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3. ANALYSIS

b. Average Analysis on Shipments

Grade	Iron	Phos.	Sil.	Mn.	Sul.
Stephenwood - To Escanaba	58.80	.696	5.04	.90	.018
to Presque Isle	60.23	.675	4.09	.99	.018
Northwood - To Escanaba	59.87	.642	5.28	1.08	.020

4. COST OF OPERATING

a. Comparative Mining Costs

	1941	1940
Underground Costs	0	1.35
Surface costs	1,881.60	1,704.90
General Mine Accounts	507.21	410.54
Total	2,388.81	2,116.79
Loading and Shipping	6,416.39	2,962.06
Taxes	576.98	1,295.76
Total Cost at Mine	9,382.18	6,374.61

In 1940 there were 28,541 tons loaded.
In 1941 " " 37,694 " "
The increased expense in loading in 1941 was due to final clean-up of the stockpiles, necessitating use of motor trucks.

10. TAXES

	1941		1940	
	Valuation	Taxes	Valuation	Taxes
80 acres - S½ of SW¼ of Sec.20,45-25	1,000	21.10	1,000	20.66
80 acres - N½ of NW¼ of Sec.29,45-25	200	4.22	200	4.14
Personal Property - Ore in stock	25,000	526.96	60,000	1,239.54
Personal property in warehouse	900	18.99	900	18.59
Total	27,100	571.27	62,100	1,282.93
Collection Fees		5.71		12.83
Total Taxes		576.98		1,295.76

CHAMPION MINE

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1. GENERAL:

The bill of sale covering the transfer of the four stockpiles at the Champion Mine from the Champion Iron Company to the Cleveland-Cliffs Iron Company was dated May 15, 1941.

Prior to that date, various officials and some of the Ishpeming district operating personell made numerous inspection trips to the mine after the piles were offered to the Company by Clement C. Quinn.

In the latter part of May, active operations were started by Lindberg & Sons Contractors, although the agreement between them and our Company was not officially effective until June 25th. Speed was mandatory to get the plant going early in July and so we could not and did not wait until all the parties signed the proposed contract.

The Wisconsin-Michigan Power Company ran a line to the property which was finished late in June.

The site was cleared and leveled off in May and timber salvaged from the Jackson Mine, from the Mather Mine, and from the Gardner -Mackinaw was trucked to Champion. Some new timber was furnished for the main pocket but all of the rest of the structure was constructed of second-hand materials.

The contractor built two ramps for loading lumps and fines near the Champion depot and also a ramp over which to transport crude ore from the stockpiles to the main pocket.

The mechanical department in the meantime shipped two conveyor belts, head and tail pulleys and two driving mechanisms from the Mesabi properties to Champion.

A new vibrating screen was also diverted to Champion. This screen was intended for the Holman-Cliffs Mine and it just happened to fit perfectly into the Champion picture.

Although it proved to be unnecessary, a pump from the Gwinn District and a two inch water line was installed to take water from the open pit East of the shaft over to the plant. One or two experiments with the use of water as a spray over the screen quickly convinced us that it was a mistake to use water because the rocky and lean material was soon covered with a film of specular hematite making it almost impossible to separate the rock from the ore.

Loading from the piles was begun on July 8th and the results of the first day's run were decidedly unsatisfactory. It was obvious that the rockpickers, eight in number, were not doing a good job and more men were needed and all of them had to be given intensive training to "spot" the rock. This difficulty was finally ironed out.

The results finally secured were most gratifying both as to percentage of recovery and quality.

During the first two months ore was loaded from the three main piles, the Norfolk, Norwalk, and Champion Crushed in about the same proportion as the original tonnage in each pile. Most of the loading, about two-thirds, was done from the lean or Norfolk Pile. During the

last two and one-half months we concentrated on this pile in order to clean up as much of it as possible to mix with the Cliffs Shaft Lump while the analysis in the latter lump continued to run well above the guarantee.

By the end of the year, shipments from the mine ceasing after November 13, we sent to the dock almost 107,000 tons or about as much as we estimated we would eventually recover from the piles. There still remain at the property about 42,500 tons of merchantable ore.

We operated with 16 men of whom 12 and sometimes 13 were on the picking belt. On a normal days run Lindberg & Sons Contractors used 9 or 10 trucks, 2 usually hauling crude ore to the plant, 1 handling rock, and the other 6 or 7 hauling ore to the loading ramps. On the days that we loaded from the Norwalk or Champion Crushed piles 14 to 15 trucks were needed. Each truck operating between the plant and the loading ramps handled from 160 to 175 tons of ore per shift.

2. PRODUCTION SHIPMENTS & INVENTORIES:

a. Production by Grades

Grade	Tons	% of Total
Champion Lump	64,777	60.6
Champion Fines	42,151	39.4
Total	106,928	100.0

The Champion Lump tonnage was made up as follows:-

Norfolk Lump	48,956 Tons
Norwalk Lump	13,932 "
Champion Lump*	1,889 "
Total	64,777 Tons

*Note: This term Champion Lump must not be confused with the other Champion Lump used to designate all the lump shipped from the mine. The 1,889 tons was the lump secured from the Champion Crushed Ore pile.

