> <u>Number of Contracts</u>		<u>Percentage Based on</u> <u>Product</u>	
	<u>1949</u>	<u>1948</u>	<u>1949</u>	<u>1948</u>
Sub Level Stopping	15%	2%	11.0%	4%
Sub Level Caving	84%	71%	88.5%	78%
Top Slicing	1%	27%	.5%	18%

The reason the sub level stoping did not produce a larger percentage of the product was that some of the stopes were small and two of the others in very hard ore that produced a large amount of chunks that had to be milled or blasted. The stopes on the North footwall were also very wet.

Drilling during 1949 was done almost entirely with the wet type of machines and either jack-bits or carset bits. This not only increases the speed of drilling in the harder ground but makes it necessary to pipe water to all the places and thus have it available in case of a fire. Some two inch powder was used in the long holes in the stopes, thus being able to put more powder in the bottom of the holes and also to load faster as it comes in 2 foot lengths. There was also introduced this year a 5 x 5 cartridge of 60% that worked out very well in blasting large chunks as there was more powder contained in a small space.

It was necessary to have more transfer drifts and employ more scraper hoist men as the very flat footwall precludes the driving of new footwall drifts and long individual raises as there would be too much rock work involved. It has also been required to place two contracts in nearly all of these places as there are not enough individual working places available to maintain the desired product.

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7. UNDERGROUND

i. Ventilation

After the Negaunee Mine was shut down in March the responsibility of maintaining the ventilation plant at No. 2 Shaft was turned over to the Maas. Inspection of all the air ways in the Negaunee Mine has had to be kept up and late in the year it was found that the stope between the 14th and 13th Level was caving and blocking the only connection through which the air traveled to the 6th Level, Maas. A contract was then started putting up a raise between these levels near the Negaunee Shaft and by the end of the year had holed the raise and started to strip. The ventilation as a whole has been very satisfactory in almost all of the working places being controlled by various doors and auxiliary fans.

j. Pumping

There was very little change in the total amount of water being pumped from underground but there was considerably more in the working places as new hanging was broken and diverted the water from the old footwall drifts. One well was all that was in operation on surface. A seismic survey was made along the Western edge of the property, North of the caved area, and from this data it would appear that it might be worthwhile to continue and determine a place somewhere along the North footwall to put down a well and cut off more of the surface water.

The number of gallons per minute pumped underground is shown below:

<u>Month</u>	<u>1949</u>	<u>1948</u>
January	1,017	975
February	1,018	1,123
March	1,024	1,156
April	1,034	1,121
May	1,012	1,143
June	1,027	1,102
July	1,040	1,132
August	1,053	1,069
September	1,066	1,037
October	1,081	1,069
November	1,054	1,024
December	1,083	1,020
Total Average	1,042	1,081

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8. COST OF OPERATING

a. Comparative Mining Cost

	<u>1949</u>	<u>1948</u>
Product	603,306	673,126
Underground Cost	2,304	2,372
Surface Cost	.222	.243
General Mine Expense	.441	.402
Cost of Production	<u>2,967</u>	<u>3,017</u>
Depletion - Original Cost	.031	.036
Depreciation - Plant & Equipment	.006	.021
Development	.017	.046
Movable Equipment	.002	.014
Taxes	.220	.209
Loading & Shipping	.055	.072
Total Cost at Mine	<u>3,298</u>	<u>3,415</u>
Budget, Estimated Cost per Ton	3.336	3.468
Number of Days Operated	245	302
1 8-hour	0	3
2 8-hour	245	299
Average Daily Product	2,462	2,229

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8. COST OF OPERATING

b. Detailed Cost Comparison

	1949		1948	
	Amount	Per Ton	Amount	Per Ton
<u>Underground Costs</u>				
1. Exploring in Mine	276.92	.000	1,366.20	.002
3. Development in Rock	1,328.87	.002	18,051.11	.027
4. Development in Ore	10,125.90	.017	7,636.71	.011
5. Stopping	481,499.08	.799	543,290.35	.807
6. Timbering	435,662.90	.722	502,736.09	.746
7. Trammig	154,508.32	.256	196,371.30	.291
8. Ventilation	25,861.68	.043	19,928.50	.030
9. Pumping	60,426.70	.100	66,409.79	.099
10. Compressors & Air Pipes	58,141.58	.097	65,954.42	.096
12. Underground Superintendence	44,316.71	.073	49,035.17	.073
14. Maintenance, Compr. & Drills	3,709.96	.006	6,752.60	.010
15. Scrapers & Mechanical Loaders	70,120.84	.116	59,186.24	.088
16. Electric Tram Equipment	31,957.69	.053	41,569.01	.062
17. Pumping Machinery	12,230.24	.020	18,584.85	.028
Total Underground Costs	1,390,167.39	2.304	1,596,872.32	2.372
<u>Surface Costs</u>				
18. Hoisting	48,629.59	.081	53,284.15	.079
19. Stocking Ore	23,043.19	.038	24,957.37	.037
20. Screening-Crushing at Mine	5.65	.000	232.90	.000
21. Dry House	14,271.00	.024	16,939.17	.025
22. General Surface	11,518.45	.019	12,653.66	.019
23. Maintenance Hoisting Equipment	8,439.33	.014	17,117.94	.025
24. Shaft	8,721.92	.014	23,274.95	.034
25. Top Tram Equipment	2,657.09	.004	4,855.00	.007
26. Docks, Trestles, & Pockets	5,892.65	.010	7,347.55	.011
27. Mine Buildings	10,930.35	.018	4,068.42	.006
Total Surface Costs	134,109.72	.222	163,431.09	.243
<u>General Mine Expense</u>				
Geological	890.68	.001	1,548.46	.002
28. Insurance	24,755.44	.041	18,328.18	.027
29. Mining Engineering	8,553.10	.014	9,594.33	.014
30. Mechanical & Electrical Engineering	6,180.66	.010	3,949.43	.006
31. Analysis & Grading	29,059.10	.048	32,719.19	.049
32. Personal Injury	38,517.72	.064	28,275.74	.042
33. Safety Department	4,129.13	.007	4,082.02	.006
34. Telephones & Safety Devices	3,439.56	.006	4,728.69	.007
35. Local & General Welfare	4,585.58	.008	5,520.29	.008
36. Sp. Exp., Pensions & Allowances	11,132.91	.018	10,385.42	.015
37. Ishpeming Office	24,580.62	.041	36,107.69	.054
39. Mine Office	31,356.08	.053	33,341.44	.050
Social Security Taxes	25,981.22	.043	27,625.77	.041
Employees' Vacation Pay	50,685.64	.084	54,135.00	.081
E & A, CC-324, Seismic Survey	1,598.00	.003		
Research Laboratory	13.81	.000		
Total General Mine Expense	265,959.25	.441	270,341.65	.402
Cost of Production	1,790,236.36	2.967	2,030,645.08	3.017

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

(1) Days and Shifts

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1949	245	1 & 2-8	383	94,278
1948	<u>302</u>	<u>1 & 2-8</u>	<u>370</u>	<u>113,552</u>
Decrease	57			19,274
Increase			13	

Total Men Employed in December of Each Year

	<u>1949</u>	<u>1948</u>	<u>1947</u>
Surface	65	59 $\frac{1}{2}$	59 $\frac{1}{2}$
Underground	321 $\frac{1}{2}$	295 $\frac{3}{4}$	301 $\frac{1}{2}$
Total	<u>386$\frac{1}{2}$</u>	<u>355$\frac{1}{4}$</u>	<u>361</u>

(2) Wages

There was no change in the wage rate schedule in 1949.

(3) Comparison of Production

<u>Year</u>	<u>Production</u>	<u>Average Daily Product</u>
1949	603,306	2,462
1948	<u>673,126</u>	<u>2,229</u>
Decrease	69,820	
Increase		233

(4) Comparison of Number of Men & Wages

<u>Year</u>	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1949	<u>383</u>	<u>94,278</u>	<u>1,193,437.61</u>	<u>12.66</u>
1948	370	113,552	<u>1,393,185.75</u>	<u>12.27</u>
Increase	13			.39
Decrease		19,274	199,748.14	

(5) Tons Per Man Per Day

	<u>1949</u>	<u>1948</u>	<u>Increase</u>	<u>Decrease</u>
Surface	35.79	32.42	3.37	
Underground	7.79	7.25	.54	
Total	6.40	5.93	.47	

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8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)

(6) Cost of Production

Year	Amount	Cost Per Ton
1949	1,790,230.36	2.967
1948	2,030,645.06	3.017
Decrease	240,414.70	.050

Year	Amount		Cost per Ton		
	Labor	%	Supplies	%	Total
1949	1,246,213.94	69.5	544,022.42	30.5	2.967
1948	1,448,650.25	71.3	581,994.81	28.7	3.017
Increase				1.8	
Decrease	202,436.31	1.8	37,972.39		.050

It is interesting to note that in the last 10 years the cost per ton for labor has increased 1.026 while the increase for supplies is only .129. In the same period the tons per man per day have increased from 6.18 to 6.40.

The decrease in the Cost of Production for 1949 as compared with 1948 was mostly due to the increase in tons per man per day. In the change from a 6-day to a 5-day operation the higher cost per ton for the overhead was just about offset by the reduction in overtime payments.

Some accounts are listed below for special comment.

(7) Detail of Accounts

UNDERGROUND COSTS

3. Development in Rock

	Drifting	Raising	Total Feet	Cost Per Foot	Cost Per Ton
1949		78'	78	17.04	.002
1948	641'	201'	842	21.44	.027
Decrease	641'	123'	764	4.40	.025

There was practically no development in rock during 1949 as the only drifting remaining to be done on the 6th Level will have to wait until the East foot-wall pillar above 5th Level is mined. Stripping of the 6th Level at the winze is covered by the E & A for 7th Level development.

4. Development in Ore

	Drifting	Raising	Total Feet	Cost Per Foot	Cost Per Ton
1949	201'	73'	274	36.96	.017
1948	418'	104'	522	14.63	.011
Increase				22.33	.006
Decrease	217'	31'	248		

The only development in ore during the year was a new connection on the North footwall on 5th Level and the extension of the 6700 Cross-cut on 6th Level. The cost per foot showed an increase on account of considerable delay in starting and finishing the 5th Level connection where the old timber had to be removed.

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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts (Cont.)

5. Stoping

	<u>Labor</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>Cost Per Ton</u>	<u>Total</u>
1949	409,919.03	.681	71,580.05	.118	.799
1948	462,540.16	.687	80,750.19	.120	.807
Decrease	52,621.13	.006	9,170.14	.002	.008

Although there was practically no difference in this account for the two years this table shows the division between labor and supplies.

6. Timbering

	<u>Labor</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>Cost Per Ton</u>	<u>Total Cost Per Ton</u>
1949	334,984.36	.555	100,678.04	.167	.722
1948	389,757.50	.579	112,978.59	.167	.746
Decrease	54,772.64	.024	12,300.55		.024

The decrease of .024 in the cost per ton for timbering was all in labor and due to being able to put up more steel sets per shift than the former timber sets when retimbering the rock drifts in slabby ground.

8. Ventilation

	<u>Amount</u>	<u>Cost Per Ton</u>
1949	25,961.68	.043
1948	19,928.50	.030
Increase	5,933.18	.013

The increase in this account was due to the Maas Mine having to carry the full expense of the fan station at No. 2 Shaft after the Negaunee Mine closed in March.

15. Scrapers & Mechanical Loaders

	<u>Amount</u>	<u>Cost Per Ton</u>
1949	70,120.84	.116
1948	59,186.24	.088
Increase	10,934.60	.028

This account continues to show an increase as there are more transfers involved with extra scraping units most of which are higher powered using larger scrapers and requiring larger sizes of rope. These items are all more expensive and also more repairs are necessary with more hoists in use.

Total Underground Costs

	<u>Labor</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>Cost Per Ton</u>
1949	1,025,556.80	1.701	364,610.61	.603
1948	1,199,166.62	1.781	397,705.70	.591
Decrease	173,609.82	.080	33,095.09	
Increase				.012

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8. COST OF OPERATING

b. Detailed Cost Comparison

(7) Detail of Accounts (Cont.)

SURFACE COSTS

24. Shaft

	<u>Amount</u>	<u>Cost Per Ton</u>
1949	8,721.92	<u>.014</u>
1948	22,274.93	<u>.034</u>
Decrease	<u>13,553.01</u>	<u>.020</u>

The cost for shaft maintenance in 1949 was practically normal again as the extensive work on the shaft pockets and trench on the 6th Level was completed in 1948.

27 Mine Buildings

	<u>Amount</u>	<u>Cost Per Ton</u>
1949	10,930.85	<u>.018</u>
1948	4,068.42	<u>.006</u>
Increase	<u>6,862.43</u>	<u>.012</u>

The increase in this account in 1949 was due to the erection of the saw mill which was moved from the Negaunee Mine and also to the necessity of considerable repairs to the shaft house where the steel had deteriorated.

Total Surface Costs

	<u>Labor</u>	<u>Cost Per Ton</u>	<u>Supplies</u>	<u>Cost Per Ton</u>	<u>Total</u>
1949	83,213.24	<u>.138</u>	50,896.48	<u>.084</u>	<u>.222</u>
1948	96,841.54	<u>.144</u>	66,589.55	<u>.099</u>	<u>.243</u>
Decrease	<u>13,628.30</u>	<u>.006</u>	<u>15,693.07</u>	<u>.015</u>	<u>.021</u>

This table was inserted to show the difference between labor and supplies.

32. Personal Injury

	<u>Amount</u>	<u>Cost Per Ton</u>
1949	38,517.72	<u>.064</u>
1948	28,275.42	<u>.042</u>
Increase	<u>10,242.30</u>	<u>.022</u>

This increase was due to there being a fatal accident in 1949 as compared to none in 1948.

Total General Mine Expense

	<u>Amount</u>	<u>Cost Per Ton</u>
1949	265,959.25	<u>.441</u>
1948	270,341.65	<u>.402</u>
Decrease	<u>4,382.40</u>	
Increase		<u>.039</u>

The increase in cost per ton was entirely due to the lower production in 1949 on account of reducing from a 6-day to a 5-day per week operation.

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8. COST OF OPERATING

b. Detailed Cost Comparison

Analysis of Supplies Used

	<u>1949</u>		<u>1948</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Supplies	51,038.48	.085	57,757.79	.086
Iron & Steel	26,069.46	.043	24,966.35	.037
Oil & Grease	3,998.09	.007	5,655.76	.008
Machinery Supplies	47,599.40	.079	45,800.17	.068
Explosives	51,687.95	.086	59,727.33	.089
Lumber & Timber	84,155.80	.139	107,524.64	.160
Fuel	10,039.52	.017	8,912.89	.013
Electric Power	135,388.06	.224	140,279.00	.208
Total	409,976.76	.680	450,627.93	.669

The cost for Iron & Steel increased in 1949 while Lumber & Timber showed a decrease due to using a large number of steel sets to replace the wooden sets. The cost for Electric Power increased due to the increase rate per K.W.H.

Idle Expense

The expense incurred during October and the first half of November when the mine was idle on account of the strike is shown below as a matter of record.

	<u>Amount</u>	<u>%</u>
Labor	30,771.83	45.1
Supplies	37,393.02	54.9
Total	68,164.85	100.0

10. TAXES

	<u>1949</u>		<u>1948</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Maas Mine	\$ 1,605,000	84,044.70	\$ 1,935,000	85,750.11
Race Course	350,000	18,327.51	450,000	19,941.89
Stockpile & Equipment	900,000	47,127.87	755,000	33,458.05
Miscellaneous Parcels	11,770	616.36	8,665	333.98
Total Oprtg. Maas Mine	2,866,770	150,116.44	3,148,665	139,534.03
Collection Fees		1,501.16		1,395.34
Total		151,617.60		140,929.37
Tax Rate		5,236.43		4,431.53
Total City of Negaunee Tax		720,387.61		512,641.46
Maas Mine % of City Tax		21.0%		27.6%
Maas Mine Rented Houses	113,050	5,919.77	70,500	3,124.22
Mineral Lands, Etc.	13,300	696.51	16,270	721.02
Total Houses & Lands	126,350	6,616.28	86,770	3,845.24
Collection Fees		66.16		38.45
Total		6,682.44		3,883.69

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11. ACCIDENTS AND PERSONAL INJURY

	<u>1949</u>	<u>1948</u>
Fatal	1	0
Time Lost, over 4 months	2	1
Time Lost, 1 to 4 months	9	5
Time Lost, less than 1 month	4	9
Total Compensable Accidents	<u>16</u>	<u>15</u>

In addition, Adolph Laitinen was accepted as an occupational disease case on 7/6/49.

On December 31, 1949 payments were being made on eight accidents which occurred prior to Jan. 1, 1949.

The total amount paid out for accidents occurring within the year, in 1949 was \$2,748.00 as compared with \$1,169.00 in 1948.

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

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Description of Accident</u>
3-19-49	Arthur Truscott	Truscott was helping to repair the cylinder which works the butterfly in the shaft house pocket. In some manner he lost his balance and fell 9' through a 1' x 3' opening to the platform below and in so doing fractured his left arm, right scapula, and left rib. He lost about seven months.
6-1-49	Toivo Holmi	Holmi had completed his shift and got off the motor to walk to the bench on the 6th Level plat where the motor crew waits for the cage. In some manner he slipped and fell, fracturing his leg. Upon examination, the place was found to be level and dry and there was no indication as to why he fell. He was taken to the hospital and died three days later. A post mortem was made but was negative as far as his previous condition was concerned. It was thought that it might have shown effects of alcoholism.
8-25-49	Fernley Kent	Kent was stemming in Contract #6 above the 4th Level and as he was making a hitch for a leg, a slab of rock came off the side and struck him in the right leg. He suffered a bad fracture and was home a little over four months. His partner was considered a very careful miner and thought the place was properly trimmed.

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11. ACCIDENTS AND PERSONAL INJURY (Cont.)

