

MAAS MINE
ANNUAL REPORT
YEAR 1936

c. Estimated Reserve Analysis

<u>Natural</u> <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 & Race Course Bessemer	53.50	.040	6.40	.195	2.00	0.80	.225	.011	1.10	12.00
Maas & Race Course Non-Bessemer	52.45	.060	6.63	.208	2.20	1.10	.320	.011	1.80	12.50

d. Estimated Production

The following is the estimated tonnage by grades on an operating basis of 5 days per week, 2 regular 8-hour shifts and 1 extra, smaller 8-hour shift; and the expected analysis of the 1937 production from the Maas Mine.

<u>Grade</u>	<u>Estimated Production</u> <u>5 Day per Week Basis</u>
Maas & Race Course Bessemer	150,000 tons
Maas & Race Course Non-Bessemer	633,000 tons
Total	<u>783,000 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 Natl.</u>
Maas & Race Course Bessemer	63.00	.043	5.75	.22	2.32	.51	.19	.012	1.18	11.00	56.00
Maas & Race Course Non-Bessemer	61.00	.080	7.56	.22	2.30	.85	.25	.015	.167	11.50	54.00

5. LABOR & WAGES

a. Comments

1. Labor

There were two changes in working schedule during 1936, the first being from 3 days per week in January to 4 days per week from February 1st to May 1st, while the second took place on May 1st and increased the working time to 5 days per week. It was then found to be impossible to hoist all the ore in 16 hours and therefore more men had to be employed to form a new crew for the motor trams, skiptenders, top landers, etc.

This type of workman was fairly easy to acquire with so many young men out of work, but when later in the year the desired increase in production necessitated hiring more miners it became a difficult problem. Only a very few experienced miners were looking for work and the plan that has been worked out is for some of our present miners to take their sons as partners and instruct them in mining. One hundred men were hired in 1936, increasing the regular Maas Mine payroll to a total of 368.

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5. LABOR & WAGES

1. Labor (Cont.)

Besides these regular men there were approximately 10 extra men employed on the steam shovel, etc, around the mine, while during the summer approximately 70 more were working in the Cleveland-Cliffs Iron Company's second addition from July to November.

There was an increase in wages of six cents per hour, effective November 16th.

During August the men who had been in the employ of the Company since June, 1931, even though they had been laid off temporarily on account of curtailment of operations, were given a vacation of a week with pay at the regular rate their particular job called for. One half of the men had the week of August 10th, while the other half took the week of August 17th, the mine only working on the day shift for these periods. 247 men at the Maas Mine were eligible and received their vacations, which was 71% of the total employed.

All these matters of change in schedule, increased wages, and vacations with pay were taken up through the employees' representatives.

A safety campaign was carried on throughout the year, a ticket being given each month to every man who had worked that month without an accident. On December 23rd the drawing took place under the direction of the employees' representatives. All the tickets were placed in a drum which was revolved, and 25 tickets were drawn, one by one, by a small, blind-folded boy. There were three prizes of \$50.00, two of \$25.00, five of \$15.00, five of \$10.00 and ten of \$5.00 and the distribution was as follows:

	<u>Surface</u>	<u>Underground</u>	<u>C.C.I.Co.</u> <u>2nd. Addition</u>
\$50.00		3	
25.00		2	
15.00	4	1	
10.00	1	2	2
5.00	3	4	3
Total	<u>8</u>	<u>12</u>	<u>5</u>

In January Captain Tregonning was found to be ailing and upon examination it was thought best to send him to Saranac Lake, where he has been ever since and his condition remains practically unchanged.

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5. LABOR & WAGES

1. Labor (Cont.)

In June Fred Prudom, Underground Foreman, was promoted to Captain and two new Shift Bosses, Sid Harvey and Arthur Truscott were appointed.

Mr. W. R. Meyers, Superintendent of the Maas Mine, was taken ill and on October 28th left for Ann Arbor where he was under treatment about a month for anemia. He was taken from there to Louisville, Kentucky, where his family had preceded him, and on December 25th, at 12:15 A. M., he died of pneumonia. His loss will be felt very keenly by the Company and also by the men at the Maas Mine to whom he had endeared himself by his fairness and thoughtfulness.

2. New Construction

The following is a list of the E & A's on which work was done during 1936:

No. 683	Purchase of 2 scraper hoists.
" 689	Moving 30 Maas Mine Location houses.
" 693	Chevrolet trucks.
" 702	Maas Mine drainage.
" 703	Foundations for Maas houses.
" 706	Equipment to increase production at Maas Mine.

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

b. Comparative Statement of Wages & Product

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
Product	548,473	363,480	184,993	
Number of Shifts & Hours				
1 8-hours	97	303		
2 8-hours	195			
<u>AVERAGE NO. MEN WORKING</u>				
Surface	57½	52	5½	
Underground	270	246	24	
Total	<u>327½</u>	<u>298</u>	<u>29½</u>	
<u>AVERAGE WAGES PER DAY</u>				
Surface	4.24	4.21	.03	
Underground	5.10	5.08	.02	
Total	<u>4.95</u>	<u>4.90</u>	<u>.05</u>	

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5. LABOR & WAGESb. Comparative Statement of Wages & Product (Cont.)

<u>AVERAGE WAGES PER MONTH</u>	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
<u>3 Days per Week 1935</u>				
<u>4½ Days per Week 1936</u>				
Surface	94.66	80.39	14.27	
Underground	108.17	78.88	29.29	
Total	105.80	79.14	26.66	
 <u>PRODUCT PER MAN PER DAY</u>				
Surface	34.98	30.48	4.50	
Underground	7.86	7.93		.07
Total	6.42	6.29	.13	
 <u>LABOR COST PER TON</u>				
Surface	.121	.138		.017
Underground	.650	.641	.09	
Total	.771	.779		.008
 <u>AVERAGE PRODUCT MINING</u>				
Stopping	17.32	19.58		2.26
Ore Development	7.54	8.11		.57
Total	16.88	18.74		1.86
 <u>AVERAGE WAGES CONTRACT LABOR</u>	 5.564	 5.745		 .181
 <u>TOTAL NUMBER OF DAYS</u>				
Surface	15,422½	11,923½	3,499	
Underground	68,657¼	45,821¼	22,836	
Total	84,079¾	57,744¾	26,335	
 <u>AMOUNT FOR LABOR</u>				
Surface	65,316.91	50,163.13	15,153.78	
Underground	350,462.80	232,852.28	117,610.52	
Total	415,779.71	283,015.41	132,764.30	
 <u>AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL</u>				
Surface	92.88	77.86	15.02	
Underground	105.36	78.10	27.26	
Total	105.15	78.06	27.09	

Proportion of Surface to Underground Men

1936 - 1 to 5.9 1 8-hour 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.

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5. LABOR & WAGES

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

Proportion of Surface to Underground Men (Cont.)

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

1934 - 1 to 4.7 1 8-hr. shift, 6 days and 5 nights per week, 3 crews working 3 and 4 days per week, January 1st to August 31st.
1 8-hr. shift, 4 days per week, 3 crews working 2 and 3 days per week, September 1st to December 31st.

1933 - 1 to 4.85 1 8-hr. shift, 2 days per week, January 1st to April 8th.
Mine idle April 8th to July 1st.
1 8-hr. shift, 2 days per week, April 8th to July 1st - 4th Level Development.
1 8-hr. shift, 2 days per week, partial operation July 1st to August 1st.
1 8-hr. shift, 5 days per week, 2 crews working alternate weeks August 1st to November 13th.
1 8-hr. shift, 6 days and 5 nights per week, 3 crews working 3 and 4 days per week, November 13th to December 31st.

1932 - 1 to 4.88 1 8-hr. shift, 2 days per week, January 1st to May 31st.
Mine idle June 1st to October 31st.
1 8-hr. shift, 2 days per week, November 1st to December 31st.

6. SURFACE

a. Buildings, Repairs

In April the storage shed just West of the shaft was dismantled and the contents stored in the basement of the Boiler House which is not being used. This storage shed was considered to be a fire hazard, being of wood construction and very close to the shaft.

A shelter for the men was erected in the timber tunnel about 200 feet North of the shaft. There is a very strong draft in the tunnel, especially during the winter months and it was deemed advisable to give the tunnel crew a warm place to wait while the timber trucks are enroute in the shaft.

The wood trim on all the mine buildings was painted during the summer and the necessary minor repairs attended to.

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6. SURFACE

b. Location Dwelling Repairs

On December 31st, 1936, the Maas Mine owned 124 dwellings.

97 Single dwellings housing	97 families,	97
3 Double dwellings housing	6 families,	6
21 Single dwellings housing	2 families each--	42 families.
2 Single dwellings housing	3 families each--	6 families.
1 Single dwelling housing	4 families.	4 families.
<u>124 Dwellings, housing a total of</u>		<u>155 families.</u>

During 1936, four dwellings in the Cleveland-Cliffs Iron Company's first addition were sold on time contracts. They are listed as follows:

<u>House No.</u>	<u>Address</u>	<u>Lot</u>	<u>Block</u>	<u>Purchaser</u>	<u>Date</u>
107	521 Elm St.	13	3	Jos. Benaglio	5-1-36
122	722 Baldwin Kiln Rd.	15	3	Henry Bean	8-1-36
97	537 Elm St.	9	3	Oliver Holm	8-15-36
79	744 Baldwin Kiln Rd.	3	3	Jos. Skues	10-1-36

The following purchases were also made:

House No. 176, 212 Healy Ave., on the South one-half of Lot 7, Block 35, Pioneer Iron Company's Plat, from Martin Anderson, March 25th, 1936.

House No. 177, 214 Brown Ave., on the South one-half of Lots 13 and 14, Block 32, Pioneer Iron Company's Plat, from the First National Bank, Mary Sheehy Estate, October 6th, 1936.

E & A No. 689 covering the expenditures for moving 30 houses from the property lying immediately East of the Race Course to the Cleveland-Cliffs Iron Company's second addition having been approved, work was started in May by building some garages to be used as storehouses and offices until the moving has been completed. Toward the latter part of May, the Cliffs Power & Light Company crane was moved to the location, excavation of the foundation sites was started, and by the 15th of July, when the first house was moved, there were 20 foundations already concreted to the grade line. As the houses were set in place, the space between the grade line and the sills was filled in with cement blocks.

Mr. G. C. Hamnes of Hibbing, Minnesota was given the contract, but owing to considerable trouble in acquiring his bond and security, was unable to start moving as early as planned. However, he completed moving the 28 houses to the new location and the Seass house to the Seass lot on Case Street by the middle of October, moving them at the rate of ten per month. There was one other house planned to be moved in 1936 but it was held over until next

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6. SURFACE

b. Location Dwelling Repairs (Cont.)

year. A crew of approximately 70 men was employed from August, when the repairs and painting started, until November, when all the outside work was stopped. Five houses were painted white on the outside, which is to be the color used for all the houses in this location. Where the roof had to be repaired, a fire-proof shingle of woodlawn green color was used, so that eventually the entire addition will have white houses with green roofs and should present a very pleasing appearance.

Nothing further was done to the streets in 1936 on account of the proposed moving in 1937, however, they should be surfaced as soon as the remainder of the houses are moved and the sidewalks and curbs should also be installed.

The repairs to the rented houses yet to be moved were kept as low as possible, as in nearly every case this year some of the plaster was cracked while moving, necessitating redecorating the rooms. The major portion of the repairs completed this year were to the houses in the Cleveland-Cliffs Iron Company's first addition, where ten houses were painted on the outside. Seven other houses which are not going to be moved in 1937 were painted on the exterior.

b. Stockpiles

There were 41,290 tons of Bessemer ore in stock December 31st, 1936, from the steel trestle East of the shaft as compared with 33,176 tons December 31st, 1935, both exclusive of overrun, therefore the stockpile situation to the East of the shaft is very similar to what it was last year. Ample room is available for the Bessemer requirements, there being approximately the same amount of space left for Race Course and Special ores as before.

Thirty-five bents of wooden trestle were framed and erected to the West from the end of the West permanent trestle in August and September, while in December the carpenters were framing an additional 23 bents to be erected to the Southwest of the shaft to take care of the increased production expected in 1937. Ores of Maas and Race Course grades will be stocked on these trestles, leaving the permanent steel trestle to the East for Maas Bessemer and Race Course Bessemer except for 2 bents of Race Course and Special grades.

c. Tracks, Roads, Etc.

There was nothing of note done to either roads or tracks during 1936.

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6. SURFACE

d. Timber Yard

There were 259 railroad cars of various types of mining timber received and unloaded during the year, a considerable increase over 1935 on account of the increased production. There was also quite an amount of timber delivered by truck, thus eliminating the rehandling at the Mine. The timber is brought in at a fairly uniform rate instead of all in the winter months as formerly, and therefore there is practically no rotting of the timber before it is used.

e. Drainage

In October, the authorization was received to proceed with the test drilling to determine whether or not it would be possible to install a Layne Boyler pump on surface and pump sufficient water from the ledge before it entered the Mine, thus eliminating a part of the difficulties now experienced in certain territories underground.

Seven holes in all were drilled from surface to ledge by the Layne-Northwest Company, averaging approximately 200 feet in depth. Two of these holes, Nos. 3 and 6, cut through a very favorable formation and also showed considerable water, while the other holes were comparatively dry. Mr. Ogran, of the Layne Northwest Company, assured us that these two holes were favorable enough to warrant the installing of a well and he was confident that we would ultimately be able to pump 1,000 gallons per minute.

Authorization for this additional work was obtained and the well will be started early in January. There would be a saving effected in two ways when this pump is in operation; first that of pumping 1,000 gallons of water at a 200 foot head instead of at a 1,000 foot head, and second the drying up of the working places and therefore an increased efficiency in these places due to less delays. As conditions are now in these places, the ore cannot be scraped from the drifts until there is a car spotted at the chute on the level below. When the train is loaded, the miners have to wait until the ore is transported to the shaft and the train returns. Again at the shaft there is a delay, as these cars must be dumped directly into the skip, the ore being too wet to hold in the pocket. Also during the shipping season, this ore has to be put in stockpile to allow the water to drain off.

The list of holes, their depth, and the height of the water standing in each is as follows. Their location is shown on the map of the Maas surface in the Annual Report Book of Maps.

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
Depth	230'	204'	225'	200'	189'	230'	185'
Height of Water	1,310	1,298	1,287	1,240	1,312	1,293	1,300

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7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking during 1936.

b. Development

Third Level

The Second Level drift connecting with the Negaunee Mine carries a large quantity of water. As explained in the annual report for 1935, a pillar of ore known as the Second Level Supporting Pillar was left on the Roman Catholic Cemetery lease East of the winze and North of No. 115 raise, in an attempt to maintain drainage on the Second Level and keep the water from seeping into the ore at the working places. This plan was a success until mining had been carried down as far as the 450' Sub Level or 50' below the Second Level. By this time the weight of the pillar had caused it to begin to move down along the steep footwall and to crack up, letting the water through. At this point the pillar having outlived its usefulness, it was decided to attempt recovery of it. Before this work could be started, some means of handling the water on the Second Level had to be devised. In December, 1934, a raise was started in the East Footwall Pillar from the 401' Sub Level to the North of No. 118 raise. This raise was put up to the East and cut out on the 485' Sub Level elevation 25' below the drift on the Second Level. A rock drift was driven under and parallel to the Second Level drift to a point 145' East of the raise. From this drift, five small rock raises were put up, holing into the floor of the Second Level drift. All the water in this territory is now being drained through these raises to the 401' Sub Level, whence it is piped to the Third Level. This work was completed early in May.

450' Sub Level

Upon completion of the drainage system from the Second Level, a drift was driven due North from No. 115 raise at this elevation connecting with a previously driven footwall drift in ore. From this transfer drift which passed directly under the Second Level Supporting Pillar in the Roman Catholic Cemetery lease, a raise was put up in the pillar to the Second Level elevation or 450'. As this raise promptly crushed due to the cracked condition of the pillar, a second one was put up to the East to take its place. From this second raise it has been possible to completely recover the pillar down to the 465' Sub Level where mining was being continued at the end of the year.

Third Level

In attempting to choose a suitable location for a new raise to take the place of No. 111, which had crushed beyond repair, it

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7. UNDERGROUND

b. Development (Cont.)
Third Level (Cont.)

was decided to continue No. 110 raise which had been put up some 90' above the level and abandoned several years ago due to the unsettled and dangerous condition in that portion of the ore body. Examination showed that the ground had settled making it safe to continue the raise, which was put up to and connected with the 435' Sub Level workings in November and December of this year and is now being used as a mining raise. This was the only development on the Third Level in 1936.

Fourth Level

The only development on the Fourth Level during the year consisted of a new series of six raises in the drift to the Northeast of the old 240-250 drift in the Maas lease. These raises, Nos. 625 to 630, inclusive, the last being a three compartment raise, were put up on the East side of the drift to enable mining to be started in this territory, part of which is new ground under the hanging wall and part of which has previously been mined as low as the 185' Sub Level. The development of this new block was necessary to furnish new places due to the curtailment of production in the Bessemer areas below the Fourth Level and West of the main dike. It has developed, however, that the percentage of Bessemer ore is decreasing in the territory West of the dike so mining will be continued at least on the 90' Sub Level in this territory. Several additional raises along this same drift to the Southeast of those above mentioned are now being planned. From these additional raises, several Sub Levels can be mined before it becomes necessary to put up raises from the Fifth Level for the recovery of the remainder of the block.

Fifth Level

No. 7 cross-cut was started early in January and planned to cross the West boundary of the Race Course lease and run parallel and adjacent to it. From the very beginning, conditions due to water made progress practically impossible and the drift was finally stopped in the middle of April, the crew being shifted to the North footwall drift also in the Maas Property. Progress was better here although conditions were still very wet. This drift was stopped in June due to the change in policy regarding the production of Bessemer ore which made these drifts unnecessary at the present time. It was thought that the water in this territory was coming from Diamond Drill Hole No. 1 and this theory was proved correct in subsequent drifting on the plus 10' Sub Level. A discussion of this will be found under Stopping on the Plus 10' Sub Level. Additional development on the Fifth Level consisted of ten raises which were worked in during the year, six being completed.

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7. UNDERGROUND

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

Raise No. 5611 to the Plus 10' Sub Level	Completed
Raise No. 5616 to the Plus 75' Sub Level	Uncompleted
Raise No. 5618 to the Fourth Level	Completed
Raise No. 5623 to the Plus 65' Sub Level	Completed
Raise No. 5627 to the Plus 65' Sub Level	Completed
Raise No. 5633 to the Plus 65' Sub Level	Completed
Raise No. 5634 to 150' Sub Level	Uncompleted
Raise No. 5636 to the 150' Sub Level	Uncompleted
Raise No. 5638 to the 150' Sub Level	Uncompleted

No. 522 raise was put up for the purpose of ventilation. It was started from the East end of the South footwall drift and put up at 60° in rock to the Southeast toward the Negaunee Mine boundary. At an elevation of 73' on the 75' Sub Level it was cut out and a rock drift was continued to the Southeast to the above mentioned boundary. This drift was necessary to avoid running into old workings on the Fourth Level and above. At the Negaunee Mine boundary in the Adams strip another raise was put up and holed into the side of the main level drift on the Thirteenth Level, Negaunee Mine. This raise was in rock from +81 to +170 and in ore from +170 to the Thirteenth Level, Negaunee Mine at +200. Later another raise was put up starting directly over the back of No. 522 raise on the 75' Sub Level. It was advanced in ore to the 100' Sub Level and the Fourth Level. The object of this development was to furnish an exhaust outlet for the air supply in the Negaunee Mine and at the same time provide a means of conducting the air into the working places between the Fourth and Fifth Levels in the Maas Mine and has proved very successful.

c. Stoping
General

On an average, there were 34 crews engaged in mining during the year, of which 24 were slicing, 8 drifting, 1 working in an open stope and an average of 1 cutting out new working places at the tops of raises. Practically all of the blasting of filling material in new uncovered territory was done by Company account workmen who relieved the contract miners of this unproductive work. These 34 contracts were all on double shift from February 1st until November 1st, when additional men were gradually hired to form 3 shift contracts, of which there were 15 by the end of the year. This was necessary for several reasons, among them being the demand for an increase in production without available working places or equipment for additional contracts; the advisability of speeding up portions of the mining areas to get them ahead of the others for the good of general working conditions.

There were also an average of four contracts engaged in development work, which consisted of raising almost entirely.

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7. UNDERGROUND

c. Stoping
General

Mining was mainly confined to the following general areas: No. 1, the Third Level East Footwall Pillar on the 450', 435' and the 425' Sub Levels, with one contract recovering the Second Level Supporting Pillar in the same area from the Second Level down to the 465' Sub Level, inclusive. No. 2, the Third Level West Footwall Pillar on the 401' and 395' Sub Levels with the open stope above the 401' Sub Level intersecting all the Sub Levels between the 401' and the +500' elevation. No. 3, the area in the Maas Fee, lying East of the South part of the Race Course lease, which was first opened in August and September above the Fourth Level on the 195' and 170' Sub Levels. No. 4, the area in the South Fee lying between the South boundary of the Race Course and the Negaunee Mine boundary and including the Cleveland-Cliffs Iron Company strip and the Adams strip. This area lies West of the East boundary of the Race Course lease on the 140', 130', Fourth Level, 100', 90', 75', 65' and 50' Sub Levels.

In area No. 1 in the Third Level East Footwall Pillar, efficient mining was and still is almost impossible due to an excessive amount of water in the ore body. In almost every case the storage of ore in the chutes is impossible because it is too wet, which makes it necessary to scrape directly into the cars from the working places and to dump directly from the cars into the skip at the shaft. The former situation makes it possible for only one crew to scrape at a time and the latter condition has the effect of materially slowing up the hoist. Further, the wet ore is continually clogging the ditch and drift on the Third Level, delaying tramming and necessitating continual hand cleaning of the drift with a small crew during the week and a very large one on Sundays and holidays. Because it was impossible to properly service the number of contracts under existing conditions, several have been moved to the Fourth Level territory, leaving only seven gangs in this area, which includes the Maas Fee, the Roman Catholic Cemetery lease and the Cleveland-Cliffs Iron Company and Adams strips.

