PRINCETON MINE
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4. ESTIMATE OF ORE RESERVES (Cont.)

	Princeport	Cambridge	Sec. 19 Princeport	Sec. 19 Cambridge	Total
Ore above 2nd Level	2,552				2,552
Ore above 4th Level		78,325			78,325
Ore above 5th Level	20,000	58,778			78,778
Ore above 6th Level	60,318	445,694	9,000	57,128	572,140
Total	82,870	582,797	9,000	57,128	731,795

b. Prospective Ore

Ore below 6th Level	20,000	418,815	5,000	46,921	490,736
TOTAL ORE					1,222,531

c. Estimated Analysis

Grade-Princeport	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Ign.	Moist
Dried 212°	59.50	.300	7.73	.505	1.214	1.605	1.037	.023	2.235	
Natural	50.60	.256	6.57	.429	1.032	1.365	.862	.020	1.900	15.00
Cambridge										
Dried 212°	59.75	.853	4.42	1.193	.937	3.676	.840	.023	1.447	
Natural	50.80	.725	3.76	1.014	.797	3.125	.714	.020	1.230	15.00

d. Estimated Tonnage as Required by State Tax Commission

Non-Bessemer Ore

Developed:	1. Princeport	91,870 tons	
	2. Cambridge	639,925 "	
Total Developed			731,795 tons
Prospective:	1. Princeport	25,000 tons	
	2. Cambridge	465,736 "	
Total Prospective			490,736 "
GRAND TOTAL			1,222,531 tons

The above estimates of ore in the mine were made in December, 1921.

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8. COST OF OPERATING

a. Comparative Costs

	1939	1938	Increase
Underground Costs	49.15	0	49.15
Surface Costs	1,678.44	1,475.84	202.60
General Mine Accounts	130.17	128.59	1.58
Total	1,857.76	1,604.43	253.33
Taxes	4,588.19	4,564.98	23.21
Loading and Shipping	99.90	42.60	57.30
Supply Inventory Adjustment	4.44		4.44
Total Cost Sheet	6,550.29	6,212.01	338.28

During the year 1939 considerable fencing around caves was done, this being classed as underground expense. Policemen worked 14 shifts per month, while in 1938 they worked 12 shifts per month.

10. TAXES

	1939		1938	
	Valuation	Taxes	Valuation	Taxes
NE¼ of NE¼, Sec.19, 45-25 (C&NW)	10,000	188.29	10,000	187.35
158.27 acres in Sec.18, 45-25	15,000	282.44	15,000	281.01
160 acres in NW¼ of Sec.20, 45-25	100,000	1,882.93	100,000	1,873.40
NW¼ of NE¼, Sec.19, 45-25 (Loc.)	420	7.91	420	7.87
S½ of NE¼, Sec.19, 45-25 (Loc.)	840	15.82	840	15.74
Personal Property	115,000	2,165.37	115,000	2,154.41
Total	241,260	4,542.76	241,260	4,519.78
Collection Fees		45.43		45.20
Total Taxes		4,588.19		4,564.98
Tax rate per $100.00		1.883		1.874

STEPHENSON MINE
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1. GENERAL

This mine was abandoned in 1927 but the Company is still paying the taxes on the original description, the S½ of the SW¼ of Section 20,45-25, as well as the adjoining 80 acres to the south, i.e., the N½ of the NW¼ of Section 29,45-25, on account of the ore in stock. The latter description is owned by the Chicago & Northwestern Railway Company.

2. PRODUCTION SHIPMENTS & INVENTORIES

b. Shipments

	1939	1938
Stephenson	-	-
Stephenwood	5,431	19,466
Northdale	-	-
Northwood	-	-
Total	5,431	19,466

c. Stockpile Inventories

	1939	1938
Stephenson Lease		
S½ of SW¼ of Sec.20,45-25	31,399	36,830
C.& N.W.Lease		
N½ of SW¼ of Sec.29,45-25	18,976	18,976
Total	50,375	55,806

Ore Statement

	Stephenson	Stephen-Wood	Northdale	Northwood	Total
On hand Dec.31,1938	171	36,659	227	18,749	55,806
On hand Dec.31,1939	171	31,228	227	18,749	50,375

3. ANALYSIS

b. Average Analysis on Shipments

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss.	Moist.
Stephenwood	5,431	60.05	.798	3.70	.85	1.10	3.13	.83	.015	2.09	10.91

STEPHENSON MINE
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8, COST OF OPERATING

a. Comparative Mining Costs

	1939	1938	Incr.	Decr.
Surface Costs	1,671.44	1,475.84	195.60	
General Mine Accounts	163.09	287.07		123.98
Total	1,834.53	1,762.91	71.62	
Loading and Shipping	546.18	1,760.15		1,213.97
Taxes	1,276.08	1,742.64		466.56
Total Cost Sheet	3,656.79	5,265.70		1,608.91

The principal reason for the decrease is due to the fact that less ore was shipped during 1939.

In 1938 there were 19,466 tons loaded
In 1939 there were 5,431 tons loaded.

10. TAXES

	1939		1938	
	Valuation	Taxes	Valuation	Taxes
80 acres, W½ of SW¼ Sec.20,45-25	1,000	18.83	1,000	18.73
80 acres, N½ of NW¼ Sec.29,45-25	200	2.76	200	3.75
Personal property, ore in stock	65,000	1,223.90	90,000	1,686.06
Personal property, in warehouse	900	16.95	900	16.85
Total	67,100	1,263.44	92,100.00	1,725.39
Collection Fees		12.64		17.25
Total Taxes		1,276.08		1,742.64

SPIES VIRGIL MINE
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1. GENERAL

Production increased for the third successive year, but unfortunately the reverse was true of shipments which reached a new low since 1934 of only 29,543 tons. The general operation otherwise was very satisfactory, ventilation difficulties being overcome, a steadier ore production assured, and plant and equipment performance improved. A low operating cost might be expected in 1940 except for the prospect of an idle period during the summer months in order to reduce the stockpile surplus.

The more even working schedule in 1939 gave the men an average of better than 3½ days per week and leveled the production rate accordingly. The number of employees remained the same at about 75, with a surface and underground division of 25 and 50 respectively.

Mining operations were continued in the stopes above the 8th Level on the Virgil property. The heavy development program of 1938 and the first half of 1939 later resulted in a steady ore supply from the southwest territory, and added enough to the reserve estimate to counterbalance about half of the year's production. The work was mostly in the footwall rock in 1938 but within the limits of the orebody this year. Production also continued from the northwest area, and advantage was taken of several opportunities to use the low cost undercut caving system of mining.

There were several visits of mining officials of the Republic and Inland Steel Companies in connection with the Sherwood, but no work was done on this property in 1939.

2. PRODUCTION SHIPMENTS & INVENTORIES

a. Production by Grades

	Grade	Tons
1939	Virgil	112,371
1938	"	89,795

The increase in 1939 was 22,576 tons. The rock hoisted from development was less at 1220 tons compared to 7396 the year before. No high sulphur ore has been produced since the reopening of the mine in 1937.

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2. PRODUCTION SHIPMENTS & INVENTORIES (Cont.)

b. Shipments

Grade	Pocket	Stockpile	Total	Total Last Year
Virgil	12,817	16,726	29,543	36,021
Virgil High Sulphur	0	0	0	0
Total	12,817	16,726	29,543	36,021
Total Last Year	20,483	15,538	36,021	
Decrease	7,666	1,188	6,478	

The shipments 2 years ago were more than double the amount forwarded from the mine in 1938 plus 1939. The sale of 150,000 tons in 1940 would restore proper stockpile balance without closing the mine during the summer months.

c. Stockpile Inventories

Grade		Tons
Virgil		166,305
"	High Sulphur	4,531
	Total	170,836

This figure compares with 88,008 tons at the end of last year, or an increase of 82,828 tons. The low point was reached in 1937 when only 34,234 tons remained in stock.

d. Division of Product by Levels

6th Level	0 Tons
8th Level	112,371 Tons

The 6th Level production ceased in February 1938 when the stope area was sealed from the ventilation circuit. This ore is considered temporarily unavailable, and will be reopened when the 8th Level development has exhausted possibilities below.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

e. Production by Months

Month		Days	Virgil Ore	Rock	Tons per Day Ore	Tons per Man per Day
January	2-8 Hr.	17	9,800	200	576	7.33
February	2-8	16	9,920	184	620	7.77
March	2-8	18	10,857		603	7.62
April	2-8	16	9,159		572	7.02
May	2-8	18	11,528		640	8.26
June	1-8	12	8,755		417	7.55
	2-8	9				
July	1-8	12	7,052	192	371	6.58
	2-8	7				
August	1-8	10	6,597		388	6.85
	2-8	7				
September	1-8	11	7,102		395	6.48
	2-8	7				
October	1-8	18	9,239		420	8.45
	2-8	4				
November	1-8	2	12,287	284	614	8.66
	2-8	18				
December	2-8	16	10,075	360	630	7.73
Total	1-8 Hr.	65	112,371	1,220	515	7.57
	2-8	153				
		218				

f. Ore Statement

	Virgil	Virgil Hi-Sulphur	Total	Total Last Year
On Hand January 1, 1939	83,477	4531	88,008	34,234
Output for Year	112,371		112,371	89,795
Total	195,848	4531	200,379	124,029
Shipments	29,543		29,543	36,021
Balance on Hand	166,305	4531	170,836	88,008
Increase in Output			22,576	
Increase in Ore on Hand			82,828	

The operating schedule follows:

Mine idle May 1, 1933 to May 3, 1937

1937 - 2-8 Hr. shifts 5 days per week May 3 to June 22
Production suspended June 22 to August 11 for repairs to underground ventilation system.
2-8 Hr. shifts 5 days per week Aug. 11 to Dec. 6
2-8 Hr. shifts 4 days per week Dec. 6 to Dec. 31st.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

f. Operating schedule (cont.)

1938 - 2-8 Hr. shifts 4 days per week Jan. 1 to Apr. 16
2-8 Hr. shifts 3 days per week Apr. 16 to June 1
1-8 Hr. shifts (2 crews alternating) 4 days per week June 1 to Oct. 31.
1-8 Hr. shifts (2 crews alternating) 5½ days per week Oct. 31 to Dec. 31.

1939 - 1-8 Hr. shift (2 crews alternating) 5½ days per week Jan. 1 to Jan. 9
2-8 Hr. shifts 4 days per week Jan. 9 to June 12.
1-8 Hr. shift(2 crews alternating) 5½ days per week June 12 to Nov. 1
2-8 Hr. shifts 4 days per week Nov. 1 to Dec. 31.

g. Delays

There were 7 delays resulting in production losses, compared to 4 in 1938. None were serious, and the total tonnage loss was less than the year before. The causes were about evenly divided between power failures and trouble with the top tram larry cars. The latter were overhauled and the door catches redesigned, so that not as much trouble is expected in the future from this source. The list of delays follows:

Jan. 5-6 hr. delay. Power failure during sleet storm. Product loss 210 tons
" 13,7 hr. delay. Larry car derailment. Product loss 260 tons
Apr. 17 - 3hr. delay. Power failure during sleet storm. Product loss 120 Tons
" 18 - 7 Hr " " " " " " " 260 "
May 3 4 hr. " Larry car derailment. Product loss 160 tons
Aug. 24 -3½ hr. " " " coil"bruned out. Product loss 150 tons
Nov. 13 - 4 hr. " Repairs to 8th Level timbering. Product loss 150 tons

3. ANALYSIS

a. Average Mine Analysis on Output

The output analysis closely resembled that of last year except for an increase in the sulphur from .062 to .080. This increase resulted from development at the east end of the 8th Level, and was not due to production from the new southwest territory as had been anticipated. The monthly analysis, was not as erratic as the year before because of the larger number of stopes to draw from. The year's analysis was remarkably close to the expected figures.

Grade	Tons	Iron	Phos.	Sil.	Sul.
Virgil	112,371	57.60	.375	6.39	.080

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3. ANALYSIS (cont.)

b. Composite Analysis of Shipments

The average analysis of 1939 shipments was similar to last year's except for an increase in the alumina from 1.18. The complete analysis follows:

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss
Virgil	57.65	.402	6.65	.19	1.68	.65	.27	.075	6.86

The one straight cargo forwarded in 1939 returned a mine analysis as follows:

	Iron	Phos.	Sil.
Virgil	57.57	.396	6.68

c. High Sulphur Ore

This grade was not produced in 1939 and there were no shipments from the 4531 ton stockpile. One of the most fortunate developments of the year was the disclosure of a lower average sulphur ore than had been indicated by drilling in the southwest section of the mine. The information had previously been based on D.D.H. 119 A which was found to have run parallel, and close to the footwall in higher sulphur material than the main mass of ore above. Ore production from 2 stopes in this area at the year end was running about .050 in sulphur compared to the .100% content indicated by the angle drill hole below.

Exploratory development at the east end of the orebody above the 8th Level, however, was disappointing in that no medium sulphur ore suitable for mixing could be located. This development will be resumed in 1940, and there is still a good chance that a small lense of .100 to .200% sulphur ore may be found in the orebody.

The broken high sulphur ore in the caved east stope was again left in place. When this ore is drawn off at the mill raises some runs of fairly good ore are expected, but this will not be done until mining is nearing completion at the west end of the main level drift.

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3. ANALYSIS (Cont.)

d. Analysis of ore in Stock Dec. 31, 1939

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Virgil	57.70	.379	6.28	.19	1.84	.58	.26	.075	6.50	8.75
Hi-Sul.	56.79	.490	7.41	.19	1.84	.60	.21	.231	7.15	7.00

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

Estimate made Nov. 30, 1938 using a factor of 12 cu. ft. per ton.

Available Virgil Grade	Northwest Orebody	Southwest Orebody	Total Tons
Between 4th and 6th Levels		82,768	82,768
Between 6th and 8th Levels	61,218	359,543	420,761
Gross Estimate	61,218	442,311	503,529
Less 10% Loss in Mining	6,122	44,231	50,353
Sub-Total	55,096	398,080	453,176
Less 10% for Rock	5,510	39,808	45,318
Net Total, Nov. 30, 1939	49,586	358,272	407,858
Less December Production	3,350	6,725	10,075
Net Total Developed Ore Dec.31, 1939	46,236	351,547	397,783

The loss in reserves due to unfavorable development and rearrangement of the pillars supporting the 6th Level last year amounted to 157,790 tons. The tonnage produced in 1939, deducted from the 461,377 ton estimate of last year, leaves a net of 349,006. This figure compared with the estimate above shows a gain of 48,777 tons from development this year - or a restoration of nearly one half the 1939 production. Not included in the estimate is the caved material in the middle and east stopes above the north 8th Level drift, so the final figure is believed to be conservative.

b. Estimated Ore Reserve Analysis

	Iron	Phos.	Sil.	Mag.	Alum.	Lime.	Mag.	Sul.	Loss	Moist
Dried	57.50	.425	7.00	.16	1.64	.60	.30	.119	7.35	
Natural	51.75	.382	6.30	.15	1.48	.55	.26	.107	6.60	10.00

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5. LABOR AND WAGES

a. General

The number of employees remained at about the level established late in 1937. The minimum working schedule of 3 days per week instead of 2 as in 1938 was a great help to the men, and the change to 4 days on Nov. 1st. in the face of the stockpile situation was appreciated although the explanation was made that it will probably force the closing of the mine for a period next summer. The wage rates and working time limits established Mar. 16, 1937 were continued, although a sizeable reduction was made in the labor proportion of the total cost by more stable mining conditions and the generally improved operation on surface and underground in 1939.

Labor relations were pleasant except for one incident caused by the head of the small group of C I O union members at the mine. This man, on complaint that his name was divulged to mine officials by the Iron County Mine Inspector, forced a court hearing which was immediately decided in favor of the Inspector. The unfavorable publicity which the union received in regard to spite and trouble making is believed to have further reduced their numbers amongst the Spies-Virgil employees.

b. Statement of Wages and Product

	1939	1938
PRODUCT	112,371	89,795
NUMBER OF SHIFTS AND HOURS	1-8 & 2-8	1-8 & 2-8
Avg. No. Men Working		
Surface	25	26
Underground	47	47
Total	72	73
AVG. WAGES PER DAY		
Surface	5.52	5.42
Underground	6.48	6.42
Total	6.15	6.06
AVG. WAGES PER MONTH OF 9 DAYS		
Surface		48.78
Underground		57.78
Total		54.54
AVG. WAGES PER MONTH OF 14 DAYS		
Surface	78.93	75.88
Underground	92.14	89.88
Total	87.55	84.84

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5. LABOR AND WAGES (Cont.)

b. Statement of Wages and Product (Cont.)

	1939	1938
AVG. WAGES PER MONTH OF 18 DAYS		
Surface	98.17	97.61
Underground	115.56	113.90
Total	107.77	105.76
PRODUCT PER MAN PER DAY		
Surface	21.991	18.323
Underground	11.541	10.205
Total	7.569	6.555
LABOR COST PER TON		
Surface	.2513	.2957
Underground	.5612	.6289
Total	.8125	.9246
AVG. PRODUCT BREAKING & TRAMMING	55.557	45.665
AVG. WAGE CONTRACT MINERS	7.293	7.614
TOTAL NUMBER OF DAYS		
Surface	5,109¾	4,900¾
Underground	9,736½	8,798¾
Total	14,846¼	13,699½
AMOUNT FOR LABOR		
Surface	28,243.15	26,552.32
Underground	63,056.88	56,471.39
Total	91,300.03	83,023.71

PROPORTION SURFACE TO UNDERGROUND MEN

1939 - 1 to 1.88
1938 - 1 to 1.81
1937 - 1 to 1.92
1936 - 1 to .50
1935 - 1 to .88

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6. SURFACE

a. Buildings, Repairs

Numerous repairs and improvements of the surface plant have been made since the reopening of the mine in 1937. None have been very expensive, but all have been directed toward effecting savings in operating cost during the remaining life of the mine, and at the same time reduce hazards and the chance of delaying the underground operation. The complete overhauling of the crusher and the larry cars were perhaps the most important improvements in 1939. The crusher repairs included re-threading of the main shaft and re-assembly with a special split nut and collar, building up the discharge casting by welding, and re-babbiting of the eccentric. The work was done in April and 2 postponed working days made up in May without delaying production.

The larry car electrical systems were overhauled and the door catches changed from the sides to the ends to eliminate ice building up and springing the catches. The end catches also allowed an extension to be fitted to the bottom plate which drops the ore farther from the side of the car and thereby reduces the amount of track shifting along the edge of the pile by about one-half. Then in October the landing floor in the headframe was repaired, placing new heavy section rails on steel plate over the pocket, and new plank in the floor of the permanent trestle on the north side of the headframe. New ties were placed under the dumping track on the stockpile, so that virtually the whole top tram system was renovated.

