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2. PRODUCTION, SHIPMENTS & INVENTORIES

g. Delays

There were six reported production delays during the year, compared with seven in 1939. None was particularly serious, the greatest amounting to only six hours. The list of delays follows:

Date	Time Lost	Cause	Loss of Product
January 17	6 Hrs.	Hoist Motor out of order	250 Tons
March 19	6 Hrs.	Motor Generator Set out of order	250 Tons
September 16	2 Hrs.	Undg. Loco. off track	85 Tons
October 31	2 Hrs.	Top Tram Car off track	85 Tons
December 17	2½ Hrs.	Broken Belt on Headframe Crusher	110 Tons
December 24	1½ Hrs.	Top Tram Car Motor out of order	65 Tons

3. ANALYSIS

a. Average Mine Analysis on Output

The output analysis for the year 1940 is somewhat changed from the previous year. The average iron for the Virgil grade was increased from 57.60 to 58.21, and the phos. from .375 to .394. Also, there was a substantial decrease in the sulphur from .080 to .073, and a decrease in the silica from 6.39 to 5.44. These improvements were the result of a small amount of necessary development work in lean and high sulphur areas.

Grade	Tons	Iron	Phos.	Silica	Sulphur
Virgil	143,360	58.21	.394	5.44	.073
Virgil Hi-Sulphur	367	55.41	.453	6.76	.200

b. Composite Analysis of Shipments

The average analysis of the 1940 shipments was slightly better than that for the previous year in that the iron was increased and the phos. and silica decreased. The sulphur content remaind practically the same. The following table is the complete analysis:

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss
Virgil	58.10	.380	5.75	.18	1.80	.60	.25	.076	7.02

The analysis of straight cargoes also reflects the increase in iron content and the decrease in phos. and silica.

	Iron	Phos.	Sil.
Virgil	58.03	.384	5.79

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3. ANALYSIS (Cont.)

c. High Sulphur Ore

This grade of ore was not mined during 1940 but it was necessary to hoist a very small tonnage in order to obtain complete extraction of the lower sulphur grade. Three hundred and sixty-seven tons of high sulphur ore were hoisted, a small amount of which was obtained in the necessary development work in preparation for the new No. 7 stope. The remainder of this tonnage was produced in No. 9 stope immediately following a bad fall of high sulphur material from the back which contaminated the ore lying in the bottom of the stope.

It is extremely fortunate that the development in the new stoping area above the 8th Level continued to show ore of a relatively low sulphur grade. The mining of these low sulphur reserves permits the inclusion of a considerable tonnage of the higher sulphur material which would otherwise be considered unmineable.

The exploratory development at the east end of the orebody above the 8th Level was continued throughout the early months of the year and results obtained were very disappointing. The ore in this locality was found to range from .100 to .300 in sulphur and therefore is not mineable by itself. It is hoped that a small tonnage of this material can be mined during 1941 and mixed with the low sulphur ores from the west end without seriously raising the average sulphur content.

d. Analysis of ore in Stock Dec. 31, 1940

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Virgil Dried	58.14	.358	5.85	.19	1.84	.58	.26	.084	6.86	
Virgil Nat.	53.05	.327	5.34	.17	1.68	.53	.24	.077	6.26	8.75
Hi-Sul. Dried	56.79	.490	7.41	.19	1.84	.60	.21	.231	7.15	
Hi-Sul. Nat.	52.81	.456	6.89	.18	1.71	.56	.20	.215	6.65	7.00

4. ESTIMATE OF ORE RESERVES

a. Developed ore

Estimate made Nov. 30, 1940 using a factor of 12 cu. ft. per ton.

Available Virgil Grade

	Northwest Orebody	Southwest Orebody	Total Tons
Between 4th and 6th Levels		78,864	78,864
Between 6th and 8th Levels	12,746	417,848	430,594
Gross Estimate	12,746	496,712	509,458
Less Dec. Production			14,200
Total Reserves as of Dec. 31			495,258
Less 10% for mining loss			49,526
Total			445,732
Less 10% for Rock			44,573
Total Developed Ore Dec. 31, 1940			401,159

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4. ESTIMATE OF ORE RESERVES (Cont.)

a. Developed ore (Cont.)

The estimated ore reserves as of December 31, 1940 are 401,159 tons as compared with 397,783 tons at the beginning of the year. This apparent increase of 3,376 tons is shown in spite of the year's production of 143,727 tons or an apparent development of 157,103 tons. A portion of this increase can be accounted for in the stope development above the 8th Level where considerable new information was obtained, resulting in an increase in the estimate. A large portion of the remainder can be explained by the fact that the bulk of the production from the east and middle stopes came as the result of caving from the upper Sub levels and did not effect the known outlined areas.

b. Estimated Ore Reserve Analysis

	Iron	Phos.	Sil.	Mang.	Alum.	Lime.	Mag.	Sul.	Loss	Moist.
Dried	57.50	.425	7.00	.16	1.64	.60	.30	.089	7.35	
Natural	51.75	.382	6.30	.15	1.48	.55	.26	.080	6.60	10.00

The estimated analysis of ore reserves is reported the same as for the previous year with one exception, the sulphur content. This estimated sulphur content has been reduced from .119 dried to .089 dried, or .080 natural. This change was made since more complete information in the mining areas has permitted the exclusion of most of the high sulphur ore from the estimate of mineable reserves. An attempt was made to estimate only those reserves which can, by mixing, produce a product comparable with the published guarantee of .079.

5. LABOR & WAGES

a. General

The average number of employees remained at 72, a figure which has been practically stationary since the re-opening in 1937. Late in the year it was necessary to employ several additional men in order to accomplish weekend repairs by a staggered crew without incurring overtime payments. This was occasioned by the advances in the working schedule from four to five days per week which was instituted November 16.

The four day per week schedule throughout the early months of the year was continued with the expectation of closing the mine during several of the summer months. The general increase in iron and steel activity permitted the continuation of this schedule and the increase in November.

Labor relations continued satisfactory with very little apparent activity among the C.I.O. employees at the property. The steady employment of four days per week throughout the year and the increase to five days had the effect of reducing the usual number of petty complaints. It was explained that the increase in the working schedule was due, not to a need for additional ore, but to the fact that the company wished to keep this property on a par with the other mines. As nearly as can be determined this fact is quite well appreciated by the men.

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5. LABOR & WAGES (Cont.)

a. General (Cont.)

There is still an over-abundance of labor in the Iron River district, both skilled and unskilled, although it is expected that operations at the new Sherwood will have the effect of reducing the supply of experienced miners.

b. Statement of Wages and Product.

	1940	1939
PRODUCT	143,727	112,371
NUMBER OF SHIFTS AND HOURS	2-8	1-8 & 2-8
Avg. No. of Men Working		
Surface	25	25
Underground	47	47
Total	72	72
Avg. Wages Per Day		
Surface	5.54	5.52
Underground	6.45	6.48
Total	6.14	6.15
Avg. Wages Per Mo. 14 Days		
Surface		78.93
Underground		92.14
Total		87.55
Avg. Wages Per Mo. 18 Days		
Surface	99.72	98.17
Underground	116.10	115.56
Total	110.41	109.52
Product Per Man Per Day		
Surface	25.549	21.991
Underground	13.244	11.541
Total	8.725	7.569
Labor Cost Per Ton		
Surface	.2168	.2513
Underground	.4873	.5612
Total	.7041	.8125
Avg. Product Breaking & Tramming	61.551	55.557
Avg. Wage Contract Miners	7.382	7.293

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5. LABOR & WAGES (Cont.)

b. Statement of Wages and Product (Cont.)

	1940	1939
Total No. of Days		
Surface	5,625½	5,109¾
Underground	10,852	9,736¼
Total	16,477½	14,846¼
Amount for Labor		
Surface	31,164.69	28,243.15
Underground	70,029.48	63,056.88
Total	101,194.17	91,300.03

Proportion Surface to Underground Men

1940	-	1	to	1.88
1939	-	1	to	1.88
1938	-	1	to	1.81
1937	-	1	to	1.92

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6. SURFACE

a. Buildings, Repairs

Aside from routine clean-up, painting and repairs, there was very little new work done on the surface during 1940. The interior of the engine house was painted and a new storage bin for stoker coal was built under the end of the coal dock. This bin was built to serve the new stoker which was installed in the dry house furnace about the middle of the year. The stoker was decided upon in an attempt to relieve some of the difficulties experienced with a hand-fired boiler of this size which serves the entire mine surface, and has proved very satisfactory.

The larry car top-tram system worked satisfactorily throughout the year and occasioned only two delays, neither of which exceeded two hours. The cars were used as side-dumpers along the east side of the main pile until after the shipping season when the new trestle was put into use. Trestle grades are now carried at 1½% instead of the usual ½ of 1% which increases considerably the capacity and is well within the power of the larry car motor.

b. Stockpiles

During the early months of the year all of the product was stocked along the east and west sides of the main pile, the new east trestle having been filled the previous year. The bulk of the east pile was loaded out early in the shipping season in time to permit the erection of a new trestle, on which the ore was stocked as soon as shipping was completed. It will be necessary to erect another new trestle in the central main area early in 1941, since the east pile will be filled very rapidly under the increased production schedule.

Whenever conditions permitted, car spotting for stockpile loading was done by gravity along the main pocket track and by the air tugger at the shaft. This economy effected a considerable saving since spotting engine charges are $7.50 an hour. On several occasions when it was not practical to do otherwise, the spotting engine was utilized.

The peculiar consistency of the ore at this property makes stockpile loading rather difficult, due to the tendency to hang up and suddenly slump from the crest. This condition was responsible, in part at least, for the fatal accident which occurred in September. This accident will be fully discussed in a subsequent portion of the report.

Once again, considerable trouble was experienced with fire in the High Sulphur rock-pile north of the shaft. Attempts to extinguish this fire by water and lime having failed, a small power shovel was hired and utilized to cut off the burning area from the main pile. The burning material was then spread out by means of a scraper and hoist and is now believed to have burned itself out. The small amount of underground rock which was handled during the latter part of the year was done by means of a pocket which was constructed under the rock-pile. The rock was drawn from this pocket and transported by the mine truck and spread in thin layers. This should prevent further trouble from fire.

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7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking during 1940 and none contemplated for the future.

b. Development

The bulk of the development work during the current year was done in advance of stoping operations in the main orebody above the 8th Level. A small portion of the total was done as a means of improving ventilation in certain local areas. No large development program was necessary due to the amount of this work that has been done during the past several years.

Development work on the 8th Level consisted of the extension of the 840 crosscut around the curve and along the boundary line to the north. One hundred and seventy-five feet of this extension was full size rock drift and the remaining 60' was small size drift for tail-track. Three new raises Nos. 840, 841 and 842 were put up from this drift in the development of what will eventually be two new stopes.

A small amount of development work was done on the -100, -115 and -135' Sub levels in advance of mining operations in the northwest stopes. In addition, a small amount of work was done on the east end exploring in the High Sulphur ore.

On the -75' Sub level a large amount of work was done to the east of raise No. 842 in the development of the new No. 7 stope. The transfer drift was driven due east of the raise a distance of 120' in ore, and an additional 15' in mixed ore and slate. Also, a ventilation drift was driven to the north and connected with the workings south of the large northwest stope. The necessary work of putting up mills and traveling raises was begun. Some development work was also done on this elevation in No. 6 stope east of raise No. 832. This work consisted entirely of mining and traveling raises.

Development work on the -50' sub consisted of the driving of No. 10 transfer drift, a distance of 165' to the east of raise No. 831, and the putting up of the necessary raises. In addition, a connecting drift was driven to the northeast to raise No. 830. The usual amount of Sub level development work was done in advance of stoping operations on the -25', 0', plus 25' and plus 50' Sub levels and the 6th Level.

The average number of development contracts varied between two and three throughout the year with several new men added in November and December. The total footage was 3,663 compared with 3,982' in 1939. The bulk of this footage was in ore with 335' in rock. The detail will be found under a subsequent heading.

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7. UNDERGROUND (Cont.)

c. Stoping

The bulk of mining operations during 1940 was in two main areas above the 8th Level. The first area, which furnished more than half of the product, was in the southwest portion of the orebody in stopes 6, 9 and 10 above the 830 series of raises. The remainder of the recovery was from the northwest portion of the orebody in old No. 12 stope and the middle stope. A small amount of mining was done in the extreme east end. The sulphur content in this area was found too high for mixing at that time. It will probably be possible to mine more of this material in 1941 if the sulphur content of the ore in the main areas remains as low as it was in the latter part of this year.

Some difficulty was experienced with falls of rock and high sulphur material. At least one serious fall occurred in each of the major stopes at some time during the year. The cave in No. 9, early in the year, contaminated a quantity of ore, some of which was hoisted as High Sulphur grade. The remainder of the ore in this stope was recovered by putting up a new mill-raise to the north of the rock area.

A fall in the east end of No. 6 stope, not only filled several mills with rock, but holed to the 6th Level and introduced foul air into the circuit. It required several days to overcome this condition and resume operations on the west side of the pillar. Later, it was possible to reopen the east side.

Occasional falls of rock in the northwest stope, No. 12, and the middle stope caused considerable inconvenience at times. In this area, the rock is pulled out as rapidly as possible and mining resumed.

The detailed description of operations follows:

Subs above the 6th Level

There was no mining on any of the sub-levels above the 6th Level during 1940.

If present plans can be carried out, mining will be resumed on several elevations above the 6th Level early in 1941, in the southwest territory.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

6th Level

A small amount of stoping was done on the 6th Level elevation. This consisted of mining in No. 9 stope, and holing No. 10 stope to the Level elevation. Previously, No. 6 stope caved to this elevation although no actual mining was done. The only other operation at this elevation during 1940 was a small amount of ventilation work necessary in connection with the re-opening of the southwest territory, which was bratticed off prior to 1930 and not re-opened since. This work consisted of rearranging several brattices, removing one and the putting up of several small ventilation raises. Also, there was a small amount of sub level drifting.

Subs above the 8th Level

+50, +25 and 0' Sub Levels

Mining on these three elevations was limited to the southwest areas in stopes 6, 9 and 10. Also, there was considerable development work done in advance of stoping operations. No. 9 was the main-stay in this area throughout the early months of the year when No. 6 was being opened up. A heavy fall of sulphur-bearing black slate tied up this stope and very little further mining was done. Production was continued in the east end of No. 6 until an unexpected cave connected the area with the 6th Level. Foul air was thus introduced into the workings and it was necessary to brattice off the stope and continue mining on the west side of the north-south dividing pillar. Later in the year, the ventilation system having been revised to permit it, mining was resumed in the far end east of the pillar.

Operations in No. 10 were extensive during the latter months of the year, the largest opening being on the +25' sub level where the stope diameter was approximately 100'. All of the work done was on the east side of the supporting pillar, connection being made with the 6th Level in December.

-25' Sub Level

In addition to development and stoping operations in Nos. 6, 9 and 10 in the southwest area, there was a large amount of mining done at this elevation on the south and west sides of No. 12 stope, north of the supporting pillar and east of the Sherwood boundary. In addition, there was a small amount of sub level development work in advance of the new No. 7 stope.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

-50' Sub Level

A relatively small amount of mining was done at this elevation, which is the mill sub for stopes 6 and 9.

The transfer-drift for No. 10 stope was driven on this sub-level east of raise No. 831 and the necessary drifts and raises were completed.

A small amount of development work was done in advance of the new No. 7 stope.

Considerable developing and mining was done in the northwest area on the south side of No. 12 stope north of the supporting pillar along the Sherwood boundary.

-75' Sub Level

The only work in the southwest area at this elevation was the putting up of a number of raises above No. 6 transfer-drift east of raise No. 832, and the driving of a small drift which was needed to pick up raise No. 831.

The new No. 7 stope transfer-drift was driven at this elevation to the east of raise No. 842. The area was first explored by a small size ore drift in November which was stripped and timbered in December. Additional work in this stope development consisted of mill and traveling raises and a ventilation drift which was driven north of the raise and connected with No. 12 stope.

A small amount of mining was done in the northwest area along the southeast side of No. 12 stope.

-100' Sub Level

A small amount of development work was done at this elevation, the bulk of which was in the High Sulphur area at the east end of the orebody. This work was extensive enough to prove that the reserves carried far too much sulphur to permit any extensive mining. The long drift at this elevation showed sulphur contents ranging from .100 to .300, which will make it necessary to limit the mining to small quantities which can be mixed with better grade ore.

A small amount of development work was done south of No. 12 stope preparatory to the mining that was done at higher elevations.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

-100' Sub Level (Cont.)

Work in the development of No. 7 stope consisted of the putting up of raises 841 and 842, and connecting them at this elevation. This work was very disappointing since it was all in Black Slate and High Sulphur ore. Subsequently, good ore was found to the north on the -75' sub level, where the transfer drift was eventually driven.

-115' Sub Level

A small amount of stoping was done at this elevation in the northwest territory in old No. 12 stope. Plans for mining the supporting pillar, which has already crushed on the upper sub levels, were being carried forward at the end of the year. In the east end of the ore-body, an exploration drift was driven to the southeast in the High Sulphur ore and enough stoping done to cone the mill raises.

-135 and -150' Sub Levels

A considerable amount of stoping was done in the northwest area in the pillars which had formerly been left between the mill raises in No. 12 stope. In addition, some development work was done preparatory to mining the supporting pillar between No. 12 and the middle stope.

8th Level

Operations on this Level consisted entirely of the extension of the 840 crosscut to the north and the necessary work in advance of No. 7 stope. This has been previously discussed under (Development).

d. Timbering

Timber consumption and costs were lower in 1940 than during any year since the re-opening of the mine in 1937. This is due to a decrease in the amount of necessary repair work and was effected in spite of some main level drifting and a considerable amount of raising. The total cost per ton for timber, including labor, declined from .050 to .035, and the total cost of timber decreased in spite of an increase in production.

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7. UNDERGROUND (Cont.)

d. Timbering (Cont.)

Kind	Lineal Feet	Avg. Price Per Foot	Amount 1940	Amount 1939
6" to 8" Cribbing	3,657	.0375	137.13	331.49
8" to 10" Stull Timber	2,432	.0554	134.76	69.39
10" to 12" " "	275	.0934	25.70	12.82
12" to 14" " "	27	.1325	3.58	34.57
14" to 16" " "	81	.1625	13.16	27.79
Total Timber 1940	6,472	.0486	314.33	
Total Timber 1939	10,595	.0449		476.06
5' Cedar Lagging	14,125	.0075	105.94	161.90
7' " "				7.50
Total Cedar Lagging	14,125	.0075	105.94	169.40
Poles	9,087	.01255	114.09	172.02
Total Lagging & Poles			220.03	341.42
Product			143,727	112,371
Feet of Timber per Ton of Ore			.0450	.0943
Feet of Lagging per Foot of Timber			2.1825	2.1317
Cost per ton for Timber			.00219	.00424
Cost per ton for Lagging			.00074	.00150
Cost per ton for Poles			.00079	.00153
Cost per ton for Timber, Lagging & Poles			.00372	.00727
Equivalent of Stull Timber to Board Measure			9,230	15,967
Feet of Board Measure per Ton of Ore			.0642	.1421
Cost of Timber, Lagging & Poles 1940	534.36			
Cost of Timber, Lagging & Poles 1939	817.48			

e. Drifting and Raising

The following table shows the 1940 development footage classified as to size and material:

	Drifting			Raising			Combined
	Ore	Rock	Total	Ore	Rock	Total	Total
Full Size	302	121	423	0	0	0	423
Small Size	1,961	48	2,009	1,065	166	1,231	3,240
	2,263	169	2,432	1,065	166	1,231	3,663

The combined total of 3,663' compares with 3,982' in 1939 and 3,642' in 1938. The amount of work that was done in rock remaind much the same as for the previous year, being 335' as compared with 350. This rock footage consists almost entirely of development which was done on and immediately above the 8th Level in advance of the new stopes in the south territory.

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7. UNDERGROUND (Cont.)

f. Explosives, Drilling and Blasting

The cost per ton for explosives used during 1940 was reduced to .0506 from .0580 in 1939. This reduction can be attributed to the fact that there was a smaller proportion of development work necessary in advance of stoping during the current year.