In area No. 2, the Third Level West Footwall Pillar, conditions were very good. Three crews worked here throughout the year with satisfactory results. One crew spent practically the entire year either developing or mining in an open stope above the 401' Sub Level, while the other two were slicing on the 401' and 395' Sub Levels. This area includes the Maas Fee, Race Course lease and the City of Negaunee lease.

The third area, in the Maas Fee, had just been well started by the end of the year but indications are that a good recovery can be expected as soon as sufficient matt has been

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7. UNDERGROUND

c. Stoping (Cont.)
General (Cont.)

established under the jasper hanging.

In the fourth area, in the Maas Fee, Race Course lease, the Cleveland-Cliffs Iron Company strip and Adams strip, the big disadvantage is the excessive weight that makes maintenance of raises and travelling ways very expensive. Also, in a number of working places in this area, the ore is the hard blue steel variety which makes drilling and blasting difficult and expensive. The necessity for working crews close together on account of there not being enough raises for the requisite number of contracts to be separated enough to have large pillars to mine is a factor contributing to this excessive weight, since quite a large area is being caved all at once making support very difficult. It is planned that as soon as possible additional working places will be opened up, thereby reducing the congestion of contracts, thus avoiding some of the weight. This attempt was made during the year but the addition of a number of new crews and the necessity of moving several in from the Third Level has resulted in filling up these new places as fast as they become available.

Subs Between the 2nd & 3rd Levels

East Footwall Pillar

The Second Level, and the 495', 485', 475', and 465' Subs

The only work on the above elevations during 1936, with the exception of the drainage drifts and raises on the 485' Sub Level mentioned under Third Level Development, was the recovery of the Second Level Supporting Pillar in the Roman Catholic Cemetery lease and the Maas Fee. This was accomplished by means of two raises from a transfer drift on the 450' Sub Level through which the ore was mined. One double shift contract worked in this pillar continuously from May, with very poor results due to an excessive amount of water and the cracked condition of the pillar. In spite of these conditions it was possible to completely recover the pillar down to the 465' Sub Level where mining is still being carried on. For purposes of record, No. 35 contract was slicing to the East of the transfer raise in the Roman Catholic Cemetery lease during the month of December.

450' Sub Level

This Sub Level was originally opened in 1916 in this area and nothing more was done until 1935 when mining was started from both the West and East ends. During 1936 this sub level was

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7. UNDERGROUND

c. Stoping (Cont.)

450' Sub Level (Cont.)

completely mined out with the exception of pillars left to support the transfer drift to the 465' Sub Level and several pillars left to support the footwall drainage drift. This footwall drainage drift was driven in January and February in an attempt to handle the water running down the footwall and thus keep it out of the working places. The driving of this drift was very slow and expensive due to long scraping distances and wet ore but it was successful in part as it permitted the hanging portion of the Sub Level to be mined dry. During December, No. 2 contract recovered the last available pillar to the Northeast of No. 116 raise and began to cut out at the same raise on the 435' Sub Level directly below. Ore has been mined from the Maas Fee and the Roman Catholic Cemetery lease, the Cleveland-Cliffs Iron Company strip and the Adams strip.

435' Sub Level

This Sub Level also was first opened in 1916 in this territory and nothing more was done until 1936 when it was re-opened at the East end from No. 122 raise. During the year it was completely mined out in the Cleveland-Cliffs Iron Company and Adams Strips, and about 50% mined in the Roman Catholic Cemetery lease. The opening of the West end in the Maas Fee was delayed until the middle of the year due to the necessity of maintaining pillars on the 450' Sub Level. Footwall drainage drifts have been started similar to those on the 450' Sub Level and were uncompleted at the end of 1936. Workings in the West end to date have been confined to the connecting of raises Nos. 107, 108, 108A, 109 and 110. As soon as possible the footwall drift will be continued to the Northeast of No. 109 raise to connect with the drift to the Northwest of No. 118 raise. During December there were five crews of miners working in the following places: No. 8 at No. 107 raise; No. 7, connecting between raises Nos. 108A and 110; No. 5 at No. 119 raise; No. 2 at No. 116 raise; and No. 29 at No. 118 raise. The drift to the Northwest of No. 118 raise has been temporarily discontinued and contract No. 29 has been moved to the 425' Sub Level at No. 121 raise.

425' Sub Level

In November, 1936, this Sub Level was started in the East end in the Cleveland-Cliffs Iron Company strip by cutting out in No. 122 raise. Raises 120, 121, and 122 have been connected and slicing has been started in the Cleveland-Cliffs Iron Company strip and the Roman Catholic Cemetery lease to the Southwest of No. 122 raise. During December No. 29 contract

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c. Stoping (Cont.)

425' Sub Level (Cont.)

was drifting from No. 121 raise and No. 6 contract was eliciting from No. 122 raise.

401' Sub Level

The raise from this elevation to the 485' Sub Level was completed early in the year as discussed under the heading of Development. No further work was done on this elevation during the year with the exception of routine timbering and repairs to maintain the travelling road to the Negaunee Mine for purposes of ventilation and outlet.

Third Level

With the exception of the completion of No. 110 raise that was discussed under Development, there was no work done on the Third Level other than re-timbering and repairing.

West Footwall Pillar

495', 485', 475', 465', 450', 435', and 425' Sub Levels

The operations in the open stope in the Northwestern end of the Sub Level and in the Race Course lease, above the 401' Sub Level, recovered all of the ore between the foot and hanging walls in this territory on the above elevations. A more complete discussion of this stope will be found under the 401' Sub Level heading.

401' Sub Level

Early in the year the crew slicing from 18W raise found the ore was continuing to the North on the footwall and it was decided to follow the ore up along the footwall which was lying at an angle of 10° to 15° with the horizontal. At a point about 180' North of the raise, a dike was encountered on the right side of the drift which was turned to the left in order to follow along the dike instead of through it. This drift was continued along the dike to a point 260' North of the raise where the intersection between the jasper foot and hanging wall was encountered. Exploration raises showed considerable ore above the back of the drift so it was decided that conditions were suitable for opening up a stope. Stopping operations were carried on for several months using a system similar to Sub Level stopping. Excellent results were obtained until material commenced to slab off from the dike on the right, thereby contaminating the ore. Recovery in this portion of the stope being almost 100% completed, the crew dropped back

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c. Stoping (Cont.)

401' Sub Level (Cont.)

to a point 80' North of the raise and drove a second entrance drift into the left side of the stope. It was from this drift that the remainder of the ore was recovered. A small pillar being left on the right or East side to keep out the broken dike. Scraping was carried on for several months using tandem scrapers, after which the system was changed whereby two independent scrapers were used, one pulling the ore from the stope half way to the raise and the other completing the operation. Inasmuch as all of this ore was above a very flat footwall, there is no possibility of ever mining beneath this stope so covering down was not necessary. The supply of ore in the stope was exhausted early in December and the crew started to slice the few remaining pillars on this elevation that had been left to support and maintain the scraping drift. In December, this contract, No. 11, was slicing to the North of No. 18W raise. The remainder of the 401' Sub Level was mined out by two contracts, one of which worked for a short time from No. 1 raise after which it was moved to No. 5W raise. The other contract did all of its mining from No. 20W raise. The ore on this Sub Level was recovered from the Race Course lease, the Maas Fee, and the City of Negaunee strip and was entirely mined out at the end of the year with the exception of the pillars in the vicinity of No. 18W raise.

395' Sub Level

This Sub Level was opened for the first time in 1936 by the two contracts that finished mining on the 401' Sub Level above. Indications are that the ore area is becoming considerably smaller due to the flat pitch of the footwall and the comparatively steep pitch of the hanging wall. Mining was carried on in the Race Course lease, the City of Negaunee strip and the Maas Fee, the last two being completed in December. During December contract No. 12 was slicing from No. 20W raise and contract No. 10 from No. 5W raise.

Sub Levels Above the Fourth Level

Mining in the Sub Levels above the Fourth Level was confined to the main mining areas Nos. 3 and 4 mentioned in the previous general discussion. In area 3 in the Maas Fee lying East of the South part of the Race Course lease and opened up by the new 600 series of raises, the mining to date has been of an exploratory nature.

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c. Stoping (Cont.)

Area No. 3

230' Sub Level

No. 625 raise was put up in ore from the Fourth Level 89' to the jasper hanging and the raise was cut out at the 195' Sub Level elevation. A short drift off the foot side of the raise to the Northeast showed additional ore in the back of the Sub Level, so the raise was flattened slightly and continued on up to the 230' Sub Level elevation. At this point solid hanging rock was encountered and the raise was cut out in preparation for mining. Unfortunately the ore proved to be a very small stringer averaging less than 20' in extent, and the contract after blasting in some of the hanging for filling moved to the 215' Sub Level below.

215' Sub Level

The ore at this elevation proved to be only slightly greater in extent than the amount found on the 230' Sub Level above. After mining a small area about 30' long and an average of 25' wide, the floor was closely poled and more hanging blasted down to form a matt and the contract moved to the 195' Sub Level where mining was continued.

195' Sub Level

Before carrying out the work discussed under the 230' and 215' Sub Level headings, the crew on this elevation drifted to the Southeast a matter of 60' from No. 625 raise, there encountering old caved workings on the 200' Sub Level. Lean ore and jasper was encountered in a number of places in this drift proving that there was little or no ore above. After completing the work on the 230' Sub Level and the 215' Sub Level the crew drifted to the Northeast 85' to the mining limit where they holed into the old cross-cut which was driven South from the Winze several years ago. Further mining on this elevation in this territory will be accomplished from a transfer raise above the 170' Sub Level drift from No. 628 raise to be discussed later. In December, No. 25 contract was engaged in slicing from No. 625 raise and No. 46 contract was preparing to start mining from the above mentioned transfer raise.

170' Sub Level

This sub level was opened in October from the 600 series of raises and in November considerable difficulty was encountered. The raises from 626 to 628 inclusive, had either found jasper hanging or old workings in the back at this elevation and therefore it was decided to cut out at this elevation. The first

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c. Stoping (Cont.)

170' Sub Level (Cont.)

The first drifts from the raises to the Northeast were put in without any trouble, but when slicing was started the ore in the back caved, running up to the old drifts on the 185' and 200' Sub Levels above. This made a very unsafe condition, at the same time proving that the ore went much higher than it was first thought. The contracts were immediately stopped and an attempt made to fill the caved area by putting up raises alongside the cave and blasting filling from these and also from the old drift on the 200' Sub Level, which we were able to enter from the 195' Sub Level. This was unseccessful due to the hanging being so far above the Sub and there was also too much ore being lost. Therefore, a transfer raise was put up from the North end of the cross-cut at 628 raise and in December No. 46 contract was cutting out here on the 195' Sub Level under the hanging. No. 21 contract was drifting to the West from 627 raise while the contract formerly in 626 raise was split up to form extra 3 shift contracts.

No. 43 contract in 629 and No. 3 in 630A were mining to the Northeast under old covering, while No. 37 was slicing to the Southwest from 630 raise. All of this area is in the Maas Fee and is a Non-Bessemer territory.

Area No. 4

The main mining area referred to as area No. 4 in the General discussion consists of that portion lying in the South part of the Race Course lease and the Southeast portion of the Maas Fee, lying South of the South boundary of the Race Course lease and North of the Negaunee Mine boundary. This includes the Cleveland Cliffs Iron Company strip and the Adams strip.

140' Sub Level

Except for a small area on the North footwall mined from No. 240 raise on the Fourth Level, this entire Sub Level has been mined from Fifth Level raises during 1934, 1935 and 1936. Mining on this elevation was completed early in 1936, a small portion of the recovery being made from the Race Course lease and the remainder from the Maas Fee. Ore from this Sub Level averaged about 50% Bessemer.

130' Sub Level

This Sub Level was originally opened in 1934 by a connecting drift between four raises in the 5500 series in the Race Course lease. The bulk of the Race Course ore and a portion of the

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c. Stoping (Cont.)

130' Sub Level (Cont.)

Maas ore was recovered in 1935, the remainder being mined out this year. The ore under the hanging wall is largely of a Bessemer grade, the recovery from the whole Sub Level having averaged about 60% Bessemer.

Fourth Level

The ore at this elevation has become considerably larger in area than that on the Sub Levels above due to the vertical dike on the East being used as a limit while the pitch of the hanging wall is to the West. Mining was carried on in the Race Course lease and Maas Fee throughout the entire year, an average of 14 contracts being employed at this elevation and subsequently on the 100' Sub Level below. At the end of the year, mining in the Race Course lease West of the dike had been practically completed with the exception of some small pillars that must be left temporarily to maintain ventilation and traveling ways to the Sub Levels below. The area in the Maas Fee has also been entirely mined with the exception of the small ore body lying South of the dike and North of the Negaunee Mine boundary. In December, No. 43 contract finished mining from No. 5516 raise in the Race Course lease and moved to the 170' Sub Level, No. 629 raise. No. 26 contract was slicing South of No. 511 raise in the Maas Fee and the Cleveland-Cliffs Iron Company and Adams strips. No. 42 contract completed an air raise from the 75' Sub Level to the 100' Sub Level and Fourth Level and moved to the Fifth Level to begin No. 5616 raise. The new raises in the 600 series have been discussed under previous headings.

Sub Levels Between the Fourth and Fifth Levels

100' Sub Level

This large Sub Level, which was originally open in December, 1935 was about 75% mined out during 1936, the Race Course lease being mined first in advance of the Maas Fee. The proportion of Bessemer ore recovered in this territory has decreased to approximately 40%. At the end of the year, mining was being carried on in both the Race Course and the Maas. For purposes of record, the following contracts were engaged as listed below:

- No. 41 at Raise No. 5620
- No. 23 at Raise No. 5518
- No. 22 at Raise No. 5622, finished and moved to the 90' Sub Level at the same raise.
- No. 33 at Raise No. 5624, moved to the 50' Sub Level, Raise No. 5627

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c. Stoping (Cont.)

100' Sub Level

No. 38 at Raise No. 5636
 No. 24 at Raise No. 5638, moved to the 90' Sub Level, Raise No. 5628.
 No. 51 at Raise No. 5640
 No. 47 at Raise No. 5642
 No. 49 at Raise No. 512
 No. 52 at Raise No. 5534
 No. 27 at Raise No. 5536
 No. 28 at Raise No. 5538
 No. 48 at Raise No. 5542
 No. 36 at Raise No. 526, moved to the 90' Sub Level, Raise No. 5528.
 No. 46 at Raise No. 518, finished and moved to the 170' Sub Level to the transfer raise at No. 628.

90' Sub Level

This Sub Level was first opened late in 1936 and operations to date have been confined to the connecting of raises Nos. 5520 to 5534, inclusive, largely in the Race Course lease and the cutting out of Nos. 5622 and 5628, also in the Race Course lease. In addition to this, slicing has been started to the East at Nos. 5522, 5526, and 5530 and to the West from 5528. In December, contract No. 51 was working at No. 5520 raise; contract No. 30 at No. 5532 raise; contract No. 32 at No. 5526 raise; No. 36 at No. 5528 raise; and No. 50 at raise No. 5530. Contracts Nos. 23 and 24 were cutting out at raises Nos. 5622 and 5628 respectively. This ore is now averaging about 30% Bessemer.

75' Sub Level

A discussion of the ventilation drift from No. 522 raise can be found under the heading of Development. A small amount of actual mining was also done at this elevation during 1936 in an attempt to mine some Race Course Special grade ore. New country was opened up in the vicinity of raises Nos. 5618 and 5620. These two raises were connected and a small amount of slicing was done to the West of No. 5618. Since it developed that an amount of ore would have to be left above this Sub Level, it was decided to stop mining in this vicinity for the present. This mining was confined entirely to the Race Course lease.

65' Sub Level

The only previous work done on this elevation was a ventilation and travelling drift that was driven in 1935. This drift was driven to the Northeast of No. 5428 raise, starting in the Race Course lease

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7. UNDERGROUND

c. Stoping (Cont.)

65' Sub Level (Cont.)

and being continued in the Maas Fee. In April, 1936, in an attempt to produce Race Course Special grade ore, mining operations were started at this elevation from raises Nos. 5623, 5627, and 5633 that had been put up for this purpose. Mining was carried on throughout the year, first by two contracts and later by one to the Southwest of an arbitrary mining limit under the new hanging wall. It later developed that only a small proportion of the ore recovered in this area was of the Race Course Special grade. The remainder being Race Course Non-Bessemer. Mining in this territory, which was confined entirely to the Race Course lease, was completed by No. 40 contract in December of this year. Further mining in this area will be carried out on the 50' Sub Level, working in this territory just enough to keep this block a step ahead of that mining to the East.

50' Sub Level

The only previous work on this Sub Level was a drift connecting raises Nos. 5522 to 5526 inclusive, which was completed in 1935. In December, 1936, drifting was started from No. 5627 raise preparatory to further mining under the new hanging wall territory at this elevation. This work was also confined to the Race Course lease and was being done by contract No. 33.

+10' Sub Level

As discussed under the heading of Development, a prohibitive amount of water was encountered when attempting to extend No. 7 cross-cut on the Fifth Level. In the hope of cutting off this water which was believed to be coming from Diamond Drill Hole No. 1, raise No. 5611 was put up on the West side of No. 6 cross-cut, 75' Southeast of the North footwall drift in the Race Course lease. This raise was put up 27' above the floor of the Fifth Level and cut out on the +10' Sub Level elevation. From there a drift was driven in ore Southeast of the raise toward the end of No. 7 cross-cut. This direction was chosen, not so much for the purpose of actually finding the Diamond Drill hole, but in an attempt to drift across the end of No. 7 cross-cut, thereby diverting the water into the Sub Level drift. At a point 125' from the foot of the raise, the jasper hanging wall was encountered. A small dog drift in rock was continued 15' where it broke through into a large open hole. This hole had been washed out of the loose jasper and lean ore hanging wall by the water running out of Diamond Drill Hole No. 1, which was found on the South Side of the opening. This opening has been completely filled with a timber bulkhead to prevent further falling away of the material. For the present, since No. 7 cross-cut has been discontinued, the

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c. Stoping (Cont.)

+10' Sub Level (Cont.)

water is still running into the main level drift but it is the intention to pipe it through the Sub Level drift at some future date. It is not deemed advisable to attempt to plug this hole with cement since the water would merely back up and run out somewhere else and it is much better to pipe it and keep it under control.

Fifth Level

There was no work done on the Fifth Level other than the drifting and raising already discussed under Development. Arrangements are now being made to continue the South footwall drift to the Northeast along the Negaunee Mine boundary line to get ready for mining additional blocks of ore above the Fourth Level.

d. Timbering

The maintenance of main level drifts was decidedly reduced in 1936 especially on the Fourth Level where the mining in the Race Course lease and South of the Race Course reached the main level elevation and thus eliminated the drifts and cross-cuts in this area. On the other hand, the treated timber in the Fifth Level has started to show signs of decaying and this, together with the necessary repairs to drifts and raises throughout the subs, has required a very large crew of men repairing on days the mine was not working as well as a normal repair crew during the week.

A study of the statement of timber used shows a considerable increase in the amount of cribbing used in 1936 as compared with 1935 which is due to the fact that during 1936, 17 raises were put up from the Fourth and Fifth Levels as compared with 10 in 1935. The feet of stull timber per ton of ore was slightly decreased in 1936 due to less main level repairs. The feet of lagging per ton of ore decreased in approximately the same proportion as the feet of poles increased, due to more covering down under new hanging to form a safe matt to work under.

The total cost for timber in 1936 was naturally much larger than in 1935 due to the increased production, but the cost per ton was less due to more 9' timber being used and a resultantly larger amount of ore per set of timber. The price of mining timber in 1936 was increased by .0056 per foot over 1935.

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d. Timbering (Cont.)Statement of Timber Used

<u>Kind</u>	<u>Linnear Feet</u>	<u>Price</u>	<u>Amount 1936</u>	<u>Amount 1935</u>
6" x 8" Cribbing Timber	103,545	.0349	3,618.22	3,115.59
8" x 10" Stull "	87,462	.0541	4,735.11	4,249.63
10" x 12" " "	118,087	.0791	9,350.80	6,778.97
12" x 14" " "	41,513	.1255	5,213.57	2,281.71
12" x 14" Treated "	2,245	.2041	458.42	680.00
Total Timber - 1936	352,852	.0662	23,376.12	
Total Timber - 1935	282,315	.0606		17,105.90
7' Lagging	1,513,757	.699	10,586.17	8,427.68
9½' Poles	1,175,226	1.066	12,529.20	7,212.53
Total - 1936	2,688,983		23,115.37	
Total - 1935	1,853,995			15,640.21
Wire Fencing - Sq. Ft.	72,875	.0063	460.81	239.58
Grand Total - 1936			46,952.30	
Grand Total - 1935				32,985.69

	<u>Amount 1936</u>	<u>Amount 1935</u>
Product, Tons	539,462	363,480
Feet of Cribbing & Stull Timber per ton of Ore	.654	.777
Feet of Stull Timber per ton of Ore	.462	.527
Feet of Lagging per ton of Ore	2.806	3.1907
Feet of Poles per ton of Ore	2.1785	1.9099
Feet of Wire Fencing per ton of Ore	.1350	.0106
Feet of Lagging per Foot of Timber	4.2900	4.1081
Feet of Poles per Foot of Timber	3.3300	2.4590
Cost per Ton for Timber	.0434	.0471
Cost per Ton for Lagging	.0196	.0232
Cost per Ton for Wire Fencing	.0008	.0006
Cost per Ton for Poles	.0232	.0198
Cost per Ton for All Timber	.0870	.0907
Equivalent of Stull Timber to Board Measure	720,956	528,914
Feet of Board Measure per Ton of Ore	1.336	1.455

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

<u>Year</u>	<u>Amount</u>	<u>Cost per Ton</u>
1936	46,952.30	.0870
1935	32,985.69	.0907
1934	29,435.36	.1055
1933	23,285.71	.1769
1932	10,857.50	.1199

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e. Drifting and Raising

The following is a comparison of the drifting and raising in the years 1936 and 1935:

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>	
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>
1936	540	369	1,347	397
1935	449	231	1,314	145
Increase	91	138	33	252

There was a slight increase in the amount of development drifting and raising during the year. The only main development drifting was in the Fifth Level in No. 7 cross-cut and in the North footwall drift which was extended Westerly into the Maas Fee. The material in both drifts was mostly jasper with a few seams of ore. There were several more raises put up in 1936 than in the preceding year but the total amount of raising only increased by 285', due to seven of the raises in the Fourth Level only being 60' in length, where the Fifth Level raises are at least 160' in length.

