

ATHENS MINE
ANNUAL REPORT
YEAR 1939

7. UNDERGROUND: (Cont'd)

d-1. Repairing: (Cont'd)

The major part of the repair work in 1939 was confined to the 6th level haulage drift South of the fault dike. In an attempt to relieve the pressure on the drifts, mining was speeded up in the area under the jasper hanging directly above. As mining proceeds underneath the hanging the jasper will break and form a cushion which will decrease the weight which has heretofore been concentrated in the solid area extending down to the level.

A brief summary of repair work in 1939 follows:

4th Level

In the main level drift which serves as the ventilation exhaust, repairs were confined to installation of lining sets and replacement of a few rotted timber sets.

Sub Levels Above the 6th Level

A small amount of repairing was required in the drifts which serve as ventilation connections between the 6th and 4th levels where broken legs and caps were replaced as needed. A new ventilation connection South of the fault dike on the -500' sub required some repair work late in the year where lining sets of treated timber were installed and all broken timber sets replaced. It is very essential that this drift be kept open because it provides for the ventilation of the area being mined along the South footwall in block 4.

6th Level

Continuation of heavy pressure in portions of the 6th level drifts has necessitated continuous repair work in two areas, viz., South of the fault dike in No. 610 cross-cut and a portion of the drift near the switch leading into this cross-cut. Some repairs were also required in the East-West drift North of the dike, the major part of the repairs, however, have been concentrated in the first area mentioned. A portion of the drift near the switch about 100 ft. in length has required constant repairs. Several times during the past year a number of repair gangs have been concentrated here and have completely retimbered this portion with full size timber. About 3 ft. of back was taken out each time and the track lowered. Extra large timber has been used which was spaced at close intervals. Upon completion of a complete repair job here very little repairing was required for about four months after which the timber sets, if not broken by the heavy pressure were driven into the floor of the drift until the size of the drift was so reduced as to make it necessary to enlarge it. Nos. 618 and 619 raises which are located in the above area have required a large amount of repairs. Both of these raises have been recribbed completely in both compartments from the level up to the sub several times during the past year. Whenever the ore compartment of the raises require repairs, the mining contract is temporarily removed from production. In No. 610 cross-cut retimbering has not only been required in that portion of the drift in ore but also further Southeast where the drift is in footwall material. Of the three raises from this cross-cut, Nos. 614, 615, and 616, No. 614 has required the most repairs.

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d-1. Repairing: (Cont'd)

This raise has also been recribbed for its total length several times during the year. Not all the repair work that has been necessary in these three raises has been due to their being crushed by heavy ground. They are about 155 ft. in length and in time wear out in the lower portions near the level due to abrasion by the falling ore.

North of the fault dike in the East-West ore drift more repair work than formerly has been necessary. From No. 608 raise East to the switch the drift has been retimbered by raising the back to permit installation of full size timber. Lining sets are also installed which provide close spacing of the sets to give added support. Both No. 608 and No. 607 raises have also required attention. A large portion of No. 608 raise was recribbed due to crushing and at the end of the year repairs were under way in No. 607 raise. The mining contract that uses No. 607 raise has been taken off production temporarily and transferred to do the repair work.

7th Level

In No. 3 cross-cut South of the fault dike retimbering has been required in some sections. About 80 ft. of the drift at the Southeast end of the cross-cut near No. 634 raise has been abandoned due to difficulty in keeping it open. Crushing was not anticipated on this level as mining is over 140 ft. above No. 3 cross-cut. The timber sets installed were broken in a very short time making it necessary to retimber one section several times. Two raises, Nos. 634 and 633, crushed soon after they were completed and no mining has been done from either of these raises. The other raises in this cross-cut have also required some repairs.

8th Level

During the year some retimbering has been required at several points in the 8th level drifts that serve as ventilation connections between the 7th and 9th levels. The work consisted mainly of replacing rotted timber sets which have been in service for a number of years.

9th Level

Evidence of heavy pressure was noted at the extreme Southwest end of the new haulage drift that was completed this year and lining sets were installed to provide additional support.

e. Drifting and Raising:

The following statement gives comparative figures of drifting and raising footage for the years 1939 and 1938:

Year	<u>Drifting</u>			<u>Raising</u>			Grand <u>Total</u>
	<u>Ore</u>	<u>Rock</u>	<u>Total</u>	<u>Ore</u>	<u>Rock</u>	<u>Total</u>	
1939	95'	598'	693'	894'	209'	1103'	1796'
1938	495'	709'	1204'	983'	257'	1240'	2444'
Decrease	400'	111'	511'	89'	48'	137'	648'

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e. Drifting and Raising: (Cont'd)

All classes of development work decreased in 1939 due in large measure to development of the 7th level having been completed in 1937 and 1938 except for three raises put up in 1939. The development of the 9th level is well advanced and 1940 will register a further decrease in all classes of development work.

f. Explosives, Drilling and Blasting:

The cost per pound for powder decreased 3.8% in 1939 but the pounds of powder per ton of ore increased 10.9% resulting in a net increase of 7% in the cost per ton for powder. The total cost for all explosives increased 7.2% in 1939 or from \$.0499 per ton to \$.0535. The cost this year was almost exactly the same as the average cost in the previous nine years. The lower cost in 1938 was due to use of Gelamite No. 1 powder which has been exclusively used since February 1938. It has twenty-five more sticks per hundred pounds and is supposed to equal 60% Gelatin in strength pound for pound. More mining under the hanging in 1939 undoubtedly accounted for the increase in the amount of powder necessary to break a ton of ore. The ore here is more often hard to break and in some areas locally is called "tight ground". The cost per ton for all explosives is the lowest of any of the soft ore mines operated by the Company.

Statement of Explosives Used: (Ore Development and Stopping)

	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1939</u>	<u>Amount 1938</u>
50% Gelatin				2,669.28
60% Gelatin	200	13.00	26.00	
No. 1 Gelamite	145,530	11.76	17,164.99	7,983.32
Total Powder 1939	145,730	11.80	17,190.99	
Total Powder 1938				10,652.60
Fuse - feet	604,770	5.05	3,052.50	1,876.94
Caps - No. 6	85,270	12.20	1,040.28	651.81
Electric Caps	1,550	10.80	167.48	77.06
Tamping Bags	21,000	2.00	42.00	34.00
Fuse Lighters	13,300	6.75	89.78	57.38
Master Fuse Lighters	500	20.36	10.18	
Connecting Wire	120	.40	48.00	19.20
Shot Firing Cord - feet	1,500	11.33	17.00	5.20
Total Fuse, Etc. 1939			4,467.22	
Total Fuse, Etc. 1938				2,721.59
Total All Explosives 1939			21,658.21	
Total All Explosives 1938				13,374.19
PRODUCT			404,877	268,050
Pounds of Powder Per Ton of Ore			.3599	.3244
Tons of Ore Per Pound of Powder			2.778	2.082
Cost Per Ton for Powder			.0425	.0397
Cost Per Ton for Fuse, Caps, Etc.			.0110	.0102
Cost Per Ton for All Explosives			.0535	.0499

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7. UNDERGROUND: (Cont'd)

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

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

	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1939</u>	<u>Amount 1938</u>
50% Gelatin				199.68
No. 1 Gelamite	4,080	11.95	487.69	224.06
Total Powder 1939	4,080	11.95	487.69	
Total Powder 1938				423.74
Fuse - feet	17,790	5.05	89.76	73.00
Caps - No. 6	2,530	12.20	30.88	25.31
Electric Caps	50	10.96	5.48	29.85
Shot Firing Cord				5.20
Total Fuse, Etc. 1939			126.12	
Total Fuse, Etc. 1938				133.36
Total All Explosives 1939			613.81	
Total All Explosives 1938				557.10
Total Explosives Used in Mine			22,272.02	13,931.29
Average Price Per Pound for Powder			.1180	.1225

g. Mining and Loading:

There was no change in mining practice in 1939. The benefit of the new raises from the 7th level in block 3 was apparent in the increased output from this area. These raises are located so as to give the most economical scraping distance from each raise. The full benefit of the more recent layout of raises will not be fully realized until crushing of raises ceases and the miners do not have to be off production for several weeks every few months to repair them.

Four 20 H.P. scraper hoists were purchased in 1939 with faster speed in line with the recent practice of lengthening the scraper haul and mining more ore from each raise. They will be used on the long hauls in the area near the hanging where the ore body grows larger on each sub level. The motors on the 20 H.P. hoists do not heat in the warmest places and burn out of the armatures should never occur.

The two raises cribbed with special large cribbing, from 9" to 14" diameter, have more than doubled the time between repair periods and seem to have justified their initial higher cost. They will be watched carefully to get full data of cost of repairs, time interval, etc., so that a decision can be definitely reached as to whether the extra large cribbing should be used in areas under extremely heavy pressure.

h. Ventilation:

Excellant ventilation was maintained throughout the year due to the large number of openings between the 7th and 6th level. Conditions were improved in the area being mined on the South footwall in the West half of block 4 by the use of doors to force air up No. 616 raise and back through No. 614 raise to the ventilation airway on the -530' sub level that connects with a raise to the 4th level. By maintenance of outlets to the main levels it was possible to have a good supply of fresh air on every operating sub

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7. UNDERGROUND: (Cont'd)

h. Ventilation: (Cont'd)

level. At the end of the year no booster fans were in operation which means that the air circulated to every sub level without power being necessary to force it. The cost for ventilation was much less than in 1938 due to cheaper current on account of more favorable load factor and to charge in 1938 for the 60 H.P. fan motor.

i. Pumping:

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

<u>Period</u>	<u>Avg. K.W.Per Day - Athens</u>	<u>K.W.Per Month Breitung Pump</u>	<u>Avg. Gals.Per Min. - Athens</u>	<u>Total Cost Both Mines From Athens Cost Sheet</u>
January	3587	2800	297	\$ 2270.82
February	3414	2700	282	1890.15
March	3367	1100	279	1973.04
April	3552	5000	293	2139.56
May	4067	9200	338	2412.52
June	4290	8400	357	2443.69
July	4583	9600	382	2762.17
August	4520	7000	375	2581.44
September	4363	3100	360	2427.08
October	4216	1700	348	2271.02
November	4013	1200	334	2161.98
December	3930	900	329	2169.36
<u>Avg. 6 Mos.</u>				
1935	3103	4366	265	2087.93
Avg.Year 1936	2949	3583	255.5	1766.08
Avg.Year 1937	3003	3283	257	1749.12
Avg.Year 1938	3767	3433	314	2350.42
Avg.Year 1939	3991	4391	331	2291.90

Average cost in 1934 prior to pumping at the Breitung 2611.79

Saving in 1935 when expense was heavy account of installing pump at Breitung	2600.59
Saving in 1936	10148.52
Saving in 1937	10352.04
Saving in 1938	3135.96
Saving in 1939	<u>3838.65</u>
Total saving in five years	<u>30075.76</u>

The water pumped at the Athens in 1939 increased and has now reached a figure comparable with the year 1934. In July 1939 with 382 gallons per minute, it is necessary to go back to the year 1933 to find an equal number of gallons per minute. The increase started in March and gained steadily to August when a small decrease occurred. There was a steady but slow decrease for the balance of the year. The Spring thaw in March and April accounted for the increase in the Spring and the continual rains in May, June and July accounted for the increase that persisted to the end of July. Dry weather came in August and continued for the balance of the year which accounts for the steady but slow decrease.

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7. UNDERGROUND: (Cont'd)

1. Pumping: (Cont'd)

There is more water on the 8th level than formerly and it seems reasonable to assume it comes from the cave to surface that is over the West end of block 2 and the East part of block 1. It should be noted that the cave has extended considerably beyond its original boundaries.

The cost per ton for pumping was lower than in 1938 due to lower cost for current account of a higher load factor. The total cost per ton for the year was \$.037 lower than in 1938 due to the larger product. The cost in money was \$ 27,502.83 as compared with \$ 28,205.02 in 1938. The Breitung pump operated throughout the year. The spare pump was installed and the other pump removed for overhauling, also the suction was pulled up and cleaned once during the year.

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

<u>Month</u>	<u>1939</u>	<u>1938</u>	<u>1937</u>	<u>1936</u>	<u>1935</u>	<u>1934</u>	<u>1933</u>
January	297	266	244	242	367	318	372
February	282	273	239	244	361*	317	358
March	279	277	237	235	313	313	340
April	293	305	242	238	292	307	326
May	338	343	266	261	290	329	365
June	357	364	269	274	293	361	416
July	382	341	271	284	288	373	422
August	375	333	271	266	278	360	411
September	360	336	263	258	263	356	399
October	348	311	262	261	261	354	356
November	334	307	260	255	253	355	342
December	329	309	263	249	249	355	326
Average	331	314	257	256	292	341	369

(*) Pumping started at the Breitung shaft.

j. Shaft:

Expense in 1939 for maintenance of the shaft and underground pockets was high due to rebuilding the 4th level pocket late in the year. This pocket was originally built with a concrete bottom and concrete dividing walls but with a wood front. The front rotted out and it was rebuilt this year with concrete. While this work was being done the fingers for the chute were repaired and some replaced, the steel guides for the fingers built up at the General Shops, etc. Plates have been ordered for lining the pockets. The repair work on the pocket will be completed by Spring of 1940. This work was necessary as dirt on the level could not be cleaned up and dumped into the skips. The area of the main drift on the 4th level must be maintained full size as it is the exhaust airway to the shaft. The level will be thoroughly cleaned as soon as the work on the pocket is completed.

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7. UNDERGROUND: (Cont'd)

j. Shaft: (Cont'd)

The clearance between the skips and the guides is maintained by use of oak strips inset on all the new runners. The old worn runners are built out to gauge with strips until they become worn so badly they have to be replaced. Most of the old runners in the shaft have been replaced during the past three years.

Near the end of the year an inspection found several of the brackets carrying the skip runners broken on the steel sets in the square shaft. They are now being removed on week-ends and replaced with a heavier bracket.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	404,877	268,050	136,827	
Underground Costs	1.356	1.552		.196
Surface Costs	.173	.244		.071
General Mine Expenses	.227	.280		.053
Cost of Production	1.756	2.076		.320
Taxes	.243	.355		.112
TOTAL COST	1.999	2.431		.432
No. of Days Operated	245	205	40	
No. Shifts & Hours	5 1-8 hr.	3 1-8 hr.	2	
	240 2-8 hr.	198 2-8 hr.	42	
		4 3-8 hr.		4
Avg. Daily Product	1653	1308	345	

COST OF PRODUCTION:

	<u>1939</u>	<u>%</u>	<u>1938</u>	<u>%</u>	<u>Increase</u>	<u>Decrease</u>
Labor	1.079	61.4	1.273	61.3	.1%	.194
Supplies	.677	38.6	.805	38.7		.128 .1%
Total	1.756	100.00	2.078	100.0		.322

b. Detailed Cost Comparison:

(1) Days and Shifts:

<u>Year</u>	<u>Days Mine Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Shifts Worked</u>
1939	245	1 & 2 8-hr.	326	69,484
1938	205	1, 2 & 3 8-hr.	327	54,808
Increase	40			14,676
Decrease		1 8-hr.	1	

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(2) Wages:

There was no change in wages in 1939, the last increase being 10¢ an hour effective March 16, 1937.

(3) Comparison of Production:

Production - 1939	404,877 Tons
Production - 1938	<u>268,050 "</u>
Increase	136,827 "

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1939	326	69,484	429,205.04	6.18
1938	<u>327</u>	<u>54,808</u>	<u>331,969.75</u>	<u>6.06</u>
Increase		14,676	97,235.29	.12
Decrease	1			

(5) Tons Per Man Per Day:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>
Surface	30.20	21.26	8.94
Underground	<u>7.22</u>	<u>6.35</u>	<u>.87</u>
Total	5.83	4.89	.94

(6) Cost of Production:

	<u>Total</u>	<u>Cost Per Ton</u>
1939	710,994.03	1.756
1938	<u>556,495.04</u>	<u>2.076</u>
Increase	154,498.99	
Decrease		.320

	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>
1939	437,016.09	61.4	273,977.94	38.6
1938	<u>341,171.56</u>	<u>61.3</u>	<u>215,323.48</u>	<u>38.7</u>
Increase	95,844.53	.1	58,654.46	
Decrease				.1

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts:

	<u>1939</u>		<u>1938</u>		<u>Inc. or Dec.</u>
Days Per Week	3, 4, & 5		2, 3, & 4		
Shifts & Hours	1 & 2 8-hr.		1, 2 & 3 8-hr.		
Production - Tons	404,877		268,050		136,827
Avg. Daily Product - Tons	1,653		1,308		345
Number of Days Worked	245		205		40
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>
					<u>Per Ton</u>
<u>UNDERGROUND COSTS:</u>					
1. Exploring in Mine	238.34	.001	37.83		200.51 .001
2. Sinking Shaft					
3. Development in Rock	6853.00	.017	6043.72	.023	809.28 .006
4. Development in Ore	5435.61	.013	9730.30	.036	4294.69 .023
5. Stopping	168349.53	.416	108159.31	.403	60190.22 .013
6. Timbering	194690.19	.481	150633.79	.562	44056.40 .081
7. Traming	60287.36	.149	43084.38	.161	17202.98 .012
8. Ventilation	5069.65	.013	6121.44	.023	1051.79 .010
9. Pumping	27502.83	.068	28205.02	.105	702.19 .037
10. Compressors & Air Pipes	36500.71	.090	30825.23	.115	5675.48 .025
11. Back Filling					
12. Underground Superintendence	14210.75	.035	11736.19	.044	2474.56 .009
13. Cave-in					
14. Maint: Comp. & Power Drills	826.96	.002	963.48	.004	136.52 .002
15. Scraper Equipment	11822.45	.029	8527.22	.032	3295.23 .003
16. Elec. Tram Equipment	15564.74	.038	9676.88	.036	5887.86 .002
17. Pumping Machinery	1694.43	.004	2152.90	.008	458.47 .004
Total Underground Costs	549046.55	1.356	415897.69	1.552	133148.86 .196
<u>SURFACE COSTS:</u>					
18. Hoisting	32943.91	.081	24496.75	.091	8447.16 .010
19. Stocking Ore	6316.68	.016	7679.89	.029	1363.21 .013
20. Screening - Crushing at Mine					
21. Dry House	7071.89	.018	6355.26	.024	716.63 .006
22. General Surface Expense	6080.81	.015	6806.65	.025	725.84 .010
23. Maint: Hoisting Equipment	11184.94	.028	5960.79	.022	5224.15 .006
24. Shaft	2906.96	.007	1802.51	.007	1104.45
25. Top Tram Equipment	1729.90	.004	2439.36	.009	709.46 .005
26. Docks, Trestles & Pockets	898.21	.002	6486.87	.024	5588.66 .022
27. Mine Buildings	893.71	.002	3423.23	.013	2529.52 .011
Total Surface Costs	70027.01	.173	65451.31	.244	4575.70 .071
<u>GENERAL MINE EXPENSES:</u>					
28. Mining Engineering	2209.61	.006	2001.94	.008	207.67 .002
29. Mech. & Elec. Engineering	2442.16	.006	1983.01	.008	459.15 .002
30. Analysis and Grading	11066.92	.027	7268.61	.027	3798.31
31. Safety Department	1982.36	.005	1736.27	.007	246.09 .002
32. Telephones & Safety Devices	2756.20	.007	2500.90	.009	255.30 .002
33. Local & General Welfare					
34. Spec. Exp., Pensions & Allow.	6175.47	.015	7094.39	.026	918.92 .011
35. Ishpeming Office	11724.39	.029	8824.79	.033	2899.60 .004
36. Mine Office	13345.12	.033	12694.16	.047	650.96 .014
37. Insurance	3295.92	.008	815.93	.003	2479.99 .005
38. Personal Injury	12991.05	.032	11274.73	.042	1716.32 .010
39. Social Security Taxes	18906.45	.047	15612.84	.058	3293.61 .011
40. Employees Vacation Pay	5024.82	.012	3338.47	.012	1686.35
Total General Mine Expenses	91920.47	.227	75146.04	.280	16774.43 .053
<u>COST OF PRODUCTION</u>					
41. Taxes	98200.56	.243	95079.02	.355	3121.54 .112
TOTAL COST	809194.59	1.999	651574.06	2.431	157620.53 .432

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

1. Exploring in Mine:

Covers a proportion of Geological Department expense. Expense charged to Athens Mine increased \$ 200.51 in 1939.

3. Development in Rock:

Total feet drifting and raising in rock 844 ft. in 1939 as compared with 966 ft. in 1938. Increase in expense of \$ 809.28 due to higher cost per foot. Decrease in cost per ton \$.006.

4. Development in Ore:

There were 400 ft. less ore drifting and 89 ft. less raising in 1939. The decrease in expense was \$ 4,294.69 and in cost per ton \$.023.

5. Stoping:

The increase in expense was \$ 60,190.22 and in cost per ton \$.013. The mine operated 74 more shifts and the production increased 136,827 tons. Stopping cost per ton increased due to mining more ore under the hanging wall.

6. Timbering:

The increase in expense was \$ 44,056.40 and the cost per ton decreased \$.081. The cost per ton for timber, lagging and poles decreased \$.0176. In 1939 there was less crushing of sixth level drifts and raises as compared with 1938.

7. Tramming:

There was an increase in production of 136,827 tons due to 74 more shifts worked and an increase in the average daily product of 345 tons. The increase in expense was \$ 17,202.98 and decrease in cost per ton \$.012.

8. Ventilation:

The decrease in expense was \$ 1,051.79 and the cost per ton \$.010. The decrease in expense was mostly due to charging out a second-hand 60 H.P. motor in 1938 at a cost of \$ 1,696.00 which was transferred from Cliffs Shaft mine equipment. There were less repairs to ventilation doors, fans and motors. The cost for electric power was \$ 231.04 more.

9. Pumping:

Expense decreased \$ 702.19 and cost per ton \$.037.