The interior of the dry house, including lockers and shower rooms, was cleaned and painted in January. A new coal bin was built at the north end of the boiler room, and the boiler after one repair job in March heated the entire surface plant with no further difficulty. A steam and return line was run to the carpenter and electrical shop building in September, and unit heaters placed in this building and the dry house. The addition of new traps, and provision for better drainage of the system, forces steam to every radiator with only 10 lb. boiler pressure and a consequent saving in coal.

The crusher house on the headframe was rebuilt using corrugated iron to replace the gunited frame structure. The same improvement was made to the tool room on the landing floor after the old heating stove had been removed. Worn shaft runners were replaced from the collar to the dump in the skip road in September.

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6. SURFACE (Cont.)

b. Stockpiles

The product was stocked under the new east trestle from January to May. This trestle held about 45,000 tons, and the remainder was side dumped along the west side of the main pile except the tonnage under a 4 bent extension erected in September to utilize the space between the end of the pile and the spur track leading to the coal dock. The small amount loaded by the shovel was taken from the east side of this pile where railroad cars were spotted on the pocket track by an air tugger to save the $7.50 per hour charge for switch engine service.

The high sulphur rock that was hoisted from the 8th Level development in 1937-8 caught fire in February. Treatment with lime and blasting reduced the intensity, and the retarded fire finally burned itself out late in the summer with no bad effects. Very little rock was hoisted in 1939, but 4 bents were added to the northeast rock trestle in November to provide space for a resumption of the 8th Level rock development the following month.

c. Transmission Lines

The sleet storm on the 17th and 18th of April damaged the power line to the fans and pump at the Virgil shaft. One of the 3 wires was cut by a tree limb, and the 3 motors ran on 2 phase current until the windings burned out. Thermal switches were added to the circuit to prevent a repetition of this occurrence, and the trees were cut back and several lengths of new wire strung to repair the line.

d. Mine Water Discharge Ditch

The pump discharge was diverted into a ditch dug around the swamp at the south end of the rock pile after building an earth dam at the upper end of the old channel. An increase in the 3rd Level water in July is believed to have resulted from additional pressure on several diamond drill holes under this swamp. After the water table was lowered in the swamp the 3rd Level water reduced to normal in September.

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7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking or stripping in 1939.

b. Development

A resume of development since the reopening of the mine in 1937 would place most of this work as a ventilation necessity in 1937, rock work preliminary to opening the southwest 8th Level orebody in 1938, and development within this orebody and the start of stoping operations in 1939. While this major development program was underway, a limited amount of drifting and raising in connection with stoping operations also continued above the north 8th Level drift.

The rock drift and crosscut under the southwest orebody was completed in August 1938, and the 6th Level drift extension in December of that year. The permanent rock ventilation raise and drift, which makes this section entirely independent of the rest of the mine, was connected between levels in February. The value of this precaution was illustrated in July when ore recovery in the first of the new stopes was increased by sealing it from the interior of the 6th Level workings without effecting production from the other 8th Level stopes. Ore development in this southwest corner restored part of the reserve estimate which had been reduced at the end of 1938 when the raises were still in rock. The location of the curved footwall was above, but also south of the previously supposed position.

The scraper transfer drifts for the 2 new stopes were located on the -75' sub level, one south of #832 raise, and the other east. The south stope, after being sealed at the 6th Level elevation, was opened to a height of 7 subs with the back in the jasper hanging wall above the +90' sub level. Mining started here in August. Development of the east stope was completed temporarily at the 4th sub to leave a floor pillar 35' thick under the sealed southeast 6th Level stope. Recovery of this pillar is planned when mining has retreated to a point over the inclined stope raise. Mining operations started in this stope in December.

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7. UNDERGROUND (Cont.)

b. Development (Cont.)

Development of the third stope above No. 830 crosscut was started in October by advancing 831 raise above the -100' sub level. The raise caved when it entered the soft contact ore and graphitic slate mixture, and was being recovered at the end of the year by a separate drift through the soft material, a raise, and a return drift to the caved section in ore. The necessary timbering can be done in safety from this second opening. The final development at the west end was the resumption of rock drifting on the 8th Level. The curve of the north crosscut had been cut out as the main drift advanced, and in December No. 7 contract extended the curve 36' in rock and started the first raise from the west side before moving the scraper slide ahead.

Development to test the medium sulphur ore indicated by underground drill hole No. 103 at the east end of the orebody was started in March by No. 8 contract. The first raise along the south side of the 8th Level drift was reopened and advanced to the -150' elevation. Transfer drifts to the northwest and southeast, and test raises above, at the end of the year had failed to disclose a medium sulphur section which was suitable for mixing with the ore from the southwest stopes. The possibilities of this area are not exhausted, although sulphur contents as high as 2% at times made it rather difficult to mix even this development ore and retain a satisfactory sulphur analysis of the product.

The extended life and low cost mining in the northwest stope was made possible by development of a permanent traveling road on the -100' sub level. This drift along the south footwall provided entrance to the southeast corner of the stope where the weak bedding planes of the slaty ore formation could be used to undercut and cave large masses of ore into the stope. Access to the grizzly sub under the middle stope was made easier and ventilation was improved, by a new traveling raise put up directly from the 8th Level in November.

The average number of development contracts remained the same at three. The total footage driven was 3982' compared to 3642' last year, and all but 350' of this was in ore. The detail classification will be found under a later heading of drifting and raising.

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7. UNDERGROUND (Cont.)

c. Stoping

Mining operations in 1939 were restricted to 3 areas above the 8th Level. The first was at the east end of the orebody where No. 11 contract mined from January until June in the higher than avg. sulphur ore above No. 803 raise. The second was at the northwest end near the Sherwood boundary where No. 12 extended the south side of the large stope above No. 824 raise. Mining continued here throughout the year. The third was the opening of the main reserve in the southwest corner by No. 9 contract in August, and the addition of the second stope in this territory by No. 6 contract in December.

No. 12 stope at the northwest end furnished the larger share of production until the last few months when surpassed by No. 9. Most of the ore had been stoped directly into the 8th Level loading chutes in 1938, while in 1939 the system was changed to scraper transfer subs under all stopes in order to reduce the amount of rock development.

The detailed description of operations follows:

Sub Levels above the 6th Level

90' Sub Level
Mining was started at this elevation in the southwest stope in August after building the brattices sealing the area from the foul air in the remainder of the old 6th Level workings. This was done to increase ore recovery, and eliminate the danger of future caving by extending the back of the stope to the hard jasper hanging wall. Mining was started by enlarging the mining raise from the -75' sub transfer sub, and completed shortly before the end of the year by stripping all the ore off the jasper hanging wall on the south and west sides of the former small 6th Level stope at this elevation.

6th Level
Stoping operations in September were concentrated on this level and the floor of the above mentioned stope on the -90' sub was undercut. During the remainder of the year mining continued to the south and west, and in December an area 60' x70' had been removed. The black slate footwall was exposed on the south side, and the bench on the west side was within 10' of the Sherwood boundary line.

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7. UNDERGROUND (Cont.)

Sub Levels above the 8th Level

+50' Sub Level

Stoping operations on this sub level were similar to those above. No. 9 contract while stoping on the south side was again limited by the black slate seams. These seams strike approximately east and west and form the same contact located by the crosscuts on the 6th Level above and to the east. In December a small quantity of ore was mined on the south and west sides, and by the end of the year the opening measured 60' x 60'.

+25' Sub Level

Mining operations on this sub level were carried on in all 4 stopes. No. 9 contract enlarged the mining raise and undercut the ore and black slate seams to the south a distance of nearly 60'. Later No. 6 contract began mining at this elevation above the east transfer after No. 7 contract had completed the stope development. In December an area about 30' x 30' had been mined, leaving a floor pillar in the back supporting the old 6th Level workings. After mining has retreated some distance to the west this pillar will be caved and a vertical stope pillar substituted to continue the air seal. The vertical pillar will be the smaller of the two, and ore recovery increased to that extent.

No. 12 contract earlier in the year mined a small area at this elevation along the south side of the northwest stope. The ore was lean transition material under the jasper hanging wall. This elevation was the highest reached by No. 11 contract in the stope at the east end of the orebody.

An area 15' x 25' was mined here in May and soon after all operations were stopped due to the caving of the north and south black slate footwalls and a resultant higher sulphur content of the ore.

00' Sub Level

Stoping operations during December by No. 9 contract were on this sub level. The stope was extended approximately 40' to the south, and widened to the east mining limit which had been established to prevent caving the concrete brattices on the 6th Level.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

00' Sub Level (Cont.)

The northwest stope on this sub level was enlarged both on the north and south sides by No. 12 contract. For the most part the ore was comparatively lean with the result that the west boundary fell somewhat short of the mining limit near the Sherwood line. The 40' ore pillar which had been left between the northwest and central stopes started caving in May. The initial opening on the -50' sub level enlarged intermittently during the remainder of the year, and will probably extend to the hard jasper forming the back of both of these stopes. The caving was induced by mining operations along the west side, the opening following along the original development raises and drifts to join the 2 stopes on the 00, -25 and -50' sub levels. Much of the broken ore which fell into the central stope, and from the cave along the south side of this stope, has been left in place to strengthen the south and west walls and prevent the cave from extending to the 6th Level along the weak slate contact which fortunately pinches before reaching the south side of the pillar. No. 11 contract mined an area in the east stope of about 35' x 40' on this sub level. Progress was somewhat hindered because of the soft nature of the ground which made it difficult to hold the benches on this and the next lower sub.

-25' Sub Level

During the year No. 9 contract mined only a small area around the stope raise. The caving of the black slate and ore seams adjacent to the originally intended mining raise farther south also enlarged this opening.

No. 12 contract in the northwest stope mined a fairly large area on this elevation. By the end of the year the dimensions of this stope had been increased to approximately 70' in width and a north-south length of approximately 140'. Late in the year the opening in the pillar mentioned above had increased to 40' at this elevation with most of the caving occurring on the east side into the central stope.

Mining operations in No. 11 stope on this sub enlarged the dimensions to 40' x 60', with the slate seams bounding both north and south sides.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

-50' Sub Levels

Progress by No. 9 contract in the southwest stope on this sub amounted only to the funneling out of the mill, or mining raise. And, as above, a small amount of caving occurred enlarging the mill to the south in the soft ore and slate seams.

No. 6 contract during December mined a small area at the east end of the new stope adjacent to the black slate footwall. This was done as the first step in preparing the mining raise for the stoping product from subs above.

Progress in the northwest stope during 1939 was to the south, and mining operations were directed on this sub level in order to undercut the floors or benches on the subs above. The large product and low powder consumption combined to reduce the mining cost, and the ore was diverted into the mining raise leading to the scraper transfer drift south of #824 chute. In other words, by means of the new traveling drift on the -100' sub the stope was advanced to the south, and the ore scraped in the opposite direction by the scraper transfer on the -150' sub. The opening made by the caving of the pillar to the east of the stope was at its maximum width of 50' at this elevation.

No. 11 stope on this sub was mined during the year to an east-west length of 70'. Its continuance to the west was limited by the leaving of a pillar between this stope and the fire area in the caved stope beyond.

-75' Sub Level

Mining operations in the northwest stope by No. 12 contract were limited to the west and south sides, the large advance being to the south. A pillar averaging 10' was left along the Sherwood line under the westward dipping jasper hanging wall. During December stoping operations progressed along the south edge. At this elevation the pillar was still intact because of the large amount of broken material in the central stope.

No. 11 stope to the east reached its maximum size on this sub. The east-west length amounted to 70', with an average width of 40' between the 2 slate contacts. A test drift to the north early in the year disclosed slate and ore seams, and it is in this direction that development in 1940 is expected to locate medium sulphur ore suitable for mixing.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

-100' Sub Level

With the exception of the funneling of No. 11 stope raises leading down to the transfer, the only mining at this elevation was done by No. 12 contract. As described above, the completion of the new ore pass from the transfer made it possible to extend the south edge of the stope a considerable distance on these lower subs. The ore was rather lean, being mixed with gray slate seams, but made an excellent rubbly product for mixing with the higher grade ores from other sections.

-115' Sub Level

Two small areas were mined at this elevation by No. 12 contract in the northwest stope. The first enlarged the mills to the north, and the second, which is separated by a slate inclusion, opened the mill receiving all the ore mined on the south side.

In summarizing the mining operations in this northwest stope it may be said that mining has been underway for well over a year, and indications are that production will continue through at least the 1st half of 1940. The maximum height of the stope is approximately 150', and over the full distance excellent mining conditions have prevailed. When mining is finished here the main product for the rest of the life of the mine will come from the southwest orebody, although several small stopes may be developed in pillars remaining in the northwest orebody as the last operation above the 8th Level.

d. Timbering

Timber consumption and cost were lower in 1939 for several reasons. The amount of repair work was less in each of the last 2 years following the reopening of the mine in 1937, and there was no main level drifting requiring timber in 1939 as in 1938. The total cost per ton, including labor, declined from .061 to .050, and the cost of timber was less in 1939 although production increased.

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7. UNDERGROUND (Cont.)

d. Timbering (Cont.)

Kind	Lineal Feet	Avg. Price Per Foot	Amount 1939	Amount 1938
6" to 8" Cribbing	8,840	.0375	331.49	257.32
8" to 10" Stull Timber	1,188	.0584	69.39	51.57
10" to 12" " "	135	.095	12.82	152.28
12" to 14" " "	261	.1325	34.57	89.37
14" to 16" " "	171	.1625	27.79	35.10
Total Timber 1939	10,595	.0449	476.06	
" " 1938	10,202	.0574		585.64
5' Lagging	21,585	.0075	161.90	128.84
7' "	1,000	.0075	7.50	28.58
Total Lagging	22,585	.0075	169.40	157.42
Poles	13,630	.01262	172.02	225.82
Total Lagging & Poles			341.42	383.24
Product			112,371	89,795
Feet of Timber per Ton of Ore			.0943	.1136
Feet of Lagging per Foot of Timber			2.1317	2.0574
Cost per Ton for Timber			.00424	.00652
Cost per ton for Lagging			.00150	.00175
Cost per Ton for Poles			.00153	.00252
Cost per ton for Timber, Lagging & Poles			.00727	.01079
Equivalent of Stull Timber to Board Measure			15,967	18,459
Feet of Board Measure per Ton of Ore			.1421	.2056
Cost of Timber, Lagging & Poles 1939		817.48		
Cost of Timber, Lagging & Poles 1938		968.88		

e. Drifting and Raising

The following table shows the 1939 development footage classified as to size and material:

	Drifting			Raising			Combined
	Ore	Rock	Total	Ore	Rock	Total	Total
Full Size	337	36	373	22	0	22	395
Full Size	2186	145	2331	1087	169	1256	3587
Total	2523	181	2704	1109	169	1278	3982'

The combined total of 3982' compares with 3642' last year and 3328' in 1937. The rock work, however, was much less in 1939 with only 350' compared to 1520 in 1938. The two stages of development of the southwest orebody was responsible for this large difference.

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7. UNDERGROUND (Cont.)

e. Drifting and Raising (Cont.)

The continuation of the sub level bench mining method, and the undercut system used in No. 12 stope, again increased the ore produced per foot of development from 24.7 tons in 1938 to 28.2 in 1939.

f. Explosives, Drilling and Blasting

The large reduction in the amount of powder used for rock development was responsible for the decreased cost of explosives. The cost per ton for breaking ore was about identical with that of last year although the ore development footage was higher. The total cost of explosives during the 2 years is worthy of note, $6529.53 in 1938 and $6527.44 in 1939. This brought the cost per ton down from .073 to .058.

Statement of Explosives Used

Ore Development & Stoping	Quantity	Average Price	Amount 1939	Amount 1938
#1 Gelamite Powder Lbs.	45,635	.1184	5,401.32	4,443.10
Total Powder	45,635	.1184	5,401.32	4,443.10
Fuse, Feet	117,949	5.0666	597.60	386.21
#6 Blasting Caps	17,159	12.20	209.33	139.36
Hot Wire Fuse Lighters	2,900	.753	21.84	14.62
Mast Fuse Lighters	500	2.064	10.32	
Powder Bags	20	1.235	24.70	11.50
Tamping Bags	4,400	2.079	9.15	
Total Fuse, Caps, etc.			872.94	551.69
Total Explosives, Ore Devel. and Stoping			6,274.26	4,994.79
Production, tons			112,371	89,795
Lbs. Powder per Ton of Ore			.4061	.4039
Cost per Ton for Powder			.0481	.0495
Cost per Ton for Breaking Ore			.0558	.0556

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7. UNDERGROUND (Cont.)

f. Explosives, Drilling and Blasting (Cont.)

Rock Development	Quantity	Average Price	Amount 1939	Amount 1938
#1 Gelamite Powder lbs	1,615	.1188	191.82	1,265.92
Fuse, feet	8,851	5.046	44.66	191.85
#6 Blasting Caps	1,141	12.21	13.93	68.59
Fuse Lighters	200	.785	1.57	6.08
Powder Bags				2.30
Tamping Bags	600	2.00	1.20	
Total All Explosives, Rock Dev.			253.18	1,534.74
Total All Explosives Used in Mine			6,527.44	6,529.53
Avg. Price per Pound for Powder			.1184	.1225
Total Cost per Ton, All Explosives			.058	.073

g. Ventilation

The ventilation problem was virtually non-existent when compared to the 2 years previous. The ridding of the mine of oxygen depleted air early in 1938, only to encounter difficulties with sulphur dioxide gas, was a disappointment that fortunately was apparently solved shortly after. The full year of 1939 was worked with an average volume of 6000 cu. ft. per minute circulated through the mine by the fan at the Virgil shaft, and there was so little leakage of foul air into the circuit that the fan could be reversed at any time with but slight change in the air quality.

The SO^2 section of the 4th Level drift cooled down after the application of lime, and there is little likelihood that this area will give further trouble. Tests at the brattices of the old east stope above the 8th Level continued to show SO^2 gas the first few months of 1939, but this was finally replaced by CO_2 although there has been little cooling of the rock nearby. The brattice at the west end of the 4th Level sealing the main CO_2 producing section above the 6th Level was closed tight and pressure allowed to build up. This cleared the whole air circuit except for the small leakage at the 6th Level brattices induced by the increased pressure in the old stopes above.

The completion of the separate air circuit between the 6th and 8th Levels in the southwest section in February was the last step in making operations independent of the older sections of the mine. Under the present system each stope is planned so that in case of trouble arises from oxidation of the slates or pyrites the area can easily be sealed from the other sections. This was used to advantage

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7. UNDERGROUND (Cont.)

g. Ventilation (Cont.)

in August when No. 9 stope was sealed at the 6th Level from the old No. 17 stope above that elevation in order to increase ore recovery by mining to the full height under the jasper hanging wall. The method used was to temporarily brattice No. 9 area below, increase the air pressure inside this air-lock and push the foul air up into the old workings until the permanent brattices were erected that prevented its return into the new stope. The operation was carefully supervised, and no doubt will be used again because of the ease and comfort of working in the fresh air under slight pressure compared to the use of blower fans.