During the coming year the South footwall drift will have to be extended to the Northeast and several raises put up to the Fourth Level to provide more working places due to the increased production of Non-Bessemer ore. This development will be about 75% rock.

f. Explosives, Drilling and Blasting

The cost per ton for explosives shows only a slight decrease for 1936 over that in 1935 while the average price per pound decreased from .1171 in 1935 to .1106 in 1936. The reason why there was not a corresponding decrease in the cost per ton was due to the fact that none of the mining in 1936 was under new hanging and necessitated a greater amount of powder per ton of ore.

The cost for explosives used in rock development and filling whows an increase in 1936 due mostly to blasting and filling under new hanging.

Stoping and Ore Development

<u>Kind</u>	<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1936</u>	<u>Amount</u> <u>1935</u>
1 $\frac{1}{4}$ " 50% Amonia Gel. Pwd.	222,705	.1106	24,631.55	17,012.16
Total Powder 1936	222,705	.1106	24,631.55	
Total Powder 1935				17,012.16

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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>1936</u>	<u>Amount</u> <u>1935</u>
Fuse	M Ft.	766,643	5.67	4,348.71	2,280.76
#6 Blasting Caps	M	111,274	11.19	1,246.26	898.10
Electric " "	Ea.	2,615	.1036	270.99	147.60
Powder Bags	Ea.	74	2.33	172.96	130.22
Tamping Bags	M	13,500	2.23	30.13	18.70
Fuse Lighters	M	18,500	6.77	125.35	77.62
Fuse Seal	Can	32	.612	19.60	7.20
Blasting Machines	Ea.	1		35.00	
Connecting Wire	Lb.	3,000	11.33	34.00	1.60
Total Fuse, Caps, Etc.				6,283.00	4,054.12
Total All Explosives				30,914.55	21,066.28
Product, Tons				539,462	363,480
Pounds of Powder per ton of Ore				.4128	.3998
Cost per ton for Powder				.0456	.0468
Cost per ton for Fuse, Caps, Etc.				.0116	.0112
Cost per ton for All Explosives				.0572	.0580

Rock Development & Filling

<u>Kind</u>		<u>Quantity</u> <u>Pounds</u>	<u>Average</u> <u>Price</u>	<u>Amount</u> <u>1936</u>	<u>Amount</u> <u>1935</u>	
1½" 50% Amonia Gel. Powder		5,265	.1123	591.71	284.94	
Total Powder 1936				5,265	.1123	591.71
Total Powder 1935				2,425	.1171	284.94
Fuse	M Ft.	18,167	5.68	103.34	55.28	
#6 Blasting Caps	M	2,616	11.20	29.30	15.73	
Total Fuse, Caps, Etc.				132.64	71.01	
Total All Explosives				724.35	355.95	
Total Explosives used at Mine				31,638.90	21,422.23	
Average Price per pound for Powder				.112	.117	

Statement showing cost per ton for Explosives, exclusive of rock development, for the period 1932 to 1936:

<u>Year</u>	<u>Cost per Ton</u>	<u>Production</u>
1936	.0572	548,473
1935	.0580	363,480
1934	.0614	278,985
1933	.0634	131,574
1932	.0593	90,531

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h. Mining and Loading

All of the ore mined during the year was handled with scrapers. There were two places where ore had to be handled by means of a transfer drift. One of these on the 435' Sub Level from No. 115 raise was still being used at the end of the year. The second, on the Fourth Level, off the end of No. 5510 raise has been eliminated since the ore above it has been exhausted.

Six new 15 H. P. scraper hoists were purchased during the year, 4 from the Sullivan Company and 2 from the Ingersoll Rand. These hoists were necessary equipment for speeding up production and there should be some additional hoists purchased in 1937, as on three shifts the machines receive such constant use that they have to be sent to the Shops more often for repairs. Several more of our double drum air hoists were changed over to single drum hoists for the hoisting of timber. It is planned to have one of these hoists for at least every three contracts so that the timber can be hoisted to their working places without the delay of using the miners scraper hoists.

i. Ventilation

The work of enlarging the air ways in the Negaunee Mine that was done in 1934 and 1935 has aided materially in increasing the fresh air supply for the Maas Mine. A total supply of about 80,000 cubic feet per minute is now being produced by the ventilation fan at the Negaunee Mine, 65,000 cubic feet of which eventually are distributed into the Maas workings. With the exception of one or two isolated areas, ventilation conditions have been much improved. The new air way from the 13th Level, Negaunee Mine, through No. 522 raise on the 75' Sub Level in the Maas Mine, is now supplying an adequate quantity of air to many of the working places below the Fourth Level. While it is still necessary to use blower fans to carry fresh air up from the Fifth Level in some instances, the need for these fans has been reduced. It has not been necessary as yet to change the direction of air currents so as to bring air up from the Fifth Level except in the case of the blower fans above mentioned.

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j. Pumping

The number of gallons pumped per minute during 1936, 1935, 1934, 1933 and 1932 are shown below:

<u>Month</u>	<u>1936</u>	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>
January	1,152	1,184	1,036	1,039	1,103
February	1,200	1,146	1,034	1,065	1,156
March	1,252	1,100	1,014	1,049	1,105
April	1,388	1,106	1,014	1,052	1,090
May	1,255	1,110	1,023	1,070	1,085
June	1,251	1,140	1,031	1,071	1,070
July	1,261	1,155	1,075	1,047	1,083
August	1,233	1,129	1,044	1,068	1,079
September	1,301	1,141	1,085	1,070	1,076
October	1,314	1,061	1,080	1,029	1,087
November	1,329	1,126	1,072	1,047	1,089
December	1,418	1,152	1,079	1,050	1,101
Total Average	1,280	1,130	1,049	1,055	1,094

It will be noted that the average water pumped per minute has increased 150 gallons per minute in 1936 over 1935. This is partly due to the water encountered in No. 7 cross-cut in the Fifth Level when this cross-cut holed into No. 1 Diamond Drill hole. There is also more water coming through the workings in the Southeast part of the Race Course. During 1937 it is planned to drill a well from surface to ledge and it is expected that when the pump is installed in this well, we will be able to very materially reduce the amount of water underground.

8. COST OF OPERATING

a. Comparative Mining Cost

	<u>1936</u>	<u>1935</u>	<u>Incr.</u>	<u>Decr.</u>
Product	539,462	363,480	175,982	
Underground Cost	1.083	1.140		.057
Surface Cost	.116	.131		.015
General Mine Expense	.185	.205		.020
Cost of Production	1.384	1.476		.092
Depletion - Original Cost	.238	.234	.004	
Increment	.003		.003	
Depreciation-Plant & Equip.	.033	.032	.001	
Development	.031	.034		.003
Movable Equip.	.000	.001		.001
Taxes	.180	.241		.061
Loading and Shipping	.000	.024		.024
Total Cost at Mine	1.869	2.042		.173
No. of Days Operated	292	303		11
No. Shifts and Hours	2-8	1-8		
Average Daily Product	1,847	1,200	647	

MAAS MINE
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8. COST OF
OPERATING

a. Comparative Cost of Mining (Cont.)

COST OF PRODUCTION

	<u>1936</u>	<u>%</u>	<u>1935</u>	<u>%</u>	<u>Decr.</u>
Labor	.795	57.4	.80	54.3	.005
Supplies	.589	42.6	.676	45.7	.087
Total	1.384	100.0	1.476	100.0	.092

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>
1936	292	2-8	327½	84,080
1935	303	1-8	298	57,745
Increase			29½	26,335
Decrease	11			

(2) Wages

There was a wage increase of six cents per hour effective November 16, 1936.

(3) Comparison of Production

	<u>Production</u>	<u>Average Daily Product</u>
1936	539,462	1,847
1935	363,480	1,200
Increase	175,982	647

(4) Comparison of Number of Men & Wages

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1936	327½	84,080	415,779.71	4.95
1935	298	57,745	283,015.41	4.90
Increase	29½	26,335	132,764.30	.05

(5) Tons per man per day

	<u>1936</u>	<u>1935</u>	<u>Incr.</u>	<u>Decr.</u>
Surface	34.98	30.48	4.5	
Underground	7.86	7.93		.07
Total	6.42	6.29	.13	

(6) Cost of Production

1936	\$746,722.88	Cost per ton	1.384
1935	535,288.30	" " "	1.476
Increase	\$211,434.58		
Decrease			.092

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YEAR 1936

8. COST OF OPERATING

(6) Cost of Production (Cont.)

	Total Cost				Cost per Ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1936	428,957.68	57.4	317,765.52	42.6	.795	.589	1.384
1935	290,831.35	54.3	245,578.61	45.7	.800	.676	1.476
Incr.	138,126.33	3.1	72,186.91				
Decr.				3.1	.005	.087	.092

(7) Detail of Accounts

	1936	1935	Incr.	Decr.
Days per Week	4 $\frac{1}{2}$	2 & 3		
Shifts & Hours	2-8	1-8	1-8	
Production, Tons	539,862	363,480	175,982	
Avg. Daily Product, Tons	1,847	1,200	647	
Number of Days Worked	292	303		11

	1936		1935		Increase		Decrease	
	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
<u>Underground Costs</u>								
1. Exploring in Mine	145.50	.000	212.24	.001			66.74	.001
2. Development in Rock	4,860.10	.009	2,354.13	.006	2,505.97	.003		
4. Development in Ore	10,563.91	.020	10,107.76	.028	456.15			.008
5. Stoping	214,331.30	.398	133,115.84	.366	81,215.46	.032		
6. Timbering	154,480.35	.287	107,043.22	.295	47,437.13			.008
7. Tramming	49,768.66	.092	34,055.23	.094	15,713.43			.002
8. Ventilation	9,114.32	.017	10,600.11	.029			1,485.79	.012
9. Pumping	56,266.42	.104	47,360.12	.130	8,906.30			.026
10. Compressors & Air Pipes	36,216.34	.067	26,590.85	.073	9,625.49			.006
11. Back Filling	1,192.22	.002	531.58	.002	660.64			
12. Underground Supt.	12,952.57	.024	12,327.38	.034	625.19			.010
13. Cave-In			40.60				40.60	
14. Main. Compr. & Drills	1,684.80	.003	1,097.58	.003	587.22			
15. Scrapers & M. Loaders	22,182.72	.041	18,354.64	.051	3,828.08			.010
16. Elec. Tram Equip.	8,249.59	.015	5,608.34	.015	2,641.25			
17. Pumping Machinery	2,008.64	.004	4,770.54	.013			2,761.90	.009
Total Undg. Costs	584,017.44	1.083	414,170.16	1.140	169,847.28			.057
<u>Surface Costs</u>								
18. Hoisting	26,566.70	.049	19,126.97	.052	7,439.73			.003
19. Stocking Ore	9,232.89	.017	6,492.99	.018	2,739.90			.001
21. Dry House	7,018.87	.013	5,866.37	.015	1,152.50			.002
22. General Surface	5,305.87	.010	4,760.75	.013	545.12			.003
23. Maint. Hoisting Equip.	8,113.63	.015	5,645.85	.016	2,467.78			.001
24. Shaft	579.85	.001	1,100.85	.003			521.00	.002
25. Top Tram Equip.	3,904.30	.007	2,393.43	.007	1,510.87			
26. Docks, T. & Pkts.	554.69	.001	1,706.73	.005			1,152.04	.004
27. Mine Buildings	1,556.37	.003	589.13	.002	967.24	.001		
Total Surface Cost	62,833.17	.116	47,683.07	.131	15,150.10			.015

MAAS MINE
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YEAR 1936

8. COST OF
OPERATING

(7) Detail of Accounts (Cont.)

<u>General Mine Expense</u>	<u>1936</u>		<u>1935</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>
28. Insurance	433.45	.001	479.60	.001			46.15	
29. Mining Engrg.	1,916.98	.004	1,609.76	.005	307.22			.001
30. Mech. & Elec. Engr.	1,518.45	.003	1,215.38	.003	303.07			
31. Analysis & Grading	20,750.28	.038	15,253.60	.042	5,496.68			.004
32. Personal Injury	13,944.39	.026	10,364.74	.028	3,579.65			.002
33. Safety Department	1,493.64	.003	702.24	.002	791.40	.001		
34. Tel. & S. Devices	1,230.72	.002	1,668.81	.005			438.09	.003
35. Local & G. Welfare	4,811.03	.009	5,277.00	.013			465.97	.004
36. Sp. Exp. Pens. & All.	8,056.72	.015	7,462.58	.021	594.14			.006
37. Ishpeming Office	16,357.24	.030	14,160.00	.042	2,197.24			.012
39. Mine Office	16,435.70	.030	13,273.26	.037	3,162.44			.007
Saranac Invest.	2,458.64	.004	1,968.10	.006	490.54			.002
Acc. for Unempmt. Tax	4,320.44	.008			4,320.44	.008		
Employees' Vacation	6,308.78	.012			6,308.78	.012		
Group Insurance	1,092.11	.002			1,092.11	.002		
Total Gen. Mine Exp.	101,128.57	.187	73,435.07	.205	27,693.50			.018
Cost of Production	747,979.18	1.386	535,288.30	1.476	212,690.88			.090
40. Taxes	96,877.83	.180	87,489.56	.241	9,388.27			.061
Total Cost	844,857.01	1.566	622,777.86	1.717	222,079.15			.151

GENERAL

Most of the accounts showed a decided increase in the amount of money but on the other hand, a decrease in the cost per ton due to a larger production and better results obtained in stoping as reflected in the tons per man, being 6.42 in 1936 as compared with 6.29 in 1935.

UNDERGROUND COSTS

3. Development in Rock

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost</u> <u>Per Foot</u>
1936	369'	397'	766	6.34
1935	231	145	376	6.26
Increase	138'	252'	390	.08

The increase in rock drifting and raising is due to drainage between the Second and Third Levels.

4. Development in Ore

	<u>Drifting</u>	<u>Raising</u>	<u>Total Feet</u>	<u>Cost</u> <u>Per Foot</u>
1936	540'	1,347'	1,887	5.60
1935	449	1,314	1,763	5.73
Increase	91'	33'	124	
Decrease				.13

The decrease in cost per foot is due to less high raises from the Fifth Level.

MAAS MINE
ANNUAL REPORT
YEAR 1936

8. COST OF
OPERATING

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

5. <u>Stoping</u>	Cost		Cost		Total
	Labor	Per Ton	Supplies	Per Ton	
1936	174,785.79	.324	39,545.51	.074	.398
1935	106,496.30	.293	26,619.54	.073	.366
Increase	68,289.49	.031	12,925.97	.001	.032

The increase in amount is due to larger production in 1936 than in 1935 while the cost per ton increase is due to more wet areas and opening up in new territories, also increase in wages November 16th.

6. <u>Timbering</u>	Labor		Supplies		Total Cost
		%		%	Per Ton
1936	96,238.44	62.3	58,241.91	37.7	.287
1935	66,291.19	61.9	40,752.03	38.1	.295
Increase	29,947.25	.4	17,489.88		
Decrease				.41	.008

More timber used in 1936 on account of larger production, but less for repairing on main levels.

7. <u>Tramming</u>	Cost	
	Labor	Per Ton
1936	43,264.51	.092
1935	29,332.39	.081
Increase	13,932.12	.011

Increase in amount due to larger production, while increase in cost per tons is on account of having to put extra tramming gangs on the third shift to handle the product from two shifts.

8. <u>Ventilation</u>	Cost	
	Cost	Per Ton
1936	9,114.32	.017
1935	10,600.11	.029
Decrease	1,485.79	.012

Decrease due to less work done on enlarging airways in 1936.

9. <u>Pumping</u>	Gallons Pumped	Gals. Per Min.	Cost for Power
	1936	674,297,310	1,298
1935	597,379,626	1,140	38,307.74
Increase	76,917,684	158	7,797.00

There was more underground water pumped in 1936 on account of encountering surface diamond drill hole No. 1 in the Race Course lease on the Fifth Level.

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YEAR 1936

8. COST OF
OPERATING

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

10. Compressors & Air Pipes

	<u>Cu.Ft. Air</u> <u>Compressed</u>
1936	897,919,800
1935	686,520,000
Increase	<u>211,399,800</u>

Both compressors had to be used steadily on account of the increased operating schedule.

12. Underground Superintendence

Larger amount due more days worked in 1936. Decrease in cost per ton due to greater production.

15. Scrapers and Mechanical Loaders

The increase is due to much greater maintenance cost on scrapers and scraper hoists on account of their being used more continuously in 1936.

17. Pumping Machinery

The decrease is due to less repairs to pumps in 1936. A large charge was made in 1935 on account of repairs to the main discharge Y connection in the Third Level pump house.

SURFACE COSTS

18. Hoisting

	<u>Total Ore</u> <u>& Rock</u>	<u>Power Cost</u>	<u>Cost per Ton</u> <u>for Power</u>	<u>Cost</u> <u>Per Ton</u>
1936	553,218	20,378.77	.037	.049
1935	373,409	13,919.43	.038	.052
Increase	<u>179,809</u>	<u>6,459.34</u>		
Decrease			.001	.003

There was a larger tonnage hoisted in 1936 than in 1935.

19. Stocking Ore

	<u>Tons Stocked</u>
1936	268,803
1935	216,635
Increase	<u>52,168</u>

More wet ore had to be stocked during the shipping season of 1936, also there was a shortage of railroad cars several times during the year. In 1936, 33 bents were added to the trestle, compared with 22 in 1935.

MAAS MINE
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YEAR 1936

8. COST OF
OPERATING

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

21. Dry House Expense

	<u>1936</u>	<u>1935</u>	<u>Increase</u>
Coal used in Heat. Plant, tons	950	804	146
Cost per ton for Coal	5.25	5.16	.09
Cost of Coal	4,989.37	4,151.34	838.03

Increase is due to much colder weather in January and February of 1936.

23. Maintenance - Hoisting Equip.

There were three skip ropes changed in 1936 as compared with one in 1935. Increase also due to repairs to hoists on account of a fire in the fill around the foundations.

25. Maintenance - Top Tram Equip.

There was more wire rope used in 1936 on account of longer trestles and more replacements.

26. Maintenance - Docks, Trestles and Pockets

Decrease in this item is due to there being no work on the rock trestle for 1936.

GENERAL MINE EXPENSE

31. Analysis and Grading

	<u>No. Determination</u>	<u>Cost per Determination</u>
1936	58,781	.35301
1935	47,825	.31894
Increase	10,956	.03407

The larger part of the increase was due to laboratory charge, also more sampling underground on account of increased production.

32. Personal Injury

	<u>1936</u>	<u>1935</u>
Compensation Department	861.00	840.00
Hospital Loss	4,056.00	3,428.25
Reserve & Catastrophe, Compensation set up & Medical Service	9,027.39	6,154.01
	<u>13,944.39</u>	<u>10,422.26</u>

36. Special Expense, Pensions & Allowances

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
Legal	528.00	621.00		93.00
Pensions	5,598.00	6,338.00		740.00
Miscellaneous	1,930.72*	534.15	1,396.57	
	<u>8,056.72</u>	<u>7,493.15</u>	<u>563.57</u>	

*Increase due to expense of Captain Tregonning at Saranac Lake \$1,340.00.

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8. COST OF
OPERATING

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

Analysis of Supplies Used

	<u>1936</u>		<u>1935</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	24,604.86	.046	15,764.32	.043	8,840.54	.003		
42. Iron & Steel	7,676.71	.014	5,303.21	.015	2,373.50			.001
43. Oil & Grease	1,955.01	.004	1,564.68	.004	390.33			
44. Machinery Supplies	17,468.72	.032	16,914.39	.047	554.33			.015
45. Explosives	31,736.43	.059	22,060.04	.061	9,676.39			.002
46. Lumber & Timber	52,517.66	.098	37,983.48	.104	14,534.18			.006
47. Fuel	4,999.57	.009	4,151.34	.011	848.23			.002
48. Electric Power	108,985.68	.201	84,455.21	.232	24,530.47			.031
49. Sundries	4,700.86	.009	3,461.36	.010	1,239.50			.001
50. Other Mines & Accounts	183.97		88.70		95.27			
TOTAL	254,461.53	.472	191,569.33	.527	62,892.20			.055

The increase in the total supplies was due to increased production, while the increase in the cost per ton in the general supplies was due in the main to larger amounts of hoisting and scraper ropes and to installing new electrical devices.

9. EXPLORATIONS
AND
FUTURE
EXPLORATIONS

There were no explorations during 1936 and none contemplated for 1937.

10. TAXES

	<u>1936</u>		<u>1935</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Maas Mine Mine	\$ 1,350,000	46,050.45	\$ 1,305,000	40,246.20
Race Course	800,000	27,289.14	800,000	24,667.20
Adams Strip	180,000*	6,140.06	190,000	5,858.46
Stockpile & Equipment	645,000	22,001.89	505,000	15,571.17
Miscellaneous Parcels	16,920	577.16	9,090	280.31
Total Mine	2,991,920	102,058.70	2,809,090	86,623.34
Collection Fees		1,020.59		866.22
Total Oprtg. Maas Mine		103,079.29		87,489.56
*1936-Adams Strip charged to Negaunee, Mine	180,000	6,201.46		
Maas Mine Total	\$ 2,811,920	96,877.83		

Tax Rate	3.41	3.09
Total City of Negaunee Tax	406,945.23	366,574.10
Maas Mine % of City Tax	23.8%	24.0%

MAAS MINE
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10. TAXES (CONT.)