The amount expended for explosives in rock development was increased somewhat over the previous year, but not out of proportion with the increase in production. Total expenditures for all explosives used in the mine was increased from $6,527.44 in 1939 to $7,281.41 in 1940 as shown in the following table:

Statement of Explosives Used

Ore Development & Stoping	Quantity	Average Price	Amount 1940	Amount 1939
No. 1 Gelamite 60%	52,263	.1150	6,010.26	5,401.32
No. 2 Gelamite 40%	100	.1150	11.50	
Total Powder	52,363	.1150	6,021.76	5,401.32
Fuse	118,400	5.0473	597.60	597.60
No. 6 Blasting Caps	17,640	12.20	215.21	209.33
Hot Wire Fuse Lighters	3,435	.6757	23.21	21.84
Master Fuse Lighters	400	2.010	8.04	10.32
Powder Bags	23	1.345	30.95	24.70
Tamping Bags	14,000	2.00	28.00	9.15
Total Fuse, Caps, etc.			903.01	872.94
Total Explosives, Ore Devel. & Stoping			6,924.77	6,274.26
Production, Tons			143,727	112,371
Lbs. Powder per Ton of Ore			.3644	.4061
Cost per Ton for Powder			.0419	.0481
Cost per Ton for Breaking Ore			.0482	.0558

Rock Development	Quantity	Average Price	Amount 1940	Amount 1939
No. 1 Gelamite Powder lbs.	2,487	.1150	285.99	191.82
Fuse, feet	9,800	5.0531	49.52	44.66
No. 6 Blasting Caps	1,310	12.20	15.98	13.93
Hot Wire Fuse Lighters	265	.6792	1.80	1.57
Powder Bags	1		1.35	
Tamping Bags	1,000	2.00	2.00	1.20
Total All Explosives, Rock Devel.			356.64	253.18
Total All Explosives Used in Mine			7,281.41	6,527.44
Average Price per Pound for Powder			.1150	.1184
Total Cost per Ton, All Explosives			.0506	.0580

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7. UNDERGROUND (Cont.)

g. Ventilation

Ventilation conditions were very satisfactory throughout 1940 with one exception, when foul air was introduced due to the caving of No. 6 stope. This cave made connection with the 6th Level and allowed the foul air from the southwest territory to enter the workings. Approximately three days were necessary to brattice off this stope, after which mining was continued on the west side of a dividing pillar. Toward the end of the year the ventilation system was rearranged to permit the re-opening of the southwest territory above the 6th Level which has been bratticed off for the last 12 or 14 years. A careful inspection, prior to this re-opening, was made with the use of the Mine Rescue oxygen apparatus. It was found that all oxidation had ceased a number of years ago and that the foul air present consisted entirely of CO2. As soon as this area had been cleaned out by the introduction of fresh air it was possible to continue the inspection without the use of the apparatus. This rearranging was done with the express purpose of getting back into the east portion of No. 6 stope and to recover a large quantity of ore lying above the 6th Level north of old No. 17 stope where the original cave occurred. The re-opening was so arranged that it can easily and quickly be closed off at any time in case oxidation begins again. The possibility of this occurring is quite remote.

Forced ventilation was continued by means of fans at the collar of the old Virgil shaft which was kept up-cast during the work-week in order to avoid any possibility of foul air leaking through the brattices and entering the workings while the men were present. Over the weekend these fans were reversed for the purpose of melting the ice from the Spies shaft. In addition, during extremely cold weather, it was necessary to chop ice in the Spies shaft once or twice a week. The addition of a number of new air-ways in the workings reduced the back pressure against the fans so that the average volume of air was increased from 6000 C.f.m. in 1939 to slightly greater than 7000 C.f.m. during 1940. There were three blower-fans at the Virgil shaft, two of which are run together, the third being held in reserve.

The bulk of the fresh air was introduced at the 8th Level and diverted as needed to the several working areas. The quantites are controlled and regulated as needed by means of specially driven drifts and raises and by the use of air-doors. For a portion of the year it was necessary to use an auxiliary fan to properly ventilate No. 10 stope.

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8. COST OF OPERATING

a. Comparative Mining Costs

	1940	1939	Incr.	Decr.
Product, Tons	143,727	112,371	31,356	
Underground Costs	.760	.906		.146
Surface Costs	.200	.249		.049
General Mine Expense	.223	.245		.022
Cost of Production	1.183	1.400		.217
Depreciation, Plant & Equip.	.388	.388		
Taxes	.067	.075		.008
Loading & Shipping	.062	.012	.050	
Total Cost at Mine	1.700	1.873	.050	.008
Budget Est. Cost at Mine	1.880	1.927		.047
Number of Operating Days	212½	185½	27	
Number of Shifts & Hours	212½, 2-8	185½, 2-8		
Average Daily Product	676	606	70	

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison

	1940		1939	
Underground Costs	Amount	Per Ton	Amount	Per Ton
1. Exploring in Mine	98.73	.001	268.97	.002
3. Development in Rock	2,946.65	.021	3,095.88	.028
4. Development in Ore	16,591.63	.116	18,306.63	.163
5. Stoping	33,569.51	.233	25,856.88	.230
6. Timbering	5,046.10	.035	5,580.62	.050
7. Tramming	17,194.99	.119	14,285.83	.127
8. Ventilation	1,668.83	.012	2,803.59	.025
9. Pumping	9,580.61	.067	10,449.95	.093
10. Comp. and Air Pipes	9,112.77	.063	7,998.06	.071
12. Undg. Superintendence	7,347.97	.051	6,631.00	.059
14. Maint. of Comp. & Power Drills	556.59	.004	1,327.64	.012
15. Scrapers & Mech. Loaders	851.24	.006	830.69	.007
16. Electric Tram Equipment	3,567.15	.025	3,287.36	.029
17. Pumping Machinery	1,105.72	.007	1,138.78	.010
Total Undg. Costs	109,238.49	.760	101,861.88	.906
Surface Costs				
18. Hoisting	7,999.88	.056	6,273.95	.056
19. Stocking Ore	6,744.52	.047	6,005.30	.054
20. Crushing at Mine	3,230.43	.022	3,582.47	.032
21. Dry House	4,137.29	.029	3,766.22	.034
22. General Surface Expense	2,852.38	.020	2,691.09	.024
23. Maint. Hoist. Equip.	928.13	.006	932.47	.008
24. Shaft	517.81	.004	477.69	.004
25. Top Tram Equip.	731.01	.005	2,907.04	.026
26. Docks, Trestles & Pkts.	746.68	.005	561.97	.005
27. Mine Buildings	885.38	.006	734.05	.006
Total Surface Costs	28,773.51	.200	27,982.25	.249
General Expense				
Vacation Expense	1,084.54	.008	1,133.59	.010
28. Insurance	633.43	.004	876.33	.008
29. Mining Engineering	2,077.74	.015	1,383.86	.012
30. Mech. & Elect. Engineering	147.25	.001	188.64	.002
31. Analysis & Grading	2,130.45	.015	1,539.38	.014
32. Personal Injury	4,050.21	.028	2,342.95	.021
33. Safety Department	471.30	.003	568.79	.005
34. Telephone, Safety Devices	652.47	.005	542.39	.005
35. Local & Gen. Welfare	1,178.38	.008	1,422.64	.013
36. Special Exp. Pensions etc.	5,159.61	.036	2,810.33	.025
37. Ishpeming Office	3,449.00	.024	4.171.06	.037
38. Social Security Taxes	4,495.34	.031	3,982.54	.035
39. Mine Office	6,462.02	.045	6,545.17	.058
Total Gen. Mine Exp.	31,955.74	.223	27,507.67	.245
COST OF PRODUCTION	169,967.74	1.183	157,351.80	1.400
40. Taxes	9,681.50	.067	8,374.04	.075
Total Cost	179,649.24	1.250	165,725.84	1.475
Budget Estimated Cost	128,400.00	1.497	116,800.00	1.554

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

	1940		1939	
	Amount	Per Ton	Amount	Per Ton
41. General Supplies	9,594.68	.067	8,053.34	.072
42. Iron and Steel	1,075.87	.007	833.14	.007
43. Oil and Grease	499.96	.003	434.95	.004
44. Machinery Supplies	6,201.32	.043	6,322.74	.056
45. Explosives	7,284.11	.051	6,528.59	.058
46. Lumber and Timber	2,391.15	.016	1,913.45	.017
47. Fuel	3,094.89	.022	1,891.42	.016
48. Electric Power	21,470.14	.151	18,441.83	.164
49. Sundries	494.29	.003	3,547.56	.032
50. Other Mines & Accounts	4,392.28	.031	2,075.11	.018
Supply Inventory Adj.	1.12	.000	545.15	.005
Total per Cost Sheet	47,715.25	.332	46,437.06	.413

In the following discussion of comparative costs no explanation is made unless the difference is large enough to be significant.

3. Development in Rock

The total cost under this heading remaind practically the same, the decrease in cost per ton being due to the increase in production.

The following table shows the comparison for the past three years.

	1940	1939	1938
Development in Rock - Feet	335	350	1414
Cost per Foot	8.80	8.84	8.40
Cost per Ton	.021	.028	.132

4. Development in Ore

This rather large decrease was due in part to the increase in production, and to a great extent, to the fact that less development work was necessary.

	1940	1939	1938
Development in Ore - Feet	3328	3632	2122
Cost per Foot	4.98	5.04	4.00
Cost per Ton	.116	.163	.095

The decreased cost per foot was due to driving 302' of full size drift in 1940 as compared with 337' in 1939.

The combined development work for 1940 was 3,663' at $5.33 per foot and .137 per ton, as compared with 3,892' in 1939 at $5.38 per foot and .191 per ton.

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

6. Timbering
This decrease in cost per ton was due almost entirely to the increase in production.

8. Ventilation
This decrease was due to the increase in production and to the fact that less trouble was experienced in the ventilation system.

9 to 17 Inclusive
These decreases were due to the increase in production.

18 to 24 Inclusive
These decreases were due to the increase in production.

25. Maint. Top Tram Equipment
This large decrease was due to the increase in production and to fewer repairs and replacements to the top tram equipment.

32. Personal Injury
This large increase was the result of the final settlement of an old injury claim, a portion of which was charged out during 1940.

36. Special Expense, Pensions and Allowances
This large increase was due to direct charges made by the Cleveland office.

37, 38 and 39
These decreases were the result of the increase in production.

41 to 50 Supplies
This decrease was due to a more efficient working schedule and the increase in production.

9. EXPLORATIONS AND FUTURE EXPLORATIONS

The only exploration at the property during 1940 was the continuation of the raising and drifting in the High Sulphur ore area at the extreme east end of the orebody above the 8th Level. This work was carried on for several months at the beginning of the year and then abandoned due to the fact that the sulphur content was too high to permit the handling of the development ore at that time. It will be possible to eventually mine a small portion of this ore and mix it with ore of a lesser sulphur content. There was no diamond drilling and none is contemplated at the present time. As mentioned in the report for last year, the area southwest of the orebody on the 6th and 8th Levels offers possibilities which should be tested when known reserves are nearing completion.

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10. TAXES

The following tabulation is a complete statement of valuations, taxes and comparison for the years 1940 and 1939:

	1940		1939	
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)	90,000	1,873.80	115,000	2,396.60
Stockpile, Supplies & Equip.	310,000	6,454.20	240,000	5,001.60
Total Spies Virgil*	400,000	8,328.00	355,000	7,398.20
Spies Dwellings	5,000	104.10	5,000	104.20
Total Iron River Twshp.	405,000	8,432.10	360,000	7,502.40
Rate		2.082		2.084
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)	90,000	304.54	115,000	316.11
Stockpile, Supplies & Equip.	310,000	1,048.96	240,000	659.73
Total Spies Virgil	400,000	1,353.50	355,000	975.84
Spies Dwellings	5,000	16.92	5,000	13.74
Total Mineral Hills	405,000	1,370.42	360,000	989.58
Rate		.33837		.27488
Ravenna Prickett Houses				
Years 1937 & 1938				38.35**
Taxes for 1939 Pd. by I.S.	700	22.75	700	22.64**
Total Rav. Prickett Houses		22.75	700	60.99
Rate		3.25		3.24
Tax per Ton Produced		.067		.075
Tax per Ton Shipped		.056		.283

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

**Inland Steel Company reimbursed by C.C.I. Co.

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11. ACCIDENTS AND PERSONAL INJURY

There were two lost-time accidents in 1940, one of which was a fatality. This compares with two in 1939 and one each in 1938 and 1937. In addition there was one reported slight injury with no lost-time, which brought the total for the year to three.

The first accident occasioned 36 days lost-time, which, when added to the 1800 days occasioned by the fatality, brought the total lost-time to 1836 days. Total days worked during the year were 17,219¼ which brings the severity rate to 106.6 as compared with 31.92 in 1939. The frequency rate for the two lost-time accidents was .116 per thousand as compared with .085 for the average of the Company's underground properties.

The following is a record of the two accidents:

Accident No. 149 - Murino Bernucci, Transfer-drift scraper-man, age 51, This man was injured on June 10, and suffered a laceration of the right shin and a crushed left instep, caused by a piece of ore which rolled down the pile from a mill in the transfer-drift. Compensable lost-time - 36 days.

This man was also injured the preceding year while working in a transfer-drift. Although he is a competent man it was decided that due to his nature he sould not be permitted to continue to work in a place which requires great care.

Accident No. 150 - John Vivian, Steam shovel craner, age 59. Vivian was repairing the dipper chain on the shovel and caught his foot between the bail and the dipper while attempting to escape a small run of ore from the stockpile. He fell on his face and was buried by the run and smothered before he could be extricated. Compensable lost-time - 1800 days. Date of accident - September 20.

12. NEW CONSTRUCTION AND
PROPOSED NEW CONSTRUCTION

There was very little new construction during 1940 with the exception of the usual work necessary for the continuation of operations. A storage bin for stoker coal was constructed at the south end of the coal dock and a small amount of work was done on the heating system in installing new hot water return lines.

In addition to the usual stocking-trestle construction, a small pocket was built beneath the rock trestle. This pocket permits handling the underground rock by truck, and spreading the rock in thin layers which are less apt to catch fire than piles of any appreciable thickness.

There is no new construction contemplated at the present time.

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13. EQUIPMENT AND PROPOSED EQUIPMENT

There were a number of rather large items added to the equipment inventory during 1940. Some of these were purchased under E&A's and the others taken up in current mining costs. These items are listed below:

1. Ingersoll-Rand 15 H.P. Scraper Hoist, E&A No. CC-25	$1,374.00
1. Ingersoll-Rand 15 H.P. Motor Pump, E&A No. CC-43	861.05*
1. Mechanical Stoker (No. 2 Iron Fireman) E&A No. CC-23	674.91
1. Six-Ton Goodman Electric Locomotive, E&A No. CC-4	500.00
3. Ingersoll-Rand Jackleg Mountings	212.21
1. Ingersoll-Rand Paving Breaker	195.55
1. Thermolier Unit Heater, Installed in Shaft House	96.83

*Cost Included Installation

The scraper hoist was needed as a spare to permit sending the others to the general shops for periodical overhauling.

The 15 H.P. motor pump was purchased for de-watering the old Virgil stopes and replaced the other Virgil shaft pump which was sent to the Lloyd Mine. This new pump is rated at 100 G.P.M. against a 300' head.

The mechanical stoker was installed for use with the dry house boiler which serves the entire property.

The six-ton underground locomotive has been at the property for a number of years and was used in connection with the driving of the Sherwood exploration drift. It was purchased for use as a spare.

14. MAINTENANCE & REPAIRS

a. Mine

Due to very extensive repairs to plant and equipment during 1937, 1938 and 1939 there was no large amount of this work done during 1940. Only repairs and maintenance of a routine nature were necessary.

b. Location

Maintenance and repairs to the Spies Location houses were of a routine nature, although the amounts spent were somewhat greater than for the previous year. This increase was due to interior decorating in the Captain's house and a large amount of necessary repairs to out-houses and sheds.

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14. MAINTENANCE & REPAIRS (Cont.)

b. Location (Cont.)

The table of comparative location expense for the last two years follows:

Spies Virgil Dwellings	Labor	Supplies	1940 Total Amount	1939 Total Amount
Repairs to Houses	127.87	163.41	291.28	159.59
Interior Decorating		77.28	77.28	69.82
Shed Repairs	104.78	188.92	293.70	15.17
Total, Dwellings	232.65	429.61	662.26	244.58
Location Maintenance				
Repairs to Sewers	47.97	11.81	59.78	114.90
Repairs to Street Lights	8.12	56.81	64.93	85.73
Fire Protection & Water		95.38	95.38	40.95
Total Location Maint.	56.09	164.00	220.09	241.58
Total Amount for Dwellings & Loc. Exp.	288.74	593.61	882.35	486.16

15. ELECTRIC POWER

Electric power, which is purchased from the Wisconsin Michigan Power Company was very satisfactory throughout 1940. There were no reported delays due to interruptions in service.

The use of the maximum demand warning signal for five-minute meter intervals was continued throughout the year with very satisfactory results. Pumping schedules were arranged to keep the maximum demand load at a practical minimum. The result of this care is shown by the reduction in cost per ton from .203 in 1938 to .164 in 1939 and .151 in 1940.

16. WATER SUPPLY

Water for the mine and the location was obtained from the Homer Mine of the M. A. Hanna Company. This water service was satisfactory with one or two exceptions when supply interruptions occurred.

17. CONDITION OF PREMISES

Routine and seasonal clean-ups and repairs kept the premises in good condition throughout the year. The mine roads and location streets and alleys, which are maintained by the Village of Mineral Hills were also well cared for.

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18. NATIONALITY OF EMPLOYEES

	American Born		Foreign Born			
	Number	%	Number	%	Total	Per Cent
Parentage						
English	6	8	11	15	17	23
Finnish	4	6	9	13	13	19
American	12	17	-	-	12	17
Scandinavian	9	13	-	-	9	13
Italian	1	1	5	7	6	8
Austrian	-	-	3	4	3	4
Polish	-	-	3	4	3	4
German	2	3	1	1	3	4
French	3	4	-	-	3	4
Irish	2	3	-	-	2	3
Belgian	-	-	1	1	1	1
Total	39	55%	33	45%	72	100%

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1. GENERAL:

Due to the necessity of speeding up the construction work and stripping, in preparation for the 1940 ore season, all work was continued throughout the Christmas holiday season.

The stripping program on the south side of the pit was carried forward with one 4-yard electric shovel and 5 to 6, 10-yard capacity trucks, operating six days of three 8-hour shifts each per week. The work was completed on February 22nd, after having stripped 219,153 cubic yards of waste material during January and February. The 4-yard electric shovel was then dismantled and shipped to the Holman-Cliffs Mine.

The construction work was pushed forward with all possible speed. Under the Worden-Allen contract, the washer building was re-assembled on the new foundations; the washing plant equipment set in place and the new conveyor gallery and two transfer stations were erected. Using mine labor, the crusher building and equipment were set up in the pit, a new crude ore pocket was constructed, and the power distribution systems and pipe lines were re-arranged. The new pumps and pumping stations were erected, completing all the preparatory work late in May.

Two new 3-1/4-yard capacity electric shovels were received and erected during the month of March and were moved into the pit on April 5th. There they were used in casting a fill around the crude ore pocket and in making the necessary rock cuts leading to the south side ore area, and to the proposed stripping area in the west end of the Snyder bottom. On completion of this work, one machine started the Snyder rock stripping; the other was used in some clean-up work in the North Bovey. The material was all hauled by truck and used to build up the main pit haulage roads leading to the crude ore pocket. The roads were built up in layers so that the fills could be compacted under truck traffic and thus avoid any appreciable settlement later. The Bovey work was completed and the stripping discontinued on May 23rd. The roads were then surfaced with a rubbly waste material and were made ready for the mining operations.

The 1940 ore mining program was started on May 29th and conducted until October 17th. During the first three weeks the mine was operated a single 8-hour shift, six days per week, but on June 17th it was stepped up to two shifts per day, five days per week and continued on this basis throughout the season.