The mining areas above the south 8th Level drifts and crosscuts are expected to be free of ventilation difficulties in the future. The nearly worked out stopes above the north drift can be ventilated properly only as long as a cave does not extend through to the 6th Level. For this reason the caved ore in the central stope is being left in place temporarily to furnish support for the weak slate contact along the south side, or until mining operations are completed in the northwest stope. The ore above the 6th Level is temporarily unavailable under brattice seal, but in the last stages of mining it is believed that this can be made recoverable also.

The regular ventilation circuit in 1939 was the average volume of 6000 C.F.M down the Spies shaft and westward along the 8th Level drift. Regulated quantities were diverted to each stope as upcast currents which joined at the 6th to 4th Level ventilation raise. The air then followed the 2nd outlet path along the 3rd and 1st Levels to the fan at the collar of the Virgil shaft. Normal fan operation was in this direction to supply fresh air to the tramming crews, and exhaust the dust and powder smoke overhead to the untravelled upper levels. Conditions are nearly as good, however, during the periods in the Winter when the fan is reversed to eliminate freezing of the Spies hoisting shaft.

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8. COST OF OPERATING

a. Comparative Mining Costs

	1939	1938	Incr.	Decr.
Product, Tons	112,371	89,795	22,576	
Underground Costs	.906	1.078		.172
Surface Costs	.249	.305		.056
General Mine Expense	.245	.289		.044
Cost of Production	1.400	1.672		.272
Depreciation, Plant & Equip.	.388	.302	.086	
Taxes	.075	.067	.008	
Loading & Shipping	.012	.027		.015
Total Cost at Mine	1.875	2.068	.094	.015
Budget Est. Cost at Mine	1.927	1.996		.069
Number of Opt. Days	218	203	15	
Number of Shifts & Hours	65, 1-8 Hr 153, 2-8	104, 1-8 Hr 99, 2-8		
Average Daily Product	515	442	73	

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison

	1939		1938	
Underground Costs	Amount	Per Ton	Amount	Per Ton
1. Exploring in Mine	268.97	.002	291.45	.003
3. Development in Rock	3,095.88	.028	11,873.37	.132
4. Development in Ore	18,306.63	.163	8,496.83	.095
5. Stoping	25,856.88	.230	21,062.17	.235
6. Timbering	5,580.62	.050	5,457.47	.061
7. Tramming	14,285.83	.127	10,351.43	.115
8. Ventilation	2,803.59	.025	7,769.81	.087
9. Pumping	10,449.95	.093	10,746.46	.120
10. Comp. and Air Pipes	7,998.06	.071	7,913.96	.088
12. Undg. Superintendence	6,631.00	.059	5,637.90	.063
14. Maint. of Comp & Power Drills	1,327.64	.012	207.16	.002
15. Scrapers & Mech. Loaders	830.69	.007	104.83.	.001
16. Electric Tram Equip	3,287.36	.029	5,030.34	.056
17. Pumping Machinery	1,138.78	.010	1,832.67	.020
Total Undg. Costs	101,861.88	.906	96,775.85	1.078
Surface Costs				
18. Hoisting	6,273.95	.056	7,025.18	.078
19. Stocking Ore	6,055.30	.054	6,079.46	.068
20. Crushing at Mine	3,582.47	.032	2,533.62	.028
21. Dry House	3,766.22	.034	3,663.81	.041
22. General Surface Expense	2,691.09	.024	2,108.46	.023
23. Maint. Hoist. Equip.	932.47	.008	2,690.25	.030
24. Shaft	477.69	.004	737.71	.008
25. Top tram Equip.	2,907.04	.026	1,122.50	.013
26. Docks, Trestles & Pkts.	561.97	.005	656.05	.007
27. Mine Buildings	734.05	.006	815.03	.009
Total Surface Costs	27,982.25	.249	27,432.07	.305
General Expense				
Vacation Expense	1,133.59	.010	17.26	.000
28. Insurance	876.33	.008	823. 92	.009
29. Mining Engineering	1,383.86	.012	1,263.54	.014
30. Mech. & Elect. Engineering	188.64	.002	113.77	.001
31. Analysis & Grading	1,539.38	.014	1,791.00	.020
32. Personal Injury	2,342.95	.021	2,679.50	.030
33. Safety Department	568.79	.005	514.97	.006
34. Telephone, Safety Devices	542.39	.005	568.28	.006
35. Local & Gen. Welfare	1,422.64	.013	1,415.18	.016
36. Special Exp. Pensions etc.	2,810.33	.025	2,587.21	.029
37. Ishpeming Office	4,171.06	.037	3,763.86	.042
38. Social Security Taxes	3,982.54	.035	3,624.40	.040
39. Mine Office	6,545.17	.058	6,800.75	.076
Total Gen. Mine Exp.	27,507.67	.245	25,963.64	.289
COST OF PRODUCTION	157,351.80	1.400	150,171.56	1.672
40. Taxes	8,374.04	.075	5,994.74	.067
Total Cost	165,725.84	1.475	156,166.30	1.739
Budget Estimated Cost	116,800	1.554	91,700.	1.739

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

	1939		1938	
	Amount	Per Ton	Amount	Per Ton
41. General Supplies	8,053.34	.072	10,120.49	.113
42. Iron and Steel	833.14	.007	2,409.73	.027
43. Oil and Grease	434.95	.004	444.44	.005
44. Machinery Supplies	6,322.74	.056	3,593.75	.040
45. Explosives	6,528.59	.058	6,523.61	.073
46. Lumber and Timber	1,913.45	.017	3,452.57	.038
47. Fuel	1,891.42	.016	2,400.56	.027
48. Electric Power	18,441.83	.164	18,204.97	.203
49. Sundries	3,547.56	.032	2,150.34	.024
50. Other Mines & Accounts	2,075.11	.018	957.58	.011
Supply Inventory Adj.	545.15	.005	45.56	.000
Total per Cost Sheet	46,437.06	.413	48,388.44	.539

The explanation and comparison of the separate accounts that are of interest follows:

1. Exploring in Mine
The amounts were about the same in both years, so the cost per ton was reduced from .003 to .002.

3. Development in Rock
The largest single decrease occurred under this heading, but of course was partially offset by an increase in ore development in proportion to the difference in footage. The total cost of development was less in 1939 because the ore was not as expensive as the rock work, and the number of tons mined per foot of development increased for the third successive year. The following table lists the comparison:

	1939	1938	Decrease
Development in Rock - Feet	338	1414	1076
Cost per Foot	9.16	8.40	.76
Cost per Ton	.028	.132	.104

4. Development in Ore
The largest increase in any account was under this heading as explained above. The increase however was not in proportion to the increase in footage so the combined total of rock and ore development declined from .227 to .191. The comparative figures on ore development follow:

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

4. Development in Ore (Cont.)

	1939	1938	Increase
Development in Ore - Feet	3632	2122	1510
Cost per Foot	5.04	4.00	1.04
Cost per Ton	.163	.095	.068

The increased cost per foot was due to driving 359' of large size drift in 1939 compared to 83' in 1938.

5. Stoping
There was slight variation in this important cost. Two new stopes were opened in each of the years 1938 and 1939, and the very low cost mining in the northwest stope achieved the small reduction from .235 to .230.

6. Timbering
The lower cost of timbering of .011 per ton was due almost entirely to the fact that there was no main level drifting requiring timbering in 1939.

7. Tramming
The opening of the stopes above the southwest crosscut necessitated the addition of another man to the tramming crew on each shift. This was done in order to prevent delaying the motor trains while the chutemen transferred from the widely separated raises. The tramming cost was thereby increased from .115 to .127 per ton, but a much larger saving in production delay resulted.

8. Ventilation
This cost of .025 per ton, compared to .124 in 1937 and .087 in 1938, was due to the elimination of the difficulties experienced in providing adequate ventilation after the reopening of the mine. The 1939 cost represented nearly a return to the normal.

9. Pumping
The small decrease in the amount combined with the larger production to bring the cost per ton down from .120 to .093.

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

10. Compressors and Air Pipes
The lower cost of electric power for operating the compressor was responsible for the decrease from .088 to .071 per ton.

12 . Underground Superintendence
The amount increased but the larger average production reduced the cost per ton from .063 to .059.

14. and 15. Maint. of Compressors, Drills and Scrapers
The repair expense of each of these mechanical aids was above that of last year. Very few parts had been bought for the drills and scrapers purchased in 1937, and normal wear during the intervening period made this necessary in 1939. This increased the maintenance cost respectively from .002 to .012 per ton, and from .001 to .007.

16 and 17. Maint. of Elect. Tram Equip. and Pumping Mach.
The reverse was true in the case of these 2 items, for the haulage motors and pumps had been overhauled last year. Car repairs were continued, but the total tram equipment maintenance was down from .056 to .029, and the pumps from .020 to .010 per ton.

18. Hoisting
The amount was less, and the cost per ton reduced from .078 to .056 because of the lower average cost of electric power.

19. Stocking Ore
The reduction in new trestle construction kept the amount at about the same total as last year and decreased the cost per ton from .068 to .054.

20. Crushing
The overhauling of the crusher in April and May increased the amount considerably, but the larger production in 1939 held the cost per ton at .032 compared to .028 in 1938.

21 and 22. Dry House and General Surface Expense
These 2 items were about in proportion to the difference in production in 1939 and 1938.

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

23. Maint. Hoisting Equipment
The large decrease from .030 to .008 was due to the purchase of two new 1¼" hoisting ropes in 1938 and none in 1939.

24. Maint. Shaft
Shaft repairs were reduced due to the elimination of ice in the Spies hoisting shaft by reversing the ventilation fan. This could not be done during the working shift last year because of underground air conditions.

25. Maint. Top Tram Equipment
The complete overhauling and changing the door catches on the larry cars to prevent the operating delays which occurred last Winter were responsible for this large increase. The cost per ton was .026 compared to .013, but it is hoped the stocking expense this season will more than compensate for the difference.

27. Mine Buildings
Less work on the heating system reduced the amount slightly and the cost per ton from .009 to .006.

29. Mining Engineering
Although the amount was a little above last year the cost per ton was .012 compared with .014.

31. Analysis and Grading
There were fewer samples from known producing stopes, so the amount was less and the cost per ton down from .020 to .014. The small shipments of the past 2 years also maintained this expense at a relatively low figure.

32. Personal Injury
The $450 reduction in the proportion of hospital operating loss was the item responsible for lowering this account from .030 to .021 per ton.

35. Local and General Welfare
The amounts were almost identical so the cost per ton declined from .016 to .013.

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

36. Special Expense, Pensions and Allowances
The pension and Saranac Investigation costs were lower, but other expenses were increased so that the total amount was $223.12 above that of last year. Applied on the increased production however, the cost per ton was .025 compared to .029 in 1938.

37 and 39. Ishpeming and Mine Offices
There was little difference in the total amounts under these headings, so the cost per ton declined .005 and .018 respectively.

38. Social Security Taxes
The amount increased from $3624.40 to $3982.54, but the cost per ton was lower at .035 compared to .040 in 1938.

40. Taxes
The gain in the stockpile reserve was responsible for the increase in the amount and the cost per ton from .067 to .075. The comparison is listed under heading number ten later in the report.

41 to 50 Supplies
Except for machinery supplies and sundries, these accounts show the reduction consistent with the more efficient working schedule and the increase in production. Repair of the compressor, crusher, spare cage, larry cars etc., was responsible for the large increase in the cost of machinery supplies. This was offset by sizeable reductions in the cost of general supplies and electric power, so the total cost declined from .539 to .413.

9. EXPLORATION AND FUTURE EXPLORATION

The drift and raise development in the high sulphur ore at the east end of the orebody above the 8th Level was exploration inside known limits with the intent of locating material suitable for mixing with the west end ores. The few medium sulphur samples disclosed by this work indicate that a continuation in 1940 may develop a small section which can be mined for this purpose.

There was no diamond drilling, and none is contemplated at the present time although the area southeast of the orebody on the 6th Level and 8th Level offers possibilities which should be tested when known reserves are nearing completion.

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10. TAXES

The mine valuation was $65,000 above that of 1938 because of the increase in the amount of ore in stock. The tax paid was up proportionately, but the larger production held the cost per ton to a figure only slightly higher than last year.

The following tabulation is a complete statement of valuations, taxes, and comparison for the years 1939 and 1938:

	1939		1938	
Description	Valuation	Taxes	Valuation	Taxes
Iron River Township, Iron County				
Spies Lease				
NE¼ of NW¼ of Sec. 24,43-35)				
SE¼ of NW¼ of Sec. 24,43-35)				
Virgil Lease				
SW¼ of NW¼ of Sec.24,43-35)	115,000	2,396.60	140,000	2,500.40
Stockpile Supplies & Equip.	240,000	5,001,60	150,000	2,679.00
Total Spies Virgil*	355,000	7,398.20	290,000	5,179.40
Spies Dwellings	5,000	104.20	5,000	89.30
Total Iron River Twshp.	360,000	7,502.40	295,000	5,268.70
Rate		2.084		1.786
Village of Mineral Hills				
Spies Lease				
NE¼ of NW¼ of Sec.24,43-35)				
SE¼ of NW¼ of Sec.24,43-35)				
Virgil Lease				
SW¼ of NW¼ of Sec.24,43-35)	115,000	316.11	140,000	393.61
Stockpile Supplies & Equip.	240,000	659.73	150,000	421.73
Total Spies Virgil*	355,000	975.84	290,000	815.34
Spies Dwellings	5,000	13.74	5,000	14.06
Total Mineral Hills	360,000	989.58	295,000	829.40
Rate		.27488		.2812
Total Taxes		8374.04		5994.74
Tax per Ton Produced		.075		.067
Tax per Ton Shipped		.283		.160

*The village of Mineral Hills is in Iron River Township and the valuations are the same for each. The realty valuations placed by Tax Commission includes both Spies and Virgil descriptions, and are not divided by the appraiser.

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11. ACCIDENTS AND PERSONAL INJURY

There were 2 lost time accidents in 1939, and one in each of the years 1938 and 1937. The slight accident in 1938 occasioned a loss of 18 days and ranked the Spies-Virgil safety record in first place among the underground mines. The period from June 15, 1938 to June 12, 1939 was worked without an accident when on that day, and the following, two serious finger injuries occurred. The remainder of the year was then gone through without another accident. Both injuries resulted from drilling chunks at a mill raise on the grizzly sub above the north 8th Level drift. The first man lost the end of his finger when it was pinched between a sharp edged chunk and the handle of the machine as the moil point broke through the chunk. He had been doing this same work for over a year, but in this instance was simply not prepared to keep his balance. The next morning the man that replaced him, also familiar with the work, broke his middle finger under similar conditions. The last injury was the more serious for the finger stiffened after it had set, and the man asked to have it amputated at the second joint several months later.

The actual time lost from these injuries was 180 days, or 10 times the number in the previous year. The compensable days, however, were 210 days for the finger loss in the first case, and 270 in the second, or a total of 480. This increased the severity rate from 1.29 days lost per 1000 worked in 1938 to 31.80 in 1939, and resulted in the mine dropping to the last place position in 1939.

The whole force was naturally disappointed in this showing, and were on the alert to prevent a repetition of the happening. The accident free interval of more than 6 months at the year end seemed to prove this intent. The record of the 2 accidents follows:

Accident No. 147 - Merino Bernucci, company account miner, age 50, Lost tip of finger when pinched between drilling machine and chunk on June 12th. Time lost actual 36 days, and compensable 210 days.

Accident No. 148 - Hadar Peterson, company account miner, age 42. Finger broken when squeezed between chunk and handle of drilling machine, and amputated at second joint four months later. Time lost actual 144 days, and compensable 270 days.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

There was very little new construction in 1939. On Surface the steam heating system was extended to the carpenter and electrical shops to do away with the last of the old heating stoves and their accompanying hazard. Short extensions were erected on the ore and rock trestles in the Fall in order to minimize delays during the stocking season. The construction of the small earth dam, and deepening of the water diversion ditch west of the swamp was the only other surface job worthy of note.

The loading chutes under the new southwest orebody raises, and the construction of 3 concrete brattices to seal No. 9 stope from the old 6th Level workings comprised the underground construction.

Outside of the probable need for additional brattices to control ventilation, and the development of No. 840 crosscut, no new construction is at this time contemplated for 1940.

13. EQUIPMENT AND PROPOSED EQUIPMENT

The one addition to equipment under an E.&A. was the purchase of a 15 H.P. Ingersol-Rand double drum hoist for the scraper transfer under the second southwest stope. The E.&A. number was 834 and the cost of the hoist and motor $1374.00.

Other additions to equipment were:

2 Thermolier Unit Heaters	$131.96
1 Centrifugal pump with 2H.P. motor	275.44
5 Circuit Breakers	151.11
4 Fire Extinguishers	89.71

The unit heaters were for the heating system extension, and the Moyno sludge pump was transferred from the Lloyd Mine for use in the skip pit. New equipment purchases were again held to a minimum, but repair and improvement of existing equipment were more extensive than last year.

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14. MAINTENANCE AND REPAIRS

a. Mine

Extensive repairs of the surface plant and equipment were continued in 1939. Some were vitally necessary, while others were in the nature of improvements to eliminate delays and reduce operating costs. The work has been described under the surface heading and will be reviewed here.

The crusher was completely overhauled in April, including the re-lining of the driving motor and improvement of the heating arrangement.

The top tram larry car electrical systems were repaired, and improved mechanically by changing the door catches and extending the dumping plates.

The top tram landing floor and stockpile track was repaired, and worn skip runners replaced in the headframe.

The compressor intercooler was replaced in February, and the moisture content in the compressed air later reduced by renewal of cylinder bushings.

The power line to the Virgil shaft was repaired in September, and thermal switches added for future protection of the fan and pump motors.

The interior of the dry house was painted and a new coal bin built in the boiler room. The corrugated iron covering of the headframe was re-spiked, the crusher house was rebuilt after the crusher overhauling, and the tool room on the landing floor was improved and reduced in size to save heating expense.

The steam shovel and 8th Level pumps had been overhauled in 1938 and few repairs were necessary this year. The spare cage was sent to the central shops at Ishpeming and repairs were completed in December. Underground maintenance and repairs were less than the last 2 years, as can be noted under timbering and maintenance of electric tram equipment.

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14. MAINTENANCE AND REPAIRS (Cont.)

b. Location

The expense of maintaining the Spies Location houses was lower by the amount spent in 1938 to complete the outside painting of all the houses. Repairs were necessary only on the apartment and Captains houses, the latter because the windstorm in August toppled the chimney onto the kitchen roof and necessitated both inside and outside repairs.