	<u>1936</u>		<u>1935</u>	
	<u>VALUATION</u>	<u>TAXES</u>	<u>VALUATION</u>	<u>TAXES</u>
Maas Mine Rented Houses	\$ 190,545	6,468.53	\$ 190,800	5,888.86
Mineral Lands, Etc.	17,910	610.98	19,530	602.22
Total Houses & Lands	\$ 208,455	7,079.51	\$ 210,330	6,491.08
Collection Fees		71.99		64.86
Total		7,270.90		6,555.94

11. ACCIDENTS
AND
PERSONAL
INJURY

	<u>1936</u>	<u>1935</u>
Fatal	0	0
Time Lost, over 4 months	4	0
" " 1 to 4 "	2	10
" " less than 1 month	3	2
Total Accidents	9	12
Number of cases paid compensation for accidents prior to Jan. 1st, 1936	7	9

There were 9 lost time accidents in 1936 as compared with 12 for the previous year which, considering the greater number of men employed in 1936 together with more time, gives a somewhat better record than in 1935. It is hoped however, that this can still be improved in 1937. There were two serious accidents due to blasting and causing the loss of sight in one eye in each case.

There were 7 cases paid compensation in 1936 for accidents prior to January 1st, 1936. Of these, 6 have been completed, leaving one old case to which will be added 4 more that will carry over from 1936, making a total of 5 cases still pending in 1937.

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

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Weeks Lost</u>	<u>Compensation Paid to 12/31/36.</u>	<u>Description of Accident</u>
1/3/36	Wm. Kempthorne	50	\$900.00	A premature explosion occurred in #52 contract, in which this man was blasted and lost his right eye. Fred Johns, Kempthorne's partner, was lighting the fuses with his igniter while Kempthorne was removing sheets of iron that had been placed in the back to protect them from water while drilling, as this place was quite wet. Johns had spit 14 of the 18 fuses they had prepared and his lighter was still burning when one of the holes went off, causing the ore to strike Kempthorne who was

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11. ACCIDENTS
AND
PERSONAL
INJURY

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Weeks Lost</u>	<u>Compensation Paid to 12/31/36.</u>	<u>Description of Accident</u>
				about 20' from the breast. Johns escaped without a scratch. A thorough investigation of this accident made both by our Company and by the Powder Company experts could not place the cause and the only possible solution seemed to be that one of the cartridges of dynamite became split while loading and a train of powder was left at the collar of the hole which ignited from the fuse. Kempthorne is now in charge of our electric cap lamps.
1/31/36	Herman Alarko	20 $\frac{1}{2}$	\$366.00	Alarko and Peterson, his partner, had unloaded several trucks of poles, and when Peterson moved the motor and empty trucks Alarko stepped too close to the track and was squeezed between the motor and the pile of poles. He knew that the motor was to be moved and had plenty of room to stand back out of the way, so this accident was due to carelessness.
3/20/36	John Mattson	4 $\frac{1}{2}$ days		Mattson was drilling a hole in the breast from a staging 3 feet above the ground, when he noticed a movement of the ground. He jumped from the stage and slipped on a piece of broken ore, causing him to twist his ankle.
5/7/36	James Marrietti	2 $\frac{1}{2}$	\$27.00	Marrietti was cutting a hitch for a leg when a chunk of blue ore slipped out of the breast, striking him on the hip, causing a contusion of the back and hip.
5/11/36	Ole Kaari	14	\$252.00	Kaari, who is a carpenter, was working on a scaffold on a garage in the C. C. I. Co. second addition, when one of the supports broke and he fell about 7 feet, dislocating his ankle.
6/3/36	Nick Tambling	32/3	\$ 48.00	Tambling was pulling timber with his hoist when the timber struck a plank lying along the side of the drift and pushed the plank against his leg, bruising the left knee.

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11. ACCIDENTS
AND
PERSONAL
INJURY

<u>Date of Accident</u>	<u>Name of Injured Man</u>	<u>Weeks Lost</u>	<u>Compensation Paid to 12/31/36</u>	<u>Description of Accident</u>
7/3/36	Sam Finnila	25	\$450.00	Another serious accident due to blasting occurred when 2 parties blasted at the same time and did not properly warn each other. After Finnila had ignited his fuse, which was for one hole only as he was blasting out a piece of timber, he and his partner, Karhi, separated to warn other men. Karhi found another miner at the next raise who also wished to blast one hole. They decided it would be alright to set it off at this time and did so. Finnila heard a shot go off and knowing nothing about this other place, thought it was his own and went back. As he approached within 6 feet, his hole exploded and caused an injury to his right eye.
7/7/36	Arne Mantela	6 5/6	\$123.00	Mantela was holding a plank for his partner while repairing a raise. The plank slipped, striking him on the foot and causing a contusion. This accident was purely carelessness.
11/11/36	Matt Lampi	5	\$ 72.00	Lampi was coming to work on the night shift and while on the path which crosses the steam shovel tracks, slipped on an icy railroad tie, falling on the rail and dislocating his shoulder.
12/23/36	George Preston	1		Preston was breaking chunks in a railroad car under the pocket, which is necessary as there is no crusher in the Maas shaft house. He climbed up onto the top end of the car and signaled for more ore, after which he stepped back and fell off the car, fracturing his elbow and small bones in the heel.

12. NEW CONSTRUCTION
AND PROPOSED NEW
CONSTRUCTION

<u>E & A No. 683</u>	
Total Estimate	\$ 2,274.00
Expended in 1936	2,244.00
Balance Dec. 31st, 1936	<u>\$ 30.00</u>

This E & A was for the purchase of two 15 H. P. Sullivan scraper hoists and was completed in 1936.

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12. NEW CONSTRUCTION
AND PROPOSED NEW
CONSTRUCTION

E & A No. 689

Total Estimate	\$ 81,262.50
Total Expended in 1936	78,047.87
Balance Dec. 31st, 1936	<u>\$ 3,214.63</u>

The purpose of this E & A was the moving of 30 houses to the Cleveland Cliffs Iron Company's second addition, and while the houses were moved in 1936, there still remains some work to be done on repairs and painting, fixing of the grounds, and laying interior sidewalks.

The accounts are detailed as follows:

Moving 30 Houses

Total Estimate	\$ 14,250.00
Total Expenditures in 1936	15,601.53
Balance Dec. 31st, 1936	<u>\$ 1,351.53</u>

This account has been completed.

Foundations

Total Estimate	\$ 20,250.00
Total Expenditure in 1936	24,920.92
Balance Dec. 31st, 1936	<u>\$ 4,670.92</u>

This account was practically completed in 1936.

Repairs

Total Estimate	\$ 15,000.00
Total Expenditures in 1936	17,144.79
Balance Dec. 31st, 1936	<u>\$ 2,144.79</u>

There were several porches yet to be rebuilt at the end of 1936 and when this is done in 1937 this account will be completed.

Interior Decorating

Total Estimate	\$ 3,000.00
Total Expenditure in 1936	2,634.60
Balance Dec. 31st, 1936	<u>\$ 365.40</u>

This account will be completed early in 1937.

Outside Painting

Total Estimate	\$ 3,900.00
Total Expenditure in 1936	1,764.89
Balance Dec. 31st, 1936	<u>\$ 2,135.11</u>

Only 5 houses were completed and 9 partially completed in 1936, the balance to be done in 1937.

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12. NEW CONSTRUCTION
AND PROPOSED NEW
CONSTRUCTION

E & A No. 689 (Cont.)

Garages and Sheds

Total Estimate	\$ 4,500.00
Total Expenditure in 1936	7,201.41
Balance Dec. 31st, 1936	<u>\$ 2,701.41</u>

This account was completed in 1936. Several more garages than was originally estimated were built to be used as temporary storehouses and office while the work was under construction. These will be moved to permanent locations in connection with the houses to be moved in 1937.

Electrical Wiring

Total Estimate	\$ 450.00
Total Expenditure in 1936	2,319.49
Balance Dec. 31st, 1936	<u>\$ 1,869.49</u>

It was only planned to change the main wires when the houses were moved, but the wiring was found to be in such bad condition that considerable work had to be done to make it conform to the building code. This account was practically completed in 1936.

Water and Sewer Connections

Total Estimate	\$ 1,350.00
Total Expenditure in 1936	2,670.15
Balance Dec. 31st, 1936	<u>\$ 1,320.15</u>

This account was completed in 1936 and exceeded the original estimate due to there being considerable more piping to be done in the new basements. Most of these houses had not had full basements heretofore.

Outside Preparation

Total Estimate	\$ 7,500.00
Total Expenditure in 1936	549.56
Balance Dec. 31st, 1936	<u>\$ 6,950.44</u>

Very little of the work under this account was done in 1936 and it will carry over into 1937.

Temporary Lighting

Total Estimate	\$ 350.00
Total Expenditure in 1936	332.92
Balance Dec. 31st, 1936	<u>\$ 17.08</u>

This account was completed in 1936.

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YEAR 1936

12. NEW CONSTRUCTION
AND PROPOSED NEW
CONSTRUCTION

E & A No. 689 (Cont.)

<u>General Expense</u>	
Total Estimate	\$ 3,325.00
Total Expenditure in 1936	3,271.63
Balance Dec. 31st, 1936	<u>\$ 53.37</u>

This account was closed in 1936.

E & A No. 693

Total Estimate	\$ 1,644.95
Total Expenditure in 1936	1,651.32
Balance Dec. 31st, 1936	<u>\$ 6.37</u>

This E & A was for the purchase of two Chevrolet dump trucks, one to be used at the Maas Mine and the other in the Cleveland-Cliffs Iron Company's second addition.

E & A No. 702

Total Estimate	\$ 7,494.85
Total Expenditure in 1936	5,225.41
Balance Dec. 31st, 1936	<u>\$ 2,269.44</u>

The purpose of this E & A was the drilling of eight test holes to ledge by the Layne Northwest Company, under contract at \$3.00 per foot. It was only necessary to drill seven holes and these have been completed. In 1937, the Layne Northwest Company will put down a well, authorized under E & A No. 716. The large unexpended balance is explained by one less hole drilled, less items on Cleveland Cliffs Iron Company account and no 10% required.

E & A No. 703

Total Estimate	\$ 3,000.00
Total Expenditure in 1936	4,435.65
Balance Dec. 31st, 1936	<u>\$ 1,435.65</u>

This E & A was a temporary authorization for the excavating and concreting of 10 basements for houses to be moved to the Cleveland Cliffs Iron Company's second addition in 1937. This work has been completed and this amount was deducted in preparing E & A No. 727, covering the moving of 28 houses in 1937, not as yet approved.

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12. NEW CONSTRUCTION
AND PROPOSED NEW
CONSTRUCTION

E & A No. 706

Total Estimate	\$ 7,907.00
Total Expenditure in 1936	4,233.99
Balance Dec. 31st, 1936	<u>\$ 3,673.01</u>

The purpose of this E & A was the purchase of new equipment to be used on account of the proposed increase in production. Four auger drill machines were purchased in 1936 and also two 15 H. P. Ingersoll Rand scraper hoists. Three new round bottom skips of approximately 5.5 tons capacity were built at the General Shops. These new skips hold about one ton more than the old ones and also clean themselves better due to the round bottom.

The four rocker dump cars will be received early in January, 1937.

PROPOSED NEW CONSTRUCTION

The only E & A's that will carry over into 1937 are Nos. 689 and 706. New E & A's that have been authorized for next year are as follows:-

No. 712	Double deck aluminum cage	\$ 2,200.00
No. 715	250 K W Generator	6,500.00
No. 716	Sinking of a well by the Layne Northwest Company	19,940.00
No. 721	Fireproofing of the head frame	3,685.00

13. EQUIPMENT
AND PROPOSED
EQUIPMENT

a. Steam Shovels

During the year 1936, there were three shovels used intermittently in loading from our stockpiles. Nos. 16 and 44 are railroad type shovels while No. 45 is a caterpillar, purchased in 1935. In the fall No. 16 shovel was sent to the Negaunee Mine for repairs while Nos. 44 and 45 were stored at the Maas Mine and are being gone over so that they will be all ready to work in the spring.

Due to so many different grades of ore, both as to royalties and analysis, it is necessary to use more than one shovel to facilitate loading rather than to move the shovel from one pile to another, as the Shipping Department sometimes needs to load two grades on the same day.

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YEAR 1936

13. EQUIPMENT
AND PROPOSED
EQUIPMENT

b. Stockpile Trestle

As the new pile to the West of the shaft was cleaned up in 1936, It was necessary to erect an entirely new wooden trestle on these stockpile grounds and at the end of the year there was one trestle of 35 bents in use and another trestle to the Southwest in course of erection.

c. Scraper Hoists

The hoists on hand December 31st, 1936 were as follows:

Ingersoll-Rand	15	H.P.	Electrics		11
"	"	10	"	"	3
Sullivan	25	"	"		2
"	20	"	"		1
"	15	"	"		23
"	$7\frac{1}{2}$	"	"		1
"	$6\frac{1}{2}$	"	"		4
Total Electric Hoists					45
Ingersoll-Rand Air Hoists, Rebuilt to handle timber (single drum)					13
Ingersoll-Rand Air Hoists, double drum					3

There were 35 contracts employed at the end of the year of which one was transferring their dirt and five were raising with a single drum air hoist. Six new hoists were purchased during the year, four 15 H.P. Sullivan electrics and two 15 H. P. Ingersoll-Rand electrics. The two 25 H.P. Sullivan electrics were in use in connection with the stope being mined to the West and above the Third Level. These hoists are too large for the ordinary slicing contract and therefore will have to be replaced in 1937 by two 15 H.P. hoists. During the year we had four more of our double drum air hoists changed to single drum hoists for handling timber up raises. There are only three more to be converted and as it is essential that we have plenty of air hoists to supply the miners with timber without using their 15 H.P. scraper hoists and thus delay them, it may be necessary to purchase some more single drum air or electric hoists for this purpose in 1937.

14. MAINTENANCE
AND REPAIRS

There were no extraordinary repairs made during 1936. Near the end of the year it was found that our skip hoist drum was cracked and this has been reinforced temporarily and a new drum shell ordered, which will have to be installed early in 1937.

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ANNUAL REPORT
YEAR 1936

14. MAINTENANCE AND
REPAIRS (CONT.)

The North skip rope was changed in January, 1936 while the South skip rope was changed twice, once in May and once in October. The ropes taken off were used Athens Mine ropes as were also the ropes put on except for that put on the South skip in October, which was a new one.

During the last week in November and the first week in December, the old, so called 4.2 tons skips were taken off and new round bottom skips of 5.1 ton estimated capacity put on. These skips actually hold more ore than this but 5.1 tons is being used as a factor of safety.

15. POWER

The following is the rate charged per K.W.H. by months during 1936:

January	\$.0144
February	.0140
March	.0142
April	.0138
May	.0136
June	.0136
July	.0136
August	.0136
September	.0134
October	.0132
November	.0132
December	.0135
Average	<u>\$.01367</u>

The auxiliary steam turbine plant at the Maas Mine was not operated during the year.

17. CONDITION OF
PREMISES

The only improvements made around the mine were the painting of the wood trim on the mine buildings and the routine work of keeping the grass and shrubbery in good condition.

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18. NATIONALITY OF
EMPLOYEES

<u>As to Parentage</u>	<u>1936</u>	<u>%</u>	<u>1935</u>	<u>%</u>
English	99	25.7	89	29.6
Finnish	138	35.8	117	38.9
Italian	37	9.6	29	9.6
Swedish	44	11.4	22	7.3
Germans	7	1.8	9	3.0
Crotians	1	.3	1	.3
Norwegians	3	.8	4	1.3
Danes	3	.8	3	1.0
Irish	5	1.3	5	1.7
French (Canadian)	25	6.5	17	5.6
Americans	23	6.0	5	1.7
Total	385	100.0	301	100.0

<u>As to Birth</u>	<u>Total</u>		<u>American Born</u>		<u>Foreign Born</u>	
	<u>1936</u>	<u>1935</u>	<u>1936</u>	<u>1935</u>	<u>1936</u>	<u>1935</u>
English	99	89	57	43	42	46
Finnish	138	117	70	47	68	70
Italian	37	29	14	7	23	22
Swedish	44	22	30	14	14	8
German	7	9	6	7	1	2
Crotians	1	1			1	1
Norwegians	3	4	2	3	1	1
Danes	3	3	2	2	1	1
Irish	5	5	5	5		
French (Canadian)	25	17	24	17	1	
Americans	23	5	23	5		
TOTAL	385	301	233	150	152	151
Percentage			61%	50%	39%	50%

19. MAAS CRUSHER

The Maas crusher was overhauled early in May and crushing was started May 7th. A crew of seven men is required to operate this plant and they worked 69 5/8 shifts during the summer, averaging 1,062 tons per shift. There were no extraordinary repairs necessary in 1936 and everything is in good condition to resume operations next year.

The following table shows the years operations:

<u>Mine</u>	<u>1936</u>	<u>1935</u>	<u>Incr.</u>	<u>Decr.</u>
Cliff Shaft	3,877	4,045		168
Lloyd	45,253	19,882	25,371	
Morris	1,927	36,586		34,659
Maas	16,959	23,577		6,618
Negaunee	5,928		5,928	
Total	73,944	84,090		10,146

SOUTH JACKSON MINE
ANNUAL REPORT
YEAR 1936

1. GENERAL:

This property has now been idle for many years and it is not expected that it will ever be operated again as an open pit mine.

4. ESTIMATE
OF ORE
RESERVES:a. Available Ore:

Above present pit available by present system of mining:

On Southwest side	35,000 tons
North of Lucy Pit	5,000 "
South and Southwest of Lucy Pit	<u>3,000 "</u>
Total	43,000 "

Below present pit and above drainage tunnel available by milling:

West of Crusher	186,000 tons
Area below bottom of present pit shown by churn drilling	<u>105,226 "</u>
Total	291,226 "

Grand Total 334,226 "

c. Estimated Analysis:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Alum</u>	<u>Mang</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist.</u>
Natural	34.55	.066	36.00	1.42	2.00	.435	.175	.010	2.00	7.00

6. SURFACE:

There has been no watchman at this property since 1931. All machinery has been removed and most of the buildings dismantled including the upper sections of the crusher building.

10. TAXES:

	<u>1 9 3 6</u>		<u>1 9 3 5</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
53% of realty as described, Sec. 1-47-27	\$ 225,250	\$ 7683.60	\$ 225,250	\$ 6945.36
Collection Fees		<u>76.83</u>		<u>69.45</u>
Total Taxes		\$ 7760.43		\$ 7014.81
City of Negaunee Tax Rate Per \$100.00		\$ 3.411		\$ 3.09

Taxes increased due to higher tax rate.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1936

1. GENERAL:

The Negaunee Mine operated on a schedule of three days per week for each crew from January 1st to February 1st when the working time was increased to four days per week. The 4-day schedule was in effect from February 1st to May 4th, when the working time was increased to five days per week. On the 3-day schedule the mine operated six days per week; on the 4-day schedule, six days and two nights per week; and on the 5-day schedule, five days and five nights per week. Early in December, a few contracts were put on a 3-8 hour shift together with two motor crews, and on surface another crew was added on the landing. Hoisting was then started on a 3-8 hour schedule, five days per week. It is planned to increase production including the overrun to approximately 800,000 tons in 1937-- and a start was made in December to organize the mine for this large production.

Shipments from stockpile in 1936 were 240,374 tons as compared with 219,673 tons in 1935. The ore under both Steel Stocking trestles was removed, and also most of the ore stocked from the auxiliary wood trestle in 1930. There is ample stocking ground available for the 1937 production until the shipping season opens.

In February a fire in the shafthouse forced the mine to shut down for sixteen days. In view of the weather conditions prevailing during most of this period (10° to 20° below zero), remarkable progress was made in repairing the head frame, etc., so that operations could be resumed. Credit for the rapid completion of the work was chiefly due to continuous supervision by the Chief Mechanical Engineer, Mr. O. D. McClure. The shafthouse was enclosed in the summer with interlocking steel sheets, to make it fire-proof.

Development of the 13th level was continued during the year, and is now well advanced. The balance of the development work can be done gradually. It has been decided to reopen the 9th level and mine the ore pillars left at No. 1 and No. 2 shafts. The ore estimates show 1,262,287 tons in these two areas. Part of the pillar is cut up by stopes into small pillars. It is known that some of the stopes are filled with sand from surface caves; it is, therefore, problematical how much ore can be recovered from these small pillars. Reopening of the 9th level started in December with the re-building of the shaft pockets. It will require several months to get the old level in condition to start development of the pillars at No. 1 shaft. The pillar at No. 2 shaft will be developed later.

An improvement was made this year in the handling of timber trucks in the concrete timber tunnel on surface through the construction of a parallel tunnel near the shaft for a distance of seventy feet. Since this work was done empty timber trucks are hoisted on the cage, and a loaded truck sent down. Prior to building the new tunnel, loads were sent down, and the cage returned to surface empty because there was no siding available for the empty trucks. The number of trucks sent down per 8-hour shift have been increased sufficiently to supply the mine without any overtime work. It had formerly been necessary to work overtime several times each week on the 5-day schedule.

NEGAUNEE MINE
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1. GENERAL:

A good safety record was made in 1936, the Negaunee Mine ranking 3rd in frequency and severity rate among the ten mines and plants operated by the Mining Department. There were four accidents during the year for which compensation was paid as compared to one in 1935. The increase in the working schedule, and the increase in number of employees has increased the exposure hazard. Strict observance of the safety rules and standards would eliminate the majority of the accidents. Education has to be continued all the time to safeguard the men from carelessness. The awarding of a number of cash prizes in December 1936 undoubtedly helped to make the men more safety conscious. Meetings of the foremen were held during the year for the discussion of accidents, and the safety rules and regulations.

The average number of men employed increased from 235 in 1935 to 262 in 1936. A few were added during the first ten months, but most of the increase occurred in the last two months of the year, when orders were received to increase production.