The accidents, their causes and classification as to responsibility, are tabulated as follows:

<u>Causes</u>	
Falls of Ground	1
Falling Material	1
Squeezed between two objects	3
Protruding spike	1
Short in electrical wiring	1
Cars and Chutes	2
Slipping	3
Tools slipped	3
Dirt in eye	1
Total	<u>16</u>
<u>Responsibility</u>	
Trade Risk	1
Injured Man	12
Injured & Others	2
Injured & Supervision	1
Total	<u>16</u>

The record for the year as regards to Frequency and Severity is as follows:

<u>Hours of Labor</u>	<u>Compensable Days Lost</u>	<u>Non-compensable Days Lost</u>	<u>Frequency Rate</u>	<u>Severity Rate</u>
726,429	644	44	57.71	1.090 (Excl. Fatal)
Total	<u>6,000 (Fatal)</u> 6,644	<u>44</u>	<u>57.71</u>	<u>8.306</u>
Average for underground miners			58.43	2.031

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

E & A CC-200

Total Estimate	\$29,000.00
Expended to Dec. 31, 1948	\$26,962.30
Expended in 1949	<u>8,936.37</u>
Total expended	35,898.67
Balance December 31, 1949	<u>\$ 6,898.67</u>

The purpose of this E & A, which was completed in 1949, was the installation of a synchronous motor, D.C. generator set, D.C. skip hoist motor and controls to replace the present A.C. equipment which was transferred to the Cambria Mine. Mr. Cory, Chief Electrical Engineer, estimates that this unit effects a power saving of approximately \$10,000.00 per typical year as well as having a much smoother running unit and less mechanical wear.

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

E & A CC-285

Total Estimate		\$225,350.00
Expended to Dec. 31, 1948	\$ 3,815.19	
Expended in 1949	<u>29,590.80</u>	
Total Expended		<u>33,405.99</u>
Balance December 31, 1949		<u>\$191,944.01</u>

The purpose of this E & A was the sinking of a winze from the 6th to 7th Level and the development of the 7th Level. At the end of 1949 the winze was down 60 feet with 47 feet to go. There was a considerable over expenditure in the account for installation of the hoist to be used permanently at the winze. It was found necessary to completely overhaul and repair this hoist at the Lake Shore Engineering Co.

E & A CC-324

Total Estimate		\$2,000.00
Expended in 1949		<u>1,598.00</u>
Balance December 31, 1949		<u>\$ 402.00</u>

The purpose of this E & A was a Seismic Prospecting Survey to determine the depth of ledge to the East of the Maas Mine to ascertain if there was a channel or deep point where it might be advisable to test for a well location. The results obtained were very relative and it was not considered advisable to do any further work here.

13. EQUIPMENT AND PROPOSED EQUIPMENT

a. Steam Shovels

The #67 Electric and the #45 Caterpillar Steam Shovels were used for loading from stockpile during 1949 and will be adequate for loading next year. A boiler was removed from one of the railroad type shovels that was scrapped and placed in the #45 during the spring and this together with other minor repairs placed the shovel in good condition.

b. Stocking Trestles

There was no erecting of either permanent or wooden trestles during 1949 as the capacity of the two steel trestles is sufficient for the ore stocked on a 5-day per week operating schedule.

c. Scraper Hoists

One 40 h.p. Sullivan scraper hoist unit was purchased in 1949 for use in the trench on 6th Level, 1 - 25 h.p. Ingersoll-Rand scraper hoist, and also 1 - 25 h.p. and 3 - 20 h.p. used scraper hoist units were purchased from the Negaunee Mine when mining was completed. These hoists were equipped with D.C. motors whereas the Mather uses A.C. current.

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13. EQUIPMENT AND PROPOSED EQUIPMENT (Cont.)

d. Drills & Drilling Equipment

One HC-10 Reverse feed drill was purchased from the Le Roi Company and also a Reverse Air feed to change over a $3\frac{1}{2}$ Automatic Drifting Drill.

e. Skips & Cages

There were no changes except minor repairs to the skip and cages in the main shaft but two new cages were built at the Ishpeming General Shops for use in the winze where they will be in balance and the material will be hoisted in cars from the 7th to the 6th Level and thence transported by motor to the shaft.

15. POWER

The following is the rate charged per K.W. hour by months in 1949.

January	\$.0134
February	.0132
March	.0132
April	.0134
May	.0134
June	.0132
July*	.0150
August	.0165
September	.0155
October	.0152
November	.0161
December	.0151
Average 1949	<u>.0144</u>
Average 1948	.0134

*Starting the 1st of July the Cliffs Power & Light Co. were allowed to increase their rates and when they did so they used an entirely new formula for calculating the cost. The rates above since July 1st do not appear on their billing, but were calculated from the total K.W.H's used to the total amount charged. The increase in cost is approximately 13%.

17. CONDITION OF PREMISES

The general appearance of the lawn and shrubbery was better during the year as there was considerably more rain than for the past two years. There were no noteworthy changes but when the L. S. & I. Rd. lower the grade of their main line North of the mine it may be advisable to do some planting along the crest of the cut.

18. MAAS CRUSHER

The crushing plant did not operate during the year. A decision should be made as to whether or not this plant is to be kept ready for operation as a considerable amount of the wooden supports are very old and becoming decayed. If any new material is used in repair work it should be steel and not wood.

19. TREATING PLANT

The treating plant was not used as it is felt that the use of steel sets is preferable to treated wood sets in the mine. Occasionally decking for the steel trestle and other types of sawed timber will be treated as needed.

MATHER MINE "B" SHAFT
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GENERAL:

The first half of 1949 was a period of substantial accomplishment with the shaft bottomed at 3093 feet below collar, an excellent start on the main buildings construction by Proksch Co., and erection of the steel headframe with all heavy machinery swung into place. In the engine house which was finished in late summer, the mechanical assembly of the hoists was completed as was also the two large compressors. On general surface construction, the engine house to shaft tunnel was completed, idler stands put up and all necessary incidentals to proper servicing of underground development readied.

A loss of 6 weeks of irreplaceable good construction weather because of the C.I.O. strike during October and the first half of November seemed to initiate an interval of frustrated effort. With the appreciated assistance of Bethlehem Steel, delivery of the long awaited electrical control equipment was made to the property during the strike. To protect the equipment from weather damage, it was unloaded by the supervisory personnel of Mather "B" into the engine house. The work of installation and connecting up the switch gear and electrical control equipment was started immediately upon termination of the strike in the middle of November but despite concentration of manpower on the project, the nature of the work required definite sequence of accomplishment producing numerous occurrences of obvious work to be done but with attendant inability to get at it because of incompleteness of another phase.

Westinghouse has cooperated to our deep satisfaction in affording the services of an installation engineer regarded as one of the finest in the profession. His knowledge and conscientious attention to the job will undoubtedly hasten an otherwise very costly delayed project.

Construction of the heating plant and dry wing of the main buildings originally scheduled for Dec. 30, 1949 was badly delayed. Extremely cold weather at times precluded any possibility of satisfactory concreting work and although Proksch Co. has commendably pushed their project it will be May 1950 before the dries are ready for occupancy.

MATHER MINE "B" SHAFT
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GENERAL: (CONT'D)

Accomplishment at the property, although not measurable in tons has been very gratifying and is due in a large part to the intense pride and personal attention to the job on the part of the handful of supervisors at Mather "B". These men have the project uppermost in their minds and have given scant regard to the demands the job has made on what is popularly termed their own time. Also, as a result of the high calibre of their work the property earned the safety banner indicative of least number of accidents of the Company's mines for the year 1949.

Inasmuch as the Mather "B" project remained in the development stage for 1949 and appropriations for the development have been granted according to the outline of E & A NM-44, an account of progress can be given following the authorization pattern.

44-B PREPARING SITE:

The heavy yardage phase of site preparation had been done in 1948 with the stocking and storage yard areas being graded. This year the main activity was in back-filling around the service and supply tunnels and at the shaft area. The long term job of laying sollar and extending fill at the far west end of the stocking areas was continued intermediately and also a considerable yardage was dumped in the proposed parking area and road fill at the east approach to the property.

For this work, the caterpillar tractor and athey wagon, Euclid trucks borrowed from the Tilden open pit and later in the summer either of two used Euclids purchased for the Mather "A" & "B" properties from the Company's Mesabi Range operations, were used together or in units as conditions demanded.

44-C TEMPORARY BUILDINGS:

No further work was necessary with the temporary buildings with the exception of dragging the original 8' x 16' shanty dry which had been used as a tool house up to the dry wing and attach it to give additional change house room. Because of the delay in construction of the permanent change house the temporary quarters have been utilized to the last nail in the walls.

This portion of the E & A was considered as closed out as of the first of the year.

MATHER MINE "B" SHAFT
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44-D INITIAL EQUIPMENT:

This portion of the estimate was set up to purchase equipment necessary to start development of the property and was considered closed as of the first of the year.

Very good performance was obtained from the dozer, clamshell machine, concrete mixer, pumpcrete, and batching plant in the past three years.

44-E SINKING SHAFT:

The Mather "B" sinking project benefited greatly by the experience and counsel of the Mather "A" Shaft personnel. With the general procedure already established for "B" sinking the "hustle every ball game" system was used with the idea that one percents and two percents trimmed off the time for cycle components would add up in the course of 3000 feet.

Use of the carbide tipped bit, as soon as it was rumored on the trade horizon, was immediately effective and Ingersoll-Rand cooperated very well in supplying all it could for our use. Development of the hydraulically operated clamshell bucket took a big bite out of the mucking period which was the last remaining portion of the cycle that consumed a lot of time.

The "A" experience plus these two major innovations enabled the "B" sinking to average 137 feet per month the first year as compared to 107 for the Mather "A" job in the best sinking year. In 1949, the finish of "B" sinking, the average was further increased to 159 feet per month. Actual sinking required 21 full months, which includes time off for summer vacation and contending with the two week deer hunting slack periods. This 21 month period produced an average of 140 feet per month of sinking advance.

Of interest is the fact that the last four months of 6 day per week operation (the last full sinking month, July 1949, was on a 5 day schedule) averaged 173 feet per month. This 4 month period brought the bottom down to 2938 feet in depth, and also gave the month with the highest rate of advance, 191 feet.

MATHER MINE "B" SHAFT
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44-E SINKING SHAFT: (CONT'D)

At this stage with fairly decent rock wall conditions and despite extra work of cutting small drifts opposite the level stations, the sinking appeared to be a function of cage travel time. Included in cage travel time consideration must be given to the normal use of the cage by the shaft mechanical crews and electrical men. It just took that much longer to get men and supplies where they were needed. The crews, sinking, mechanical, electrical, surface and landing help seemed to have reached their peak in daily output. Frequent time checks indicated little variance in crew accomplishments, but inspection of the Logan trip recorder graph removed daily from the instrument showed a gradually widening base to the collar - bottom - collar triangle. The status of sinking at this depth was such that the mucking crews had their tray loaded before the cage with its car reached the collar. The car already had side-boards by this time and the limit of the hoist had been reached, which set up conditions wherein men were waiting on machines and nothing further could be expected in man output.

It was felt during the latter stages of sinking that mechanical aids to the long regarded laborious task of shaft sinking now justified a re-inspection of the balance between the cost of installation of permanent, fast hoisting equipment prior to start of sinking and the usual conception of temporary sinking equipment sufficient to match output of hand work at the shaft bottom.

The shaft was bottomed at 3093 feet on Aug. 5, 1949. Installation of the bottom three steel sets was held off until excavation of the skip pit south of the skip compartments was finished to avoid possible damage to the sets. An additional foot was taken out of the bottom below the cage compartment to permit matching of the cage rails with the rail on skip pit elevation should occasional spillage result from cage loading during early level development when all rock would be taken out through the cage compartment. The last three sets were installed in November, a concrete pillar poured in the center of each skip compartment to support a sloping chute to the south skip pit opening and a double wall of ventilation plate installed with concrete poured into the slot between the plates to afford a rugged shaft bottom deflector for skip loading spillage.

The following table reviews the monthly progress of shaft sinking, repeating previous accomplishment for purposes of complete record.

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44-E SINKING SHAFT (CONT'D)

<u>Month</u>	<u>Days Worked</u>	<u>Footage</u>		<u>Cuts Blasted</u>	<u>Steel Sets</u>
		<u>Advance</u>	<u>Depth</u>		
Prior 1947	-	127	127	19	15
November "	26	88	215	16	13
December "	26	107	322	20	14
January 1948	26	142	464	26	19
February "	25	101	565	21	16
March "	27	118	683	23	17
April "	26	144	827	27	20
May "	25	138	965	26	20
June "	26	138	1103	28	18
July "	26	140	1243	28	21
August "	20	112	1355	17	16
September "	24	153	1508	19	22
October "	26	170	1678	24	24
November "	21	138	1816	17	19
December "	25	145	1961	19	21
January 1949	25	155	2116	20	21
February "	24	130	2246	19	20
March "	27	191	2437	32	26
April "	26	160	2597	27	24
May "	25	170	2767	28	25
June "	26	171	2938	29	23
July "	20	135	3073	23	20
August "	5	20	3093	3	4
November "		-		-	3

GILBERT BROS. CO. 25% COTTON

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44-E SINKING SHAFT (CONT'D)

<u>Month</u>	<u>Sets Concreted</u>	<u>Cu. Yards Concrete</u>	<u>Cu. Yards Rock Hoisted</u>	<u>Cu. Yards Per Foot</u>	<u>Advance Per Day</u>
Prior 1947	12	494	640	-	-
November "	7	33	1446	16.4	3.4
December "	7	39	1466	13.7	4.1
January 1948	9	41	2210	15.5	5.5
February "	10	66	1606	16.1	4.0
March "	17	125	1900	16.1	4.4
April "	12	122	2409	16.7	5.5
May "	13	44	2480	18.0	5.5
June "	15	87	2311	16.7	5.3
July "	12	82	2680	19.1	5.4
August "	9	68	2238	20.0	5.6
September "	11	105	2810	18.4	6.3
October "	13	101	3198	18.8	6.5
November "	10	95	3054	22.1	6.6
December "	13	105	3354	20.3	5.8
January 1949	18	99	3348	21.6	6.2
February "	13	92	2650	20.4	5.4
March "	13	78	3950	20.7	7.07
April "	17	129	3520	22.0	6.15
May "	17	94	3136	18.4	6.8
June "	18	93	3552	20.6	6.57
July "	12	54	2708	20.0	6.75
August "	2	8	544	27.2	6.7
November "	1	7	-	-	-

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44-E Sinking shaft (Cont'd)

The shaft sinking in itself was completed in August 1949. Total costs of the job to Sept. 1, 1949 are tabulated below. As of Sept. 1, 1949 the shaft was complete with the exception of installation of permanent guides, 12" air line, discharge column and 50% of necessary power cables.

Because of the fact that the first 88 feet of shaft contains the headframe footings, the openings for three tunnels, and air heating shaft and steam line concrete tunnel, this first distance is given separately in the shaft costs and included of course in the totals. The remaining 3005 feet were excavated under similar conditions and this stretch of shaft can be regarded as a unit.

	<u>LABOR</u>	<u>SUPPLIES</u>	<u>TOTAL</u>
Total Cost - Collar to Ledge, Not including General Expense (88 ft.)	\$21,094.89	\$21,839.25	\$42,934.14
Cost Per Foot (88 Ft.)	239.71	248.17	487.89
Total Cost - Ledge to Bottom, Not Including Gen'l Expense (3005 ft.)	555,564.65	656,834.03	1,212,398.68
Cost Per Foot (3005 ft.)	184.88	218.58	403.46
Total Cost - Collar to Bottom, Not Including General Expense	576,659.54	678,673.28	1,255,332.82
Cost Per Foot (3093 ft.)	186.44	219.42	405.86
Grand Total Cost - Including General Expense			\$1,346,110.58
Cost Per Foot - Including General Expense			\$435.21

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44-E SINKING SHAFT (CONT'D)

To further detail the costs of the shaft sinking and outfitting the total costs of sinking to Dec. 31, 1949 are given below. These costs include the purchase of the eight lines of permanent fir guides and the 12 inch air line, but not installation of this equipment. Installation will be made early in 1950.

		<u>To Dec. 31, 1949</u>	
		<u>TOTAL</u>	<u>PER FOOT</u>
44-E-a	- Equipment	\$27,326.62	9.09
b	- Sinking Shaft		
	Stocking Rock	51,558.14	17.16
	Sinking Shaft	562,449.77	187.17
	Temp. Air-Water Lines	24,187.84	8.05
	Clean Steel	1,447.53	.48
c	- Steel Sets, Sheathing	267,358.41	88.97
d	- Install Sets, "tc.		
	Sets	58,256.69	19.39
	Sheathing	22,126.55	7.36
	Ladders	2,617.28	.87
	Bearers	4,962.85	1.65
	Runners	9,615.16	3.20
	Block & Trim	1,376.65	.46
e	- Concrete		
	Concrete	68,802.24	22.90
	Forms	11,654.52	3.88
f	- Ventilation Seal	51,407.87	17.11
h	- Counterweight Pipe		
	Pipe	28,160.06	9.37
	Hoist	3,382.35	1.13
i	- Air Lines	18,979.07	6.31
j	- Power Cables	22,233.94	7.40
k	- Water Lines	28.56	.01
l	- Skip & Cage Guides		
	a-Skip Guides	403.53	.13
	b-Cage Guides	8,987.18	2.99
m	- Signal Cables	505.44	.17
		<u>\$1,247,828.25</u>	<u>\$415.25</u>
	Collar To Ledge-88 ft.	42,934.14	487.89
	Total General Expense - To Dec. 31, 1949	96,579.44	31.23
	Total Cost Including General Expense	\$1,387,341.83	\$448.54

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44-F ENGINE HOUSE:

From a mechanical installation viewpoint the engine house project shaped up excellently. At the start of the year only 3 walls and a roof comprised the building and at the years end all mechanical equipment necessary for cage and skip operation was in place.