The location sewer continued to give trouble due to leaks. The wooden pipe is badly rotted, and more extensive patching and repairs may be necessary in 1940 to maintain health standards. The table of comparative location expense for the last 2 years follows:

Spies Virgil Dwellings	Labor	Sps	1939 Total Amount	1938 Total Amount
Repairs to Houses	99.63	59.96	159.59	186.15
Interior Decorating		69.82	69.82	68.35
Outside Painting				101.95
Shed Repairs	5.71	9.46	15.17	
Total, Dwellings	105.34	139.24	244.58	356.45
Location Maint.				
Repairs to Sewers	84.10	30.80	114.90	77.18
Wiring & Light Repairs	33.88	51.85	85.73	82.52
Fire Protection and Water		40.95	40.95	65.90
Total Location Maint.	117.98	123.60	241.58	225.60
Total Rented Bldgs. and Location Maint.	223.32	262.84	486.16	582.05

15. POWER

The Wisconsin-Michigan power service was uninterrupted in 1938, but sleet storms in January and April were responsible for power failure causing delays on 3 days in 1939. The total time lost was 16 hours, and the production loss 590 tons, or nearly half the tonnage from all causes.

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15. POWER (Cont.)

Experiments were conducted by arranging different pumping schedules with the idea of gaining a more uniform load and thereby reducing the unit cost. Changes are necessary for each operating schedule, but the peak load was reduced from about 450 K.W. to less than 400 near the end of the year, permission having been granted by the Power Co. to install a maximum demand signal that warns of excess current use during the 5 minute meter intervals. The average cost of power was reduced from .203 to .164 per ton mainly because of the steadier operation in 1939, and it is hoped the saving can be carried farther in 1940.

17. CONDITION OF PREMISES

The repairing and painting of the mine structures and location houses in 1937 and 1938 placed them in good condition, so all that was necessary in 1939 was to keep everything clean and in order. The shafthouse was repaired promptly after the crusher was overhauled, and the appearance of this structure somewhat improved. The mine road, and location streets and alley, were also well maintained by the village.

18. NATIONALITY OF EMPLOYEES

	American Born		Foreign Born		Per Cent
	Number	%	Number	%	of Total
Parentage					
English	6	9	12	17	26
Finnish	5	7	8	11	18
American	12	17			17
Scandinavian	10	14			14
Italian	1	1	6	9	10
Austrian			3	4	4
Polish	1	1	2	3	4
German	2	3	1	1	4
French	1	1			1
Irish	1	1			1
Belgian			1	1	1
Total	39	54%	33	46%	100%

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1. GENERAL:

In preparation for the 1939 ore season, preliminary work was started by the Canisteo Mining Company during the month of April.

A small crew of men were engaged from April 10th to the third week in June, re-assemblying and repairing washing plant machinery, and re-conditioning the main line tracks between the pit and concentrator.

A force of twenty men were employed during the fore part of April, getting the North Bovey stripping job started. This included track work, shovel casting for an initial operating cut, shifting a transmission line and re-locating a surface drainage ditch to the north of the ultimate stripping limits in this locality. Actual stripping operations begun April 26th and were continued with steam haulage equipment and one 120 electric shovel until the fore part of June.

The truck stripping job was started on May 15th along the south side of the Hemmens land and extending a short distance on to the east Snyder forty. Beginning with two trucks, a "Caterpillar" tractor; a road patrol and loading with a 4-yard electric shovel, on May 15th, two additional trucks were added on May 17th and the final two on the 23rd of that month. The operation was concluded the middle of June, with the exception of a small amount of clean-up work, which could be accomplished to advantage during week-ends of the early part of the ore operation.

In connection with truck haulage of ore, it was necessary to construct two ramps for dumping in to 30-yard railway cars. Erection work was begun during May and the structures were ready for service by the third week in June, including the approach and truck run-arounds, which were constructed of rocky material sorted out from former operations.

The ore mining program was started on June 23rd and conducted until October 13th, the work week being of five or six days of one 8-hour shift each, depending on the boat cargo requirements.

The washing plant was operated 89 days, producing 218,514 tons of concentrates from the treatment of 353,728 tons of crude ore. The plant output per shift compared very favorably with that of former years. The ratio of delays to the total working time was quite satisfactory from a comparative standpoint.

Upon the completion of the ore season, the two 4-yard shovels were used to dig around the ramps, so that these structures could be salvaged. Preparations were undertaken to start the North Bovey stripping job and a track was laid from the high line of the washing plant site so that the contractor's derrick could be delivered for plant dismantling.

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1. GENERAL:
(Continued)

The track was also utilized for the moving of the structural steel and washing plant equipment.

Fall stripping operations were started on the North Bovey land on October 20th and completed December 7th. The trucks and other motorized equipment was then moved to the Hemmens forty and that job undertaken. One 4-yard electric shovel was utilized on the Hemmens stripping, the second machine being sent to the Holman Mine upon the completion of the Canisteo ore season.

A considerable amount of The Mesaba-Cliffs Mining Company's tracks in the pit, which were not in use during 1939, were taken up and moved from the property by the owner.

The fall work undertaken in connection with the water storage reservoir, diking for the new tailings basin, dismantling the washing plant, providing foundations for the new plant location and installing a fresh water line from the Village of Coleraine to the mine and plant, will be discussed under "New Construction".

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Snyder Crude,	137,974	tons.
Bovey Crude,	110,629	"
Hemmens Crude,	105,125	"
TOTAL CRUDE ORE,	353,728	"
Snyder Non-Bessemer Concentrates,	27,385	"
Snyder Bessemer Concentrates,	57,579	"
Bovey Non-Bessemer Concentrates,	70,941	"
Bovey Bessemer Concentrates,	1,323	"
Hemmens Non-Bessemer Concentrates,	15,150	"
Hemmens Bessemer Concentrates,	46,136	"
TOTAL CANISTEO MINE,	218,514	"

Ore operations started on June 23rd and were completed on October 13th.

b. Shipments:

The shipments from the Canisteo Mine during 1939 were the same as shown under the production statement, as all ore mined was forwarded to Lower Lake ports.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

c. Stockpile Inventories:

No merchantable ore, either concentrates or direct shipping was stocked at the Canisteo property during 1939.

e. Production by Months:

(1) Crude Ore:

	SNYDER	BOVEY	HEMMENS	TOTAL
June,	-	18,436	598	19,034
July,	14,271	38,638	19,886	72,795
August,	34,265	27,817	43,416	105,498
September,	68,019	14,540	27,583	110,142
October,	21,419	11,198	13,642	46,259
TOTAL 1939	137,974	110,629	105,125	353,728

(2) Concentrates:

	SNYDER	BOVEY	HEMMENS	TOTAL
June,	-	12,145	420	12,565
July,	8,080	24,765	11,654	44,499
August,	22,039	18,683	26,190	66,912
September,	41,998	9,825	15,690	67,513
October,	12,847	6,846	7,332	27,025
TOTAL 1939,	84,964	72,264	61,286	218,514

f. Ore Statement:

All material considered as ore, that was mined during 1939, was shipped from the property.

g. Delays:

The following delays were reported during the year 1939: (Including stripping operations):

Date:	Time Lost: Hours	Minutes	Cause:
April 26th,	2	-	Derailment.
May 3rd,	1	10	Repairing draw-bar on locomotive.
		30	Derailment.
5th,	1	15	Train off track.
8th,	5	-	Cars off track on dump.
10th,	-	20	Derailment.
12th,	4	-	Shovel mired down.
16th,	2	-	Broken side rod on locomotive.
19th,	1	-	Repairing dump tracks.
22nd,	-	30	Electric trouble on shovel.
24th,	1	-	Shovel stuck in caved drift and cars off track.
29th,		30	Cars off track.
	2	-	Repairing bull-dozer; casting and moving.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date		Time lost: Hours	Minutes	Cause:
May	30th,	2	30	Repairing trip motor on shovel.
	31st,		45	Repairing trip motor on shovel.
June	1st,	4	30	Moving shovel and repairing roads.
	2nd,	2		Putting drain pipe in pit.
		1		Repairing road.
	5th,		30	Rock stuck in shovel dipper.
	8th,	1	15	Power off.
	9th,	1	45	Splicing and changing cable #32 shovel.
	12th,		15	Wet roads.
	19th,	2	45	Repairing roads and shovel.
	20th,	2	30	Heavy rains.
	23rd,	3		Changing coils on log motor.
	24th,	1		Handling rock in crusher house.
	26th,	3		Repairing shovels and roads.
July	5th,	1		Heavy rains
	12th,	2		Crusher and classifier plugged.
	19th,	1		Waiting for cars; Great Northern.
Sept.	13th,	2		Haulage motor derailed
	14th,	2		Broken valve on air compressor.
	15th,		30	Waiting for Great Northern cars.
	18th,		45	Broken valve on air compressor.
	28th,	1		Waiting for Great Northern cars.
		1		Power off.
Oct.	11th,	1	30	East crusher broken.
	12th,	2	30	Waiting for Great Northern cars.
	31st,	1	30	Repairing control on shovel.
Nov.	6th,	1	30	Replacing hoist cable.
Dec.	1st,	1		Changing cable.
		1		Salting trucks.
	29th,	1	15	Replacing hoist cable.
Total,		69	30	

3. ANALYSIS:

a. Mine Analysis of Production & Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Snyder Non-Bess.Concs.	27,385	58.15	.067	10.31	.26	.62	8.39	53.27
Snyder Bess.Concs.	57,579	58.73	.034	9.95	.15	.54	8.13	53.95
Bovey Non-Bess.Concs.	70,942	57.83	.093	10.47	.25	.60	8.42	52.95
Bovey Bess.Concts.	1,322	58.32	.045	10.20	.15	.50	8.76	53.20
Hemmens Non-Bess.Concs.	15,150	57.33	.073	10.72	.21	.55	9.32	51.99
Hemmens Bess.Concs.	46,136	58.46	.032	9.80	.11	.43	8.89	53.26
TOTAL 1939,	218,514	58.21	.060	10.19	.19	.55	8.50	53.26

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3. ANALYSIS:
(Continued)

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Snyder Crude,	137,974	44.02	.042	31.26
Bovey Crude,	110,629	47.00	.089	25.85
Hemmens Crude,	105,125	42.84	.039	32.66
Total Crude Ore,	353,728	44.60	.056	29.98

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Snyder Non-Bess.Concs.	58.00	.066	10.20	.26	.54	.24	.16	.011	5.40
Snyder Bess. Concts.	58.80	.035	9.80	.12	.38	.16	.12	.010	5.20
Bovey Non-Bess.Concs.	57.90	.088	10.20	.26	.52	.30	.14	.016	5.45
Bovey Bess. Concts.	58.20	.045	10.05	.14	.44	.18	.12	.014	5.70
Hemmens Non. Bess.Concs.	57.30	.071	10.55	.21	.62	.20	.16	.012	6.05
Hemmens Bess. Concs.	58.50	.033	9.75	.11	.38	.14	.10	.012	5.75

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:
Factors Used:

	Rock Deduction	Cu. Ft. Per Ton	% Recovery
North Bovey:			
Wash, ----------	10%	14	60%
Low Grade Wash, --------	10%	15	60%
Rocky Wash, ----------	20%	14	60%
South Bovey:			
Wash, ----------	10%	14	60%
Lean Wash, ----------	10%	14	50%
Low Grade Wash, --------	10%	15	60%
Lean Low Grade Wash, ---	10%	15	50%
Hemmens:			
Wash, ----------	10%	14	60%
Low Grade Wash, --------	10%	15	60%
Lean Low Grade Wash, ---	10%	15	50%
Rocky Wash, ----------	20%	14	60%
Snyder:			
Wash, ----------	10%	14	60%
Lean Wash, ----------	10%	14	50%
Low Grade Wash, ---------	10%	15	60%
Lean Low Grade Wash, ---	10%	15	50%
Rocky Wash, ----------	20%	14	60%

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

Snyder:	Jan. 1st - 1939	Mined 1939	Jan. 1st - 1940
SE¼-SE¼ - Sec. 30,	1,817,423	69,964	1,763,381
SW¼-SE¼ - Sec. 30,	704,985	15,000	729,544
SE¼-SW¼ - Sec. 30,	216,203	-	216,203
Total Snyder,	2,738,611	84,964	2,709,128
Bovey:			
SW¼-NE¼ - Sec. 30,) SE¼-NE¼ - Sec. 30,)	273,071	42,264	230,807
NW¼-SE¼ - Sec. 30,	313,522	30,000	295,903
NE¼-SE¼ - Sec. 30,	155,543	-	249,105
NE¼-NE¼ - Sec. 31,	799,642	-	799,642
Total Bovey,	1,541,778	72,264	1,575,457
Hemmens:			
SW¼-SW¼ - Sec. 29,	921,556	61,286	1,329,182
Grand Total,			5,613,767

The estimated tonnage of reserve ore in the Canisteo Mine, as of January 1st, 1940, shows an increase of 630,336 tons, compared with the estimate of the previous year, after taking into account the 218,514 tons produced from the property during the year 1939.

The above tabulation shows an increase of over 55,000 tons in the Snyder lands and approximately 161,000 tons in the Bovey. These increases are due entirely to former track benches, which are now made available for mining with the motorized equipment in use at this property.

As regards the Hemmens land, there is an increase in this tonnage of 468,912 tons. This is the result of the structural drilling undertaken during the fall of 1939.

The following tabulation shows the tonnage and analysis of the reserve ore, as of January 1st, 1940:

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

Lease:	Grade:	Tons	Iron	Phos.	Silica
Bovey,	Bessemer	379,000	57.50	.037	8.25
Bovey,	Non-Bessemer,	1,196,457	57.64	.076	10.62
Hemmens,	Bessemer,	1,000,000	57.50	.040	10.75
Hemmens,	Non-Bessemer,	329,182	57.50	.055	11.00
Snyder,	Bessemer,	1,424,761	58.23	.035	10.29
Snyder,	Non-Bessemer,	1,284,367	58.11	.066	10.36
Grand Total,	Bessemer,	2,803,761	57.87	.037	10.18
	Non-Bessemer,	2,810,006	57.84	.069	10.55
		5,613,767	57.85	.053	10.36

5. LABOR & WAGES:

a. Comments:

There was an abundance of both skilled and common labor in the Western Mesaba district during the past year and no difficulty was encountered in maintaining a full crew of experienced men at all times. A crew of men were broken in to handle the motorized equipment and, fortunately it was possible to secure these men from our employees. There was no noticeable union activity at the Canisteo Mine during the past year.

b. Comparative Statement of Wages & Product:

Production:	
Direct Shipping Ore,	-
Concentrates Shipped,	218,514 Tons.
Concentrates in Stock,	-
Number of Days Operated, 1, 8-hour shift per day:	89
Average Daily Product,	2,455 tons.
Average Number of Men Working,	92
Average Wages Per Day,	$6.05
Amount Paid for Labor,	$ 56,122.91

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6. SURFACE:

a. Buildings, Repairs:

Only the necessary minor repairs were made to the mine buildings and the Company dwellings at the Canisteo Mine during 1939. A number of changes and alterations were made, following the completion of the ore season. This work will be described under "New Construction".

c. Tracks, Roads, Transmission Lines, etc:

Roadways for the motorized equipment were provided in connection with the several stripping jobs, a main roadway, leading in to the pit from the north end of the property was provided, as well as roads leading thereto and connecting with the shops, tailings basin and new washing plant site.

Several transmission line changes are being made in connection with the new method of operations to be conducted at the property during 1940. This includes the moving back of the line around the north end of the Bovey land beyond the ultimate stripping limits and making suitable connections for the operation of the washing plant in its new locality. A considerable part of this work was completed during the fall of 1939.

7. OPEN PIT:

a. Stripping:

Stripping at the property was divided in to four jobs; first - the spring work on the Hemmens-Snyder south bank; second - the North Bovey spring stripping; third - the North Bovey work in the fall - and, finally, the Hemmens south bank activities, which were going forward at the end of the year.

The truck stripping job on the south side of the pit was started May 15th, with two Euclid trucks. The other four trucks were delivered during that month. In connection with the 6 trucks, a 17-ton "caterpillar" tractor and road patrol were purchased and utilized. It was necessary to break in new men to handle the Diesel motorized equipment and considering this fact, as well as the difficulties encountered with the frequent rains and natural seepage from the banks, the job, which was completed during June, was handled quite satisfactorily.

The pit bank was removed to the southward an average distance of 200 feet on the Hemmens and East Snyder forties. The material consisted of 97,767 cubic yards of surface and 7,029 yards of rocky material. A suitable berm was left so that fall stripping could be undertaken to advantage.

The spring stripping on the North Bovey land was accomplished with steam equipment, rented from the Mesaba-Cliffs Company. Three locomotives, twelve 30-yard cars and a 4-yard electric shovel were in service here. The work was started late in April and completed the fore part of June. It consisted in removing the overburden and some rock from the rather narrow extension of the North Bovey ore body. The stripping bank was comparatively shallow and good progress was

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

made with the comparatively dry material. The yardage removed here is shown on the stripping statement, found at the end of this caption.

The fall stripping work on the North Bovey consisted in extending further to the North the pit limits and the providing of a permanent truck roadway in to the pit. This job was accomplished with the use of motorized equipment. The work started October 20th and was completed December 7th.

A total of 147,284 cubic yards was removed here, 12,618 yards being in connection with road construction and 134,666 yards were hauled to the new tailings basin and utilized in building up the 15-foot dykes around the perimeter of the basin. The basin provided will suffice for the handling of tailings from the washing plant during the next two years operation of this property.

An estimate of $.15 per yard was allowed for this job and $.05 per yard in addition was set up to cover the expense of hauling the stripping material one mile and building up the dykes with 5-foot lifts. It was found that the $.05 per yard allocated to the dyke job was inadequate, as the long haul, plus the truck delays in backing up for end dumping on the dykes, actually cost more than this.

The 4-yard electric shovel and motorized equipment were transferred to the south side of the pit, December 8th, and the final stripping job for the year was started on the Hemmens-Snyder properties. The top 30 feet of the overburden was removed from an area 1100 feet long and approximately 200 feet wide, - 56,867 yards of Hemmens and 38,091 yards of Snyder surface material being handled by the end of the year. The bank attacked during December was mostly a blue gumbo clay, carrying considerable moisture and this slowed up the work to quite an extent, as not only were there bank slides, but the trucks had to be salted in order to dump their loads. The clay also occasioned some trouble on the dumps, as it would slide out from time to time and make haulage to the edges somewhat hazardous.

The fall stripping cost has amounted to $.179 per yard. In order to complete the jobs under the authorized estimate, it will be necessary to secure a cost of $.13 per yard on the balance, to secure an average, as per the setup, of $.15 per cubic yard. The cost for the month of January on the south bank should show some improvement and the Snyder rock island stripping, to be undertaken in April, will be on a basis well under the $.15 per yard.