2. PRODUCTION:

a. Product etc., by grades

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
Negaunee Ore	512,612	291,318	221,294	
Total Ore	512,612	291,318	221,294	
Rock	18,212	20,128		1,916
Total Hoist	530,824	311,446	219,378	

b. Shipments

	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
Negaunee Ore	308,510	240,374	548,884	362,525
Total	308,510	240,374	548,884	362,525
Total Last Year	142,852	219,673	362,525	
Increase	165,658	20,701	186,359	

Shipments increased 51.4% in 1936 (and were 36,272 tons more than the product for the year).

c. Stockpile Inventories

	<u>Dec. 31, 1936</u>	<u>Dec. 31, 1935</u>	<u>Decrease</u>
Negaunee Ore	90,925	127,197	36,272

Including estimated overrun there were approximately 145,000 tons in stock at the end of the year.

d. Division of Product by Levels

	<u>1936</u>	<u>% of Product</u>	<u>1935</u>	<u>% of Product</u>
10th Level				
11th Level	159,634	31.2	106,508	36.6
12th Level	331,327	64.6	183,362	62.9
13th Level	21,651	4.2	1,448	.5
	512,612	100.0	291,318	100.0

NEGAUNEE MINE
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2. PRODUCTION:

e. Production by Months

<u>Month</u>	<u>Negaunee Ore</u>	<u>Rock</u>
January	24,656	2,600
February	14,006	588
March	33,309	2,180
April	31,796	2,328
May	42,138	1,524
June	46,266	1,424
July	50,650	2,460
August	46,153	916
September	57,096	716
October	56,823	1,688
November	51,897	896
December	57,922	892
Total	512,612	18,212
Total 1935	291,318	20,128
Increase	221,294	
Decrease		1,916

The product by leases was distributed as follows:

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
Negaunee Mine Co.	490,880	268,882	221,998	
American Mining Co.	21,732	22,436		704
	512,612	291,318	221,294	

f. Ore Statement

	<u>Neg. Ore</u>	<u>Total</u> <u>1936</u>	<u>Total</u> <u>1935</u>
On Hand, Jan. 1, 1936	127,197	127,197	198,404
Product for year	512,612	512,612	291,318
Overrun	0	0	0
Total	639,809	639,809	489,722
Shipments	548,884	548,884	362,525
Balance on hand	90,925	90,925	127,197
Inc. in Output		221,294	55,654
Dec. in Ore on Hand		36,272	71,207

1936 1-8 hr. shift 6 days per week to Feb. 1st.
1-8 hr. shift 6 days & 2 nights per week from Feb. 1st to May 4th.
2-8 hr. shift 5 days & 5 nights per week from May 4th to Dec. 7th.
3-8 hr. shift 5 days & 5 nights per week from Dec. 7th to Dec. 31st.

1935 1-8 hr. shift 4 days per week, Jan. 1st to Feb. 11th.
1-8 hr. shift 6 days per week, Feb. 11th to Dec. 31st.

g. Delays

The mine was idle February 9th to February 24th inclusive on account of the shafthouse fire.

h. Delays from lack of Current

There were no delays from lack of current that affected production. The current was off for a few minutes several times during the summer.

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3. ANALYSIS:

Avg. Mine Analysis on Output		1936			Total	1935			Total
<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Tons</u>	
Negaunee Ore	61.08	.122	6.56	512,612	61.32	.114	6.34	291,318	

4. ESTIMATE OF ORE RESERVES:a. Developed Ore

Assumption: 12 cu. ft. equals one ton
10% deducted for rock
10% deducted for loss in mining
% of Bessemer--none

Above 9th Level

No. 1 Shaft Pillar	1,148,681	
No. 2 Shaft Pillar	<u>113,906</u>	
Total Above 9th Level		1,262,587
Between 10th and 11th Levels		357,751
Between 11th and 12th Levels		1,189,817
Between 12th and 13th Levels		<u>1,076,767</u>
Total Developed Ore Above 13th Level -	12/31/36	3,886,922

The development of the 13th level in 1936 changed the status of the ore between the 12th to 13th levels from prospective to developed ore. Accordingly the tonnage in this area is included for the first time in the estimate of ore reserves.

The estimate in 1936 is 620,645 tons greater than the estimate in 1935. Including the ore mined in 1936 it is 1,111,525 tons greater. If the ore between the 12th and 13th levels be subtracted from the 1,111,525 tons there remains 34,758 tons as the actual increase in developed ore above the 12th level in 1936. This increase is due to more accurate location of the hanging in certain areas as a result of mining operations.

b. Prospective Ore:

The tax commission estimate includes prospective ore below the 13th level, but the mine estimate of ore reserves stops at the elevation of the 13th level.

c. Estimated Analysis:

Ore Reserves:	Approximate Expected Natural Analysis:									
	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Igni.</u>	<u>Moist.</u>
Neg.	53.20	.102	6.10	.210	2.60	1.00	.320	.011	1.94	12.00

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4. ESTIMATE OF ORE RESERVES:

6. Estimated Analysis:

Ore in stock:	Average Natural Analysis:									
	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
	53.82	.119	6.35	.19	2.26	.67	.26	.011	1.81	11.25

5. LABOR & WAGES:

a. Comments:

(1) Labor:

There was no labor turnover in 1936. The employees were pleased with the increase in working time from three to four days in February and to five days per week in May. All of the men with families welcomed the opportunity to earn more money and pay the debts that had accumulated during the depression. Even on the 5-day schedule, the men like to work one or two extra shifts per month on repair work.

A large number of young men are looking for work at the mines, while older, experienced men are very scarce. When mining contracts are added, they have in most cases been made up by splitting the old contracts and each experienced miner has taken on his son or relative as a partner. This has added a number of young miners who have many years of work ahead of them. This plan will provide miners for the life of the Negaunee Mine, as even with fewer men employed the young miners are available to take the place of the old miners that have to retire on account of age or disability.

The men welcomed the opportunity to get insurance under the group plan and practically 98% of the men signed up. Nearly all of the 2% have since taken the insurance.

The week's vacation with pay was enjoyed by the men as it gave many a chance to visit friends whom they had not seen for years. Others brought in their winter's supply of wood while others worked in their gardens, and a few loafed.

I am glad to report a good feeling among the employees, a willingness to work and satisfaction with the pay checks received twice each month.

b. Comparative Statement of Wages and Product:

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	512,612	291,318	221,294	
No. Shifts and Hours		1-8 hr.		
AVERAGE NO. MEN WORKING:				
Surface	50	45	5	
Underground	<u>212</u>	<u>190</u>	<u>22</u>	
Total	262	235	27	
AVERAGE WAGES PER DAY:				
Surface	4.31	4.30	.01	
Underground	<u>5.31</u>	<u>5.14</u>	<u>.17</u>	
Total	5.10	4.95	.18	
AVERAGE WAGES PER MONTH: Average 19 days				
Surface	81.89	75.71	6.18	
Underground	<u>100.89</u>	<u>73.90</u>	<u>26.99</u>	
Total	96.90	74.25	22.65	

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5. LABOR AND WAGES: (Cont'd)

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

AVERAGE WAGES PER MONTH: (Cont'd)

Increase in wages of six cents (6¢) per hour effective November 16, 1936.

PRODUCT PER MAN PER DAY:	1936	1935	<u>Increase</u>	<u>Decrease</u>
Surface	38.61	30.64	7.97	
Underground	<u>10.14</u>	<u>8.88</u>	<u>1.26</u>	
Total	8.02	6.89	1.13	

LABOR COST PER TON:

Surface	.112	.141		.029
Underground	<u>.524</u>	<u>.578</u>		<u>.054</u>
Total	.636	.719		.083

AVERAGE PRODUCT MINING:

Stopping	25.07	24.64	.43	
Ore Development	<u>14.17(1)</u>	<u>8.65</u>	<u>5.52</u>	
Total	24.30	24.36		.06

(1) 1501-1/2 days compared with 222-1/4 in 1935.

AVERAGE WAGES CONT. LABOR 6.54 6.06

TOTAL NUMBER OF DAYS	1936	1935	<u>Increase</u>
Surface	13,262-3/4	9,509-3/4	3,753
Underground	<u>50,551-1/4</u>	<u>32,785-3/4</u>	<u>17,765-1/2</u>
Total	63,814	42,295-1/2	21,518-1/2

AMOUNT FOR LABOR:

Surface	57,199.54	40,882.80	16,316.74
Underground	<u>268,488.19</u>	<u>168,513.14</u>	<u>99,975.05</u>
Total	325,687.73	209,395.94	116,291.79

AVERAGE WAGES PER MONTH AS PER LABOR STATEMENT, LESS CAPTAIN AND CLERKS:

Surface	80.56	72.36	8.20
Underground	<u>100.02</u>	<u>72.86</u>	<u>27.46</u>
Total	96.47	72.76	23.71

Increase in wages of six cents (6¢) per hour effective November 16, 1936.

PROPORTION OF SURFACE TO UNDERGROUND MEN:

1936: 1-5.24--1-8 hr. shift 3 days per week to February 1st.

1-8 hr. shift 4 days per week from Feb. 1st to May 4th.

2-8 hr. shift 5 " " " " May 4th to Dec. 7th.

3-8 hr. shift 5 " " " " Dec. 7th to present

1935: 1-4.22--1-8 hr. shift, 2 days per week, January 1st to Feb. 11th.

1-8 hr. shift, 3 days per week, Feb. 11th to December 31st.

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5. LABOR AND WAGES: (Cont'd)

<u>Operating Schedule:</u>		<u>Days Mine</u>	<u>Days Worked</u>	<u>Days Men</u>	<u>Avg. Shifts</u>	<u>Size</u>
<u>Month</u>	<u>(1)</u>	<u>Worked Per</u>	<u>Per Month</u>	<u>Worked</u>	<u>Worked by</u>	<u>Crew</u>
		<u>Week</u>		<u>Per Week</u>	<u>Each Man</u>	
January	(1)	6 Days	27 Days	3 Days	13-1/2	1/2 Norm.
February	(2)	6 " 2 Nights	12 Days	4 Days	8	1/2 "
March	(3)	6 " 2 "	26 Days	4 Days	17-1/2	1/2 "
April	(4)	6 " 2 "	26 Days	4 Days	17-1/2	1/2 "
May	(5)	5 " 5 "	22 Days	5 Days	21	1/2 "
June	(6)	5 " 5 "	21 Days	5 Days	21	1/2 "
July	(7)	5 " 5 "	24 Days	5 Days	23	1/2 "
August	(8)	5 " 5 "	25 Days	5 Days	17-1/2	1/2 "
September	(9)	5 " 5 "	25 Days	5 Days	22-1/2	1/2 "
October	(10)	5 " 5 "	24 Days	5 Days	23	1/2 "
November	(11)	5 " 5 "	23 Days	5 Days	21	1/2 "
December	(12)	5 " 5 "	25 Days	5 Days	23	1/2 "
Average for year			23-1/3		19	

3-8 hour shifts from December 7th--2 full crews and a small number on 3rd crew.

Remarks

- (1) Mine worked night shift Jan. 3rd to make up for time lost on New Year's Day.
- (2) Fire occurred in shafthouse Feb. 8, 1936. Resumed operations Feb. 25, 1936.
- (3) Worked Tuesday and Thursday nights.
- (4) Mine worked night shift on the 3rd and 13th to make up for Election Day and Good Friday.
- (5) Mine started to operate five days and five nights May 4th.
- (6) Mine Idle June 24th.
- (7) Mine Idle July 4th. Worked 25th and 31st to make up for 4th.
- (8) Each crew receives one week vacation with pay.
- (9) Made up time lost on holidays and account of vacation with pay by working day shift on Saturdays.
- (10) Made up time lost on account of vacation with pay by working day shift on Saturdays.
- (11) Mine idle Election and Thanksgiving Days. Worked Saturdays to make up time lost.
- (12) Mine idle Dec. 25th and night of 24th & 31st. Worked Saturdays to make up time lost.

6. SURFACE:a. Building Repairs:

The shop building was rewired in 1936, as the wiring did not comply with the National Electrical Code. All wires are now in conduit pipe and modern lights have replaced the old cord drop lights.

When the shaft house was being repaired after the fire in February, certain improvements were made that were not covered by insurance (fire loss). In order to decrease the fire and accident hazard the voltage of the electric line to the shaft was reduced from 2200 to 220 volts. This made it necessary to purchase transformers, switches, etc. The two skips that fell in the shaft when the hoisting ropes broke due to heat of the fire, were not covered by insurance. One new spherical bottomed skip was built and tried out in the Negaunee shaft; it proved to be more successful in cleaning itself, and had a number of other improvements. Another new skip was being built at the general shops at the end of the year. The mine had

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6. SURFACE: (Cont'd)

a. Building Repairs: (Cont'd)

four skips when the fire occurred so that with two on hand, it was possible to resume operations and the new skip was put in service later.

The skip roads above the landing were enclosed with $\frac{1}{4}$ " steel plate instead of plank. Later in the year $\frac{1}{4}$ " plates were ordered for enclosing the skip roads from the collar of the shaft to the landing but they had not been installed at the end of the year due to cold weather. The plate will replace the plank casing and further reduce the fire hazard. The plank casing has to be replaced every few years due to wear from spillage of ore at the skip dump.

The steel covering was painted with aluminum paint to prevent rusting.

The first section of the stairway to the landing - 16' in length - was rebuilt in the fall as the side channels had rusted away until they were too weak for further use.

When the shaft house was rewired after the fire all the wires were put in conduit pipe and more lights were installed as the new covering enclosed the entire shaft house while formerly the cage compartment was not enclosed.

A concrete tunnel about 70' in length parallel with the old concrete timber tunnel was built in October. The ground for the tunnel was excavated with a revolving clam dredge. Ledge was encountered at the west end which extended 15' in the tunnel from nearly full height down to the floor level. The ledge was drilled, blasted and the material removed by the dredge. Forms were built on one side and the top - the south wall of the old tunnel formed the other side of the new tunnel. Holes were drilled in the old tunnel wall at a height of 7-1/2 ft. and 30-lb. rail inserted across the top of the new tunnel and wire rope was laid lengthwise on top of the rails for reinforcing. Near the east end of the new tunnel ground was excavated on the south side for a 5' x 5' pump house and sump. The sump will catch the water entering the tunnel following the spring break up and after heavy rainfalls which, heretofore, has gone down the shaft. A small electric pump will be installed in the pump house next spring. The new tunnel was completed in November with the installation of tracks, trolley wire and lights. The number of loaded timber trucks sent underground per 8-hour shift has increased 25% as empty trucks can now be sent to surface when a loaded truck is sent down. There was no siding for the empty trucks prior to construction of the new tunnel. The total cost of the tunnel was approximately \$800.00 which will soon be saved by the elimination of overtime work sending down timber and from the saving made by decreasing the number of trips made by the cage. When the five day and five night schedule started, it was necessary to work overtime three or four times each week in order to send down the required amount of timber. There has been no overtime work since the new tunnel was completed except for sending down special material such as rail and plank on Saturdays when the mine is idle.

With the increase in number of men working in the mine it became necessary to have more electric cap lamps. The hospital room in the dry was used for storage, charging and repair of the lamps. There was only room for four charging racks in the room or 240 lamps and room was needed for another rack or 60 more lamps. The wall next to the change room in the dry was torn down and the lamp room extended eight feet into the change

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5. SURFACE: (Cont'd)

a. Buildings, Repairs: (Cont'd)

room. A sink and an outlet for water from washing the floor was also installed at this time. The lamp room is now large enough for a further increase in the number of lamps if it should ever be necessary to increase the underground crew above 300 men.

In order to house the switches for the electric lines to the shaft house, a small room 8' x 10' in size was built as an addition on the north side of the top tram engine house which is located on ground level, 100' northeast of the shaft house. Cement plaster on wire lath was used on the walls in order to make them fireproof.

In order to provide lockers for the men employed in November and December, it was necessary to install two dozen more steel lockers in the dry and also additional facilities for hanging the mine clothes.

The roof of the brick storage shed, one half of the shop roof, and a portion of the engine house roof were treated with primer and sealcote to prolong the life of the composition roofing on these buildings.

b. Stockpiles:

Practically all the ore in stock under the steel trestles was loaded during the shipping season, and also more than one-half of the ore remaining in stock under the old wood auxiliary stocking trestle erected in 1929.

b-1. Rock Trestles:

The rock trestle erected in 1934 and 1935 was filled this year and a branch trestle was erected late in the fall. A total of ten bents or 240 feet of trestle was erected which will be ample for another year.

c. Tracks, Roads:

There was no expense incurred in 1936 for tracks or roads.

d. Water Supply:

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

	<u>1936</u>	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>	<u>1931</u>	<u>1930</u>
1st Quarter	67.61	44.31	47.39	54.25	58.11	104.72	180.01
2nd Quarter	59.77	62.98	76.80	36.00	68.68	57.41	175.71
3rd Quarter	83.64	61.51	75.85	52.14	51.25	76.41	219.47
4th Quarter	<u>81.75</u>	<u>62.55</u>	<u>35.98</u>	<u>36.29</u>	<u>40.43</u>	<u>46.55</u>	<u>147.36</u>
Total	292.77	231.35	235.02	178.68	218.47	284.99	722.55
Product							
Tons	512,612	291,318	235,664	61,761	84,046	338,696	579,740
Cost Per							
Ton	.000571	.000794	.001001	.002893	.0026	.00084	.00124

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5. SURFACE: (Cont'd)

d. Water Supply: (Cont'd)

The cost per ton for city water was the lowest in the past seven years or since records have been kept. A quite appreciable saving has occurred since the construction of the hot well to save the water condensed in the various heaters for use again in the boilers.

e. Grounds:

The lawn and shrubbery were fertilized this year for the first time in several years. The grounds were kept in good condition during the summer; the long period of hot dry weather made it necessary to sprinkle day and night for nearly a month. The shrubbery was pruned severely as the growth in many cases had shut off light from the windows.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1936.

b. Development:

Development of the 13th level was started in March 1935 and continued during the past year. It was well-advanced by the end of 1936 and from now on will be continued at a rate that will keep the development work in advance of mining operations.

The most interesting development on the 13th level during the year was the finding of two relatively small ore bodies near the Maas boundary beyond the main dike. These two ore bodies are bounded by small dikes that are off shoots from the main dike. They are separated by jasper that is probably hanging wall material. Both ore bodies are not far from the North West corner of the property, they will be described in detail under Stopping.

At several places above the 12th level the ore was found to extend upward into the hanging probably due to local rolls in the hanging. This condition was discovered in several of the raises from the 13th level in the main ore body south and west of the area being mined on the subs above the 12th.

Late in the year drifting was started in rock on the 12th level to develop the ore pillar left on the North footwall adjacent to the Maas Boundary. This pillar is being mined a short distance above the 11th level and the 11th level raises are now so short that it is advisable to handle the balance of the ore in raises from the 12th level. There was the equivalent of 1-1/2 gangs of miners developing in rock and three developing in ore during the year.

The last of the year, work preliminary to reopening the old 9th level was started and in 1937 the shaft pillars at No. 1 and No. 2 shafts will be developed for mining.

b-1. Development in Rock:

The only rock work on the 11th level in 1936 consisted in widening the plat near the shaft to make room for a side track for empty timber trucks.

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7. UNDERGROUND: (Cont'd)

b-1. Development in Rock: (Cont'd)

This work was 75% completed at the end of the year. The ground excavated was equivalent to twenty feet of full-sized rock drift.

There was some development work in rock on two sub-levels above the 11th level. On the 450' sub near the South footwall, a rock drift was driven 169' in the footwall and a rock raise extended 54' to the 10th level footwall drift. This provided an air inlet from the main airway on the 10th level direct to the 460' sub via No. 171 raise. The connection in rock from #171 raise to the 10th level will also serve as an airway for the subs opened at lower elevations in this area.

On the 460' sub-level a rock drift was driven from #1108 raise west through jasper to #1104 raise. A horse of jasper splits the ore body in this area. In order to mine the last ore above the jasper near #2 dike, it was necessary to drift in jasper to connect the raises for a second outlet for ventilation and a traveling road. There was a total of 82 feet of rock drifting here.

The plat was widened on the 12th level to provide room for a side track near the shaft for storing empty timber trucks. With this side track installed, it was possible to send up an empty timber truck after a loaded truck was sent down, and thus increase the number of loaded trucks handled each 8-hour shift. The ground excavated here was equivalent to 33 feet of a full-sized rock drift.

In 1936, there was 1079 feet of rock drifting on the 13th level as compared with 1130 feet in 1935. Approximately 70% of the total rock drifting on this level has now been completed. The work done in 1936 covered completion of No. 2 and 3 cross-cuts, extension of No. 1 through the main dike, and driving part of the North East footwall drift, also, a portion of the drift parallel with and 115 feet distant from the Maas boundary.

During the year three raises were completed in No. 2 cross-cut, 13th level, two in #3 cross-cut, four in the drift parallel with the Maas boundary and three in the small ore body found beyond the main dike near the North West corner of the property. Also one other raise was put up 27' in the drift along the Maas boundary and a drift driven to connect with the main ventilation raise from the 4th level, Maas Mine.

The total feet of rock encountered in the above raises amounted to 504 feet. In practically all cases, it was footwall material through which the raises had to be extended to the ore.

The grand total, drifting and raising in rock (rock development) was 1959 feet.

b-2. Development in Ore:

There was a large increase in ore development in 1936, as compared with 1935. The increase was 563% or over 5-1/2 times as much. This was due to drifting and raising in ore on the 13th level. Opening a new level increases development work for a few years much above normal. The 13th level increased the development work in rock in 1935 and development in both ore and rock in 1936. It will decrease somewhat in 1937 and in 1938 will be normal.

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7. UNDERGROUND: (Cont'd)

b-2. Development in Ore: (Cont'd)

On the 12th level two raises were put up in ore; one to an operating sub-level to replace two raises that had crushed, the other to handle ore from repair of an airway drift at the elevation of the 370' sub-level. On this level, there was a total of 135 feet raising in ore.

In order to provide airways from the 12th to 13th levels, five raises from the 13th level were connected by short drifts in ore to the 12th level haulage drift in #1240 and #1230 cross-cuts. There was a total of 102 feet of ore drifting here for the airways.

The balance of development, drifting and raising in ore was confined to the 13th level, where nine raises were extended to the hanging at the elevation of the 12th and subs above up to the 350 feet elevation. These raises varied in height from 122' to 166', the total feet of raising in ore in the 9 raises was 984'. There were also three raises completed to the hanging in the small ore body found South West of the main dike. There was 213 feet of ore raising here.

On the sub-level above the 13th opened at elevation 250' under the hanging in the small ore body beyond the dike, there was 117 feet of drifting in ore to outline the ore body. As a result of this development work one other raise was located and extended to the elevation of the 295' sub-level where mining was started under the hanging.