<u>Year</u>	<u>Total Gallons Pumped</u>	<u>Gallons Per Minute</u>
1939	173,774,003	331
1938	165,316,266	314
Increase	8,457,737	17

The decrease in expense was due to mine operating more days per week thereby reducing the time worked by pumpman helpers. When the mine is idle an extra man works with the pumpman. The cost for electric power was only \$ 11.83 more due to a decrease in the cost per K.W. on account of a more favorable load factor.

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

10. Compressors and Air Pipes:

Expenditures increased \$ 5,675.48 while the cost per ton decreased \$.025.

Cu. ft. air compressed - 1939	819,405,000	
Cu. ft. air compressed - 1938	<u>643,005,000</u>	
Increase	176,400,000	
Electric Power Cost - 1939	\$ 26,464.34	Cost Per Ton \$.065
Electric Power Cost - 1938	<u>21,975.66</u>	Cost Per Ton .082
Increase	4,488.68	Decrease .017

More air used account of 74 more shifts worked and larger product.

12. Underground Superintendence:

The increase in expense was \$ 2,474.56 and the cost per ton decreased \$.009. The increase in expense was due to more operating days and one more shift boss since September 11th when a small hoisting crew was put on the midnight shift. The safety bonus paid bosses in 1939 was more due to mine working more days.

14. Compressors and Power Drills:

The decrease in expense was \$ 136.52 and cost per ton \$.002. All the expense was for repairs to compressors.

15. Scrapers and Mechanical Loaders:

The expense in 1939 increased \$ 3,295.23 and cost per ton decreased \$.003. In 1939 two Holcomb-Westeece scrapers were charged to this account. Six other Holcomb-Westeece scrapers and four 20 H.P. Ingersoll-Rand electric scraper hoists were bought and charged through E. & A. accounts to Plant and Equipment. The increase in expense was for more repairs to scrapers and scraper hoists and an increased charge for scraper rope. More scraper hoists were in operation due to increase in production in latter months of the year.

16. Electric Tram Equipment:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Generators	3112.39	3001.44	110.95	
Locomotives	101.50	344.38		242.88
Wiring	1983.85	1387.95	595.90	
Main Line Tracks	5748.76	4321.13	1427.63	
Main Line Cars	4618.24	621.98	3996.26	

Total expenditures increased \$ 5887.86 and cost per ton \$.002. Decrease in Generators due to less repairs. Increase in Locomotives and Wiring due to more repairs and extension of trolley lines in new drifts on the 9th level. Increase in Main Line Tracks due to replacing 30-lb. rail on 6th level and 9th level with 40-lb. rail and more repairs to 6th level tracks account of swelling ground. Increase in Main Line Cars due to overhauling eighteen cars at the General Shops at a cost of \$ 3,395.00.

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

17. Pumping Machinery:

Expenditures decreased \$ 458.47 and cost per ton \$.004. Decrease in expenditures due to expense in 1938 for digging a ditch around the caved area on surface to prevent surface water from entering the mine, replacing syphon pipes in shaft, building new launders underground leading to the sump and to charging out \$ 270.00 for pumps transferred from other mines. Expense in 1939 was for repairs to pumps, water column in shaft and replacement of drain pipes in shaft, etc.

SURFACE COSTS:

18. Hoisting:

Ore and rock hoisted during 1939 and 1938 was as follows:

<u>Year</u>	<u>Ore</u>	<u>Rock</u>	<u>Total</u>
1939	404,877	11,348	416,225
1938	268,050	8,760	276,810
Increase	136,827	2,588	139,415

Expenditures increased \$ 8,447.16 and cost per ton decreased \$.010. The cost per ton for electric power in 1939 was \$.061 as compared with \$.067 in 1938 due to more favorable load factor in 1939.

19. Stocking Ore:

Tons stocked - 1939	200,871
Tons stocked - 1938	203,324
Decrease	2,453

Expenditures decreased \$ 1,363.21 and the cost per ton \$.013. The decrease in expense was due to less ore stocked and less expense for dismantling and erecting wood stocking trestles.

21. Dry House:

Expense increased \$ 716.63 due to mine operating more shifts and the cost per ton decreased \$.006 due to larger product.

22. General Surface Expense:

Expenditures decreased \$ 725.84 and cost per ton \$.010. The decrease in cost was due to less repairs to fences around property, less expense for care of grounds, and more of the surface foreman's time charged to other accounts.

23. Hoisting Equipment:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>
Electric Hoists	2306.20	1355.93	950.27
Ropes	4592.75	1528.56	3064.19
Skips & Roads	3239.60	2552.02	687.58
Sheaves	1046.39	524.28	522.11

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

23. Hoisting Equipment: (Cont'd)

The expenditures increased \$ 5,224.15 and cost per ton \$.006. Increase in expense to Electric Hoists due to more repairs to hoist motors and generator set. In 1939 there was one 1-1/4" cage rope costing \$ 1,219.59, two 1-3/8" skip ropes costing \$ 2,799.29 and \$ 573.87 on a third skip rope charged out while in 1938 only one 1-3/8" skip rope costing \$ 1,528.56 was charged out. The increase in expenditures for Skips and Skip Roads was due to more repairs to skips and replacing shaft runners in the skip roads. The cost of five new rubber lined idler sheaves was charged to this account, also there was more expense for maintenance of the sheaves due to hoisting larger product.

24. Shaft:

There was an increase in expenditures of \$ 1,104.45 while the cost per ton remained the same.

<u>Year</u>	<u>Steel Sets</u>	<u>Undg. Pockets</u>	<u>Total</u>
1939	466.81	2440.15	2906.96
1938	558.56	1243.95	1802.51
Increase		1196.20	1104.45
Decrease	91.75		

The decrease in expense to steel sets was due to less repairs. The increase in expenditures for underground pockets was due to repairing the 4th level pocket.

25. Top Tram Equipment:

The expense in this account decreased \$ 709.46 and the cost per ton \$.005.

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Engines & Motors	159.34	200.82		41.48
Wire Rope	702.99	528.44	174.55	
Sheaves, Rollers, etc.	538.72	565.69		26.97
Tracks & Cars	328.85	1144.41		815.56

The increase in expense for wire rope was due to charging out more top tram rope. There were decreases in expenditures to engines and motors, sheaves, rollers, etc., and to tracks and cars due to less repairs and replacements.

26. Docks, Trestles and Pockets:

The decrease in expenditures was \$ 5,588.66 and in cost per ton \$.022. The expense to this account in 1939 was for repairs to rock trestle and skip dump, changing steel plates in pockets and replacing ties on steel trestle. The decrease in expense was due to the following extraordinary expenditures in 1938: Repairing braces supporting girders on steel trestles \$ 1,878.00, rebuilding and repairing skip dump before installing spherical bottom skips \$ 2,612.00, and replacing decking timbers on steel trestle \$ 780.00.

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

27. Mine Buildings:

<u>Building</u>	<u>Amount</u>	<u>1 9 3 9</u>	<u>Remarks</u>
Office	6.88		Making trap door over coal bin.
Warehouse	20.40		Painting floor.
Shops	22.96		Repairs to windows and doors.
Shaft House	159.14		Enlarging enclosure at base.
Engine House	223.58		New base for stack, cut hole for stoker, and electric wiring.
Boiler House	1.93		Repairs to windows.
Dry House	119.69		Repairs to windows and doors, piping and lights.
Top Tram Bldg.	33.36		Built covering over sheave.
Timber Tunnel	305.58		Fixing sheet iron covering, repairing frame and painting.
Total	893.71		
		<u>1 9 3 8</u>	
Office	16.30		Repairs to porch.
Shops	6.89		Repairs to doors and windows.
Shaft House	335.17		Enlarging enclosure at base on South side.
Engine House	7.73		Repairs to windows.
Boiler House	19.21		New doors.
Dry House	401.15		Painting, repairs to windows and new hot water tank.
Coal Dock	2636.78		Erecting new dock.
Total	3423.23		

28. GENERAL MINE EXPENSES:

28. Mining Engineering:

Covers time and expense of mine engineer and helpers. The expense to this account increased \$ 207.67 and the cost per ton decreased \$.002 due to larger product.

29. Mechanical and Electrical Engineering:

The expense to this account increased \$ 459.15 and the cost per ton decreased \$.002. The charge to this account covers a proportion of time spent on mechanical and electrical work at the mine by these departments.

30. Analysis and Grading:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Sampling at Mine	2289.79	1637.88	651.91	
Central Lab. Expense	5784.62	3283.36	2501.26	
Shipping Dept. Expense	2517.50	2086.29	431.21	
Trucking Samples, Etc.	475.01	261.08	213.93	
No. of Determinations	20,328	11,230	9,098	
Cost Per Determination	.284564	.292373		.007809

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

30. Analysis and Grading: (Cont'd)

The increase in expenditures to this account was \$ 3,798.31 while the cost per ton remained the same due to more ore shipped from pocket and stockpiles and larger product, also more samples from mine account of more contracts mining ore.

31. Safety Department:

The expense to this account increased \$ 246.09 and the cost per ton decreased \$.002.

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
First Aid Supplies	136.57	131.92	4.65	
First Aid & Helmet Practice	60.83	56.80	4.03	
Ishpeming Office Charge	1748.96	930.09	818.87	
Cash Safety Awards	36.00	612.00		576.00

32. Telephones and Safety Devices:

Expenditures to this account increased \$ 255.30 and the cost per ton decreased \$.002.

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Lights at Shaft & Levels	2417.72	1974.99	442.73	
Mine Telephones	113.13	127.27		14.14
Safety Gates & Undg. Improvements	117.57	153.92		36.35
Sign Boards & Signals	97.82	191.58		93.76
Fire Equipment	9.96	53.14		43.18

The increase in expense for lights at shaft and on levels was due to mine operating more shifts in 1939. The decreases for expenditures to other sub accounts were due to less repairs.

34. Special Expense, Pensions and Allowances:

There was a decrease in expenditures of \$ 918.92 and in cost per ton of \$.011.

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Legal	436.57	396.32	40.25	
Saranac Investigation	1636.21	1572.95	63.26	
Curtailment	1375.50	2846.67		1471.17
Retirement	825.00	-	825.00	
Other	1902.19	2208.45		306.26

35. Ishpeming Office:

Proportion of Ishpeming Office expense prorated to various mines on basis of labor. The increase in expense to this account was \$ 2,899.60 and the cost per ton decreased \$.004.

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts: (Cont'd)

36. Mine Office:

The increase in expenditures was \$ 646.96 and the cost per ton decreased \$.014.

	<u>1939</u>	<u>1938</u>	<u>Increase</u>
Salaries	9601.72	9142.02	459.70
Central Warehouse Exp.	2910.06	2820.86	89.20
Miscellaneous	829.34	731.28	98.06

37. Insurance:

The expenditures increased \$ 2,524.09 and the cost per ton \$.005.

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Property	872.63	514.06	358.57	
Group	2181.99	531.82	2713.81	
Catastrophe	285.40	585.27		299.87

38. Personal Injury:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Compensation & Doctors	8842.28	7843.32	998.96	
Compensation Department	758.87	783.14		24.27
Hospital Loss	3439.45	3516.61		77.16

There was an increase in expense to this account of \$ 1,765.87 and the cost per ton decreased \$.010.

39. Social Security Taxes:

	<u>Unemployment Insurance Tax</u>	<u>Old Age Benefit Tax</u>
1939	14,510.04	4,396.41
1938	12,225.01	3,387.83
Increase	2,285.03	1,008.58

The increase in expense was \$ 3,293.61 and the cost per ton decreased \$.011. The charges to this account are based on the amount of the pay-rolls. The unemployment insurance tax was 3.3% and the old age benefit tax 1% in both 1939 and 1938. The increase in expenditures was due to larger payrolls account of mine operating more days in 1939.

40. Employees Vacation Pay:

The expense to this account increased \$ 1,686.35 while the cost per ton was the same as last year. In 1939 employees entitled to vacations with pay received pay for 32 hours while in 1938 they were given pay for 24 hours.

41. Taxes:

There was an increase in taxes levied of \$ 3,121.54 but on account of larger product the cost per ton decreased \$.112.

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9. EXPLORATIONS
AND FUTURE
EXPLORATIONS:

There was no diamond drilling on the Athens property in 1939 and no explorations are under consideration at this time.

10. TAXES:

A comparison of assessed valuation and taxes for 1939 and 1938 follows:

	<u>1 9 3 9</u>		<u>1 9 3 8</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty (Tax Commission)	1,730,000	63,332.54	2,025,000	76,071.96
Ore in Stock, Equipt. & Supp.	920,000	33,679.73	475,000	17,844.04
Total by Tax Commission	<u>2,650,000</u>	<u>97,012.27</u>	<u>2,500,000</u>	<u>93,916.00</u>
Sterling Addition	4,600	168.41	4,600	172.80
Harvey Plat	1,300	47.60	1,300	48.84
Total	<u>2,655,900</u>	<u>97,228.28</u>	<u>2,505,900</u>	<u>94,137.64</u>
Collection Fees		972.28		941.38
Total Optg. Athens Mine	<u>2,655,900</u>	<u>98,200.56</u>	<u>2,505,900</u>	<u>95,079.02</u>
 <u>Rented Buildings:</u>				
Harvey Plat	4,700	172.10	4,200	157.78
Sterling Addition	22,800	834.72	22,800	856.53
Total	<u>27,500</u>	<u>1,006.82</u>	<u>27,000</u>	<u>1,014.31</u>
Collection Fees		10.07		10.14
Total Athens Rented Bldgs.	<u>27,500</u>	<u>1,016.89</u>	<u>27,000</u>	<u>1,024.45</u>
 Total Athens Iron Mining Co.	 2,683,400	 99,217.45	 2,532,000	 96,103.47
 Total Taxes City of Negaunee		 560,092.01		 556,066.25
Tax Rate Per \$100 Valuation		3.66084		3.7566
Athens Iron Mining Co. % of City Taxes		17.7%		17.1%

The City of Negaunee tax rate decreased \$.9576 per \$ 1,000.00 valuation and the total City tax \$ 4,025.76. The increase of \$ 3,113.98 in taxes paid by the Athens Iron Mining Company was due to increase of \$ 150,000.00 in valuation made by the State Tax Commission

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11. ACCIDENTS
AND
PERSONAL
INJURY:

The following table gives the number and classification of the accidents causing personal injury for the past six years:

	<u>1939</u>	<u>1938</u>	<u>1937</u>	<u>1936</u>	<u>1935</u>	<u>1934</u>
Fatal	0	1	0	0	0	0
Time lost - Over 4 months	0	1	1	3	1	1
Time lost - 1 to 4 months	5	3	5	3	2	0
Time lost - Less than 1 month	3	1	1	1	0	0
Total Accidents	<u>8</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>3</u>	<u>1</u>
Number of cases paid compensation for accidents prior to Jan. 1st of each year	5	7	7	6	7	7
Number of cases paid difference in wages (included in above total)	2	3	3	3	4	4

Nature and Classification of Compensable Accidents:

<u>Date</u>		<u>Days Lost</u>
1/13/39	Contusion, right chest	26
2/23/39	Injury to leg - Died of heart disease 3/8/39	
3/9/39	Laceration of finger	16
3/2/39	Injury to ligament of right knee	87
4/25/39	Lost left little finger	60
9/15/39	Hernia	59
5/27/39	Separation cartilage right knee	23
11/15/39	Hernia	Still Home

The accident record in 1939 shows an increase of two compensable accidents as compared with 1938. Due to the fatality and one very severe accident in 1938, the 1939 record showed a great improvement over the previous year as none of the accidents in 1939 were very severe. The days lost were greatly reduced and the record made in days lost account of accidents was below the average of the other Company mines. Two hernia accidents were considered mine accidents this year due to the Michigan Occupational Disease Act whereas in previous years they were not classified as compensable accidents except under very unusual circumstances.

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12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

The following is a list of the E. & A.'s authorized in 1939:

E. & A. No. 832 dated 7/20/39 - Rocker Dump Cars

	<u>Estimated</u> <u>Expenditure</u>	<u>Expended</u> <u>1939</u>	<u>Expended</u> <u>1938</u>	<u>Expended</u> <u>To Date</u>	<u>Unexpended</u> <u>Balance</u>
3 - 65 cu. ft. Rocker Dump Cars	1,440.00	1,380.00		1,380.00	60.00

E. & A. No. 833 dated 8/16/39 - Water Cooling Tank

Water Cooling Tank - 34' x 34'	583.50				
10% Contingencies	58.35				
Total	641.85	851.32		851.32	209.47

E. & A. No. 840 dated 9/11/39 - 4 I-R Scraper Hoists

4 - 20 NM 2C Ingersoll- Rand Double Drum Scraper Hoists	6,144.00	6,144.00		6,144.00	-
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E. & A. No. 849 dated 10/25/39 - Equipment to Increase Production

3 Duger Drills	606.00	601.27		601.27	4.73
2 Utility Hoists	950.00	950.00		950.00	-
6 Holcomb Scrapers	999.00	1,006.18		1,006.18	7.18
1 Impact Wrench	260.00	260.00		260.00	-
Total	2,815.00	2,817.45		2,817.45	2.45

13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

The ore shipped from stockpile was loaded by No. 43 shovel owned by The Cleveland-Cliffs Iron Company and rented to the Athens Mine.

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13. EQUIPMENT
AND
PROPOSED
EQUIPMENT: (Cont'd)

b. Scraper Hoists:

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

	On Hand 1-1-1939	Purchased 1939	Total on Hand 12/31/39	Repair Cost Per Machine	
				1939	1938
Sull. 15 H.P. Elec.	17		17	96.46	67.86
" 20 H.P. "	2		2	148.82	46.80
" 25 H.P. "	1		1	-	18.78
I-R. 10 H.P. "	2		2	134.16	145.01
" 15 H.P. "	4		4	48.17	23.42
" 20 H.P. "	3	4	7	7.16	40.30
Total	29	4	33	Avg. 74.20	61.06

The repair cost was higher in 1939 due to more ore scraped and to the greater age of a number of the scraper hoists. Four new 20 H.P. scraper hoists were purchased at a cost of \$ 6,144.00 and charged to E. & A. No. 840 dated 9/11/39.

c. Drill Machines:

There were three new RB-12 Ingersoll-Rand drill machines purchased in 1939 at a cost of \$ 601.27 and charged to E. & A. No. 849 dated 10/25/39.

d. Motor Haulage: Cars:

Three 65 cu. ft. rocker dump cars were purchased in 1939 at a cost of \$ 1,380.00 and charged to E. & A. No. 832 dated 7/20/39. More cars were needed account of haulage on three levels, i.e., 6th, 7th, and 9th.

14. MAINTENANCE
AND REPAIRS:

a. Steel Trestles:

On the Southeast steel trestle all the rotted 4-1/2 ft. ties were replaced on both tracks. No repairs were made to the steel trestles while in 1938 there was an expenditure of \$ 1,378.00 for reinforcing of channels at all of the piers on both of the steel trestles.

b. Water Cooling Tank:

Construction of a new cooling tank was authorized on August 16, 1939, E. & A. No. 833. The old tank was too small and also leaked in a number of places. Work was completed in November and the new tank put in commission. The E. & A. was closed in December 1939.

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14. MAINTENANCE
AND REPAIRS: (Cont'd)

c. Water Column in Shaft:

One of the 10" water discharge column pipes in the shaft, about 300 ft. below surface, split in November and was repaired with clamps and by welding. Another leak developed within a short time and on examination it was found that the upper 508 ft. of the water column was worn thin and should be replaced. E. & A. No. 858 was authorized on December 27, 1939 and an order placed for the pipe. Unless serious trouble develops, replacement of the pipe will be postponed until warmer weather in the Spring. While repairs are under way the mine water will be diverted to the Negaunee Mine on the connecting drift 1,000 ft. below surface and pumped to surface at the Negaunee Mine.

d. Comparison of Costs - 1939 with 1938:

Maintenance and repairs listed under underground costs:

	<u>Amount</u>	<u>Cost Per Ton</u>
1939	29,908.58	.073
1938	21,320.48	.080
Increase	8,588.10	
Decrease		.007

Maintenance and repairs listed by the four accounts as shown on the Cost Sheet:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Comp. & Power Drills	826.96	963.48		136.52
Scraper Equipment	11,822.45	8,527.22	3,295.23	
Elec. Tram Equipt.	15,564.74	9,676.88	5,887.86	
Pumping Machinery	1,694.43	2,152.90		458.47
Total	29,908.58	21,320.48	8,588.10	

The expense for compressors and power drills in both years was for repairs to the compressor. Power drills purchased in 1938 and 1939 were covered by E. & A.'s and charged to Plant and Equipment account.

The increase in expense for maintenance of scraper equipment was due to more repairs to scrapers and scraper hoists and to an increased charge for scraper ropes.

The large increase in expense for electric tram equipment was partly due to tracks in new drifts on the 9th level and replacemtn of worn 30-lb. rail on this level being charged to sub account "Main Line Tracks", but mainly to expense at General Shops for overhauling eighteen 65 cu. ft. rocker dump cars.

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14. MAINTENANCE
AND REPAIRS: (Cont'd)

d. Comparison of Costs - 1939 with 1938: (Cont'd)

Maintenance and repairs listed under surface costs:

	<u>Amount</u>	<u>Cost Per Ton</u>
1939	17,613.72	.043
1938	<u>20,112.76</u>	<u>.075</u>
Decrease	2,499.04	.032

Listed by the five accounts as shown on the Cost Sheet:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Hoisting Equipt.	11,184.94	5,960.79	5,224.15	
Shaft	2,906.96	1,802.51	1,104.45	
Top Tram Equipt.	1,729.90	2,439.36		709.46
D. T. & P.	898.21	6,486.87		5,588.66
Mine Buildings	893.71	3,423.23		<u>2,529.52</u>
Total	<u>17,613.72</u>	<u>20,112.76</u>		<u>2,499.04</u>

In 1939 one 1-1/4" cage rope costing \$ 1,219.59, two 1-3/8" skip ropes costing \$ 2,799.29 and \$ 573.87 on a third skip rope were charged out while in 1938 only one 1-3/8" skip rope costing \$ 1,528.56 was charged out. There were more repairs to electric hoists and skips and skip roads and more expense for sheaves due to hoisting larger product and installing five new rubber lined idler sheaves on pulley stands.