The washing plant was operated 103 days and 478,339 tons of concentrates were produced in the treatment of 791,671 tons of crude ore. The average plant output per shift was slightly above that for the past several years. The ratio of delays to total working time was quite satisfactory, considering the fact that there were numerous long delays in new equipment adjustments during the first few

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1. GENERAL:
(Continued)

weeks of the operations.

Upon completion of the ore season, the two electric shovels and six trucks were used in opening up the Bovey and Snyder rock stripping jobs, preparing the haulage roads and dumps so that the work could be successfully undertaken during the winter. The equipment was then shifted to the south side stripping program.

Surface stripping operations in the Hemmens, Snyder and South Bovey leases, on the south side of the pit, got underway on October 21st, using two 3-1/4-yard electric shovels and nine dump trucks. This was an extension of the area stripped in January and February.

The winter repair work at the washing plant was started immediately after the ore season and carried forward until December 20th.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Snyder Crude,	373,991	tons.
Bovey Crude,	342,884	"
Hemmens Crude,	74,796	"
TOTAL CRUDE ORE,	791,671	"
Snyder Non-Bessemer Concentrates,	109,047	"
Snyder Bessemer Concentrates,	119,626	"
Bovey Non-Bessemer Concentrates,	209,094	"
Hemmens Non-Bessemer Concentrates,	38,295	"
Hemmens Bessemer Concentrates,	2,277	"
TOTAL CANISTEO MINE,	478,339	"

Ore operations started on May 29th and were completed on October 17th.

b. Shipments:

The shipments from the Canisteo Mine during 1940 were the same as the production, as all ore mined was forwarded to Lower Lake ports.

c. Stockpile Inventories:

No merchantable ore, either concentrates or direct shipping was stocked at the Canisteo Mine during 1940.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

e. Production by Months:

(1) Crude Ore:

	SNYDER	BOVEY	HEMMENS	TOTAL
May,	3,096	4,924	-	8,020
June,	65,228	37,425	19,387	122,040
July,	70,306	86,345	36,446	193,097
August,	77,841	86,063	12,608	176,512
September,	116,096	56,084	6,355	178,535
October,	41,424	72,043	-	113,467
TOTAL 1940	373,991	342,884	74,796	791,671

(2) Concentrates:

	SNYDER	BOVEY	HEMMENS	TOTAL
May,	2,100	2,880	-	4,980
June,	42,285	24,846	9,836	76,967
July,	44,852	51,601	19,859	116,312
August,	45,298	53,648	7,282	106,228
September,	68,713	32,199	3,595	104,507
October,	25,425	43,920	-	69,345
TOTAL 1940	228,673	209,094	40,572	478,339

f. Ore Statement:

All material considered as ore, that was mined during 1940, was shipped from the property.

g. Delays:

The following delays were reported during the year 1940; (including stripping operations):

Date:	Time Lost: Hours	Minutes	Cause:
June 3rd,	1	-	Broken drum on lower conveyor section.
4th,	-	30	No crude ore, shovel partially buried by slide.
5th,	1	40	Mill plugged when conveyor brake failed.
6th,	1	-	Repairing conveyor brake.
8th,	1	-	No Great Northern empties.
11th,	-	30	Repairing clutch on 5-ft. pan conveyor.
12th,	-	40	Trouble with top conveyor motor.
	-	30	Brake let go on lower conveyor section.
13th,	-	45	Trouble with lower conveyor brake.
17th,	3	20	Repairing tailings pump.
19th,	3	20	Conveyor motor burned out.
21st,	1	30	Cleaning off conveyor belt. Temporary motor could not start with a load.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause:
21st,	1	45	Rock haulage motor off track.
24th,	-	30	Great Northern track plugged with loads.
	-	30	Trouble with conveyor belt motor.
25th,	-	30	Repairing 8-ft. pan conveyor.
26th,	4	20	No Great Northern empties.
27th,	1	30	No Great Northern empties.
28th,	1	30	No Great Northern empties.
	-	30	Repairing air hoist on rock chute.
	-	50	Repacking tailings pump.
July 1st,	-	30	Waiting for Great Northern empties.
	-	50	Rock chute plugged.
3rd,	1	-	Rock haulage motor derailed.
5th,	-	30	Repairing rock gun.
6th,	1	20	Jaw crusher plugged.
	1	20	Repairing fingers on rock chute.
8th,	2	-	No crude ore - sorting rock in pit.
9th,	1	30	No crude ore - sorting rock in pit.
10th,	-	45	No crude ore- sorting rock in pit.
	1	-	No crude ore, shovel partially buried by slide in high bank.
	-	25	Repairing double-deck screen.
11th,	2	-	Waiting for Great Northern empties.
12th,	1	40	Waiting for Great Northern empties.
	-	30	Repairing 4' x 6' screen.
16th,	2	-	Welding lower deck of 5'x14' screen.
	1	-	Repairing tailings pump.
17th,	2	50	Waiting for Great Northern empties.
18th,	-	30	Waiting for Great Northern empties.
	-	45	Repairing 5' x 14' screen.
	-	30	Rock caught in 5-ft. pan tail pulley.
19th,	2	55	Waiting for Great Northern empties.
22nd,	6	-	Repairing tailings pump.
24th,	-	30	Repairing tear in 36" conveyor belt.
25th,	-	45	Waiting for Great Northern empties.
26th,	-	30	Waiting for Great Northern empties.
30th,	-	30	Waiting for Great Northern empties.
31st,	2	40	Waiting for Great Northern empties.
Aug. 2nd,	3	15	Waiting for Great Northern empties.
5th,	2	15	Motor on 5'x14' screen burned out.
	2	20	Repairing tailings pump.
6th,	3	45	Repairing tailings pump.
7th,	5	45	Repairing tailings pump.
8th,	3	45	Repairing tailings pump.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause:
Aug. 9th,	1	45	Waiting for Great Northern empties.
14th,	1	20	Repairing 8' pan conveyor.
15th,	1	15	Repairing rock gun.
	-	30	No power - electric storm.
	-	40	Replacing jaw crusher drive belt.
20th,	1	50	No crude ore, handling Bovey rock.
22nd,	-	50	Moving shovels for grading.
	-	30	Repairing Symons cone crusher.
26th,	2	10	Motor on 5'x14' screen burned out.
	-	35	Repairing starter on south log.
27th,	1	35	Waiting for Great Northern empties.
28th,	-	40	No crude ore, shifting shovels for grade.
	-	40	Waiting for Great Northern empties.
	-	25	Waiting for Great Northern to pull loads.
29th,	5	10	Waiting for Great Northern empties.
30th,	5	-	Waiting for Great Northern empties.
Sept. 3rd,	3	50	Repairing broken 36" conveyor belt, top section.
5th,	-	50	Repairing conveyor guide roller.
	-	50	Waiting for Great Northern empties.
6th,	2	-	Waiting for Great Northern empties.
9th,	-	50	Waiting for Great Northern empties.
11th,	-	45	Waiting for Great Northern empties.
13th,	4	35	Waiting for Great Northern empties.
16th,	-	30	Electric fuse blown out.
18th,	1	45	Waiting for Great Northern empties.
	1	-	Repairing west log washer.
19th,	-	40	Waiting for Great Northern empties.
21st,	-	25	Waiting for Great Northern empties.
23rd,	1	20	Repairing lining in crude ore pocket.
24th,	1	-	Repairing classifier switch.
27th,	3	15	Waiting for Great Northern empties.
30th,	1	10	Waiting for Great Northern empties.
Oct. 1st,	-	25	Repairing 4'x6' vibrating screen.
2nd,	-	30	Repairing 5'x14' vibrating screen.
3rd,	1	15	Waiting for Great Northern to pull loads.
	1	25	Waiting for Great Northern empties.
4th,	2	10	Waiting for Great Northern empties.
	-	30	Repairing rock gun.
7th,	1	-	Replacing electric fuses on picking belts.
	-	30	Repairing log motor.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued):

Date	Time Lost Hours	Time Lost Minutes	Cause:
Oct. 7th,	-	30	Repairing rock gun.
9th,	-	45	Waiting for Great Northern empties.
11th,	1	15	Waiting for Great Northern empties.
	-	45	Repairing rock gun.
	-	45	Repairing rock chute.
16th,	-	30	Repairing 5'x14' vibrating screen.
	-	45	Waiting for Great Northern to pull loads.
Total,	148	55	

3. ANALYSIS:

a. Mine Analysis of Production & Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Snyder Non-Bess.Concs.	109,047	58.04	.046	10.24	.28	.62	7.95	53.42
Snyder Bess.Concs.	119,626	58.20	.034	10.04	.29	.57	7.84	53.64
Bovey Non-Bess.Concs.	209,094	57.75	.074	10.74	.23	.61	7.86	53.22
Hemmens Non-Bess.Concs.	38,295	57.24	.064	11.00	.28	.61	8.12	52.60
Hemmens Bess.Concs.	2,277	57.08	.038	11.30	.28	.56	7.60	52.74
TOTAL 1940,	478,339	57.89	.057	10.48	.26	.60	7.89	53.32

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Snyder Crude,	373,991	47.51	.039	25.67
Bovey Crude,	342,884	49.33	.074	23.13
Hemmens Crude,	74,796	45.31	.062	28.25
TOTAL CRUDE ORE,	791,671	48.09	.056	24.81

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Snyder Non-Bess.Concs.	58.10	.047	10.20	.27	.60	.16	.14	.010	5.35
Snyder Bess. Concs.	58.20	.034	9.94	.27	.55	.18	.14	.010	5.55
Bovey Non-Bess.Concs.	57.80	.074	10.70	.22	.60	.18	.12	.010	5.30
Hemmens Non-Bess.Concs.	57.30	.065	10.95	.29	.60	.14	.14	.010	5.65
Hemmens Bess.Concs.	57.10	.039	11.20	.26	.52	.16	.12	.011	5.90

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Factors Used:

All Leases:

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

Lease:	Reserve 1-1-40	Developed By Drilling	Balance	Mined 1940	Reserve 1-1-41
Snyder;					
SE¼-SE¼-Sec.30,	1,763,381	-	1,763,381	154,232	1,609,149
SW¼-SE¼- " 30,	729,544	-	729,544	55,201	674,343
SE¼-SW¼- " 30,	216,203	-	216,203	19,240	196,963
Total,	2,709,128	-	2,709,128	228,673	2,480,455
Bovey:					
SW¼-NE¼-Sec.30,)					
SE¼-NE¼- " 30,)	230,807	-	230,807	124,500	106,307
NW¼-SE¼- " 30,	295,903	-	295,903	55,500	240,403
NE¼-SE¼- " 30,	249,105	267,161	516,266	29,094	487,172
NE¼-NE¼- " 31,	799,642	-	799,642	-	799,642
Total,	1,575,457	267,161	1,842,618	209,094	1,633,524
Hemmens:					
SW¼-SW¼-Sec.29,	1,329,182	-	1,329,182	40,572	1,288,610
Grand Total,	5,613,767	267,161	5,880,928	478,339	5,402,589

The estimated tonnage of reserve ore in the Canisteo Mine, as of January 1st, 1941, shows a decrease of 211,178 tons, as compared with the estimate of the previous year.

A comprehensive drilling program in the North Bovey developed an increase of 267,161 tons of ore in a pit extension on the east side of the North Bovey. The increase was more than offset by the deduction of the 478,339 tons mined the year 1940, showing the above decrease in total tonnage.

Additional drilling in the South Bovey forties during the coming year, will quite likely prove up some additional Bovey ore.

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

Lease	Grade	Tons	Iron	Phos.	Silica
Snyder,	Bessemer,	1,289,837	58.22	.035	10.29
	Non-Bessemer,	1,190,618	58.13	.066	10.36
Bovey,	Bessemer,	408,381	57.50	.037	8.25
	Non-Bessemer,	1,225,143	57.58	.072	11.26
Hemmens,	Bessemer,	966,457	57.48	.032	11.30
	Non-Bessemer,	322,153	57.24	.064	11.55
Total,	Bessemer,	2,664,675	57.84	.034	10.34
	Non-Bessemer,	2,737,914	57.78	.068	10.90
GRAND TOTAL,		5,402,589	57.81	.051	10.62

5. LABOR & WAGES:

a. Comments:

With an abundance of both skilled and common labor in the western Mesaba district during the past year, there was no difficulty in maintaining a full crew of experienced men at all times. 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,	478,339 tons
Concentrates in Stock,	-
Number of Days Operated,	103
Number of Shifts Operated,	191
Average Daily Product,	4,644 tons
Average Product per Shift,	2,505 tons
Average Number of Men Working,	141
Average Wages Per Day,	$6.15
Amount Paid for Labor,	$ 88,599.51

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6. SURFACE:

a. Buildings, Repairs:

The mine buildings, dwelling houses and the washing plant structures were all painted during the season. On the washing plant buildings and structures both the interiors and exteriors were painted; the exteriors only were painted on the other mine buildings and dwellings. Aside from the painting, only the minor necessary repairs were undertaken.

c. Tracks, Roads, Transmission Lines, etc:

The new pit and washing plant roads, which were built in 1939, were all re-surfaced, using material which was being moved in the clean-up and stripping operations.

The transmission line additions and changes were all completed and a new system of primary and secondary distribution was built in the pit. This materially reduced the length of the lines and the subsequent loss in power.

7. OPEN PIT:

a. Stripping:

There were three main stripping jobs undertaken during the year: First - the completion of the Hemmens and Snyder south bank work, which was started in December 1939 and carried forward into the latter part of February: Second - the spring rock stripping job in the west end of the former Snyder so-called rock island area: Third - a new extension of the south side area, carrying the pit limits south and west into the South Bovey forty.

On the south side of the pit the stripping job, which had been started in December of 1939, covered an area about 1000 feet long and approximately 200 feet wide. It extended about 500 feet east and 500 feet west of the Snyder-Hemmens line; the depth of the stripping was about 110 feet and it was made up in layers of clay, quick-sand; hardpan and lean waste ore material.

Using a 4-yard electric shovel and five or six 10-yard dump trucks, as the work required, the stripping was carried forward six days of three 8-hour shifts each, per week. A total of 219,153 cubic yards of material were moved and hauled approximately 2600 feet to the South Bovey stripping dump. This consisted of 124,714 yards of surface material and 22,876 yards of rock from the Snyder lease; 59,859 yards of surface and 11,704 cubic yards of rock from the Hemmens. The progress in general was fairly slow. There was little snow and the weather was extremely cold, resulting in a frost penetration of five to six feet. This necessitated drilling and blasting and the loading was delayed in the handling of large frost chunks. In the lower benches between the surface and rock, considerable water was

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)
encountered, with the added difficulty of handling wet, sticky material in sub-zero weather. The winter stripping cost amounted to approximately $.17 per cubic yard, which was above the estimate of $.15 per yard. This was accounted for in the excessive drilling and blasting cost, along with the slow production, due to the cold weather difficulties.

The spring stripping program was started early in April, in the west end of the Snyder island area. This consisted of stripping - 115,000 cubic yards of paint-rock and taconite from a triangular area at the extreme west end of the rock island area and from a rock cut approximately 800 feet long, leading to the stripping area. Stripping operations were started on April 22nd, on a basis of three shifts per day and five days per week and were carried forward until May 23rd, when it was necessary to discontinue the work in preparation for the ore operations. Numerous long delays were occasioned through the spring rains. A total of 103,372 cubic yards of rock were stripped during this time. The material was used to build up a haulage road from the south side of the pit to the crude ore pocket. This road was about 1800 feet long, - 50 feet wide at the top and from 20 feet to 30 feet in height. It was built up in layers of approximately 5 feet in depth. Although the work was slow, due to the necessary road building and to weather delays, the rock stripping costs were only slightly above the estimated $.15 per yard.

On completion of the ore season, 4,272 yards of slough material were removed from the North Bovey track benches and 5,656 cubic yards of paint-rock were taken from the Snyder bottom in preparation for the winter rock stripping from these areas. The equipment was then moved to the south side extension job, late in October. The proposed operation in this area consisted of moving approximately 600,000 cubic yards of surface material from an area extending about 1400 feet along the south bank of the pit. This area, which is about 300 feet wide at the mid point, pinches out at both ends and extends into the Hemmens 200 feet east of the Snyder-Hemmens lines, then southwestward about 1200 feet into the Snyder and South Bovey properties. The stripping bank averaged about 110 feet high.

Actual stripping operations were started on October 21st, and were conducted six days per week of three 8-hour shifts each through the balance of the year, - two 3-1/4-yard electric shovels; ten 15-ton Euclid dump trucks and two D-8 tractors were used on the job. In order to maintain nine to ten trucks in line at all times, it was necessary to rent five trucks from The Mesaba-Cliffs Mining Company. The haul averaged 2600 feet, with a maximum grade of 8%. Up to the end of the year, a total of 534,686 cubic yards of surface material had been moved - 389,763 yards from the South Bovey, 120,989 yards from the Snyder and 23,934 cubic yards from the Hemmens.

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

A slow start was made, due to continuous rain and soft hauling conditions in the latter part of October and early in November. However, in the last half of November and during December, the progress was much better and a daily output of from 10,500 to 11,000 cubic yards was realized. The cost of the fall stripping was 14.9¢ per yard, including all equipment rental and overhead charges.

The following tabulation shows the classification of the material stripped during the year 1940:

LEASE:	SURFACE CUBIC YARDS	WASTE CUBIC YARDS	TOTAL CUBIC YARDS
Bovey, ----------	393,563	472	394,035
Hemmens, ----------	83,793	11,704	95,497
Snyder, ----------	245,703	131,564	377,267
Total, ----------	723,059	143,740	866,799

f. Explosives, Drilling and Blasting:

Statement of Explosives Used:

ORE OPERATIONS - 1940	QUANTITY	PRICE	AMOUNT
25% duPont Special Gel. - 5 x 16,	88,750 Lbs.	$9.75 Cwt.	$8,653.13
25% duPont Special Gel. - 3 x 10,	71,250 "	9.75 "	6,946.87
Total and Average,	160,000 "	9.75 "	15,600.00
30' duPont No. 6 E.B. Caps,	600 Ea.	12.65 C	75.90
40' duPont No. 6 E.B. Caps,	600 Ea.	17.65 C	105.90
No. 20 Connecting Wire,	50 Lbs.	.40 Lb.	20.00
Cap Crimpers,	2 Ea.	1.00 Ea.	2.00
Total,			203.80
TOTAL ORE OPERATIONS - 1940,			$15,803.80
STRIPPING OPERATIONS - 1940:			
25% duPont Special Gel. - 5 x 16,	56,500 Lbs.	9.75 Cwt.	5,508.75
25% duPont Special Gel. - 3 x 10,	57,000 "	9.75 "	5,557.50
60% R.C.Special Gel. 7/8 x 8,	50 "	12.00 "	6.00
60% R.C.Extra Gel. 7/8 x 8,	300 "	11.50	34.50
Total and Average,	113,850 "		11,106.75

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7. OPEN PIT:
(Continued)

f. Explosives, Drilling and Blasting: (Continued)

Statement of Explosives Used: (Continued)

	QUANTITY	PRICE	AMOUNT
16' duPont No. 6 E.B. Caps,	2,150 Ea.	$8.65 C	$ 185.98
30' duPont No. 6 E.B. Caps,	1,200 Ea.	12.65 C	151.80
36' duPont No. 6 E.B. Caps,	800 Ea.	12.65 C	101.20
No. 20 Connecting Wire,	100 Lbs.	.40 Lb.	40.00
Lead Wire,	1,000 Ft.	1.40 C	14.00
Total,			492.98
TOTAL STRIPPING OPERATIONS - 1940,			$11,599.73
STRUCTURAL DRILLING - 1940:			
40% R.C. Special Gel. 1-1/8 x 8,	250 Lbs.	10.50 Cwt.	26.25
40% R.C. Special Gel. 1-1/4 x 8,	50 "	10.00 Cwt.	5.00
16' duPont No. 6 E. B. Caps,	500 Ea.	6.15 C.	30.75
TOTAL STRUCTURAL DRILLING - 1940,			62.00
PIPE LINE E&A NO. 22:			
40% R.C. Extra Gel. 7/8 x 8,	1,300 Lbs.	10.00 Cwt.	130.00
Clover Fuse,	3,000 Ft.	5.95 M Ft.	17.85
TOTAL PIPE LINE E&A NO. 22,			147.85
TOTAL ALL EXPLOSIVES - 1940, - -			$27,613.38

g. Open Pit Mining and Loading:

The ore operations, starting on May 29th, were conducted one 8-hour shift per day and six days per week, until June 15th. On the 17th, they were stepped up to two 8-hour shifts per day and five days per week and were carried forward on that basis until October 17th, when the season closed. A total of 478,339 tons of concentrates were produced in the treatment of 791,671 tons of crude ore.