The overhead traveling crane was lifted in place using a 20 ton mobile crane from the Company's general warehouse in the first month of the year and outfitted electrically as soon as the building roof was waterproofed. In the meantime a 50 ton steam railroad crane was borrowed from the L.S. & I. railroad to unload the heavy shafting of the hoists delivered to the property.

To match installation of permanent hoisting facilities with the accelerated shaft sinking progress Mather "B" men started mechanical assembly of the cage hoist early in March in what appeared to be a confusing mixture of contractor's men and equipment. It was definitely necessary however to push the building contractor and schedule his work to dovetail with equipment progress. Both skip and cage hoist mechanical parts were ready to turn over in August, and two compressors, Ingersoll-Rand PRE class, were in working shape.

However, the zeal in mechanical assembly seemed to be wasted when a delay growing prolonged showed up in delivery of electrical control equipment from Westinghouse. The first shipment of the control equipment was received in October during the early part of the C.I.O. strike. This along with other deliveries of equipment was unloaded and moved under cover by the supervisory staff at the property. The assistance of Bethlehem Steel Company in effecting as early shipment as possible of the entire electrical equipment order from Westinghouse was very much appreciated at Mather "B" inasmuch as the work of underground development entailing rock hoisting was definitely limited with only the sinking hoist available.

Westinghouse carried out their end of the installation and wiring exceedingly well by furnishing the services of one of their most highly regarded engineers who carried the project as rapidly as could be expected to successful completion.

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MATHER MINE "B" SHAFT
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44-F ENGINE HOUSE: (CONT'D)

A touchy job at the end of the year consisted of nudging a 90 ton M.G. set flywheel off a special flat car, moving it to the site and lowering the mass into the bearings. The entire job was handled with four 50 ton jacks borrowed from the C.C.I. Co. general shops inasmuch as no lifting equipment of this capacity was available at the property. A structural steel yoke was designed and fabricated at Mather "B" to handle the job and great care was observed in method. Any mishap, however slight to the shaft couplings would have necessitated a return of the huge weight to Pittsburgh and it was considered a job well done when it was resting in its bearings.

44-G SHOPS, OFFICE AND DRY WINGS:

The construction contract of these main buildings was awarded Proksch Co. whose headquarters are in the Upper Peninsula. Immediately upon letting of the contract Proksch moved in with excavating machinery and was accomplishing a splendid job when the C.I.O. strike on Sept. 30 robbed him of six weeks of construction weather and left him with a heating plant wing and change house building to put up in the middle of winter. Much credit can be given Proksch Co. for conscientious effort and accomplishment under very tough winter weather.

A description of the various sections of the main buildings and their function was given in the report for the year 1948 and need not be duplicated here. A few minor improvements were made in the plans and construction as the forms took shape. Much credit for the smoothness with which this construction has moved along can be given to the adequate and competent foremen of the Proksch Co. and to the work of a resident inspection engineer from the Starin architectural firm who cooperated with the contractor in planning construction steps.

44-H HEADFRAME:

McDowell Co. of Cleveland was given the steel headframe construction contract as was mentioned in the 1948 report. The design of the structure had been completed by R. E. Boeck, consulting engineer of Milwaukee working with Company representatives.

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44-H HEADFRAME: (CONT'D)

Good weather in March enabled the construction company to get off to an early start in setting up their erection derrick. They were assisted in this work by Mather "B" and General Shops mobile crane equipment. Counterweight boxes were built and filled by Mather "B" and a shelter for the McDowell personnel set up. In anticipation of headframe erection, the supply tunnel construction had been pushed to permit laying of track over the bottom tunnel to within easy reach of the erection derrick. The track will be shifted later to serve as permanent supply track to the coal storage section of the heating plant wing.

While snow was on the ground providing good skidding conditions, the heavy ore handling machinery to be used in the shaft house was unloaded at the main railroad approach dock by a Bucyrus-Erie 54 diesel shovel borrowed from the neighboring Cambria-Jackson property. With the dipper sticks removed the machine working as a crane was adequate to handle the heavy jaw crusher and the two pan feeders, one of which weighed 34 tons. These heavy pieces were lowered onto skids and dragged up to the headframe area by tractor. The machinery was dismantled into several sections to reduce the weight and swung into place in the steel framework with the McDowell derrick.

While steel erection was taking place the wood headframe was completely closed in and all flat projections or shelves sheathed with corrugated iron to eliminate possible sources of fire from dropped red hot rivets. A prolonged hot dry period necessitated twice daily drenching of the wood framework, and constant patrol of the structure and immediate area to cut potential fire quickly. Cooperation was also necessary between the contractor's work scheduling and the shaft sinking operations especially in the handling of heavy sections over the shaft proper to avoid any possible accident. Aside from several instances of hot rivet incipient fires no trouble nor delay to either operation occurred.

Brickwork for the shaft house enclosure and sheathing of the headframe was awarded by contract to Proksch Co. Again in this instance the strike in the fall put a crimp in the schedule, delaying construction and installation of electrical drive and control equipment of the ore handling machinery.

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44-H HEADFRAME: (CONT'D)

Formwork for the pulley stand foundations was made during the winter months in a temporary carpenter shop rigged out in the east unused end of the upper supply tunnel. In the spring these were quickly set up in the excavations and filled with concrete. Wisconsin Bridge, low bidder on the erection of the stands completed the job in June 1949.

44-I SERVICE TUNNELS:

Construction of the supply tunnels to the west was made when men and equipment were available. In 1947 and 1948 this work was pushed to obtain adequate cover for shaft set and concrete supply to the sinking work. In 1949 other projects relating directly to rock hoisting (ie.) engine house foundation work, headframe and idler stand concrete-work, were of more importance and the tunnel work was resorted to in between timing of these operating projects.

The one exception to this procedure was the completion of the service tunnel from the shaft to the engine house. It was necessary, of course, to finish this connection so that the air lines, power and signal cables to the shaft and steam line from the main heating plant could be installed.

A 70 foot section of upper supply tunnel formwork had been practically completed up to the time of the strike. Following the strike, despite cold weather, this section was poured in December, with adequate heating aids to prevent possible ruin of the forms by warping and weathering until the following spring.

Permanent track was laid in the tunnels starting in early summer. During shaft sinking the lower tunnel was used to the greatest extent so the upper tunnel was fitted out with track and the 4" layer of floor concrete poured. The concrete work was done in cold weather making it necessary to brattice off the tunnels in sections. This procedure worked very well. The lower tunnel, following completion of shaft sinking was then blocked off and the track laying and concreting repeated. This procedure extended into the winter because of the fact that the upper tunnel being on the main shops level would carry the heaviest traffic and no delay would be desirable upon completion of the shops wing.

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44-J PUMPING PLANT:

Water drainage into the shaft was almost entirely within the section of the shaft between the 1650 foot depth, the transition iron formation-slate area, and the collar. This drainage amounted to approximately 75 g.p.m. and was handled by 50 g.p.m. 450 foot head motor pumps working through surge tanks in the shaft ladder compartment. These pumps were powered with 25 h.p. motors instead of the customary 20 h.p. units and adequately handled the job in shaft sinking.

However, faced with the problem of pumping this gallonage until the 6th level drift would be holed through from Mather "A" which appeared to be a time early in the summer of 1950, it appeared advisable to enlarge the cut-out made at the 1829 depth during shaft sinking and install the two 1850 foot head, 100 g.p.m. pumps which had been purchased previously for possible high inflow of water at the slate contact.

Maintenance of the pumps in the shaft column 24 hours a day was becoming a problem and installation of these two larger units would permit removal of 6 smaller pumps. A secondary line had been hung in the shaft to handle the clean water drainage, for a section of the depth, separately from the shaft bottom discharge to balance the surges more evenly. Removal of these 6 units would reduce the chances of pump failure and delay to operations and also provide spare units. In addition, the removal of the surge tanks, eliminated points of congestion in the ladder and pipe compartment through which points the hanging of air line and electrical cables had been accompanied by much delay.

A drift 100 feet in length was driven west from the cage compartment and was finished at the end of the year. A dam will be built in this drift to provide sump capacity of approximately 35,000 gallons. This impounded clean water will provide adequate supply for drilling in the development of the levels below and also will serve as a reservoir for emergency fire fighting underground. The discharge line will be connected to the water supply to the property on surface and a turn of a valve will maintain the gallonage in the sump at proper pressure for the fire control work should it be necessary.

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44-J PUMPING PLANT: (CONT'D)

A secondary advantage obtained in handling the shaft drainage at this elevation will be in removing this amount from the 6th level plat at "B" and from the ditch in the drift towards the "A" Shaft pump station. It is not improbable that large amounts of water will be encountered in the "B" Shaft mining on 6th level and the difference between a ditch filled to capacity and an overflowing ditch is serious to track maintenance and efficient rail haulage.

44-K ELECTRIC HAULAGE:

Late in the year ten combination trolley-battery locomotives, five of Goodman manufacture and five Jeffrey Mfg. Co. were delivered to Mather "B". One each of these locomotives was sent over to Mather "A" for their use underground to pick out the weak points in design and manufacture. The basic design and performance characteristics had been considered very carefully with each manufacturer because of the fact that we limited the size of the locomotive both in width (camelback car dumper position at the shaft) and in height (ore chute heights in the production areas).

Into this volume we insisted that a minimum amount of potential power be packed. How the individual manufacturer accomplished this was up to the ingenuity of their engineering departments. Both makes of locomotive appear in general quite satisfactory. In both however, definite electrical shortcomings, such as uneven heating of certain battery cells because of heat dissipation from the charging resistors, had to be remedied. The braking system on the Jeffrey was inadequate. These and other incidental operational faults have been successfully overcome on the trial machines and the remainder are being changed as they go into operation at Mather "B".

44-L MAIN LEVEL DEVELOPMENT:

Finishing shaft sinking in the early part of August 1949, the second major step in the "B" development of course was plat cutting and drifting towards the ore bodies.

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44-L MAIN LEVEL DEVELOPMENT: (CONT'D)

In anticipation of plat cutting, small drifts had been cut out on both sides of the cage compartment, the blasting being done as the shaft bottom passed that particular level elevation and before shaft steel set installation, usually 20 - 40 feet above the bottom, reached that point. Small sheet steel, two yard capacity pockets were set in the floor of the small drift cut-outs, concreted in place with the shaft set at that elevation. Also, a cut, 5 feet average depth, was blasted on the south side for the length of the plat opening and skip measuring pockets along the shaft. This opening along the vertical on the south side was blocked off with wood ties fitted into the 6" H beam steel end pieces until the shaft sinking was completed.

During the interval of sinking from the 6th level to the bottom, wherever possible, the 6th level small drift was extended west then turned south to the skip side plat and east passing across the front of the shaft. Because of the fact that the 6th level drifting from Mather "A" would of course open up that level for earliest ore production on the "B" project, it was expedient that the initial small size drifting on the 6th level plat be done, dovetailing in with shaft blasting and hoisting rock on weekends, as soon as possible. The idea was to get into position to use the skips for plat development, therefore, it was necessary to be on the skip side with the small drifts.

The 7th followed the 6th in priority in usage of the cage and shaft tie-ups. Tenth level and skip pit development followed in order purely because they also were essential, but priority had to be defined in the multitudinous tasks involving the use of men and materials.

Plat cutting became complicated by the end of the year purely because no means were available to properly handle the rock broken on the plat development projects. Mechanically the hoists had been complete in August and it had been anticipated that the electrical equipment would be received in June, and that by the completion of shaft sinking the large permanent hoists would be in operation.

The job then would have been to install guides in the three compartments, cage and two skips, and hang the large skips and double deck cage. But, by the end of the year the electrical end of the hoist installation was still not sufficient to operate a hoist.

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44-L MAIN LEVEL DEVELOPMENT: (CONT'D)

Consequently it was necessary to continue using the sinking hoist and cage. Several types of cars were ultimately used, each having its own advantage for a particular job but it was still a boy sent in to do a man's job. A two yard load of rock was the limit of capacity of the sinking hoist. Everything that went down in the way of steel, concrete mixes, supplies, men and everything that came out did so by means of the single deck sinking cage. The double deck cage was available, but couldn't be used because the sinking hoist didn't have the capacity to handle it.

Only the most necessary rock excavation was made because of the disposal problem and anything that could be done after skip installation was held in abeyance. Excavation from the cage side around to the skip side had to be done of course to bring supplies around to the skip side and to get rock out because with no guides or a hoist to hang a skip in the guides, no use could be made of the two skip compartments. In handling rock from the skip measuring pocket excavation, the ventilation sheets were removed and the broken rock chuted across the skip compartment and ladder road into the car in the cage, much in the fashion employed in the shaft sinking muck removal. This sort of thing was paralleled many times until the skips were in but advancement had to be made despite lack of equipment.

At the end of the year the measuring pockets on 6th level were in, concreted and plated. A start was also made in drilling long 30 foot holes in the proposed plat for blasting when the rock hoisting could be done with skips.

On 7th level the pocket had been assembled and concreted in place. These pocket frameworks had been built on surface by carpenters, disassembled and re-fitted underground in the rock excavation. The wood work in this method could be done by skilled carpenters while skilled miners did the rock work. It was not necessary to wait until excavation was complete then have miners, unused to wood work, try to frame a pocket.

The 10th level pocket was substantially complete except for a small part of the lining plate installation.

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44-L MAIN LEVEL DEVELOPMENT: (CONT'D)

Skip pit work accomplished at the end of the period consisted of completion of the spillage pocket at the bottom of the shaft. Four shaft sets were equipped with double vent seal, the space between being filled with concrete. A 45° chute was concreted at the shaft bottom supported by a concrete pillar in the center of each compartment to deflect spillage in the skip pit trench.

44-Q SEWERS:

Early in the year a contract was let to a general contractor to lay sewer lines from the property according to plans made up by Mather "B" engineers to tie in with the City of Negaunee sewers.

Discharge was made south from the property, down the railroad embankment in a series of steps by manholes, under the L. S. & I. railroad track to Mather "A", then south to tie into the city installations. A 12" sanitary line, and a 21" storm sewer were laid with a total of 7 combination manholes to complete the connection.

4. ESTIMATE OF RESERVES:

Original estimates of the ore reserves in Section One as made by the geological department from drill hole information placed the tonnage at 2,869,000 tons assured and 8,650,000 prospective. The estimates as presented to the tax commission have been unchanged. No ore tonnages were indicated by 6th level horizontal drilling prior to September 1, 1949, the date of submission of ore estimates to the tax commission. Subsequent drilling during 1949 on 6th level would not warrant revision of the original estimates.

5. LABOR AND WAGES:

No. of Men 1-1-1949 - 97	<u>Additions Include:</u>
Added During Year 41	4 - New Hires
Total 138	22 - Negaunee Mine Trans.
Separations 6	1 - Maas Transfer
Total 132	14 - Mather "A" Transfers
Net Gain 35	

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5. LABOR AND WAGES: (CONT'D)

<u>Statement of Wages</u>	<u>1949</u>	<u>1948</u>
<u>Average No. Men Working</u>		
Surface	66	48
Underground	38	38
Total	<u>104</u>	<u>86</u>
 <u>Average Wages Per Day</u>		
Surface	\$11.19	\$11.18
Underground	19.94	19.02
Total	<u>\$14.42</u>	<u>\$14.39</u>
 <u>Wages Per Mo. of 25 Days</u>		
Surface	\$279.75	\$279.50
Underground	498.50	475.50
Total	<u>\$360.50</u>	<u>\$359.75</u>
 <u>Total No. Days</u>		
Surface	17,882	14,807
Underground	10,415	11,360
Total	<u>28,297</u>	<u>26,167</u>
 <u>Amount for Labor</u>		
Surface	\$200,094.77	\$160,556.43
Underground	208,123.96	216,076.95
Total	<u>\$408,218.73</u>	<u>\$376,633.38</u>

9. EXPLORATION AND FUTURE EXPLORATION:

Diamond drilling of the Mather "B" ore bodies followed drifting progress on the 6th level as the heading advanced eastward from "A" Shaft to "B". The first six holes drilled south from the footwall drift into the iron formation were very spotty and unfruitful in turning up ore bodies of any size. A further indication of the ragged characteristic of the upper reaches of the "B" ore bodies was the high sulfur analysis obtained in several of the drill holes. The "B" drilling resembles quite closely the experience at Mather "A" in the early exploration and mining on the upper levels and it is not illogical to expect similar spottiness in the higher mining elevations at "B" with subsequent settling into sustained mining in ore of standard quality.