The increase in expense to shaft was due to extensive repairs to the fourth level pocket.

The decrease in expenditures to top tram equipment was due to less repairs to engines and motors, tracks and cars, and less expense for sheaves and rollers. There was an increase in cost for new rope charged out.

There was a decrease in cost for docks, trestles and pockets of \$ 5,588.66 due to extraordinary expenditures in 1938. Repairing braces supporting girders on steel trestles \$ 1,878.00, rebuilding and repairing skip dump before installing spherical bottom skips \$ 2,612.00, and replacing decking timbers on steel trestle \$ 780.00.

The decrease of \$ 2,529.52 in expense to mine buildings was due to erecting a new coal dock in 1938 at a cost of \$ 2,636.78.

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15. POWER:

Detail of electric current purchased compared with 1938:

	<u>1939 - 12 Mos. Optg.</u>		<u>1938 - 12 Mos. Optg.</u>	
	<u>Cost</u>	<u>Per Ton</u>	<u>Cost</u>	<u>Per Ton</u>
Stopping	1,096.53	.003	1,094.40	.004
Ventilation	3,311.37	.008	3,080.33	.011
Pumping	21,940.79	.054	21,928.96	.082
Hoisting	24,614.38	.061	17,951.58	.067
Stocking Ore	804.88	.002	731.02	.003
Dry House	93.82		99.71	
Lights at Levels	1,366.90	.004	1,256.34	.005
Compressors	26,464.34	.065	21,975.66	.082
Electric Haulage	1,863.50	.005	1,789.07	.006
Shops	395.72	.001	260.26	.001
Heating Plant	17.37		18.46	
Office	18.97		18.76	
Storage Battery Loco.	48.52		8.46	
Total	<u>82,037.09</u>	<u>.203</u>	<u>70,213.01</u>	<u>.261</u>
Main Line Meter - K.W.		5,768,463		4,627,154
Separate Meter Readings		<u>5,687,837</u>		<u>4,592,820</u>
Line Loss		80,626		34,334
Product		404,877		268,050
K.W. Per Ton (Inc. Line Loss)		14.27		17.26
Cost Per K.W. (Avg.)		.014276		.015174
15 Min. Demand (Avg.)		1360		1300
Load Factor (Avg.)		47.2%		39.9%

The cost per ton for electric power decreased \$.058 in 1939 due to larger product and more favorable load factor.

17. CONDITION
OF
PREMISES:a. Grounds:

The grounds around the mine were kept in good condition during the year. Fertilizer was applied to the lawn and shrubbery.

b. Athens Mine Houses:

The following statement gives the total cost of repairs and the average cost per house for 1939 and 1938:

<u>Year</u>	<u>No. Houses</u>	<u>Amount</u>	<u>Avg. Cost Per House</u>	<u>Rental Income</u>
1939	31	4,862.60	156.86	4,926.56
1938	31	7,303.20	235.59	4,886.80

The cost for repairs in 1939 was considerably less than in 1938 and were general in character. They comprised replacement of several chimneys from cellar to roof, new roof on one house and one barn, hardwood floors, storm windows and window repairs, remodeling of rooms in several houses, new water line from street to one house and interior decorating of all the houses. During the past six years the Athens houses have been overhauled, new garages built and a number of the houses painted. They are now up to the standard maintained in Company houses at the other locations in Negaunee and Ishpeming.

ATHENS MINE
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18. NATIONALITY
OF
EMPLOYEES:

The following statements show, first, the nationality of employees as to parentage, and secondly, a separation of nationalities into American and foreign born:

<u>As to Parentage</u>	<u>1939</u>	<u>%</u>	<u>1938</u>	<u>%</u>
English	50	15.3	49	15.0
Finnish	148	45.4	144	44.0
Italian	60	18.4	60	18.4
Swedish	23	7.1	24	7.4
French (Canadian)	27	8.3	29	8.9
Scotch	1	.3	2	.6
German	3	.9	6	1.8
Austrian	3	.9	3	.9
Norwegian	7	2.2	7	2.1
Irish	2	.6	1	.3
Greek	1	.3	1	.3
Danish	1	.3	1	.3
Total	326	100.0	327	100.0

<u>As to Birth</u>	<u>American Born</u>		<u>Foreign Born</u>	
	<u>1939</u>	<u>1938</u>	<u>1939</u>	<u>1938</u>
English	35	33	15	16
Finnish	91	86	57	58
Italian	25	24	35	36
Swedish	18	19	5	5
French (Canadian)	27	28		1
Scotch	1	2		
German	3	6		
Austrian	2	2	1	1
Norwegian	6	6	1	1
Irish	2	1		
Greek			1	1
Danish	1	1		
Total	211	208	115	119
Percentage	64.7%	63.6%	35.3%	36.4%

JACKSON LEASE-CAMBRIA MINE
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1. GENERAL

The Cambria Mine, which was closed on May 28th, 1938, was reopened on January 16th, 1939 on a schedule of six eight hour shifts per week. This schedule was continued until February 20th when it was increased to two eight hour shifts, four days a week and operated thus until April 22nd when the mine was again closed down. Operations were resumed on August 1st on a schedule of two 8 hour shifts, five days a week for the balance of the year.

In April, 1937, it was mutually agreed that the underground car weight would be fixed at 2.40 tons. This factor is probably very nearly correct for ore with an analysis of better than 59% Iron, but as the analysis of the product this year is only 56.80% Iron, it is obvious that the car factor should be lower. With this view in mind, during the months of September and October, when the entire product was put in railway cars and shipped, the actual railway weights were taken and dividing it by the car tally it was found that the weight of cars in September was 2.367 tons and in October 2.384 tons. These facts were brought out in the monthly reports and on December 7th, I received a copy of a letter from Mr. S. R. Elliott to Mr. J. W. Whiting, stating that he had received a letter from Mr. T. A. Flannigan, Superintendent, of the Cambria Mine, that effective December 1st, 1939, the underground car factor for both Cambria and Jackson would be reduced from 2.40 to 2.35 tons per car.

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

<u>Grade</u>	<u>Tons</u>	<u>% of Product</u>
Cambria (Non-Bessemer) - - - - -	62,036	100
Violet (Bessemer) - - - - -	0	0
Total - - - - -	62,036	100

The production from the property since the lease became operative is as follows:

<u>Grade</u>	<u>1939</u> <u>Tons</u>	<u>1938</u> <u>Tons</u>	<u>1937</u> <u>Tons</u>	<u>1936</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
Cambria (Non-Bessemer)	62,036	21,663	66,116	7,791	157,606

b. Shipments

<u>Grade of Ore</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u> <u>Tons.</u>	<u>Total</u> <u>Last Year</u>
Cambria (Non-Bessemer)	30,661	49,292	79,953	0

Shipments include 291 tons of overrun in stockpile.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (CONT.)

b. Shipments (Cont.)

Shipments from the property since the lease became operative are as follows:

<u>Grade</u>	<u>1939</u> <u>Tons</u>	<u>1938</u> <u>Tons</u>	<u>1937</u> <u>Tons</u>	<u>1936</u> <u>Tons</u>	<u>Total</u> <u>Tons.</u>
Cambria (Non-Bessemer)	79,953	0	61,008	2,324	143,285

c. Stockpile Inventories

<u>Grade of Ore</u>	<u>Dec. 31st,</u> <u>1939</u>	<u>Dec. 31st,</u> <u>1938</u>	<u>Decrease</u>
Cambria (Non-Bessemer)	14,611	32,237	17,626

e. Production by Months

<u>Month</u>	<u>Cambria Ore</u> <u>Tons</u>	<u>Rock</u> <u>Tons</u>
January - - - - -	1,519	0
February - - - - -	4,346	19
March - - - - -	6,583	53
April - - - - -	5,224	19
August - - - - -	7,010	0
September - - - - -	8,838	71
October - - - - -	10,445	0
November - - - - -	8,488	0
December - - - - -	9,583	0
Totals - - - - -	62,036	162

3. ANALYSIS

The following are the analyses of the Cambria Ore produced from the Jackson Lease during 1939. These figures are compiled from the averages of the daily reports of production and analyses by underground cars of each contract for each day's operation:

<u>Month</u>	<u>Grade</u>	<u>Cars</u>	<u>Dried</u> <u>Iron</u>	<u>Dried</u> <u>Phos.</u>
January	Cambria	633	59.15	.082
February	"	1,811	58.53	.074
March	"	2,743	56.96	.077
April	"	2,177	55.78	.101
August	"	2,921	56.87	.099
September	"	3,734	56.05	.070
October	"	4,382	57.16	.086
November	"	3,643	56.45	.080
December	"	4,078	56.67	.081
Total		26,122	56.80	.081

JACKSON LEASE-CAMBERIA MINE
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6. SURFACE

Shipments from stockpile started on May and the stockpile grounds were practically cleaned of ore in November with a credit to Jackson Lease of 291 tons overrun. The customary stocking trestles were erected.

7. UNDERGROUND

a. General

The average monthly production for the eight and one-half months that the mine was worked was 7,298 tons as compared to 4,333 tons in 1938 and represents an increase of 68.4%. This increase was due to an increase of 43% in working schedule and also 17.6% more tons per miner per shift. The average number of miner shifts worked per month in 1939 was 503 as compared to 351 in 1938 and the production of tons per shift per miner in 1939 was 14.51 whereas it was 12.34 tons in 1938.

During the period from May 23th to August 1st, when the mining operations were shut down, the management employed about 35 men to keep the mine workings in repair and complete the shaft to the Seventh Level. The shaft work consisted of removing the pentice, putting in runners, completing the storage and measuring pockets and installing the balance of the steel shaft sets.

Nothing was done on the Seventh Level after resumption of operations on August 1st until December when they advanced the main haulage drift 40 feet to the West and 40 feet to the East.

The average number of miners employed on the Jackson Lease during the time the mine operated was 13.60 per shift as compared with 14.12 last year. The number of men will probably be reduced in the near future as the tonnage of ore and the number of places that can be worked above the Sixth Level are being depleted. To maintain normal production, two working places are now being worked three shifts a day to take the place of two other places that are worked out.

It will be noted that the analysis of the ore mined this year is much lower than last year. This is due to the fact that the production was decreased in the better grade of ore which is limited, and increased in the lower grade.

The development of the Seventh Level has been very slow and unless this work is speeded up all available ore above the Sixth Level will be mined out long before the level is completed and the necessary raises are put up.

b. Development

Developments for the operation of the sub-level stope in the west wing of the West Deposit consisted of putting up a raise from the Sixth Level to a point underneath a mill on the +135 foot Sub from where a drift was driven 25 feet to the north in ore, 80 feet of dog drifting on the 150' Sub-Level, 55 feet of dog drifting on the 160' Sub, 50 feet of dog drifting on the 180' Sub, and 30 feet of dog drifting on the 200' Sub. A double compartment raise was put up from the Sixth Level to the +135' Sub, holing near the north central part of the West Deposit to facilitate the slicing of ore near the boundary line.

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7. UNDERGROUND (CONF.)

b. Development (Cont.)

In the Center Deposit a raise was put up in the hanging from the Sixth Level to the +135' Sub and was utilized for slicing a portion of the southwest corner of the deposit. In the East portion of the deposit, six mills were put up from the +135' Sub to the 150' Sub to mill ore extending from the +135' Sub to an elevation of approximately +190 feet. After milling all possible ore from these mills it was found that the ore extended further East so another scraping drift was driven southerly from a raise near the north boundary. The length of this drift was 145', the last 80' of which was in merchantable ore. Two mills were put up from this drift, one 20' from the breast and the other 60' from the breast, the former is up 40' and still in ore and the latter is up 25' in ore where it holed into an exploration drift on the 150' Sub.

c. Stoping

East Deposit

Very little stoping was done on the Jackson Lease in the East Deposit, practically all work being confined to the Cambria side of the line. Mining on the 135' Sub-Level was just started at the close of last year. This year's work consisted of 130' of slicing, taking the back as they retreated.

Center Deposit

The extreme west portion of this deposit has been mined to an elevation of +135' and slicing has been started 20 feet below from a raise in the hanging that was put up this year. The mining of the center portion is being held up until such time as the eastern portion has been mined above the 135' Sub-Level. Two gangs have been engaged all year in the eastern portion stoping the ore that was found by last year's exploration. The mining of this ore necessitated 160' of additional drifting on the 135' Sub-Level. After taking just about all that could be reached from these developments, it was found that the ore extended still further east so a scraping drift (mentioned under development) was driven southerly, cutting through the ore about 25 feet east of previous developed ore. It is not known at the present time how far this ore will extend to the east or what the height will be, but it is known that the deposit is at least 90' wide on the 135' Sub and not less than 50' high. This eastern portion of the deposit is not a high grade ore and is responsible for the lower analysis of the total product this year.

West Deposit

The east wing of this deposit is practically all mined above the 120' Sub, which is 10 feet above the main haulage level. One gang, which is now idle, was employed here until December 12th when they completed stoping the most southerly portion of this wing down to the 120' Sub-Level.

The work in the center portion of the West Deposit was mostly confined to slicing on the Cambria property, there being only 65' of slicing on the Jackson Lease.

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7. UNDERGROUND (CONT.)

c. Stoping (Cont.)

The west wing of the West Deposit is being sub-level stoped from the 135' Sub on elevations of +150', +162', +186' and +199'. The southwest corner is now mined down to the 135' Sub-Level and as this place is finished and one other place in the east wing is through, work has been concentrated on extracting the ore that remains in the West Deposit. At the present time, two gangs are employed three shifts a day and at this rate it will not take long to mine it out and this will make it difficult to keep up present production as the number of places that can be worked is gradually diminishing.

John Irving
Engineer

JT:DWC
1-27-40.
-3-

LUCY MINE
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1. GENERAL:

The fences around the open pits and the old shaft were inspected during the Summer and necessary repairs made.

10. TAXES:

	<u>1 9 3 9</u>		<u>1 9 3 8</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Various Parcels	\$ 29,600	\$ 1,083.63	\$ 29,600	\$ 1,111.96
Collection Fees		10.83		11.12
Total Taxes	<u>\$ 29,600</u>	<u>\$ 1,094.46</u>	<u>\$ 29,600</u>	<u>\$ 1,123.08</u>

City of Negaunee Tax Rate		
Per \$100.00 Valuation	3.661	3.7566

The City of Negaunee tax rate decreased with a consequent reduction in the taxes on this property.

MAAS MINE
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1. GENERAL

The Maas Mine operated continuously during the year 1939 with a varied working schedule. From the first of the year to January 9th, the mine operated on a three day per week schedule with two full mining crews and a small hoisting crew, requiring the mine to operate four days per week with one eight-hour shift, one day per week with two eight-hour shifts, and on three of the days there was an additional eight hour shift for hoisting. From January 9th to June 12th the schedule was increased to four days per week with two regular eight-hour shifts and one eight-hour small hoisting shift. On June 12th the working schedule was decreased to three days per week with the same arrangement as in the first week of the year and this continued until September 11th when there was an increase to five days per week with two regular eight-hour shifts and one small eight-hour hoisting shift each day, which schedule continued to the end of the year.

When the working time was increased to five days per week, it became necessary to hire more men to take care of the cleaning of tracks and extra repairing as, while under the former schedule this work could be done on Friday or Saturday, the new operation called for full 40 hours by the men and this work would have to receive overtime pay. These new men were used on the so-called midnight or third shift which did not interfere so much with the tramming on the main levels. A still further increase in production was desired without putting on a third shift mining crew which is not considered economical, therefore new equipment was purchased and men hired for four more contracts during the latter part of December. In March of this year, in accordance with a new plan whereby some of the employees, who were 65 years of age or older and had worked 25 years or more for the Company, could be retired with a special allowance and be replaced with younger, more efficient men, the Maas Mine retired seven, replacing them with former employees laid off in June, 1938.

Mining was continued in the same areas as in 1938, namely the East and West footwall pillars above the Third Level, the two blocks lying East of the Race Course Lease above the Fourth Level and the main area, lying in and South of the Race Course Lease, between the Fourth and Fifth Levels. The new area developed in 1938 lying further East of the Race Course Lease and 100 feet above the Fourth Level had to be temporarily abandoned about the middle of this year as the extreme weight of the unmined pillar, together with the jasper hanging above, crushed the new drift on the Fourth Level and the new raises so that it was impossible to continue mining. A special repair crew has been engaged in retimbering this drift and it is expected to resume operations early in 1940.

The only development for the year was raising in No. 3 Cross-cut on the Fifth Level and opening two new transfer systems, one above the Third Level in the West end of the East footwall pillar and the other half way between the Third and Fourth Levels in the West footwall pillar of the main dike, the latter drift having to be driven almost entirely in

MAAS MINE
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the footwall on account of the flat pitch of the ore body.

The two greatest handicaps which tend to delay production and increase costs at the Maas Mine are the large flow of water that is encountered in the workings and the handling of the large number of grades and royalties of ore existing in the mine. While the total gallons per minute pumped showed a slight decrease as reported by the Mechanical Department, this was due to the extensive repairs to the Third Level pumps and main discharge rather than to any decrease in volume as the total of the wiers installed on all the levels showed very little difference throughout the year and the action of the water in the working places, especially below the Third Level, was even more difficult to combat than it has been previously.

The operations of the surface wells have been rather intermittent and therefore the expected results in decreasing the flow of water underground have failed to materialize, although the general level of the water bearing surface has been lowered between 15 and 20 feet and with more continuous pumping next year, together with the addition of the Negaunee well and possibly one or two more along the Western end of the caved area, there will probably be a noticeable decrease in the underground water. No. 1 well only pumped 187 days in 1939, at approximately 250 gallons per minute, the idle time being due to repairs to the pump caused by the excessive amount of sand that works into the bearings. A plan is now in progress to remove the old shutter screen pipe, drill some 15 or 20 feet into the ledge and replace new screen with additional gravel, all of which should improve the pumping conditions as well as to increase the flow. No. 2 well started to pump August 4th and has pumped 550 gallons continuously since that date with almost no sand in the water, which is being used for all purposes at the Mine instead of purchasing water from the City of Negaunee as heretofore.

The introduction of the new Bessemer Special grade of ore caused further delay as that increased the total of the various grades and royalties to eight, wick added to the rock, gives nine different products that have to be handled through three pockets at the shaft. These pockets are of the storage variety and hold some twenty cars each which unload into the skip through measuring pockets. It can be readily seen that as the train loads come from the mine, they naturally carry ore of different grades and if the pockets are full of other grades, there has to be a delay until they can dump, and therefore the more grades, the more delay. In addition there is the wet ore to contend with which has to be dumped directly into a skip as it can not be held in the pocket and therefore one pocket is unavailable at some times for other grades. These matters are regulated as far as possible by the shaft sampler reporting to the motor crews what grades he can take, but often there is none available and they have to bring out what grades they find in the chutes.

There has been a very extensive timbering and repairing program

MAAS MINE
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carried out throughout the year, partly on account of the decreased working schedule whereby the places have to be kept open longer with a consequently greater amount of reopening and partly due to excessive pressure in some of the new mining blocks where the weight of the jasper hanging has not yet been relieved by sub level mining which causes the hanging to form an arch above the broken gob and thus reduce the pressure on the drifts and raises directly beneath.

The large increase in the shipments of ore for the year, which totaled approximately 100,000 tons more than was produced, placed the mine in a very favorable position as regards stocking ore during the winter season, compared to last winter when two completely new stocking areas had to be prepared by filling existing gulleys with rock to the East and West of the shaft on the South side of the stocking grounds. There was enough ore cleaned up West of the shaft to allow for two single track trestles 100 feet apart which will be used mostly for Maas grade ore with a small amount of Race Course, while the steel trestle and the Southeast wooden trestle have ample capacity for the other grades. These trestles have all been electrified with the exception of the Southeast and Southwest wooden trestles and the track gauge has been increased from 30" to 36", making a much more stable unit as the new larry cars are longer and lower and on the wider gauge are not nearly as top heavy as the old type. The new rock trestle erected last fall was also electrified and joined to the North system of haulage. A third rail consisting of a twenty pound rail mounted on porcelain insulators is used for the return current. This type of tram car should work out much better than the endless rope type used heretofore as there are no rollers, rope sheaves or ropes to keep in shape and the horsepower of the motors is also much less on the new system, thus decreasing the cost of operation. The only disadvantage that has been noticed in the short time they have been in intermittent use is that the aluminum alloy of which the new cars are made appears to cool off quicker, thus causing the ore to freeze around the door openings. However, as they are used more often, this difficulty will probably be overcome and if not, some type of insulation can be used.

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES

<u>a. Production by Grades</u>	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Maas Bessemer	40,203 ✓	44,753		4,550
Race Course Bessemer	14,184 ✓	22,740		8,556
Maas	356,037 ✓	273,050	82,987	
Race Course	79,921 ✓	68,903	11,018	
Maas Special	2,829* ✓	715	2,114	
Race Course Special	22,627* ✓	11,077	11,550	
Maas Bess. Special	236 ✓		236	
R. C. Bess. Special	4,907 ✓	2,332	2,575	
Total	<u>520,944</u>	<u>423,570</u>	<u>97,374</u>	
Rock	11,356	14,789		3,433
Total Hoist	<u>532,300</u>	<u>438,359</u>	<u>93,941</u>	

*Includes current and previous year's stockpile overrun of 3,893 tons.

54,387 tons or 10.5% of the actual production was Bessemer grade.