With the rail haulage eliminated and with the use of trucks hauling to the crushing plant in the pit and with conveyor belt delivery from the pit to the mill, the operations were much simplified. All of the anticipated savings were realized and the system was found much more flexible. The grading problem was simplified through the moving of the lighter shovels on well established haulage roads. Four to five trucks sufficed at all times to haul

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)
an adequate supply of crude ore from the two shovels and provided a uniform supply of ore in a smoothly-running operation.

Five main loading places were opened up and maintained during the season, two in the North Bovey lease; two in the Snyder and one in the Hemmens. In the North Bovey, one operating area carried the mining to the extreme north limits; the other was located in the track benches made available on the east side through the removal of the former haulage tracks. In the Snyder, one operation mined the scram ore and cleaned up the low track benches in the west end of the pit; the other mining area was located in the main bank on the south side of the pit, in the area uncovered by the recent stripping program. The Hemmens operation was in the same area, immediately east of the Snyder-Hemmens line. The crude ore output was made up of 342,884 tons from the Bovey; 373,991 tons from the Snyder and 74,796 tons from the Hemmens.

The shovels were shifted among the several loading places continually to meet grading requirements and in an effort to mine as much Bovey ore as possible. All of the Bessemer grade ore was mined from the two Snyder areas. The non-Bessemer cargoes, whenever possible, were made up entirely of Bovey ore, or a mixture of Bovey and Hemmens. However, at times the high phosphorous content of the North Bovey material made it necessary to grade the cargo with low phosphorous Snyder ores. The bulk of the material taken from the Bovey came from the extreme north end, leaving but a small tonnage in this area for the 1941 season. In the Snyder, the track benches and the scram ore in the bottom were completely cleaned down to rock, making available dumping space for the 1941 paint-rock stripping. Part of this scram work was accomplished through the use of a D-8 tractor and a 5-yard scraper. The Hemmens ore was of such mediocre grade that it was mined only in sufficient quantity to cover the royalty requirements.

During the ore season, considerable rock and other waste material were cleaned up on the night shift and during week-ends. This material was all dumped into worked-out areas in the pit.

k. Drainage:
The water level was maintained at an elevation about 60 feet above the deepest part of the pit. This provided a very large sump and there were no particular drainage problems. When necessary, the water was pumped from the pit to the washing plant reservoir; at other times it was taken out over the south bank at a much lower head.

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8. COST OF OPERATION:

a. Comparative Mining Costs:

	BUDGET ESTIMATE	1940 COST PER TON	1939 COST PER TON
PRODUCT: (Tons)	500,000	478,339	218,514
Average Shift Production,		2,505	2,455
Tons Per Man Per Day,		33.18	23.64
Days Operated,		103	89
COST:			
Open Pit Wash Ore,	$ .147	$ .150	$ .252
General Pit Expense,	.049	.071	.040
Concentrating,	.114	.134	.162
General Mine Expense,	.069	.057	.096
Winter & Idle Expense,	.090	.156	.175
Cost of Production,	$ .469	$ .568	$ .725
Depreciation, Plant & Equipment,	.167	.103	.086
Depreciation, Motorized Equipment,	-	.087	-
Amortization- Stripping,	.300	.250	.200
Taxes - Ad Valorem,	.160	.167	.364
Taxes - Occupational,	.185	.124	.165
Taxes - Royalty,	.027	.024	.027
Total Cost at Mine,	1.308	1.323	1.567
Administrative Expense,	.050	.050	.050
Miscellaneous Expense & Income,	-	.002	.000
GRAND TOTAL, ----------	$ 1.358	$ 1.375	$ 1.617

The final cost figures have not been received from Cleveland and there may be some adjustments. However, their effect on the above costs will be very small.

d. Detailed Cost Comparison:

(1) Product:

With an entirely different system of mining and with more than double the production, there is very little basis for a comparison of the mining costs in 1940 as against those of 1939.

The ore mined and treated in the two years was very similar and there was little difference in the recovery by weight. The wage scale and the average rate per day was the same as in 1939, for there was no difference in the proportion of skilled labor.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

The pumping and drainage problems in 1940 were about the same and the cost of pumping water against an excessive head to the old washing plant site was eliminated.

The total cost of production for 1940, including Winter and Idle Expense, was $.099 higher than the budget estimate and was $.157 under that for 1939. However, the Winter and Idle Expense was $.066 above the estimate, due to the extensive repairs on rented equipment. In addition, there were several large expenditures for maintenance and mining preparations that had not been anticipated in the budget estimate. They went into the operating cost, whereas no provision had been made in the estimate figures. The elimination of these charges would have shown a slight improvement over the budget and a marked decrease, as compared with former operating costs.

(2) Open Pit Mining:

In this account there was an increase of $.003 per ton over the budget and a decrease of $.102 under that for the year 1939. Three items under this caption showed an increase over the budget. Drilling and Blasting was higher by $.002, due to a larger proportion of Bovey ore and the accompanying rock work requiring heavy shooting. Trucks Operating and Trucks Maintenance were both higher by $.003, due to the extensive clean-up operations on the night shift and over week-ends, All this work was charged directly into ore operations.

These increases were practically off-set by a decrease of $.005 in Power Shovels Operating and $.001 in Power Shovels Maintenance. This was due to the use of faster and lighter shovels, with a smaller power consumption and to the small amount of upkeep necessary on new machines.

The cost under Pit Roads and Ramps was the same as the budget.

The marked saving over the 1939 cost was reflected in a cheaper truck operation as a combined truck and steam equipment operation, including track cost.

(3) General Pit Expense:

The 1940 cost per ton was $.022 over the budget and $.031 over that in 1939, despite a much larger production.

There were but two items under this caption which were under the budget estimate - Pumping and Drainage was down $.002 per ton and Open Pit Superintendence was $.001 lower. The former was due to the fact that it was not necessary to pump as much water as had been anticipated up to the storage reservoir.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(3) General Pit Expense: (Continued)

As compared with these savings, three items were well above the budget. General Open Pit Expense was up $.013, due to some unforseen maintenance charges. Waste Pile Expense showed a charge of $.002 per ton in 1940, whereas no provision was made for waste disposal of cleaned-up material in the budget. The cost of Structure Drilling was up $.011, due to the fact that the contract drilling program and the extensive work undertaken with the company drill were much larger than had been anticipated. Had these charges been normal, the General Pit Expense would have been under the budget.

(4) Concentrating:

The 1940 cost under this caption exceeded the budget estimate by $.020, but was $.028 under that for 1939. The increase over the budget was due entirely to the cost of several large maintenance items. With the rush of moving the plant and equipment, some of the repairs and re-arrangements had to be carried over into the operating season. These were charged to General Expense and Maintenance-Building and Machinery items, which were $.014 and $.009 per ton, respectively, above the budget.

Below the budget, under this caption, was the cost per ton for Power. This was lower by $.005 per ton. The per ton cost for Washing was up $.001. This was due to some extensive repairs and adjustments in the conveying system and the tailings pump during the season.

(5) General Mine Expenses:

The 1940 cost per ton under this caption was $.012 under the budget estimate and $.039 under that for the year 1939.

The costs per ton for Mining Engineering and for Mechanical and Electrical Engineering were the same as the budget.

A large amount of chemical laboratory work in connection with the drilling programs brought the charge per ton for Analysis and Grading up $.002, this work all being charged to the 1940 ore.

With the expenses of the Safety Engineer spread over three mines, the Safety Department cost per ton was $.001 below the budget.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(5) General Mine Expenses: (Continued)

The Ishpeming and District Office costs per ton were the same as the budget estimate.

The charges to Mine Office were less than had been expected, due to the fact that a larger proportion of the Local Superintendent's time was charged to the Holman-Cliffs Mine on account of an increase in their tonnage during this season.

There was an increase of $.001 per ton to the charges for Property Insurance over the estimated budget figure. This was due to a large increase in Plant and Equipment values.

The Employees' Compensation Insurance Expense was $.003 per ton less than had been anticipated. This was occasioned by a decrease in the compensation rate.

Social Security Taxes were $.004 per ton under the budget, due entirely to a big decrease in the labor cost per ton of ore.

The Geological Expense was the same as the budget estimate.

There was a decrease of $.002 per ton in the charges for Employee's Vacation Pay. This was due to the fact that there were a larger number of new employees than had been anticipated.

The charges to Winter and Idle Expense were $.066 per ton in excess of the budget estimate. This was due to the fact that it was necessary to make extensive repairs to the shovels, drills, locomotives and cars, which were rented from the Mesaba-Cliffs Company. These were in excess of what had been anticipated, for it was necessary that the repairs be made at the Mesaba-Cliffs mines, due to the fact that the Canisteo Mine was not equipped to handle the work. This further increased the cost through shop overhead and shop expense.

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9. EXPLORATIONS AND FUTURE EXPLORATIONS:

A contract was let to the John Schultze Company of Grand Rapids, Minnesota, for the drilling of ten holes along the east side of the North Bovey to determine a possible extension of the ore body under the east bank of the pit.

These ten holes were put down late in the fall, at the following respective depths: Hole No. 286 - 143 feet; Hole No. 288 - 193 feet; Hole No. 292 - 158-1/2 feet; Hole No. 296 - 173-1/4 feet; Hole No. 298 - 163-2/3 feet - Hole No. 303 - 167-2/3 feet - Hole No. 305 - 165 feet; Hole No. 307 - 177-3/4 feet - Hole No. 309 - 165 feet and Hole No. 312 - 158 feet. The total footage on this contract amounted to 1,664-2/3 feet. Only four of the ten holes showed ore that could be stripped and mined and that was of a mediocre grade ore, with a high stripping ratio. The remaining six holes were all no good and definitely established the east limits of the mineable ore in the North Bovey area.

In addition to the drilling done by the Schultze Company, nineteen structure holes, totaling 1,945 feet, were put down with a company drill. The work was charged directly in the 1940 ore costs. These holes were all drilled to determine the grade of the 1941 ore in the Bovey east track bench and in the ore bank along the south side of the pit. The Bovey holes, as was expected, developed a border line ore. Those in the south bank were all in good wash ore. The program in the latter area will be extended when the ore is uncovered through the present stripping program.

10. TAXES:

The following statement shows the Canisteo Mine taxes and the average rates for the years 1939 and 1940:

Statement of Taxes:	1940	1939	Increase	Decrease
Canisteo Mine,	$80,193.40	76,552.34	3,641.06	
Washing Plant Lands,	477.42	3,032.68	-	2,555.26
Personal Property,	3,320.00	53.01	3,266.99	-
Total,	$83,990.82	79,638.03	4,352.79	
Village Lots,	-	-	-	-
Grand Total,	$83,990.82	79,638.03	4,352.79	
Average Tax Rate,	.09333	.09021	.00312	-

The increase in the mine taxes was due to several reasons: First: Through a review of the property by the Tax Commissioner's

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10. TAXES:
(Continued)

engineers, the Ad Valorem taxes were increased on a greater tonnage shown. Second: The washing plant was moved down to the mine area and taxes on the same were included under mine taxes. Third: There was a slight increase in the tax rate for the year 1940, over that in 1939.

The decrease under the caption "Washing Plant Lands" is accounted for in the fact that all the concentrator buildings and equipment were moved to a site adjacent to the pit.

The large increase in Personal Property taxes is explained by the fact that on May 1st, 1939, the Canisteo Mining Company had very little Personal Property on the premises, having rented a large part of the operating equipment from the Mesaba-Cliffs Company. By May 1st, 1940, all of the new equipment had been received and was included in the valuations set up for Personal Property for that year.

11. ACCIDENTS AND PERSONAL INJURY:

There were ten lost-time accidents at the Canisteo Mine during the year 1940. In five of these accidents, "green" men were involved - the other five, involving our old employees, were, in the most part, due to a rush of construction work, along with the other preparations;and one of these five, unfortunately, was a fatal accident.

The ten lost-time accidents occurring during the year are described as follows:

NAME: Walter Liimatainen DATE: March 19, 1940.
CAUSE: Liimatainen and his partner were taking down some 3" x 10" plank braces from the old coal dock approach. The lower end of one plank had been knocked loose. The upper end, which was about 10 feet above the ground, was being freed by Liimatainen, by working and swinging the lower end of the plank. When the brace dropped, Liimatainen's hand was squeezed against an adjacent sawed-off piling, breaking the mid finger of the left hand. The men were working in a cramped place, on a steep slope, and held onto the plank to prevent its sliding down the bank into the pit approach, which would have entailed their having to carry it up out of the approach again.
NATURE: Fracture of proximal phalanx of middle finger of left hand.
TIME LOST: 28-1/2 days (5 weeks - 5 days)
COMPENSATION: Total paid by Insurance Company - $106.95

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: Morris H. Strand DATE: May 27, 1940.
CAUSE: Strand was standing in the log washer, working on the gear housing, when the log washer started, catching Strand between the log paddles as it started to revolve.
NATURE: Fatal.

NAME: Eli Pachucha DATE: June 7, 1940.
CAUSE: Pachucha, standing 300 feet, or more, from the hole he had blasted, was struck in the face by a "gob" of mud, which had flown skyward from the blast and came back down again.
NATURE: Abrasions of cornea and conjunctivi lateral portion of left eye, with particles ground into it.
TIME LOST: 4-1/2 days.
COMPENSATION - None.

NAME: Axel F. Rundquist DATE: Aug. 12, 1940.
CAUSE: Rundquist was employed as a shovel oiler. Sometimes, when throwing the clutch, when cutting the shovel, the clutch sticks, so the oiler uses a short piece of 2" pipe to extend the clutch handle. The pipe lays on the floor, next to the door. When Rundquist, standing on the ground, reached up to get the pipe, a short-pointed bar, laying alongside, started to fall down. Rundquist caught the bar and in so doing, the end of the bar struck the palm of his right hand.
NATURE: Small laceration on hypothenar eminence; pain and tenderness and lymphadenitis almost to right axilla.
TIME LOST: Three shifts.
COMPENSATION - None.

NAME: George Dimich DATE: Aug. 20, 1940.
CAUSE: While changing a drill bit, Dimich dropped a drill bit wrench on his right foot.
NATURE: Pain and tenderness, with some swelling over region of third to fifth metartarsal.
TIME LOST: One day.
COMPENSATION - None.

NAME: George Struss DATE: Aug. 28, 1940.
CAUSE: Struss was cleaning up under the end of the 8' pan conveyor, when a rock, or small piece of ore, bounced over the splashboard, about 10 feet in the air, and came down, striking Struss on the instep of right foot.
NATURE: Contusion, dorsum of right foot.
TIME LOST: Four days.
COMPENSATION - None.

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: George Hecomovich DATE: June 27, 1940.
CAUSE: Hecomovich bumped his left knee on radiator shield of truck sprinkler.
NATURE: Bursitis of left knee.
TIME LOST: 22 Days.
COMPENSATION: Total paid by Insurance Company $90.00.

NAME: Amos Holcomb DATE: Sept. 25, 1940.
CAUSE: Holcomb was climbing a short ladder, to the top of the welding hood, in the shop. When he stepped on the top rung, the ladder slipped and he fell to the floor, about 7 feet below, landing on his left heel.
NATURE: Sprain of left ankle and contusion of left heel.
TIME LOST: 3-1/2 Days.
COMPENSATION - None.

NAME: Kenneth Nelson DATE: October 4,1940.
CAUSE: Nelson was dropping Great Northern ore cars at the washing plant. The dog on the brake slipped and caught his index finger on right hand, between the brake handle and the car body.
NATURE: Comminuted fracture of distal phalanyx of right second finger.
TIME LOST: 65 Days.
COMPENSATION: Total compensation paid by Insurance Company $252.68.
Note: Finger amputated in November. (Above compensation is for time lost only and does not include anything for loss of finger).

NAME: Francis Goulet DATE: November 14,1940.
CAUSE: Goulet was cleaning truck box with a scraper and what he thought was a chunk of snow, proved to be a rock, which slid out of the truck box and struck his left ankle. (Rock was covered with snow).
NATURE: Bruise and strain of left ankle.
TIME LOST: 11-1/2 Days.
COMPENSATION: Total paid by Insurance Company $24.44.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

The numerous construction jobs undertaken in connection with the transfer of the concentrator buildings and equipment to the new site, were all carried forward into the year 1940 and were not completed until late in May, when the ore season was started.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION: (Continued)

E&A #17 - The 22,000-volt high tension line in to the pit; the pit transformer station and the 2300-volt secondary distribution lines within the pit, were all completed in April. This afforded a direct feed for all pit work and a saving in line loss was affected.

E&A #18 - The lines and cables installed to provide power service to the washing plant and from the plant to the crusher building, were all completed late in May.

E&A #19 - The transfer of the building and equipment from the old site to the new, was completed early in February. Air and wrecker service were furnished the steel contractor until the completion of the erection work, in March. The replacement of the wiring and woodwork was held up by the steel and equipment erection and was not completed until the latter part of May.

E&A #20 - In addition to the foundations and footings constructed for the washer building and the old section of the conveyor, it was necessary to prepare footings for several conveyor bents and foundation walls under both transfer houses. The conveyor bent footings were installed to support several steel bents, which were necessary to carry the conveyor supports in an effort to eliminate the settlement of a new fill under the conveyor gallery. In addition to these steel supports, several timber bents, on timber piling, were also erected for the same purpose. This work was completed early in February.

The erection of the crushing plant building and equipment, which was undertaken with mine labor, carried over into the late spring. The building and equipment were all in place early in March. However, the sheeting was not replaced under the Worden-Allen contract until the latter part of May.

E&A #21 - Under the Worden-Allen contract, the washer building and equipment; the conveyor gallery and its supports and the transfer houses were completely re-erected in April. A few of the smaller jobs, including the replacement of the sash and sheeting, were carried over into the month of May.

E&A #22 - The construction of the sluice boxes for the inlets and outlets of the storage reservoir and the settling basin - and the erection of the connecting pipe lines and pumping stations, were all carried forward into the year 1940.

A 1500 G.P.M., high-head pump was installed in the pit and was connected to the ten million-gallon storage reservoir by 2400' of 16"

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION: (Continued)

pipe line. The reservoir was also connected with the settling basin by a 2,000-foot 10" pipe line, by means of which the water could be returned from the tailings pond through a 2000 G.P.M., low-head pump. The equipment erected to handle the tailings consisted of 800 feet of 16" pipe, through which the waste water was flumed to a 12" rubber-lined Hydroseal pump. By means of the latter, it was lifted over the tailings basin dykes through 1600 feet of 12" pipe line. This pumping equipment and the pipe lines were all completely erected early in March and make-up water was pumped into the storage reservoir and the settling basin, commencing March 15th.

E&A #23 - The washing plant watchman's house, the laboratory building and the sample crushing house were all moved to their new locations and set on newly-prepared foundations. Water, sewer and light connections were installed and this work was completed early in the spring.

During the year 1939 there was a total expenditure of $102,156.00 against E&A's Nos. 17 to 22, inclusive. The work was completed in 1940 with an expenditure of $77,785.00 and the total actual cost amounted to $179,941.00. Compared with an estimated cost of $184,337.00, there was a saving of $4,396.00.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

Blast hole drills, which had been rented from the Mesaba-Cliffs Company, were replaced early in the year with two No.27-T Bucyrus-Armstrong machines and one was immediately put to work on the stripping operations. The other was equipped with a structure drilling attachment and was used in the 1940 sample drilling programs.

Two Bucyrus-Erie No. 85-B electric shovels were received and erected during the month of March. These were heavy duty machines and equipped with 3-1/4-yard capacity buckets and were used in the mining and stripping operations.

A 1-1/2-ton Ford dump truck was purchased for the disposal of the picking belt rock at the washing plant. This replaced the electric haulage units and eliminated the inconvenience of the tracks and low trolley lines at the plant site.