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9. EXPLORATION AND FUTURE EXPLORATION: (CONT'D)

A description of the location of the six holes drilled from the 6th level drift and the results obtained are given in the following summary

No.	LOCATION	DIRECTION	DIP	DATE	
				STARTED	FINISHED
1	6th Level (2200')	S.15°59'W	49°47'	6/15/49	6/25/49

- MATERIAL
- 0 - 105' Transition Slate & Jasper
 - 105' - 135' Soft Ore Jasper
 - 135' - 161' Dike
 - 161' - 172' Soft Ore Jasper
 - 172' - 225' Transition Slate & Jasper
 - 225' - 251' Transition Jasper & Slate
 - 251' - 257' Soft Ore Jasper
 - 257' - 260' Lean Ore
 - 260' - 270' 1st Class Ore
 - 270' - 277' Lean Ore
 - 277' - 282' 1st Class Ore
 - 282' - 308' Soft Ore Jasper
 - 308' - 310' Dike
 - 310' - 398' Soft Ore Jasper

2	6th Level (2200')	S.00°27'W	42°55'	7/14/49	8/9/49
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- MATERIAL
- 0 - 93' Slate
 - 93' - 95' Lean Ore
 - 95' - 127' Slate
 - 127' - 155' Soft Ore Jasper
 - 155' - 303' Slate
 - 303' - 339' Soft Ore Jasper
 - 339' - 349' Slate
 - 349' - 408' Soft Ore Jasper

3	6th Level (2200')	S.1°13'W	42°40'	7/15/49	8/18/49
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- MATERIAL
- 0 - 156' Slate
 - 156' - 161' High Sulphur Ore
 - 161' - 168' Lean High Sulphur Ore
 - 168' - 172' High Sulphur Ore
 - 172' - 173' Slate
 - 173' - 194' High Sulphur Ore
 - 194' - 235' Slate
 - 235' - 253' 1st Class Ore
 - 253' - 263' Lean Ore
 - 263' - 273' 1st Class Ore

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9. EXPLORATION AND FUTURE EXPLORATION: (CONT'D)

<u>NO.</u>	<u>LOCATION</u>	<u>DIRECTION</u>	<u>DIP</u>	<u>DATE</u>	
				<u>STARTED</u>	<u>FINISHED</u>

3 (Cont'd)

MATERIAL

273' - 288' Lean Ore
 288' - 340' 1st Class Ore
 340' - 343' Soft Ore Jasper
 343' - 369' Lean Ore
 369' - 378' Soft Ore Jasper
 378' - 400' Lean Ore
 400' - 415' Soft Ore Jasper
 415' - 420' Lean Ore
 420' - 427' Soft Ore Jasper
 427' - 448' Lean Ore
 448' - 460' Soft Ore Jasper

4 6th Level (2200') S.00°13'E +1°57' 8/11/49 9/6/49

MATERIAL

0 - 119' Slate
 119' - 135' 1st Class Ore
 135' - 164' Slate
 164' - 167' Lean Ore
 167' - 178' Slate
 178' - 187' Lean Ore
 187' - 222' Slate
 222' - 285' Soft Ore Jasper
 285' - 325' Lean Ore
 325' - 420' Soft Ore Jasper
 420' - 433' Lean Ore
 433' - 535' Soft Ore Jasper

5 6th Level (2200') S.00°31'W -45°32' 8/24/49 9/18/49

MATERIAL

0 - 88' Slate
 88' - 94' High Sulphur Ore
 94' - 127' Slate
 127' - 135' Soft Ore Jasper
 135' - 143' Slate
 143' - 223' Soft Ore Jasper
 223' - 243' Lean High Sulphur Ore
 243' - 253' Soft Ore Jasper
 253' - 258' Lean High Sulphur Ore
 258' - 263' High Sulphur Ore
 263' - 269' Lean High Sulphur Ore
 269' - 312' Soft Ore Jasper

MATHER MINE "B" SHAFT
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9. EXPLORATION AND FUTURE EXPLORATION: (CONT'D)

NO.	LOCATION	DIRECTION	DIP	DATE	
				STARTED	FINISHED
6	6th Level (2200')	S.00°32'E	+2°	9/8/49	9/29/49

MATERIAL

0 - 192'	Slate
192' - 195'	Dike
195' - 260'	Slate
260' - 289'	Soft Ore Jasper
289' - 296'	1st Class Ore
296' - 298'	Lean Ore
298' - 499'	Soft Ore Jasper

7	6th Level (2200')	S.00°03'W	+2°	9/13/49	9/28/49
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MATERIAL

0 - 75'	Slate
75' - 200'	1st Class Ore
200' - 220'	Dike
220' - 345'	Soft Ore Jasper
345' - 362'	1st Class Ore
362' - 366'	Lean Ore

10. TAXES

Valuation and taxes assessed Mather "B" for the year 1949 are given below with 1948 compared. These taxes were taken up by Mather "A".

	VALUATION	1949 RATE	TAXES
Jackson Sec. 1, 47-27			
Real	\$605,000		\$31,680.40
Personal	150,000		7,854.65
Total	\$755,000	\$52.3643	\$39,535.05
Coll. Fee 1%		.5236	395.35
Total Mather "B" (Sec. 1, City of Negaunee)	\$755,000	\$52.8879	\$39,930.40

	VALUATION	1948 RATE	TAXES
Jackson Sec. 1, 47-27			
Real	\$550,000		\$24,373.42
Personal	145,000		6,425.72
Total	\$695,000	\$44.3153	\$30,799.14
Coll. Fee 1%		.4432	307.99
Total Mather "B" (Sec. 1, City of Negaunee)	\$695,000	\$44.7585	\$31,107.13

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MATHER MINE "B" SHAFT
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11. ACCIDENTS AND PERSONAL INJURY:

A very commendable job was turned in by both the supervisory staff and working crews of the property along the lines of combining high speed work with accident prevention. Their accomplishment is all the more remarkable when it is considered that the bulk of the work was entirely new to mining companies in this area; much of the project was work usually let to contractors. Little was known of the hazards involved and much credit is due the foremen for their anticipation of trouble both in method and accident potentiality and their success in avoiding both.

The property was awarded the Company Safety Banner for achieving the lowest accident statistics of the eleven underground properties. A total 235,620 man-hours were worked with a total of 31 days lost time. One compensable accident with eight days lost time and nine non-compensable accidents with 23 days total lost time. The acquisition of first place in the safety column was gratifying to Mather "B" personnel because of the fact that the property had achieved that standing in 1947 but suffered a fatality in 1948. To make a comeback with larger numbers of inexperienced men both on surface and underground to handle, is a fine accomplishment on the part of the supervisory staff.

A brief description of the single compensable lost time accident follows:

1. Sam Carilli, a shaft miner, age 34, was helping to load the shaft mucking tray onto the cage preparatory to start of mucking. He did not notice that the 2 yard tray was not resting flatly on the deck of the cage and permitted his foot to get under one corner while he directed his attention on another phase of equipment loading. A fellow workman pried the tray from its stuck position on the deck on the far side of the tray not realizing of course, and not being able to see Carilli's foot position. The weight of the tray corner slumping on Carilli's foot resulted in bad bruises and swelling which caused a lost time period of 8 days.

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18. NATIONALITY OF EMPLOYEES:

	<u>TOTAL</u>	<u>AMERICAN BORN</u>	<u>FOREIGN BORN</u>
Finnish	44	39	5
Italian	14	14	-
French	17	16	1
Swedish	25	25	-
English	21	17	4
German	1	1	-
Norwegian	4	4	-
Belgian	1	1	-
English-Swedish	2	2	-
English-Finnish	1	1	-
English-French	1	1	-
English-German	1	1	-
Total	132	122	10
		92.4%	7.6%

25% 00

GILBERT

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1. GENERAL:

The Negaunee Mine hoisted ore on a six day, twelve shift per week schedule until April 27th on which day the last skip of ore was hoisted. Ore was accumulated in pockets and cars and hoisting was done during off peak electrical load periods in order to conserve power. At the beginning of the year there were nine contracts mining and by the third week in April they had been reduced to three. By the end of April most of the salvage work was completed and the remaining men in the underground crew were transferred to the Mather Mine "A" Shaft. A small surface crew was retained to complete loading of ore from stockpile. Late in the summer these men were also transferred to other mines and since this time only the men necessary to maintain pumping of mine water were retained.

The production during the four months of operation amounted to 86,676 tons. A total of 61,546 tons came from the Maas area including the N 1/3 and N 1/6 strips of Right of Way, 3,648 tons from the South Shore Right of Way and 21,482 tons from the Negaunee Lease. The relative high tonnage of Negaunee ore resulted from the development of small stopes along the south footwall which were completely mined out before mining was completed in the Maas area.

There was no ore reserve estimate for the Negaunee Mine because all of the Negaunee ore was mined and the ore remaining in the Maas area under lease from the Maas Mine was included in the Maas Mine report.

In all comparisons of production, costs, etc. it should be remembered that ore production was completed late in the month of April.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

	<u>1949</u>	<u>1948</u>
Negaunee Ore	21,482	165,171
South Shore Right of Way Ore	3,648	36,801
Negaunee-Maas Ore	<u>61,546</u>	<u>180,104</u>
Total Ore	86,676	382,076
Rock	750	8,460
Total Hoist	<u>87,426</u>	<u>390,536</u>

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (CONT'D)

b. Shipments:

	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total Tons Last Year</u>
Negaunee Ore	6,063	24,285	30,348	180,756
South Shore Right of Way Ore	-	5,727	5,727	38,718
Negaunee-Maas Ore	19,649	55,166	74,815	209,201
Total 1949	25,712	85,178	110,890	428,675
Total 1948	248,621	180,054	428,675	
Decrease	222,909	94,876	317,785	

c. Stockpile Inventories:

Dec. 31, 1949 - None

d. Division of Product by Levels:

All mining was on 14th level during 1949.

e. Production by Months:

<u>Month</u>	<u>Negaunee</u>	<u>S/S/R/W</u>	<u>Neg.-Maas</u>	<u>Total Ore</u>	<u>Rock</u>
January	6,212	848	14,508	21,568	210
February	4,202	1,145	12,273	17,620	450
March	4,746	1,266	14,584	20,596	20
April	4,675	-	14,490	19,165	70
Total 1949	19,835	3,259	55,855	78,949	750
Stkple. Overrun	1,647	389	5,691	7,727	-
Total 1949	21,482	3,648	61,546	86,676	750
Total 1948	165,171	36,801	180,104	382,076	8460
Decrease	143,689	33,153	118,558	295,400	7710

The product by leases was distributed as follows:

	<u>1949</u>	<u>1948</u>
Negaunee Mine Company	21,482	165,171
South Shore Right of Way	3,648	36,801
Maas Lease	50,317	159,524
N 1/3 Right of Way	8,244	14,712
N 1/6 Right of Way	2,985	5,868
Total	86,676	382,076

f. Ore Statement:

	<u>Negaunee</u>	<u>S.S.R/W.</u>	<u>Neg.-Maas</u>	<u>Total-1949</u>	<u>Total-1948</u>
On Hand Jan. 1, 1949	8,866	2,079	13,268	24,213	51,438
Product for Year	19,835	3,259	55,855	78,949	377,745
Stockpile Overrun	1,647	389	5,691	7,727	23,705
Total	30,348	5,727	74,814	110,889	452,888
Shipments	30,348	5,727	74,814	110,889	428,675
Balance on Hand	-	-	-	-	24,213
Decrease in Product	141,844	32,703	124,249	298,796	-
Decrease in Ore on Hand	8,866	2,079	13,268	24,213	27,225

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (CONT'D)

g. Delays:

There were no delays at the mine during the year.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	1949				1948			
	Tons	Iron	Phos.	Sil.	Tons	Iron	Phos.	Sil.
Negaunee	21,482	55.98	.101	11.63	165,171	57.55	.096	9.73
Neg.-Maas	61,546	56.60	.102	11.19	180,104	57.89	.094	9.63
S.S.R/W.	3,648	55.83	.085	12.66	36,801	58.70	.090	8.83
	86,676	56.41						

b. Average Mine Analysis on Straight Cargoes:

There were no straight cargo shipments during 1949.

4. ESTIMATE OF ORE RESERVES:

There was no estimate of reserves made for the Negaunee Mine. The remaining ore on 14th level and below is in the Maas area which is now accounted for in the Maas Mine reserve estimate.

5. LABOR AND WAGES:

a. Comments:

The average number of men working during the operating months of 1949 was almost 50% less than the number of men during the year 1948. This large reduction was due to the shortage of working places underground as the mine was being worked out. Production of ore was ended late in April and following this date only a small surface crew was retained necessary to load ore from the stockpile. Most of the men were transferred to the Mather "A" and Mather "B" Mines with a small number going to other Company mines.

The average wages per day increased somewhat as indicated in the following table. This was due to the fact that men in the higher wage bracket were retained while laborers and company account men were transferred to other mines.

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5. LABOR AND WAGES: (CONT'D)

b. Comparative Statement of Wages & Product:

	<u>1949*</u>	<u>1948</u>
Product	86,676	382,076
No. Shifts & Hours	1-8 1 2-8 98	1-8 2 2-8 299
 <u>Average Number Men Working:</u>		
Surface	34	44 $\frac{3}{4}$
Underground	75 $\frac{1}{2}$	158
Total	109 $\frac{1}{2}$	202 $\frac{3}{4}$
 <u>Average Wages Per Day:</u>		
Surface	11.90	11.07
Underground	14.44	12.74
Total	13.18	12.38
 <u>Tons Per Man Per Day:</u>		
Surface	17.61	27.94
Underground	7.05	8.02
Total	5.04	6.23
 <u>Labor Cost Per Ton:</u>		
Surface	.741	.403
Underground	1.795	1.594
Total	2.536	1.997
 <u>Average Product Mining:</u>		
Development in Ore	4.24	8.19
Stoping	26.26	30.43
Total	25.10	27.39
 <u>Avg. Wages Contract Labor:</u>		
	13.90	13.58
 <u>Total Number of Days:</u>		
Surface	3773	13675
Underground	11414	47610
Total	15187	61285
 <u>Amount for Labor:</u>		
Surface	44,606.26	154,004.91
Underground	155,595.35	609,037.15
Total	200,201.61	763,042.06
 <u>Average Wages Per Month as Per Labor Statement - Less Captains & Clerks:</u>		
Surface	297.84	276.21
Underground	319.98	318.20
Total	315.04	308.93
 <u>Proportion of Surface to Underground Men:</u>		
1949	1 to 3.23	
1948	1 to 3.65	

* Four months operating period used for comparison

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6. SURFACE:

a. Buildings & Repairs:

Late in the summer the district sawmill was dismantled and moved to the Maas Mine. Minor repairs were made to the dry house, engine house and office during the year.

b. Fences:

Repairs were made to the fences along the mine road where the bulldozer had pushed them down while clearing snow.

c. Stockpiles:

Loading from stockpile was done with the old steamshovel. Work was started on May 5th and all the ore was loaded out by July 26th, 1949.

d. Ore & Rock Trestles:

Some new decking was installed on the rock trestle.

e. Shaft House:

There was no repair work done to the shaft house during the year.

f. Water Supply:

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

	<u>1949</u>	<u>1948</u>	<u>1947</u>	<u>1946</u>
1st Quarter	68.59	74.89	200.40	99.04
2nd Quarter	77.55	101.14	248.14	142.23
3rd Quarter	29.54	124.24	136.35	275.44
4th Quarter	12.45	57.84	90.15	228.75
Total	<u>188.13</u>	<u>358.11</u>	<u>675.04</u>	<u>745.46</u>
Product - Tons	86,676	382,076	518,387	416,021
Cost Per Ton	.002170	.000937	.001302	.001792

g. Grounds:

The grounds were kept in order during the year.

h. District Sawmill Plant:

The sawmill operated until late in the summer when it was dismantled and moved to the Maas Mine.

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7. UNDERGROUND

a. Shaft Sinking:

There was no shaft sinking during 1949.

b. Development:

Practically all of the development work was done in advance of stoping operations and was charged to the stoping account. This development was in ore in the stoping area along the south footwall.

c. Stoping:

(1) General:

The product for the four months of 1949 was mined from three leases, viz., the Negaunee Lease, the South Shore Right of Way and the Maas Area. By percentages, 25% was from the Negaunee Lease, 4% from the South Shore Right of Way and 71% from the Maas Area, which includes Parcels No. 1, 2 and 3.

Mining was conducted in two areas, namely the main Negaunee ore body and the stoping area along the south footwall.

In the stoping area along the south footwall mining was carried on from the 14th level up to the +140' sub level. In the main top slicing and sub level caving area, ore was mined on the +100' sub level, +90' sub level and on the 14th level. At the beginning of the year there were 8 contracts working and at the time of closing in April this had been reduced to three. One contract worked in the stoping area while the remainder were sub caving and top slicing.

(2) Detail of Stoping:

Subs Above the 14th Level

Sub Level Stope Area at End of No. 1470 Drift.

This was the last of a series of sub level stopes along the fringes of the south footwall. The ore in these areas was of a hard wuggy nature which slowed up progress because of the long drilling period. Some improvement was made with the advent of tungsten carbide insert bits but the main difficulty was getting the rods stuck due to the wuggy nature of the ore. Diamond drilling for blast holes was tried but costs were prohibitive.

Stoping and development was carried on between the +90' and +140' sub level with the ore coming out on two different transfer drifts on the +90' sub level. The final horizontal dimensions of the stope was approximately 130 feet in length by 60 feet in width. The ore recovered from this area was lean being mixed with jasper seams. The average dried analysis was about 55 to 56% in iron content. Two contracts, namely 34 and 44, had previously been working in this area and during the four months of operations in 1949 these crews were grouped into contract No. 44.

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7. UNDERGROUND: (CONT'D)

c. Stoping: (Cont'd)

Main Ore Body - Negaunee Lease & South Shore Right of Way

In January contracts No. 7 and 8 completed recovery of the last pillars of ore on the 100' sub level between No. 1442 and No. 1443 raises. This completed mining operations for No. 8 contract and the men were transferred to the Mather "A" Mine. No. 7 contract then cut out on the +90' sub level and mined a short slice north across the South Shore Right of Way. This last slice which completed top slicing and sub caving operations in Negaunee Lease main ore body was finished in February and the miners were then transferred to Mather "A" Mine.

Main Ore Body - Maas Lease

At the beginning of the year mining operations were being carried on by contracts No. 14 and No. 21 on the +90' sub level. A small portion of this mining was in the South Shore Right of Way while the larger share was in Maas Area Parcels No. 2 and 3. No. 14 contract completed operations from No. 1480 Raise on the 90' sub level early in March and then moved down to the 14th level elevation. No. 21 contract completed mining from No. 1444 Raise in March and the crew was then transferred to Mather "A" Mine. By April month all mining operations in the Maas Area were at the 14th level and the number of working places were reduced to four.

Top slicing was started on 14th level early in January by Contracts No. 23 and No. 36. No. 17 contract was also doing ore development work at this elevation and early in April No. 14 contract moved to this elevation.

Contract No. 23 mined five long slices northwest from No. 1438 raise. The ore was loaded into cars by means of a scraper slide located at the start of the initial slice. This area was depleted in March month and the crew then started slicing operations from a point midway between No. 1434 and No. 1435 raises. Two slices were mined to the west and this completed recovery of all ore and the crew was transferred to Mather "A" Mine.

Contract No. 36 completed five long slices west of No. 1436 raise. Progress was much slower in this area due to extremely heavy ground and wet conditions. By the last week in April mining was completed and all operations ceased.