The following tabulation shows the classification of material stripped during the year 1939:

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

LEASE	SURFACE CUBIC YARDS	WASTE CUBIC YARDS	TOTAL CUBIC YARDS
Snyder, ----------	92,891	13,676	106,567
Hemmens, ----------	99,834	56,332	156,166
Bovey, ----------	269,174	17,058	286,232
Total, ----------	461,899	87,066	548,965

f. Explosives, Drilling & Blasting:

Statement of Explosives Used:

	QUANTITY	PRICE	AMOUNT
60% R.C. Extra - 7/8" x 8",	100#	$12.00	$ 12.00
R.C. Blasting, No. 4 Bags,	10,350	10.00	1,035.00
25% DuPont Special Gel. 3 x 10,	27,750	9.75	2,705.63
25% DuPont Special Gel. 5 x 16,	26,500	9.75	2,583.75
Total and Average,	64,700	9.793	$6,336.38
30' DuPont #6 E.B. Caps,	750	12.65	94.89
DuPont #6 Blasting Caps,	1,000	12.20	12.20
Total and Average,	1,750	6.119	$ 107.09
TOTAL ALL EXPLOSIVES, - - - - -			$6,443.47

Division of Charges:

1939 Ore Operations, ----------	$6,128.34
E&A #9 - Spring Stripping, ----------	255.75
E&A #20- Conveyor Foundations, ----------	59.38
Total, ----------	$6,443.47

g. Open Pit Mining and Loading:

In preparation for open pit ore mining during the season of 1939, which was conducted by using motorized equipment as an auxiliary source of haul in the pit, two ramps were constructed near the Bovey run-down track. Roadways were provided in the pit, one leading to the south bank of the Hemmens-Snyder land, one to the track benches left along the north side of the Mid-Snyder forty and a third to the North Bovey ore bank.

The ore from the Bovey property was dumped through one of the ramps into 30-yard cars, and the Snyder, or Hemmens, as the case might be, was dumped through the second one. The ore was then hauled by steam equipment from the ramps to the washing plant, with equipment rented from The Mesaba-Cliffs Mining Company.

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)

Ore operations were inaugurated on June 23rd and were conducted, for the most part, six days per week of one 8-hour shift each, until October 13th. A total of 353,728 tons of crude ore was mined and delivered to the washing plant and the treatment of this material produced 218,514 tons of concentrates.

Mining operations were rather evenly divided between the Bovey, Hemmens and Snyder areas in the pit, somewhat more than one-third of the product coming from the Snyder. The crude ore output was: Bovey 110,629 - Hemmens 105,125 and Snyder 137,974 tons.

Early season's operations were largely confined to the North Bovey, as the bank on the south side of the pit had not then been prepared for mining activities and Bessemer ore was not required.

The two 4-yard electric shovels rented from the Mesaba-Cliffs Company, were moved about the pit as grading and low Phosphorous requirements demanded. For the most part the shovel mining along the south bank was moved to the Mid-Snyder area for grading purposes and the second machine was transferred between the upper and lower North Bovey ore benches, in an endeavor to furnish as uniform an Iron and Phosphorous as possible. The upper bench at times produced a very high Phosphorous ore which could not be shipped in cargoes without obtaining some lower Phosphorous material for mixing.

Some scram ore was obtained from the southerly part of the North Bovey property and a few gouges were taken along the north side of the East Snyder forty. The ore obtained from these sources, however, was of small amount.

On account of the prepaid royalty situation, it was advisable to obtain the maximum tonnage from the Hemmens and Bovey lands and work to this end was followed, as far as grading conditions warranted. With more ore available in 1940, a relatively larger proportion of the output can be secured from the Hemmens and Bovey leases and still afford the desired grade.

During the season of 1939, considerable rock and other waste material was moved on week-ends, being hauled and dumped with trucks in worked-out areas in the pit.

k. Drainage:

As mining operations were not carried on in the lower part of the pit, it was not necessary to lower the water in the sump. The head pumped against during 1939 was approximately 50 feet less than during the previous year. As no deep mining is contemplated during 1940, the drainage situation will not be altered next season.

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8. COST OF OPERATION:

a. Comparative Mining Costs:

	Budget Estimate	1939 Cost Per Ton	1938 Cost Per Ton
PRODUCT (Tons)	202,020	218,514	777,881
Average Shift Production,		2,455	7,270
Tons Per Man Per Day (Shift)		23.64	26.35
Days Operated,		89	107
COST			
Open Pit Wash Ore,	$ .251	$ .252	$ .189
General Pit Expense,	.127	.040	.041
Concentrating,	.140	.162	.161
General Mine Expense,	.112	.096	.096
Idle & Winter Expense,	.125	.175	.154
Cost of Production,	$ .755	$ .725	$ .641
Depreciation, Plant & Equipment,	.089	.086	.167
Amortization- Stripping,	.200	.200	.196
Taxes - Ad Valorem,	.560	.364	.088
Taxes - Occupational,	.065	.165	.088
Taxes - Royalty,	.061	.027	.029
Total Cost at Mine,	1.730	1.567	1.209
Administrative Expense,	.050	.050	.100
Miscellaneous Expense & Income,	.005	.000	.005
GRAND TOTAL, ----------	$ 1.785	$ 1.617	$ 1.314

The final cost sheet figures have not been received from Cleveland and there may be some small adjustments, but the cost per ton will only be affected to a slight degree.

d. Detailed Cost Comparison:

(1) Product:

In analyzing the Canisteo cost sheet for the year 1939, as against that for 1938, there are so many items not comparable that it would be rather meaningless. The tonnage of ore produced in 1938 was almost 560,000 in excess of the output for 1939 and the method of haulage in the pit was entirely different.

The character of the ore treated during 1939 was of a somewhat lower average grade and this affected the weight recovery and cost. The scale of wages in effect was the same for the two years, but with the introduction of motorized equipment in the pit, the average rate

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(1) Product: (Continued)

was somewhat higher in 1939, the proportion of skilled employees being greater.

The pumping and drainage problems during 1939 were conducted under more favorable circumstances, due to the fact that it was not necessary to confine the water in the pit to a small sump, mining operations being carried on at a higher elevation. It was, however, necessary to pump extensively to the washing plant storage reservoir during 1939 and the plant operating costs were increased as a result.

The total cost of production for 1939, including Idle and Winter Expense, was $.030 per ton under the budget estimate and was $.084 higher than 1938. If the Winter and Idle Expense had not exceeded our estimate by $.05 per ton, the cost for the relatively small production in 1939 would have been well below the budget and would have compared very favorably with the cost of the large tonnage secured in 1938. The estimate for Idle and Winter Expense was set up at $25,000.00 and this amount was actually exceeded by approximately $10,000.00. It is almost impossible to make estimates on repairs, as the machinery has to be taken down before the extent of the repairs can be accurately determined.

(2) Open Pit Mining:

There was an increase of $.001 to this account, as compared with the budget - and $.063 per ton over that for the year 1938. There were three items under this caption which showed an increase over the budget - Drilling and Blasting being higher by $.009 per ton, due to the fact that the ore banks were lower and considerably more drilling and blasting had to be done per ton of ore mined; Power Shovels Operating showed an increased cost per ton of $.018, occasioned by the extensive moving of shovels about the pit in connection with grading and the operation on comparatively low banks; - Locomotives and Cars Maintenance was $.003 per ton higher as the result of this equipment requiring more attention than had been anticipated.

To offset these figures over the budget, there was a saving in Power Shovels Maintenance of $.003 per ton, these machines having been given a thorough overhauling for the season's work and the wear was noticeably light. Locomotives and Cars Operating showed a reduction in cost of $.013 per ton, as compared with the budget. This was due to the fact that the equipment was operated on main line tracks only and there were no serious derailments, or delays. Heretofore, in the operation of the Canisteo Mine, the cost for delays resulting from derailments and operating on wavy tracks has been a considerable item of expense.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

There was a decided saving in track expense during 1939, as compared with the budget. This amounted to $.029 per ton and it is explained by the fact that considerable less labor was required on the main line tracks in use than had been anticipated. It is quite costly to furnish tracks for power shovel loading, as they have to be shifted for each cut and require constant attention in ballasting and straightening. The work on temporary tracks was eliminated during 1939, as the trucks hauled from the shovels to ramps along the main line.

(3) General Pit Expense:

The 1939 cost per ton was well under the budget and compared very favorably with the cost secured in 1938, even with the greatly reduced tonnage.

There was only one item of expense under this caption that showed an increase over the budget. The charges to Water Supply during 1939 resulted in showing an expense of $.001 per ton to this account, whereas there was no expense anticipated when the budget was prepared.

Due to the fact that regular pumping operations from the pit were only carried on intermittently during the ore season and no charges made in connection with pit drainage ditches, or sumps, the expense for pit pumping was comparatively low. The pumping of the pit water to the washing plant reservoir was charged to Concentrating and this was the big factor in showing the large reduction in pit pumping expense.

The reduction of $.004 per ton for General Open Pit Expense, as compared with the budget, was due to less work being required, such as throwing switches and general clean-up in the pit.

The Open Pit Superintendence account was $.006 per ton under the budget. This was the result of employing fewer supervisors in the pit than had been anticipated.

Although in preparing the estimate an allocation of $.016 per ton was set up against Structural Drilling, no work of this nature was undertaken during 1939 in connection with the season's ore output. Some structure drilling was done toward the end of the year, but this was for future ore operations and was charged to Plant Account.

(4) Concentrating:

The 1939 cost per ton against this caption exceeded the budget estimate by $.022 per ton, but it was very close to the 1938 cost, being only $.001 per ton higher.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(4) Concentrating: (Continued)

The Transportation to Mill expense was $.006 per ton over the budget. It was necessary to operate one more tain than had been anticipated, which explains this increase.

The actual Washing expense agreed with the budget, amounting to $.057 per ton in each case.

The Power charge to Concentrating was $.016 above the budget, which is explained by the fact that it was necessary to pump from the pit to the storage reservoir during a considerable part of the ore season. As the ore operation was only conducted on one shift, the power factor was higher and this resulted in showing higher charges to all operations where electric current was used.

There was a small increase of $.001 per ton over the budget in Maintenance of Washing Plant Machinery. This was due largely to more than the expected repairs to the pan conveyors.

As no work was necessary on the tailings basin Dam and Spillway, this account showed a reduction of $.002 per ton, which was set up in the budget.

(5) General Mine Expenses:

There was an increase of $.003 per ton for Mining Engineering. This was occasioned by the fact that more engineering help was required than had been estimated.

There was a small reduction to the account Mechanical and Electrical Engineering, amounting to $.001 per ton. At the time of making the estimate it was not anticipated that the Mechanical Engineer, would be transferred from the Hibbing to the Ishpeming office, which explains the decreased cost here, as compared with the budget.

On account of there being an excessive amount of work required in connection with grading ore, the budget figure of $.017 per ton was exceeded by $.001 per ton.

More safety work was undertaken during 1939 than had been estimated, with the result that the item Safety Department exceeded the budget by $.001 per ton.

There had been no charge made during 1939 for the Lake Superior Industrial Bureau assessment, whereas in the budget, $.006 per ton was set up. On this cost sheet, therefore, there is a saving of this amount.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(5) General Mine Expenses: (Continued)

The charges to Ishpeming Office were somewhat lower than had been anticipated. This is occasioned by a more extensive operating program in the Michigan district and thereby lowering the charges allocated to the Canisteo Mine. The charge per ton was $.001 under the budget.

There was a small increase of $.001 per ton for District Office, as compared with the budget. At the time of preparing the budget, the operation of the Holman-Cliffs property was anticipated and while the Hill-Trumbull tonnage was increased, it was not in sufficient amount to offset the expected operation of the Holman-Cliffs.

The charges to Mine Office for 1939 were considerably less than had been expected. There was a reduction of $.007 per ton, as compared with the budget. While no mining operation was conducted at the Holman-Cliffs property, Superintendent Sterling spent an appreciably amount of time in working up estimates and going over proposed work at this mine. Further than this, Mr. Sterling's services were required in connection with the moving of Mesaba-Cliffs equipment.

The saving in the Insurance item of $.003 per ton was occasioned by a reduction in the expected number of employees and to favorable insurance rates on the plant and equipment.

The expense for Compensation Insurance and Personal Injury practically agreed with our budget.

On account of there being less employees than had been anticipated at the time of preparing the budget, Social Security Taxes were $.002 per ton under the budget.

Employees' Vacation Pay account was $.006 per ton under the budget. At the time of making the estimate, all of the regular Canisteo Mine employees, who were eligible, were considered as receiving vacation pay from this mine, whereas a number of them were employed a part of the year by the Mesaba-Cliffs Company and the vacation pay was allocated according to the amount of time serviced in connection with each operation.

There was no allowance made for Geological Expense at the time of preparing the budget, as we did not anticipate doing any exploratory work at this property. It was, however, found necessary to have some geological work done in connection with Canisteo Mine tax matters. The cost to this item increased the expense by $.002 per ton.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(5) General Mine Expenses: (Continued)

The charges to Idle and Winter Expense was considerably in excess of the estimate. When the equipment was examined for overhauling, it was found that the repairs were considerably more extensive than had been anticipated. The charges to this account resulted in showing an increase of $.050 per ton above the budget. The estimate of $25,000.00 was exceeded by approximately $10,000.00.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

A contract was let to the John Schultze Company of Grand Rapids, Minnesota, for the drilling of seven holes on the Hemmens land to the South of the present pit.

These seven holes were put down the latter part of the year, the following footages being obtained: Hole No. 279 - 207 feet, with good ore runs; Hole No. 280 - 214 feet, with some good ore runs; Hole No. 281 - 214 feet, with good ore runs; Hole No. 282 - 249 feet, with some fair ore runs - good ore in bottom; Hole No. 283 - 301 feet, showing the same ore conditions as the previous hole; Hole No. 284 - 300 feet - mostly poor ore, with some good ore in the bottom - and this also applies to No.285, which was drilled down 340 feet, The total was 1,825 feet.

10. TAXES:

The following statement shows the Canisteo Mine taxes and average rates for the years 1938 and 1939:

Statement of Taxes	1939	1938	Increase	Decrease
Canisteo Mine,	$76,552.34	62,998.46	13,553.88	
Washing Plant Lands,	3,032.68	3,121.79		89.11
Personal Property,	53.01	2,683.64		2,630.63
Total,	$79,638.03	68,803.89	10,834.14	
Village Lots,	-	219.70	-	219.70
Grand Total,	$79,638.03	69,023.59	10,614.44	-
Average Tax Rate,	.09021	.09305	-	.00384

The personal taxes assessed in 1939 were considerably less than those for the previous year, due to the fact that a considerable amount of the personal property belong to The Mesaba-Cliffs Mining Company and was not charged against the Canisteo MiningCompany in 1939.

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10: TAXES:
(Continued)

The increase in the Canisteo Mine Ad Valorem taxes was due to the fact that the Commission used their engineers' figures, instead of those submitted by the Mining Company during the past several years. The rate of valuation, however, was lowere in 1939 on most of the reserve tonnage; otherwise, the Ad Valorem taxes shown for 1939 and based on the Tax Commission engineers' tonnage, would have been considerably higher.

11. ACCIDENTS AND PERSONAL INJURY

There were but two lost-time accidents during 1939 at the Canisteo Mine, a description of which follows:

NAME: Dominick Gareri DATE: September 23rd.
CAUSE: Gareri was assisting in moving the #35 electric shovel and was putting the electric shovel cable through a "trough" while standing on "caterpillar" crawling mechanism. He slipped and fell against a clutch lever.
NATURE: Contusion of left lower chest and fracture of anterior thirt of left eighth rib.
TIME LOST: Nineteen and 1/2 shifts (19-1/2).
COMPENSATION: Total paid by Insurance Company $36.66.

NAME: Gust Maves DATE: October 30th.
CAUSE: Maves threw oily waste into firebox of locomotive crane to clean out the flues. The oil exploded, blowing flame into face.
NATURE: Second degree burns to entire face, including anterior surface of both ears and of neck.
TIME LOST: Four days.
COMPENSATION PAID: None.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

Two ramps for truck dumping were constructed prior to the ore season and a corrugated servicing building was erected for truck conditioning early in the summer.

Upon the conclusion of the ore season, the following construction jobs were undertaken:

E&A #17 - The washing plant sub-station, which was purchased from the Mesaba-Cliffs Company, was moved in to the pit and the transformers and sub-station structures set up on the new foundations. A new 22000-volt connecting line is being constructed to provide a more direct service for the pumping and shovel work and to avoid

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION (Continued)

high line loss. Work under this estimate will not be completed until February, 1940. The estimated cost should not be exceeded.

E&A #19 - The washing plant wiring and woodwork have all been removed and transferred to the new site. The dismantled structure and equipment have been moved and most of it unloaded, leaving about ten loaded dump cars, which will be switched in as required by the contractor. An air line was run to the new plant site from the shop, for the contractor's requirements - and there will be but little further crane service required after the first week in January.

The expenditures under this estimate, to January 1st, have amounted to $4,868.86. All work should be completed early in January, with the exception of re-installing the wiring and woodwork, which cannot be undertaken until the plant is virtually erected by the contractor. There is an unexpended balance under this account in the amount of $2,631.14.

E&A #20 - All the foundation work has been completed, with the exception of four small footings. It was decided to put in the latter and build steel supports, rather than provide excessive timber matting for carrying the conveyor in the approach and at the foot of the fill in the pit. In addition to the steel bents, two pile bents and two low timber supports are being constructed for carrying the conveyor.

The crushing plant and equipment are being erected and installed by mine labor. The expenditures to date under this estimate amount to $24,389.10 and there remains a balance of $3,610.90. Most of the work yet to be accomplished is the erection of the crusher building.

E&A #21 - The washer building has been completely dismantled and moved; the main columns for the building have been lengthened and new supports and bracing provided. The contractor's derrick was put up at the new site and the erection work on the mill will get underway the first week in January. The steel work for the new conveyor gallery has been received and unloaded at convenient points in the pit and in the approach.

The total billing from the Worden-Allen Company to January 1st, has amounted to $53,385.18 and this leaves an unexpended balance of $38,336.52.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION (Continued)

E&A #22 - The tailings basin dyke was completed and the draw-off pipes installed. Posts are being placed for a baffle wall to extend out in to the basin and insure settlement before water is drawn off. The frame work for the sluice box is also being constructed.

The water supply pipe from the storage reservoir to the pumps in the mill building was installed and a sluice box is being made for the intake.

The 10" booster line pipe is being taken up and hauled to a convenient place for distribution. The 16" water line from the pit to the storage reservoir is now being erected.

The expenditures under this estimate, to January 1st, amount to $16,956.19, leaving an unexpended balance of $26,543.81. Future expenditures under this estimate will cover mostly the purchase of pumps, pipe and the installation of same.

E&A #23 - The foundation for the watchman's house at the new site has been completed and a contract has been let to move the house for $300.00. The laboratory building will be moved on skids, utilizing the mine tractor.

The expenditures to January 1st, on this job, amount to $968.57. Allowing $300.00 to the contractor for moving the watchman's house, will leave a balance of $231.41 to take care of transferring the laboratory buildings.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

Six 15-ton capacity Euclid trucks were delivered during the month of May. They were utilized the balance of the year in connection with stripping and ore loading.