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13. EQUIPMENT AND PROPOSED EQUIPMENT: (Continued)

In order to clean up the shallow layers and windrows of ore on the pit bottom, a 5-yard capacity LaPlant-Choate "Carrimor" scraper was purchased during the late summer. This machine was attached to the D-8 tractor and used in the scramming and clean-up work.

The extensive stripping operations planned for the fall and winter required the use of two tractors and a second D-8 "caterpillar" machine was purchased late in the fall. It will be used extensively in the 1941 scraper work.

The seventh Euclid dump-truck and a spare motor were received in December. The truck will serve as a spare unit and will be utilized in stocking concentrates. The spare motor was purchased to affect a saving in truck rental while various older motors were being overhauled.

14. MAINTENANCE AND REPAIRS:

The locomotives, cars, electric shovels and drills, which had been rented from the Mesaba-Cliffs Company, were given the necessary repairs to place them in the same good condition in which they were received.

Repairs to the washing plant equipment were undertaken as the plant was being moved and re-erected. The greater part of the repair work consisted in overhauling the log washers, the classifiers and the two pan conveyors.

The trucks, tractor and road grader were all completely overhauled during the latter part of February and March. It was found that the winter repairs necessary for this type of equipment will show a large saving over that required by steam haulage units.

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18. NATIONALITY OF EMPLOYEES:

NATIONALITY:	NO. MEN 1940	NO. MEN 1939
American,	139	102
Jugo-Slav,	8	4
Finnish,	9	12
Italian,	2	3
Swedish,	4	4
Bulgarian,	2	1
Canadian,	5	3
Austrian,	1	2
Norwegian,	1	2
Danish,	1	1
Montenegrin,	1	1
Belgian,	1	1
German,	1	-
Russian,	1	1
Croatian,	-	1
Total,	176	138

19. WASHING PLANT OPERATIONS:

The washing plant season extended from May 29th to October 17th, and included 15 days of one shift and 88 days of two, 8-hour shifts, each, totaling 103 days, or 191 shifts.

The performance of the concentrating system, as a whole, was very satisfactory. The numerous long delays through new equipment adjustments during the first part of the season were fully expected. A long delay was experienced when a new conveyor motor burned out in the month of June. This was replaced with a temporary motor while the original was being re-wound. There were likewise several long delays occasioned by the failure of the automatic conveyor brakes. These were finally replaced and located in a more effective position, eliminating all further trouble. Adjustments in the tailings pump and its controlls occasioned numerous delays, until the operation was finally straightened out. Substantial delays were likewise occasioned by a shortage of Great Northern ore cars. Such delays are to be expected during a big season and can be overcome only through some means of stocking concentrates. During the year, it was found more economical to replace the electric haulage system in the pit with small rented trucks. It is planned to replace these rented machines with a new type dumptor unit during the next season.

The production held up well through the entire season. The average output of 2,505 tons per shift was above that for the past several years.

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19. WASHING PLANT OPERATIONS: (Continued)

The amount and analysis of the plant rejects for the year 1940 were as follows:

	5-FT. PAN REJECTS			
Lease:	Tons	Iron	Phos.	Silica
Snyder,	12,441	31.34	.055	47.51
Bovey,	40,069	30.48	.092	49.10
Hemmens,	2,778	30.53	.073	48.93
Total,	55,288	30.68	.083	48.73

	36" BELT REJECTS			
Lease:	Tons	Iron	Phos.	Silica
Snyder,	886	35.04	.047	41.57
Bovey,	3,442	34.05	.088	43.63
Hemmens,	399	33.39	.075	44.27
Total,	4,727	34.18	.079	43.30

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

Lease:	Cu. Yds.	Tons	Iron
Snyder,	-	1,536	24.05
Bovey,	-	34,364	22.39
Hemmens,	-	84	32.89
Total,	-	35,984	22.49

The tonnage and iron unit recovery realized in the treatment of Canisteo ore during 1940, was as follows:

Lease:	Tonnage	Iron Unit
Snyder,	61.14%	74.80%
Bovey,	60.98%	71.40%
Hemmens,	54.24%	68.53%
Total,	60.42%	72.73%

The analysis of the product from the several machines for the year 1940 was:

SNYDER MILL MACHINES:

	Iron	Phos.	Silica
Log Washer,	58.41	.044	9.49
Classifier,	57.97	.038	10.69
Tailings,	18.18	-	-

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19. WASHING PLANT OPERATIONS: (Continued)

BOVEY MILL MACHINES:

	Iron	Phos.	Silica
Log Washer,	58.05	.074	10.09
Classifier,	57.62	.063	11.36
Tailings,	18.08	-	-

HEMMENS MILL MACHINES:

Log Washer,	57.44	.068	10.39
Classifier,	56.99	.059	11.98
Tailings,	18.05	-	-

The following is the concentrating data for the Canisteo Mine during the year 1940:

	Tons	Percentage of Total Mined	Iron Dried	Tonnage Recovery	Iron Unit Recovery
Material removed in mining operations (exclusive of surface),	882,943	100.00	45.95		
Less: lean ore stocked in mining,	-	-	-		
	882,943	100.00	45.95		
Less: pit rock wasted,	35,984	4.08	22.49		
Total transported to mill,	846,959	95.92	46.95		
Less rock rejects (crusher house)	55,288	6.26	30.68		
Crude ore entering mill,	791,671	89.66	48.09		
Concentrates produced,	478,339	54.18	57.89	60.42	72.73%
Rock rejects on mill picking belt,	4,727	.54	34.18		
Tailings, (by deduction),	308,605	34.94	33.11		
Total Pit rock and crusher house rejects,	91,272	10.34	27.45		
Total,	882,943	100.00	45.95		

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1. GENERAL:

Following the customary shut-down for the Christmas holidays, the preparations for the re-opening of the Holman-Cliffs Mine were resumed on January 3rd.

A small crew of men were employed repairing the bridge which carries the washing plant tracks over the D. M. & I. R. Railway and the State Highway; and in dismantling the coal dock. This structure was replaced with the dock, which had been in use at the Canisteo Mine. Pumping with a 7,000 gallon per minute pump was continued until late in February, when the water had been lowered sufficiently below the proposed mining level. It was maintained at that elevation by a 1600 gallon per minute pump.

The reconditioning of the washing plant and the installation of the new equipment was started early in March, but slow deliveries held up the work and the plant was not ready for operation until the first week in June.

Track work was resumed as early as the weather conditions would permit. The sloughed material was cleaned from the approach tracks leading into the pit; these tracks were reconditioned and the necessary pit tracks laid. The replacement of old ties and switch sets was continued on the main haulage lines.

The 1940 mining program was started on June 4th and conducted until October 18th. During the first month, the mine was operated a single 8-hour shift, five days per week, so as to provide time for adjustments in the mill equipment. On July 5th, it was stepped up to two 8-hour shifts, five days per week and continued on this basis until the last week in September. From then until the end of the season, the operations were conducted five days per week of three 8-hour shifts each in order to complete the tonnage requirements for the season. At that time, experienced men were available at the Hill-Trumbull Mine for the third shift.

The washing plant was operated 97 days, producing 425,274 tons of concentrates. The average output of 2,250 tons per shift was satisfactory in view of the one shovel operation in the pit. The plant results secured were satisfactory as to tonnage, but the grades of the ores produced were penalized somewhat, due to a narrowly restricted mining area. The ratio of delays to the total working time was high, due to the nature of the operations.

In addition to the spring clean-up of 4,724 yards of sloughed material from the approach tracks along the North Star lease, a small stripping program was undertaken at the close of the ore season. This made available some additional ore along the west property line of the North Star and Brown No. 1 forties.

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1. GENERAL:
(Continued)

The winter repair work on the mine and mill equipment was started immediately following the ore season and carried forward with a small crew until December 13th,

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

North Star Crude, ----------	258,323	tons.
Brown Crude, ----------	395,911	"
TOTAL CRUDE, ----------	654,234	"
North Star Non-Bessemer Concentrates, ------	34,325	"
North Star Bessemer Concentrates, ----------	135,861	"
Brown Non-Bessemer Concentrates, ----------	66,570	"
Brown Bessemer Concentrates, ----------	188,518	"
TOTAL PRODUCTION - 1940, ----------	425,274	"

b. Shipments:

The shipments from the Holman-Cliffs Mine during 1940 were the same tonnages as shown under the production statement, as all ore mined was forwarded to Lower Lake ports.

c. Stockpile Inventories:

No merchantable ore, either concentrates or direct shipping, was stocked at the Holman-Cliffs property during 1940.

The following amount of lean material is now in stock:

Concentrating Material above 25%:

	Tons	Iron	Phos.	Silica
North Star,	20,658	26.29	.046	49.24

Coarse Non-Concentrating Material above 40%:

	Tons	Iron	Phos.	Silica
North Star,	585	48.89	.044	24.50

e. Production by Months:

(1) Crude Ore:

	NORTH STAR	BROWN	TOTAL
June, ----------	-	58,194	58,194
July, ----------	12,742	148,266	161,008
August, ----------	157,656	14,274	171,930
September, ----------	17,960	132,592	150,552
October, ----------	69,965	42,585	112,550
TOTAL - 1940, ----------	258,323	395,911	654,234

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays:

The following delays were reported during the year 1940:

Date:	Time Lost: Hours	Minutes	Cause:
June 5th,	1	-	Broken rock gun piston.
	1	-	Adjusting 5'x14' double-deck screens.
6th,	2	-	Adjusting 5'x14' double-deck screens.
7th,	3	-	No crude ore. Derailment near bridge on main line.
	2	30	Foot valves plugged on water supply pumps.
10th,	1	30	Power cable on shovel burned out. No crude ore.
11th,	-	30	Rock chute plugged.
12th,	1	30	No crude ore. Repairing shovel power cable.
21st,	1	-	Large rock stuck in rock chute.
25th,	-	40	Waiting for Great Northern to pull loads.
26th,	1	-	Rock chute plugged.
	1	-	Waiting for Great Northern empties.
27th,	2	45	Waiting for Great Northern empties.
28th,	1	45	Waiting for Great Northern empties.
July 2nd,	-	30	Waiting for Great Northern empties.
3rd,	2	-	Waiting for Great Northern empties.
5th,	-	45	Large rock stuck in rock chute.
	1	20	Cleaning out washing plant pump intake.
6th,	-	45	Rock chute plugged by large rock.
8th,	-	30	Repairing classifier switch.
	-	30	No crude ore - sorting rock in pit.
9th,	2	5	No crude ore. Accumulated delay, sorting rock.
10th,	1	35	No crude ore. Accumulated delay, sorting rock.
	1	30	No crude ore, derailment in pit.
11th,	1	20	Waiting for Great Northern empties.
	1	-	No crude ore, sorting rock in pit.
12th,	3	-	No crude ore. Accumulated delay, sorting rock.
	2	-	Repairing air compressor bearing.
15th,	-	30	Rock car off track.
	-	30	Large rock stuck in rock pocket.
	1	30	Waiting for Great Northern empties.
16th,	-	45	No crude ore, sorting rock in pit.
17th,	2	-	Waiting for Great Northern empties.
18th,	2	15	Waiting for Great Northern empties.
19th,	1	30	Waiting for Great Northern empties.
22nd,	1	-	Log washer plugged.

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays: (Continued)

Date	Time Lost: Hours	Minutes	Cause:
July 22nd,	-	35	Waiting for Great Northern to pull loads.
	-	30	Large rock stuck in rock chute.
23rd,	1	-	No crude ore, sorting rock in pit.
	1	30	Waiting for Great Northern empties.
	-	35	Repairing door on Great Northern car.
24th,	3	20	West log washer plugged.
	1	-	Handling large rock in crusher house.
	-	30	Waiting for Great Northern to pull loads.
25th,	1	-	Handling large rock in crusher house.
	-	30	Waiting for Great Northern empties.
26th,	1	-	Waiting for Great Northern empties.
	3	-	No crude ore, shovel power cable blown out.
29th,	1	-	No crude ore, repairing dump line on car at pocket.
	2	15	Large rock stuck in rock chute.
30th,	1	30	Waiting for Great Northern empties.
31st,	1	45	Waiting for Great Northern empties.
	-	45	Rock haulage motor off track.
	-	30	Rock stuck in rock chute.
Aug. 1st,	--	30	No crude ore, sorting rock in pit.
	-	45	Waiting for Great Northern empties.
2nd,	3	30	No crude ore, handling rock in pit.
	-	30	No crude ore, sorting sand and gravel, from ore.
	1	30	Waiting for Great Northern empties.
5th,	-	30	Repairing rock gun.
	-	30	Repairing 5' pan conveyor.
	1	30	No crude ore, sorting rock and gravel in pit.
	1	-	Rock chute plugged.
	1	35	No crude ore, broken hoisting cable on shovel.
6th,	2	20	No crude ore, sorting rock and gravel in pit.
	-	45	Waiting for Great Northern empties.
8th,	2	10	Waiting for Great Northern empties.
	-	30	Waiting for Great Northern to pull loads.
9th,	1	15	Waiting for Great Northern empties.
	1	35	Symons cone crusher plugged.
13th,	1	15	No crude ore. Shovel partially buried in slide.
14th,	-	30	Waiting for Great Northern empties.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost: Hours	Minutes	Cause:
Aug. 19th,	-	30	Repairing jaw crusher.
	-	30	Pipe from log classifier plugged.
20th,	1	45	Waiting for Great Northern empties.
23rd,	-	40	Waiting for Great Northern empties.
26th,	1	30	No crude ore, slow loading in pit, due to clean-up.
	-	30	No crude ore, derailment in pit.
27th,	2	10	No crude ore, derailment at loading pocket.
28th,	-	30	Waiting for Great Northern empties.
	2	-	No crude ore, sorting and loading lean ore and rock.
29th,	3	15	Waiting for Great Northern empties.
	1	-	West log washer plugged.
30th,	3	45	No crude ore, broken swinging gear on shovel.
Sept. 3rd,	3	-	Repairing bearing on west log washer.
	-	45	Repairing rock gun.
	1	-	No crude ore, handling lean ore in pit.
4th,	1	50	No crude ore, broken trip motor cable on shovel.
9th,	1	-	No crude ore, sorting lean ore and rock in pit.
10th,	1	30	Repairing broken grizzly.
11th,	1	-	Waiting for Great Northern empties.
12th,	3	15	Waiting for Great Northern empties.
13th,	2	15	Waiting for Great Northern empties.
18th,	-	50	No crude ore, shovel damaged by rock slide.
19th,	3	-	No crude ore, shovel damaged by rock slide.
20th,	1	40	Waiting for Great Northern empties.
23rd,	1	-	Broken spring on double-deck screen.
24th,	5	-	No crude ore, power cable on shovel blown out.
27th,	1	45	Waiting for Great Northern empties.
28th,	3	30	No crude ore, broken hoist brake on shovel.
Oct. 2nd,	4	-	Waiting for Great Northern empties.
3rd,	7	-	Waiting for Great Northern empties.
4th,	9	-	Waiting for Great Northern empties.
7th,	3	-	No crude ore, broken car journal.
8th,	1	15	No crude ore, repairing intermediate shaft on shovel.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause:
Oct. 14th,	-	30	No crude ore, repairing shovel.
16th,	6	-	No crude ore, broken propelling gear on shovel.
Total,	175	45	

The total delays of 175 hours and 45 minutes amounted to 11.63% of the total working time. Sixty-eight hours of these delays were due to interrupted car service by the Great Northern Railway Company. Sixty-seven hours and ten minutes due to pit delays, occasioned by derailments, sorting of materials and shifting of shovel. The total delays due to the plant, or mill equipment amounted to forty hours - forty-five minutes, which was quite satisfactory, in consideration of the adjustments required on the new equipment.

3. ANALYSIS:

a. Mine Analysis of Production & Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
North Star N.B.Concs.	34,325	57.82	.040	12.26	.13	.39	6.73	53.93
North Star Bess.Concs.	135,861	59.08	.035	10.50	.13	.39	7.09	54.89
Brown Non-Bess.Concs.	66,570	57.39	.038	12.80	.13	.44	6.74	53.52
Brown Bess. Concs.	188,518	58.58	.034	11.24	.13	.42	6.78	54.60
TOTAL, 1940 -	425,274	58.49	.035	11.33	.13	.41	6.87	54.47

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Sil.
North Star,	258,323	47.29	.031	27.85
Brown,	395,911	44.87	.029	31.47
Total Crude Ore,	654,234	45.83	.030	30.04

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
North Star N.B.Concs.	57.80	.040	12.20	.15	.42	.18	.10	.022	4.15
North Star Bess.Concs.	59.10	.033	10.50	.12	.40	.16	.12	.016	4.10
Brown Non-Bess.Concs.	57.40	.037	12.85	.14	.42	.16	.14	.013	4.00
Brown Bess. Concs.	58.50	.033	11.20	.12	.40	.18	.12	.014	4.20

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Factors Used:

	Rock Deduction	Cu. Ft. Per Ton	% Recovery
Holman-Brown No. 1 & Brown No. 2:			
Wash, ----------	10%	16	60%
Rocky Wash, ----------	35%	16	60%
North-Star-Bingham:			
Wash, ----------	10%	16	60%
Rocky Wash, ----------	30%	16	60%

Lease	Reported 1-1-40	Developed By Drilling	Mined 1 9 4 0	Reserve 1-1-41
Brown No. 1,	1,126,196	335,324	255,088	535,784
Holman,	2,798,873		-	2,798,873
Brown No. 2,	1,891,533		-	1,891,533
Total,	5,816,602	335,324	255,088	5,226,190
North Star,	720,077		170,186	549,891
Bingham,	2,387,853		-	2,387,853
Total,	3,107,930		170,186	2,937,744
Grand Total,	8,924,532	335,324	425,274	8,163,934

The estimated tonnage of reserve ore in the Holman-Cliffs Mine, as of January 1, 1941, shows a decrease of 760,598 tons as compared with the estimate for the previous year, after having taken into account the 425,274 tons of ore produced from the property during the year 1940.

A new estimate was made of the tonnage in the Brown No.1 lease, following a comprehensive drilling program which covered the entire pit bottom on that property. This resulted in a decrease of 335,324 tons as compared with the 1939 estimated tonnage which was based on the old drilling. This reduction, together with the 425,274 tons mined, made up the total decrease of 760,598 tons in the total developed ore in the Holman-Cliffs Mine.

5. LABOR & WAGES:

a. Comments:

(1) Labor:

A full crew of experienced men was maintained at all times, for there was an abundance of both skilled and common labor in the vicinity. There were no apparent labor activities.

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5. LABOR & WAGES:
(Continued)

b. Comparative Statement of Wages & Product:

Production:	
Concentrates Shipped,	425,274 Tons.
Number of Days Operated,	97
Number of Shifts Operated,	189
Average Daily Product,	4,385 Tons.
Average Product per Shift,	2,250 Tons.
Average Number of Men Working,	108½
Average Wages Per Day,	$ 6.00
Amount paid for Labor,	$ 85,021.48

6. SURFACE:

a. Buildings, Repairs:

A repair crew of several carpenters, three painters and a plasterer were kept busy throughout the greater part of the year on the necessary repairs to the mine buildings and dwellings leased from the Oliver Iron Mining Company.

On the mine buildings, the repairs on the office and warehouse were completed; the doors and windows of the locomotive house were repaired, and an addition was built to the shops for a boiler house.

The repair work on the dwellings consisted mainly in providing new foundations, re-plastering, re-decorating and a few repairs to the floors and roofs.