During the last month of operation, No. 14 Contract started a new slice from a point just northwest of No. 1430 raise on the 14th level. A total length of 150 feet was advanced and some pillars of ore that had remained on the sub level above were recovered by caving into the open drift. Mining was completed late in April and this crew was then transferred to Mather "A" Mine.

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7. UNDERGROUND: (CONT'D)

c. Stoping: (Cont'd)

(2) Detail of Stoping: (Cont'd)

Contract No. 17 advanced about 200 feet of ore drift along the west side of old No. 1440 cross cut in order to develop for mining a pillar of ore in the northwest corner of the Maas area. Two sub level caving drifts were driven to the southwest from the end of this new cross cut and all of the ore was recovered from old pillars which had been left on the sub level above.

In the four working areas on the 14th level, considerable lean ore was mined in order to gain entrance to some of the higher grade ore. Considerable difficulty was experienced due to extremely heavy conditions and also wet conditions in some of the working places. There was of necessity some pillars of ore left at the 14th level elevation due to the above mentioned conditions and this ore will be recovered by the Maas Mine operations along with the ore remaining below the 14th level elevation.

d. Timbering:

The cost per ton of timber supplies used was slightly less for the four months of operation in 1949 than in 1948.

Total unit costs of timbering including labor was much higher due to reduced tonnages and also increased proportions of timbering necessary to keep working places open for production. This was particularly true in the Maas Area where extreme pressures were encountered as the mining operations approached the main level.

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7. UNDERGROUND: (CONT'D)

d. Timbering: (Cont'd)

Statement of Timber Used:

	<u>Lineal Feet</u>	<u>Avg. Price Per Foot</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
6" to 8" Cribbing	-	-	-	2183.20
8" Stulls	11,271	.1203	1356.33	5107.02
10" Stulls	12,906	.1587	2048.84	11572.36
12" Stulls & Over	<u>8,457</u>	<u>.3390</u>	<u>2866.92</u>	<u>10999.59</u>
Total 1949	32,634	.1922	6272.09	29862.17
Lagging - 7 ft.	377,959	.0161	6089.79	15575.22
Poles - 9½ ft.	<u>76,929</u>	<u>.0302</u>	<u>2321.58</u>	<u>19639.47</u>
Total 1949	454,888	.0185	8411.37	35214.69
H Beams - 10' & 12'	-	-	-	<u>1459.26</u>
Grand Total 1949			14683.46	66536.12

	<u>1949</u>	<u>1948</u>
Product - Tons	86,676	382,076
Feet Timber Per Ton of Ore	.376	.494
Feet Lagging Per Ton of Ore	4.361	2.582
Feet Poles Per Ton of Ore	.887	1.692
Feet Lagging Per Foot of Timber	11.582	5.224
Feet H Beams Per Ton of Ore	-	.0063
Cost Per Ton for Timber	.0724	.0781
Cost Per Ton for Lagging	.0702	.0408
Cost Per Ton for Poles	.0268	.0514
Cost Per Ton for H Beams	-	.0038
Total Cost Per Ton	.1694	.1741

Total Cost for Timber, Lagging, Poles, Etc.

<u>Year</u>	<u>Product</u>	<u>Amount</u>	<u>Cost Per Ton</u>
1949	86,676	14,683.46	.1694
1948	382,076	66,536.12	.1741
1947	518,387	72,441.81	.1398
1946	416,021	57,999.98	.1394
1945	654,447	92,666.50	.1409
1944	757,677	108,489.21	.1431
1943	954,990	129,718.86	.1358

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7. UNDERGROUND: (CONT'D)

f. Explosives, Drilling and Blasting:

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

<u>Year</u>	<u>Cost per lb. for Powder</u>	<u>Lbs. Powder Per Ton of Ore</u>	<u>Cost Per Ton For Powder</u>	<u>Cost Per Ton Fuse & Caps</u>	<u>Total Cost</u>
1949	.1415	.4655	.0659	.0156	.0815
1948	.1412	.4383	.0619	.0148	.0767
1947	.1359	.4415	.0600	.0133	.0733
1946	.1245	.4222	.0526	.0111	.0637
1945	.1150	.4346	.0500	.0100	.0600
1944	.1150	.4723	.0543	.0107	.0650

Statement of Explosives Used: (Ore Development & Stopping)

	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
Gelamite #1	14,450	15.55	2,246.38	6,872.76
Hercomite 2X	25,900	13.39	3,468.65	16,775.62
Total Powder 1949	40,350	14.16	5,715.03	23,648.38
Fuse - Feet	118,640	8.41	997.48	4,443.26
#6 Blasting Caps	12,330	14.70	181.25	996.91
Tamping Shells	350	8.06	2.82	37.87
Fuse Lighters	5,000	9.00	45.00	84.36
Prima-Cord - Feet	4,000	32.00	128.00	96.00
Total Fuse, Etc. 1949			1,354.55	5,658.40
Total Cost All Explosives			7,069.58	29,306.78
Product - Tons			86,676	382,076
Pounds Powder Per Ton of Ore			.4655	.4383
Cost Per Ton for Powder			.0659	.0619
Cost Per Ton for Caps, Fuse, Etc.			.0156	.0148
Cost Per Ton for all Explosives			.0815	.0767
<u>Explosives Used for Rock Development:</u>				
Gelamite #1	-	-	-	698.26
Hercomite 2X	300	13.45	40.35	145.13
Total Powder 1949	300	13.45	40.35	843.39
Fuse - Feet	1,360	8.40	11.42	130.73
#6 Blasting Caps	170	14.70	2.50	27.94
Total Fuse & Caps 1949			13.92	158.67
Total Cost All Explosives 1949 Rock Development			54.27	1,002.06
Grand Total All Explosives Used 1949			7,123.85	30,308.84
Average Price Per Pound for Powder 1949			.141	.141
Explosives Used for Stopping & Development			7,123.85	30,308.84
Explosives Used for Other Work			9.91	117.46
Total as Per Cost Sheet			7,133.76	30,426.30

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7. UNDERGROUND: (CONT'D)

g. Mining and Loading:

Mining methods were essentially the same as in previous years. Toward the later stages of the operation however, more caving methods were used to recover small pillars of ore which were left due to breakdowns or mud runs. As mining approached the 14th level elevation the ore was loaded into cars through a top timber cut-out and where mining operations were on the 14th level, loading into cars was done by means of a scraper slide or ramp.

h. Ventilation:

Ventilation was maintained with the use of the Aerodyne fan at No. 2 shaft. During the winter months the heating plant at the fan station was operated to prevent formation of ice in the ventilation shaft.

i. Pumping:

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

<u>Month</u>	<u>1949</u>	<u>1948</u>	<u>1947</u>	<u>1946</u>
January	776	787	659	677
February	781	616	633	664
March	771	764	631	665
April	750	763	653	679
May	781	775	710	689
June	818	723	811	731
July	776	790	818	711
August	932	812	814	695
September	1034	764	816	698
October	1031	766	807	680
November	1046	753	792	664
December	<u>1068</u>	<u>773</u>	<u>792</u>	<u>632</u>
Total Average	880	757	745	682

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

<u>Year</u>	<u>Gallons Per Minute</u>
1949	880
1948	757
1947	745
1946	682
1945	681
1944	713
1943	770
1942	656
1941	645
1940	714

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8. COST OF OPERATING:a. Cost Comparison:

	<u>1949</u>		<u>1948</u>	
Production - Tons	86,676		382,076	
<u>UNDERGROUND COSTS:</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
1 Exploring in Mine	-	-	-	-
3 Development in Rock	727.38	.008	7564.24	.020
4 Development in Ore	3111.65	.036	32130.51	.084
5 Stopping	61266.54	.707	236176.40	.618
6 Timbering	79079.30	.911	315030.71	.825
7 Trammig	20148.46	.232	69984.45	.183
8 Ventilation	6738.38	.078	13699.99	.036
9 Pumping	21154.66	.244	42067.68	.110
10 Compressors & Air Pipes	10723.86	.124	34348.46	.090
12 Underground Superintendence	11237.86	.130	42657.68	.111
13 Cave-in	10.45	-	49.33	-
14 Maint: Comp. & Power Drills	70.06	.001	2686.38	.007
15 Scraper Equipment	3871.30	.045	10373.52	.027
16 Trammig Equipment	4754.42	.055	18576.30	.049
17 Pumping Machinery	1534.57	.018	1741.08	.005
Total Underground Costs	<u>224428.89</u>	<u>2.589</u>	<u>827089.73</u>	<u>2.165</u>
<u>SURFACE COSTS:</u>				
18 Hoisting	14246.31	.164	38061.50	.099
19 Stocking Ore	6225.12	.072	11051.90	.029
21 Dry House	4711.45	.054	10971.37	.029
22 General Surface Expense	7538.64	.087	16186.29	.042
23 Maint: Hoisting Equipment	366.77	.004	4117.04	.011
24 Shaft	665.32	.008	5806.24	.015
25 Top Tram Equipment	271.92	.003	1534.22	.004
26 Docks, Trestles, Pockets	692.44	.008	1478.48	.004
27 Mine Buildings	296.02	.004	2567.34	.007
Total Surface Costs:	<u>35013.99</u>	<u>.404</u>	<u>91774.38</u>	<u>.240</u>
<u>GENERAL MINE EXPENSES:</u>				
28 Geological	312.28	.003	799.02	.002
29 Mining Engineering	998.35	.011	3032.57	.008
30 Mech. & Elec. Engineering	220.53	.003	1951.04	.005
31 Analysis & Grading	5203.54	.060	17028.15	.044
32 Safety Department	522.86	.006	2216.49	.006
33 Tel. & Safety Devices	2109.87	.024	6010.60	.016
34 Local & General Welfare	848.68	.010	3023.44	.008
35 Spec. Exp., Pensions, All.	2126.77	.024	5730.11	.015
36 Ishpeming Office	4019.95	.046	19586.25	.051
37 Mine Office	9237.25	.107	21699.37	.057
38 Insurance (1)	12282.15	.142	13476.27	.035
39 Personal Injury	20714.85	.239	11396.12	.030
40 Soc. Sec. Taxes	5440.12	.063	15225.74	.040
41 Employees' Vacation Pay	28569.12	.330	31363.32	.082
42 Abandoning Mine	3780.58	.044	-	-
Total General Mine Expenses	<u>96386.90</u>	<u>1.112</u>	<u>152538.49</u>	<u>.399</u>
 COST OF PRODUCTION	 355829.78	 4.105	 1071402.60	 2.804

(1) Included in year to date is \$6,863.66 - representing past service 1948 and 1949.

9. EXPLORATIONS & FUTURE EXPLORATIONS:

There were no diamond drill explorations carried on during 1949 and no future explorations are anticipated at this time.

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10. TAXES:

Following is a comparative statement of taxes for 1949 and 1948:

<u>Description:</u>	<u>1949</u>		<u>1948</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>CITY OF NEGAUNEE:</u>				
Negaunee Mine, including stckple, Supplies, & Equip. as placed by State Tax. Comm.				
Real Estate	200,000	10,472.86	150,000	6,647.30
Personal Property	290,000	15,185.65	550,000	24,373.42
Collection Fee		256.59		310.20
Total Negaunee Mine	<u>490,000</u>	<u>25,915.10</u>	<u>700,000</u>	<u>31,330.92</u>
Mather B Shaft, including Stckple, Supplies, & Equip. as placed by State Tax. Comm.				
Real Estate	605,000	31,997.20	550,000	24,617.15
Personal Property	150,000	7,933.20	145,000	6,489.98
Total Mather B	<u>755,000</u>	<u>39,930.40</u>	<u>695,000</u>	<u>31,107.13</u>
Operating Neg. & Jackson Rented Bldgs.	<u>63,000</u>	<u>3,331.91</u>	<u>14,895</u>	<u>666.69</u>
TOTAL CITY OF NEGAUNEE	1,308,000	69,177.41	1,409,895	63,104.74
 <u>CITY OF ISHPEMING:</u>				
Mather A Mine, including Stckple, Supplies & Equip. as placed by State Tax. Comm.				
Real Estate	2,640,000	98,475.70	2,125,000	84,435.60
Personal Property	1,660,000	61,920.32	1,175,000	46,687.92
Pipe Line "Cloverdale Tract"	650	24.25	250	9.93
TOTAL CITY OF ISHPEMING	<u>4,300,650</u>	<u>160,420.27</u>	<u>3,300,250</u>	<u>131,133.45</u>
TOTAL NEGAUNEE MINE COMPANY	5,608,650	229,597.68	4,710,145	194,238.19
 <u>DISTRIBUTION BY ACCOUNTS</u>				
Operating Negaunee Mine	490,000	25,915.10	700,000	31,330.92
Operating Mather Mine				
Mather Mine "A"	4,300,650	160,420.27	3,300,250	131,133.45
Mather Mine "B"	<u>755,000</u>	<u>39,930.40</u>	<u>695,000</u>	<u>31,107.13</u>
Total Operating Mather Mines	<u>5,055,650</u>	<u>200,350.67</u>	<u>3,995,250</u>	<u>162,240.58</u>
Operating Negaunee Rented Bldgs.	<u>63,000</u>	<u>3,331.91</u>	<u>14,895</u>	<u>666.69</u>
TOTAL NEGAUNEE MINE COMPANY	5,608,650	229,597.68	4,710,145	194,238.19

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10. TAXES: (CONT'D)

	<u>1949</u>		<u>1948</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>TOTAL NEGAUNEE RENTED BLDGS:</u>				
No. 1 Jackson Office, Lot 30 W. Iron St.	2,400	125.67	665	29.47
2 Penhale Hse. W $\frac{1}{2}$ Lot 30 Block 4	2,900	151.86	855	37.89
3 Uren " " 3 " 7	1,950	102.11	950	42.10
4 Abbott " " 12 " 6	1,600	83.78	950	42.10
5 Toms " " 36 " 5	1,350	70.69	700	31.02
6 Portale " " 2 " 9	4,100	214.69	1,045	46.31
7 Bowden " " 21 " 8	2,600	136.15	700	31.02
8 Letcher " " 16 " 5	1,600	83.78	570	25.26
9 Senobe " " 9 " 7	2,050	107.35	760	33.68
10 Leaf " " 7 " 10	1,600	83.78	760	33.68
11 Harris " " 4 " 8	2,400	235.67	1,140	50.52
12 Dyer " " 1 " 5	2,000	104.73	475	21.05
13 Peterson " Parcel 39	1,400	73.31	380	16.84
14 Stark " " 1 Block 15	1,850	96.87	475	21.05
15 Kutchie " " 14 " 7	2,250	117.82	950	42.10
16 Jandron " Parcel A 2	3,450	180.66	1,710	75.78
17 Cory " " 7 Block 6	2,300	120.44	285	12.63
18 Paavala " " 9 & 10 " 8	1,350	70.69	285	12.63
19 Crowe " Parcel 79	1,300	68.07	100	4.43
20, 21, 22 Hall Houses " 12 Block 2	6,500	340.37		
23 Krongberg House " 8 " 2	3,400	178.04		
24 OLeary Coyle " " 1 " 6	1,050	54.98		
25 Cory " " 17 " 2D	3,150	164.95		
26 Krongberg " " 17 " 2L	1,400	73.31		
27 Krongberg " " 17 " 2M	1,400	73.31		
28 Ellis " " 4 " 13	2,100	109.96		
29 Kivisto " " 9 " 3	1,650	86.40		
37 CCI First Addition Parcel 7 2	1,900	99.49	1,140	50.52
Total Negaunee Rented Bldgs.	<u>63,000</u>	<u>3,298.93</u>	<u>14,895</u>	<u>660.08</u>
Collection Fee		32.98		6.61
TOTAL	<u>63,000</u>	<u>3,331.92</u>	<u>14,895</u>	<u>666.69</u>

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11. ACCIDENTS AND PERSONAL INJURY:

The accident statistics for the Negaunee Mine compared favorably with the general average for underground mines. The severity rating of 2.031 was the same as the average of 11 underground mines, however, the position rating based on severity placed the Negaunee Mine in 10th place. The general average for the year was considered good for underground mines.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

There was no new construction or proposed new construction work in 1949.

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1. GENERAL

The production was 150,022 tons compared with 197,256 tons in 1948 and shipments from the mine decreased by a much larger proportion and totalled 88,453 tons. The working schedule was reduced from two eight-hour shifts, six days per week to five days per week on June 27 and later in the year the schedule was reduced to two eight-hour shifts, four days per week, effective September 5. There was very little change in the size of the labor force, a reduction of 2½% being made compared with the size of the crew at the end of the previous year.

Mining was completed above the 4th Level in July upon depletion of ore areas and production during the balance of the year was entirely from new stopes above the 6th Level. A large ore development program has been continued throughout the year and the small orebody continues to cause this work to be hard pressed to keep pace with the rate at which stopes are worked out. This factor is again reflected in the abnormally high development cost. A shrinkage method of mining is being given a trial in two areas and whether the method will be employed more generally will be determined on the basis of results from the two trial stopes.

A small amount of drilling was done from the 6th Level to explore the south end of the deposit and two holes proved a short ore extension beyond the limits disclosed by the level development. A continuation of the deposit in this direction offers hope of proving additional reserves above the 6th Level and to thoroughly explore this possibility work was started driving the main level further to the southwest along the strike. A favorable location for drilling this area will be provided when the level development is completed.

In each of the stopes above the 4th Level operations were seriously hindered by the large amount of water encountered and this condition existed until mining was completed. In the stopes above the 6th Level conditions are considerably better from this standpoint and only in one stope at the north end of the orebody has interference from water been of any consequence. A large volume of water continues to drain from the old workings above the 4th Level and the drainage project development above the level and a large portion of it is being diverted to the pump station at the bottom of the ventilation shaft.

An industry-wide strike was called by the Union on October 1 at 12:01 A.M. in support of their demands for increased retirement and health and insurance benefits. Operations were resumed on November 14 following settlement of the strike which caused employees a loss of 24 working days. There were six regular holidays observed during the year and a one week vacation was allowed employees during the week of August 15.