The grand total development in ore in 1936 was 2478 feet as compared with 372 feet in 1935.

c. Stoping:

Mining in 1936 was confined to the same areas as in 1935 and one new area between the 12th and 13th levels. Ore was mined between the 10th and 11th levels on the 460', 450', and 440' sub-levels in the pillar on the North footwall adjacent to the Maas Boundary, on the 475', 460', and 450' sub-levels in the area between No. 1 dike and the South footwall and on the 475', and 460' sub-levels in the area between No. 1 and No. 2 dikes. The main ore body was mined between the 11th and 12th levels on the 395', 385', 370', 360', 350', and 335' sub-levels. A new ore body, discovered in the haulage drift on the 13th level beyond the main dike near the Northwest corner of the Negaunee property was mined on the 295' and 285' sub-levels and partially mined under the hanging on the 250 foot sub-level. Ore was, therefore, mined during the year on eight sub-levels between the 10th and 11th levels, on 6 sub-levels between the 11th and 12th levels and on three sub-levels between the 12th and 13th levels.

The increased operating schedule and production resulted in more rapid mining of the sub-levels. The practice of giving each contract a large area to mine which was started in 1934 was even carried further in 1936. Now each contract, if it is at all possible, mines the ore from a raise by radial slicing. This has been worked out in practice to the point that a contract mines two-thirds or more of the ore in a circle around a raise. By using only part of the raises and mining by radial slicing the length of slices has been increased. At none raise the slices are 140' in length and at several others, 125' in length; the average length of slices in the mine is now about 90'.

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7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

Output per man per day has increased, crushing has decreased. Ventilation has been easier to maintain and hazards have been reduced. The average for the year of 8.03 tons per man per day and 25.07 tons per man per day stoping is evidence of the success of the plan.

During 1935 there was an average of 24 contracts on ore production, the average by division into the three general operations was as follows: Slicing 17, Drifting 6, Cutting out in raises 1, total 24. There were 18 contracts mining ore in January. Starting in April, the number gradually increased until there was 26 gangs in September and 28 in December. Four of the 28 contracts started on a 3-8 hour shift basis on December 7th to increase production.

475' SUB-LEVEL BETWEEN NO. 1 & NO. 2 DIKES & SOUTH OF NO. 1 DIKE

Mining of the last pillars left on this sub-level was underway in January 1936 with three contracts mining between the two dikes and one contract south of No. 1 dike in the area near the footwall. Mining was finished near the footwall in April and between the two dikes in May. This sub-level was opened in 1935 and mining finished in the spring of 1936.

460' SUB-LEVEL BETWEEN NO. 1 & NO. 2 DIKES & SOUTH OF NO. 1 DIKE

Mining was started here by one contract in January in the area between the two dikes and three more contracts moved down as work was finished on the sub-level above. It was 80% mined at the end of the year. More water is encountered in this area than in any other and it is a serious handicap. Some of the raises have to be used entirely for drainage of water. Inclusions of jasper along No. 2 dike makes the ore area irregular in outline. Some sections are dry and long slices that average over 100 feet are possible. In the area south of No. 1 dike mining was started in February 1936 and finished in October. The ore area was 230 feet in length and averaged 85' in width. Only three of the six raises were used by two contracts mining the sub-level.

460' SUB-LEVEL NORTH FOOTWALL PILLAR

Mining of the three remaining pillars on this sub-level was completed in March by one contract. Mining was started here in 1935.

450' SUB-LEVEL NORTH FOOTWALL PILLAR

Mining was started in this pillar in October 1935 and was nearly completed in December 1936. Two contracts worked here until late in the fall when one moved down and opened the 440' sub-level. There were two small pillars left at the end of the year, one of which has been left on two subs above to protect the airway raise to the 10th level. Mining of this pillar will start in January by an extension on a flat incline of No. 305 raise to the elevation of the 475' sub-level. The pillar is 25' square and will be mined quickly. Air is now forced to the sub-level by installation of a door in the main 11th level haulage drift beneath. Two contracts mined from the six raises.

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• UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

450' SUB-LEVEL AREA SOUTH OF NO. 1 DIKE NEAR SOUTH FOOTWALL

This sub-level was opened in February at #170 raise which is no longer in use for mining as it is in the footwall at this elevation. A drift was driven 90' to the South East, and a raise extended 54' to the 10th level airway drift. A drift was then driven in the footwall and through No. 1 dike to #171 raise, 79' to the Northwest. This provided an airway connection from the main airway on the 10th level to the 460' sub-level in the area between No. 1 and No. 2 dikes.

The ore area was opened for mining in September 1936 by one contract that started slicing near the west end under the hanging. The jasper turned or rolled back to the East and the footwall also flattened reducing the ore area here fully 40%. This contract worked here until in December when they were moved to another location. Another contract came to this sub in October and started mining at the East end of the sub-level, and with the removal of the other contract will now mine the balance of ore on the sub-level. The ore area on the sub above was 230' x 100'; on this sub it is only 200' x 70'. It is expected the ore body will increase to its former size on the lower sub-levels.

440' SUB-LEVEL NORTH FOOTWALL PILLAR

This sub-level was opened in October by one contract which connected two raises and then started slicing to the West to the Maas boundary. Another contract was added in December when the number of employees was increased and they drifted to another raise and started slicing north to the footwall. The sub-level was 20% mined at the end of the year.

11th LEVEL

There was no raising or drifting on the 11th level in 1936 aside from widening the plat at the shaft. No. 1 cross-cut beneath the ore body between the dikes crushed quite badly and has been undergoing repairs for the last 90 days. It is hoped to relieve the pressure by mining directly over the drift.

395' SUB-LEVEL MAIN ORE BODY NORTH CENTRAL FOOTWALL PILLAR

Mining was originally started on this sub-level in the main ore body in 1929. Several years previously owing to crushing of the 11th level haulage drifts, the pillar on the footwall got behind and was mined later by raises from the 12th level. This pillar has been behind mining on the other sub-levels at least two years ever since. Two contracts started mining the pillar which is 300' x 100' in size on this sub-level late in 1934 and finished mining in May 1936.

385' SUB-LEVEL MAIN ORE BODY

Mining was started on this sub-level under the hanging in 1930 and was finished in October 1936. The remaining pillars left above the 1260 and 1270 series of raises were mined in 1936. The only part of the sub-level that was both opened and mined in 1936 was the footwall pillar above the 1280 series of raises which was 200' x 100' in size. It is interesting to note that the 385' sub in the main ore was approximately 800' in length and 520' in width.

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7. UNDERGROUND: (Cont'd)

c. Stoping:

370' SUB-LEVEL MAIN ORE BODY

This sub-level was opened in 1931 in a small area under the hanging. Mining was resumed here in 1934 and was 85% completed at the end of 1936. The past year mining was completed above the 1240, 1250, 1290, and 1290-A series of raises. At the end of the year it was 60% completed above the 1260 series and 30% above the 1270 and the 1280 series.

There was an average of six contracts working on this sub-level during the year.

360' SUB-LEVEL MAIN ORE BODY

This sub-level was opened under the hanging in 1933, and the ore above the 1240 and 1230 series of raises was mined during the next two years. Mining was resumed at this elevation in May 1936 when the raises in the 1290-A and 1290 series were connected and slicing started. At the end of the year four contracts worked here. There are twelve raises in the 1290 and 1290-A series, the four contracts use alternate raises and retreat toward the airway. At the end of the year 65% of the ore in this area had been mined. In July the raises in the 1250 series were connected and mining started by three contracts. About 80% of the ore adjacent to the 1250 series of raises was mined at the end of the year and two contracts will finish mining here within 60 days. The remaining ore on the 360' sub-level will be mined from the 1260, 1270, 1280 series of raises. This area is approximately 300' x 200' in size.

350' SUB-LEVEL MAIN ORE BODY

This sub-level was opened in January 1936 and mining nearly completed in two-thirds of the area under the hanging by the end of the year. One contract mined the pillar adjacent to five raises in the 1240 series and three contracts mined the ore further to the Southwest from the 1320 series of three raises from the 13th level. Late in the year mining from the 1330 and 1350 series of raises from the 13th level was started under the hanging further to the West. Due to both the dip and pitch of the hanging having flattened in this area, the ore has extended 50 feet further West and South in the sub-level interval of 12-1/2 feet. Mining was also underway on this sub-level in December from the most westerly raise in the 1250 series and a drift had been started to connect to several other raises in this series. At the end of the year four contracts were mining on this sub-level, three from 13th level raises and one from a 12th level raise.

335' SUB-LEVEL MAIN ORE BODY

This is the most recent sub-level opened in the main ore body as work only started here in September 1936. It is only two subs above the 12th level. An area adjacent to four raises in the 1240 series is being mined by one contract and another area further to the Southwest by a contract working at the top of a raise from the 13th level. At the end of the year mining was two-thirds completed by the contract using the 12th level raises, and 95% completed by the one at 1325 raise. Both these contracts take long slices and mine an area very rapidly on the five day and five nights schedule.

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7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

12TH LEVEL:

During the year two raises were put up on the 12th level, one in No. 1260 cross-cut to the 360' sub level and one in the 1250 cross-cut to the 370' sub level - both raises were in ore. Connections were made in No. 1230 cross-cut to No. 1325 and No. 1324 raises from the 13th level and in No. 1240 cross-cut to No. 1330, No. 1331 and No. 1355 raises. In all cases the connections were driven in ore and in no case was the drive over 30 ft. in length. These drifts were driven to provide airway connection from the 12th to 13th levels.

Repair of the haulage drifts on the 12th level in 1936 was only slightly above normal. The extraordinary repairs necessary after the shut downs in 1932 and 1933 have been practically completed and only the ordinary repairs due to crushing on account of mining operations approaching the level have to be taken care of.

295' Sub - SMALL ORE BODY ABOVE THE 13TH LEVEL

As a result of exploratory drifting on the 250' sub level from No. 1341 raise, it was necessary to put up another raise on the opposite side of the 13th level haulage drift which reached the hanging nearly 50 ft. above 250' sub level. A sub level was opened at the 295' sub level elevation, practically 98 ft. above the floor of the 13th level and all the ore mined in one drift 50 ft. in length. The main dike formed the north boundary and jasper and dike elsewhere. Most of the ore was in the American Mining Company strip. This ore was originally found on the 13th level in the haulage drift parallel with the Maas boundary beyond the main dike. It is a concentration in a small area between the main dike and a small dike running south as an off-shoot from the main dike which runs east and west. The ore is high grade Bessemer.

285' Sub - SMALL ORE BODY ABOVE THE 13TH LEVEL

This sub level was opened in October after the sub above had been blasted down. Mining was completed here in December as the ore body was still small in area. It was 65 ft. in length by 30 ft. in width. A connection was made by a small raise and drift from the 250' sub level for a second outlet. This sub level was covered down with poles laid close together and wire netting on top of the poles after which it was blasted down. The dike and jasper has caved and practically filled the opening so that it may not be necessary to break extra filling. In small ore bodies the breaking of filling to form a cushion for falls of ground is very important from the safety standpoint.

270' Sub - SMALL ORE BODY ABOVE THE 13TH LEVEL

This sub level was started late in December when No. 1342 raise was put out at this elevation. The ore area on this sub level will probably be 50% larger than on the sub above.

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7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

250' SUB-LEVEL SMALL ORE BODY ABOVE THE 13TH LEVEL

This sub-level was opened in June at #1341 raise, directly under the hanging wall jasper which was encountered at -263' elevation or 67 feet above the floor of the 13th level. It was opened as an exploration to determine the size and limits of the ore body preliminary to mining. The first drift driven to the South struck dike and jasper within 30' and then a drift was started to the Southwest where after drifting 74' in ore, a two-foot dike was encountered with five feet of ore beyond it and then solid jasper. Holes drilled in the back of the drift struck the hanging within two feet, so in this direction the ore averaged 12' to 13' in thickness above the floor of the sub-level. A drift driven Northwest from the raise showed the hanging to rise in this direction and the drift was stopped after advancing 20'. A single compartment raise was put up to the jasper which was encountered 28' above the floor of the sub. The hanging, therefore, rises rapidly to the Northwest--18' rise in 20' horizontal distance. This discovery indicated that a raise should be put up on the Northwest side of the 13th level haulage drift. The new raise was started in July and finished in August at a height of 111' above the floor of the 13th level. Development of a sub--the 295'--under the jasper is described in a preceding paragraph. The ore South and West of #1341 raise was mined under the jasper hanging. The area mined was 100' x 25' in size. The ore body extends to the Northwest to the main dike and this portion of the 250' sub will be mined after the upper extension has been mined. The ore area on the 250' sub-level will probably average 120' x 80' in size and will increase on lower sub-levels.

13TH LEVEL

Development of the 13th level started early in 1935, and at the end of 1936, it was 70% completed. At the end of December 1935, No. 2 cross-cut was nearly around the curve to the line of the drift along the Maas boundary. During the year this drift, which is 115' from the Maas boundary and parallel with it, advanced about 200' and was then turned more to the West for 250' where it encountered the main dike (#1 and #2 dikes combined). It was in ore the entire distance of 450'. The dike was 25' thick with a few feet of ore just beyond it, then another dike about 5' thick, then 50' ore. The drift was then in jasper for 114'. Beyond the jasper a 10' dike was found, then 56' of ore, then hard jasper in which the drift was advanced 32' and stopped. Total advance of the main haulage drift in a Southwesterly direction in 1936 was 751 feet.

Number 1 cross-cut was turned off to run in a Southeasterly direction 160' distant from No. 2 cross-cut. Drifting was resumed here in November in the footwall jasper 22' from the main Southwest haulage drift, and after advancing 32' in jasper, ore was encountered. The cross-cut was then turned more to the South so as to strike the main dike at a right angle. The log of the cross-cut driven in 1936 is as follows: Ore 25', jasper 32', ore 65', jasper 21', dike 22' in which material the cross-cut was advancing on December 31st. It is hoped to find ore beyond the main dike, as the dip and westward pitch of the ore body South of the dike on the South footwall should bring it to this location on the 13th level. Total advancement, No. 1 cross-cut, for the year, 165'.

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7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

13TH LEVEL (Cont'd)

The drift parallel with and 115' from the Maas boundary was extended to the Northeast from No. 2 cross-cut to No. 3 cross-cut, a distance of 250' in low grade ore, averaging from 50 to 58% in iron. For about 200' the material was graded as ore, the last 50' near #3 cross-cut was hoisted as rock. The drift was continued 255' further to the Northeast in footwall rock. Drifting was then temporarily stopped here but will be resumed in 1937.

Another development gang continued the main footwall drift Northeast from No. 2 cross-cut 110' and turned off No. 3 cross-cut which was then driven a distance of 345' to the point of intersection with the drift which parallels the Maas boundary. The footwall drift and the cross-cut were in jasper except when they passed through No. 1 dike which was 15' thick and No. 2 which was only 10' thick. About 200' of the rock drift was gunited, otherwise it would have had to be timbered as the ground slabbed off from the action of air on the lime seams.

Three raises were cut out in No. 2 cross-cut late in 1935 two of which were started in December 1935. All three were extended to the hanging 50' above the 12th level in 1936, and mining was underway above these raises the greater part of the year.

Two raises were cut out in No. 3 cross-cut and extended to the mined area above the 12th level, one to the 350' sub-level and one to the 335' sub-level elevation. These two raises are 90' apart. In the drift parallel to the Maas boundary four raises were extended to the hanging above the 12th level, and one other cut out and a chute built. These raises were adjacent to the switch at No. 3 cross-cut and reached the 12th level in the neighborhood of #1240 cross-cut. These raises were 80' center to center, three were on one side of the drift and two, on the other.

Three raises were put up beyond the main dike in the drift parallel with the Maas boundary. No. 1340 and No. 1344 raises were located on the South side of the drift and No. 1342 on the North side. The first raise, No. 1340, struck a small dike 21' above the 13th level, where the raise was offset to the South beyond the dike which was 5' thick and continued in ore to the jasper at an elevation 48' above the level. The next raise No. 1341, was started close to the jasper struck in the main drift beyond the ore. At a height of 26' above the 13th level a 2' seam of jasper was encountered with ore above it in which the raise was continued to the hanging wall jasper 62' above the level. A sub-level was opened at 250' elevation and the ore outlined under the hanging which was found to dip to the South. Accordingly No. 1342 raise was started in jasper on the North side of the haulage drift, 35' Southwest of 1341 raise. It was continued up to the intersection of the hanging and the main dike which was found 111' above the 13th level. A sub-level was opened at elevation 295' or 98' above the 13th level.

A short raise, 8' x 8' in size, was put up a distance of 27' above the drift along the Maas boundary between No. 2 and No. 1 cross-cuts. A drift was driven at this elevation to the ventilation raise from the 4th level Maas Mine. The cost of the raise and drift was charged to the Maas.

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7. UNDERGROUND: (Cont'd)

c. Stopings: (Cont'd)

13TH LEVEL (Cont'd)

A short drift 15' in length was driven at a point 590' further to the Southwest to connect with a raise from the 5th level, Maas. This provided an air inlet to the 5th level. At the end of 1936, there was about 800' of rock drifting and 100' ore drifting to be done to complete development of the 13th level.

d. Timbering:

There was a small decrease in the cost per ton for timber in 1936. The amount of cribbing timber used in 1936 increased over 200% due to the heavy program of raising on the 13th level. The inclusion of the large amount of cribbing costing .035 per linear foot with the larger sizes of stull timber, which cost more per foot in 1936 than in 1935, caused an actual decrease in the cost per foot for timber \$.0669 in 1936 as compared with \$.0712 in 1935. The amount of treated timber used, mainly on the 13th level, increased 170% and the cost from 635.73 in 1935 to \$1743.75 in 1936. The feet of timber per ton of ore increased 7-1/2% but the feet of board measure per ton of ore decreased slightly.

A test was made this year of large sizes of hemlock stull timber in areas under heavy pressure. In some cases, the large legs split lengthwise into a number of pieces and in others the hardwood caps pushed down into the softer hemlock legs mushrooming the tops. The large hemlock legs were not forced down into the floor as the smaller hardwood legs often are, particularly in wet areas. The large hemlock legs proved to be excellent for props on the connecting drifts on the sub-levels and in airway drifts. They were not as good as large hardwood legs in the main drifts as they had to be replaced more frequently. It is planned to use them in the future for props in sub-level drifts that have to be kept open a long time.

Statement of Timber Used:

	Linear Feet	Avg. Price Per Foot	Amount 1936	Amount 1935
6" to 8" Cribbing	123,168	.0350	4307.41	1418.18
8" Stulls	70,591	.0552	3894.33	1969.24
10" "	116,144	.0776	9019.50	5953.74
12" "	42,733	.1200	5126.33	3580.66
14" "				
Treated Timber	7,562	.2306	1743.75	635.73
Total 1936	360,198	.0669	24093.32	
Total 1935				13557.55
Lagging--7 ft.	1,452,076	.710	10304.83	5876.91
Poles 9-1/2 ft.	956,161	1.086	10382.24	7202.26
Total 1936	2,408,237	.859	20687.07	
Total 1935				13079.17
Wire Fencing-rods	230	.881	202.71	298.97
Grand Total 1936			44983.10	
Grand Total 1935				26935.69

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

Product	1936	1935
	<u>Amount</u>	<u>Amount</u>
Feet of Timber per ton of ore	512,612	291,318
" " Lagging per ton of ore	.703	.654
" " " per ft. of timber	3.53	2.90
" " wire fencing per ton of ore	4.03	4.44
Cost per ton for timber	.0074	.0198
" " " " Lagging	.0470	.0466
" " " " Poles	.0201	.0202
" " " " wire fencing	.0202	.0247
" " " " total	.00039	.00102
	.0877	.0924
Equivalent of stull timber to board measure	702,178	445,910
Feet of board measure per ton of ore	1.37	1.53

Total Cost for Timber, Lagging, Poles, etc.

<u>Year</u>	<u>Product</u>	<u>Amount</u>	<u>Cost Per Ton</u>
1936	512,612	44,983.10	.0877
1935	291,318	26,935.69	.0924
1934	235,664	23,441.91	.0985
1933	61,941	9,147.82	.1477
1932	84,046	8,988.22	.1069
1931	338,696	33,408.70	.0986

e. Drifting & Raising:

There was a large increase in ore drifting and ore raising in 1936 due to development of the 13th level. The only decrease was in rock drifting which was much above normal in both 1936 and 1935. This year the net increase in drifting and raising was approximately 80% over 1935, last year it was 171% over 1934. Due to the larger product in 1936, the cost per ton for drifting and raising was \$.036 as compared with \$.054 in 1935. In both years over 95% of the expense was on account of developing the 13th level.

<u>Year</u>	<u>Drifting</u>		<u>Raising</u>		<u>Total</u>
	<u>Ore</u>	<u>Rock</u>	<u>Ore</u>	<u>Rock</u>	
1936	1146	1401	1322	558	4427
1935	114	1855	258	241	2468
Increase	1032		1064	317	1959
Decrease		454			

f. Explosives, Drilling & Blasting:

The average price of powder decreased 5-1/2% in 1936, and was the lowest price in over 20 years. The pounds of powder per ton of ore increased slightly but due to the lower price per pound the cost per ton was 4-1/2% lower than in 1935. It was the lowest in many years, namely \$.0475 which is a very reasonable cost for powder in a soft ore mine. The cost per ton for fuse and caps increased slightly due to use of longer fuse, seven feet instead of six feet as a safety measure. The cost for fuse and caps has risen from \$.0090 in 1926 to \$.0105 in 1936. The total cost for all

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e. UNDERGROUND: (Cont'd)

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

explosives was .058 per ton which was the lowest cost in six years. The decrease in 1936 over cost in 1935 was due to lower cost for powder, and intelligent supervision of powder used by the miners. Insistence on use of tamping in holes is a prominent factor in the low cost per ton for all explosives. More slicing and less drifting is another factor entering into the lower cost for the last two years.

The ore near the hanging runs uniformly harder than elsewhere in the ore body. More ore was mined in 1936 from the hanging wall areas in order to increase the output of low Phosphorous ore, most of which is shipped all-rail to charcoal furnaces. The BBR230 auger drill machines purchased in 1928 to 1931 are gradually being replaced with RB12 machines. These later model machines are more powerful and drill faster.