The following statement shows the houses, by number; the occupants, together with the nature and cost of the repairs undertaken in each case; and the nature and cost of the repairs to the mine buildings:

No.	Occupant	Description of Work Done:	Amount
1-	J. T. Hughey,	Repairs to windows, interior carpentry; interior painting, electrical wiring, plastering and new complete sewer line,	$628.01
11-	Peter Baril,	Window repairs; interior painting; exterior painting,	78.93
12-	Malkolm Olson,	Repairs to doors, etc., interior painting and exterior painting,	81.58
13-	Frank Deaton,	Window repairs; door and porch repairs and exterior painting,	105.26

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done:	Amount
14-	George Dunstan, Sr.	Window repairs; interior painting, plastering,	95.07
15-	Thos. Wivell,	Window repairs,	2.49
17-	Allen Shegrud,	Changing sink; repairs to porch, floors, doors and windows; interior painting, plastering,	258.33
37-	William Wirtanen,	Window repairs,	1.97
38-	Martin Fleisher,	Repairs to windows and doors; exterior painting,	108.92
39-	A. W. Jenkins,	Repairs to foundation and doors; exterior painting, plastering and plumbing,	501.27
40-	T. J. O'Brien,	Repairs to doors;interior painting,	253.48
41-	Mrs. A. L. Sundquist,	Repairs to floor, doors and windows; exterior painting,plumbing,	190.87
42-	Mike Shipka,	Repairs to porch and chimney; interior woodwork, plumbing and exterior painting,	265.11
43-	Lee Poore,	Repairs to interior woodwork; doors, siding and windows; interior painting; exterior painting and plastering,	358.21
44-	B. P. Axford,	Repairs to siding; foundation; windows and doors; exterior painting,	168.20
45-	Edwin Gustason,	Repairs to siding and windows; exterior painting; cement floor,	124.12
46-	Russell Wivell,	Repairs to foundation; porch, windows and doors; exterior painting,	558.39
47-	Emil Camilli,	Repairs to porch, floors and doors; interior and exterior painting; plastering and plumbing,	351.71
50-	Linas Berg,	Exterior painting,	77.09
51-	Oscar Engstrom,	Repairs to siding and exterior painting,	153.20

HOLMAN-CLIFFS MINE
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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done	Amount
53-	Claude Winkleblack,	Repairs to porch floor, doors and windows and exterior painting,	118.15
55-	Raymond DeShaw,	Repairs to doors; plastering and exterior painting,	18.97
56-	Grant Hess,	Repairs to windows and foundation; plumbing and exterior painting,	19.91
57-	August Mergele,	Repairs to foundation; skirting, porch, floors, doors and interior carpentry; exterior painting; electrical wiring; plastering and new plumbing,	631.20
58-	Russell Barkla,	Repairs to porch and plumbing,	111.02
59-	George Beasley,	Repairs to porch; foundation; doors and windows; exterior painting; plastering and repairs to plumbing and sink change,	152.36
60-	W. F. LeClair,	Repairs to floors, doors, foundation and interior carpentry; interior painting; plastering and plumbing repairs,	738.53
61-	John Laine,	Repairs to porch, doors and windows; exterior painting,	33.40
62-	Joseph Dolezel,	Repairs to skirting and foundation; new cellar floor; repairs to doors; interior and exterior painting,	426.24
63-	Matt Dosser,	Repairs to foundation, skirting, doors, etc., exterior painting; basement floor and repairs to plumbing and sink change,	525.07
64-	Vincent Soleture,	Repairs to foundation; floors, doors and stairs; exterior painting; plastering and plumbing repairs,	425.45
65-	Edwin Johnson,	Repairs to porch, doors and cellar stairs; exterior painting and cement steps,	157.68

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done	Amount
67-	Pat Maney,	Repairs to windows and foundation, interior woodwork and exterior painting,	23.41
68-	George Lee,	Plastering,	30.68
69-	Arnold Lawson,	Interior woodwork; interior painting; electrical wiring, plastering and repair hot water tank,	276.93
70-	Ambrose Hoey,	Repairs to doors and windows,	24.11
71-	Charles James,	Repairs to doors and windows; exterior painting,	20.60
72-	Frank Dionne,	Repairs to garage; doors and windows; exterior painting and chimney repairs, plumbing,etc.	81.02
73-	George Dunstan, Jr.	Repairs to doors and windows; exterior painting,	12.48
74-	William Laine,	Exterior painting,	5.57
78-	Lucien DeCoster,	Repairs to doors and exterior painting,	83.87
79-	John Winkleblack,	Repairs to doors and windows; exterior painting,	44.38
80-	H. James Stephens,	Repairs to windows and exterior painting,	37.56
81-	Lloyd Wetherell,	Repairs to windows and exterior painting,	34.61
97-	William Saw,	Complete new roof; window repairs, exterior painting and plumbing,	204.94
98-	Dan Fitzhenry,	Repairs to doors and windows; exterior painting,	52.12
101-	Loy Kolar,	Interior carpentry; repairs to doors and plumbing; interior and exterior painting and plastering,	426.01
102-	Myron Youngberg,	Interior carpentry; exterior painting; electrical wiring and plastering,	58.56

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YEAR 1940

6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done	Amount
105-	Dennis Chamberlain,	Repairs to doors and windows; exterior painting,	119.56
106-	William Ryser,	New doors and windows; repairs to windows and exterior painting,	108.77
107-	George Whittington,	Repairs to doors and windows; exterior painting; chimney and sidewalk repairs and repairs to water line,	51.83
116-	Carl Eggebraaten,	Repairs to Windows and doors,	8.55
155-	George Sullivan,	Repairs to porch and steps; window and door repairs, new doors; interior and exterior painting and plumbing repairs,	336.50
156-	Lee Farr,	Repairs to porch and steps; doors and windows; interior carpentry; exterior painting; plastering and plumbing repairs,	202.67
157-	J. W. Mattson,	Repairs to doors; miscellaneous carpentry; interior and exterior painting,	149.89
158-	W. S. McComber,	Repairs to porch, steps and storm door,	23.14
5-	Harry Hart,	Repairs to doors, windows and sewer,	319.50
7-	Sam Kerkes,	Window repairs,	3.72
10-	Harley Point,	Repairs to shed, floors, doors and chimney,	41.82
		Social Security and Insurance on Canisteo Vacation Payroll for 1939,	3.99
		TOTAL COST OF REPAIR WORK FOR YEAR 1940, ---------	$ 10,506.98

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

Building:	Description of Work Done	Amount
Mine Office,	Repairs to doors and lighting fixtures; painting interior of warehouse,	$ 175.89
Loco. & Car Shop,	Locomotive pit; building partition and repairs to doors,	926.89
Machine Shop,	Addition to shop boiler house - wiring shop,	1,112.43
	TOTAL COST OF REPAIRS TO MINE BUILDINGS FOR YEAR 1940-------	$2,215.21

c. Tracks, Roads, Transmission Lines, etc:

The reconditioning of the main haulage tracks, the yard and the necessary pit tracks, which was started in the fall of 1939, was continued throughout the year. New ties and switch tie sets were installed and the tracks brought to final grade.

In June, a temporary road was graded into the pit along the north side of the approach tracks. This was used during the ore season, but was abandoned in the fall, due to the fact that it was hard to maintain and that there were many safety hazards. Following the fall stripping program, a new road was graded into the pit from the south side. It entered near the old boiler house location and reached the pit bottom at the narrow neck between the Holman and Brown No. 1 pits. It will be used in connection with the truck operations.

The transmission lines serving the pit were extended and several safety switches and cutouts installed. A line was run from the pit to the coal dock to furnish power for the conveying equipment used in elevating the coal.

7. OPEN PIT:

a. Stripping:

In the spring, 4,724 yards of surface material were cleaned up from the approach tracks into the pit on the North Star lease.

On completion of the ore season, a small stripping program was undertaken along the west property line of the pit. It consisted in the removal of 32,773 yards of surface material in a single cut along the west property line. This cut, 400 feet in length, extended 250 feet in the Brown No. 1 lease and 150 feet in the North Star. The removal of this material makes available for mining approximately 40,000 tons of ore and permits mining up to the west property line.

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

Using one 4-yard electric shovel and four 10-yard dump trucks, the operation was carried forward on a basis of two shifts per day and five days per week. The material was hauled to adjacent Brown and North Star dumps. Of the 32,773 yards removed, 13,428 cubic yards were taken from the Brown and 19,345 yards from the North Star lease.

The total yardage was under the estimated 35,000 and the cost per yard was below the anticipated figure of $.15, resulting in a substantial saving in the amount set up for this program.

The following tabulation shows the classification of the material stripped during the year 1940:

	SURFACE MATERIAL CUBIC YARDS	ROCK CUBIC YARDS	TOTAL CUBIC YARDS
North Star,	24,069	-	24,069
Brown No. 2,	13,428	-	13,428
Total,	37,497	-	37,497

d. Timbering:

Statement of Ties Used:	QUANTITY	PRICE	AMOUNT
Standard No. 2 Green Tamarack,	6,855	$.94395	$ 6,470.78
Standard White Oak,	1,009	1.10939	1,119.37
Total, ----------	7,864	.9650	7,590.15
Standard Oak Switch Sets,	7	$105.00	735.00
Grand Total, ----------			$ 8,325.15
Ties on Hand:			
No. 1 Green Tamarack,	2,660	.95	2,527.00
Standard White Oak,	435	$1.1094	482.59
Total, ----------	3,095	.9724	$ 3,009.59
Standard Oak Switch Sets,	7	$105.00	735.00
Grand Total, ----------			$ 3,744.59

HOLMAN-CLIFFS MINE
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YEAR 1940

7. OPEN PIT:
(Continued)

d. Timbering: (Continued)

Statement of Railroad Ties Used: (Continued)

	Oak	Tamarack	Oak Switch Sets-52 Ties each-
Holman-Brown Pit Tracks,		417	
Bingham-North Star Pit Tracks,		626	
Washing Plant Tracks - Joint,	283	1,668	156
Waste Pile Tracks, Joint,	-	453	52
Coal Dock Approach Tracks, Joint	-	448	-
Pit Approach Tracks - Joint,	726	2,400	52
Shop & Yard Tracks- Joint,	-	843	104
Total,	1,009	6,855	364

f. Explosives, Drilling & Blasting:

Statement of Explosives Used:

	QUANTITY		PRICE	AMOUNT
40% No. 4 Bag Powder,	80,000	Lbs.	$10.00	$8,000.00
25% 3x10 Quarry Gelatin,	33,650	"	9.75	3,280.88
25% 5x16 Quarry Gelatin,	32,250	"	9.75	3,144.38
40% 7/8 x 8 R.C.Extra Powder,	50	"	10.00	5.00
Total Powder,	145,950	"	9.887	$14,430.26
No. 6 Blasting Caps,	500		1.22	6.10
No. 6 Electric Exploders,	855		15.75	134.66
No. 20 Connecting Wire,	41	Lbs.	.40	16.40
Fuse, Clover	600	Ft.	.595	3.57
Lead Wire,	500	Ft.	1.40	7.00
Cap Crimpers,	2		1.00	2.00
Total Caps, etc.,				169.73
TOTAL COST, ALL EXPLOSIVES,				$14,599.99

		Crude Ore 1940	Concs. 1940
Product,	(Tons)	654,234	425,274
Lbs. Powder per ton of Ore,		.2231	.3432
Cost per ton for Powder,		.0221	.0339
Cost per ton for Caps, etc.,		.00026	.0004
Cost per ton All Explosives,		.02232	.0343
Average Cost per Lb. for Powder,		.09887	.09887

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7. OPEN PIT:
(Continued)

g. Open Pit Mining & Loading:

The 1940 ore season presented the problem of mining as much ore as possible with one shovel, confining the operation to a narrowly restricted area. The program consisted in mining the high ore bank in the west end of the pit, down to the existing pit floor, carrying the work northward across the Brown lease to the north limits in the North Star. This was all undertaken by loading the ore directly into dump cars and 259,000 tons of concentrates were secured from this area. The remaining 166,000 tons of the season's requirements had to be secured through carrying the mining in this same area approximately 40 feet below the pit floor. The crude material was loaded into trucks and hauled to an adjacent transfer pocket or ramp, and loaded into dump cars.

The operating shifts were so arranged that there was time between shifts to fill all empty cars, re-load and remove pit rock encountered in mining and to shift loading tracks. This was necessitated by the fact that an adequate supply of ore for a normal production at the mill could not be furnished with one shovel.

Ore operations were commenced on June 4th, and conducted one shift per day and five days per week until July 5th, making the necessary adjustments and changes at the mill during the afternoon shift. On July 5th, the work was stepped up to two 8-hour shifts per day and five days per week, the operating shifts so arranged that there was an intervening four-hour period for the extra pit work. The program was continued on this basis until the 23rd of September, when it was found necessary to operate the plant five days of three 8-hour shifts each per week throughout the balance of the season, in order to complete the tonnage requirements. A total of 654,234 tons of crude ore were mined and treated, producing 425,274 tons of concentrates.

The mining in the upper bench was carried to the north limits by a series of shovel cuts along the face. The bank was 60 feet in height and it was necessary to use a very heavy charge in the blasting to insure free-running in the loading operations. This minimized the hazards of constant caves and slides in the ore bank. The area was congested and considerable track work was involved. However, by filling the empty cars between shifts, a good average output was maintained during this phase of the work.

While the high bank was being mined to the pit floor level, a pocket, or "ramp" was constructed, with the necessary tracks and haulage roads. A sinking cut was started below the pit floor to open up the deeper layers of ore. Mining in the latter started the first week in September, using the three Euclid trucks to haul the crude material to the ramp. Due to the restricted area, it was necessary to carry the work downward on a 15% grade. The haulage road took the shape of an "S" and reached a depth of

HOLMAN-CLIFFS MINE
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YEAR 1940

7. OPEN PIT:
(Continued)

g. Open Pit Mining & Loading: (Continued)

40 feet below the pit floor in a distance of 300 feet. A layer of lean ore, immediately below the pit floor, necessitated taking the entire 40 feet in one cut in order to grade the ore. At this depth the mining was conducted 20 feet below the pit water level and constant infiltration presented quite a problem. Dry roads could not be maintained and the crude ore was painty, resulting in very slippery hauling conditions. Operating under these difficulties, the production of crude ore in the pit was quite slow. Moreover, the sticky ore was difficult to handle at the washing plant and it was necessary to run at a reduced speed. For that reason it was necessary to go to a three shift operation as soon as experienced plant men, truck drivers and trucks were available from the Hill-Trumbull Mine.

The ore from the high bank was contaminated by sand and gravel which had been washed down into the former underground workings. This occasioned some delays in sorting and resulted in a high Silica content in the concentrates. The crude material, which was mined below the pit floor, was very irregular as to grade. The top one-third was very lean and painty and the material was difficult to handle in the mill. There were numerous delays in shifting operations and in sorting ores for grading purposes.

The pit rock encountered in the operations during the fore part of the season was hauled by train to the waste dumps; that removed in the deep operations was hauled by truck to adjacent barren areas.

k. Drainage:

The water level in the Holman pit was lowered an additional ten feet in August, in preparation for a deep mining operation. The 7,000 gallon per minute pump was used for that purpose and the pumping cost was much higher during that month. Smaller pumps were used to unwater the southwest corner of the Brown and the mining operations in the Brown-North Star area, pumping the water into the Holman pit.

On December 23rd, pumping with the 7,000 gallon per minute equipment was again resumed in a program to completely unwater the pit.

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8. COST OF OPERATION:

a. Comparative Mining Costs:

	Budget Estimate	Year 1940
PRODUCT: (Tons)	250,000 400,000	425,274
Average Shift Production,		2,250
Tons Per Man Per Day,		30.04
Days Operated,		97
COST:		
Open Pit Wash Ore,	$ .163	$ .229
General Pit Expense,	.055	.113
Concentrating,	.151	.151
General Mine Expense,	.085	.064
Winter & Idle Expense,	.113	.108
Cost of Production,	.567	.665
Depreciation, Plant & Equipment,	.150	.150
Amortization - Stripping,	.390	.390
Taxes - Ad Valorem,	.188	.173
Taxes - Occupational,	.076	.076
Taxes - Royalty,	.060	.060
Total Cost at Mine,	$ 1.431	$ 1.514
Administrative Expense,	.100	.100
Miscellaneous Expense & Income,	.003	.003
GRAND TOTAL, ----------	$ 1.534	$ 1.617

d. Detailed Cost Comparison:

(1) Product:

In analyzing the Holman-Cliffs cost sheet for 1940, a comparison is made with the estimated costs only. The operation was so different from that in other years, that a comparison with any former operating costs would be meaningless.

The total cost of production for 1940, including Winter and Idle Expense, was $.098 per ton above the budget estimate. This was entirely within the accounts "Open Pit Wash Ore" and "General Pit Expense." Drilling results developed the necessity of changing the method of operation from that originally planned, increasing the costs. This, together with additional repairs to equipment, additional pumping, extensions to power lines and the installation of coal elevating equipment, all of which were chargeable to the season's ore operations, accounted for the increased cost.

(2) Open Pit Mining:

There was an increase of $.066 per ton in this account. Drilling and Blasting was $.001 under the estimate, due to the fact that

HOLMAN-CLIFFS MINE
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YEAR 1940

8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)
the powder cost for the deep ore was less than that required for the high bank operations from which it had been originally planned to take all of the crude ore. Power Shovels Operating was up $.001, due to the slow production during the latter part of the season. The Power Shovel Maintenance items were the same.

Locomotives and Cars Operating and Locomotives and Cars Maintenance were both down $.002, due to the fact that the hauling was practically all on main lines and required the use of but three trains. Track Expense was down $.009 below the estimated budget figure, for it was necessary to use the small track crew on other work during the greater part of the season. This resulted in a lower cost, for there was very little opportunity for main line maintenance. In addition, there was no track work in connection with the truck and "ramp" operation during the latter part of the season.

Not having anticipated a truck operation at the time of the budget estimate, no allowance had been made for the operating and maintenance of trucks, nor for the maintenance of roads and the "ramp" operation; consequently, there was a total increase of $.012 over the budget in these accounts.

Added to the operating costs in open pit mining was a charge of $.043 per ton, covering added equipment repairs; a new pit substation; power line extensions and other pit work necessary in the mining operation. No provision for these items had been made in the early estimates.

(3) General Pit Expenses:
The increase of $.058 per ton over the budget, under this caption, was due entirely to increases of $.022 - $.020 and $.016, in Pumping and Drainage; General Open Pit Expense, and Exploratory Drilling, respectively. Lowering the water level in the Holman pit and the pumping necessary in the deep ore operations in the Brown #1 pit, occasioned the increase in the first of these items. General Open Pit Expense included costs for the construction of "ramp" and pit roads; added safety switches and cutouts in the power lines; the installation of a telephone system; the installation of coal-handling equipment and the construction of a temporary road into the pit. No provision had been made to cover all of these items in the budget estimate. The charges to Exploratory Drilling included the cost of the work with the company sample drill in addition to the contract drilling program. The former program was extended during the season as the tonnage was increased and the work was necessary in connection with the 1940 ore operations. This resulted in the increased cost per ton over the budget estimate.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(4) Concentrating:

The 1940 cost per ton under this account was the same as the budget estimate. The increases in Washing; Power-Mill Machinery, and General Expense were offset by a saving under Transportation, or Conveying, and Maintenance - Building and Machinery.

(5) General Mine Expenses:

This account showed a decrease of $.021 per ton, as compared with the estimate. The charges for Mining, and Mechanical and Electrical Engineering were the same.

Analysis and Grading and Safety work were down $.002. This was due to the fact that the proportionate charges to the Holman Mine were lowered, due to increased tonnages at all three operating mines. For this same reason, the charges for Ishpeming Office; District Office and Mine Office Expense were $.002, $.004 and $.004, respectively, under the budget figures.

A saving of $.002 in Insurance was realized through a reduction in the rates and a reduction in the expected number of employees. The rate on plant and equipment insurance was also slightly lower than had been anticipated.

The decrease of $.003 in the Personal Injury account was due to a smaller number of employees than had been anticipated.

Social Security Taxes were the same as the budget estimate. No charges had been anticipated for Geological Expense and the cost per ton under this account was up $.001 over the budget estimate. There was a saving of $.001 under the caption "Employees Vacation Pay", due to the increased percentage of new men among the employees.

(6) Winter and Idle Expense:

The equipment repairs, which were undertaken just previous to the ore operations and continued into the operating period, were charged into the open pit mine account. This resulted in a saving of $.005 per ton over the budget figures.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

The contract drilling program, which was started by the Schultze Company of Grand Rapids, Minnesota, in November, 1939, carried over into the year 1940; Structure holes Nos. 35, 36, 37, 38 and 39, - at depths of 180' - 186' - 90' - 192' and 181', respectively, were completed in the Brown lease. Holes Nos. 1011 at 158' - #102, at 162' and #1013 at 122' - were completed in the North Star. These were all put down in the high bank at the west end of the pit.