2. PRODUCTION, SHIPMENTS AND INVENTORIES

a. Production by Grades

	<u>1948</u>	<u>1949</u>
Spies	197,256	150,022
Spies Hi-Sulphur	-	-
Total	197,256	150,022

There was no high sulphur grade produced and operations in the coming year will again be based on the production of one grade.

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

b. Shipments

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

<u>Year</u>	<u>Spies</u>	<u>Spies Hi-Sul.</u>	<u>Virgil</u>	<u>Virgil Hi-Sul.</u>
1945	367	-	52,774	29,932
1946	45,120	2,394	3,987	-
1947	151,670	-	-	-
1948	183,574	-	-	-
1949	88,453	-	-	-

Shipments were considerably smaller than last year and most of the tonnage was loaded from the pocket. The bulk of the shipments was again mixed with Cliffs Group cargoes.

c. Stockpile Inventories

<u>Grade</u>	<u>Tons</u>
Spies	99,743

Due to the small tonnage shipped the stockpile inventory at the close of the year was considerably larger than a year ago.

d. Division of Product by Levels

4th Level	55,983
6th Level	94,039
Total	150,022

Mining was completed above the 4th Level due to depletion of ore and the production during the second half of the year and also in 1950 will be obtained from the 6th Level.

e. Production by 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	25	13,882	116	4.79
February	24	15,733	188	5.58
March	27	19,380	184	6.35
April	26	18,147	116	6.38
May	25	14,474	56	5.16
June	26	13,312	116	4.88
July	20	6,965	604	3.14
August	18	9,817	-	4.66
September	18	13,526	-	6.60
October	-	7	-	-
November	11	9,464	-	8.00
December	17	15,315	204	6.85
	237	150,022	1,584	5.57

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

f. Ore Statement

	<u>Spies</u> <u>Grade</u>	<u>Total</u>	<u>Total</u> <u>Last Year</u>
On Hand January 1, 1949	38,174	38,174	24,492
Output for Year	150,022	150,022	197,256
Total	188,196	188,196	221,748
Shipments	88,453	88,453	183,574
Balance on Hand	99,743	99,743	38,174
Decrease in Output		47,244	
Decrease in Shipments		97,121	
Increase in Ore on Hand		61,569	

The operating schedule for the past five years follows:

- 1945 - 2-8 hr. shifts mining and 1-8 hr. shift hoisting, 5 days per week January 1 to January 27.
2-8 hr. shifts mining and 1-8 hr. shift hoisting, 6 days per week January 27 to December 31.
- 1946 - 2-8 hr. shifts mining and 1-8 hr. shift hoisting, 6 days per week January 1 to August 8.
2-8 hr. shifts mining and hoisting, 6 days per week August 8 to December 31.
- 1947 - 2-8 hr. shifts mining and hoisting, 6 days per week January 1 to December 31.
- 1948 - 2-8 hr. shifts mining and hoisting, 6 days per week January 1 to December 31.
- 1949 - 2-8 hr. shifts mining and hoisting, 6 days per week January 1 to June 26.
2-8 hr. shifts mining and hoisting, 5 days per week June 27 to August 31.
2-8 hr. shifts mining and hoisting, 4 days per week September 5 to December 31.

g. Delays

There were a number of minor delays to operations that were of no serious consequence because it was possible in these cases to make up the loss in production on succeeding shifts. The delays listed below are of a more serious nature and their combined effect caused a substantial loss in production.

On the day shift January 22 an eight-hour delay to hoisting occurred when the scraper hoist at the 4th Level loading pockets went out of order. Estimated loss in production was 400 tons.

On the night shift March 4 a seven-hour delay to tramming occurred on the 4th Level when the scraper hoist for No. 5 Stope operation went out of order. Estimated loss in production was 300 tons.

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

g. Delays (Cont'd)

On December 27 on the day shift a delay to hoisting occurred when a wearing shoe on the south skip broke loose causing damage to the shaft runners. Hoisting was delayed until the broken runners were replaced and there was an estimated loss in production of 250 tons on this account.

3. ANALYSIS

a. Average Mine Analysis on Output

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>
Spies	150,022	57.72	.269	6.44	.074

The average analysis shows an improvement over last year with a higher iron content and lower phos., silica and sulphur.

b. 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	57.33	.288	6.85	.28	2.45	.09	.31	.089	7.02	9.30
Spies Nat'l.	52.00	.261	6.21	.25	2.22	.08	.28	.081	6.37	

c. Analysis of Shipments

<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	57.15	.255	7.00	.28	2.45	.09	.31	.082	7.02	9.13

d. High Sulphur Ore

There has been no production of high sulphur grade. There were several occasions when the ore was contaminated with slate that caved from either the hanging or footwall side causing the sulphur content to rise above the guaranteed limits.

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

The following is an estimate of the reserves made as of December 31, 1949 using a factor of 12 cubic feet per ton:

Between 4th and 6th Levels	<u>Spies</u>	<u>Total</u>
	522,467	522,467
Less Production Oct. 1 - Dec. 31, 1949	24,786	24,786
Total Gross as of December 31, 1949	497,681	497,681
Less 10% for Mining and Rock	52,247	52,247
Net Total as of December 31, 1949	445,434	445,434

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4. ESTIMATE OF ORE RESERVES (Cont'd)

a. Developed Ore (Cont'd)

There was a substantial reduction in reserves due to depletion of ore above the 4th Level and because no new ore was proven by the development above the 6th Level. In the development for the various stopes a persistent narrow width has been proven in the area between the 4th and 6th Levels and this has continued to be a very disappointing factor both from the standpoint of mining and reserves. The width of the deposit is confined to very narrow limits and only in several localized places does it widen to any appreciable extent.

The estimated reserves includes only ore that is available for mining and excluded is a substantial tonnage that must be left in place as pillars. A comparison of the reserves with a year ago shows a net loss of approximately 70,000 tons of mineable ore as a result of outlining the ore limits more completely by the development above the 6th Level. Exploration in the coming year to the south of the 6th Level holds promise of proving additional ore along the strike but unless the deposit widens appreciably the outlook for proving a large tonnage of new ore is not very encouraging.

b. Estimated Analysis of Ore Reserves

<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	57.50	.276	6.80	.30	2.90	.24	.21	.090	7.56	
Spies Nat'l.	51.75	.248	6.12	.27	2.61	.22	.19	.081	6.80	10.00

5. LABOR AND WAGES

a. General

Employee membership in the Union has remained at 100% and a change in the officers in the Spies Local including grievance committee members during the year has had a disturbing effect on employee relations. The younger group of committee members have been quite active in submitting complaints and have demonstrated an unreasonable attitude on several occasions. Most of the grievances were settled in Step 1 or 2 of the procedure and one reached Step 3 in which our original position was upheld and the Union then dropped the matter. It is evident that an improvement in relations is dependent on the employees selecting older and more experienced men as officers and representatives because they have demonstrated in the past better judgment and fair mindedness in grievance matters.

There were 112 employees on the labor force at the close of the year compared with 115 a year ago. The labor turnover was unusually small and this is due, no doubt, to the relatively large supply of labor in the area. There were seven employees who quit, one was retired, one discharged and six men were hired resulting in a net decrease of three men.

During the strike picketing was conducted in a very peaceful manner and there was no interference with the maintenance men reporting for work. The employee's allegiance to the Union, however, was indicated by the fact that there appeared no group among them that expressed an attitude other than to support the action the Union had taken. The strike was settled on the basis of the industry-wide settlement granting pensions of \$100.00 a month including social security to employees 65 years of age with 25 years of service. Increased health and insurance benefits were also part of the basis for settlement.

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5. LABOR AND WAGES (Cont'd)

b. Statement of Wages and Product

	<u>1949</u>	<u>1948</u>
Product	150,022	197,256
Number of Shifts and Hours	2-8	2-8
 <u>Average Number of Men Working</u>		
Surface	28 $\frac{1}{2}$	32
Underground	82 $\frac{1}{4}$	79 $\frac{1}{4}$
Total	<u>110$\frac{3}{4}$</u>	<u>111$\frac{1}{4}$</u>
 <u>Average Wages Per Day</u>		
Surface	11.43	10.96
Underground	13.37	13.26
Total	<u>12.87</u>	<u>12.60</u>
 <u>Average Per Month of 18 Days</u>		
Surface	205.74	197.28
Underground	240.66	238.68
Total	<u>231.66</u>	<u>226.80</u>
 <u>Average Per Month of 22 Days</u>		
Surface	251.46	241.12
Underground	294.14	291.72
Total	<u>283.14</u>	<u>277.20</u>
 <u>Average Per Month of 24 Days</u>		
Surface	274.32	263.04
Underground	320.88	318.24
Total	<u>308.88</u>	<u>302.40</u>
 <u>Product Per Man Per Day</u>		
Surface	20.92	22.26
Underground	7.59	9.61
Total	<u>5.57</u>	<u>6.71</u>
 <u>Labor Cost Per Ton</u>		
Surface	.550	.496
Underground	1.770	1.347
Total	<u>2.320</u>	<u>1.843</u>
Average Product Breaking and Trammig	31.02	41.12
Average Wages Contract Miners	18.82	15.81
 <u>Total Number of Days</u>		
Surface	6,718	9,749
Underground	19,509	24,122
Total	<u>26,227</u>	<u>33,871</u>
 <u>Amount of Labor</u>		
Surface	76,799.58	106,895.87
Underground	260,812.92	320,002.43
Total	<u>337,612.50</u>	<u>426,898.30</u>

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5. LABOR AND WAGES (Cont'd)

b. Statement of Wages and Product (Cont'd)

Proportion Surface to Underground Men

1945	1 to 1.38
1946	1 to 2.01
1947	1 to 2.35
1948	1 to 2.48
1949	1 to 2.885

6. SURFACE

a. Buildings

An addition 28' x 22' was constructed to the north end of the dryhouse to provide a change room for surface employees, a new bosses' quarters and a lamp and check room. The interior of the old dryhouse was remodeled providing a separate room for clean and underground clothes, a new shower room and toilets. The addition to the north end of the building was constructed of concrete block and cinder block was used in the various partition walls in the new addition and in remodeling the interior of the old structure. An approved sewage disposal system was provided with a septic tank installed below ground level about 250' south of the building. This project was constructed under E & A cc-304 and all the work was done with mine labor. The old change house was overcrowded and the facilities for underground employees particularly were obsolete and unsanitary.

When the dryhouse remodeling was completed the wood trim on the outside of the building was painted and all the windows repaired and painted and put into good condition.

The various rooms in the combined office and warehouse building were painted and the floors varnished and in the warehouse some rearranging of the shelves was done to improve conditions.

The machine shop building and also the small carpenter shop have both deteriorated to a bad state. Both of these are old wood frame structures that will have to be replaced as soon as sufficient reserves are proven to indicate longer operating life.

b. Stockpiles

Due to the relatively small tonnage shipped from the stockpile a substantial tonnage was left in stock in the area northwest of the shaft. Seven bents of trestle were erected early in the year to extend the trestle to the north limits of this area. The bull-dozer was also employed extensively spreading the pile during the stocking season to utilize all the available space.

There was no trestle erected or stocking done in the area due north of the shaft.

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7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking done in 1949.

b. Development

A large development program was underway during the year and it was confined chiefly to drifting and raising in ore for new stopes above the 6th Level. A small amount of development was also done above the 4th Level before mining operations were completed.

Due to the extent of the development program the work is described under the following sub level headings:

Stope Development
1075' Sub Level

In the first half of the year when mining was underway above the 4th Level a scam stope was developed under and adjacent to old No. 3 Stope to recover a small pillar. On this sub about 110' of small drift was advanced in ore to connect a series of six mill raises.

1050' Sub Level

The development for No. 3 Scram Stope on this sub comprised driving 130' of small drift in ore to connect a series of seven mill raises. Another small scam operation was developed adjacent to old No. 4 Stope to recover a narrow pillar on the footwall side. The development consisted of driving 100' of small drift in ore to connect a series of six mill raises.

4th Level

The development for No. 3 Scram Stope on this elevation comprised driving a transfer drift 170' in ore to the south from a loading slide over the main haulage drift. Seven mills were cut out on the west side and advanced 25' in ore to complete the development for the stope. The development for No. 4 Scram Stope consisted of putting up six mills in ore to a height of 25' on the east side of the original transfer that was driven from a loading slide over the south crosscut. Upon completing operations above this level the contracts were transferred to new areas above the 6th Level.

Stope Development above the 6th Level
950' Sub Level

At the north end of the orebody the development for No. 6 Stope consisted of driving 175' of small drift in ore to complete a connection from a raise in the pillar to the mining raise near the Bates boundary. In the pillar at the south end of the stope a small raise was driven 75' in ore to connect with the 4th Level for ventilation. The development for No. 9 Stope consisted of driving 170' of small drift in ore to complete a connection from the travelling raise in the pillar south to the mining raise.

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7. UNDERGROUND (Cont'd)

b. Development (Cont'd)

Stope Development above the 6th Level (Cont'd)
920' Sub Level

The development for No. 6 Stope consisted of driving 145' of small drift in ore northeast from the travelling raise in the pillar to connect with the mining raise near the Bates boundary. For No. 9 Stope 160' of small drift was advanced south from the travelling raise in the pillar to connect with the mining raise at the south end of this area.

890' Sub Level

At the north end of the orebody 135' of small drift was advanced in ore from the travelling raise in the pillar northeast to the mining raise. The slate hanging was exposed in the development on the east side near the travelling raise. The development for No. 9 Stope consisted of driving 170' of small drift in ore south from the travelling raise to connect with the raise at the south end of this area.

860' Sub Level

The only development on this elevation was for No. 9 Stope and it again comprised driving 150' of small drift in ore to connect the travelling raise with the mining raise at the south end of this area.

830' Sub Level

At the north end of the deposit the development for No. 6 Stope consisted of driving 120' of small drift in ore northeast to connect the travelling raise in the pillar with the mining raise near the Bates boundary. No. 9 Stope Development consisted of driving 150' of small drift in ore south from the travelling raise in the pillar to connect with the mining raise at the south end of this area. About 35' of small drift was also advanced between the two raises in the pillar for travelling purposes and 48' of small drift was advanced east and west from the most northerly mill to explore the width of ore.

800' Sub Level

The development for No. 6 Stope again comprised driving a connecting drift in ore between the travelling raise in the pillar and the mining raise near the Bates boundary. A total of 135' of small drift was advanced in ore and the slate hanging was encountered in the development near the travelling raise. A small amount of development was advanced for No. 8 Stope and it consisted of driving 60' of small drift in ore and jasper north from the travelling raise. The development for No. 9 Stope consisted of driving 60' of small drift in ore to connect two mill raises at the south end of the area.

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7. UNDERGROUND (Cont'd)

b. Development (Cont'd)

Stope Development above the 6th Level (Cont'd)
770' Sub Level

The development for No. 6 Stope consisted of driving 140' of drift between the travelling raise and the mining raise near the Bates boundary. To provide a connection from this area to No. 7 Stope 35' of small drift was advanced in ore south to an adjacent raise. No. 8 Stope Development consisted of driving 135' of small drift in ore to connect the raise in the pillar at the south end to the mining raise and then 45' of small drift was advanced further north to connect with No. 7 Stope Development. A transfer drift 140' in length was advanced for No. 9 Stope to the south from the travelling raise to the south limits of the stope. A mill was cut out at the south end of the transfer on the east side and driven to the top elevation of mining on the 950' Sub Level.

740' Sub Level

At the north end of the orebody 160' of small drift was advanced in ore for No. 6 Stope to complete a connection from the travelling raise northeast to the mining raise near the Bates boundary. The slate footwall was exposed at the east end of the development near the mining limit and the jasper and slate hanging at the west end. The development for No. 8 Stope consisted of driving 160' of small drift in ore to connect the raise in the pillar to the mining raise at the north end of this area. About 35' of small drift was also advanced south from the travelling raise to connect with an adjacent raise in the pillar.

710' Sub Level

The development for No. 6 Stope again comprised driving a connecting drift from the travelling raise in the pillar east to the mining raise and 60' of small drift was advanced south from the travelling raise to connect with No. 7 Stope Development. The development for the latter stope consisted of driving 140' of small drift in ore south to connect a series of five mill raises. For No. 8 Stope a total of 200' of small drift was advanced in ore connecting a series of nine mills. Jasper was encountered in this development near the north end of the stope indicating a width of only 30' of ore on this sub.

685' Sub Level

Most of the development for the various stopes was completed on this sub in the previous year. Some additional development was driven for No. 6 Stope and it consisted of driving 90' of small drift in ore at the east end of the area and putting up two additional mills to a height of 25' in ore to complete the development on this elevation. The development for No. 8 Stope comprised driving 110' of small drift in ore north to connect with the development for No. 7 Stope and about 40' of small drift was advanced to complete two short crosscuts to the east. Two mill raises were cut out from the end of each of the crosscuts and advanced 25' in ore to complete the development on this sub. At the south end of No. 10 Stope Development an exploration drift was advanced 70' southwest following the strike of the deposit until the slate hanging was encountered.

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7. UNDERGROUND (Cont'd)

b. Development (Cont'd)

6th Level

There was very little development done on the 6th Level during the year. At the north end of the level a short drift was advanced from the north side of the crosscut to connect with the transfer for No. 6 Stope for drainage purposes. Another mill was cut out on the west side of the transfer for No. 7 Stope and advanced 25' in ore to connect with the first sub for travelling purposes. In the pillar between No. 8 and No. 9 Stopes two raises were driven to the 950' Sub Level 290' above the 6th Level and the most northerly raise was continued 75' further in ore to connect with the 4th Level for ventilation. This was the first connection between the levels for ventilation and later a second raise was driven from the west end of No. 6 Stope Development to the 4th Level for the same purpose. Another mill was put up from the northwest side of the transfer for No. 10 Stope to a height of 25' in ore to the first sub.