<u>b. Shipments</u>	<u>Pocket</u>	<u>Stockpile</u>	<u>Total</u>	<u>Total</u>
<u>Grade of Ore</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Last Year</u>
Maas Bessemer	235	34,651	34,886	25,082
Race Course Bessemer	123	18,200	18,323	20,400
Maas	159,138	271,493	430,631	57,852
Race Course	36,084	66,380	102,464	23,972
Maas Special	778	1,903	2,681	438
Race Course Special	4,326	23,283	27,609	10,813
Maas Bess. Special	236		236	
R. C. Bess. Special		5,873	5,873	
Total	<u>200,920</u>	<u>421,783</u>	<u>622,703</u>	<u>138,557</u>
Total Last Year	42,628	95,929	138,557	
Increase	<u>158,292</u>	<u>325,854</u>	<u>484,146</u>	

Included in the above is 25,491 tons shipped all rail to Charcoal furnaces.

c. Stockpile Inventories

<u>Grade of Ore</u>	<u>12-31-39</u>	<u>12-31-38</u>	<u>Increase</u>	<u>Decrease</u>
Maas Bessemer	31,104	25,787	5,317	
Race Course Bessemer	7,530	11,669		4,139
Maas	229,608	304,202		74,594
Race Course	46,349	68,892		22,543
Maas Special	454	306	148	
Race Course Special	929	5,911		4,982
R. C. Bess. Special	1,366	2,332		966
Total	<u>317,340</u>	<u>419,099</u>		<u>101,759</u>

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d. Division of Product by Levels

	<u>1939</u>	<u>%</u>	<u>1938</u>	<u>%</u>
Third Level	160,082	31.0	126,281	29.8
Fourth Level	132,776	25.6	99,604	23.5
Fifth Level	225,041	43.4	197,685	46.7
Total	517,899	100.0	423,570	100.0

e. Production by Months

<u>Month</u>	<u>Maas</u>		<u>Maas Spcl.</u>	<u>R. C.</u>		<u>Race Course</u>	<u>R. C.</u>		<u>Total</u>	<u>Rock</u>
	<u>Bess.</u>	<u>Maas</u>		<u>Bess.</u>	<u>Spcl.</u>		<u>Bess.</u>	<u>Spcl.</u>		
January	5,386	27,554	61	1,626	5,840	1,731	764	42,962	1,543	
February	6,519	24,757		1,479	4,298	1,480	533	39,066	986	
March	6,289	26,940	5	1,233	5,748	1,644	22	41,881	1,258	
April	4,396	23,910	87	1,722	6,193	940	973	38,221	1,269	
May	3,360	31,692	264	687	11,526	2,166	270	49,965	1,180	
June	1,471	27,510	105	710	7,843	890	792	39,321	859	
July	914	21,108	11	1,056	6,140	1,491	110	30,830	801	
August	353	22,374	644	517	2,946	1,311	297	28,442	814	
September	2,068	36,024	861	989	5,474	2,445		47,861	932	
October	3,104	39,420	198	1,166	8,475	2,872		55,235	664	
November	3,094	38,866	157	1,199	9,024	2,110		54,450	746	
December	5,695	33,672	355	2,098	5,284	567	1,146	48,817	304	
Total	42,649	353,827	2,748	14,482	78,791	19,647	4,907	517,051	11,356	
1939 Stockpile O'run.			81			767		848		
1938 "						3,045		3,045		
Gr. Total	42,649	353,827	2,829	14,482	78,791	23,459	4,907	520,944	11,356	

The product was distributed as follows:

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
George Maas Lease	331,080	253,875	77,205	
Catholic Cemetery	31,063	37,144		6,081
American Mining Co.	9,498	6,988	2,510	
C.C.I.Co.(Right of Way)	18,350	11,306	7,044	
Race Course	121,639	105,052	16,587	
City of Negaunee	9,314	9,205	109	
Total	520,944*	423,570	97,374	

*Includes current and previous year's stockpile overrun of 3,893 tons.

f. Ore Statement

	<u>Maas</u>		<u>Maas</u>	<u>R. C.</u>		<u>Race Course</u>	<u>Maas</u>		<u>Total</u>	<u>Total Last Year</u>
	<u>Bess.</u>	<u>M. B. Spcl.</u>		<u>Bess.</u>	<u>Spcl.</u>		<u>Spcl.</u>	<u>Spcl.</u>		
On Hand 1-1-39	25,787		304,202	11,669	2,332	68,892	306	5,911	419,099	134,086
Product for year	42,649		353,827	14,482	4,907	78,791	2,748	19,647	517,051	423,570
Trans. to & from	2,446	236	2,210	298		1,130		832		
1939 Overrun							81	767	848	
1938 Overrun								3,045	3,045	
Total	65,990	236	660,239	25,853	7,239	148,813	3,135	28,538	940,043	557,656
Shipments	34,886	236	430,631	18,323	5,873	102,464	2,681	27,609	622,703	138,557
Balance on Hand	31,104		229,608	7,530	1,366	46,349	454	929	317,340	419,099
Increase in Output									94,329	
Decrease in ore on hand									101,759	

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f. Ore Statement (Cont.)

Estimated stockpile overrun end of 1939 season:

Maas Bessemer	0 tons
Maas	50,000 "
Race Course Bessemer	2,000 "
Race Course	6,000 "
Maas Special	0 "
Race Course Special	0 "
R. C. Bess. Special	0 "
Total Estimated Stockpile	<hr style="width: 100px; margin-left: auto; margin-right: 0;"/> 0 "
Overrun	58,000 tons

Stockpile overrun shipped in 1939 was 3,893 tons.

- 1939 1 8-hr. shift, 4 days per week, and 2 8-hour shifts, 1 day per week, with a small hoisting shift 3 8-hour shifts per week with crews alternating to receive 3 days per week, January 1st to January 9th.
- 2 8-hr. shifts, 4 days per week, and a small hoisting third shift with crews alternating to receive 4 days per week, January 9th to June 12th.
- 1 8-hr. shift, 4 days per week, and 2 8-hour shifts one day per week, with a small hoisting shift 3 8-hour shifts per week with crews alternating to receive 3 days per week, June 12th to September 11th.
- 2 8-hr. shifts, 5 days per week, and a small hoisting third shift with crews alternating to receive 5 days per week, September 11th to December 31st.
- 1938 2 8-hr. shifts, 6 days per week January 1st to April 16th, with 3 crews alternating to average 4 days per week; April 16th to June 1st, 5 days per week with 3 crews alternating to average 3 days per week.
- 1 8-hr. shift, June 1st to November 1st, 4 days per week, with 2 crews alternating each week to average 2 days per week. November 1st to December 31st, 5 days per week with 2 crews staggered to average 3 days per week. In last two schedules there was also a small hoisting crew on a second 8-hour shift.
- 1937 2 8-hr. shifts, 5 days per week, January 1st to April 17th, with a third 8-hour shift composed of a tramming and hoisting crew and approximately 16 mining contracts. April 17th to October 3rd, the same schedule as above with one extra 8-hour shift on Saturdays. October 3rd to December 6th, 5 days per week as from

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January 1st to April 17th. December 6th to December 31st, 2 8-hour shifts 6 days per week with the men alternating to average 4 days per week.

1936 1 8-hr. shift, 6 days per week, 2 crews working alternate weeks, January 1st to February 1st; 6 days and 2 nights per week with 2 crews averaging 4 days per week, February 1st to May 1st. 2 8-hour shifts 5 days per week with 1 extra 8-hour hoisting shift from May 1st through the balance of the year. Starting November 15th, a few mining crews were gradually added to this third shift. About October 1st the straight 8-hour shift was put into operation. Under this schedule the men take their lunches underground with them and relieve their opposite partners in the working places, thus having the entire 8 hours for work instead of losing part of their time in going to and from their working places. They do not take time out for lunch, arranging to eat when it does not interfere with their operation.

1935 1 8-hr. shift, 4 days per week, 2 crews working alternate weeks, January 1st to February 11th. Six days per week, 2 crews working each 3 days from February 11th through balance of year.

g. Delays
Electrical

<u>Date</u>	<u>Shift</u>	<u>Duration</u>	<u>Loss In Product</u>	<u>Cause</u>
Jan. 5th	Day	1 $\frac{1}{2}$ hr.	150 tons	No current.
April 17th	Day	1 $\frac{1}{4}$ hr.	125 tons	No current on account of very severe sleet storm.
April 18th	Both	24 hrs.	None	No current on account of very severe sleet storm. Tonnage made up by working following Saturday.
July 12th	Af'noon	16 hrs.	None	Rotor of the skip hoist motor burned out but it was found only one coil was gone and this was shunted and mining resumed on the 13th. A new rotor was ordered to replace the old one as this was the second burn out in 6 weeks. The motor is 19 years old. No loss of tonnage as the time was made up.
Nov. 14th	Night	1 hr.	100 tons	Skip hoist motor heated up.
Dec. 14th	Af'noon	1 $\frac{1}{2}$ hrs.	150 tons	Current was low due to apparent overload in haulage system.

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g. Delays (Cont.)Non-Electrical

<u>Date</u>	<u>Shift</u>	<u>Duration</u>	<u>Loss In Product</u>	<u>Cause</u>
Feb. 20th	Both	24 hrs.	None	Straightening discharge column in shaft and welding leaks. Started job February 18th but did not complete until February 21st. Tonnage made up by working following Saturday.
Mar. 28th	Day	2 hrs.	200 tons	Cage jammed in shaft due to shifting of load of plank.
April 13th	Day	3/4 hrs.	77 tons	Welding leak in discharge pipe.
May 24th	Night	1 hr.	None	Repairing measuring pocket on 5th Level.
Sept. 28th	Day	1 1/2 hrs.	150 tons	Runners loose in shaft.
Oct. 27th	Night	1 hr.	100 tons	Chunk of ore stuck in measuring pocket.
Nov. 21st	Day	1/2 hr.	60 tons	Repairing skip.
Dec. 30th	Day	3 hrs.	150 tons	Skip stuck in dump.

3. ANALYSISa. Average Mine Analysis on Output

<u>Grade</u>	<u>1939</u>				<u>1938</u>			
	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Sul.</u>
Maas Bessemer	62.15 ✓	.047	6.68	.016	62.05	.046	6.73	.016
Maas	61.05 ✓	.079	7.69	.017	60.61	.075	7.85	.015
Race Course Bess.	62.93 ✓	.047	6.02	.022	62.59	.044	6.34	.018
Race Course	61.85 ✓	.072	7.46	.018	60.45	.072	8.10	.016
Maas Special	60.66 ✓	.084	7.21	.094	59.65	.077	6.86	.075
Race Course Special	61.60 ✓	.058	6.90	.103	61.58	.054	5.63	.102
R. C. Bess. Spcl.	61.60 ✓	.046	7.38	.107	62.84	.047	5.43	.118
Maas Bess. Special	61.70 ✓	.042	6.98	.043				

b. Average Mine Analysis on Ore Shipped

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Alum.</u>	<u>Mang.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Maas & R. C. Bess.	62.70	.042	6.07	2.40	.20	.39	.17	.016	1.20	11.43
Maas & Race Course	60.70	.076	8.33	2.38	.21	.55	.18	.015	1.52	11.70
Maas & R. C. Special	61.60	.057	7.04	2.37	.20	.47	.14	.115	1.45	11.75
Maas & R. C. B. Spcl.	61.50	.047	7.50	2.35	.21	.48	.15	.080	1.25	11.50

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c. Average Analysis on Straight Cargoes

	<u>Mine</u>			<u>Lake Erie</u>		
	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Iron</u>	<u>Phos.</u>	<u>Moist.</u>
Lake Bessemer (Maas & Race Course Bessemer)	62.75	.043	5.99	62.67	.043	10.39
Maas (Maas & Race Course Non-Bessemer)	60.68	.074	8.10	60.59	.072	11.13

e. Average Analysis of Ore in Stockpiles

Average Natural Analysis

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist</u>
Maas Bessemer	55.50	.042	5.34	.19	2.08	.35	.13	.013	.89	11.39
Race Course Bess.	55.45	.040	5.93	.19	2.08	.36	.22	.016	.89	11.27
Maas	53.88	.066	7.39	.19	2.16	.49	.18	.012	1.33	11.23
Race Course	53.61	.062	7.08	.19	2.15	.42	.15	.014	1.34	11.55
Maas Special	53.17	.105	5.31	.19	2.08	.48	.16	.115	1.32	12.60
Race Course Spl.	53.50	.058	6.51	.19	2.30	.41	.24	.102	1.75	12.46
R. C. Bess. Spl.	55.23	.040	5.78	.20	2.08	.35	.15	.180	1.07	11.12

4. ESTIMATE OF
ORE RESERVES

a. Developed Ore

Assumptions: 12 Cu. Ft. equals one ton.
10% deduction for rock.
10% deduction for loss in mining.

<u>Location</u>	<u>Race Course</u>		<u>R.C.Cem.</u>	<u>B.K. Road</u>		<u>C.C.I.Co.</u>	<u>Total</u>
	<u>Lease</u>	<u>Maas Lease</u>		<u>Lease</u>	<u>City of Neg.</u>		
Above 3rd Level	35,194	645,340	177,981	4,904	45,096	908,515	
3rd to 4th Levels	239,417	3,182,099	5,588	26,760	110,413	3,564,277	
4th to 5th Levels	1,279,396	1,941,058		59,740	27,542	3,307,736	
Total above 5th Level	1,554,007	5,768,497	183,569	91,404	183,051	7,780,528	
Below 5th Level	774,062	316,146				1,090,208	
Grand Total	2,328,069	6,084,643	183,569	91,404	183,051	8,870,736	
Less 10% Mining Loss	232,807	608,464	18,357	9,140	18,305	887,073	
Balance	2,095,262	5,476,179	165,212	82,264	164,746	7,983,663	
Less 10% for Rock	209,526	547,618	16,521	8,226	16,475	798,366	
Balance	1,885,736	4,928,561	148,691	74,038	148,271	7,185,297	
Less Dec. 1939, Prod.	9,095	36,172	2,524	350		48,141	
Net Total, 12-31-39	1,876,641	4,892,389	146,167	73,688	148,271	7,137,156	

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a. Developed Ore (Cont.)

INCREASE IN ORE RESERVES

There was an increase in the estimate of ore reserves of 386,274 tons over the 1939 production and this is explained in detail as follows:

	<u>Maas</u>	<u>Race Course</u>	<u>Total</u>
Above 3rd Level	70,003	7,200	62,803
3rd to 4th Levels	51,747	3,777	47,970
4th to 5th Levels	226,121	49,380	275,501
Total	<u>347,871</u>	<u>38,403</u>	<u>386,274</u>

There was an increase in the ore reserve estimate over the production for 1939 on all three levels but mostly in the area between the Fourth and Fifth Levels. The increase above the Third Level was due to the cutting out of several jasper pillars and a Western extension of the ore body in the East footwall pillar. The increase between the Third and Fourth was also accounted for by the reduction in the size of the jasper pillar East of the Race Course Lease. There was a decided extension to the North of the ore in the Race Course Lease below the Fourth Level and a flattening of the hanging to the Southwest of the Race Course, as well as to the South of the dike, which accounted for the large increase in the Maas Lease between the Fourth and Fifth Levels. The percentage of Bessemer was reduced from 6.7 to 6.05 as the actual percentage mined during 1939 was 10.5 and there was very little new Bessemer areas proved up this year.

c. Estimated Reserve Analysis

<u>Natural Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist</u>
Maas & Race Course										
Bessemer	54.00	.040	5.60	.180	2.00	.700	.200	.012	1.00	11.50
Maas & Race Course										
Non-Bessemer	53.00	.070	7.20	.190	2.20	.800	.240	.012	1.70	12.00

d. Estimated Production

The following is the estimated tonnage and expected analysis, by grades, of the 1940 production from the Maas Mine on an operating schedule of 5 days per week, 2 straight 8-hour shifts and one small hoisting shift.

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d. Estimated Production (Cont.)

<u>Grade</u>	<u>Estimated Production</u> <u>5 Day per Week Basis</u>
Maas & Race Course Bessemer	74,000 tons
Maas & Race Course Non-Bessemer	596,000 "
Maas & Race Course Special	60,000 "
Maas & Race Course Bessemer Special	10,000 "
Total	<u>740,000 tons</u>

Expected Analysis of Above Tonnages

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist</u>	<u>Iron</u> <u>Natl.</u>
Maas & Race Course Bessemer	62.50	.043	6.50	.22	2.30	.60	.20	.015	1.00	11.25	55.47
Maas & Race Course Non-Bessemer	60.50	.080	8.30	.22	2.40	.85	.25	.015	1.80	11.75	53.69
Maas & Race Course Special	61.00	.070	7.70	.22	2.40	.85	.25	.200	1.80	11.75	54.13
Maas & Race Course Bessemer Special	61.50	.043	7.30	.22	2.30	.85	.20	.200	1.00	11.25	55.47

5. LABOR & WAGES

a. Comments

1. Labor

There were only three times during 1939 when it was necessary to make any important changes in the personnel of the Maas Mine employees; the first being in March when seven of the older employees who had reached 65 years of age and had worked 25 years or more for the Company were retired on a special allowance and these vacancies were filled with younger and more efficient men. The second change took place when the stockpile loading and crushing of ore became very intensive which, due to the fact that our regular men were working 40 hours per week and it was not desired to pay them overtime, made it necessary to hire some ten young men for this purpose. In November of this year it was decided to increase production by adding more contracts on the regular shifts and as soon as the new equipment arrived in December, these same men were transferred underground as their work on surface was completed. There was very little temporary employment outside of the steam shovel and crusher men as the regular very small crew of carpenters and painters did not have to be increased to any extent this year.

Six employees died during the year and were replaced with former employees.

All of the men added to the force this year were requisitioned by the Employment Department from those laid off in June, 1938, in

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5. LABOR & WAGES

1. Labor (Cont.)

accordance with their seniority and dependants.

The average age of the employees at the end of the year was 41, the same as last year despite the fact that seven of the older men were retired and six of the older employees died during the year. There remained eleven men 65 years of age or older on the pay roll December 31, 1939.

There was no change in the wage scale during 1939.

Those employees who had worked for the Company for five years or more received four days vacation with pay during the week of August 13th, the mine being idle during the vacation period and the men who were not eligible for vacations made up their lost time the previous week as the mine was only operating on a three day per week schedule. A total of 286 men received their vacation pay, this being 75% of the total employed.

There were no safety bonuses paid to the men in 1939, it being decided that these former methods of prizes and lotteries were not accomplishing the desired results. The bonus to bosses was kept up however, with the addition of the penalty clause which was used to considerable extent, being applied from the reports by the Safety Inspector and Superintendent. The fact that the penalties were less toward the last of the year proved that more care was being taken by the foremen and men.

2. New Construction

Work was carried out during 1939 on the following E & A's:

- No. 689 Moving 30 houses to the Cleveland-Cliffs Iron Co. Second Addition.
- " 783 New larry car system of top tram.
- " 808 & 808A One test hole, No. 2 well and increasing capacity of No. 1 well.
- " 826 Purchase of two 20 H.P. Scraper Hoists for new transfer systems underground.
- " 831 Purchase of Westinghouse rotor and coupling for replacement on skip hoist motor.
- " 852 Purchase of new equipment to increase production.
- " 855 Sinking of 5 test holes on surface by Layne North-West Company.

All E & A's will be taken up in detail under No. 12, "New Construction and Proposed New Construction".

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5. LABOR & WAGES

b. Comparative Statement of Wages & Product

	<u>1939</u>	<u>1938</u>	<u>Increase</u>	<u>Decrease</u>
Product	517,899	423,570	94,329	
Number of Shifts & Hours				
2 8-hour	230	237		7
<u>AVERAGE NO. MEN WORKING</u>				
Surface	64	77		13
Underground	388	339	49	
Total	452	416	36	
<u>AVERAGE WAGES PER DAY</u>				
Surface	5.63	5.61	.02	
Underground	6.27	6.31		.04
Total	6.16	6.16		
<u>AVERAGE WAGES PER MONTH</u>				
<u>2.9 Days per Week 1938</u>				
<u>4.4 Days per Week 1939</u>				
Surface	107.48	88.82	18.66	
Underground	111.54	85.56	25.98	
Total	110.87	86.17	24.70	
<u>PRODUCT PER MAN PER DAY</u>				
Surface	35.31	28.95	6.36	
Underground	7.49	7.68		.19
Total	6.18	6.07	.11	
<u>LABOR COST PER TON</u>				
Surface	.160	.194		.034
Underground	.837	.822	.015	
Total	.997	1.016		.019
<u>AVERAGE PRODUCT MINING</u>				
Stoping	17.46	19.12		1.66
Ore Development	8.77	10.57		1.80
Total	17.20	18.66		1.46
<u>AVERAGE WAGES CONTRACT LABOR</u>				
	6.558	6.764		.206
<u>TOTAL NUMBER OF DAYS</u>				
Surface	14,667 ³ / ₄	14,628 ³ / ₄	3939	
Underground	69,160 ³ / ₄	55,157 ³ / ₄	14,003	
Total	83,828 ³ / ₄	69,786 ³ / ₄	14,042	
<u>AMOUNT FOR LABOR</u>				
Surface	82,544.97	82,070.23	474.74	
Underground	433,656.86	348,081.43	85,575.43	
Total	516,201.83	430,151.66	86,050.17	

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5. LABOR & WAGES

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

AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL

	1939	1938	Increase
Surface	104.67	86.06	18.61
Underground	110.95	84.99	25.96
Total	110.73	85.18	25.55

Proportion of Surface to Underground Men

- 1939 - 1 to 5.1 1 8-hour shift, 4 days per week, and 2 8-hour shifts 1 day per week, with a small hoisting shift 3 8-hour shifts per week with crews alternating to receive 3 days per week, January 1st to January 9th. 2 8-hour shifts, 4 days per week, and a small hoisting third shift with crews alternating to receive 4 days per week, January 9th to June 12th. 1 8-hour shift 4 days per week, and 2 8-hour shifts one day per week, with a small hoisting shift 3 8-hour shifts per week, with crews alternating to receive 3 days per week, June 12th to September 11th. 2 8-hour shifts 5 days per week, and a small hoisting third shift with crews alternating to receive 5 days per week, September 11th to December 31st.
- 1938 - 1 to 4.4 2 8-hour shifts, 6 days per week, from January 1st to April 16th, with a third 8-hour shift composed of a tramping and hoisting crew and approximately 16 mining contracts. April 16th to June 1st, the time was decreased to two days per week with the same crews. On June 1st the third shift mining crew was laid off and until November 1st operated 1 8-hour shift 4 days per week with a very small haulage crew on the second shift, the two crews alternating each week so that the men received only 2 days per week average. November 1st to December 31st, 1 8-hour shift 4 days per week and 2 8-hour shifts 1 day per week with staggered crews receiving 3 days per week.
- 1937 - 1 to 5.2 2 8-hour shifts, 5 days per week, from January 1st to April 17th with a third 8-hour shift composed of a tramping and hoisting crew and approximately 16 mining contracts. April 17th to October 3rd, the same schedule as above with one extra 8-hour shift on Saturdays. October 3rd to December 6th, 5 days per week as from January 1st

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5. LABOR & WAGES

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

Proportion of Surface to Underground Men (Cont.)

to April 17th. December 6th to December 31st, 2 8-hour shifts, 6 days per week with themen alternating to average 4 days per week.