One new 17-ton "caterpillar" tractor was put in service the fore part of the stripping season, as was one Austin-Western road patrol.

It was found advisable to keep the pit roads wet down during dry spells and a second-hand sprinkler was secured for this purpose.

A 2-ton "International" truck for general surface work was delivered the latter part of the year.

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14. MAINTENANCE AND REPAIRS:

The pit and steam haulage equipment was rented from the Mesaba-Cliffs Company by the Canisteo Mining Company and this machinery was delivered to the Canisteo Company in good operating shape. No repairs of moment were necessary, so far as the Canisteo Mining Company was concerned.

The usual washing plant repairs were made prior to the starting of washing operations, the concentrating equipment having been purchased from The Mesaba-Cliffs Mining Company.

Upon the completion of the ore season, the washing plant was dismantled for moving, including all machinery. The necessary repairs will be undertaken when the plant is re-erected by the Worden-Allen Company on the new site.

18. NATIONALITY OF EMPLOYEES:

NATIONALITY:	NO. MEN 1939	NO. MEN 1938
American,	102	236
Jugo-Slav,	4	22
Finnish,	12	27
Italian,	3	9
Swedish,	4	7
Bulgarian,	1	7
Canadian,	3	6
Austrian,	2	5
Norwegian,	2	3
Dane,	1	2
Montenegrin,	1	2
Irish,	-	1
English,	-	1
Macedonian,	-	1
Belgian,	1	1
German,	-	1
Russian,	1	1
Croatian,	1	2
Bohemian,	-	1
TOTAL,	138	335

19. WASHING PLANT OPERATIONS:

The operating season at the Canisteo Mine washing plant extended from June 23rd to October 13th, a total of 89 days. The schedule consisted of one 8-hour shift, five, or six days per week, depending on the cargoes called for.

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19. WASHING PLANT OPERATIONS: (Continued):

The performance of the mill was generally satisfactory and comparatively few major washing plant delays were sustained. The 8-ft. pan conveyor needed some repairs during the season and there were a few instances of current failures.

The amount and analysis of the plant rejects for 1939 were as follows:

	5-FT. PAN REJECTS			
Lease	Tons	Iron	Phos.	Silica
Snyder,	4,893	30.71	.065	47.57
Bovey,	10,776	30.08	.119	48.35
Hemmens,	2,580	30.62	.072	47.98
Total,	18,249	30.33	.098	48.09

	36" BELT REJECTS			
Lease:	Tons	Iron	Phos.	Silica
Snyder,	1,015	33.85	.054	42.28
Bovey,	1,125	32.50	.093	44.55
Hemmens,	610	33.31	.050	43.44
Total,	2,750	33.18	.069	43.47

The rock removed from the pit and placed on the waste dump was as follows:

	Cu.Yds.	Tons	Iron
Snyder,	6,301	9,452	24.02
Bovey,	3,234	4,850	22.42
Hemmens,	-	-	-
Total,	9,535	14,302	23.48

The tonnage and iron unit recovery realized in the treatment of Canisteo ore during 1939, was as follows:

Lease:	Tonnage	Iron Unit
Snyder,	61.58%	81.90%
Bovey,	65.32%	80.39%
Hemmens,	58.30%	79.18%
Total,	61.77%	80.63%

The analysis of the product from the several machines for the year 1939 was:

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OPERATING AGENT FOR CANISTEO MINING COMPANY
CANISTEO MINE
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19. WASHING PLANT OPERATIONS: (Continued)

SNYDER MILL MACHINES:

	Iron	Phos.	Silica
Log Washer, ----------	58.65	.054	9.71
Classifier, ----------	58.65	.036	10.23
Tailings, ----------	17.58		

BOVEY MILL MACHINES:

Log Washer, ----------	57.65	.100	10.32
Classifier, ----------	58.12	.064	10.53
Tailings, ----------	18.63		

HEMMENS MILL MACHINES:

Log Washer, ----------	57.97	.054	10.17
Classifier, ----------	58.54	.038	10.21
Tailings, ----------	18.69		

The following is the concentrating data for the Canisteo Mine during the year 1939:

	Tons	Percentage of Total Mined	Iron Dried	Tonnage Recovery	Iron Unit Recovery
Material removed in mining operations (exclusive of surface),	386,279	100.00	43.14		
Less lean ore stocked in mining,	-	-	-		
	386,279	100.00	43.14		
Less pit rock wasted,	14,302	3.70	23.48		
Total transported to mill,	371,977	96.30	43.90		
Less rock rejects (crusher house)	18,249	4.72	30.33		
Crude ore entering mill,	353,728	91.58	44.60		
Concentrates produced,	218,514	56.57	58.21	61.77%	80.63%
Rock rejects on mill picking belt,	2,750	.71	33.18		
Tailings, (by deduction)	132,464	34.29	22.37		
Total rock and lean ore from above,	32,551	8.43	27.32		

HOLMAN-CLIFFS MINE
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1. GENERAL:

The customary watchmen's services were provided at the mine and washing plant throughout the year. Due to the fact that there was some winter activity at the Canisteo and Hill-Trumbull Mines, it was not necessary to split the time of the watchmen at this property and they were employed on a full monthly basis during the year 1939.

There were no brush fires of consequence during the year and no irregularities of moment were reported by the watchmen.

In anticipation of resuming ore mining activities at the property during the season of 1940, several estimates of expenditures were made covering preparatory work that should have been undertaken during 1939. The programs approved and a description of the progress made under each during 1939 follows:

E&A No. 822 - (Reconditioning Tracks):

Orders were placed for ties during July and deliveries started in August, over 8,000 oak ties being decked along the yard tracks by September 1st. The balance of the oak ties, 2,000 - and the bulk of the 10,000 green tamarack ties were delivered during the last three months of the year.

A crew of fifteen men started placing ties on the main lines leading from the pit to the washing plant, on October 20th, and this force was increased to sixty-seven by the end of the month.

The main line tracks were reconditioned by December 1st. Every other tie was replaced on the load and empty lines. Five ties were renewed at each of the joints. Oak ties only were used on the curves, while Oak and tamarack were alternated on the tangents. The coal dock tracks were also reconditioned with tamarack ties and three switch sets were placed. The necessary tamping was accomplished and the tracks brought to grade, ready for operations. During December, some work was done on the yard tracks.

The pit tracks will be put in condition during the spring, as weather conditions are favorable, and the water level in the pit has been lowered sufficiently.

The expenditures on the tracks during 1939, including the cost of the ties placed, amounted to $20,892.58 and this leaves an unexpended balance from the authorized estimate of $26,107.42. The amount of money remaining in this account should be adequate to complete the work contemplated.

HOLMAN-CLIFFS MINE
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YEAR 1939

1. GENERAL:
(Continued)

E&A No. 821 - (Revised Stripping):

Stripping operations were started November 27th, on the upper bench of the Brown No. 1 land, and the North Star area to the north of the No. 1 Brown pit. This ground had not been flooded.

The No. 32 electric 4-yard shovel was moved over from the Canisteo Mine and the three Hill-Trumbull Euclid trucks were transferred from that property. A "caterpillar" tractor was rented for road work, as well as to push out the dirt along the edge of the dump. Stripping operations were conducted on two 8-hour shifts, five days per week and the equipment was serviced on the third shift each day.

The program was completed on December 20th, the material handled amounting to 38,986 cubic yards of surface from the North Star and 7,784 cubic yards of lean rocky waste ore from the Brown No. 1.

The estimated cost for this operation amounted to $10,200.00 and after all charges had been made, the actual expense was $9,026.73. This figures $.193 per yard against an estimate of $.198 per yard, or a total saving of $1,173.27 from the authorized estimate.

There was a decrease in the yardage, as compared with the estimate, and this more than offset the cost of preliminary work incidental to starting the job, which included expense in connection with a transmission line extension, fitting out a truck-servicing shop and grading and preparing a roadway from the mine shops to the stripping job. The work was somewhat slow and rather hazardous, due to slides from the extremely high bank and to numerous underground drifts made by former operations. It was necessary to stop and fill these dfifts as the shovel encountered them.

E&A No. 824-A - (Pumping):

The work on the pumphouse, pumps, electric starting apparatus, transmission line changes and controlls, was completed and actual pumping operations got underway November 27th. The water in the pit was lowered 12'2" by the end of the year.

Due to the fact that stripping operations were to be carried on with an electric shovel, it was found more economical to enter into a year's contract with the Minnesota Power & Light Company, with a provision for adjustment for enlarged activities, rather than to obtain a short-term contract for the few weeks of winter work. One 7000-gallon pump was therefore operated 24 hours per day - seven days per week, excepting on occasions when shut-downs were necessary for pipe extensions.

The expenditures to January 1st, amounted to $6,826.49, which leaves an unexpended balance in this account of $7,173.51. Future

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1. GENERAL:
(Continued)

pumping operations will be influenced by the decision as to whether the Holman pit water is to be lowered to the bottom, or held at a stage sufficient to allow for the mining of the Brown No. 1- North Star ores with our steam equipment. If mining operations are not to be carried to the bottom of the Holman pit, a small pump will be installed to hold the water approximately 20 feet below the approach track, leading from the Holman in to the Brown No. 1 pit, but, should we elect to conduct mining operations in the bottom of the Holman pit, the 7,000-gallon pump will be continued in service and the enlarged pumping estimate will be in effect.

E&A No. 823 - (Structure Drilling):

In order to secure the necessary exploratory information for guidance in 1940 ore operations, structure drilling was started on the Brown No. 1 and North Star lands during November. Contractor Schultze put one drill in service in November and added a second machine December 19th.

Two holes - Nos. 30 and 31, were put down 79 feet and 80 feet, respectively, along the edge of the Brown No. 1 main ore channel. Neither of These holes showed any commercial ore. Holes Nos. 32, 33 and 34, at depths of 78-1/2 feet; 150-1/2 feet and 190 feet were drilled in ore of a satisfactory washing grade.

The deep ore channel was found to be slightly narrower than had been anticipated, but this was offset by the showing of a greater depth. A total of seventeen holes were to be put down, six of which were practically completed by the end of the year at a cost of $1,475.48 (contract billing). This leaves $5,509.52 to complete the work, according to the authorized estimate. The amount remaining in this fund should be adequate to complete the job.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 16 Cubic Feet per ton for Wash Ore.

A rock deduction of 10% was made generally and in estimating a part of the deposit, the deduction was increased to 20%, due to the exceptionally rocky condition of this ore.

No extensive exploratory work was undertaken at the Holman-Cliffs group of properties during the past year and there was, therefore, no occasion for making any re-estimates.

The tonnage listed below is on a concentrated basis and is figured on a 60% gross recovery:

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

Brown No. 1:		
Non-Bessemer Concentrates,	1,126,196	tons
Brown No. 2:		
Non-Bessemer Concentrates,	1,891,533	"
Holman:		
Non-Bessemer Concentrates,	2,798,873	"
TOTAL HOLMAN-BROWN,	5,816,602	"
North Star:		
Non-Bessemer Direct,	80,103	"
Non-Bessemer Concentrates,	101,891	"
Bessemer Concentrates,	538,083	"
TOTAL NORTH STAR,	720,077	"
Bingham Mine:		
Bessemer Direct,	269,664	"
Non-Bessemer Direct,	329,590	"
Bessemer Concentrates,	1,198,361	"
Non-Bessemer Concentrates,	590,238	"
TOTAL BINGHAM,	2,387,853	"
TOTAL BINGHAM-NORTH STAR,	3,107,930	"
GRAND TOTAL HOLMAN-CLIFFS MINE,	8,924,532	"

b. Prospective Ore:

Additional drilling in the southerly and southeasterly portions of the Holman forty is quite likely to result in proving up additional deep ore of treatable character. The possibilities of additional ore in the Brown-North Star or Binghan lands is rather remote, as the ore bodies in these properties have been pretty well outlined.

6. SURFACE:

a. Buildings, repairs:

The annual joint inspection of the Oliver Iron Mining Company's houses in Taconite was made on May 24th and the repair program for the year was decided upon.

Two painters were employed during the first four months of the year in redecorating the interior of those houses which were found to be in the worst state of repair.

HOLMAN-CLIFFS MINE
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6. SURFACE
(Continued)

a. Buildings, repairs: (Continued)

The office building was repaired and redecorated during June and July, two painters being engaged here constantly. The repair job included the refinishing of the floors and the renewing of wiring and electric fixtures.

A force of from two to three carpenters were employed from June to October, replacing four roofs, providing four new foundations and generally overhauling windows and doors.

The following statement shows the houses by number; the occupants, together with the nature and cost of repairs undertaken in each case: Rather extensive repairs to the office are also shown:

House No.	Name of Occupant:	Repair work done	Cost
12	Malkolm Olson,	Repairs to toilet,	$ 1.48
13	Frank Deaton,	Electric wiring;plastering; interior painting; exterior painting; foundation; windows;steps;skirting; cellar cribbing, new screens,	639.41
14	Geo. Dunstan, Sr.	Windows and doors; interior painting,	90.65
15	Thomas Wivell,	Floors, doors, windows, interior painting; electric wiring; plastering,	366.25
16	William LeClair,	Plastering; windows; interior painting,	111.90
17	Allen Shegrud,	Windows,	.89
37	William Wirtanen,	Plumbing; water line; interior painting; window repairs;chimney repairs,	149.42
40	T. J. O'Brien,	Plastering; removing chimney; electric wiring; plumbing; interior woodwork,	292.73
41	Mrs. A. L. Sundquist,	Plastering; floors,	86.27
42	Mike Shipka,	Windows; plastering; interior painting; chimney repairs,	162.02
44	B. P. Axford,	Interior painting,	114.45
45	Edwin Gustason,	Foundation; footings; chimney repairs,	392.98

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6. SURFACE: (Continued)

a. Buildings, repairs: (Continued)

House No.	Name of Occupant:	Repair work done:	Cost
46	Russell Wivell,	Interior painting,	$ 52.59
48	William Hanson,	Plumbing,	3.81
50	Linas Berg,	New storm windows; chimney repairs,	35.28
53	Claude Winkleblack,	Interior painting,	155.77
56	Grant Hess,	New window plastering,	39.53
60	W. F. LeClair,	Electric wiring; plumbing,	1.62
62	Joseph Dolezel,	Interior painting;plumbing,	184.69
63	Matt Dosser,	Interior painting;	57.78
64	Vincent Soleture,	Interior painting;door repairs,	71.27
65	Edwin Johnson,	Interior painting; new cellarway door,	122.25
69	Arnold Lawson,	Foundation, doors, windows, new sink cabinet, etc. Exterior painting,	258.75
70	Ambrose Hoey,	Room partitions,	14.69
72	Frank Dionne,	Door repairs; electric wiring; interior painting; plumbing,	123.59
74	William Laine,	Door repairs;toilet repairs,	5.93
78	Lucien Decoster,	New roof, complete,	110.33
81	Lloyd Wetherell,	Interior painting,	139.17
97	William Saw,	Interior painting,	193.60
101	Loy Kolar,	Plumbing, water line,	27.97
102	Myron Youngberg,	Plumbing, water line,	27.98
105	Dennis Chamberlain,	Repairs to doors; interior painting,	130.22
106	William Ryser,	Interior painting,	137.33
107	George Whittington,	Repairs to doors; plumbing repairs,	11.52
116	Carl Eggebraaten,	Plumbing, new water line,	80.32
157	J. W. Mattson,	Interior painting, bathroom and hall,	23.30
158	W. S. McComber,	Interior painting,	77.85
4	Charles Flynn,	Electric wiring; repairs to windows, stairway (outside) new, interior painting; repairs to chimney,	224.04
5	Harry Hart,	New roof; plumbing repairs; water and new sewer; new stairway, outside; chimney repairs,	298.37
7	Sam Kirkes,	New shed roof,	25.16
10	Harley Point,	Interior painting; stairs, exterior painting,	22.70

HOLMAN-CLIFFS MINE
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6. SURFACE:
(Continued)

a. Buildings, repairs: (Continued)

House No.	Name of Occupant	Repair work done:	Cost
38	Martin Fleisher,	Plastering; interior painting; window repairs; plumbing,	$ 191.13
		Proportion Vacation Pay Roll - 1939,	89.23
		TOTAL COST OF REPAIR WORK FOR YEAR 1939,	$5,346.22
Mine Office:		Plastering; electric wiring complete and new fixtures; exterior painting; interior painting; plumbing; sewer and water; roof, repairs and new over warehouse; taking down smoke stack; new chimney; heating plant repairs; repairs to siding; floors, doors, windows, woodwork; new steps to basement, door to basement; new floor, main office room; sanding floors; cleaning up - ceiling warehouse and shelving,	
		TOTAL COST OF REPAIR WORK FOR YEAR 1939,	$ 2,511.42

The following statement shows the rent collections made from the occupants of the Taconite Houses for the year 1939:

		CANISTEO PAYROLL			GENERAL ROLL:			
MONTH	HOLMAN-CLIFFS	MESABA-CLIFFS	C.C.I.CO. OPTG.AGT.	HILL-TRUMBULL PAYROLL	CLEVELAND CLIFFS	C.C.I.CO. OPTG.AGT.	CASH REMITTANCE	GRAND TOTAL
Jan.	$ 50.00	253.00	-	127.00	66.00	-	51.50	547.50
Feb.	50.00	110.50	-	112.50	66.00	-	63.50	402.50
Mar.	50.00	110.50	-	140.00	66.00	-	51.50	418.00
April,	50.00	165.50	-	168.50	66.00	-	71.50	521.50
May,	41.50	-	228.50	583.00	66.00	-	71.50	990.50
June,	41.50	-	251.50	563.00	66.00	-	51.50	973.50
July,	41.50	-	220.50	525.50	52.50	13.50	89.50	943.00
Aug.	41.50	-	214.50	462.00	52.50	13.50	41.50	825.50
Sept.	41.50	-	219.50	442.00	52.50	13.50	71.50	840.50
Oct.	46.50	-	184.50	361.00	52.50	13.50	51.50	709.50
Nov.	159.00	-	114.00	314.00	52.50	13.50	63.50	716.50
Dec.	154.00	-	114.00	324.00	52.50	13.50	51.50	709.50
TOTAL,	$767.00	639.50	1,547.00	4,122.50	711.00	81.00	730.00	8,598.00

HOLMAN-CLIFFS MINE
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YEAR 1939.

6. SURFACE:
(Continued)

a. Buildings, repairs: (Continued)

The total repair cost to the houses and mine buildings for 1939 amounted to $7,857.64; the taxes were $1,077.06 and the Insurance is estimated at $288.00. This would make a total of $9,222.70 and, deducting the revenue of $8,598.00, would show an expenditure of $624.70 in excess of revenue. Adding the $2,000.00 rental charge of the Oliver Iron Mining Company, would show a total cost of $2,624.70, in excess of revenue.