At the south end of the south crosscut a drill station was cut out from which two holes were drilled to explore this end of the orebody and late in the year work was started driving the main level southwest in the hanging slate parallel to the strike of the orebody. It is planned to drive 300' of drift to reach a favorable location to more thoroughly explore a possible continuation of the orebody to the southwest. About 35' of drift was advanced in December around the turn branching to the southwest.

The following table shows the development footage:

	<u>Drifting</u>		<u>Raising</u>		<u>Total</u>
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>	
Small Size	5496'	67'	3088'	222'	8873'
Large Size	558'	-	-	-	558'
Total	6054'	67'	3088'	222'	9431'

c. Stoping

The bulk of the production was obtained from stopes and ore development above the 6th Level. Two sub level stopes were the main source of production and a smaller tonnage was produced in the two shrinkage stopes. In the first half of the year production was obtained mostly from one sub level stope and two small scam stopes above the 4th Level and in July operations were completed above the level due to depletion of ore areas. The following is a description of the mining on the various sub levels:

Subs above the 4th Level
1240' Sub Level

No. 5 Stope was enlarged to 160' x 75' by benching on the south and north-east sides. The jasper hanging was encountered as the north face of the stope retreated towards the pillar line.

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7. UNDERGROUND (Cont'd)

c. Stoping (Cont'd)

Subs above the 4th Level (Cont'd)
1210' Sub Level

An area 90' x 50' was mined in No. 5 Stope to retreat the north face of the stope to the pillar line and complete recovery of the ore on this sub.

1180' Sub Level

An area 90' x 50' was also mined in No. 5 Stope on this sub to retreat the north face to the pillar line and recover the available ore.

1150' Sub Level

An area 100' x 35' was mined to complete recovery of the available ore in No. 5 Stope on this sub.

1125' Sub Level

An area 60' x 40' was mined in No. 5 Stope to retreat the north face to the pillar and complete the mining on this sub.

1100' Sub Level

Two small areas were mined in No. 5 Stope on this sub separated by a narrow pillar that was left in place when caving interrupted mining. On the south side of the pillar an area 35' x 15' was recovered and on the north side an area 30' x 35' was mined.

1075' Sub Level

Two small areas were mined in No. 5 Stope on this sub also to complete recovery of the available ore. In the small scam stope that was developed adjacent to old No. 3 Stope an area 115' x 15' was mined adjacent to the slate hanging.

1050' Sub Level

An area 120' x 25' was mined in No. 3 Scram Stope to complete recovery of a narrow pillar adjacent to the slate hanging. In the scam stope adjacent to old No. 4 Stope an area 80' x 20' was mined along the slate footwall side to recover a narrow pillar. Two small areas were recovered in No. 5 Stope on this sub separated by a pillar that was left when caving interrupted the mining. This sub is the bottom elevation of mining above the 4th Level.

Subs above the 6th Level

950' Sub Level

This is the top elevation of mining above the 6th Level and at the north end of the orebody an area 50' x 35' was mined in No. 6 Stope. The mining extended to the limit established near the Bates boundary. In No. 9 Stope near the center of the deposit an area 55' x 35' was mined starting at the south limit of the stope and retreating north. The position of the slate footwall was determined on the east side by a test hole and the jasper hanging was exposed on the west side by the mining.

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7. UNDERGROUND (Cont'd)

c. Stoping (Cont'd)

Subs above the 6th Level (Cont'd)

920' Sub Level

An area 60' x 25' was mined in No. 6 Stope at the north end to extend the mining to the limit near the Bates boundary. Mining in No. 9 Stope comprised recovering an area 50' x 50'.

890' Sub Level

In No. 6 Stope an area 60' x 40' was mined to extend the mining to the limit near the Bates boundary. An area 35' x 40' was mined in No. 9 Stope starting at the south limits and retreating north.

860' Sub Level

Two small areas were mined on this sub also in each of the sub level stopes. In No. 6 Stope an area 60' x 35' was recovered and in No. 9 Stope an area 40' x 25' was mined.

830' Sub Level

Two small areas were recovered on this sub in each of the sub level stopes. An area 45' x 35' was mined in No. 6 Stope at the north end of the orebody and an area 30' x 25' was mined in No. 9 Stope.

800' Sub Level

In No. 6 Stope an area 65' x 25' was mined and in the south half of No. 7 Shrinkage Stope an area 55' x 45' was recovered by long hole drilling. This is the top elevation to which mining in the latter stope had reached at the close of the year. A small area 35' x 20' was mined in No. 9 Stope on this sub at the south end near the pillar line. In No. 10 Shrinkage Stope at the south end of the orebody an area 115' x 45' was mined by long hole drilling that was conducted from the pillars at each end of the stope.

770' Sub Level

A small area was mined in No. 6 Stope at the north end of the orebody on this sub and it comprised enlarging the mill at the east end to 30' x 30'. In No. 7 Shrinkage Stope an area 95' x 50' was mined by long hole drilling that was conducted from both ends of the stopes. At the south end of the orebody in No. 10 Shrinkage Stope an area 120' x 45' was mined by long hole drilling from stations in the pillar at each end of the stope.

740' Sub Level

In No. 6 Stope mining comprised recovering an area 40' x 35' and in No. 7 Shrinkage Stope an area 95' x 50' was recovered. At the south end of the orebody in No. 10 Shrinkage Stope an area 110' x 40' was mined by long hole drilling from stations in the pillar at each end of the stope.

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7. UNDERGROUND (Cont'd)

c. Stoping (Cont'd)

Subs above the 6th Level (Cont'd)
710' Sub Level

This is the bottom elevation of mining in the stopes above the 6th Level. An area 40' x 35' was mined in No. 6 Stope at the north end of the orebody and in No. 7 Shrinkage Stope an area 95' x 45' was recovered. At the south end in No. 10 Shrinkage Stope an area 115' x 35' was mined.

d. Timbering

There was only a small amount of timber used but it exceeded slightly the amount used in the previous year. In the ore development above the 6th Level timbering was required in several places in the transfer drifts and at the mouth of the mill raises that lead to the stopes. Steel wearing plate is being used to a larger extent at the mill openings to reinforce the timber and reduce the amount of repair work at these points. In the various sub drifts for the stopes a small amount of timbering was done at several points where large water vugs were encountered in the orebody but none of the mill raises required timber support. In the main level drifting that is planned for the coming year it is expected no timbering will be required because the drift is located in the hard slate hanging and experience to date proves it holds well without timber support.

There was a substantial increase in the price of some timber supplies although this has not been reflected seriously in the cost due to the small amount used. The cost per ton for these supplies was slightly higher than last year due to the larger consumption and price increases. The following is the comparative timber statement:

Kind	Lineal Feet	Avg. Price Per Foot	Amount 1949	Amount 1948
6" to 8" Cribbing	996	.125	124.50	-
8" to 10" Stull Timber	214	.1523	32.60	8.55
10" to 12" Stull Timber	361	.1930	69.70	79.20
Total Timber	1571	.1443	226.80	87.75
Lagging	1932	.01804	34.85	320.68
Poles	17432	.02779	484.49	285.44
Total Lagging and Poles			519.34	606.12
Product			150,022	197,256
Feet of Timber Per Ton of Ore			.0105	.0023
Feet of Lagging Per Foot of Timber			1.2298	47.8940
Cost Per Ton for Timber			.0015	.0005
Cost Per Ton for Lagging			.0002	.0016
Cost Per Ton for Poles			.0032	.0014
Cost Per Ton for Timber, Lagging and Poles			.0049	.0035
Equivalent of Stull Timber to Board Measure			2306'	878'
Feet of Board Measure Per Ton of Ore			.0154	.0045
Cost of Timber, Lagging and Poles			746.14	693.87

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7. UNDERGROUND (Cont'd)

e. Explosives, Drilling and Blasting

The amount of powder consumed was less than last year due to the absence of a large rock development program. The cost per ton was higher, however, due to employing the shrinkage system of mining in two stopes and because the tonnage broken in these areas is being allowed to accumulate until mining reaches the top elevation of the block that is being recovered. There were substantial increases in the price of some explosive supplies and this also is reflected in the higher cost per ton. Gelex No. 1 powder is used exclusively in the development and sub level stoping methods and Gelex No. 2 is used in large sized cartridges in the shrinkage method of mining. Electric blasting is employed in all the work because this method has definite advantages from a safety standpoint particularly when driving the development headings to the high elevation required above the 6th Level. In the shrinkage stopes milli-second delay caps have been introduced with the electric blasting to insure better fragmentation and less concussion with the large charges that are set off. From a ventilation standpoint less smoke and gases are also produced with electric blasting than with conventional fuse and caps.

Carboloy insert bits have continued to be used in the mining and development. A change was made to the Timken bit exclusively during the year because in trial tests it appeared to offer longer bit thread life with no significant difference in the drilling speed and life of the inserts compared with the Carset bits first employed. Another advantage the change offered was the fact that it was possible to standardize on the drill rod threads for all drilling. In the long hole drilling Timken couplings are also employed with sectional steel and here too a definite advantage was gained over the type of couplings previously used. General use of tungsten carbide bits is justified by the hardness of the ground that is encountered in all the work and the favorable rate of advance that is being realized in the development headings. The following is the comparative explosives statement:

<u>Ore Development and Stopping</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
No. 1 Gelex	105,570	.1532 Lb.	16168.27	17073.01
No. 2 Gelex	19,150	.1525 Lb.	2920.27	57.00
Hi-Vel 5 x 5	4,100	.1700 Lb.	697.00	
Electric Caps - Regular Delays	43,050	18.354 C	7901.48	7546.97
Electric Caps - Milli-Second	850	17.891 C	152.08	
Connecting Wire	1,950	.800 Lb.	1560.00	1688.00
Fuse - Feet	10,570	3.559 M	90.47	27.43
No. 6 Blasting Caps	2,000	1.668 C	33.37	29.38
Hot Wire Lighters	800	.901 C	7.21	2.76
Master Fuse Lighters				7.00
Powder Bags	83	1.895 Ea.	157.35	72.15
Primacord	12,500	32.000 M	400.00	16.00
Total Expense			30087.50	26519.70
Production - Tons			150,022	197,256
Lbs. Powder Per Ton of Ore			.8586	.5868
Cost Per Ton for Powder			.1319	.0868
Cost Per Ton for All Explosives			.2005	.1344

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7. UNDERGROUND (Cont'd)

e. Explosives, Drilling and Blasting (Cont'd)

<u>Rock Development</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
No. 1 Gelex			-	188.41
Electric Caps			-	130.16
Connecting Wire			-	17.60
Powder Bags			-	1.85
Total Expense			-	338.02

<u>E & A Development</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1949</u>	<u>Amount 1948</u>
No. 1 Gelex			-	6096.60
Duplex Special			-	2600.00
Electric Caps			-	3315.28
Fuse - Feet			-	13.02
Connecting Wire			-	506.40
No. 6 Blasting Caps			-	2.75
Hot Wire Lighters			-	.92
Powder Bags			-	5.55
Total Expense			-	12540.52

Total Expense All Explosives 30087.50 39398.24

f. Ventilation

Good ventilation has been maintained in the mine by the Aerodyne Fan at the collar of the ventilation shaft. A volume slightly in excess of 16,000 C.F.M. is being delivered into the mine and this can be increased to nearly double this amount when required by a change in the blade setting. While the mine is operating the fan is upcasting through the ventilation shaft and on weekends during the winter months the direction is reversed to prevent ice formation in the hoisting shaft. The oil-burning heater at the collar of the hoisting shaft is operated during periods of freezing temperatures to pre-heat the intake air and also prevent serious ice formation in the wet shaft.

Early in the year the first raise connection in ore was driven from the 6th to the 4th Level in a pillar near the center of the orebody for ventilation. Upon completion of this connection good ventilation was provided in the areas on the 6th Level and the auxiliary fan with 14" tubing extending to the skip compartments was no longer needed to ventilate the level after the raise was completed. When the development for No. 6 Stope at the north end of the orebody was completed to the top elevation of mining a raise was driven from the west end of this development to the 4th Level to provide another connection for ventilation. An auxiliary fan was installed in the grizzly sub for No. 6 Stope with 8" metal pipe extending to one of the ventilation raises to the 4th Level so that smoke and gases produced in the secondary blasting on this sub can be quickly removed. There were no permanent ventilation connections driven in rock although after the ore outline on the 6th Level has been definitely determined it is likely that a permanent ventilation connection in the hanging slate will have to be driven between the levels.

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8. COST OF OPERATINGa. Comparative Mining Costs

Product	<u>1949</u>	<u>1948</u>
	150,022	197,256
Underground Costs	2.695	2.065
Surface Costs	.440	.404
General Mine Expense	.534	.389
Cost of Production	<u>3.669</u>	<u>2.858</u>
Depreciation and Depletion	1.064	1.106
Taxes	.099	.066
Loading and Shipping	.059	.079
Total Cost at Mine	<u>4.891</u>	<u>4.109</u>
Budget Estimated Cost at Mine	4.614	3.760
Number of Operating Days	237	304½
Number of Shifts and Hours	237, 2-8 Hr. 304½, 2-8 Hr.	
Average Daily Product	633	648

b. Detailed Cost Comparison

	<u>1949</u>		<u>1948</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs</u>				
1. Exploring in Mine	1427.30	.009	3653.76	.019
3. Development in Rock	1332.50	.009	2497.66	.013
4. Development in Ore	91930.02	.613	60332.05	.306
5. Stopping	105809.32	.705	103482.88	.525
6. Timbering	14880.24	.099	9632.51	.049
7. Tramming	45471.45	.303	67964.68	.345
8. Ventilation	4556.41	.031	2194.33	.011
9. Pumping	39936.80	.266	45389.85	.230
10. Compressors and Air Pipes	19694.25	.131	19822.77	.100
12. Underground Superintendence	18588.82	.124	15257.08	.077
14. Compressors and Power Drills	7310.72	.049	3011.61	.015
15. Scrapers and Mechanical Loaders	30027.54	.200	44658.46	.226
16. Electric Tram Equipment	11510.68	.077	9293.29	.047
17. Pumping Machinery	11867.78	.079	20118.54	.102
Total Underground Costs	<u>404343.83</u>	<u>2.695</u>	<u>407359.47</u>	<u>2.065</u>
<u>Surface Costs</u>				
18. Hoisting	19631.44	.131	19445.15	.099
19. Stocking Ore	12052.38	.080	14072.57	.071
20. Screening-Crushing at Mine	10515.37	.070	10294.52	.052
21. Dry House	7006.92	.047	7711.93	.039
22. General Surface Expense	9062.38	.060	9777.41	.050
23. Hoisting Equipment	3187.02	.021	5729.97	.029
24. Shaft	2556.54	.017	2810.61	.014
25. Top Tram Equipment	976.46	.007	1274.45	.007
26. Docks, Trestles and Pockets	680.11	.004	587.99	.003
27. Mine Buildings	370.10	.003	7846.39	.040
Total Surface Costs	<u>66038.72</u>	<u>.440</u>	<u>79550.99</u>	<u>.404</u>

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8. COST OF OPERATING (Cont'd)

b. Detailed Cost Comparison (Cont'd)

	<u>1949</u>		<u>1948</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>General Mine Expense</u>				
Geological	1136.35	.008	1386.98	.007
28. Insurance	7813.34	.052	3554.40	.028
29. Mining Engineering	9059.76	.060	6207.94	.032
30. Mech. & Elec. Engineering	901.76	.006	566.95	.003
31. Analysis & Grading	5008.34	.033	6556.04	.033
32. Personal Injury	5963.64	.040	2585.61	.013
33. Safety Department	1696.00	.011	1268.12	.006
34. Telephones & Safety Devices	1360.08	.009	1666.68	.008
35. Local & General Welfare	1623.50	.011	1719.44	.009
36. Special Exp., Pensions & Allowances	4438.95	.030	2965.53	.015
37. Ishpeming Office	7233.70	.048	9423.69	.048
38. Social Security Tax	7678.94	.052	8807.79	.045
39. Mine Office	14634.66	.098	15875.36	.080
Employees Vacation Pay	11465.40	.076	12196.54	.062
Total General Mine Expenses	80014.42	.534	76781.07	.389
Cost of Production	550396.97	3.669	563691.53	2.858
41. General Supplies	19974.81	.133	18585.72	.094
42. Iron & Steel	10966.14	.073	10202.69	.052
43. Oil & Grease	3540.77	.024	4055.10	.021
44. Machinery Supplies	26493.21	.177	30371.51	.154
45. Explosives	30098.60	.201	36896.83	.136
46. Lumber & Timber	5294.02	.035	4336.34	.022
47. Fuel	5019.05	.033	7156.97	.036
48. Electric Power	42727.79	.285	44553.31	.226
50. Other Items of Expense	7552.04	.050	8571.36	.043
Total Per Cost Sheet	151666.43	1.011	154729.83	.784

The following table shows the idle expense during the strike and covers the period from October 1 to November 14.

<u>Month</u>	<u>Amount</u>
October	14170.99
November	6823.81
Total	20994.80

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

1. Exploring in Mine

The smaller expense is due to less diamond drilling done.

3. Development in Rock

There was a decrease in this expense due to the small rock development program.

4. Development in Ore

The expense in this account increased due to the large ore development program that was underway throughout the year.

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8. COST OF OPERATING (Cont'd)

b. Detailed Cost Comparison (Cont'd)

5. Stoping

There was an increase in this expense due to the larger mining program and charging a substantial amount of new equipment to this account.

6. Timbering

There was a larger expenditure in this account due to more timbering done in the transfer drifts and at the mill raises for the various stopes.

7. Tramming

There was a decrease in this expenditure due to more favorable tramming conditions on the 6th Level.

8. Ventilation

The expense in this account increased due to driving new connections for ventilation.

9. Pumping

There was a favorable decrease in this expenditure although the large volume of underground water still requires a pumping schedule of three eight-hour shifts per day for seven days per week. There has been a downward trend in the volume of mine water; the average at the end of the year being 731 G.P.M. compared with 792 G.P.M. a year ago. Maintenance on pumps has been less although an added expense that occurred during the year was the need for introducing large quantities of lime as a neutralizing agent because of the high acidity of the water draining from the 4th Level workings. The cost per ton in this account increased due to the smaller production.