1936 - 1 to 5.9 1 8-hour shift 6 days per week, 2 crews working alternate weeks, January 1st to February 1st. Six days and 2 nights per week with 2 crews averaging 4 days per week, February 1st to May 1st. Two 8-hour shifts, 5 days per week with 1 extra 8-hour hoisting shift from May 1st through the balance of the year. Starting November 15th, a few mining crews were gradually added to this third shift.

1935 - 1 to 4.9 4 days per week, 2 crews working alternate weeks, January 1st to February 11th. Six days per week, 2 crews working each 3 days, from February 11th through balance of year.

6. SURFACE

a. Buildings, Repairs

The only repair work done on the mine buildings during 1939 was that of renewing the roofs on two of the small store sheds used for tools and electrical supplies. However, it was planned to put a new roof on the dry and an authorization was obtained, but it was decided to hold this off until spring as the weather was too uncertain. There was a considerable amount of work put in on the shaft house, repairing the loading pockets in which both the steel supports and wood lining were in very bad shape. New channels and "I" beam supports were installed in two of the pockets, after which complete new pockets and lining plates were put in place. The other two auxiliary pockets used for loading extra grades of ore are also in poor shape and will be repaired before shipping starts next year. The partition between the skip and cage compartments from the top landing to surface was formerly made of planks covered with gunnite and as these had become rotten and were a source of danger, they were replaced with steel plates similar to the construction above the landing and the cage compartment was also enclosed with ferro board from surface to the landing so that this compartment can be shut off in the winter and prevent freezing in the shaft. The doors on top of this compartment have to be at the landing instead of on surface as it is often necessary to bring the cage to surface for supplies too long to handle in the tunnel.

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6. SURFACE

b. Location Dwelling Repairs

There were no extensive repairs to the rented houses during 1939 as only the necessary minor repairs were performed and most of the Negaunee district summer crew of carpenters and painters were used on the main office and other work in the Ishpeming district. The only work in the Cleveland-Cliffs Iron Company Second Addition was the staining of the fences, while the proposed painting of the second coat on the houses still uncompleted was left for next year on account of the painters being employed so long in Ishpeming.

On December 31st, 1939, the Maas Mine owned 125 dwellings, an increase of five as compared with 1938.

Single Family Houses	93
Two " "	24
Three " "	3
Four " "	2
Legion Club	1
Store	1
Church*	1
Total	125

*This church will probably be moved to its new position in the Cleveland Cliffs Iron Company Second Addition during 1940.

The following houses were sold during 1939:

C.C.I.Co. 1st Addition

<u>House No.</u>	<u>Address</u>	<u>Lot</u>	<u>Block</u>	<u>Purchaser</u>	<u>Date</u>
121	554 Elm St.	14	1	Nick Tasseris	7-15-39

The following houses were purchased during 1939, all located in the Pioneer Iron Company's Plat:

<u>House No.</u>	<u>Address</u>	<u>Lot</u>	<u>Block</u>	<u>Purchased From</u>	<u>Date</u>
185	323 E. Main	6 & 7	31	L'Hillier Estate	10-7-39
186	319 Peck St.	5	33	Lequia Estate	10-25-39
187	319 $\frac{1}{2}$ Peck St.	5	33	" "	10-25-39
188	307 Peck St.	2	33	" "	10-25-39
189	305 Peck St.	2	33	" "	10-25-39
190	305 $\frac{1}{2}$ Peck St.	2	33	" "	10-25-39

In addition there was a house and lot purchased from the Dionne Estate situated at Lot 1, Block 1, Gaffney Addition, in the area from which the houses were moved to the Cleveland-Cliffs Iron Co. Second Addition, but the house remains the property of the former owners until October, 1941, with the proviso that they remove it before that date.

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6. SURFACE

b. Stockpiles

The grading of the new stockpile grounds Southeast of the shaft, started last year, was continued during September and October of this year by using a small tractor steam shovel loading from the old rock pile East of the steel trestle into trucks and filling the gulley just East of the new Southeast trestle. With the completion of this work it is possible to extend the trestle a total of 1300 feet from the shaft and at the same time the excavation of the rock has made it possible to extend the loading tracks beyond the steel trestle and thus facilitate the removal of the ore at the extreme East end of the stocking grounds. It is intended to remove the ore of Maas grade from the Southeast trestle next year provided the amount of shipping makes this possible and then keep this trestle for the Special grades only as with only a small space available as there was this year, it was necessary to dismantle and reerect the trestle twice during the shipping season, thus increasing the cost and further delaying the handling of the various grades at the shaft house. With this one trestle used entirely for Special grades of ore, it will be possible to load from the East end and thus maintain the West end and permanent approach at all times.

The Maas and Race Course piles lying West of the shaft were sufficiently cleaned to allow the erecting of two single track wooden trestles 100 feet apart, which will be ample for the stocking of these grades during the winter months and also the wet ore in the shipping season, especially as there is room for approximately two months stocking of Race Course on the steel trestle. There is also ample capacity on the steel for the two Bessemer grades.

While the total stocking grounds at the Maas Mine are fully capable of stocking some 700,000 tons, there has to be so many gaps left between grades that the available space will only accommodate approximately 550,000 tons unless the space between two piles is filled by scraper at considerable extra cost and this is only possible where two piles of like grade lie adjacent to each other.

All the trestles except the Southeast and Southwest were electrified for the use of the larry car system and the track gauge was changed from 30" to 36" to make a more stable unit. A third rail consisting of a twenty pound rail mounted on the ties just outside of the regular rail and supported by porcelain insulators is used for the return current, except close to the shaft house where an overhead trolley has to be used on account of the spillage of ore from the shaft pockets which would cover the third rail and break the current. These larry cars are made of aluminum alloy and carry a $9\frac{1}{2}$ H.P. D.C. motor with electrically operated brakes, all controlled by an operator in the shaft house. This new installation should be a great improvement over the old system as it does away with all the pulleys, rollers and sheaves as well as some 15,000 feet of rope used to operate the former cars. A 40 H.P. motor was required to

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6. SURFACE

b. Stockpiles (Cont.)

move the old cars as the weight of the rope and the consequent friction increased the load.

There were only two grades of ore cleaned up from stockpile during 1939 which resulted in a total overrun of 3,812 tons of Race Course Special and 81 tons of Maas Special, of which only 848 tons were credited to this year, the balance of 3,045 tons being called previous years overrun. At the end of the year there was a total of 375,340 tons of all grades in stock, including an estimated 58,000 tons of overrun, of which 24,000 was accumulated during the last summers stocking.

c. Tracks, Roads, Etc.

There was no new work done in connection with roads and tracks during 1939 except the regular maintenance. However, during the summer it was found that the sewer in the dry was blocked and upon looking into the occasion for this it was found that although a new main sewer had been laid in the rear of the dry some years ago, its only connection with the dry was by means of a very flat line running the full length of the front of the building and then around one end and back to the main line. This was much longer than necessary and consequently had very little grade, so it was abandoned and new cross lines put in direct to the center of the dry from the main line, which well warranted the expenditure as it is now possible to wash out the building without any backing up of the water.

d. Timber Yard

There were 110 railroad cars of various kinds of mine timber unloaded during the year which showed a decrease as compared with 1938, although the product for this year was much larger, and this was due to the fact that more timber is being brought in by trucks direct from the woods. As the unloading of these trucks in the timber yard during the winter when the snow is very deep is very difficult, a short ramp was prepared leading up to the railroad track where the cars are unloaded and a portion of this blocked off so that the trucks can be unloaded from this extra height with much less trouble and at the same time this gives a greater capacity of logs without increasing the area.

e. Drainage

The results of the surface pumping of water from the ledge have been somewhat disappointing, although as more knowledge of the action of these wells is obtained, it would appear that no immediate results can be expected unless they are very close to the point where the ledge is broken due to mining above. The resultant gradient from the bottom of the well is fairly steep and

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6. SURFACE

e. Drainage (Cont.)

therefore the only immediate result is the lowering of the head on the water generally in the area and before it can be cut off from entering the mine there will have to be more wells and a considerably longer lapse of time.

The pump in No. 1 well only operated 187 days during 1939, pumping approximately 250 gallons per minute, while the pump in No. 2 well, which was started on August 4th of this year, has been in constant operation at the rate of 550 gallons per minute, which is only 50 gallons per minute above the minimum expected by the Layne Northwest officials from the data obtained when sinking the well. The water from this pump has, however, been very clear and therefore the pump has operated continuously while the sand continues to cut the impellers and bearings of the pump in No. 1 well to a great extent, it having had to be pulled and repaired four times during the year.

The water level in the various test wells on the property shows a general lowering of from 15 to 20 feet and if this drop increases a like amount each year, it should not be long before a noticeable decrease should be apparent underground. However, a new well has been sunk near the East end of the Maas-Negaunee cave on the Negaunee Mine property and in the preliminary tests pumped approximately 400 gallons per minute which should show results very quickly, it being much closer to the break in the ledge. Test holes are also being put down along the Western edge of the cave and it is planned to put wells in the most favorable of these with the expectation that more immediate results will be obtained underground. At the end of the year two of these test holes had been drilled and at least three more will be put down early in the year.

Wiers were installed on all of the levels whereby it is possible to locate any change in the amount of water in any particular area, but the total of 1,225 gallons per minute has remained fairly constant during the entire year and the small variations were evidently seasonable rather than due to any surface pumping. The decrease in the average gallons per minute as shown later in the report, from data obtained by the Mechanical Department based on the power consumed by the pumps, is due to increased efficiency of the pumps, a large program of sump cleaning whereby the pumps are pumping clearer water, a general overhaul of all the pumps and repairs to the discharge column which had been leaking very badly and had to have its supports renewed and strengthened in the shaft before the leaks could be welded in such a manner that they would hold.

The Layne Northwest Company has undertaken to increase the flow in No. 1 well and cut out the fine sand entering the well by

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6. SURFACE

e. Drainage (Cont.)

removing the old screen, drilling some 15 or 20 feet into the ledge, installing new screen and regraveling. Up to the present time they have been unable to remove all of the old screen and therefore this well is not producing but it is hoped that they will soon find some method that will be successful so the pump can be again installed with an increased capacity.

7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking in 1939 but it is expected that either the shaft will be sunk further or a winze put down near the North footwall in order to open the Sixth Level sometime in 1940, as the workings above the Fifth Level are just reaching a point where further mining from the Fifth would be impossible.

b. Development

There was an average of four contracts on development during 1939, the work being mostly raising, as there were only two drifts, one in ore and one in rock, driven during the year.

Third Level

In the East Footwall Pillar above the Third Level, a transfer drift was driven on the 345' Sub, 30' above the floor of the Third Level, from No. 107 Raise South 160' and two raises were put up to the East, encountering the hanging at +420' in the most Northerly one and at +408' in the other. The purpose of this transfer is to remove the ore in this vicinity which is too far from the footwall drift for economical mining and where a Third Level Cross-Cut could not be driven on account of the old crushed drifts and cross-cuts in this area. It will also be possible to mine from these transfer raises with fairly dry workings as a drift from the old footwall raises driven along the footwall on each sub level should drain off the water.

The only other development on this level was the extension of No. 300 Raise put up from the Fourth Level some 30' to the 345' Sub Level, where the hanging was encountered.

Fourth Level

Raising continued in No. 4000 Cross-Cut 340' East of and parallel to the East boundary of the Race Course by one contract, completing No. 4020 Raise to the 215' Sub 100' above the Fourth Level where the hanging was encountered. About the same time as this raise was completed it was found that this new Cross-Cut put in last

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7. UNDERGROUND

b. Development (Cont.)
Fourth Level (Cont.)

year and most of the new raises were crushing so badly that mining here was impossible and therefore all the contracts were removed and two crews of two men each were put on three shifts per day re-timbering the cross-cut. The pressure here was probably occasioned by the weight of the unmined pillar of ore and the jasper hanging above which could not be undercut quickly enough on a curtailed production schedule such as has been in effect the last year and a half. When this cross-cut has been retimbered and the mining contracts restored, it is hoped that one or two sub levels can be mined very quickly and then the pressure should be removed from this area.

The other development from this level was that of putting up No. 300 Raise in the Northwest footwall and cutting out a transfer drift on the 200' Sub Level approximately half way between the Fourth and Third Levels, extending this raise to the Third Level, driving the transfer drift West 200' in the footwall and also putting up another transfer raise to the Third Level. One more raise will be put up here early next year to complete this transfer system, which was necessary on account of the very flat dipping footwall making it impossible to reach the ore above direct from the Fourth Level without extensive rock drifts and raises, the cost of which would have been prohibitive.

Late in the year it was decided to place a diamond drill on this Sub Level to explore to the Southwest in order to ascertain if there was any extension of the ore body to the West beyond the limits shown up at present on the Fourth Level below. Some 85' of ore was found which partly proved the theory that the supposed hanging wall on the Fourth Level North of the dike was only a dropper and not the true limit of the enriched formation. The hole will be continued to a depth of approximately 300' to prove whether or not the ore found on the Fifth Level extends to this elevation. This preliminary drilling will make it possible to lay out the new main level drifts and raises on the Fourth Level more economically. It has also been planned to cross section the ore body below the Fifth Level, both in the main area and in the ore body North of the dike, to prove the grade of this lower horizon and thus determine as to whether or not it is desirable to open a lower level.

Fifth Level

No. 3 Cross-Cut started in March of last year, was completed and holed into the South footwall drift, being in the East footwall for the entire distance. Three raises were put up to the Fourth Level and above to various heights where mining was in progress, and at the end of the year one contract was still raising here. Raise No. 5614 in No. 6 Cross-Cut was also completed this year.

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7. UNDERGROUND

b. Development (Cont.)
Fifth Level (Cont.)

Detail of the development is as follows:

<u>Location</u>	<u>Ore Drifting</u>	<u>Ore Raising</u>	<u>Rock Drifting</u>	<u>Rock Raising</u>
345' Sub Level		149		
Third Level	50	76		
200' Sub Level			38	
Fourth Level		337		46
Subs Above Fifth Level		47		
Fifth Level		703	111	112
Total	50	1,312	149	158

c. Stoping
General

Mining was continued throughout the year 1939 at the Maas Mine in the same four general areas as in the preceding year with an average of 37 contracts engaged in stoping on two shifts per day on a varied three, four and five day per week schedule, while a very large timber crew consisting of 55 men was required to maintain the main level drifts, raises and sub level traveling ways, as during the more curtailed working periods, the places had to be kept open so much longer before the pillars were removed. A large percentage of the mining was done under new hanging, either under jasper pillars within the ore body or new extensions of the hanging as mining progressed to lower elevations, and this necessitated an increased amount of time spent on blasting down rock for filling, close poling of the bottom and covering with wire netting to prevent the material coming through into the sub level below and causing delays through breakdowns.

The water conditions underground remained about the same although the total amount of water pumped shows a decrease due to repairs to the pumps and discharge column whereby the pumps have to operate less time; the inefficient centrifugal pumps used for emergencies are hardly ever operated and no water has to be repumped due to leaky discharge. Wiers were installed on all of the levels and the total thus obtained shows very little difference throughout the year. Nearly half of all the water comes in above the Third Level and yet this amount does not cause as much delay and difficulty as does that on the Fourth and Fifth, as it is mostly on the North footwall and can be cut off by driving a drift along the footwall its entire length and then mining the rest of the ore from raises to the South, whereby the subsequent drifts are at more or less right angles with the footwall and do not drain the water away from the footwall drift, thus keeping the balance of the ore dry.

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7. UNDERGROUND

c. Stoping
General (Cont.)

The water in the Fourth and Fifth Level areas, however, is disseminated through the broken hanging above the workings and so far it has not been possible to concentrate it in any one or two localities and thus drain the remainder. It seems to move around with subsequent breaks in the hanging causing one place to dry up while a new one becomes wet and there is just as much water on the hanging side of the ore body as on the footwall, thus making each contract a special drainage job. The only success so far has been to sometimes localize the water in the first slice from the raise and thus mine adjacent slices more or less dry; however, this does not always work and occasionally the water will follow the new workings completely around the raises for 360°. As has often been reported heretofore, this water causes a lot of delay, not only in the places where the miners have to wait until transportation is available to scrape directly into the cars, but at the shaft pockets and on surface besides, causing bust-outs at the chutes, washing ore and water in the form of mud onto the tracks where it blocks up the ditches, causing derailments and considerable extra time and expense to be cleaned up. In the last month over 300 cars of this mud have been shoveled by hand on the midnight shift on one level only.

As was mentioned in the introduction, another factor which increases the cost of tramping and causes numerous delays, especially on the Fifth Level where the condition is the worst, is that of having to separate so many different grades and royalties. About 90% of the two Bessemer grades and all of the Special and Bessemer Special ore comes from this level, which together with the Maas and Race Course, keep the shaft sampler and the motor crews constantly on the alert to best handle them so that, with only three pockets available, there is the minimum amount of delay. None of the other mines have more than two grades or royalties as compared to eight at the Maas and sometimes this fact is lost sight of when making cost comparisons. If the ore were all dry and a new level is opened from the shaft, it would then be possible to install large raises from the Fifth to the Sixth Levels where these different grades could be stored and removed only as additional space was required, but one of these conditions will probably never be fulfilled while the other is yet sometime in the future, and all that is possible at the present time is to hold the grades of smaller percentage inside in the chutes where their capacity allows until the midnight shift when their movement does not cause as much delay.

There has been an average of eight contracts mining on four elevations in the East footwall pillar above the Third Level. Mining at the end of the year had reached the 395' Sub Level, 85' above the Third Level, and has been mainly in the Maas and Roman Catholic Cemetery Leases with a small amount in the Cleveland-Cliffs Iron Company and American Mining Company strips. The ore is all of Non-Bessemer grade and in general this area, together with the West

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7. UNDERGROUND

c. Stoping
General (Cont.)

footwall pillar above the Third Level, obtains the best results in stoping, this being due to the fact that a greater percentage of the ore is dry and that only two grades or royalties of ore are handled on this level.

Two transfer systems had to be installed on this East pillar on account of the footwall raises being too far from the mining limit to the South and it was impossible to drive new cross-cuts on the Third Level as there are so many old crushed drifts already abandoned in this area.

In the West footwall pillar above the Third Level there have been three contracts mining on three elevations during the year in the Race Course, City of Negaunee and Maas Leases. Two of the contracts on the 345' and 355' Subs have had dry stoping conditions although the ore is somewhat hard, but the other on the Third Level near the old winze has encountered a lot of water and this, together with trying to recover the ore adjacent to the old winze which is badly crushed, has caused considerable trouble and delay. In the Western end it has been necessary to install a new transfer system as the formation is very flat, requiring an excessive amount of rock drifting and raising between the Third and Fourth Levels. A new East-West transfer drift has therefore been driven partly in ore and partly in the footwall halfway between the two levels with raises now being put up to the Third Level and above.

In the most Easterly of the three small mining blocks, above the Fourth Level and East of the Race Course Lease, the development was completed last year and two contracts started to mine but by the middle of 1939 this drift and the raises had become so badly crushed that mining was stopped temporarily and repair crews consisting of four men on each eight hour shift were employed to retimber. The crushing was probably due to this cross-cut being almost entirely in a pillar which had been cut off by previous mining and had not only the weight of the ore, but also that of the jasper hanging above. As soon as mining can be again started in this area, every attempt will be made to mine very rapidly on the top sub and cut off the weight of the hanging as soon as possible. Several lining sets of a new type are being tried out in this cross-cut and so far show no signs of crushing. They consist of five pieces of timber placed inside of the regular set in the form of an arch and therefore double the strength of the original timber.

In the middle block of this Fourth Level area, there has been an average of three contracts mining on the 160' and 170' elevations in the Northern end and four on the 140' and 150' Subs in the Southern part near the Negaunee boundary. This area is quite wet and mining is further retarded by the old covering being rotten

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7. UNDERGROUND

c. Stoping
General (Cont.)

and therefore breakdowns and rock runs are fairly frequent. When mining reaches the next elevation below, conditions should be very much be better.

In the first block East of the Race Course Lease, two contracts worked throughout the year mining on the 140' and 130' Subs, the latter being just above the Fourth Level, while the ore is scraped into raises from the Fifth Level. In this area the work on the 140' Sub was subject to the same difficulties as mentioned above but mining on the 130' Sub has been normal with good results. The ore in the three areas just mentioned has been mostly of Maas grade with a slight amount of Bessemer and the largest percentage came from the Maas Lease with a small amount from the City of Negaunee, Cleveland-Cliffs Iron Company and American Mining Company Leases.