10. TAXES:

The following statement shows the taxes and average rate for the Holman-Brown, Bingham and North Star Mines, together with the Holman-Cliffs auxiliary lands; Bingham-North Star washing plant lands; Holman-Brown lands; Holman-Cliffs shops and Holman-Cliffs personal property for the years 1938 and 1939:

	1939	1938	Increase	Decrease
Holman-Brown Mine,	$ 41,773.29	42,527.88		754.59
Bingham Mine,	16,403.03	16,699.33		296.30
North Star Mine,	8,734.37	8,892.13		157.76
Holman-Cliffs Aux.Lands,	1,943.66	1,977.20		33.54
Bingham-North Star Washing Plant Lands,	45.03	45.81		.78
Holman-Brown Lands,	22.98	23.38		.40
Holman-Cliffs Shops and Office,	232.39	236.63		4.24
Holman-Cliffs Personal Property,	508.70	549.50		40.80
TOTAL, ----------	$ 69,663.45	70,951.86		1,288.41
Rented Buildings,	837.13	852.24		15.11
GRAND TOTAL, -------	$ 70,500.58	71,804.10		1,303.52
Average Tax Rate,	.09090	.09254		.00164

HILL-TRUMBULL MINE
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1. GENERAL:

Repair work in the shops and at the washing plant was resumed January 4th, following the holiday layoff. In order to furnish employment to the maximum number of men, the repair crews were staggered and each man obtained at least two shifts work per week. For the most part all foremen were engaged full time, viz: five days each week.

The locomotives were generally overhauled during the first four months of the year, including such replacements as were necessary. The 30-yard air-dump cars were repaired and put in shape for service by May 1st. A number of worn wheels were replaced.

The 350 Marion steam shovel was overhauled, worn parts being taken to the shop for repairs, while the engines, dipper sticks, loose rivets and steam lines were repaired in the pit. The new crawler equipment was installed under this machine during the latter part of March and the fore part of April.

Besides the work of reconditioning the washing plant machinery, renewing worn wearing plates, chutes and launders, the old 20" pipe line from the former pumphouse site to the plant was taken up and most of it salvaged. The new 16" pipe line from the pressure pumps to the plant was installed, as well as the discharge line to the new tailings basin.

A track crew started work on April 17th. The main lines were put in shape, which included straightening rails, ballasting and tamping. This work was completed before operations were begun on May 8th.

The 1939 mining program was inaugurated on May 8th and conducted to October 23rd. During the month of May, the mine was operated on a three shift basis, four days per week, but this schedule was stepped up to five days per week in June and continued on this basis for the balance of the season, the increased requirements making this procedure necessary.

The washing plant was operated 116 days, producing 782,726 tons of concentrates from the treatment of 1,354,716 tons of crude ore. A total of 236,947 tons of direct shipping ore was also produced during the year. The average output of concentrates per day was 6,745 and of direct shipping ore - 2,255 tons.

Fall stripping operations were started November 20th on a three shift, five days per week basis, at the east end of the Hill pit. This program was continued to the end of the year and the yardage to be handled was practically all moved.

HILL-TRUMBULL MINE
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1. GENERAL:
(Continued)

Upon the completion of the ore season, the shop crew were employed in repairing pit and washing plant equipment, as well as maintaining the machinery in service on the stripping job.

A comprehensive structural drilling campaign was undertaken during 1939. Two outfits started work on May 3rd and continued operating three shifts - five days per week, until the end of the year. The northerly and easterly Hill areas were drilled, as well as that part of the Trumbull pit immediately east of the main approach. A total of 8,393 feet of structure drilling was accomplished.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Hill Crude,	196,199	tons.
Trumbull Crude,	1,158,517	"
TOTAL CRUDE ORE,	1,354,716	"
Hill Non-Bessemer Direct Shipping Ore,	234,036	"
Hill Bessemer Direct Shipping Ore,	2,911	"
Trumbull Non-Bessemer Direct Shipping Ore,	338	"
Hill Non-Bessemer Concentrates,	94,815	"
Hill Bessemer Concentrates,	30,017	"
Trumbull Non-Bessemer Concentrates,	485,689	"
Trumbull Bessemer Concentrates,	171,867	"
TOTAL PRODUCED,	1,019,673	"

b. Shipments:

The shipments from the Hill-Trumbull Mine during 1939, were as follows:

Hill Non-Bessemer Direct Shipping Ore,	234,036	tons.
Hill Bessemer Direct Shipping Ore,	2,911	"
Trumbull Non-Bessemer Direct Shipping Ore,	338	"
Hill Non-Bessemer Concentrates,	94,815	"
Hill Bessemer Concentrates,	30,017	"
Trumbull Non-Bessemer Concentrates,	453,934	"
Trumbull Bessemer Concentrates,	171,867	"
TOTAL SHIPMENTS,	987,918	"

c. Stockpile Inventories:

There were 70,731 tons of Trumbull Non-Bessemer Concentrates placed in stock during 1939, but 38,976 tons were shipped to dock before the end of the season, leaving a balance of 31,755 tons in stock, as of December 31st, 1939.

HILL-TRUMBULL MINE
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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

c. Stockpile Inventories: (Continued)

At the Canisteo Mine, The Mesaba-Cliffs Mining Company had a total of 222,687 tons (car tally) of Snyder Concentrates in stock. The shipments from this stockpile were as follows:

	Tons	Iron	Phos.	Sil.	Alu.	Mang.	Moist.	Fe. Nat.
Snyder N.B.Concs.	95,642	57.46	.057	11.02	.25	.40	6.973	53.45
Snyder Bess.Concs.	131,389	58.38	.039	10.51	.23	.41	6.733	54.45
Total,	227,031*	57.99	.046	10.72	.24	.41	6.834	54.03

* A total overrun of 4,344 tons developed in shipping the stockpile.

The following amount of lean material is now in stock:

Concentrating Material Above 25%:

	Tons	Iron	Phos.	Silica
Hill,	52,549	29.36	.037	52.66
Trumbull,	231,778	27.55	.031	55.13
Total,	284,327	27.88	.032	54.67

Non-Concentrating Material Above 35%:

	Tons	Iron	Phos.	Silica
Hill,	140,476	48.53	.081	21.86

Coarse Non-Concentrating Material Above 40%:

	Tons	Iron	Phos.	Silica
Hill,	7,527	33.23	.028	43.33

e. Production by Months:

(1) Crude Ore:

MONTH	HILL	TRUMBULL	TOTAL
May,	132,498	40,409	172,907
June,	33,829	217,376	251,205
July,	4,576	225,852	230,428
August,	11,296	260,980	272,276
September,	14,000	225,919	239,919
October,	-	187,981	187,981
TOTAL 1939,	196,199	1,158,517	1,354,716

HILL-TRUMBULL MINE
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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

e. Production by Months: (Continued)
(2) Concentrates & Direct Ore:

MONTH	HILL DIRECT	TRUMBULL DIRECT	HILL CONCTS.	TRUMBULL CONCTS.	GRAND TOTAL
May,	33,382	-	81,605	18,705	133,692
June,	52,364	-	23,787	121,855	198,006
July,	40,113	-	2,925	125,913	168,951
August,	61,961	338	7,928	144,209	214,436
September,	31,939	-	8,587	133,407	173,933
October,	17,188	-	-	113,467	130,655
TOTAL 1939,	236,947	338	124,832	657,556	1,019,673

f. Ore Statement:
Of the 1,019,673 tons produced during 1939, there is a total of 31,755 tons of Trumbull Non-Bessemer Concentrates remaining in stock-pile.

g. Delays:
The following delays were reported during the year 1939:

Date:	Time Lost Hours	Time Lost Minutes	Cause:
May 22nd,	1	-	Friction band broken on #28 shovel.
23rd,	2	-	Broken water main in washing plant pumphouse.
	1	30	Broken hoist cable on #34 shovel.
June 7th,	1		#34 Shovel broken down.
Aug. 10th,	3	17	Rock motor off track
11th,	2	35	Broken power cable feeding shovels.
Sept. 13th,	2	40	Shovel #34 broken down.
15th,	1	15	Bearing burned out on conveyor motor.
28th,	1		No electric power.
Nov. 21st,	3		Bearing burned out on generator set- electric shovel #34.
22nd,	2	30	Bearing burned out on generator set- electric shovel #34.
	1	30	Broken hoist cable
	1	55	Electrical trouble on shovel #34.
Total,	25	12	

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3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess.Direct,	234,036	60.07	.055	8.59	.11	.87	7.585	55.51
Hill Bessemer Direct,	2,911	61.68	.045	7.17	.11	.83	6.427	57.72
Trumbull Non-Bess.Direct,	338	52.80	.043	16.15	.12	.46	10.400	47.30
Hill Non-Bess.Concts.	94,815	60.06	.050	5.88	.13	.35	8.187	55.14
Hill Bessemer Concts.	30,017	59.73	.039	6.91	.14	.35	7.648	55.16
Trumbull Non-Bess.Concs.	485,689	58.95	.048	7.22	.14	.40	9.306	53.47
Trumbull Bess.Concts.	171,867	58.82	.038	7.53	.15	.41	9.274	53.36
Total,	1,019,673	59.32	.047	7.46	.13	.51	8.744	54.13

b. Mine Analysis of Shipments:

Hill Non-Bess.Direct,	234,036	60.07	.055	8.59	.11	.87	7.585	55.51
Hill Bess.Direct,	2,911	61.68	.045	7.17	.11	.83	6.427	57.72
Trumbull Non-Bess.Direct	338	52.80	.043	16.15	.12	.46	10.400	47.30
Hill-Non-Bess.Concs.	94,815	60.06	.050	5.88	.13	.35	8.187	55.14
Hill Bess. Concts.	30,017	59.73	.039	6.91	.14	.35	7.648	55.16
Trumbull Non-Bess.Concs.	453,934	58.90	.048	7.29	.14	.40	9.322	53.41
Trumbull Bess.Concs.	171,867	58.82	.038	7.53	.15	.41	9.274	53.36
Total,	987,918	59.31	.047	7.50	.13	.51	8.734	54.13

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Hill Crude,	196,199	42.71	.042	32.93
Trumbull Crude,	1,158,517	38.73	.034	38.90
TOTAL 1939,	1,354,716	39.31	.035	38.04

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Hill Non-Bess. Direct,	60.20	.054	8.25	.12	.94	.18	.12	.012	4.15
Hill Bess.Direct,	61.60	.045	7.15	.12	.82	.18	.12	.011	3.30
Trumbull Non-Bess.Direct,	52.80	.043	16.15	.12	.46	.20	.14	.010	7.30
Hill Non-Bess. Concts.	60.00	.049	5.94	.13	.38	.18	.12	.008	7.30
Hill Bess.Concs.	59.80	.040	6.90	.14	.34	.16	.14	.007	6.70
Trumbull Non-Bess.Concs.	58.81	.050	7.36	.13	.44	.16	.12	.008	7.57
Trumbull Bess Concs.	58.81	.040	7.47	.15	.40	.14	.12	.009	7.52

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Hill Mine:

Assumption: 13 Cu. Ft. Per Ton for Direct Ore.
17 Cu. Ft. Per Ton for Wash Ore.

A rock deduction of 10% was made in the case of the Direct ore, as well as Wash Ore, and 35% for the Rocky Wash. Concentrates are figured all the way from 50% to 65%, depending on the character of the ore.

The following tabulation shows the estimate of January 1st, 1939, the amount mined during 1939 and the ore reserve estimated as of January 1st, 1940:

Hill Mine:	Jan. 1st 1939	Mined 1939	Jan. 1st 1940
SE¼-NE¼ - Sec. 17,	-	353,192	1,655,059
SW¼-NE¼ - Sec. 17,	-	-	773,808
SE¼-NW¼ - Sec. 17,	-	8,587	371,551
Total Hill,	2,279,927	361,779	2,800,418

Trumbull Mine:

Assumption:

	Rock Deduction	Cu. Ft. Per Ton	Recovery
Merchantable Ore,	10%	13	-
Wash Ore,	10%	14	50%
Lean Wash,	10%	14	50%
Low Grade Wash,	10%	15	60%
Lean Low Grade Wash,	10%	15	50%
Rocky Wash,	20%	14	62%

	Jan. 1st 1939	Mined 1939	Jan. 1st 1940
NE¼-SW¼ - Sec. 17,	2,247,758	425,818	1,785,858
NW¼-SW¼ - Sec. 17,	1,460,910	232,076	1,228,834
Total Trumbull,	3,708,668	657,894	3,014,692
GRAND TOTAL, HILL-TRUMBULL,	5,988,595	1,019,673	5,815,110

A comprehensive drilling program was carried on during 1939. These operations were confined to the north side of the Hill pit, the southeast corner of the Hill and the Trumbull deposit immediately east of the main approach. The result of this drilling, combined with data secured in connection with mining operations, have been the basis for some changes in the ore estimates.

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

At the Hill Mine, the drilling along the north part of the property and in the southeast corner has resulted in a net increase of 882,300 tons. Due to the development of rock horses in the so-called Hill direct ore area, the tonnage of direct ore was substantially reduced, but the increase in wash ore concentrates more than offset the reduction in the southeast corner deposit and the development of the ore along the north side of the pit added to the increase. No exploratory work of moment has been undertaken in the Hill pit for some considerable time, although a substantial tonnage of ore was mined therefrom and the new estimate on this property, therefore, shows a substantial change from the previous year.

As regards the Trumbull ore reserve, no exploratory work was undertaken on the west forty, but drilling in the east forty, combined with mining and concentrating results obtained during the past season, have resulted in decreasing the estimated tonnage in this description by 36,100 tons. While the tonnage of crude ore was increased somewhat in this description, we found that the weight recovery secured during 1939 was such that it is necessary to apply a factor of 50% recovery in the ore remaining, instead of the 62%, which had previously been set up for this deposit.

b. Prospective Ore:

It is the present plan to conduct exploratory operations in the bottom of the Hill pit during 1940, to determine definitely the mineable areas, as well as to ascertain more definite knowledge with respect to the so-called re-treat ores. No doubt this exploratory work will increase the reserve tonnage to some extent in this area.

Future drilling of the triangular area to the southwest of the Trumbull deposit, immediately east of the main approach should add a fairly substantial tonnage to the reserves of this property. This work will be deferred for at least one, and possibly two years, as the information will not be pertinent until we are ready to go ahead with the stripping and mining of the area in question.

The land to the north of the Hill pit holds possibilities for the development of an additional tonnage of wash ore. This is indicated by test-pits put down along the pit limits in 1925 and also by a few old scattered drill holes. Up to the present time it has been deemed inadvisable to do any drilling in this north area on account of the tax situation. The time is approaching, however, when a drilling campaign here should be considered, so that any ore developed might be mined and treated in connection with the product from other sections of the property.

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4. ESTIMATE OF ORE RESERVES: (Continued)

c. Estimated Analysis:

Lease	Grade	Tons	Iron	Phos.	Silica
Hill:	Bessemer Direct,	79,865	59.02	.032	10.83
	Non-Bessemer Direct,	830,879	59.45	.060	8.88
	Bess. Concts.	982,243	61.10	.028	10.03
	Non-Bessemer Concts.	907,431	60.42	.049	7.75
Trumbull:	Bessemer Direct,	62,252	56.61	.035	9.85
	Non-Bessemer Direct,	111,650	57.70	.054	8.66
	Bess. Concts.	735,904	58.30	.037	8.06
	Non-Bess. Concts.	2,104,886	59.19	.050	6.96
Total Bessemer Direct,		142,117	57.96	.033	10.40
Total Non-Bessemer Direct,		942,529	59.24	.059	8.85
Total Bessemer Concentrates,		1,718,147	59.90	.032	9.19
Total Non-Bessemer Concentrates,		3,012,317	59.56	.050	7.20
Total Bessemer,		1,860,264	59.75	.032	9.28
Total Non-Bessemer,		3,954,846	59.48	.052	7.59
GRAND TOTAL, HILL-TRUMBULL MINE,		5,815,110	59.57	.046	8.13

It is to be noted that the Bessemer Direct Shipping and Bessemer Concentrates in the Hill Mine are very low in Phosphorous, and unquestionably some of the so-called Non-Bessemer Concentrates can be mixed in and shipped as a Bessemer grade. From a practical mining standpoint, it would be impossible to mine all of the Non-Bessemer Concentrates in such a manner as to mix them in with the low Phosphorous Bessemer material. The drilling work along the north side of the Hill pit disclosed a considerable tonnage of ore which would yield concentrates approximating .020 in Phosphorous. This explains the very low Phosphorous content in the Bessemer Concentrates shown in the tabulation.

The Phosphorous content of the Bessemer Direct and Concentrates shown for the Trumbull property are such that some of the so-called Non-Bessemer ore might be worked in to advantage, provided mining operations can be conducted economically to this end.

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5. LABOR & WAGES:

a. Comments:

(1) Labor:

No labor disturbances were in evidence during the past year and there was at all times sufficient skilled and common labor available for the Hill-Trumbull operations.

b. Comparative Statement of Wages & Product:

PRODUCT,	1,019,673 Tons
Number of Shifts and Hours,	3 - 8-Hour
Average Number of Men Working,	158
Average Wages Per Day,	$ 6.44
Product Per Man Per Day,	42.35
Labor Cost Per Ton,	$ .152
Total Number of Days,	121
Amount Paid for Labor,	$ 155,069.88

6. SURFACE:

a. Buildings, Repairs:

Only the necessary minor repairs were made to the mine buildings and Company dwellings at the Hill-Trumbull Mine during 1939.

c. Tracks, Roads, Transmission Lines, etc:

The usual maintenance work was carried forward during the past year.

7. OPEN PIT:

a. Stripping:

Stripping operations at the Hill-Trumbull Mine were started November 20th, on a three shift, five days per week basis. A 4-yard electric shovel, serviced by three trains of four cars each, constituted the equipment in use.

The job was confined to the so-called direct ore area at the southeast corner of the Hill pit. Surface, lean waste ore material, paint-rock and cretaceous ore made up the yardage handled.

The following tabulation gives the yardage of the various materials removed between November 20th and the end of the year:

	CUBIC YARDS
Surface,	30,142
Cretaceous Lean,	36,084
Sand and Ore, Lean	10,122
Paint Rock - Waste,	21,110
Sand and Ore - Waste,	82,293
Wash Ore Dumped in Pit,	344
Total,	180,095

The cretaceous ore was placed on the stockpile provided for this purpose.

The operation consisted of numerous short cuts in a rather restricted area and this added to the amount of track work necessary and affected the costs adversely. The stripping will be completed on January 3rd.

During the progress of this work, several pot holes of lean waste ore were developed. This material extended down in to the wash ore to such

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)
an extent that it could not be removed to advantage in connection with the stripping job and it was, therefore, left in place and will be removed in connection with mining operations during the ore season of 1940.