Year	Cost per Lb. For Powder	Lbs. Powder Per Ton of Ore	Cost per Ton Powder	Cost Per Ton Fuse & Caps	Total Cost
1936	.1104	.4320	.0475	.0105	.0580
1935	.1168	.4270	.0498	.0102	.0600
1934	.1140	.4350	.0507	.0106	.0613
1933	.1196	.5110	.0610	.0130	.0740
1932	.1235	.4191	.0518	.0099	.0617
1931	.1268	.4025	.0510	.0091	.0602

Statement of Explosives Used: (Ore Development and Stopping)

	Quantity	Average Price	Amount 1936	Amount 1935
50% Gelatin	221,440	11.00	24,358.27	14,416.67
60% "				100.01
Total Powder 1936	221,440	11.00	24,358.27	14,516.68
Total Powder 1935				14,516.68
Fuse - feet	721,917	5.73	4,140.82	2,152.60
Caps - No. 6	100,404	11.19	1,113.41	688.19
Tamping Bags	39,200	2.14	84.01	73.10
Fuse Lighters	11,000	6.75	74.25	45.23
Total Fuse, etc. 1936			5,412.49	
Total Fuse, etc. 1935				2,959.12
Total All Explosives - 1936			29,770.76	
Total All Explosives - 1935				17,475.80

Product			512,612	291,318
Pounds of Powder per ton of ore			.432	.427
Cost per ton for powder			.0475	.0498
Cost per ton for fuse, caps, etc.			.0105	.0102
Cost per ton for all explosives			.0580	.0600

Sinking, Rock Development, Etc.

50% Gelatin	12,175	10.96	1334.60	1038.71
60% Gelatin	10,350	12.11	1253.50	3012.50
Total Powder - 1936	22,525	11.49	2588.10	
Total Powder - 1935				4051.21
Fuse - feet	55,934	5.70	319.00	327.62
Caps - No. 6	7,066	11.22	79.32	100.04
Total Fuse, etc. - 1936			398.32	
Total Fuse, etc. - 1935				427.66

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7. UNDERGROUND: (Cont'd)

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

	Amount <u>1936</u>	Amount <u>1935</u>
Total Explosives for Rock Drifting - 1936	\$ 2,986.42	\$
Total Explosives for Rock Drifting - 1935		\$ 4,478.87
Total Explosives used in mine	32,757.18	21,954.67
Avg. Price per lb. for powder	.1104	.1181

g. Mining & Loading:

There was no change in mining methods in 1936. The change to fewer contracts on each sub level which was started in 1934 was continued in 1936. Where possible, longer slices were taken and more of the pillars mined by radial slicing. The raises on the 13th level were laid out to conform with this plan and mining above the 12th under the hanging is now underway from these raises. Some slices here are 140 ft. in length which is not too long for the 20 H.P. scraper hoist with 48" scraper in use here. The tendency of all operators is to increase the horsepower of the scraper hoists and to use larger scrapers. The determining factor in length of slices is the completion of a cycle in an eight hour shift. The complete cycle covers drilling, blasting, scraping off the broken ore and timbering. The limit of scraping distance from a raise is that distance beyond which a cycle cannot be made in eight hours. Longer slices increase the tons per man per day in that they reduce the time lost in starting new slices. With short slicing distances sometimes unavoidable, the output from a contract will drop from 20% to 35% as compared with a month in which they have long slices. Even with only two or three contracts on a sub level where six used to work, it is quite remarkable how quickly the sub level is mined on the present operating schedule of five days and five nights per week. In some cases it has been noted that mining is so rapid that complete settlement of a sub level does not take place before the same area is being mined on the next lower sub level. This is another argument in favor of wider spacing of contracts than was formerly followed.

All the ore mined is handled by electric scraper hoists most of which are 15 H.P. with a few 10 and 20 H.P. units. Until very recently home-made box scrapers were used entirely. In November a fabricated steel scraper made from an alloy steel was tried out and proved very successful in handling soft ore. When loaded this scraper rides on the back of the cutting blade which reduces friction and digging down into the floor of the sub level. Its capacity is greater than the home-made scrapers and the load curve indicates less horsepower consumed. It is now planned to gradually replace the home-made scrapers with the new molychrome steel scrapers.

h. Ventilation:

Ventilation was good during 1936. In only one or two cases was it necessary to use a booster fan for short periods of time while a connection was being driven on a sub level to the airway. Wherever possible connections have been maintained on the sub levels direct to the main airway. Where this was not practical doors were installed on the main level to divert the air up a raise to the sub level.

The airway raises in rock from the 10th to 11th level, also from the 9th to 6-1/2 level, and several hundred feet of the 9th level airway drift were gunited in the summer to prevent slabbing of the rock due to action of the air.

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7. UNDERGROUND: (Cont'd)

h. Ventilation: (Cont'd)

Ventilation expense in 1936 was \$7,786.94 as compared with \$6,658.17 last year, \$.015 per ton in 1936, \$.023 per ton in 1935. The increase was due to more current used by the fan at No. 2 shaft, on account of the increase in operating schedule. There was also a new driving belt purchased for the fan at a cost of \$375.00. The cost of guniting the rock raises and rock drift on the 9th level was also charged to this account.

During the year two connections were made to the Maas Mine on the 13th level for airways. The expense of this work was charged to the Maas Mine.

i. Pumping:

The number of gallons pumped per minute in each month of the year for the past six years are shown in the following statement:

Month	1936	1935	1934	1933	1932	1931
January	886	931	815	814	942	990
February	898	953	788	808	982	914
March	867	898	779	751	963	891
April	866	878	796	816	973	878
May	992	887	807	926	1000	847
June	798	895	826	876	835	960
July	931	911	837	984	918	972
August	952	917	854	882	885	923
September	959	936	857	889	889	953
October	951	944	859	866	786	931
November	954	940	875	849	920	839
December	916	927	876	826	771	875
Total Avg.	914	918	831	857	905	914

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

<u>Year</u>	<u>Gallons Per Minute</u>
1936	914
1935	918
1934	831
1933	857
1932	905
1931	914
1930	1060
1929	1230
1928	1198
1927	1144

The average gallons pumped per minute in 1936 was four gallons less than in 1935, and exactly the same as in 1931. The water is apparently about stationary for the time being. It is probable that no new cracks in the hanging connected with surface occurred during the year for this always changes the point of inlet and dry areas in the mine suddenly become wet and often the amount of water increases.

The sub-levels above the 11th level in the area between the two dikes continue to be the wettest in the mine. Some water comes in under the hanging in the main ore body as in 1935, but if anything it has decreased in quantity. Almost 600 gallons of the 914 entering the mine comes in near No. 2 shaft from the old workings Northeast of the cave to surface.

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7. UNDERGROUND: (Cont'd)j. Underground in General:

The mine was in excellent condition at the end of the year. One area on the 11th level is under heavy pressure and it is planned to relieve it by mining a sub-level under a horse of jasper directly over the drift. A pillar over a main level drift with a mined area adjacent always exerts heavy pressure. This pressure can often be relieved by mining several slices on sub-levels as much as 70 feet above the drift. Replacement of rotted timber was underway during the year on the 11th and 12th levels, but there was less expense for this work than in the previous year. The mine is kept clean all the time as this increases safety.

8. COST OF OPERATING:a. Comparative Mining Costs:

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	512,612	291,318	221,294	
Underground Costs	.910	1.059		.149
Surface Costs	.115	.136		.021
General Mine Expenses	<u>.163</u>	<u>.241</u>		<u>.078</u>
Cost of Production	1.188	1.436		.248
Taxes	.210	.357		.147
Depletion & Depreciation	.352	.353		.001
Loading & Shipping	.020	.022		.002
Adm. & General Expense	.020	.031		.011
Miscellaneous Income	<u>.008</u>	<u>.017</u>	.009	
TOTAL COST	1.782	2.182		.400
Supply Inventory Adjustment	.003		.003	
	1.785	2.182		.397
No. of Days operated	272	303		31
No. of Shifts & Hours	1-8 hr. 2-8 hr. 3-8 hr.	1-8 hr.		
Average Daily Product	1885	961	924	

COST OF PRODUCTION:

	<u>1936</u>	<u>%</u>	<u>1935</u>	<u>%</u>	<u>Increase</u>	<u>Decrease</u>
Labor	.652	54.9	.742	51.7		.090
Supplies	.536	45.1	.694	48.3		.158
Total	1.188	100.0	1.436	100.0		.248

b. Detailed Cost Comparison:

(1) <u>Days and Shifts:</u>		<u>Shifts & Hours</u>		<u>Men Employed</u>	<u>Total Shifts Worked</u>
<u>Year</u>	<u>Days Mine Worked</u>	<u>1-8</u>	<u>2-8 3-8</u>		
1936	277			262	63,814
1935	<u>303</u>	<u>1-8</u>		<u>235</u>	<u>42,295-1/2</u>
Increase				27	21,518-1/2
Decrease	26				

(2) Wages:

There was an increase of six cents (6¢) per hour in wages on November 16th, 1936.

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a. COST OF OPERATING:

b. Detailed Cost Comparison:

(3) Comparison of Production:

Production - 1936	512,612
Production - 1935	<u>291,318</u>
Increase	221,294

(4) Comparison of Number of Men and Wages:

	<u>No. Men</u>	<u>No. Days</u>	<u>Amount</u>	<u>Rate Per Day</u>
1936	262	63,814	325,688.13	5.10
1935	235	<u>42,295¹</u>	<u>209,395.94</u>	<u>4.95</u>
Increase	27	<u>21,318²</u>	116,292.19	0.15

(5) Tons Per Man Per Day:

	<u>1936</u>	<u>1935</u>	<u>Increase</u>
Surface	38.61	30.64	<u>7.97</u>
Underground	<u>10.14</u>	<u>8.88</u>	<u>1.26</u>
Total	8.03	6.89	1.14

(6) Cost of Production:

1936	608,896.70	Cost per ton	1.188
1935	<u>418,315.71</u>	Cost per ton	<u>1.436</u>
Increase	190,580.99		
Decrease			.248

	<u>Labor</u>	<u>%</u>	<u>Supplies</u>	<u>%</u>
1936	334,343.91	54.9	274,552.79	45.1
1935	<u>216,156.02</u>	<u>51.7</u>	<u>202,159.69</u>	<u>48.3</u>
Increase	118,187.89	3.2	72,393.10	
Decrease				3.2

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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(7) Detail of Accounts:

	<u>1936</u>	<u>1935</u>	<u>Increase</u>	<u>Decrease</u>
Days Per Week	5	4 & 6		
Shifts & Hours	2-8 hr.	1-8 hr.		
Production - Tons	512,612	291,318	221,294	
Avg. Daily Product-Tons	1,885	961	924	
Number of Days Worked	272	303		31

	<u>1936</u>		<u>1935</u>		<u>Inc. or</u>	<u>decr.</u>
	<u>Amount</u>	<u>Per</u>	<u>Amount</u>	<u>Per</u>	<u>Amount</u>	<u>Per</u>
		<u>Ton</u>		<u>Ton</u>		<u>Ton</u>
<u>UNDERGROUND COSTS</u>						
1. Exploring	191.49		118.66		72.83	
2. Sinking in Shaft						
3. Development in Rock	14431.77	.028	18175.98	.062	3744.21	.034
4. Development in Ore	12619.14	.025	1908.01	.007	10711.13	.018
5. Stopping	159601.39	.312	94257.72	.324	65343.67	.012
6. Timbering	121059.64	.236	80840.21	.278	40219.43	.042
7. Trammig	44735.61	.087	23912.04	.082	20823.57	.005
8. Ventilation	7786.94	.015	6658.17	.023	1128.77	.008
9. Pumping	29344.47	.057	31250.00	.107	1905.53	.050
10. Compressors and Air Pipes	29753.32	.058	19874.54	.068	9878.78	.010
11. Back Filling			345.15	.001	345.15	.001
12. Underground Superintendence	9986.26	.020	9078.88	.031	907.38	.011
13. Cave-in			6.00		6.00	
14. Maint: Comp. & P. Drills	1442.82	.003	1680.89	.006	238.07	.003
15. Scraper Equipment	16049.56	.031	9437.36	.032	6612.20	.001
16. Elec. Tram Equip.	17816.87	.035	8816.80	.030	9000.07	.005
17. Pumping Machinery	1726.66	.003	2330.59	.008	603.93	.005
Total Undg. Costs	466545.94	.910	308691.00	1.059	157854.94	.149
<u>SURFACE COSTS:</u>						
18. Hoisting	24469.81	.048	17129.97	.059	7339.84	.011
19. Stocking Ore	4725.17	.009	2854.70	.010	1870.47	.001
20. Screening--Crushing At Mine						
21. Dry House	5620.35	.011	5454.47	.019	165.88	.008
22. General Surface Expense	5763.93	.011	4838.65	.017	925.28	.006
23. Maint: Hoisting Equipment	6043.74	.012	3994.96	.014	2049.38	.002
24. Shaft	1627.38	.003	2405.58	.008	778.20	.005
25. Top Tram Equipment	2162.30	.004	820.12	.003	1342.18	.001
26. Docks, Trestles & Pockets	1019.82	.002	1114.16	.004	94.34	.002
27. Mine Buildings	7396.47	.015	736.72	.003	6659.75	.012
Total Surface Costs	58828.97	.115	39349.33	.136	19479.64	.021
<u>GENERAL MINE EXPENSES:</u>						
27.a Employees Vacation Payroll	4592.19	.009			4592.19	.009
27.b Accrued Unemployment Tax	3427.55	.007			3427.55	.007
28. Insurance	1222.43	.002	639.71	.002	582.72	.000
29. Mining Engineering	1907.36	.004	1826.90	.006	80.46	.002
30. Mech. & Elec. Engr.	1725.85	.003	1348.88	.005	376.97	.002
31. Analysis and Grading	10260.13	.020	7541.91	.026	2718.22	.006
32. Personal Injury	18503.56	.036	17000.79	.059	1502.77	.023
33. Safety Department	1179.47	.002	625.97	.002	553.50	.000
34. Telephones and Safety Devices	2640.61	.005	1945.00	.007	695.61	.002
35. Local and General Welfare	3769.19	.007	3685.42	.012	83.77	.005
36. Special Expense, Pen. & Allow.	7435.39	.015	12254.50	.042	4819.11	.027
37. Ishpeming Office	11908.41	.023	10438.22	.036	1470.19	.013
38. Saranac Invest.	1969.75	.005	1519.53	.005	450.22	.000
39. Mine Office	12929.94	.025	11448.55	.039	1481.39	.014
Total General Mine Expenses	83471.83	.163	70275.38	.241	13196.45	.078
COST OF PRODUCTION	608846.74	1.188	418315.71	1.436	190531.03	.248

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8. COST OF OPERATING: (Cont'd)

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

	<u>1936</u>		<u>1935</u>		<u>Inc. or decr.</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
COST OF PRODUCTION	608846.74	1.188	418315.71	1.436	190531.03	.248
40. Taxes	107640.61	.210	104158.77	.357	3481.84	.147
Depl'n & Depr'n	243497.86	.475	102632.84	.353	140865.02	.122
Loading & Shipping	10513.79	.020	6636.75	.022	3877.04	.002
Adm. & Gen. Expenses	10590.71	.021	8975.85	.031	1614.86	.010
Misc. Income	4071.47	.008	5059.47	.017	988.00	.009
Supply Inventory Adjustment	1593.26	.003	22.87		1570.39	.003
TOTAL COST	978611.50	1.908	635683.32	2.182	342928.18	.273

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8. COST OF OPERATING:

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

UNDERGROUND COSTS:

1. Exploring in Mine:

Increase is due to more time spent at the mine by the Geological Department men.

3. Development in Rock:

There were 1379-1/2 shifts worked in 1936 compared with 1527-3/4 shifts in 1935. Number of feet drifted in 1936 was 1959 ft. compared with 2096 ft. in 1935. Cost in 1936 was \$7.37 per foot compared with \$8.67 per foot in 1935. Ground less hard in 1936.

4. Development in Ore:

In 1936 there were 1501-1/2 shifts worked compared with 222-1/2 shifts in 1935. The footage in 1936 was 2470 as compared with 372 ft. in 1935.

5. Stoping:

In 1936 there were 19,592-1/4 shifts worked compared with 11,744 shifts in 1935. The cost per ton shows a decrease of \$.012. Tons per man for stoping increased from 24.64 in 1935 to 25.07 in 1936. New auger steel charged out in 1936 - \$1465.13, drill repair parts - \$1072.64 and electric lamp rental \$749.15. The average cost per pound for powder in 1936 was \$.1104 compared with \$.1168 in 1935. The cost for all explosives used decreased \$.012 per ton in 1936.

6. Timbering:

Expenditures increased \$20,323.57 in 1936 and cost per ton \$.005. The increase in cost per ton was due to more expense for retimbering drifts on the main levels and propping ventilation drifts on the sub levels. The actual cost for timber, lagging and poles decreased \$.0047 in 1936 as compared with 1935.

7. Tramming:

Increase is due to more track cleaning expense in 1936, also larger proportion of electric haulage expense account of larger tonnage of ore trammed.

8. Ventilation:

Increase in expense due to more electric current required for ventilation fan at No. 2 shaft on account of increase in operating schedule. One endless 16" leather belt (\$375.00) for fan motor was charged out in 1936. Cost \$.008 per ton less in 1936.

9. Pumping:

Decrease due to \$815.08 less electric current used in 1936 than in 1935, also less labor account of 213-3/4 more shifts pumping in 1935 than in 1936 - 1194-3/4 shifts in 1936, 1408-1/2 shifts in 1935. Less time by pumpman's helpers in 1936 account of increased operating schedule.

MEGAMINE MINE
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8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparisons: (Cont'd)
(7) Detail of Accounts: (Cont'd)

UNDERGROUND COSTS: (Cont'd)

10. Compressors and Air Pipes:

Increase due to more air consumed account of increase in operating schedule. Cost per ton .010 lower than 1935.

cu. ft. air 1936	737,716,000
cu. ft. air 1935	<u>501,336,761</u>
Increase	236,379,239

11. Back Filling:

No charge to this account in 1936. In 1935 the charge was due to breaking down filling to provide a mat in new territory under the hanging.

12. Underground Superintendence:

Increase due to 146-1/2 more shifts in 1936. In 1936, 1409 shifts, in 1935, 1262-1/2 shifts. Cost per ton .011 lower in 1936. Two additional bosses started working in December account of hoisting on 3-8 hour shifts.

14. Maintenance--Compressor & Power Drills:

In 1936 there were six RB12 Ing.-land drill machines charged out amounting to \$1140.75. In 1935 there were five drill machines and one set Tubes and Ferrules for intercooler on the compressor, charged out, amounting to \$1402.37. Total expense in 1936 decreased \$238.09 and cost per ton \$.003.

15. Maintenance--Scrapers & Mechanical Loaders:

In 1936, three 15 H.P. Sullivan Scraper Hoists were charged out amounting to \$3455.92 and one 20 H.P. Ing.-land Scraper Hoist amounting to \$1151.92, and one Holcomb scraper \$155.20, Gardner Denver scraper hoist repair parts \$200.00, and 44,360 feet of 1/2 and 3/8 wire rope amounting to \$3967.45. Cost per ton .001 less than 1935.

16. Electric Tram Equipment:

Increase due to charging out four-65 cubic feet Rocker Dump Cars \$2130.56, 45,550 pounds 40 pound rail \$922.96, three Manganese frogs, \$332.80, two hundred steel ties \$117.42, labor on track \$1875.97, for repairing locomotives \$1340.46, and labor and supplies for wiring. There was also expense for overhauling all the 65 cubic feet rocker dump cars in the mine, which were brought to surface and repaired in the mine shops at a cost of \$1890.46. Expense in 1936 and 1935 was above normal account of developing the 13th level.

17. Pumping Machinery:

costing

In 1936 one Prosscott pump body/\$532.00 was charged out. In 1935 excavation was made for a new pump house on the 13th level and sinking to sump level preliminary to excavating the sump. Expenditures decreased \$603.93 in 1936 and cost per ton \$.005.

SURFACE COSTS:

18. Hoisting:

Increase in cost for electric current account of larger tonnage hoisted.

1936	\$ 18,150.94	Cost per K.W. lower in 1936.
1935	<u>\$ 11,970.45</u>	
	\$ 7,180.49	

Decrease of .011 in cost per ton.

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8. COST OF OPERATING: (Cont'd)

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

SURFACE COSTS: (Cont'd)

19. Stocking Ore:

204,102 tons stocked in 1936 compared with 148,466 tons in 1935.
Decrease of .001 in cost per ton.

21. Dry House Expense:

Increase in labor attending dry, etc. account of mine working more shifts. Cost per ton decreased .008.

22. General Surface Expense:

One Watchmen clock \$69.25, charged out, also increase in labor account of mine working 5 days per week. Cost per ton decreased .006.

23. Hoisting Equipment:

Charged out two new skip ropes costing \$1243.73, repairing skips and cage roads \$2098.76, one new spherical bottom skip \$634.47, repairing one cage \$354.10, new coils and repairing fly wheel set \$364.66, also proportion of cost of rewiring switch board. Expenditures increased \$2049.38 and cost per ton decreased .002.

24. Shaft:

Very little repair work on shaft pockets and shaft. Repair work was about normal in both 1935 and 1936.

25. Top Tram Equipment:

7338 feet 5/8 wire rope costing \$883.03 was charged out in 1936; labor and supplies for rewiring on landing and repairing top tram cars. Expense above normal account of putting on two new top tram ropes and rewiring account of change from 2200 volt to 220 volt current on landing.

26. Docks, Trestles, Pockets:

This account shows a small decrease account of less expense for rock trestles in 1936.

27. Mine Buildings:

Extension of Timber Tunnel	796.45
Repair & Painting Shaft House	1740.00
Difference between repairs account fire & amount allowed by adjustors	4121.73
Dry House Enlarging Edison Cap Lamp Room	120.75

Expense much above normal account of the fire in shaft house and painting steel covering on the shaft house, and addition to timber tunnel.