There were approximately 17 contracts stoping in the main area below the Fourth Level and were divided about equally between the Maas and Race Course Leases with a small amount from the Cleveland-Cliffs Iron Company and American Mining Company Leases. Ores of all the different grades found at the Maas were mined in this area and as this is all handled on the Fifth Level together with most of that from above the Fourth Level, it made a very congested situation at the shaft. As soon as the block above the Fourth is reopened, contracts will be removed and this condition remedied. This area was also very wet in the Northern part above both Nos. 5 and 6 Cross-Cuts, while the contracts in the Southern part above No. 7 Cross-Cut and the South footwall drift had dry places. Above No. 7 Cross-Cut and also to the North above No. 6, there was considerable work done under new hanging and considerable extra work had to be done in special covering and blasting of rock filling to make a safe matt for future mining. Most of the mining was done on three elevations; namely, the 65, 75 and 90' Subs, with one contract on the 25' and 40' elevations. When the 25' Sub is completed, work in this area will have to stop temporarily as this is only 40' above the Fifth Level and further mining would result in the loss of the main level drifts which have to be maintained until the areas now being worked on the 65' Sub reach this lower elevation.

Subs Between the 2nd & 3rd Levels

East Footwall Pillar

425' Sub Level

Work in the Eastern end of this elevation was begun in November, 1936 and continued during 1937 and 1938 with the bulk of the ore being recovered from the Maas and Roman Catholic Cemetery Leases and a small amount from the Cleveland-Cliffs Iron Company and American Mining Company strips. During 1939 a maximum of four

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7. UNDERGROUND

c. Stoping (Cont.)

425' Sub Level (Cont.)

crews was engaged in mining out the few remaining pillars until at the end of the year, all of the ore on this elevation had been recovered.

Since it was originally opened up, this territory has been extremely wet, a condition which is very difficult to overcome and which complicates considerably all phases of the mining operation. The bulk of the ore recovered during 1939 was mined from the raises served by the transfer drift South of Raise No. 111 which was developed in 1937 and 1938. Without this transfer system the proper recovery of the ore to the South under the new hanging wall would have been impossible.

During December Contract No. 35 completed the recovery of a small pillar Northwest of No. 113 Transfer Raise and Contract No. 8 recovered two small pillars Southeast of Raise No. 1111, both in the Maas Lease.

415' Sub Level

Mining in this territory was started in the Eastern end in July, 1937, in the Roman Catholic Cemetery Lease and the Railroad Pillar and confined largely to those leases prior to the current year. During 1938 and 1939 additional crews were moved to this area from the sub level above which was becoming mined out and at the end of 1939 accommodated eight mining crews. Work throughout the year was carried on for the most part in the Maas Lease with a small amount in the Roman Catholic Cemetery Lease. Mining was done from the original raises in the North footwall drift and also from the transfer systems at Raises Nos. 111 and 107. This latter transfer system was developed during the current year and first used in the Western portion of this sub level. The extremely wet conditions which usually characterize this territory have not as yet been encountered since the bulk of the mining has been carried on to the South under the hanging wall and the driving of the North footwall drainage drifts has not yet been started.

The extension of the ore to the Southwest under the hanging wall is developing rather rapidly with every indication that the jasper capping will soon be cut off at the old mining limit to the South. Due to the fact that a large proportion of the work is now being mined under this new hanging wall, considerable expense has been incurred in placing double pole covering, heavy fencing wire and taking other precautions which are necessary under such conditions. At the end of the current year the reserves at this elevation were about 65% mined out with the remainder lying for the most part in the Maas Lease with two small pillars in the Roman Catholic Cemetery.

For the purpose of record, the activities of the eight mining contracts

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7. UNDERGROUND

c. Stoping (Cont.)

415' Sub Level (Cont.)

in December are listed below:

- Contract No. 3, a newly formed contract, moved to Raise No. 1073 late in the month and drove a drift to the North toward Raise No. 1071.
- Contract No. 5 drove a drift South from Raise No. 1071 toward No. 1073 and completed a long drift and a short slice to the West.
- Contract No. 8 moved to Raise No. 1115 in the last half of the month and drove a drift to the North to No. 1111.
- Contract No. 2 was slicing Southeast of Raise No. 115.
- Contract No. 9 was slicing Southwest of Raise No. 1113.
- Contract No. 7 was slicing Northwest of Raise No. 114.
- Contract No. 29 finished slicing West of Raise No. 116 and moved to Raise No. 119 on the 401' Sub Level.
- Contract No. 35, after completing the work on the 425' Sub Level above, moved down to Raise No. 113 at this elevation and started a drift to the West.

All of the December work was in the Maas Lease.

401' Sub Level

Mining in this territory at this elevation was originally started a good many years ago and partially mined by small drifts before the ore body had been developed to its full height. Since that time, several intermediate sub level connecting drifts have been driven for the purpose of traveling and ventilation, most of which have subsequently been crushed and filled, as have the original mining drifts. The present mining campaign was started in July, 1938, and continued through 1939 with two contracts working at Raises Nos. 119 to 122, inclusive, in the Roman Catholic Cemetery and the Maas Leases and the Railroad Pillar. The presence of the above mentioned old workings complicated present day mining considerably since the drifts and slices frequently encounter old timber and ore contaminated with rock.

The work for 1939 consisted of the recovery of all the ore available from Raises Nos. 120 to 122, inclusive, and was being continued in December with a single crew, No. 29, which was making preparations to drive a new connection West from Raise No. 119 to No. 116. The extension of the ore to the South under the jasper capping continues to be evident at this elevation, at one point extending out to within 15 feet of the old mining limits.

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7. UNDERGROUND

c. Stoping (Cont.)

395' Sub Level

The conditions described on the 401' Sub Level apply also to future work at this elevation with the exception that the old mining drifts are not quite as numerous or extensive as those on the Sub Level above. The present mining campaign at this elevation was started in November of this year by Contract No. 6, which cut out in the top of Raise No. 122 in the Railroad Pillar and drove a drift connecting with Raises Nos. 121, 120 and 119 in the Roman Catholic Cemetery Lease. Work for December consisted of the completion of this connecting drift and the driving of a long mining drift to the Southwest of Raise No. 121, also in the Roman Catholic Cemetery Lease.

345' Sub Level

The only work done at this elevation during 1939 was the driving of a sub level transfer drift to the South of Raise No. 107. Two mining raises (1071 and 1073) have been completed to date on the East side of this transfer drift and a small amount of mining done from them on the 415' Sub Level. The extension of the ore to the South, which was discussed previously, made this transfer system necessary since the original raises are too far North to permit recovery of these additional reserves. Other raises will be put up to mine further extensions of this ore to the South.

Considerable difficulty was experienced in maintaining the timber in this new transfer drift which had to be completely retimbered before raising could be started. While the weight continues to be very great, it is probably not now as extreme as when the drift was originally opened.

Third Level

The only work done on the Third Level elevation in the East Footwall Pillar during 1939 was the continuation of mining operations North and East of Raise No. 4002 in the supporting pillar around the old winze, which was started in October, 1938. This work has progressed very slowly due to the large amount of water flowing into the working place from the hanging, a condition which necessitates scraping directly into the cars on the Fourth Level. Another condition which materially slows up operations is the presence of the old Third Level drifts and the opening around the old winze which, as nearly as possible, was filled by dumping the ore into it.

Operations during December were merely a continuation of mining to the Northeast by Contract No. 12 in the last small pillar remaining at this elevation. On the next sub level below it is hoped that the second Raise, No. 4004, which was stopped short of this elevation in hanging wall Jasper, can be utilized.

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7. UNDERGROUND

c. Stoping (Cont.)

West Footwall Pillar

375' Sub Level

Work in the small ore body at this elevation was almost entirely completed during 1937 and 1938, with the exception of a small pillar in the Northwest corner lying along the footwall. Recovery of this pillar was effected by means of a short raise in the end of the original mining drift, which was driven Northwest from Raise No. 8W on the 355' Sub Level immediately below. The extent of this pillar was disappointingly small since it was barely wide enough to accommodate a single mining drift which was driven Northwesterly from the top of the raise. The work was in the Race Course Lease.

355' Sub Level

This Sub Level was originally opened up several years ago from Raises Nos. 3W, 1E and 2E and a small amount of ore mined to the Southwest of Raise No. 2E. As was explained in the report for 1938, mining was stopped on the discovery that the ore rose to a much higher elevation in its Northwesterly extension. Subsequent to the mining of the ore above this elevation, work was again started from Raise No. 5W in 1938 and continued through the greater portion of the current year. By far the bulk of the ore was mined in the Race Course Lease from Raises Nos. 5W and 8W, with a small amount to the Southwest of Raise No. 1E in the Maas Lease and City of Negaunee strip. At the end of the year, all recoverable ore on this elevation had been mined and the two crews had been moved to the 345' Sub Level below.

As has been previously mentioned in a number of reports, the size of this small ore body is continually decreasing due to the flat dip of the footwall and the abnormal steepness of the hanging wall. A slight indication of flattening in the hanging wall was observed on this elevation Southwest of Raise No. 1E.

345' Sub Level

With the exception of a small amount of slicing which was done at this elevation prior to 1935 in the vicinity of Raise No. 2E, all of the mining was done during the current year. For the most part two crews were engaged, one working from Raises 1E and the new Raise, No. 300, and the other from Raises Nos. 5W and 8W. There is apparently a small horse of jasper separating the ore in Raise No. 5W from the ore around No. 300, which has the effect of making two separate mining territories in this small ore body.

During December, Contract No. 10 did a small amount of exploration work to the West of Raise No. 300 in lean ore and jasper, completed the recovery of two small pillars and moved to Raise No. 1E on the 335' Sub below. Contract No. 11 was slicing in the last pillar

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7. UNDERGROUND

c. Stoping (Cont.)

345' Sub Level (Cont.)

remaining between Raises Nos. 5W and 8W. The work for the most part was in the Race Course Lease with a small amount in the City of Negaunee strip and the Maas Lease. At the end of the year the reserves at this elevation were approximately 90% mined out.

The very steep angle of the hanging wall jasper on this elevation creates a condition which requires very careful handling, namely, the breaking of a sufficient amount of this material to provide safe filling as mining progresses downward. On several sub levels prior to the 345' Sub, a few long holes were blasted simultaneously with the timber in the hope that this would provide a sufficient amount of filling. Subsequently it was found that the jasper was so hard that it refused to break off and come down in the proper manner with the result that insufficient filling was obtained. Above the sub level in question, a considerable amount of work was done prior to the end of the year and was being continued into 1940. This work consisted of the putting up of a small raise in the hanging wall just South of Raise No. 300 from which it is planned to drive a bench along the edge of the hanging wall and to blast large amounts of this material for filling. This work, while expensive, is necessary to provide safe working conditions.

335' Sub Level

The only work done on this elevation during 1939 was a small drift in the Maas Lease which was driven by Contract No. 10 to the North of Raise No. 1E in the latter part of December. Previously two short exploration drifts were driven on this sub level to the North of Raise No. 10W in the Race Course.

Third Level

The small amount of work done in the West Footwall Pillar on the Third Level elevation consisted of the completion of Raise No. 300 to the elevation of the floor of the level, the driving of a connecting drift, and the continuation of the raise some 30 feet to the 345' Sub Level. A second raise from the 200' Sub Level Transfer drift, No. 300A, was completed in December by Contract No. 31 and a connection made with the main level drift just South of Raise No. 5W. This latter work was in the Race Course Lease and the former in the City of Negaunee strip. Raise No. 300A and a third Raise, No. 300B, which will be put up during 1940, will also be extended above the Third Level elevation. These raises will deliver the ore to the 200' Sub Level Transfer and will be ready to take the place of the present mining raises as soon as operations have advanced to the point where there is no longer chute room above the Third Level elevation. Subsequently the ore will be handled on the Fourth Level.

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7. UNDERGROUND

c. Stoping (Cont.)

Subs Between the 3rd & 4th Levels

230' Sub Level

A very small amount of work was done at this elevation during 1939 and consisted of approximately 10 feet of drifting from the top of Raise No. 4020, which was the last one put up from the new 4000 Cross-Cut on the Fourth Level. The drift disclosed lean ore and jasper, but since there is a good possibility that the ore is rising above this elevation to the Northeast, it will probably be extended some time in 1940 as soon as repairs are completed to the cross-cut and raise.

215' Sub Level

A small amount of work was done at this elevation from the top of the transfer raise, No. 4030A, which was put up from the 200' Sub Level below. Mining conditions were extremely difficult due to the rotted condition of the old covering poles and the cracked condition of the ore pillars which combined to prevent complete recovery. A number of serious breakdowns were experienced, after which mining operations were moved to the 200' Sub Level immediately below.

200' Sub Level

Mining to the East of Raise No. 4030 in the third block East of the Race Course under the workings which were discussed on the 215' Sub Level above, was carried on for several months with reasonably good success until the latter part of September when the crushed condition of the Fourth Level Cross-Cut and the 4000 series of raises made it necessary to temporarily stop mining in this vicinity. It is hoped that some time in 1940 that work can be resumed.

In the West Footwall Pillar, a new transfer drift was driven from the top of Raise No. 300 in the Race Course Lease and City of Negaunee strip. The purpose of this transfer drift is to make possible the mining of the ore lying too flat to be economically reached by raises direct from the Fourth Level. This transfer drift was extended 25 feet to the East in the City of Negaunee strip and 200 feet to the West in the Race Course, the bulk of the work being done in transition slate and jasper with the first few feet in ore. Raises Nos. 300 and 300A were put up to the Third Level and have been previously discussed.

The work for December consisted of the completion of Raise No. 300A and the cutting of a small 10 foot drift in the Southwest corner of the West end of the transfer. This cut-out was made to permit the drilling of Diamond Drill Hole No. 30, which was started during the month. Fifty-eight feet of transition slate and jasper were disclosed

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7. UNDERGROUND

c. Stoping (Cont.)

200' Sub Level (Cont.)

before the drill entered the ore, which extended an additional 85 feet and stopped adjacent to a small East-West dike beyond which lay nothing but lean formation. A complete record of this drilling will be found in the report of the Geological Department. The reasons for this drilling were thoroughly discussed in a previous portion of this report.

195' Sub Level

The connecting of the last of the 4000 series of raises was completed early in the year by a drift between Raises Nos. 4028 and 4030. Mining to the South of Raise No. 4031, which was started in December, 1939, was continued throughout the greater portion of the current year until September, when the crushing of the 4000 Cross-Cut and raises made it necessary to stop mining operations. A considerable portion of the reserves to the South of Raise No. 4031 were recovered, the bulk from the Maas Lease and the remainder from the Cleveland-Cliffs Iron Company and American Mining Company strips. The last raise in this series, No. 4020, was continued above this elevation to the 230' Sub Level and connected with Raise No. 4022 to the Southeast.

170' Sub Level

In the second mining block East of the Race Course, the last few remaining pillars in the vicinity of Raise No. 625 were recovered by the middle of the year and the crew moved to the 160' Sub Level, the opening up of which had already been started. In this Northern end of the mining block, which was finished last, mining conditions were quite satisfactory since the extremely wet conditions have so far been confined to the Southern portion of the area. All of the work for the year was in the Maas Lease.

160' Sub Level

Mining in the second block East of the Race Course along the 600 series of raises was started in March of the current year with the connecting drift driven South from Raise No. 626 along the series. Four crews were ultimately moved into this territory and mining was carried on from Raises Nos. 625, 627, 628 and a new raise, No. 5330, which was put up from No. 3 Cross-Cut on the Fifth Level to take the place of Raise No. 630 which had crushed. The South two-thirds of this territory continues to be very wet with the result that mining operations are considerably slowed up. A new Raise, No. 629A, was put up from the Fourth Level in March just South of Raise No. 629 which had crushed to the point where it could no longer be used. A third new raise, No. 5326, was put up from No. 3 Cross-Cut on the Fifth Level to this elevation for the purpose of cutting down the

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7. UNDERGROUND

c. Stoping (Cont.)

160' Sub Level (Cont.)

scraping distance between the raises now available.

The work for December is as follows:

- Contract No. 25 was slicing to the West of Raise No. 625.
- Contract No. 45 was drifting and slicing to the Southwest of Raise No. 627.
- Contract No. 50 was slicing Southeast of Raise No. 628 along the old connecting drift toward the new raise, No. 5326. This slice will serve as a new ventilation and travel way.
- Contract No. 49 drove two short slices Northwest from Raise No. 5330 and spent the remainder of the month repairing the timber over the raise.

Complete extraction of the ore lying West of Raise No. 5330 and North and East of the old mining limits is not possible at this elevation due to the presence of extremely low covering and the frequency of breakdowns and runs of fine rock and mud. All of the above work was in the Maas Lease.

150' Sub Level

Mining in the block Southeast of the Race Course and adjacent to the Maas-Negaunee boundary line was completed in August of the current year in the vicinity of Raise No. 531. A short time previously the last available pillar Southeast of Raise No. 529 had been recovered. Complete extraction was not obtained at this elevation due to the presence of low cover in the vicinity of the old Fourth Level drifts and also to the loss of the raises in the 5400 series due to crushing. It was hoped that conditions would be somewhat better on the sub level below due to the addition of new raises and the possibility of getting under the low covering. All of the work for the year was in the Maas Lease.

140' Sub Level

Mining was carried on in two blocks during 1939, in the first block East of the Race Course and in the previously mentioned block Southeast of the Race Course. Work in the former territory consisted of slicing out the remaining pillars in the vicinity of Raises Nos. 5420 and 5424, all of which could not be recovered due to the fact that in several places the covering poles had slumped almost to the elevation of the sub level floor. Most of the work in this block was in the Maas Lease with a small amount in the City of Negaunee strip.

In the block Southeast of the Race Course a small amount of work was

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7. UNDERGROUND

c. Stoping (Cont.)

140' Sub Level (Cont.)

done in 1938 in the vicinity of Raise No. 5434. This work had to be stopped due to the crushed condition of the raise. Subsequently the opening of the main area was started late in 1938 at Raise No. 528 from which a connecting drift was driven to Raise No. 526. During the current year the Sub Level was completely opened up with connecting drifts between Raises Nos. 526, 528, 529 and 531, and subsequently with connecting drifts to two new raises, Nos. 527 and 5331. Mining conditions on this elevation are somewhat better than on the sub level above but there are still a few areas where the covering is too low to permit complete extraction. By far the greater part of the mining was done to the South and East of Raises Nos. 526 and 528 and between Raises 526 and 527. The loss of the raises in the 5400 series creates a considerable hardship in that it increases tremendously the scraping distance from the remaining raises. Conditions in the vicinity of Raises Nos. 526, 527, 529 and 531 continue to be extremely wet.

During December Contract No. 41 completed the connecting drift Northwest of Raise No. 529 to No. 5331; Contract No. 21 completed a long slice from No. 529 to No. 528; Contract No. 44 was slicing Northeast of No. 528; Contract No. 36 was slicing Northwest of No. 527 and Contract No. 27 was slicing West of No. 526, all in the Maas Lease.

Work for the year was largely in the Maas Lease with a small amount in the Railroad Pillar.

130' Sub Level

The last work done on this elevation prior to 1939 was finished in 1936 in the Race Course Lease and the area immediately South. In March of the current year, work was started along the 5400 series of raises in the first block East of the Race Course. Connections were made between Raises Nos. 5410, 5420, 5422 and 5424, and mining carried on South of No. 5424 and East of No. 5420, in the Maas Lease and City of Negaunee strip with a small amount in the Race Course. In the territory lying South of Raise No. 5424, considerable trouble was experienced with low cover in some places, which prevented complete extraction, and with runs in other places due to incomplete mining on the Sub Level above. There is very little hope for satisfactory mining conditions in this area until operations have progressed to the first sub below the Fourth Level.

Work for December consisted of slicing East of Raise No. 5420 by Contract No. 28, and Southeast of No. 5424 by Contract No. 37, both in the Maas Lease.

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7. UNDERGROUND

c. Stoping (Cont.)

Fourth Level

Most of the work on the Fourth Level during 1939 has been previously discussed under the heading "Development Work". This consisted of the completion of Raises Nos. 300 and 4020 which have been discussed. In addition, a new Raise, No. 629A, was put up to the 160' Sub to take the place of No. 629 which had crushed. A single compartment raise was put up as a continuation of Raise No. 5410 to the 130' Sub Level for use as a ventilation and traveling connection with the mining crews on that elevation.

In general, conditions were very heavy, necessitating continual repairs to timber and tracks and causing the abandoning of the South portions of the 600 and 4000 Cross-Cuts and a considerable portion of the connecting drift along the 5400 series. The only work during December was done by Contract No. 20 in making preparations to start a new raise East of No. 306 from which it is intended to explore the Race Course ore body in that vicinity.

Subs Between the 4th & 5th Levels

100' Sub Level

The main mining area lying in the Race Course Lease and in the Maas directly to the South was finished in 1938 and no work was done on this elevation during the current year.

90' Sub Level

The main mining area on this elevation, similar to the one described above and lying for the most part in the Race Course Lease and in the Maas Lease to the South, was almost completely mined out prior to 1938 with the exception of a small area to the North in the Race Course and two small areas to the South along the dikes. The mining of these portions was continued through 1938 and 1939 and by the end of the current year had been practically completed. All of the ore along the new 5700 Cross-Cut in the Maas Lease was recovered, as was the small ore body in the vicinity of Raise No. 509A in the Maas Lease and Railroad Pillar, which was originally discovered by diamond drilling in 1938. The extension of this ore was very disappointing, being almost circular in shape and hardly 50 feet in diameter.

Mining was continued in the Race Course Lease in the Northern portion of the main area from Raises Nos. 5411, 5614 and 5616 and at the end of the year had been almost entirely completed with the exception of a small pillar in the vicinity of Raise No. 5614.

Work for December consisted of a continuation of the mining around Raise No. 5614 to the East and North by Contract No. 19.

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7. UNDERGROUND

c. Stoping, (Cont.)