12. Underground Superintendence

A larger expenditure is due to employing two sub foremen in addition to the salaried bosses on each shift for the entire year. A Christmas bonus of \$100.00 was paid the salaried bosses.

14. Compressors and Power Drills

There was a larger expense in this account due to installing new copper piping for the compressor cooling system.

15. Scrapers and Mechanical Loaders

There was a decrease in this expenditure due to less repairs and there was less new equipment purchased.

16. Electric Tram Equipment

The expenditure in this account was larger due to more repairs and maintenance on the tram cars as the service life of this equipment is increasing.

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8. COST OF OPERATING (Cont'd)

b. Detailed Cost Comparison (Cont'd)

17. Pumping Machinery

There was a favorable decrease in this expenditure due to less maintenance and new equipment required.

19. Stocking Ore

There was less total expense due to the smaller amount of trestle construction although the cost per ton increased because of the smaller production.

20. Screening-Crushing at Mine

There was an increase in this expense due to installing a rebuilt crusher that was obtained from the Gwinn District replacing the crusher that was badly worn after many years of service.

22. General Surface Expense

The total expense was less due to the reduced working schedule but the cost per ton was slightly higher due to the smaller production.

23. Hoisting Equipment

The decrease in the total expenditure and cost per ton is due to less maintenance and repairs to this equipment.

27. Mine Buildings

The large decrease in this expense is due to less repairs to buildings and the absence of new construction charged to this account.

28-39. Inclusive

The cost per ton in each of these accounts was higher in nearly every case due to a reduction in the working schedule and the smaller product.

9. EXPLORATION AND FUTURE EXPLORATION

Two relatively short holes were drilled from the south end of the 6th Level to explore for an ore extension along the strike of the deposit. Each of the holes encountered ore proving a continuation of the narrow width and a further extension of the orebody to the southwest than outlined by the level development. On the basis of this drilling the main level will be driven further to the southwest in the hanging slate to reach a favorable location from which additional drilling will be done to more thoroughly explore the area.

Early in 1950 it is planned to cut out drill stations at the north and south ends of the 6th Level from which several inclined holes will be drilled to explore the extent of ore below the 6th Level and determine if sufficient tonnage can be proven to warrant development of the 8th Level.

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9. EXPLORATION AND FUTURE EXPLORATION (Cont'd)

The following is a log of the drilling that was done in 1949:

<u>D.D.H. No. 42</u>	<u>D.D.H. No. 43</u>
<u>6th Level - Dip 0° - N 80° W</u>	<u>6th Level - Dip 0° - S 55° W</u>
0' - 65' Ore	0' - 23' Ore
65' - 71' Lean Ore	23' - 47' Graphitic Slate
71' - 88' Cherty Gray Slate	47' - 132' Ore
	132' - 142' Iron Formation
	142' - 167' Slaty Iron Formation
	167' - 175' Ferr. Slate
	175' - 180' Iron Formation
	180' - 190' Second Class Sulphur Ore
	190' - 193' Lean Ore
	193' - 230' Graphitic Slate
	230' - 236' Iron Formation
	236' - 245' Gray Slate

10. TAXES

The taxes were higher due to the large increase in personal property valuation and also the mineral land valuation in the City of Iron River. The following is a comparison of the taxes paid in 1949 and 1948 in Iron County:

<u>Description</u>	<u>1949</u>	<u>1948</u>	<u>1949</u>	<u>1948</u>
<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>	<u>Taxes</u>
<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, 40A)	40,000	800.00	40,000	800.00
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40A)	300,000	6000.00	195,000	3900.00
<u>Virgil Mine Lease No. 51</u>	340,000	6800.00	235,000	4700.00
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40A)	1,250	25.00	1,250	25.00
Per. Prop., Stkple., Supp. & Equip.	341,250	6825.00	236,250	4725.00
Total Spies Mine		2.000		2.000
Spies Dwellings				
Total Iron River Township				
Tax Rate				
 <u>Village of Mineral Hills</u>				
<u>Spies Mine</u>				
NE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40A)	40,000	239.60	40,000	253.57
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40A)	300,000	1797.00	195,000	1236.18
<u>Virgil Mine Lease No. 51</u>	340,000	2036.60	235,000	1489.75
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40A)	1,250	7.48	1,250	7.93
Per. Prop., Stkple., Supp. & Equip.	341,250	2044.08	236,250	1497.68
Total Spies Mine		.5989986		.63394
Spies Dwellings				
Total Village of Mineral Hills				
Tax Rate				

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10. TAXES (Cont'd)

<u>Description</u>	<u>1949</u>		<u>1948</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
<u>Iron County</u>				
<u>City of Iron River</u>				
<u>Spies-Johnson (East Deposit)</u>				
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35, 40A	115,000	4025.00	95,000	3336.40
NE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 24, 43-35, 40A	115,000	4025.00	95,000	3336.40
<u>Mineral Lands</u>				
NE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35, 40A	2,000	70.00	2,000	70.24
NW $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 24, 43-35, 40A	1,600	56.00	1,600	56.19
NW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35, 40A*			2,000	70.24
NW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 24, 43-35, 40A	1,600	56.00	1,600	56.19
NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Sec. 24, 43-35, 25A (Exc. Carlson's Maple Valley Add.)	1,400	49.00	1,400	49.17
Lots in Carlson's Maple Valley Add.	1,005	35.45	1,005	36.02
Total	237,605	8316.45	199,605	7010.85
Collection Fees		83.16		70.11
Total City of Iron River	237,605	8399.61	199,605	7080.96
Paid in August 1949		4799.62		4032.02
Paid in January 1950		3599.99		3048.94
Total		8399.61		7080.96
Rate		3.5000		3.5119

*The James Mining Co. paid the taxes on the NW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 24, 43-35.

11. ACCIDENTS AND PERSONAL INJURY

The accident frequency and severity rates were higher than last year with three compensable accidents compared with two in 1948. There was a total of 27,928 man days worked and there were 379 days lost on account of all injuries compared with 180 in the previous year. There was a total of five injuries in which some lost time occurred but fortunately none were very serious in nature.

	<u>Frequency Rate</u>	<u>Severity Rate</u>
1949	22.38	1.696
1948	21.43	0.643

Frequency Rate - Number of accidents per 1,000,000 man hours.
Severity Rate - Number of days lost per 1,000 man hours.

The following is a detailed description of the compensable accidents:

Accident No. 172, February 17, 1949, Sebastian Taetsch, Blacksmith. He and his helper were straightening a 2" x 5" x 7' scraper arm after heating the piece in the forge at the point where it was bent. It was lifted onto the floor of the shop and when Taetsch was dropping his end the arm turned suddenly squeezing his finger against the floor. Crushed ends of middle and ring fingers of left hand - time lost - 26 days.

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11. ACCIDENTS AND PERSONAL INJURY (Cont'd)

Accident No. 173, March 11, 1949, James Turner, Scrapperman. A fuse burned out in the switch box on the level below the scraping slide as he was operating the tugger. The motorman replaced the fuse and closed the switch again but Turner neglected to open the switch at the transfer so when the switch on the level was closed, the tugger started. He was resting his foot on one drum of the tugger and when it started, the drum pulled his foot between the sprag and the turning drum. Burn and laceration of dorsum of foot to metatarsal bone - time lost - 50 days.

Accident No. 174, April 16, 1949, Joseph Kolbas, Jr., Company Account Miner. He was breaking a chunk over the grizzly with the chunk breaker and when the chunk broke, the pile of ore moved causing another chunk to roll down and strike him on the hand. Crushed first, second and third fingers of right hand, amputation middle finger proximal to first joint - time lost - 54 days.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

a. Surface

The only new construction of buildings comprised remodeling and enlarging the dryhouse under E & A cc-304. As previously mentioned a 28' x 22' addition was erected to the north end of the change house to provide a change room for surface employees, a new quarters for the shift bosses and a new lamp and check room. The interior was renovated providing separate rooms for the underground and clean clothes and modern shower and toilet facilities. The old style lockers were discarded and metal baskets provided as clothes containers. A separate shower room and toilet facilities was also provided for the surface employees in the new addition. Before construction was started on this project 140' of 24" concrete pipe was laid in a ditch under the new wing to provide proper drainage of rainfall and spring run-off water to the mine discharge ditch.

Because of the small shipments from the stockpile only a small amount of new trestle construction was required. Seven bents were erected to extend the trestle to the limits of the area northwest of the shaft.

b. Underground

Proposed new construction underground will consist of installing a 500 G.P.M. centrifugal pump on the 4th Level plat and a 6" discharge line in the shaft so that water can be pumped directly from this level to surface. This project will be under E & A cc-330. The pump will handle approximately 41% of the mine water that drains from the old workings above the 4th Level and with automatic controls a reduction in pumping expense will be realized. This water is very acid and presently requires the addition of a large amount of lime to neutralize it, but with a pump equipped with corrosion resistant parts the need to add lime will be eliminated.

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13. EQUIPMENT AND PROPOSED EQUIPMENT

There was a relatively large amount of new equipment purchased and a bulk of it was charged to stoping. For the shrinkage system of mining new drill machines and pneumatic columns were purchased that have capacity for drilling the deep holes employed in this method. Due to the large development program it was also necessary to purchase additional stoper drill machines to realize the best advance and efficiency. A motor pump that is fitted with corrosive resistant parts was purchased for installation on the 4th Level to divert water to the pump station at the air shaft replacing a pump that was requiring excessive repairs due to corrosion. A substantial amount of new equipment was also purchased when the change house was remodeled. The following is a list of the larger items of equipment added to the inventory:

<u>Item</u>	<u>Number</u>	<u>Cost</u>
3" x 7' Column	1	276.60
H-10 Drill Machines	4	1160.00
H-23 Sinkers	4	2430.00
PB-6 Paving Breakers	2	560.00
R-48 Stoppers	3	1695.00
#83 Sinker Columns	4	700.00
Jacklegs	3	414.00
A5NNOH Air Hoist	1	795.00
2 MRV Motor Pump	1	1052.00
Electric Calculator	1	480.00
Inventory Steel Cabinet	1	111.60
Lo Head Cars	2	600.00
24" Concrete Pipe	140'	413.00
4' x 4' Concrete Pipe	2	149.52
8" Spiral Vent Pipe	500'	1104.08

New Equipment Charged to E & A cc-304

Shower Heads and Fittings	19	355.31
Metal Clothes Baskets	120	362.60
Wash Fountain	1	171.70
Urinal and Lavatory		93.45
Closets	5	128.75
Flush Valves	5	56.25
Unit Heaters	6	352.10

14. MAINTENANCE AND REPAIRS

a. Mine

Maintenance expense in some cases was higher than last year but there was a favorable decrease in the amount of this work required on pumps. After mining was completed above the 4th Level there was no further need to maintain the settling sumps to settle the gritty solids out of the water. It was necessary to clean these sumps every week while mining was conducted above the 4th Level. Upon installation of the 500 G.P.M. pump on the 4th Level a further decrease in pump maintenance and pumping expense is anticipated. Severe corrosion of a drain line in the shaft between the 4th and 6th Levels caused frequent repairs but the trouble from this source will be eliminated upon the installation of a corrosion resistant plastic pipe. The three centrifugal pumps that are employed to divert water through the air shaft and lighten the load on the main pumps at shaft have given dependable service and maintenance on them has been light. These pumps are automatically controlled and require no attention other than inspections.

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14. MAINTENANCE AND REPAIRS (Cont'd)

a. Mine (Cont'd)

Repair work in the shaft has continued at about a normal rate and occasional replacement of worn out or damaged runners in the skip roads has comprised most of the work. A weekend shaft inspection has been in effect throughout the year. In the skip dump and in the chutes directly below, a new steel plate lining was installed and worn out bars in the grizzly chute were replaced with new ones. A new butterfly chute was also built replacing one that was badly worn.

During the vacation period in August the badly worn crusher bowl in the shaft house was removed and a reconditioned unit that was obtained from the Gwinn District was installed in its place. At this time the chutes directly below the crusher were also relined with steel plate and one of the top tram cars was overhauled and put into good condition.

Maintenance on tramping equipment has been confined mostly to the Granby type cars replacing worn out wheels and bearings and broken springs. Late in the year another six ton locomotive was obtained from the Negaunee Mine and it will be completely overhauled and put into good condition at the General Shops before it is placed into service. Repairs to power drills and scraper hoists has been small because a large amount of this equipment is new and has been in service for a relatively short time. There has been some timber repair work required at the mouth of the mill raises in the various transfer drifts where abrasion from the broken ore has necessitated frequent replacement of the timber. To insure strong support at these points fir timber is employed and reinforced with steel plate and rails.

There was only a small amount of repair work on surface buildings and it consisted mainly of putting the windows in the dryhouse in good condition and painting all the exterior woodwork after the remodeling project was completed. In the enginehouse the equipment has required only normal maintenance to keep it in good condition, and to add to the orderliness and appearance all the equipment has been painted. As previously mentioned new copper piping was installed for the compressor cooling system replacing rusted steel pipe. The roof on this building has deteriorated to the extent it will be necessary to install a new one in the coming year.

b. Location

The maintenance expense on the two rented houses in the location was less than last year and most of the work comprised papering several rooms in the house occupied by the mine clerk. In the Captain's house the repairs consisted of cleaning and re-cementing the furnace. The following table shows the cost of maintenance on rented houses:

	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>1948</u>
Interior Decorating and Repairs	11.90	139.32	151.22	256.01

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15. ELECTRIC POWER

There was slightly less power consumed due to the reduction in the working schedule but the average maximum demand was the same as last year. There were no serious delays to operations because of the lack of power although several short interruptions to power occurred but these 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>
1949	729	.0127	3,995,600	.285
1948	729	.0127	4,005,600	.226

16. WATER SUPPLY

There have been no extensions or changes made in the water mains and the supply has continued to be obtained from the Homer Mine.

17. CONDITION OF PREMISES

There has been no landscaping or improvements done on the premises and it is difficult to keep the grounds around the shop and office building in neat condition due to their close proximity to the shaft.

18. NATIONALITY OF EMPLOYEES

	<u>American Born</u>	<u>Foreign Born</u>	<u>Total</u>	<u>Percent</u>
Finnish	15	6	21	19
Italian	14	4	18	16
Polish	14	3	17	15
English	10	7	17	15
French	10		10	9
Swedish	8	1	9	8
Danish	5		5	4
German	2	2	4	3
Lithuanian	3		3	3
Austrian	1	2	3	3
Scotch	2		2	2
Irish	1		1	1
Yugoslavian	1		1	1
Welsh	1		1	1
Total	87	25	112	100

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1. GENERAL:

Mining operations at the Agnew Mine were carried forward from the first of the year to June 27th, on a two-shift, six-day a week basis and were then cut back to a two-shift, five-day a week for the balance of the year. In addition to time lost on holidays, three days were lost from production in July, due to floods. A general strike in the area caused a complete loss of production from midnight, September 30th, to 7:00 A.M. November 14th. An average of 12 gangs were employed, with two developing and ten mining. From January 1st to March 25th, ore was placed in stockpile. Loading directly into cars started on March 25th and was completed on November 28th. The stockpile was loaded out from March 28th to April 26th. There was no cross-mining activity during the year. The E. J. Longyear Company resumed the underground drilling program on February 1st and completed this program on June 20th.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production:

Agnew Bessemer Shaft, -----	7,220 tons
Agnew Non-Bessemer Shaft, -----	<u>273,181</u> "
Total, -----	280,401 "

b. Shipments:

Agnew Bessemer Shaft, -----	7,220 "
Agnew Non-Bessemer Shaft, -----	<u>265,432</u> "
Total, -----	272,652 "

c. Stockpile Inventories:

Agnew, -----	34,098 "
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d. Production by Months:

January, -----	24,372 tons
February, -----	24,060 "
March, -----	26,481 "
April, -----	39,707 "
May, -----	31,563 "
June, -----	33,020 "
July, -----	19,142 "
August, -----	23,056 "
September, -----	23,103 "
October, -----	-
November, -----	12,143 "
December, -----	<u>23,754</u> "
Total, -----	280,401 tons.

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

f. Ore Statement:

The 1948 stockpile ore of 23,856 tons of Agnew and 2,493 tons of Agnew-South Agnew, in addition to the 69,753 tons put on the pile the first part of 1949, was shipped in March and April, 1949.

3. ANALYSIS:

b. Tonnage and Analysis of Ore Produced:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron</u> <u>Nat.</u>
Agnew Bess.	7,220	59.43	.039	8.83	.53	1.22	13.55	51.38
Agnew N.B.	273,181	57.42	.047	9.71	.66	1.32	12.59	50.19
Total,	280,401	57.47	.047	9.09	.66	1.32	12.61	50.22

c. Tonnage and Analysis of Ore Shipped:

Agnew Bess.	7,220	59.43	.039	8.83	.53	1.22	13.55	51.38
Agnew N.B.	265,432	57.43	.047	9.62	.66	1.33	12.51	50.25
Total,	272,652	57.49	.047	9.60	.66	1.33	12.54	50.28

d. Mine Analysis of Ore in Stockpile:

Agnew,	34,098	57.57	.048	9.92	.67	1.23	12.72	50.25
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e. Complete Analysis of Shipments:

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Agnew Bess.	59.43	.039	8.83	.53	1.22	.33	.21	.011	3.58
Agnew N.B.	57.43	.047	9.62	.66	1.33	.33	.21	.011	5.33

4. ESTIMATE OF
ORE RESERVES:

a. Factors Used:

Direct Ore,	<u>Cu.Ft. Per</u> <u>Ton Crude</u>	<u>%</u> <u>Recovery</u>
	14	100

b. Ore Reserves:

	<u>Reserve</u> <u>12-31-48</u>	<u>Mined</u> <u>1949</u>	<u>Balance</u> <u>After Mining</u>	<u>Reserve</u> <u>12-31-49</u>
NE-NE 11,57-21	1,277,199	280,401	996,798	996,798