GENERAL MINE EXPENSES:

27a. Employees Vacation Payroll:

Covers payroll account of week's vacation with pay granted in August.

27b. Accrued Unemployment Tax:

Accrued Unemployment tax levied in 1936, \$3427.55.

28. Insurance:

Fire Insurance \$264.54 less than in 1935 but \$847.26 for Group Insurance charged to this account.

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8. COST OF OPERATING: (Cont'd)

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

GENERAL MINE EXPENSES: (Cont'd)

29. Mining Engineering:

This account shows a small increase due to more engineering work account of increased operations and development of the 13th level.

30. Mechanical & Electrical Engineering:

Proportion of cost of Mechanical & Electrical Department--charged on basis of time actually spent at the mine. More time than usual was spent at the mine while the shaft house was being repaired after the fire in February.

31. Analysis & Grading:

Increase due to increased production and shipments--which increased number of analysis.

32. Personal Injury:

Increase due to larger payrolls for 1936. Includes .08 per \$100 for catastrophe insurance and compensation payments for injuries prior to May 15, 1933.

33. Safety Department:

Safety cash awards in December \$285.00. More first aid supplies and more expense for first aid and helmet practice.

34. Telephones and Safety Devices:

Increase in cost of lighting on main levels, also cost whitewashing plats and guniting main drifts was charged to this account.

35. Local and General Welfare:

Proportion of cost of Company visiting nurse at Negaunee and other welfare expense charged at Ishpeming office.

36. Special Expense, Pensions and Allowances:

		1935
Pensions	\$4309.41	\$4781.37
Legal & Other		
Expense	1357.85	1112.63
Curtailment		
Expense	1703.11	6291.25
All Other		
Expense	65.02	69.25
Total	\$7435.39	\$12254.50

Decrease in expense \$4819.11 in 1936; also in cost per ton \$.027.

37. Ishpeming Office:

Expense increased \$1470.19 in 1936, but cost per ton decreased .013 due to larger product.

38. Saranac Investigations:

This represents examination of men at \$4.00 per man and proportion of cost of Saranac Laboratory Contract which is prorated on a labor basis. The increase in expense in 1936 was due to hiring additional men.

39. Mine Office:

Expense increased \$1481.39 in 1936 and cost per ton decreased .014, warehouse overhead nearly doubled in 1936 due to more supplies used at mine, and salaries increased account of advance in wages on November 16th.

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8. COST OF OPERATING: (Cont'd)

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

GENERAL MINE EXPENSES: (Cont'd)39. Mine Office: (Cont'd)

More office supplies used account of increased working schedule and more men on payroll.

40. Taxes:

Detail of total taxes in 1936 and 1935 follows:

<u>City</u>	<u>1936</u>	<u>1935</u>
City Tax	\$100,859.97	\$95,226.14
1934 tax charged in 1935		8,113.73
Franchise Tax	579.18	538.70
Capital Stock Tax	(1)	280.00
Adams Strip	<u>6,201.46</u>	
Total	\$107,640.61	<u>\$104,158.77</u>

City tax rate per \$1000 increased \$3.29 in 1936.

(1) Capital Stock Tax charged to Administrative expense in 1936.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

There was no diamond drilling on the property in 1936.

10. TAXES:

A comparison of taxes paid by the Negaunee Mine Company in 1936 and 1935 follows:

	<u>1936</u>		<u>1935</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty-213.19 Acres	\$2,380,000	\$81,194.65	\$2,415,000	\$74,464.12
Personal-Stockpile, Equip				
Equip. & Supp.	<u>525,000</u>	<u>17,910.58</u>	<u>620,000</u>	<u>19,117.08</u>
Total by Tax Comm.	\$2,905,000	99,105.23	\$3,035,000	\$93,581.20
Collection Fees		<u>991.05</u>		<u>935.81</u>
Total Optg. Neg.				
Mine	\$2,905,000	\$100,096.28	\$3,035,000	\$94,517.01
Rented Buildings	22,770	776.80	22,770	702.11
Collection Fees		<u>7.77</u>		<u>7.02</u>
Total Neg. Mine Co.	\$2,927,770	\$100,880.85	\$3,057,770	\$95,226.14
Tax Rate Per \$100 Valuation	3.411			3.082
Total Tax City of Negaunee (Includes Collection Fee)	\$406,945.23			\$366,574.10
Negaunee Mine Co. % of City Tax	24.78%			25.98%

There was a small decrease in both realty and personal valuation by the State Tax Commission, \$40,000 in total. The city tax rate increased \$3.29 per \$1000 resulting in an increase of \$5,654.71 in total taxes.

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11. ACCIDENTS
AND
PERSONAL
INJURY:

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

	<u>1936</u>	<u>1935</u>	<u>1934</u>	<u>1933</u>	<u>1932</u>
Fatal	0	0	1	0	0
Time Lost - Over four months	0	1	1	0	1
" " - One to four months	3	1	1	2	1
" " - Less than one month	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>
Total Compensable Accidents	4	2	4	2	3

Number of cases paid compensation for accidents prior to Jan. 1st, 1936	7	8	10	14	14
---	---	---	----	----	----

Number of cases being paid difference in wages (Included in above total)	2	4	4	4	4
--	---	---	---	---	---

The record in 1936 while not as good in number of accidents as in 1935 was better as far as severity was concerned. The increased operating schedule and increase in number of employees increased the exposure hazard.

The nature of injuries for which compensation was paid in 1936 was as follows: fracture rib, fracture of leg, contusion of leg, contusion & bruise both legs. One accident was classified by the Central Safety Committee as a Trade Risk and three due to carelessness.

12. NEW
CONSTRUCTION
AND
PROPOSED NEW
CONSTRUCTION:

All the E. & A's authorized in 1936 were for new equipment.

13. EQUIPMENT
AND
PROPOSED
EQUIPMENT:

a. Steam Shovels:

No. 7 Shovel loaded	238,116 tons
No. 16 " " "	<u>2,258 "</u>
Total	240,374 "

Extensive repairs were made to No. 7 shovel last winter and very little overhauling is required this winter.

b. Stockpile Trestles:
(2) Wooden Trestles:

A total of ten bents were erected on a branch trestle leading to the Northeast from last years trestle. The old trestle was filled with rock and as it stopped at the cave, it was necessary to build a branch trestle.

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

c. Scraper Hoists:

Following is a list of scraper hoists at the mine:

<u>Company</u>		<u>On Hand</u>	<u>Purchased</u>	<u>Total</u>	<u>Cost for repairs Per</u>	
		<u>1-1-36</u>	<u>1936</u>		<u>Machine</u>	<u>- Parts Only</u>
					<u>1936</u>	<u>1935</u>
Ing.-Rand	20 H.P. Elec.		1	1		
"	" 15 H.P. Elec.	7	1	8	25.76	23.85
"	" 10 H.P. Elec.	6		6	39.77	37.85
Sullivan	25 H.P. Elec.	2		2		
Sullivan	20H.P. Elec.	1		1	19.44	42.78
Sullivan	15 H.P. Elec.	11	3	14	9.72	20.98
Gard-Den.	15 H.P. Elec.	2		2	55.11	5.75
	<u>Total</u>	<u>29</u>	<u>5</u>	<u>34</u>		
Lake Shore Engine Works						
25 H.P. Electric						
	Scraper Slide	2		2		

Five scraper hoists were purchased in 1936 and in addition four are still due on E. & A., #704. The increase in production scheduled for 1937, made it necessary to purchase the additional scraper equipment. This year three 10 H.P. Gardner Denver hoists were scrapped and next year the two 15 H.P. Gardner Denver will be scrapped. To avoid delays it is necessary to have at least three spare scraper hoists.

d. Underground Tram Cars:

When the change from saddle-back to rocker dump type of cars was made a few years ago, thirty-six cars were purchased. When mining started above the 13th level, more cars were required and E. & A. #691, covering purchase of four cars at \$540.00 each was authorized. These cars were delivered in the spring of 1936. The increase in production and reopening of the old 9th level made it necessary to get two additional cars which was covered by E. & A. #704. The two cars will be delivered in January 1937.

e. Drill Equipment:

costing

Six RB12 Ing.-Rand Drill Machines/\$1140.00 charged out in 1936 and the purchase of six more machines was authorized by E. & A. #704. Some of the new drill machines replaced worn out BBR230 machines and some were required for new contracts that are being added to increase production.

f. Haulage Tracks:

The expenditures for new haulage tracks on the 13th level was as follows:

	<u>1936</u>	<u>1935</u>
40 lb. rail	\$922.96	\$1013.46
Steel Ties & Tie Plates	117.42	285.93
Manganese frogs	332.80	280.00
<u>Total</u>	<u>\$1373.18</u>	<u>\$1579.39</u>

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4. MAINTENANCE
AND REPAIRS:

Maintenance accounts under U.G. Costs were \$37,035.91 in 1936 as compared with \$22,265.64 in 1935. The large increase was in two accounts, Scrapers and Mechanical Loaders, and Electric Tram Equipment. It was due to purchase of five new scraper hoists, and four new haulage cars, overhauling thirty-six haulage cars, more labor cleaning tracks and more general expense account of the increased operating schedule. The cost per ton decreased \$.004 account of the larger product.

Maintenance expense under Surface Costs was \$18,249.71 in 1936 as compared with \$9,071.54 in 1935. There were decreases in two accounts and increases in three of which the largest was in account Mine Buildings. Expense was much above normal due mainly to fire in the shaft house.

Expense increased in account Hoisting Equipment due to building new skip to replace one lost in the fire in shaft house, more expense for repairing skip and cage roads, repairing one cage, repairs to fly-wheel set and proportion of cost of rewiring the main switch board. "Mine Buildings" account was much above normal due to fire in the shaft house which accounts for a change of nearly \$6000.00, and addition to concrete timber tunnel on surface which cost nearly \$800.00.

Expense in account Top Tram Equipment was unusually high due to fire in shaft house and replacing both top tram ropes.

5. POWER:

The following is a detail of electric current purchased, charged out as follows - also other data:

	1936 - 12 months Optg.		1935 - 12 Months Optg.	
	Cost	Cost Per Ton	Cost	Cost Per Ton
Stopping	698.50	.0014	440.98	.0015
Timbering	79.32	.0002	58.51	.0002
Ventilation	5769.42	.0112	5156.98	.0177
Pumping	23462.90	.0457	24277.98	.0832
Hoisting	18150.94	.0354	11973.45	.0411
Stocking Ore	401.04	.0008	285.54	.0010
Dry House	238.02	.0005	162.64	.0006
Tel. & Safety Devises	903.31	.0018	527.80	.0018
Mine Office	42.95	.0001	27.33	.0001
Elec. Haulage	4551.86	.0089	3135.80	.0108
Shops	329.30	.0006	72.29	.0003
Optg. Compressors	22857.37	.0446	15541.98	.0533
Total	77484.93	.1511	61661.28	.2117
		<u>1936</u>		<u>1935</u>
Main Line Meter - K.W. (Less Maas Charge)	5,593,200		4,419,313	
Separate Meter Reading - K.W.	5,347,263		4,316,543	
Line Loss - K.W.	245,947		102,770	
Product Tons	512,612		291,318	
K.W. Per Ton (Inc. Line Loss)	10.91		15.17	
Cost Per K.W. (Avg. for Year)	.01398		.01435	
15 Min. Demand - K.W. (Avg. for Year)	1257		1111	
Load Factor	53.67%		49.17%	

The load factor increased from 49.17% in 1935 to 53.67% in 1936 and this reduced the cost per K.W. \$.0037. The K.W. per ton of ore produced showed a

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15. POWER: (Cont'd)

substantial decrease due to the larger product. A further saving is contemplated in the cost per K.W. as a result of installation of an alarm signal to control the 15 minute peak load. The alarm has been ordered and will be installed in January.

17. CONDITION
OF
PREMISES:a. Mine Grounds:

The grounds at the mine were kept clean and in good condition in 1936.

b. Negaunee Mine Company Houses:

One house was sold in 1936, leaving fourteen houses owned by the Negaunee Mine Company out of twenty originally owned. Three houses were repaired and painted in 1936 at a cost of \$1156.41. Repairs to interiors, with papering, painting, and plumbing etc. accounted for the balance of the repairs. There are twenty-six families living in the fourteen houses. The cost of repairs in 1936 was \$2373.36 and in 1935 \$1509.97.

18. NATIONALITY OF EMPLOYEES:

The nationality record of employees is submitted in two forms, one as to parentage and the other as to country of birth.

<u>As to Parentage</u>	<u>1936</u>	<u>%</u>	<u>1935</u>	<u>%</u>
English	55	17.6	43	18
Finnish	138	44	101	42
Italian	44	14	36	15
Swedish	35	11	27	11
French(Canadian)	24	8	22	9
German	2	.7	2	1
Austrian	7	2	5	2
Irish	2	.7	2	1
Belgian	1	.3		
Norwegian	1	.3	1	.5
Danish	4	1.2	4	1.5
Total	313	100.0	243	100.0

<u>As to Birth</u>	<u>American Born</u>		<u>Foreign Born</u>	
	<u>1936</u>	<u>1935</u>	<u>1936</u>	<u>1935</u>
English	35	23	20	20
Finnish	76	41	62	60
Italian	22	14	22	22
Swedish	21	13	14	14
French(Canadian)	23	21	1	1
German	1	1	1	1
Austrian	5	3	2	2
Irish	2	2	0	0
Norwegian	0	0	1	1
Danish	3	3	1	1
Belgian	1	0	0	0
Total	189	121	124	122

Practically all new employees in 1936 were American born.

NORTH JACKSON MINE
ANNUAL REPORT
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1. GENERAL:

This property has been idle for 28 years or since 1908.

6. SURFACE:

An arrangement, made last summer with the City of Negaunee, provided for an exchange of buildings whereby the old stone boiler and shop building at the North Jackson was exchanged for the fire hall located on Mitchell Avenue on the Maas Mine property. The old shop building was used as a garage by three of the tenants in the Jackson office building so that it was necessary to build a three-car garage.

Early in the spring the fences around the open pits were repaired.

	<u>1 9 3 6</u>		<u>1 9 3 5</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
47% of Jackson Realty				
Sec. 1-47-27	\$ 199,750	\$ 6813.77	\$ 199,750	\$ 6159.09
Collection Fees		68.13		61.59
Total Taxes		<u>\$ 6881.90</u>		<u>\$ 6220.68</u>
<u>Rented Buildings</u>				
Old Jackson Office	630	21.69	\$ 630	\$ 19.62
Grand Total Taxes		<u>\$ 6903.59</u>		<u>\$ 6240.30</u>
City of Negaunee Tax Rate				
Per \$100.00		\$ 3.411		\$ 3.09

JACKSON LEASE
CAMBRIA MINE
ANNUAL REPORT
YEAR 1936

1. GENERAL

The first ore was hoisted from the Jackson property on August 5th and was recovered from a development drift on the 150' Sub-Level.

Operations throughout this first year of the Lease were largely of an exploratory nature, with the exception of one open stope from which a considerable quantity of ore was mined above the 150' elevation.

Production was increased from 260 tons in August, to 2,660 in December, with a total of 7791 for the year, of which 2,325 were shipped and 5,466 were stocked. All the production for the year was hoisted as Cambria or non-Bessemer grade.

Shortly before operations were started, Mr. E. A. Anderson of Crystal Falls was transferred to Negaunee to take charge of the engineering work at the mine. The work had previously been done by men who made occasional trips to this property from other mines of the Republic Steel Corporation.

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

<u>Grade</u>	<u>Tons</u>	<u>% of Product</u>
Cambria (non-Bessemer)	7,791	100
Violet (Bessemer)	0	0
Total	<u>7,791</u>	<u>100</u>

b. Shipments

<u>Grade</u>	<u>Pocket</u> <u>Tons</u>	<u>Stockpile</u> <u>Tons</u>	<u>Total</u>
Cambria (Non-Bessemer)	2,324		2,324
Violet (Bessemer)	0	0	0
Total	<u>2,324</u>	<u>0</u>	<u>2,324</u>

c. Stockpile Inventory

The amount of Jackson Ore in stock at the Cambria Mine on December 31, 1936 is shown below:

<u>Grade</u>	<u>Tons</u>
Cambria (Non-Bessemer)	5,467

The figures reported by the mine clerk showed production, shipment, and inventory tonnages to the nearest pound. The above figures were condensed from the clerk's report to show the nearest even ton.

JACKSON LEASE
CAMBRIA MINE
ANNUAL REPORT
YEAR 1936

2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

e. Production by Months

August	259 tons
September	769 "
October	2,027 "
November	2,076 "
December	2,660 "
Total	<u>7,791 tons.</u>

6. SURFACE

The ore produced from the Jackson Lease was mixed with the product from the Cambria Mine property, and either shipped or stocked as Cambria or Non-Bessemer grade. Two separate stocking trestles were used during the year, one for the combined Cambria Grade and the other for the Violet or Bessemer Grade. To date, none of the product from the Jackson has been of a Bessemer grade.

7. UNDERGROUND

a. General

The method of distributing the total product of the mine as of the two properties is recorded below:

The average capacity of the skips as figured from actual railroad weights when shipping from pocket has been calculated as practically 6 tons. This figure is the average obtained from several years of pocket shipments. During the months when ore is being stocked, production is calculated by skip tally using the figure of 5.8 tons per skip. This figure allows a margin of safety or overrun of nearly 3%. All of the underground cars observed to date are of the same type and size. The capacity of these cars, as figured from skip tally is in the vicinity of 2.4 tons. This average capacity, of course, varies slightly from time to time due to a number of reasons, the variation being usually between 2.35 and 2.45 tons per car.

The locations of the several contracts that are working in the vicinity of the boundary line between the two properties are mapped by the engineer who keeps the captain informed as to their positions. Car tallies are kept by the tramping crews who report to the captain the number of cars of ore that are taken from each contract during the day. At the end of each day, the captain turns in a form on which is recorded the contract numbers, the product from each and the grade of ore hoisted. In addition to this, the car tally for each contract is posted in the change house each day so that the contract miners may check the output from their individual contracts. The skip factor is used in figuring daily tonnages which are then pro-rated according to the number of

JACKSON LEASE
CAMBRIA MINE
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7. UNDERGROUND (Cont.)

a. General (Cont.)

underground cars hoisted. When the ore is being shipped, actual railroad weights are used, the tonnage from each property being again pro-rated according to the number of underground cars.

Operations during the year were confined to a small area immediately South of the boundary line, on and above the 6th Level. A number of drifts were driven across the line in an attempt to outline the ore reserves. In general, the ore bodies encountered are relatively limited in extent at the 6th Level elevation which is 110' above sea level.

At the end of the year there were 5 contracts at work on the Jackson side of the line, the number having been increased from none in August.

As a matter of record, the contracts are listed below for the several months:

August	-	#35
September	-	#35, 22, 5.
October	-	#35, 22, 5, 12.
November	-	#35, 22, 5, 12, 1.
December	-	#35, 5, 12, 27, 2.

In some cases, several of the above contracts worked only a portion of the month on the Jackson property, the remainder of their time being spent on the Cambria side of the line.

b. Development

The development work on the 6th Level consisted of four drifts South of the boundary line and a number of small raises above the level.

The drift at 3300 West was driven due South across the line which at that point is approximately 3' South of the 00 coordinate in Section 1. This drift passed through 10' of ore into the jasper hanging wall into which it was being continued at the end of the year.

A second drift was driven to the Southwest, starting at 3120 West. After passing through 50' of lean ore and jasper, high grade ore was encountered. At the end of the year, 40' of ore had been passed and the drift was being continued.

The drift at 2580 West was driven South 10° W. across the line through 25' of ore before encountering a large dike. Beyond the dike, 25' of jasper was traversed before the drift re-entered the ore which extended an additional 30'. At a point 90' from the boundary, jasper was again

JACKSON LEASE
CAMBRIA MINE
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7. UNDERGROUND (Cont.)

b. Development (Cont.)

encountered, after which the drift was reduced in size and advanced an additional 20' before being stopped. At the end of the year the height of this small ore body was being tested by means of a raise.

The fourth Main Level drift crossed the line at 2510 West and was driven due West along the South side of the boundary line; 60' of ore was passed before the drift encountered mixed jasper and lean ore into which it was continued, only to be stopped after passing through 20' of this material. Three raises were put up from this drift to the 150' Sub-Level above, two on the South side in Jackson ore and one on the North side in the Cambria Mine property.

The development of the several sub-levels will be discussed under the various headings below.

c. Stoping

Stoping Above the 150' Sub-Level

Stoping by means of an open stope was carried on by #5 contract starting as soon as the ore body at 2950 West could be opened. A raise was put up in rock from the boundary line drift at 2900 West to the 150' Sub-Level elevation, where a drift was driven to the Southeast, entering the ore some 35' from the line. This drift was continued an additional 55' in ore, after which stoping was started without further development. Two small raises were put up to the Southwest and stopped in ore 20' above the Sub. The raise to the North is now being used as a mill through which the ore runs to the Sub-Level. As stoping progressed, two additional entrances were driven from the footwall or north side, one at the 170' and the other at the 190' elevation. At the end of the year this stope was approximately 50' long, 30' wide, and 65' high above the 150' Sub-Level transfer drift. The extent of the ore in this area is not known as the only contact that has been established is that of the footwall on the North.

A seam of lean material has been encountered running through the ore body in an easterly direction, but the location of the wall rock to the South, and East has not been determined by development, nor has the ore above the present back been explored. Stoping was being carried on at the end of the year, with some dilution of the product being caused by the seam of lean material in the back.

150' Sub-Level

Preparatory to stoping, an exploratory drift was driven at this elevation, starting from a raise that had been put up from the Sixth Level at 2525 West. This drift was driven Westerly, South of and adjacent to

JACKSON LEASE
CAMBRIA MINE
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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

150' Sub-Level (Cont.)

the boundary line. The extent of the ore in this direction was 70', after which the drift was stopped in hanging wall jasper. The extent of the ore to the South was determined by several drill holes that reached the hanging wall at distances of from 8' to 12' South of the drift. At the end of the year, preparations were being made to stope out the small amount of ore lying above the Sub-Level and between the hanging wall and the boundary line.

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