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9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

This drilling resulted in a decrease in the anticipated tonnage in this area.

In addition to the above, a program was undertaken with the company drill in the Brown lease, in the west end of the pit bottom. The work was started early in the season and continued throughout the year. Forty-three holes were drilled, varying in depth from 12 feet to 157 feet, and totaling 2,656 feet of drilling. About one-half of this footage only showed useable ore.

10. TAXES:

The following statement shows the Holman-Cliffs Mine taxes and the average rates for the years 1939 and 1940:

	1940	1939	Increase	Decrease
Holman-Brown Mine,	$43,310.05	$41,773.29	1,536.76	-
Bingham Mine,	17,006.47	16,403.03	603.44	-
North Star Mine,	9,055.68	8,734.37	321.31	-
Holman-Cliffs Aux.Lands,	1,924.35	1,943.66	-	19.21
Bingham-North Star Washing Plant Lands,	44.57	45.03	-	.46
Holman-Brown Lands,	22.76	22.98	-	.22
Holman-Cliffs Shops and Office,	240.97	232.39	8.58	-
Holman-Cliffs Personal Property,	2,161.51	508.70	1,652.81	-
Total, -	73,766.36	69,663.45	4,102.91	-
Rented Buildings,	866.06	837.13	28.93	-
GRAND TOTAL, -	$74,632.42	70,500.58	4,131.84	-
Average Tax Rate,	.09413	.09090	.00323	-

The tax rate for the village of Taconite was higher for the year 1940 by $.00334, accounting for the increase in the taxes on mine buildings.

There was a decrease in the tax rate for the Iron Range Township. This drop of $.00096 in the tax rate accounted for a decrease in the taxes on washing plant lands. Personal Property taxes showed an increase, due to the fact that the equipment from the Mesaba-Cliffs operations at the Canisteo Mine had all been received and in operation early in the year.

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11. ACCIDENTS AND PERSONAL INJURY:

There were but three lost-time accidents during 1940 at the Holman-Cliffs Mine, a description of which follows:

NAME: Oni Luoma DATE: February 13, 1940.
CAUSE: Luoma and Salmi Anderson were engaged in hooking salvaged rails to bunching chains, back of the tractor, so that the rails could be skidded to the decking ground. Luoma and Anderson were prying one end of a rail with a bar, so that the chain could be hooked through the bolt hole. The bar slipped from Luoma's hands and came down across the toe of his left foot, splitting the great toe. In handling the bar, hooks, etc., in the snow on a mild day, their mittens and the bar became slippery, making it difficult to hang on to the bar. As Luoma and Anderson were prying, using the same bar, Luoma, on the end and Anderson nearer the rail, Anderson was unable to hold the bar as it slipped from Luoma's hands.
NATURE: Comminuted fracture of terminal phalanx, first metatarsal bone - left foot.
TIME LOSR: Two weeks - four days.
COMPENSATION - $30.58.

NAME: George Lakich DATE: July 16th,1940.
CAUSE: Lakich complained to the blacksmith at noon of pain in abdomen and of not feeling well. He reported to the shop foreman at 3:00 P.M., and stated that if he did not feel any better the following day, he would not be out to work.
NATURE: Left indirect hernia, left side, with bowel in hernia sac, partial strangulation present.
TIME LOST: - Six weeks, four days.
COMPENSATION: - $109.71.

NAME: Sigward Sigfrinius DATE: Sept. 27th, 1940.
CAUSE: As injured was helping to unload gasoline-driven pump from tractor, on which it had been hauled from pit, the pump overbalanced and rolled to the ground, striking him a glancing blow on the right ankle.
NATURE: Tenderness and swelling of external malleclus of right ankle. Also small abrasion.
TIME LOST: One Week, two days.
COMPENSATION: $ 6.55.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

The coal dock, which had been dismantled and moved from the Mesaba-Cliffs operations at the Canisteo Mine, was re-erected, replacing the old Holman Mine structure. The old trestle approach to the dock was dismantled and a loading pocket and belt conveyor were installed to elevate the coal to the top of the dock.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION: (Continued)

The car repair house was moved from the Canisteo Mine and re-erected on new foundations at the Holman.

During the ore season, a temporary transfer pocket, or "ramp", was erected in the Brown No. 1 pit, for the truck operations.

Following the ore season, construction was started on a new laboratory building and the former quick laboratory is being remodeled for a crusher house at the washing plant. A steel building for the new change house was received and erected and the necessary water and sewer connections were made.

A small addition was made to the shops for a boiler house. A re-built shovel boiler was installed for the heating system and the latter was overhauled in preparation for the fall and winter work.

A new and more efficient transfer pocket, or "ramp", with its connecting roads and tracks will be erected for the 1941 ore operations.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

The reconditioning of the washing plant included the installation of the following new equipment: One 25-foot log washer, with speed reducer and motor drive; four 66" high weir double pitch Akins classifiers, with driving mechanism; two picking belts, complete; two 4'x6' Allis-Chalmers vibrating screens for log deslimers; a 5'x14' Robins double-deck vibrating screen - and a 2,000 gallon per minute centrifugal pump, with motor drive.

A Ford 1-1/2-ton dump truck was purchased for the disposal of picking belt rock to avoid confusion with electric haulage tracks and trolley lines around the washer building.

Three 15-ton Euclid rear-end dump trucks and a "caterpillar" D-8 tractor were purchased for the mining operations in the deep ore body in the Brown and North Star leases. This equipment was also used in the fall stripping program.

A 2-ton "International" platform truck for general surface use was delivered in August.

The following additional pit equipment is proposed for the 1941 operations: One Model 4101 "Marion" electric shovel, with a 3-1/4-yard bucket; one Model 27-T Bucyrus-Armstrong blast hole drill, with structural attachments; three Euclid 15-ton Trucks;

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13. EQUIPMENT AND PROPOSED EQUIPMENT:

one "caterpillar" D-8 tractor and a 5-yard capacity LaPlante-Choate "Carrimor" scraper.

At the washing plant, a Koehring 6-yard Model WD-60 Dumptor truck will be purchased for rock disposal, replacing the electric haulage system.

14. MAINTENANCE AND REPAIRS:

Previous to the ore season, the steam haulage equipment, the 120-B electric shovel, and the blast hole drills were given some repairs.

The reconditioning of the washing plant, consisting of repairs and re-arrangements of the existing equipment, and the installation of the new machines was started early in March and carried forward to June first.

Upon conclusion of the ore season, the fall and winter repairs to the locomotives and cars were undertaken at the shops. This includes completely overhauling the locomotives and their boilers and the checking over and reconditioning of the 30-yard dump cars. At the washing plant, the usual winter repair work was conducted from the close of the ore season until the 13th of December.

18. NATIONALITY OF EMPLOYEES:

NATIONALITY:	NO. OF MEN
American,	39
Austrian,	4
Bulgarian,	1
Canadian,	3
Croatian,	2
English,	1
French,	1
Finnish,	18
German,	5
Irish,	1
Italian,	6
Jugo-Slav,	8
Montenegrin,	1
Norwegian,	6
Swedish,	11
Scotch,	2
Total,	109

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19. WASHING PLANT OPERATIONS:

The operating season at the Holman-Cliffs washing plant extended from June 4th until October 18th, a total of 97 days, or 189 shifts. During the first month the washing plant was operated a single shift, five days per week. From July 5th to September 23rd, it was conducted five days per week of two 8-hour shifts, each. During the last month, the washing plant operation was stepped up to a 3-shift basis. A total of 425,274 tons of concentrates were secured in the treatment of 654,234 tons of crude ore.

The performance of the mill equipment, with the exception of the double-deck screen, was satisfactory. The screen worked very well with a dry, rubbly ore, but the perforated plate decks were unable to handle sticky crude material. Whenever the latter was encountered, it was necessary to operate the mull at a reduced feed. This will be corrected during the coming year by rebuilding the screen so that wire mesh decks can be used.

There were few delays due to other mill equipment.

As had been anticipated, the Akins classifiers proved to be much more efficient than the Dorr bowls, both as to quantity and quality of concentrates produced.

The amount and analysis of the plant rejects for 1940 were as follows:

	5-Ft. Pan Rejects:			
Lease:	Tons	Iron	Phos.	Silica
Brown, ----------	32,238	29.50	.019	54.07
North Star, ----------	20,265	30.02	.022	48.58
Total, ----------	52,503	29.70	.020	51.95
Lease:	Tons	Iron	Phos.	Silica
Brown, ----------	6,921	33.35	.022	47.85
North Star, ----------	3,486	34.74	.027	45.73
Total, ----------	10,407	33.82	.024	47.14

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

	Cu. Yds.	Tons	Iron
Brown, ----------	8,043	12,065	22.89
North Star, ----------	2,460	3,690	30.54
Total, ----------	10,503	15,755	24.68

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19. WASHING PLANT OPERATIONS: (Continued)

The analysis of the product from the various machines for the year 1940 was:

BROWN MILL MACHINES:

	Iron	Phos.	Silica
Log Washer, ----------	56.85	.037	13.43
Classifier, ----------	58.57	.033	11.81
Tailings, ----------	20.76	-	-

NORTH STAR MILL MACHINES:

Log Washer, ----------	57.50	.037	12.57
Classifier, ----------	59.42	.034	10.35
Tailings, ----------	21.58	-	-

The following is the concentrating data for the Holman-Cliffs Mine during the year:

	Tons	Percentage of Total Mined	Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined,	722,492	100.00	44.20		
Less: Rock removed in Mining,	15,755	2.18	24.68		
Crude Ore transported to Mill,	706,737	97.82	44.63		
Less: Rock rejects in crusher house,	52,503	7.27	29.70		
Crude Ore entering mill,	654,234	90.55	45.83		
Concentrates produced,	425,274	58.86	58.49	65.00%	82.96%
Rock Rejects on Mill picking belt, -	10,407	1.44	33.82		
Tailings (by deduction) -	218,553	30.25	21.77		
Total Rock and Lean Ore from above,	68,258	9.45	28.54		

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1. GENERAL:

Repair work was started in the shops on January 4th, upon the completion of the winter stripping program. The washing plant repairs were uninterrupted from the time they were begun, at the close of the ore season in the fall of 1939. The usual two week lay-off was not put into effect for the holiday season, because of activities in the mine during that period. The repair crews were worked on a one shift, five days per week basis and the time of the men was staggered in order to employ as many as possible.

A total of five locomotives and eighteen 30-yard air dump cars were given a thorough overhauling during the first four months of the year. The work consisted in the replacement of worn and broken parts and the general reconditioning and adjustment of the mechanism of this equipment. Necessary repairs were also made on the blast hole and structure drilling machinery.

The model 350 Marion steam shovel and the 120-B electric shovel (No. 34) were given a thorough overhauling after a season of steady operation. Such parts as required special attention were removed and sent to the shop and other necessary repairs were made in the pit.

One of the 120-B electric shovels (No. 35) was purchased from the Canisteo Mine and received at the Hill-Trumbull Mine early in March. This machine was erected in the pit and necessary repairs were made as the work progressed.

In addition to the general overhauling of the plant machinery and equipment, a new 5' x 14' Robins double-decked vibrating screen was installed to replace the old trommel.

A crew of track men started work on April 22nd. A loading track was laid on the second bench on the north side of the Hill pit and served for the handling of clean-up material, as well as for ore operations. The main line and approach tracks were checked over and were given such attention as was necessary.

Ore operations for the 1940 season were started on May 6th, and continued to October 15th. The mining of wash ore and production of concentrates were completed on September 30th, and direct ore loading was carried into October. Concentrates were shipped from the stockpile from September 26th to October 25th. Mine and washing plant operations were conducted on a three shift, five days per week basis throughout the season.

The washing plant operated 107 days in the treatment of 1,298,142 tons of crude ore, which resulted in the production of 765,330 tons of concentrates. The direct shipping ore loaded during the year

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1. GENERAL:
(Continued)

amounted to 289,980 tons. The average daily output of concentrates was 7,152 tons. Direct ore operations were not conducted on a regular schedule, but the material was loaded as required for making up cargoes. A total of 79 shifts were worked during the season, with an average production of 3,671 tons per shift.

Stripping operations were started on October 2nd, on a two shift five days per week basis. The work was all done in the Hill pit and consisted in the removal of rock from the mining area in the north central part of the property, and the clean up of sloughed surface material along the north and south banks. The rock was used in making fills for the ramp and truck roads and the surface material was hauled to the dumps. These activities were completed on November 2nd.

No program of exploration was carried on during 1940. The two structure drilling outfits worked until January 9th, to complete the rather extensive campaign undertaken in 1939.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Hill Crude,	496,626	tons.
Trumbull Crude,	801,516	"
TOTAL CRUDE,	1,298,142	"
Hill Non-Bessemer Direct Shipping Ore,	277,487	"
Hill Bessemer Direct Shipping Ore,	12,493	"
Hill Non-Bessemer Concentrates,	206,433	"
Hill Bessemer Concentrates,	102,016	"
Trumbull Non-Bessemer Concentrates,	309,363	"
Trumbull Bessemer Concentrates,	147,518	"
TOTAL PRODUCED,	1,055,310	"

b. Shipments:

The shipments from the Hill-Trumbull Mine during 1940 were as follows:

Hill Non-Bessemer Direct Shipping Ore,	277,487	tons
Hill Bessemer Direct Shipping Ore,	12,493	"
Hill Non-Bessemer Concentrates,	206,433	"
Hill Bessemer Concentrates,	102,016	"
Trumbull Non-Bessemer Concentrates,	341,118	"
Trumbull Bessemer Concentrates,	147,518	"
TOTAL SHIPMENTS,	1,087,065	"

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

c. Stockpile Inventories:

At the end of the 1939 shipping season, there remained in stockpile a total of 31,755 tons of concentrates, all of which was loaded out in April of 1940. During the year there was placed in stockpile a total of 116,079 tons of ore, and the entire amount was loaded and shipped by October 25th.

The following amount of lean material is now in stock:

Concentrating Material Above 25%:

	Tons	Iron	Phos.	Silica
Hill,	55,439	29.37	.037	52.71
Trumbull,	231,778	27.55	.031	55.13
Total,	287,217	27.90	.032	54.66

Non-Concentrating Material Above 35%:

	Tons	Iron	Phos.	Silica
Hill,	142,833	48.50	.081	21.90

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,	114,481	100,280	214,761
June,	110,404	120,837	231,241
July,	95,247	201,335	296,582
August,	54,111	231,143	285,254
September,	122,383	147,921	270,304
TOTAL 1940,	496,626	801,516	1,298,142

(2) Concentrates & Direct Ore:

MONTH	HILL DIRECT TONS.	HILL CONCS.	TRUMBULL CONCS.	GRAND TOTAL
May,	28,322	69,589	55,125	153,036
June,	62,890	66,000	64,761	193,651
July,	73,339	57,864	111,312	242,515
August,	57,161	33,267	131,274	221,702
September,	45,440	73,593	87,937	206,970
October,	22,828	8,136	6,472	37,436
TOTAL 1940,	289,980	308,449	456,881	1,055,310

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

f. Ore Statement:

All of the ore, of merchantable grade, mined during 1940, was shipped from the property.

g. Delays:

The following delays were reported during the year 1940:

Date	Time Lost Hours	Time Lost Minutes	Cause:
May 6th,	9	-	No ore, break-down on shovel.
9th,	-	45	Broken trolley line on rock haulage.
11th,	-	30	Broken oil line on pump.
14th,	-	45	Break-down on shovel.
16th,	1	40	Out of ore - broken hoist cable on shovel.
20th,	2	35	Out of ore.
22nd,	1	-	Out of ore.
	-	25	Chute plugged.
	-	25	Broken spring on screen.
27th,	-	50	Out of ore.
28th,	1	20	Out of ore.
29th,	1	05	Out of ore.
31st,	1	10	Out of ore.
June 19th,	-	35	Packing pump.
21st,	-	25	Repairing rollers on 36" conveyor.
27th,	1	20	Broken spring on double-deck screen.
July 2nd,	1	45	Out of ore.
8th,	1	10	Out of ore.
12th,	1	45	Trouble with belt on stacker.
16th,	-	35	Repairing pulley on classifier.
17th,	-	20	Repairing pulley on classifier.
	-	20	Repairing screen cloth on 4' x 6' vibrating screen.
18th,	6	05	Broken crankshaft on classifier; ran one side of mill.
23rd,	2	06	Out of ore.
	-	45	Switch on 36" conveyor out of order.
	1	-	Broken transverse spring on vibrating screen.
	1	35	Burned out coil on motor generator set starter.
24th,	1	40	Repair above coil.
26th,	1	30	Out of ore.
31st,	1	-	Trouble with switch on starter.
Aug. 5th,	-	30	Out of ore.
7th,	1	20	Out of ore.
8th,	1	45	Out of ore.
12th,	2	30	Out of ore.
	-	25	Broken spring on double-deck screen.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Time Lost Minutes	Cause:
Aug. 13th,	-	35	Out of ore.
21st,	1	10	Out of ore.
22nd,	1	05	Mechanical trouble in mill.
23rd,	6	-	Shovel broke down.
26th,	1	30	Out of ore.
	-	30	North classifier plugged.
27th,	-	25	Out of ore.
28th,	2	55	Out of ore.
	-	30	Trouble on stacker.
30th,	2	15	Out of ore.
Sept. 3rd,	3	15	Out of ore.
4th,	-	45	Repairing 4' x 6' vibrating screen.
5th,	-	40	Repairing 4' x 6' vibrating screen.
6th,	-	45	Out of ore.
12th,	1	55	Out of ore.
13th,	2	-	Out of ore.
16th,	1	45	Out of ore.
	-	40	Classifier plugged. Power off.
17th,	1	10	Out of ore.
18th,	2	45	Out of ore.
20th,	1	10	Out of ore
24th,	-	55	Out of ore.
25th,	2	20	Out of ore.
27th,	1	20	Repair broken water supply pipe.
28th,	-	50	Repair broken water supply pipe.
30th,	1	50	Out of ore.
Total,	92	56	

3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist	Fe. Nat.
Hill Non-Bess.Direct,	277,487	60.58	.057	7.98	.12	.93	8.20	55.61
Hill Bess.Direct,	12,493	62.40	.044	6.07	.12	.98	8.15	57.31
Hill Non-Bess.Concs.	206,433	59.29	.050	8.05	.12	.41	7.89	54.61
Hill Bess. Concs.	102,016	59.66	.039	8.83	.13	.42	7.68	55.08
Trumbull Non.Bess.Concs.	309,363	59.53	.049	6.18	.13	.45	9.39	53.94
Trumbull Bess.Concs.	147,518	59.33	.041	6.33	.15	.43	9.81	53.51
Total,	1,055,310	59.78	.049	7.29	.13	.57	8.66	54.60

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3. ANALYSIS:
(Continued)

b. Mine Analysis of Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Hill Non-Bess.Direct,	277,487	60.58	.057	7.98	.12	.93	8.20	55.61
Hill Bess. Direct,	12,493	62.40	.044	6.07	.12	.98	8.15	57.31
Hill Non-Bess.Concs.	206,433	59.29	.050	8.05	.12	.41	7.89	54.61
Hill Bess.Concs.	102,016	59.66	.039	8.83	.13	.42	7.68	55.08
Trumbull Non-Bess.Conc.	341,118	59.54	.049	6.16	.13	.44	9.28	54.01
Trumbull Bess.Concs.	147,518	59.33	.041	6.33	.15	.43	9.81	53.51
Total,	1,087,065	59.77	.049	7.25	.13	.57	8.65	54.60

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Hill Crude,	496,626	43.66	.040	32.51
Trumbull Crude,	801,516	40.94	.036	35.16
Total,	1,298,142	41.98	.038	34.15

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Hill Non-Bess. Direct,	60.50	.057	7.90	.12	.96	.14	.14	.013	4.10
Hill Bess.Direct,	62.30	.043	6.00	.11	1.02	.16	.12	.013	3.40
Hill Non-Bess.Concs.	59.26	.049	8.03	.10	.46	.16	.12	.010	6.24
Hill Bess.Concs.	59.65	.038	8.80	.10	.42	.14	.14	.012	4.99
Trumbull Non-Bess.Concs.	59.52	.048	6.13	.12	.43	.16	.12	.010	7.79
Trumbull Bess. Concs.	59.40	.040	6.27	.14	.44	.14	.12	.010	7.94

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:
Hill-Trumbull Mine:
Assumption:

Class of Material:	Cu. Ft. Per Ton	Rock Deduction	Recovery
Merchantable Ore, ----------	13	10%	-
Wash Ore, ----------	14	-	60.04%
Lean Wash Ore, ----------	15	-	46.45%
Low Grade Wash Ore, ----------	15	-	61.00%
Lean Low Grade Wash Ore, ----------	15	-	42.29%
Rocky Wash Ore, ----------	14	-	51.24%
Jig Ore, ----------	14	-	42.23%

The above factors were used in preparing the revised estimates of both the Hill and Trumbull, as of May 1st, 1940, and were accepted and used by the State Tax Commission engineers in preparing their most recent tonnage figures for this property. They are based on actual results obtained in mining operations, in the case of merchantable ore,

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)
Hill-Trumbull Mine:

and on data procured from hand-wash tests made on the 1940 [illegible] 1940 structure drill samples for all classes of wash ore and the jig ore. It will be noted that a percentage of rock deduction has been set up only for merchantable ore. This factor has been taken into consideration in calculating the percentages of recovery for the various grades of wash ore and the jig ore.