The stripping estimate as authorized, called for the handling of 192,000 cubic yards of material at a cost of $.310 per yard. The 180,095 cubic yards moved on this job has cost $.267 per yard. The small clean-up yardage yet to be handled will affect the average cost per yard very slightly and the $11,395.36 unexpended balance in this account, as of January 1st, will be ample to complete the job and show a very substantial saving.

d. Timbering:

	PIECES	AMOUNT
Standard Tamarack Ties,	2,257	$ 2,257.00
Dry Tamarack Ties,	1,695	679.00
Cribbing, Tamarack,	619	567.60

f. Explosives, Drilling & Blasting:

	POUNDS	AMOUNT
No. 4 Bag Powder,	64,700	$ 7,528.00
25% Gel. 3 x 10,	33,250	3,289.51
60% Gel. 5 x 16,	6,550	798.00
60% Spec. Gel. 1-1/8" x 8",	3,000	360.00
Total,	107,500	11,975.00
No. 6 Blasting Caps,	1,000	12.20
8-ft. Electric Exploders,	1,100	52.90
30-ft. Electric Exploders,	925	117.03
40-ft. Electric Exploders,	40	7.06
Clover Fuse,	1,900'	11.40

g. Open Pit Mining and Loading;
The 1939 ore season was started May 8th, on a 3 shift, four days per week basis. This was stepped up to five days per week, beginning the first of June. The season's requirements were secured by October 11th, in the amount of 950,000 tons (bill-of-lading weights), but, due to the fact that no decision had been reached in regard to the fall stripping, ore operations were continued to October 23rd and the output for the year was 1,019,673 tons. The original schedule of 800,000 tons was increased twice during the season.

Mining activities were carried on in three distinct parts of the pit during 1939. First, the so-called direct ore area at the southeast corner of the Hill pit; second, that part of the Trumbull pit immediately east of the main approach and - third, the westerly Trumbull property lying to the west of the main approach.

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)

Operations at the east end of the Hill pit consisted in mining out the layers of wash material and direct shipping ore, the former being obtained during the early part of the season. Horses of rock were encountered in several places in connection with direct ore operations, cuts being taken around the rock and this added to the track work, complicated the haulage, as well as mining operations. While the ore from this area was a very good grade, and, for the most part, could be used as a sweetener, the gouging nature of the work added considerably to the cost. The 1939 development in this area demonstrated the economy of introducing truck haulage for future operations. During 1940 it will still be advisable to continue our present system of steam haulage and mine the southeast corner of ore down to the elevation established during 1939, but thereafter, due to the presence of the extensive rock horses, the mining can be accomplished to advantage by introducing motorized equipment and plans should be made to this end.

A total of 236,947 tons of direct ore and 124,832 tons of concentrates were produced from this area during 1939.

The Trumbull deposit to the east of the main approach was attacked quite continually during 1939. The 350-ton Marion steam shove, which was equipped with crawler mechanism in the spring, performed in a most satisfactory manner.

The area, which had been stripped during 1938, was mined down to the elevation of the pit, immediately to the north. The deposit mined averaged about 45 feet in thickness and the bulk of it was loaded into cars, 45 feet above the shovel cuts. The trains were hauled directly out on to the approach track, thus saving a long movement to the switchback at the east end of the Hill pit. This haul saving amounted to more than one mile. The large shove, equipped with its long boom, made this possible.

The ore mined from this area furnished a satisfactory concentrate, but the weight recovery was quite low, averaging only about 50%. The product secured here amounted to 425,818 tons of concentrates.

A stripping berm was left along the south rim of the area, as the ore extends beyond the present pit limits. An additional 40-ft. ore cut will be taken over the bottom of this deposit, as a part of the proposed operating program for next year.

The third area of mining activities in 1939 was the high grade Trumbull wash ore deposit to the west of the approach. One 4-yard electric shovel was engaged here intermittently during the season, as grading conditions necessitated. East-West cuts were taken across the deposit from the central part of the area to the south boundary. Several ore cuts were also taken to the northeast, following along the west side of the approach. The ore encountered at the west end of the cuts was of rather low grade and some lean material was also encountered in the

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)
cuts along the approach bench. The bulk of the wash material produced, however, was of high grade and yielded a concentrate suitable for sweetening.

The northerly and westerly limits of the re-treat ore was outlined and future wash ore operations in this part of the pit will be confined to a triangular-shaped deposit in the southeast part of the area. The wash ore here goes to considerable depth and will present a mining problem. The present plan is to mine out the deep ore in connection with the approach track pillar and utilize truck haulage and belt conveying to lift the ore from the pit. This operation will necessarily be the last mining activity undertaken at this property.

During 1940, a 30 foot cut can be taken from the triangular area and additional mining activities in the West Trumbull pit should be confined to the re-treat ore, previously referred to as jig ore.

The output from the West Trumbull pit during 1939 yielded 232,076 tons of concentrates.

8. COST OF OPERATION:

a. Comparative Mining Costs:

	1939 BUDGET	1939 COST PER TON	1937 COST PER TON
PRODUCT:			
Direct Shipping Ore, Tons		237,286	201,982
Concentrates, Tons		782,387	606,143
Total Production,		1,019,673	808,125
Average Daily Product, Tons,		13,157	5,772
Tons Per Man Per Day, (Shift)		42.33	31.29
Days Operated,		121	140
COST:			
Open Pit Direct Shipping Ore,	$ .138	$.076	$.141
Open Pit Wash Ore,	.197	.133	.167
General Pit Expense,	.020	.024	.037
Concentrating,	.138	.136	.148
Stocking Concentrates,	.020	.003	.002
General Mine Expense,	.084	.062	.080
Idle and Winter Expense,	.069	.059	.098
Cost of Production,	$ .459	$ .372	$.488

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8. COST OF OPERATION: (Continued)

a. Comparative Mining Costs: (Continued)

	1939 BUDGET	1939 COST PER TON	1937 COST PER TON
Cost of Production, forward	$ .459	$ .372	$ .488
Depreciation, Plant & Equipment,	.200	.200	.200
Amortization, Stripping,	.250	.250	.250
Taxes - Ad Valorem,	.105	.103	.115
Taxes - Occupational,	.165	.144	.156
Taxes - Royalty,	.095	.037	.073
Total Cost at Mine,	.815	.934	.794
Administrative Expense,	.100	.100	.100
Miscellaneous Expense & Income,	.000	.003	.005
GRAND TOTAL,	$ 1.374	$ 1.209	$ 1.397

The final cost sheet figures have not been furnished by the Cleveland office and there may be some small adjustments to the above tabulation, but the cost per ton would only be affected to a slight extent.

The Hill-Trumbull property was not operated during the year 1938, consequently, for comparative purposes, the budget estimate, 1939 and 1937 costs have been shown.

d. Detailed Cost Comparison:

(1) Product:

While the budget estimate was set up for a 1,000,000-ton production, we actually operated during the fore part of the season on an 800,000-ton schedule. The boat situation was such, however, that operations were forced and when the bump-up in requirements was made, our tonnage forwarded from the property was on a higher schedule. There was a second increase in tonnage and operations were conducted for an additional week at the end of the season, as no decision had been reached as to the stripping work and it was considered advisable to mine and stock ore in order to furnish employment to our organization. The output for 1939 consisted of 1,109,673 tons, made up of 237,286 tons of direct ore and 782,387 tons of concentrates. This production compares with a budget figure of 1,010,010 tons and a 1937 output of 808,125 tons.

Owing to the fact that the Hill-Trumbull operations were forced from the opening of the season, the areas mined were comparatively favorable and weather conditions were ideal throughout the season, the costs secured were the lowest that the Mesaba-Cliffs Company have ever obtained at this property. The cost of production was $.087 per ton under the budget and $.116 below that for 1937.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining:

The cost of producing direct ore in 1939 was $.062 per ton below the budget and $.065 below that for 1937. All items under this caption, with the exception of maintenance, was much below our expectations at the time of preparing the budget.

One of the 4-yard electric shovels was utilized in the direct ore area during the first two months of the season. During 1937, a 2-yard machine was used here and it was found rather light for capacity output. The larger machine was able to dig the direct ore in this area, as well as the wash material, with the minimum of drilling and blasting. From July to the end of the season, the 2-yard machine was used here in 1939, but the work had been carried along to such a point that this machine could secure the direct ore requirements to advantage. The cost per ton for Drilling and Blasting was $.017 per ton under the budget, as well as the 1937 cost. One drill operated here during the latter part of the season, but a considerable amount of the tonnage was secured without the necessity of any blasting. This was not anticipated when the budget was prepared.

Power Shovel Operating was $.010 under the budget and the 1937 cost. This is explained partly by the utilization of the larger machine here during the fore part of the season, longer cuts being afforded and practically no operating delays. The Locomotives and Cars Operating also showed a substantial reduction in cost per ton, as compared with the budget and 1937 results, being in each instance $.012 under. The direct ore operations were conducted on but one shift and preparations made so that a very satisfactory tonnage was secured here during the season and the amount of equipment in use was kept at a minimum. The largest decrease in the direct ore costs was the track expense, which amountsd to $.023 per ton under the budget. This is explained by the fact that the tracks leading in to the direct ore area were new in 1937 and required practically no attention during the past year. Further than this the average length of the cuts was considerably greater than had been anticipated and the comparatively small track crew engaged during 1939 were shifted from one area to another, as occasion required. The number of track men was decidedly reduced, as compared with 1937, or our budget anticipations.

The wash ore operations were also most favorable during 1939 and the cost per ton of concentrates was $.064 under the budget and $.034 below the 1937. Again, the item of Drilling and Blasting showed a very decided reduction from the estimate, amounting to $.017 per ton. The concentrates secured in connection with the direct ore operation required practically no blasting and the 350-ton steam shovel was able to dig the 45-foot bank to the east of the approach with less than half of the blasting that we had anticipated.

Power Shovels Operating showed a reduction of $.015 from the budget. There were no delays of consequence during the season and the crews were shifted from one operation to another, as grading re-

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

quired and the output per shift was kept at a maximum at all times.

The track expense also showed a very large reduction in this instance, being $.024 per ton below the budget and the 1937 cost. All the tracks in the pit were new in 1937 and the upkeep was comparatively light during 1939 and the comparatively small crew of track men was moved from operation to operation, to advantage. The very favorable weather conditions prevailing also had an effect on this cost, as the tracks stood up very much better than we had figured on;

(3) General Pit Expense:

All items under this caption were very close to the budget and the costs realized in 1937, with the exception of General Open Pit Expense and Structure Drilling. In the case of General Open Pit Expense, the cost per ton in 1939 was $.008 per ton under the estimate and $.010 below the 1937 cost. This was due to the fact that rather extensive repairs were made to buildings during 1937 and they were held to a minimum in 1939.

At the time of preparing the budget it was not anticipated that Structure Drilling expense would be charged directly to the ore production. This was later decided upon and there was a charge amounting to $.014 per ton here, whereas no allowance had been made for this in the budget. The General Pit Expense exceeded the budget by $.004 per ton, but was $.013 below the charge for 1937.

(4) Concentrating:

The cost per ton for 1937 was $.002 below the budget and $.012 under that for 1937. Most of the items were very close to the estimate, - Transportation to Mill being $.007 under, due to the average daily production exceeding our expectations. Most of the other items were slightly under the budget, with the exception of Dam and Spillway. The cost here exceeded the budget by $.009 per ton. This is explained by the fact that a new tailings basin dyke was provided in 1939 and it was necessary to let a contract for a cross-dyke to control the flow of tailings.

(5) General Mine Expenses:

There was a saving in the cost per ton under this caption of $.022, as compared with the budget and $.018 below that for 1937. The increased production from the Hill-Trumbull Mine partly explains this decrease; most of the items were very close to the budget, with the exception of Analysis and Grading and District Office. In the case of Analysis and Grading it was not necessary to do as much sampling in the pit as had been anticipated, the saving over the budget here amounting to $.008 per ton and for the District Office, the operation of the Canisteo Mine was not anticipated and the lower cost per ton, in the amount of $.009, was the result of allocating a part of the District Office expense to the Canisteo Mine.

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9. EXPLORATIONS:

A rather comprehensive drilling campaign was undertaken at the Hill-Trumbull Mine during the year 1939. Three areas were drilled, first - along the north side of the Hill pit, 53 holes were put down, showing a total of 2,395 feet; at the southeast corner of the Hill pit - 33 holes were drilled, the footage being 2,652 and in the Trumbull area immediately east of the main approach tracks - 26 holes were drilled, with a total footage of 3,346 feet. The total drilling for the year amounted to 8,393 feet and covered a program sufficient to govern mining operations and grading for the year 1940.

During the year 1940, the bottom of the Hill pit should be explored by drilling, to ascertain the economic manner of mining activities in this area.

10. TAXES:

The following statement shows the taxes and average rate at the Hill-Trumbull Mine for the years 1939 and 1938:

	1939	1938	Increase	Decrease
Hill Mine, ----------	$41,595.53	42,009.52		$ 413.99
Trumbull Mine, -------	56,793.22	57,358.49		565.27
Hill-Trumbull Shops,--	824.71	832.92		8.21
Hill-Trumbull W.P.Lands	3,045.22	2,968.12	77.10	
Personal Property, ---	2,344.94	2,529.41	-	184.47
TOTAL, ----------	$104,603.62	105,698.46	-	1,094.84
Village Lots, --------	493.92	498.88	-	4.96
GRAND TOTAL, --------	$105,097.54	106,197.34		1,099.80
Average Tax Rate, ----	.08596	.08673		.00077

The small decrease in the 1939 taxes, as compared with those of 1938, are due entirely to a change in tax rates applicable to this property. There was no mining conducted during the year 1938, so that if the rates of taxation had been the same there would have been no difference in the two years considered.

11. ACCIDENTS AND PERSONAL INJURY

There were four lost-time accidents at the Hill-Trumbull Mine during the year 1939, which are described as follows:

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: Andre Sasah DATE: June 11th, 1939.
CAUSE: Was cutting a switch point with a track chisel, when a piece of steel struck him in right eye.
NATURE: "Laceration of lower lid, and laceration of eyeball, with hermation of iris and hemoulage into interior chamber".
Operation performed and eye removed.
TIME LOST: Full Time paid June 11th; returned to work July 5th.
COMPENSATION: $494.91

NAME: Sima Simunovich DATE: August 15th.
CAUSE: On his way to work, he entered the pit on the west end on a path that leads down over the surface bank to first ore bench; thence over the other benches to floor of pit, where he worked as a switchtender. It was while traversing along the top ore bench that he stepped into a filled test pit and fell, injuring his knees.
NATURE: "Strain of left laterial knee ligaments and contusion of right knee".
TIME LOST: Full time paid August 15th; returned to work Sept. 5th.
COMPENSATION: $ 33.61

NAME: Nick Erkeneff DATE: (Not definitely known - about August 25th, 1939)
CAUSE: While coming out from under a dump car, which he was repairing, he bumped his head on the drawbar, following which he suffered severe headaches, dizziness and sleeplessness. He consulted the Doctor September 1st, who advised a week in bed. Not satisfied with this, he went to the Duluth Clinic, where he received the same advice. He stayed in Duluth under the care of the Clinic for two weeks.
NATURE: (Excerpt from doctor's report): "I consider it to be a concussion of slight degree, as his symptoms seem to indicate".
TIME LOST: Full time paid August 25th; returned to work Sept. 18th.
COMPENSATION: $ 23.33.

NAME: Barthold Castellano DATE: November 6th.
CAUSE: Two inch drill rods were being pulled out of a hole through opening in roof of drill house and lowering over side of drill house to the ground. Castellano was outside, making ready to guide rods to a laying position on the ground, when end of rod struck his left foot. The drill runner and helper not being in a position to see each other, the rod was lowered before Castellano was ready to receive it.
NATURE: "Complete transverse fracture of first meta tarsal bone of left foot".
TIME LOST: Full time paid November 6th; returned to work Nov. 27th.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

A new laboratory was constructed at the washing plant site and fully equipped to handle the major portion of analytical work for The Mesaba-Cliffs Company's operations.

A suitable change house was erected and equipped for the use of washing plant employees. A heating boiler was installed in connection with this building and a heat line extended to the laboratory. This facility was greatly needed and has been fully appreciated by the washing plant employees.

A ramp, which was utilized at the Canisteo Mine during the season of 1939, was shipped to the Hill-Trumbull and will be erected in the pit in connection with ore operations during 1940.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

Three 15-ton Euclid trucks were purchased for the Hill-Trumbull Mine during the fall of 1939. The machines were rented and sent to the Holman-Cliffs Mine for a stripping operation. They will be utilized at the Hill-Trumbull Mine in connection with mining out a pocket of ore along the north side of the Hill pit next season.

Locomotive and car equipment, which had been rented to the Canisteo Mine for 1938 operations, were returned to the Hill-Trumbull and put in service during 1939.

NATIONALITY OF EMPLOYEES:

NATIONALITY:	NO. OF MEN
English,	35
Jugo-Slav,	27
Swedish,	26
German,	25
Finnish,	30
Croatian,	19
Irish,	13
Norwegian,	11
French,	7
Italian,	6
Bulgarian,	4
Welch,	1
Bohemian,	1
Polish,	1
Swiss,	1
TOTAL,	207

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19. WASHING PLANT OPERATIONS:

Washing operations were started on May 8th and completed for the season on October 23rd. The working schedule was conducted on two 8-hour shifts, five days per week, during the month of May, but, beginning the first of June, and continuing to the end of the season, the program was three 8-hour shifts, five days per week.

Generally speaking, operations were quite satisfactory during 1939 and no serious delays developed.

The stacking equipment was put into service during the latter part of the season. The 2-yard electric shovel loaded out a part of the stocked ore before the season ended.

During the year 1939, 1,354,716 tons of wash ore were treated. The concentrates produced amounted to 782,387 tons. The rejects from the mill amounted to 20,937 tons, averaging 20.82% Iron.

The complete washing plant data for the year was as follows:

	TONNAGE	% IRON DRIED:	TONNAGE RECOVERY	IRON UNIT RECOVERY.
Crude Ore and Rock Mined,	1,376,351	39.05		
Less:Rock removed in Mining,	4,853	27.39		
Crude Ore Transported to Mill,	1,371,498	39.09		
Less: Rock Rejects in Crusher House,	16,782	21.44		
Crude Ore entering Mill,	1,354,716	39.31		
Concentrates Produced,	782,387	59.09	57.75%	86.81%
Rock Rejects on Mill Picking Belt,	4,155	18.34		
Tailings (by Deduction)	568,174	12.23		
Total Heads, as above,	1,354,716	39.31		

The analysis of the product from the various machines for 1939, were as follows:

	IRON	PHOS.	SILICA
Logs,	59.84	.046	6.03
Classifiers,	56.84	.039	11.12
Picking Belt Concentrates,	58.04	.046	8.64
Tailings,	16.46		

The analysis of the plant rejects for the year 1939 were as follows:

	TONS	IRON	PHOS.	SILICA
Hill,	951	25.00	.037	58.92
Trumbull,	19,986	20.62	.036	64.80
Total,	20,937	20.82	.036	64.53