75' Sub Level

The reserves in the main mining territory at this elevation for the most part were recovered prior to the current year with the exception of the area to the North in the Race Course, the small ore bodies in the Maas South of the main dike and the reserves in the vicinity of the 5700 Cross-Cut, also in the Maas Lease Southwest of the Race Course. During the current year mining was completed South of the dike, both in the area adjacent to Raise No. 511 and in the very small ore body at Raise No. 509A. This ore lay mostly in the Maas and partly in the Railroad Pillar. The territory in the 5700 series of raises was almost completely mined out during 1939 with the exception of several small pillars where mining was being continued at the end of the year. In the Race Course area to the North, very little work was done due to the fact that mining had not been completed on the sub level above.

Contract No. 24 was moved down to Raise No. 5616 late in the year and sliced out an area lying to the East, the mining of which was being continued in December. Two other crews were also at work during December, No. 38 slicing Southeast of Raise No. 5737 and No. 47 slicing Northwest of No. 5742. This latter crew had moved to the 65' Sub by the end of the month.

65' Sub Level

Previous to the current year, the only work done on this sub level was the mining out of the small area under the hanging wall of the 5600 series which was completed in 1938 and the partial opening up of the main mining area which was also done during that year. During 1939 connection drifts in the 5500 and 5600 series of raises were completed from No. 5618 to 5642 and 5518 to 5542, inclusive. Mining was carried on throughout the year from both series with rather good success in spite of extremely wet conditions in approximately half of the working places. At the end of the year, work from the two main series was approximately 75% completed and arrangements were being made to drop down and cut out on the 50' Sub Level below. In addition to the work in the 5500 and 5600 series, a small amount was done in the 5700 raises at Nos. 5742 and 5745.

The small ore body at Raise No. 509A was finished in December by Contract No. 1 which spent the month slicing the small remaining pillar to the Southeast. Work for the month was in the Railroad Pillar, as was the bulk of the work for the year with the exception of a very small amount in the Maas.

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7. UNDERGROUND

c. Stoping (Cont.)

65' Sub Level (Cont.)

The following is the record of the work for December:

In the Race Course Lease:

- Contract No. 18 was slicing North of Raise No. 5620, and drifting East of No. 5618.
- Contract No. 23 was slicing South of No. 5520 and spent two weeks repairing the raise.
- Contract No. 46 was slicing East of Raise No. 5524.
- Contract No. 51 was slicing Northeast of Raise No. 5626.
- Contract No. 40, slicing North of No. 5636, finished and moved to No. 5528.

In the Maas Lease:

- Contract No. 43 was slicing Northeast of No. 5536.
- Contract No. 22 was slicing Northwest of No. 5640.
- Contract No. 32 was slicing Southwest of No. 5542.
- Contract No. 30 was slicing Northwest of No. 5645.
- Contract No. 33 was slicing Northeast of No. 5745.
- Contract No. 47 was taking up Raise No. 5742.
- Contract No. 26 was drifting Southeast of No. 511.

50' Sub Level

Work done at this elevation previous to the current year consisted of a drift connecting Raises Nos. 5522, 5524 and 5526, the mining of the area under the hanging wall West of the 5600 Raises and an exploration drift Southeast of No. 509 to the boundary line. This latter work was completed in December of 1938 and described in the report for that year. Work during 1939 consisted of the putting up of Raise No. 509A in the South end of the transfer drift from which the small ore body on the 90', 75' and 65' Sub Levels was mined. On the above elevations this small ore body has shown no tendency to increase in size, being approximately vertical on both foot and hanging walls. On this elevation, however, it is definitely known that the ore is of considerably greater extent, possibly joining the ore body South of Raise No. 511 under a dropper in the jasper hanging wall which has, up to now, kept the two areas separated. In December, Contract No. 1 finished mining on the 65' Sub Level above and moved down to this elevation to start mining around the transfer drift.

40' Sub Level

The small area lying West of the 5600 series under the jasper hanging wall was mined out previous to the current year and no work has been done at this elevation since that time.

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7. UNDERGROUND

c. Stoping (Cont.)

25' Sub Level

Work in this same area West of the 5600 series in the Race Course Lease was started in 1938 by one contract which drove a connecting drift South from Raise No. 5627 to No. 5633. This connecting drift showed further evidence of the reverse roll in the jasper hanging wall which has tended to make the mining area smaller instead of larger as would normally have been expected.

Work was continued throughout the greater part of the current year and consisted of the mining out of all the Race Course reserves to the South of Raise No. 5633 and the driving of the connecting drift Northwest of No. 5627 to No. 5623, with a small amount of mining being done to the Northwest of the latter. Work for December consisted of two short slices by Contract No. 48.

The very wet conditions found in this territory when it was originally opened on the 65' Sub Level have continued throughout subsequent mining down to and including the present elevation. Practically all of the ore recovered has had to be scraped directly into cars with the result that operations progressed very slowly. It will not be expedient to continue mining in this territory after the completion of the present work on this sub level due to the fact that it would be impossible to maintain the 5600 Cross-Cut on the Fifth Level if mining were continued any longer. Subsequent mining in this territory will probably be done by means of raises from the next main level below the Fifth.

Fifth Level

Work on the Fifth Level during 1939 consisted of the completion of No. 3 Cross-Cut to the South footwall drift and the putting up of Raises Nos. 5326, 5330, 5331 and 5327 from this new cross-cut. This latter raise, which was not completed, was being continued at the end of the year. Another raise, No. 527, was put up from the South footwall drift into the same territory on the 140' Sub Level, which was reached by No. 5331. Raise No. 5614, which was started in 1938, was completed early in the current year.

The only other work done on the level during the year was the driving of a small drift West of and at right angles to the 5600 Cross-Cut between Raises Nos. 5616 and 5618. This small drift was put in a distance of 20 feet and will serve as a station from which diamond drilling below the level will be carried on in 1940. This proposed drill hole and a second which will be put down to the Southwest from the end of No. 5700 Cross-Cut North of the dike, are planned to determine the dip, extent and the grade of the reserves lying below the Fifth Level and will be used to determine the advisability and location of the Sixth Level, which may be started in the near future. Work for December consisted of timbering in the above mentioned diamond drill station and the continuation by Contract No. 42 of Raise No. 5327.

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7. UNDERGROUNDd. Timbering

<u>Kind</u>	<u>Linnear Feet</u>	<u>Price</u>	<u>Amount 1939</u>	<u>Amount 1938</u>
6" x 8" Cribbing Timber	98,673	.035	3,455.46	3,764.96
8" x 10" Stull "	75,866	.0652	4,948.80	3,483.71
10" x 12" " "	116,402	.0947	11,024.27	8,312.64
12" x 14" " "	50,968	.1299	6,621.25	5,325.74
12" x 14" Treated "	187	.33	61.71	258.55
Total Timber - 1939	342,096	.0763	26,111.49	
Total Timber - 1938	279,781	.0755		21,145.60
7' Lagging	1,464,043	.7839	11,476.41	9,754.76
9½' Poles	1,188,994	1.1997	14,264.74	9,297.91
Total - 1939	2,653,037		25,741.15	
Total - 1938	1,887,030			19,052.67
Wire Fencing	174,525	.0066	1,158.02	92.59
Grand Total - 1939			53,010.66	
Grand Total - 1938				40,290.86

	<u>Amount 1939</u>	<u>Amount 1938</u>
Product, Tons	517,899	423,570
Feet of Cribbing & Stull Timber per ton of Ore	.6605	.6605
Feet of Stull Timber per ton of Ore	.4700	.41306
Feet of Lagging per ton of Ore	2.8268	2.8566
Feet of Poles per ton of Ore	2.2958	1.598
Feet of Wire Fencing per ton of Ore	.3369	.03246
Feet of Lagging per Foot of Timber	6.0143	6.9157
Feet of Poles per Foot of Timber	4.8844	3.8696
Cost per Ton for Timber	.0504	.0499
Cost per Ton for Lagging	.0221	.023
Cost per Ton for Wire Fencing	.0023	.000218
Cost per Ton for Poles	.0275	.02195
Cost per Ton for All Timber	.1023	.0951
Equivalent of Stull Timber to Board Measure	729,203	585,481
Feet of Board Measure per Ton of Ore	1.409	1.382

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

<u>Year</u>	<u>Amount</u>	<u>Cost Per Ton</u>
1939	53,010.66	.1023
1938	40,290.86	.0951
1937	69,695.41	.0892
1936	46,952.30	.0870
1935	32,985.69	.0907

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7. UNDERGROUND

d. Timbering (Cont.)

The cost per ton for timbering has shown a steady increase since 1936 and this is due partly to the increased cost of timber and the two increases in wages. The other factor is the increased weight or pressure underground whereby the drifts and raises crush much more rapidly than in former years, due to a larger proportion of the mining being done at lower elevations and also, since 1937, the curtailed schedule of operations has necessitated the places having to remain open much longer before the pillars are removed. Special care has been taken throughout the year to cover down more securely under newhanging and jasper pillars and this has increased the use of poles and wire netting, the latter having jumped from ten rolls in 1938 to 127 in 1939. There has been an average of 12 contracts working under new ground in 1939 and this, together with a regular timber crew of some 50 men with an addition of 12 men the last three months repairing the new cross-cut on the Fourth Level, has increased the timbering cost materially.

e. Drifting and Raising

The following is a comparison of the drifting and raising in the years 1939 and 1938:

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>	
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>
1939	50	149	1,312	158
1938	523	573	1,262	52
Increase			50	106
Decrease	473	424		

The development for the years 1939 and 1938 was very light as nearly all of the necessary work had been done to take care of the existing areas being mined at present. The new cross-cut to the East of the Race Course Lease on the Fifth Level was completed and four raises put up in 1939. A transfer drift was driven partly in the footwall in the West footwall pillar above the Fourth Level. The only development planned for 1940 is the extension of the West footwall drift on the Fourth Level to reach the ore found by diamond drilling late this year and the possible opening of the Sixth Level by winze or shaft late in the year.

f. Explosives, Drilling and Blasting

Stoping and Ore Development

<u>Kind</u>	<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1939</u>	<u>Amount</u> <u>1938</u>
1 $\frac{1}{4}$ " 60% Amonia Gel. Pwd.				1,504.75
1 $\frac{1}{4}$ " 50% " " "	31,315	.1164	3,645.85	7,979.67
1 $\frac{1}{4}$ " Gelamite 1	163,800	.1177	19,290.37	9,690.69
Total Powder - 1939	195,115	.1175	22,936.22	
Total Powder - 1938	157,965	.1214		19,175.11

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7. UNDERGROUNDf. Explosives, Drilling and Blasting (Cont.)

<u>Kind</u>	<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1939</u>	<u>Amount</u> <u>1938</u>
Fuse M Ft.	768,850	5.109	3,928.19	3,166.80
#6 Blasting Caps M	112,370	12.20	1,370.91	1,047.14
Electric " "	409	.1128	46.15	110.13
Powder Bags	105	2.754	289.25	237.60
Tamping Bags M	15,000	3.25	48.75	56.87
Fuse Lighters	21,000	6.75	141.79	108.02
Fuse Seal Pt.	44	.50	22.00	20.00
Connecting Wire M Ft.	900	2.007	18.07	19.90
Master Fuse Lighters	1,000	10.50	10.50	
Total Fuse, Caps, Etc.			5,875.61	4,766.46
Total All Explosives			28,811.83	23,941.57
Product, Tons			517,899	423,570
Pounds of Powder per ton of Ore			.3767	.3729
Cost per ton for Powder			.0442	.0453
Cost per ton for Fuse, Caps, Etc.			.0113	.0112
Cost per ton for All Explosives			.0555	.0565

Rock Development and Filling

<u>Kind</u>	<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1939</u>	<u>Amount</u> <u>1938</u>
1 $\frac{1}{4}$ " 60% Amonia Gel. Pwd.	150	.1200	18.00	545.14
1 $\frac{1}{4}$ " 50% " " "	2,400	.1206	289.51	315.25
1 $\frac{1}{4}$ " Gelamite 1	150	.1150	17.25	
Total Powder - 1939	2,700	.1202	324.76	
Total Powder - 1938	6,875	.1251		860.39
Electric Blasting Caps				88.45
Fuse M Ft.	10,925	5.04	55.07	30.63
#6 Blasting Caps M	1,565	12.20	19.30	
Total Fuse, Caps, Etc.			74.17	119.08
Total All Explosives			398.93	979.47
Total Explosives used at Mine			29,210.76	24,921.04
Average Price per Pound for Powder			.1176	.1215

Statement showing cost per ton for Explosives, exclusive of rock development, for the period 1935 to 1939:

<u>Year</u>	<u>Cost per Ton</u>	<u>Production</u>
1939	.0555	517,899
1938	.0565	423,570
1937	.0565	780,189
1936	.0572	548,473
1935	.0580	363,480

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7. UNDERGROUND

h. Mining and Loading

The entire product for the year, outside of the raise development, was handled by scraper hoist units, of which there were 49 in service, two 20 H.P. and four 15 H.P. Ingersoll-Rands having been purchased in 1939. An average of five of these were used in transfer systems while the remainder scraped the ore directly into their respective raises.

As twelve or approximately 30% of the contracts were mining under new ground, very careful attention had to be given to covering down which includes the laying of close poles, covering them with wire netting, then more poles or old timber and finally extensive blasting of filling from the jasper hanging above. In most cases this work has to be done by the mining contracts and therefore the yearly average production per contract was less than in 1938 on this account and also due to the delays caused by water in the working places which effected some 60% of the gangs during the year.

There were more 8' legs used in 1939 on account of the increased pressure which caused the gob to settle and therefore the legs had to be shortened or else the slice had to be driven downhill, which is a poor practice generally and impossible where there is water. Also there was required considerably more retimbering of the tops of raises and the traveling roads and this, together with 127 rolls of wire netting used in covering, increased the cost of timbering materially.

The loading of the wet ore and also the various grades at the shaft pocket continued to be a major problem and only by the closest cooperation between the shaft sampler, who directs the distribution of the ore in the pockets, and the motor crews, was it possible to maintain as high a daily production as was achieved. A small night shift crew was necessary and on this shift also there were approximately twelve men who spent the entire shift cleaning up the spillage around the wet chutes caused by water washing the ore that sticks to the foot of the raise through the stoppers and onto the track. It is also necessary to clean the mud out of the ditches and various settling basins along the sides of the levels and six men are kept continuously on this work. The Third and Fifth Level sumps were cleaned out and the contemplated work of improving dams, with their pipes and valves, was completed on the Fifth Level and will also be finished on the Third Level next summer when gravel for the concrete is available. This latter work has very greatly improved the operating condition of the pumps as it relieves them of the extra load of pumping thick muddy water which soon cuts the impellers and plungers and in extreme cases even blocks the suction.

There was no change made in the skip capacity weight of 5.5 during 1939, although the Engineer's estimate of stockpile shows that there was better than 6% overrun for this seasons stocking, it being

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7. UNDERGROUND

h. Mining and Loading (Cont.)

thought advisable not to risk a higher factor on account of so much wet ore being loaded with only one car per skip, whereas with dry ore a skip holds $1\frac{1}{2}$ cars.

i. Ventilation

The forced ventilation of the Maas Mine continued to be brought from the Negaunee Mine through drifts and raises and in most cases was very satisfactory, but on the bottom level, due to very severe crushing conditions in the Negaunee Mine, very little air came through the Maas raises originally planned for air ducts. To overcome this, more small doors were installed on the Fourth Level to force the air coming from the upper levels down through the workings to the Fifth and also nearly every other raise had a small fan so that air from the Fifth could be forced up to the working places. Early in 1940 there will be a new connection on the Thirteenth Level, Negaunee, and this should improve the ventilation of the Southern part of the workings above the Fifth Level, Maas. Later in the year the new Fourteenth Level of the Negaunee Mine will reach the Maas boundary and being entirely in rock, should make a good permanent outlet for a large volume of air.

j. Pumping

The number of gallons pumped per minute during 1939, 1938, 1937, 1936 and 1935 are shown below, as calculated by the Mechanical Department from the power consumption of the pumps:

<u>Month</u>	<u>1939</u>	<u>1938</u>	<u>1937</u>	<u>1936</u>	<u>1935</u>
January	1,565	1,240	1,460	1,152	1,184
February	1,525	1,442	1,607	1,200	1,146
March	1,339	1,367	1,336	1,252	1,100
April	1,430	1,379	1,204	1,388	1,106
May	1,327	1,545	1,317	1,255	1,110
June	1,290	1,372	1,300	1,251	1,140
July	1,224	1,438	1,404	1,261	1,155
August	1,356	1,391	1,319	1,233	1,129
September	1,397	1,434	1,234	1,301	1,141
October	1,385	1,644	1,168	1,314	1,061
November	1,434	1,408	1,240	1,329	1,126
December	1,370	1,496	1,219	1,418	1,152
Total Average	1,387	1,430	1,327	1,280	1,130

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7. UNDERGROUND

j. Pumping (Cont.)

Readings taken by underground wiers in 1939, showing gallons per minute:

<u>Month</u>	<u>1st Level</u>	<u>2nd Level</u>	<u>3rd Level</u>	<u>3rd Level to Neg. Mine</u>	<u>4th Level</u>	<u>5th Level</u>	<u>Total Maas</u>	<u>Gross Total</u>
January	102	20	324	88	464	252	1,162	1,250
February	92	18	331	129	455	243	1,139	1,268
March	76	17	353	144	440	212	1,098	1,242
April	73	17	390	136	414	212	1,106	1,242
May	73	17	400	130	400	212	1,102	1,232
June	73	17	390	128	374	218	1,072	1,200
July	73	17	391	128	398	218	1,097	1,225
August	73	42	509		375	229		1,228
September	73	52	500		367	242		1,234
October	73	52	500		338	236		1,200
November	73	52	490		338	241		1,194
December	73	52	504		336	246		1,211

The average gallons per minute pumped from underground decreased from 1,431 in 1938 to 1,387 in 1939, as reported by the Mechanical Department; however, this was due to increased efficiency of the pumps and repairs to leaks in the discharge column rather than to any decrease in the actual amount of water entering the mine. This latter is born out by the readings taken every operating day on the wiers installed on each level, the total result of which has only varied from 1,195 to 1,268 gallons per minute and not in a decreasing sequence. The 130 gallons per minute which were diverted to the Negaunee Mine last year was rediverted to the Maas pumping station the first of August, when the repairing of the pumps was completed, and the total water is being handled by the two plunger pumps, one operating 24 hours per day and the other only 17 hours. The two centrifugal pumps can therefore be kept for emergency use only as they are not very economical in operation.

8. COST OF OPERATING

a. Comparative Mining Cost

	<u>1939</u>	<u>1938</u>	<u>Incr.</u>	<u>Decr.</u>
Product	517,899	423,570	94,329	
Underground Cost	1.368	1.385		.017
Surface Cost	.154	.178		.024
General Mine Expense	.290	.296		.006
Cost of Production	1.812	1.859		.047

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8. COST OF
OPERATING

a. Comparative Mining Cost (Cont.)

	<u>1939</u>	<u>1938</u>	<u>Incr.</u>	<u>Decr.</u>
Depletion - Original Cost	.135	.176		.041
Increment	.000	.000		
Depreciation-Plant & Equip.	.033	.033		
Development	.033	.032	.001	
Movable Equip.	.001	.001		
Taxes	.295	.359		.064
Loading and Shipping	.051	.014	.037	
Total Cost at Mine	2,360	2,474		.114
No. of Days Operated	.230	.237		7
No. of Shifts and Hours	2-8	1-8		
Average Daily Product	2,252	1,787	465	

COST OF PRODUCTION

	<u>1939</u>	<u>%</u>	<u>1938</u>	<u>%</u>	<u>Decr.</u>
Labor	1.037	57.2	1.064	57.2	.027
Supplies	.775	42.8	.795	42.8	.020
Total	1.812	100.0	1.859	100.0	.047

b. Detailed Cost Comparison

(1) Days and Shifts

<u>Year</u>	<u>Days Worked</u>	<u>Shifts & Hours</u>	<u>Men Employed</u>	<u>Total Days Worked</u>
1939	230	2-8	388	83,828½
1938	237	1-8	416	69,786½
Increase				14,042
Decrease	7		28	

In both 1938 and 1939 there were two full crews working alternately together with a small 8-hour hoisting and tramping shift, but due to the more curtailed working schedule, there were times when only one crew worked on any one day while as the schedule increased, there would be more days when both crews had to come out. The following table shows a better comparison:

Total Men Employed in December of Each Year

	<u>1939</u>	<u>1938</u>	<u>1937</u>
Surface	71	78	79
Underground	357	324	363
Total	428	402	442

(2) Wages

There was no change in the wage scale in 1939.

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8. COST OF
OPERATING

b. Detailed Cost Comparison (Cont.)

(3) Comparison of Production

Year	Production	Average Daily Product
1939	517,899	2,252
1938	423,570	1,787
Increase	94,329	465

There were more 2 8-hour shifts in 1939, hence a larger daily product.

(4) Comparison of Number of Men & Wages

Year	No. Men	No. Days	Amount	Rate Per Day
1939	388	83,828 $\frac{1}{2}$	516,191.83	6.16
1938	416	69,786 $\frac{1}{2}$	430,151.66	6.16
Increase		14,042	86,040.17	
Decrease	28			

(5) Tons Per Man Per Day

	1939	1938	Incr.	Decr.
Surface	35.31	28.95	6.36	
Underground	7.49	7.68		.19
Total	6.18	6.07	.11	

The decrease in the tons per man underground was due to a decrease in the tons per man stoping of 1.66, caused by increased water in the working places and increased weight in the mining areas.