The following tabulation shows the estimate of January 1st, 1940, the revised estimate as of May 1st, 1940, the amount mined during 1940 and the ore reserve estimated as of January 1st, 1941:

	Jan. 1st, 1940	Revised May 1st, 1940	Mined 1940	Jan.1st, 1941
Hill Mine:				
SE¼-NE¼, Sec.17,	1,655,059	1,856,707	470,914	1,385,793
SW¼-NE¼, Sec.17,	773,808	959,226	65,402	893,824
SE¼-NW¼, Sec.17,	371,551	700,540	62,113	638,427
TOTAL HILL,	2,800,418	3,516,473	598,429	2,918,044
Trumbull Mine:				
NE¼-SW¼, Sec.17,	1,785,858	2,802,779	456,881	2,345,898
NW¼-SW¼, Sec.17,	1,228,834	1,921,015	-	1,921,015
NE¼-SE¼, Sec.18,	-	12,779	-	12,779
TOTAL TRUMBULL,	3,014,692	4,736,573	456,881	4,279,692
GRAND TOTAL - HILL-TRUMBULL MINE,	5,815,110	8,253,046	1,055,310	7,197,736

It will be noted that there is a substantial increase in the total of the revised estimate as of May 1st, 1940 over the reserve estimate of January 1st, 1940. This is accounted for by the fact that the State Tax Commission engineers made a review of the Hill-Trumbull property during 1940 and set up new tonnage figures as a result. In their estimate they included ore outside of the present pit limits and a considerable quantity of jig ore, which were not previously considered as part of the taxable ore body. The Tax Commission engineer's estimate, as originally prepared, showed a total of 11,043,184 tons of ore in the property, made up of 1,105,887 tons of direct ore, 7,399,015 tons of wash concentrates and 2,538,282 tons of jig concentrates. The figures for wash concentrates and jig concentrates were based on broad assumptions and old and inaccurate information, and were so far in excess of any reasonable calculations that it was deemed advisable to have the State officials make an inspection of the property. This was accordingly arranged, and a tour of the mine was made, in October,

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

by the State engineers and Company representatives. Observation made at this time convinced the Tax Commission engineers that they had classified large quantities of material as wash and jig ore, which were, in reality, untreatable taconite. As a result of the inspection, the original State estimate was scaled down to a total of 8,253,046 tons, made up of 1,105,887 tons of direct ore; 6,226,087 tons of wash concentrates and 921,072 tons of jig concentrates. There was no change in the tonnage of direct ore, as this was based on accurate information, but the wash concentrates were reduced by 1,172,928 tons, and the jig concentrates by 1,617,210 tons, or a total of 2,790,138 tons.

The Company's estimate of May 1st, 1940, as submitted to the State Tax Commission, shows a total of 6,387,454 tons, made up of 1,075,017 tons of direct ore and 5,312,437 tons of concentrates. At the time the estimate was made, 745,300 tons of proven jig concentrates were set up, but were not included in the above figures, as this material had not been previously classed as taxable ore. In view of the fact that the State authorities have seen fit to include jig ore in their latest estimate, the 745,300 tons of jig concentrates may properly be added to the Company's figures, bringing the total to 7,132,754 tons. This amount is less by 1,120,292 tons than the total shown in the final estimate of the State Tax Commission engineers; however, since the Company's estimate was very conservative, and disregarded marginal ore and any possible extensions beyond the present pit limits, it was considered inadvisable to challenge the Tax Commission's position with regard to the increased tonnage, and their figures were adopted as the basis for the ore reserve estimate as of January 1st, 1941. Of the total difference of 1,120,292 tons, between the estimates made by the Company and the Tax Commission engineers, 613,790 tons is found in the Trumbull property and 506,502 tons in the Hill. The Trumbull increase is accounted for by the extension made to the south of the present pit limits, east of the approach, and the general inclusion of marginal ore on each of the forties. Approximately 65% of the Hill increase comes in the extension on the north side of the pit and the remainder is largely marginal ore.

b. Prospective Ore:

Definite plans have been made to conduct a drilling campaign in the bottom of the Hill pit during 1941, to determine the extent of the ore body and the grade and class of the material. This may increase, to some extent, the reserve tonnage in this area.

Although tonnages have now been set up in the reserve estimate as of January 1st, 1940, for the possible extensions beyond the present stripping limits on the north side of the Hill pit and the south side of the Trumbull, east of the approach, it will be necessary to thoroughly drill these areas to more accurately determine the tonnage and character of the ore located there.

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4. ESTIMATE OF ORE RESERVES: (Continued)

c. Estimated Analysis:

Lease:	Grade	Tons	Iron	Phos.	Silica
Trumbull:					
NE¼-SE¼- 18,56-23,	Bessemer Concs.	2,555 ×	58.86	.036	7.39
	Non-Bess. Concs.	10,224 ×	58.99	.053	7.34
NW¼-SW¼- 17,56-23,	Bessemer Direct,	33,912 ○	55.53	.039	10.89
	Non-Bess. Direct,	101,738 ○	57.82	.053	8.25
	Bess. Concs.	357,073 ×	58.86	.036	7.39
	Non-Bess. Concs.	1,428,292 ×	58.99	.053	7.34
NE¼-SW¼- 17,56-23,	Bess. Direct,	20,570 ○	58.14	.028	8.37
	Bess. Concs.	767,358 ×	57.91	.038	9.35
	Non-Bess.Concs.	1,557,970 ×	59.58	.052	7.24
	Total Trumbull,	4,279,692			
Hill:					
SE¼-NW¼- 17,56-23,	Bess. Concs.	140,454 ×	56.56	.038	11.77
	Non-Bess.Concs.	497,973 ×	57.95	.057	7.90
SW¼-NE¼- 17,56-23,	Non-Bess.Direct,	118,264 ○	60.23	.055	9.05
	Bess. Concs.	465,336 ×	60.62	.032	10.14
	Non-Bess.Concs.	310,224 ×	61.18	.048	7.71
SE¼-NE¼- 17,56-23,	Bess. Direct,	59,556 ○	59.11	.031	10.94
	Non-Bess. Direct,	481,867 ○	60.24	.069	9.09
	Bess. Concs.	506,622 ×	61.74	.029	9.04
	Non-Bess.Concs.	337,748 ×	60.06	.055	8.18
	Total Hill,	2,918,044			
	Grand Total,	7,197,736			

Attention is called to the fact that approximately one-third of the total ore reserve is shown as Bessemer ore, with a fairly low phosphorous content. This may be increased to some extent by mixing in some of the lower phosphorous Non-Bessemer ore, as it is encountered in actual mining operations.

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5. LABOR & WAGES:

a. Comments:

(1) Labor:

Operations at the Hill-Trumbull Mine were not affected, in any way, by labor disturbances during 1940, and the supply of all classes of labor was adequate for the maintenance of full crews in every department.

b. Comparative Statement of Wages & Product:

PRODUCT,	1,055,310 Tons.
Number of Shifts and Hours,	3 - 8-hour.
Average Number of Men Working,	155
Average Wages Per Day,	$ 6.31
Product Per Man Per Day,	44.78
Labor Cost per Ton,	$.141
Total Number of Days,	123
Amount Paid for Labor,	$ 148,827.70

6. SURFACE:

a. Buildings, Repairs:

The roofs of the mine buildings were given a dressing of asphalt paint, and some alterations were made in the shop heating plant. Only minor repairs were required on the dwellings in Marble.

c. Tracks, Roads, Transmission Lines, etc:

The main haulage track leading to the east end of the Hill pit, as established some years ago, was found to be located on a pocket of wash ore, disclosed by drill holes put down in 1939. In order to make this ore available for mining in 1940 it was necessary to move the track approximately 150 feet to the north. In preparing a new roadbed, the south face of the taconite island was cut back a sufficient distance to accommodate the new layout. The greater part of this job was done in April and several shifts were worked, on week-ends, during the first two months of the ore season, to complete it.

In anticipation of a more extensive use of trucks on ore haulage in 1941, roads were constructed in the pit, leading from the ramp to the proposed mining areas.

The usual maintenance work on the tracks and transmission lines, was carried out during the year.

7. OPEN PIT:

a. Stripping:

The stripping operations in the southeast corner of the Hill pit, which were started in November of 1939, were completed on January 3, 1940. The material handled during January consisted of 1,134 cubic yards of sandy lean ore and 2,781 cubic yards of rocky waste, making a total of 3,915 cubic yards.

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

Upon the conclusion of 1940 wash ore operations, a comparatively small program of stripping was carried out, on a two shift, five days per week basis, from October 2nd to November 3rd. One of the four-yard electric shovels and three trucks were engaged in removing rock from the north Hill wash ore area; the material being disposed of in the fills for the "ramp" and truck roads. When this work had been completed, a heavy layer of washed-down surface was cleaned up along the north side of the Hill pit and the sloughed material lying at the toe of the south bank was loaded out. A total of 55,562 cubic yards of stripping was handled, consisting of 24,647 yards of rock and 30,915 yards of surface and slough.

The original estimate for all classes of stripping was 65,000 cubic yards, at a cost of $.300 per yard, or a total cost of $19,500.00. The actual quantity of material handled amounted to 55,562 cubic yards at a total cost of $19,405.09, or $.349 per yard. The difference between the estimated and actual figures is accounted for by the fact that it was very difficult to make an accurate estimate of volumes to be handled, because of the scattered nature of the deposits, and the cost per yard was higher because the rock was tougher than anticipated and some sorting was necessary in handling the sloughed material, which made for slower loading.

d. Timbering:

	PIECES	AMOUNT
Standard Ties, ----------	2,629	$ 2,121.50
Trestle Timber, ----------	1,464'	81.60

f. Explosives, Drilling & Blasting:

	QUANTITY	AMOUNT
No. 4 Bag Blasting Powder, ----------	66,500 Lbs.	$ 6,650.00
25% - 3 x 10" Gelatin, ----------	26,750 "	2,608.12
60% - 5 x 16" Special Gelatin, ----------	15,950 "	1,905.10
60% - 1-1/8 x 8" Special Gelatin, ------	150 "	18.00
40% - 1-1/8 x 8" Red Cross, ----------	950 "	95.00
No. 6 Blasting Caps, ----------	900	10.98
8-Ft. Electric Exploders, ----------	600	34.93
30-Ft.Electric Exploders, ----------	930	115.12
Clover Fuse, ----------	3,000 Ft.	17.85
Lead Wire, ----------	500 Ft.	7.00
Connecting Wire, ----------	51 Lbs.	20.40

g. Open Pit Mining and Loading:

The 1940 ore season was started on May 6th, on a three shift, five days per week basis. The concentrate portion of the season's requirements, amounting to 765,330 tons, (railroad ding weights), was secured by September 30th. Direct ore loading was continued until October 28th, in order to provide a proportion of this class of material for shipment with stockpiled concentrates. The output of direct ore during the season amounted to 289,980 tons, making a

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)
total production of 1,055,310 tons for 1940. The original schedule of 950,000 tons was increased twice during the season.

There were five areas included in the operations for 1940, four of which were in the Hill pit and one in the Trumbull. The Hill areas consisted of the north bench, extending from the taconite island eastward; the rocky wash ore pocket in the north central part of the pit, east of the taconite island; the so-called direct ore area in the southeast corner of the property, and the east end of the south bank. The Trumbull area is located immediately east of the main approach.

One of the four-yard electric shovels was used in the Hill north bench from early in May until June 7th. Mining was started in the vicinity of the taconite island and carried eastward, all of the material in the bench being taken in a single cut. Owing to the mixed nature of the deposit, there being alternate pockets of fairly good wash ore and horses of rock, the operation was not carried on continuously, but ore was loaded only at such times as grading conditions would permit. A total of 26,426 tons of concentrates was produced from this area.

Upon the completion of mining activities in the north bench, the shovel was moved to the north central Hill rocky wash area. The top layer of this deposit was loaded directly into cars until the excavation became too deep for track grades; after which time the three Euclid trucks were placed in service and the ore hauled to a "ramp", where it was delivered to the waiting trains. Rock conditions in this area were such that loading was quite slow, due to the required sorting, and it was necessary to produce ore from another part of the mine, at the same time, in order to supply a sufficient tonnage to the mill.

All of the ore in this area was not mined in 1940, and what remains will be included in next year's program. The original estimate showed 88,681 tons of concentrates, but this total will not be realized, due to the fact that more rock was developed in mining operations than was disclosed by the drilling. The concentrates produced from this area during the past season amounted to 45,884 tons.

A four-yard electric shovel was used throughout the season in mining both wash and direct ore in the southeast corner of the Hill pit. The ore body consisted of an upper layer of wash ore, of varying thickness, and a lower layer of direct ore, both extending over the entire area. During the first two weeks of operations, every effort was directed toward mining the thinner portion of the wash ore layer, in order to open up a washable section of merchantable material. This was accomplished by confining activities largely to the west end of the area and direct ore was available for mining by May 20th. From this time to the end of the season, this class of material was loaded on a schedule consistent with the requirements of the

HILL-TRUMBULL MINE
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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)

grading department. The removal of the wash ore had been practically completed by the end of July, by keeping the shovel engaged in this work on the shifts when merchantable ore was not being mined. As operations were carried forward, a track grade, running from east to west, was developed along the south bank, and this, together with switch-backs, provided a means of access to the deeper ore. When operations were carried to the lower levels, numerous rock horses were encountered. These, being left in place, necessitated the taking of shorter cuts, with the result that more track work was required and the operations were slowed down. Conditions in the southeast corner of the Hill pit are such that practically all of the remaining ore will be moved by truck haulage.

The production from this area consisted of 289,719 tons of direct ore and 168,898 tons of concentrates during 1940. Generally speaking, the grade of both classes of material was very good.

A small tonnage of wash ore was loaded from the west end of the south bank, in the Hill pit, toward the end of the season, in order to provide some high grade concentrates for sweetening purposes.

The Trumbull area east of the main approach was mined continuously throughout the 1940 ore season; approximately 68% of the season's tonnage of concentrates having been produced from this section of the mine. The Model "350" Marion steam shovel was used exclusively in this operation, loading on a track at an elevation of 45 feet above the pit bottom. A sinking cut was developed along the south side of the area. When this had been completed at the desired depth, subsequent cuts were taken to the north, the floor of the pit being carried at a uniform level. The ore was all handled by train, over a switch-back leading to the east end of the Hill Mine, where it joined the main haulage line out of the pit. The grade of the ore varied considerably in different sections of the area; that located on the south side being somewhat lean and yielding a low recovery, while that portion of the ore body to the north was of much better quality.

A total of 524,122 tons of concentrates was produced from this area in 1940.

No operations were conducted in the Trumbull property, west of the approach, during 1940, but operations will be resumed here in 1941.

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8. COST OF OPERATION:

a. Comparative Mining Costs:

	1940 BUDGET	1 9 4 0 COST PER TON	1 9 3 9 COST PER TON
PRODUCT:			
Direct Shipping Ore, Tons	277,778	289,980	237,286
Concentrates, Tons	732,323	765,330	782,387
Total Production, Tons	1,010,101	1,055,310	1,019,673
Average Daily Product "		8,580	8,427
Tons Per Man Per Day		44.78	42.33
Days Operated,		123	121
COST:			
Open Pit Direct Shipping Ore,	$.077	$.060	$.076
Open Pit Crude Ore,	.148	.134	.133
General Pit Expense,	.026	.034	.024
Concentrating,	.137	.125	.136
Stocking Concentrates,	-	.018	.003
General Mine Expense,	.067	.051	.063
Idle & Winter Expense,	.085	.098	.060
Cost of Production,	$.406	$.400	$.374
Depreciation- Plant and Equipment -	.200	.200	.200
Amortization, Stripping,	.250	.200	.250
Taxes - Ad Valorem,	.118	.121	.103
Taxes - Occupational,	.155	.124	.144
Taxes - Royalty,	.045	.048	.037
Total Cost at Mine,	$1.174	$1.093	$1.108
Administrative Expense,	.100	.100	.100
Miscellaneous Expense and Income,	.003	.001	.003
Grand Total, -	$ 1.277	$ 1.192	$ 1.211

The 1940 figures were taken from the December cost sheet, which was prepared before the final figures were received from the Cleveland office. Any changes that are made will be small and will not effect the cost per ton to any appreciable extent.

d. Detailed Cost Comparison:

(1) Product:

The original operating schedule for 1940 called for the production of 950,000 tons, but this was increased, early in the season, to 1,000,000 tons and again, at a later date, to 1,050,000 tons. The budget estimate, as shown in the above tabulation for comparative purposes, is based on the production of 1,000,000 tons. The total

HILL-TRUMBULL MINE
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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(1) Product: (Continued)

output for 1940 amounted to 1,055,310 tons, made up of 289,980 tons of direct ore and 765,330 tons of concentrates; while that for 1939 reached a total of 1,019,673 tons.

Operating conditions in the mine and at the washing plant were generally favorable throughout the season, with the result that the costs realized were quite satisfactory. The cost of production was $.006 under the budget and $.026 above that for 1939. The lower cost for 1939, as compared with that for 1940, is largely reflected in the item, "Idle and Winter Expense", there being a difference of $.038 in favor of the former year.

(2) Open Pit Mining:

The cost of producing direct ore in 1940 was $.017 below the budget and $.016 below that for 1939. In only one instance did the items under this caption exceed the budget figure, all others being equal or somewhat below.

The Drilling and Blasting required in the mining of direct ore was much less than was anticipated, and as a result, only a nominal sum was expended for this purpose. This is accounted for by the fact that the four-yard electric shovel, which was used all season, was able to dig practically all of the ore without the necessity of shaking it up. A two-yard machine was used during most of 1939 and was not able to handle some of the ground without shooting. The cost per ton for Drilling and Blasting was $.010 under the budget and $.008 under the 1939 figure.

Power Shovels Operating was $.002 under the budget and $.003 under the 1939 cost. The use of the larger shovel accounts for the difference. Locomotives and Cars Operating was $.005 under the budget and $.009 under 1939. The saving is explained by the fact that the larger tonnage per shift loaded by the four-yard shovel was handled by practically the same equipment as was used in 1939. The Track Expense in 1940 was higher than in 1939, because ore was mined at a greater depth and several switch-backs were required to reach the lower level, and the occurrance of numerous rock horses shortened the cust, with the result that more track work was required. The cost per ton was $.001 under the budget and $.003 above that for 1939.

The crude ore costs per ton of concentrates, as shown in the tabulation, was $.014 under the budget and $.001 higher than for 1939. However, the cost per ton on a crude ore basis was $.005 above the budget and $.009 above that for 1939, and it is necessary to consider these latter figures in making comparisons of the individual items under this caption. Drilling and Blasting was very close to the budget figures and $.002 above the 1939. The ore mined at lower