(6) Cost of Production

1939	\$ 938,307.36	Cost per ton 1.812
1938	787,337.62	" " " 1.859
Increase	\$ 150,969.74	
Decrease		.047

	Total Cost				Cost Per Ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1939	537,094.85	57.2	401,212.51	42.8	1.037	.775	1.812
1938	450,517.89	57.2	336,819.73	42.8	1.064	.795	1.859
Incr.	86,576.96		64,392.78				
Decr.					.027	.020	.047

(7) Detail of Accounts

	1939	1938	Incr.	Decr.
Avg. Days Per Week	4.23	2.9	1.33	
Shifts & Hours	1 & 2-8	1-8		
Production, Tons	517,899	423,570	94,329	
Avg. Daily Product, Tons	2,252	1,787	465	
Number of Days Worked	230	237		7

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8. COST OF
OPERATING

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

	<u>1939</u>		<u>1938</u>		<u>Increase</u>		<u>Decrease</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs</u>								
1. Exploring in Mine	1,269.34	.002	605.43	.001	663.91	.001		
2. Development in Rock	2,760.23	.001	6,222.35	.015			3,462.12	.014
4. Development in Ore	8,335.14	.016	11,423.44	.027			3,088.30	.011
5. Stopping	234,353.61	.454	180,566.75	.426	53,786.86	.028		
6. Timbering	195,111.46	.378	149,762.11	.354	45,349.35	.024		
7. Trammig	70,268.80	.136	56,957.68	.134	13,311.12	.002		
8. Ventilation	7,120.85	.014	6,852.65	.016	268.20			.002
9. Pumping	68,006.02	.131	75,265.84	.178			7,259.82	.047
10. Comp. & Air Pipes	42,023.49	.081	33,715.74	.080	8,307.75	.001		
11. Back Filling	119.20	.000	35.76	.000	83.44			
12. Underground Supt.	21,579.40	.042	17,359.46	.041	4,219.94	.001		
13. Cave-In	397.99	.001	17.03	.000	380.96	.001		
14. Main. Compr. & Drills	764.75	.001	219.65	.001	545.10			
15. Scrapers & M. Loaders	24,691.18	.049	20,532.67	.048	4,158.51	.001		
16. Elec. Tram Equipment	13,430.99	.026	13,889.24	.033			458.25	.007
17. Pumping Machinery	18,439.11	.036	13,081.42	.031	5,357.69	.005		
Total Undg. Costs	708,671.56	1.368	586,507.22	1.385	122,164.34			.017
<u>Surface Costs</u>								
18. Hoisting	29,748.45	.057	25,290.51	.059	4,458.94			.002
19. Stocking Ore	13,262.25	.027	16,848.66	.040			3,586.41	.013
20. Screening, Crushing at Mine	230.51	.000			230.51			
21. Dry House	8,439.81	.016	6,999.29	.017	1,439.52			.001
22. General Surface	4,866.20	.009	6,114.30	.014			1,248.10	.005
23. Maint. Hoisting Equip.	7,965.94	.015	6,586.19	.016	1,379.75			.001
24. Shaft	1,192.58	.002	962.38	.002	230.20			
25. Top Tram Equip.	3,897.33	.008	4,558.64	.011			661.31	.003
26. Docks, T. & Pkts.	8,282.77	.017	7,319.54	.017	963.23			
27. Mine Buildings	1,668.21	.003	794.46	.002	873.75	.001		
Total Surface Costs	79,554.05	.154	75,473.97	.178	4,080.08			.024
<u>General Mine Expense</u>								
28. Insurance	4,047.91	.008	146.47	.000	3,901.44	.008		
29. Mining Engrg.	5,020.30	.010	3,905.48	.009	1,114.82	.001		
30. Mech. & Elec. Engrg.	2,563.81	.005	2,268.86	.005	294.95			.000
31. Analysis & Grading	22,759.49	.044	19,317.53	.046	3,441.96			.002
32. Personal Injury	19,764.63	.038	17,520.56	.041	2,244.07			.003
33. Safety Department	2,308.04	.004	2,168.10	.005	139.94			.001
34. Tel. & S. Devices	1,823.39	.004	1,559.84	.004	263.55			
35. Local & Gen. Welfare	7,467.35	.014	6,838.82	.017	628.53			.003
36. Sp. Exp. Pens. & All.	11,410.45	.022	9,359.97	.022	2,050.48			
37. Ishpeming Office	23,240.39	.045	19,528.95	.046	3,711.44			.001
39. Mine Office	19,297.07	.037	18,776.96	.045	520.11			.008
Social Security Taxes	22,571.30	.044	18,675.04	.044	3,896.26			
Employee's Vacation	7,807.62	.015	5,289.85	.012	2,517.77	.003		
Total Gen. Mine Exp.	150,081.75	.290	125,356.43	.296	24,725.32			.006
Cost of Production	938,307.36	1.812	787,337.62	1.859	150,969.74			.047
40. Taxes	153,033.24	.295	151,963.79	.359	1,069.45			.064
Total Cost	1,091,340.60	2.107	939,301.41	2.218	152,039.19			.111

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8. COST OF
OPERATING

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

GENERAL

Practically all of the accounts show an increase in amount due to the increase in the schedule of production and with the exception of stoping and timbering, there is naturally also a decrease in the cost per ton, the increase in the two accounts mentioned being due to more water causing delays in the working places and a larger proportion of time spent on timbering.

UNDERGROUND COSTS

3. Development in Rock

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost</u> <u>Per Foot</u>
1939	149'	158'	307'	8.99
1938	573	52	625	9.96
Increase		106'		
Decrease	424'		318'	.97

There was very little rock development for the year 1939 as all of the main level drifting necessary for present operations had been completed with the exception of 100' of drift in the No. 3 Cross-Cut on the Fifth Level. All that remained to be done in 1939 was a transfer drift above the Fourth Level and a few raises on the Fourth and Fifth Levels. Unless the Sixth Level is opened in 1940, there is very little proposed development outside of our extension to the West of the Fourth Level. The cost per foot was less in 1939 due to the work being done in softer material.

4. Development in Ore

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost</u> <u>Per Foot</u>
1939	50'	1,312'	1,362'	6.12
1938	523	1,262	1,785	6.40
Increase		50'		
Decrease	473'		423'	.28

There were less contracts on ore development in 1939 and the cost per foot was less on account of fewer high raises. There is very little ore development planned for 1940.

5. Stoping

	<u>Labor</u>	<u>Cost</u> <u>Per Ton</u>	<u>Supplies</u>	<u>Cost</u> <u>Per Ton</u>	<u>Total</u>
1939	197,329.93	.382	37,023.68	.072	.454
1938	149,804.20	.354	30,762.55	.072	.426
Increase	47,525.73	.028	6,261.13		.028

The increase in amount is due to larger production in 1939 while the increased cost per ton is due to more water and more weight in the working places, the first of which caused daily delays while the latter occasioned the stopping of the contract several times to repair around their raise before the given area was mined.

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8. COST OF OPERATING

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

6. Timbering

	Labor	%	Cost Per Ton	Supplies	%	Cost Per Ton	Total Cost Per Ton
1939	138,498.56	71.0	.268	56,612.90	29.0	.110	.378
1938	101,760.48	67.9	.240	48,001.63	32.1	.114	.354
Increase	36,738.08	3.1	.028	8,611.27			.024
Decrease					3.1	.004	

More timber was used on account of larger production and also on account of the increased weight. One new main level drift had to be retimbered three times. Also, due to curtailed operations, some of the traveling roads in the subs had to be kept open for a year or more and there was also considerable more repairing of raises.

7. Tramming

	Labor	Cost Per Ton
1939	56,757.26	.110
1938	56,957.68	.134
Decrease	200.42	.024

The decrease in labor is due to less general level clean-up, especially during five day period, when no extra time can be put in on account of overtime pay. Therefore, this work can only be carried on by a few extra men working on the third shift when there is not so much movement of trains. It will probably be necessary to work some overtime in 1940 as the quantity of spillage from the chutes is increasing due to more water in the working places.

8. Ventilation

	Cost	Cost Per Ton
1939	7,120.85	.014
1938	6,852.65	.016
Increase	268.20	
Decrease		.002

Increase is due to ventilation system operating greater number of hours during 1939 on account of increased operating schedule.

9. Pumping

	Gallons Pumped	Gals. Per Min.	Cost for Power
1939	726,916,014	1,387	53,302.34
1938	752,268,448	1,431	59,733.65
Decrease	25,352,434	44	6,431.31

While the records show a decrease in gallons per minute in 1939, this

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8. COST OF
OPERATING

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

9. Pumping (Cont.)

was due to increased efficiency of the pumps and the sealing of leaks in the discharge column. The decrease in the cost is also due to the fact that the 15 minute demand peaks were lower, which together with more total electric current consumed, gave a consequently lower rate.

10. Compressors & Air Pipes

	<u>Cu. Ft. Air</u> <u>Compressed</u>
1939	1,005,165,000
1938	742,635,000
Increase	<u>262,530,000</u>

The large increase was due to two compressors working for two shifts, besides which one and sometimes both had to be used on the third shift. The mine averaged 2.9 days per week in 1938 as compared with 4.4 in 1939.

12. Underground Superintendence

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	21,579.40	<u>.042</u>
1938	17,359.46	.041
Increase	<u>4,219.94</u>	<u>.001</u>

Increased cost is due to operating schedule increased in 1939.

15. Scrapers and Mechanical Loaders

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	24,691.18	<u>.049</u>
1938	20,532.67	.048
Increase	<u>4,158.51</u>	<u>.001</u>

The increase was due to the increased operating schedule in 1939 while the slight difference in cost per ton would seem to indicate that the repairs are determined by the individual output of each machine rather than to time in service.

16. Electric Tram Equipment

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	13,430.99	<u>.026</u>
1938	13,889.24	.033
Decrease	<u>458.25</u>	<u>.007</u>

The increased cost is due to more repairs to underground locomotives, cars and more trolley repairs.

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8. COST OF
OPERATING

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

17. Pumping Machinery

	Cost	Cost Per Ton
1939	18,439.11	.036
1938	13,081.42	.031
Increase	5,357.69	.005

This cost is high in both years due to emergency repairs. In 1939 the pumping equipment at the mine was given a general overhauling and the main discharge column was equipped with new hangers throughout the shaft and several sections where leaks had developed were reinforced and welded.

SURFACE COSTS

18. Hoisting

	Total Ore & Rock	Power Cost	Cost Per Ton For Power	Cost Per Ton
1939	529,255	21,018.42	.041	.057
1938	438,359	18,587.41	.042	.059
Increase	90,896	2,431.01		
Decrease			.001	.002

There was a larger tonnage hoisted in 1939 than in 1938.

19. Stocking Ore

	Tons Stocked	Amount	Cost Per Ton
1939	316,980	13,262.25	.027
1938	380,942	16,848.66	.040
Decrease	63,962	3,586.41	.013

Decrease is due to less ore stocked in 1939. As the shipments from the pocket were greatly increased, only the wet ore of the Maas grade and the Bessemer grades were being stocked to any extent.

21. Dry House Expense

	1939	1938	Incr.	Decr.
Coal Used in Heat. Plant, Tons	940	748	192	
Cost per Ton for Coal	5.485	5.70		.215
Cost of Coal	5,155.87	4,274.06	881.81	

Increase due to increased operating schedule making more coal necessary and also a quite extensive change in the sewer system.

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8. COST OF
OPERATING

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

22. General Surface

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	4,866.20	.009
1938	6,114.30	.014
Decrease	1,248.10	.005

Decrease is due to less general surface repairs in 1939.

23. Hoisting Equipment

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	7,965.94	.015
1938	6,586.19	.016
Increase	1,379.75	
Decrease		.001

Increase is due to charging two new ropes, one second hand rope, one new counterweight sheave and repairs to hoist equipment in 1939.

24. Shaft

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	1,192.58	.002
1938	962.38	.002
Increase	230.20	

Increase is due to more repairs to shaft level pockets in 1939.

25. Top Tram Equipment

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	3,897.33	.008
1938	4,558.64	.011
Decrease	661.31	.003

Decrease is due to installing new larry car system on top tram, the charges of which were charged to E & A No. 783.

26. Docks, Trestles & Pockets

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	8,282.77	.017
1938	7,319.54	.017
Increase	963.23	

Increase is due to repairs to shafthouse pockets and grading for additional stocking grounds. There was also some grading and extending new stocking grounds in 1938.

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8. COST OF
OPERATING

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

27. Mine Buildings

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	1,668.21	.003
1938	794.46	.002
Increase	873.75	.001

Increase is due to extensive repairs to shafthouse building and building enclosure over No. 2 well.

28. Insurance

	<u>1939</u>	<u>1938</u>	<u>Incr.</u>	<u>Decr.</u>
Property	1,056.11	517.68	538.43	
Group	2,539.94	1,269.54	3,809.48	
Catastrophe	451.86	898.33		446.47
Total	4,047.91	146.47	3,901.44	

Increase is due to adjustment in group insurance account of 25% in 1938, also increase in property premium in 1939.

29. Mining Engineering

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	5,020.30	.010
1938	3,905.48	.009
Increase	1,114.82	.001

Increase is due to more expense to mine surveys and stocking trestle alignment in 1939.

30. Mechanical & Electrical Engineering

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	2,563.81	.005
1938	2,268.86	.005
Increase	294.95	

Increase is due to proportion of mechanical and electrical engineering charge greater in 1939.

GENERAL MINE EXPENSES

31. Analysis and Grading

	<u>No. Determination</u>	<u>Cost Per</u> <u>Determination</u>
1939	48,332	.47090
1938	40,511	.47685
Increase	7,821	
Decrease		.00595

There was more shovelloading in 1939 and therefore more samples taken and more determinations worked.

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8. COST OF
OPERATING

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

32. Personal Injury

	<u>1939</u>	<u>1938</u>	<u>Incr.</u>	<u>Decr.</u>
Compensation Department	909.73	1,013.16		103.43
Hospital Loss	8,252.70	7,681.26	571.44	
Reserve & Catastrophe, Com- pensation set up & Medical Service	10,602.20	8,826.14	1,776.06	
	<u>19,764.63</u>	<u>17,520.56</u>	<u>2,244.07</u>	

33. Safety Department

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	2,308.04	.004
1938	2,168.10	.005
Increase	139.94	
Decrease		.001

Increase is due to Ishpeming office proportion greater in 1939.

34. Telephone & Safety Devices

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	1,823.39	.004
1938	1,559.84	.004
Increase	263.55	

Increase is due to more safety equipment charged in 1939, such as equipping underground employees with goggles, etc.

35. Local and General Welfare

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	5,999.00	.014
1938	6,838.82	.017
Decrease	839.82	.003

Decrease is due to less aid to employees during 1939.

36. Special Expense, Pensions & Allowances

	<u>1939</u>	<u>1938</u>	<u>Incr.</u>	<u>Decr.</u>
Saranac Invest.	1,923.23	2,081.26		158.03
Legal	438.00	512.73		74.73
Pensions	3,546.00	4,522.03		976.03
Miscellaneous	3,795.00	2,243.95	1,551.05	
	<u>9,702.23</u>	<u>9,359.97</u>	<u>342.26</u>	

Increase in miscellaneous due to expense of retiring old employees.

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8. COST OF OPERATING

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

37. Ishpeming Office

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	23,240.39	.045
1938	19,528.95	.046
Increase	3,711.44	
Decrease		.001

Increase due to general curtailment in 1938.

39. Mine Office

	<u>Cost</u>	<u>Warehouse</u> <u>Overhead</u>	<u>Cost</u> <u>Per Ton</u>
1939	19,297.07	5,125.82	.037
1938	18,776.96	5,569.53	.045
Increase	520.11		
Decrease		443.71	.008

Increase due to salary adjustment, increase in printing and stationery and Superintendent's auto in 1939.

Employees' Vacation

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	7,807.62	.015
1938	5,289.85	.012
Increase	2,517.77	.003

Increase is due to more men receiving paid vacations and each man allowed four days this year compared with three days last year.

40. Taxes

	<u>Cost</u>	<u>Cost</u> <u>Per Ton</u>
1939	150,033.24	.295
1938	151,963.79	.359
Decrease	1,930.55	.064

Decrease is due to lower tax rate in 1939.

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8. COST OF
OPERATING

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

Analysis of Supplies Used

	<u>1939</u>		<u>1938</u>		<u>Increase</u>		<u>Decrease</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
41. General Supplies	29,824.38	.057	23,747.46	.056	6,076.92	.001		
42. Iron & Steel	10,108.24	.020	9,340.12	.022	768.12			.002
43. Oil & Grease	2,434.66	.005	2,612.93	.006			178.27	.001
44. Machinery Supplies	20,183.81	.039	16,875.53	.040	3,308.28			.001
45. Explosives	29,289.16	.057	24,921.04	.059	4,368.12			.002
46. Lumber & Timber	58,872.15	.114	47,224.76	.111	11,647.39	.003		
47. Fuel	5,166.87	.010	4,274.33	.010	892.54			.000
48. Electric Power	122,246.30	.236	115,597.38	.273	6,648.92			.037
49. Sundries	22,485.50	.043	7,034.71	.017	15,450.79	.026		
50. Other Mines & Accounts	274.95	.001	307.63	.001			32.68	
TOTAL	300,336.12	.580	251,320.63	.593	49,015.49			.013

The general increase in total supplies was due to the curtailed schedule of operations during 1938. One exception was No. 43, Oil and Grease, which was less due to general overhaul of pumping equipment in 1939. The increase in No. 49, Sundries, was due to Shop labor, about \$12,000 per year, charged through labor accounts previous to 1939. Also more general shop repairs to underground equipment in 1939.

9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS

The only exploration done in the Maas Mine in 1939 was the drilling of the diamond drill hole to the Southwest on the 200' Sub Level to prove the continuance of the ore body lying between the Third and Fifth Levels. It is expected to drill two more holes in 1940 at a more or less vertical angle below the Fifth Level to prove the grade of the ore from foot to hanging, both North and South of the dike.

10. TAXES

	<u>1939</u>		<u>1938</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Maas Mine	\$ 1,745,000	63,881.66	\$ 2,260,000	84,900.06
Race Course	820,000	30,018.89	850,000	31,931.44
Adams Strip	120,000	4,393.01	140,000	5,259.30
Stockpile & Equipment	1,535,000	56,193.89	850,000	31,931.44
Miscellaneous Parcels	8,880	325.37	10,160	381.43
Total Mine	4,228,880	154,812.82	4,110,160	154,403.67
Collection Fees		1,548.13		1,544.04
Total Oprtg. Maas Mine		156,360.95		155,947.71
Adams Strip Charged to Negaunee Mine	90,000	3,327.71	105,000	3,983.92
Maas Mine Total	4,138,880	153,033.24	4,005,160	151,963.79

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10. TAXES

	<u>1939</u>		<u>1938</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Tax Rate		3.66084		3.7566
Total City of Negaunee Tax		560,092.01		561,742.78
Maas Mine % of City Tax		27.3%		27.0%
Maas Mine Rented Houses	207,700	7,604.36	202,500	7,607.51
Mineral Lands, Etc.	19,200	702.91	19,100	717.51
Total Houses & Lands	<u>226,900</u>	<u>8,307.27</u>	<u>221,600</u>	<u>8,325.02</u>
Collection Fees		83.07		83.26
Total		<u>8,390.34</u>		<u>8,408.28</u>

11. ACCIDENTS
AND
PERSONAL
INJURY

	<u>1939</u>	<u>1938</u>
Fatal	0	0
Time Lost, over 4 months	1	2
" " 1 to 4 "	7	9
" " less than 1 month	6	1
Total Accidents	<u>14</u>	<u>12</u>
Number of cases paid compensation for accidents prior to Jan. 1st, 1939	9	5

The total amount paid for accidents in 1939 was \$1,136 as compared with \$2,373 in 1938. While there were more lost time accidents in 1939 than in 1938, their severity was not as great nor was the frequency rate as there were more man days worked in 1939. The use of safety goggles has reduced the eye injuries and every effort is being made to eliminate accidents caused by falls of ground and motor haulage, which were responsible for the majority of the lost time this year. Slipping and strains have also been fairly prevalent and this type of accident is the hardest to combat, being entirely up to the man himself.

The following is a brief description of the lost time accidents:

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Lost Wk.Da.</u>	<u>Compensation Paid to 12-31-39</u>	<u>Description of Accident</u>
1/12/39	John Iskela	7 4	\$138.00	Iskela was making a hitch to stand a leg when a piece of ore fell from the side, striking him on the chest and fracturing three ribs.
2/6/39	John Trethewey	5 5	\$ 69.00	Trethewey was working on the Fifth Level and had been warned by the brakeman of an approaching train. He selected a place to stand that was too small and was squeezed slightly on chest and back.

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11. ACCIDENTS
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PERSONAL
INJURY

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Lost Wk. Da.</u>	<u>Compensation Paid to 12-31-39</u>	<u>Description of Accident</u>
2/25/39	George Flack	2 5	\$ 15.00	Flack was barring ore from a chute when a chunk hit the bar, causing him to bump his hand on the car. He had the bruise treated but it became infected. Afterwards this man was tied up for a long time as it was found that his blood was in very poor condition.
2/28/39	Robert Smith, Sr.	1 0	\$	Smith was attempting to remove a pole from the back when he slipped and fell on another piece of timber lying on the ground, suffering a slight contusion of the chest.
3/27/39	Martin Anderson	2 5	\$ 15.00	Anderson was unloading the carpenter's truck when his foot broke through the snow, causing him to fall and sprain his knee.
4/26/39	Frank Campain	11 3	\$207.00	Campain was riding on the motor and in turning to speak to the motorman, twisted his body so that his leg projected outside and was struck by the safety post at a loading bench, causing a bad contusion of his right leg.
5/22/39	Gerolomo Armatti	3 5	\$ 33.00	Armatti was digging a hitch to stand a leg when a piece of ore came out of the breast, striking him on the back and knocking him down. This caused a contusion of the chest.
7/6/39	Jalmer Hill	7 3	\$135.00	Hill suffered a hernia while lifting a rope block onto the cap.
7/20/39	Gust Simonson	8 3	\$153.00	Simonson also suffered a hernia when he slipped in stepping off his motor.
9/26/39	Henry Houseman	2 4	\$ 30.00	As Houseman was removing a piece of lagging that had caught in the scraper, the piece flew up and fractured his jaw.
9/25/39	Emil Asikainen	2 4	\$ 30.00	Asikainen was working with a scraper rope and although wearing gloves, punctured his finger on a broken strand. He did not go to the doctor at once and the wound became infected.