The Fines shipped were secured from the three piles as shown viz:

Norfolk Fines	29,138 Tons
Norwalk Fines	7,977 "
Champion Crushed	5,036 "
Total	42,151 Tons

In order to get a clearer picture of the operation it is necessary to add another table showing the tonnage of Crude loaded and the amount of rock discarded.

	Original Tonnage	Tons Recovered	Tons Rock	Crude Ore Loaded	% of Pile Recov.
Norfolk Pile	92,046	78,094	8,310	86,404	90.4%
Norwalk Pile	43,436	21,909	1,488	23,397	93.2%
Champion Crushed	11,161	6,925	24	6,949	99.7%
Total	146,643	106,928	9,822	116,750	91.6%

It will be noted that on the average 91.6% of the stockpiles were recovered and shipped as ore.

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b. Shipments

No attempt was made to differentiate between Lump or Fine ore grades as they were screened from the Norfolk, Norwalk, or Champion Crushed piles. Two grades only were shipped from the Champion Mine--one called "Lump" and the other "Fine" ore.

Shipments follow:-

Champion Lump	64,777 Tons
Champion Fines	42,151 "
Total	106,928 Tons

c. Stockpile Balances

Ore in stock as of Dec. 31, 1941:

Norfolk ore Pile	5,642 Tons
Norwalk " "	20,039 "
Champion Crushed Pile	4,212 "
Beacon ore Pile	6,000 "
Total	35,893 Tons

Note: Above figures based on Clement Quinn's report.

Ore in stock as of December 31, 1941 assuming an overrun of 9,500 tons in the Norfolk ore pile gives these figures

Norfolk ore pile	15,142 tons
Norwalk ore pile	20,039 "
Champ. Cr. pile	4,212 "
Beacon ore pile	6,000 "
Total	45,393 tons

From this tonnage we estimate 1942 shipments to be as follows:-

Lump	25,500 tons
Fines	17,000 "
Total	42,500 tons

e. Production by months was:-

Month	Lumps	Fines	Total
July 1941	9,472	6,687	16,159
Aug. "	15,898	10,082	25,980
Sept. "	15,860	10,585	26,445
Oct. "	16,979	10,325	27,304
Nov. "	6,568	4,472	11,040
Total	64,777	42,151	106,928

Average Daily Output

July	898 tons
August	989 "
Sept.	1,058 "
Oct.	1,011 "
Nov.	1,003 "

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3. ANALYSIS

a. Average analysis of 1941 output

	Iron	Phos.	Silica	Sulphur
Champion Lump	56.45	.073	13.31	.016
Champion Crushed	56.87	.066	13.16	.026

The foregoing figures are a combination of the analysis as reported by the shipping department. These are based on assumed car weights and so do not give the true picture. However, they are given in this report in case the data is used for comparison.

The average analysis of the output is more accurately shown by the following figures, which are weighted averages on actual tonnages.

Lump Analysis

	Tons	Iron	Phos.	Silica
Norfolk Lump	48,956	56.20	.067	14.48
Norwalk Lump	13,932	56.96	.088	9.07
Champion Lump	1,889	63.36	.092	4.38
Total	64,777	56.57	.073	13.03

Fines Analysis

	Tons	Iron	Phos.	Silica
Norfolk Fines	29,138	55.32	.061	15.83
Norwalk Fines	7,977	57.37	.077	9.62
Champion Fines	5,036	64.43	.074	3.61
Total	42,151	56.81	.066	13.15

c. Complete Analysis of 1940 ores as shipped from the Mine

Grade	Iron	Phos	Sil.	Alum	Mang	Lime	Mag.	Sul.	Tit.	Loss
Lump Ore	56.50	.073	13.25	4.23	.10	.35	.50	.015	.22	.09
Fine Ore	56.80	.067	13.20	3.68	.10	.36	.44	.027	.23	.25

The above analysis are based on determinations made on the powders from samples taken daily as the railway cars were loaded.

5. LABOR & WAGES

Because all of the ore hauling, both crude to the plant and rock and ore from the plant, was done on contract, only 16 men were on the Champion Mine payroll.

Product	106,928 Tons
Shifts & Hours Worked	1-8 Hr. Shift
Days Operated	106
Av. No. of Men Employed	16

8. COST OF OPERATING

Product	106,928 Tons
Rock Discarded	9,822 Tons

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Operating Cost		
Contract Handling ore	$27,801.40	.260 Per Ton
Contract Handling Rock	$ 982.20	.009 " "
Sorting Ore and Rock	$10,303.55	.096 " "
Sampling	$ 1,349.91	.013 " "
Plant Foreman	$ 952.00	.009 " "
Electric Power	$ 231.45	.002 " "
Laboratory Expense	$ 3,681.41	.035 " "
Maintenance		
Equipment	$ 366.11	.003 " "
Structures	$ 275.72	.003 " "
Total	$45,946.75	.430 " "
General Expense		
Insurance	$ 6.74	- -
Mechanical & Elec. Engineering	161.44	.002
Warehouse Overhead Expense	62.62	- -
Superintendence	1,026.90	.010
Ishpeming Office Expense	514.38	.005
Personal Injury Expense	232.51	.002
Social Security Taxes	467.66	.004
Total General Expense	$ 2,472.25	.023
Total Cost at Plant	$48,419.00	.453
Amortization of Plant	9,602.17	.090
Administrative Expense	10,692.84	.100
Taxes	5,346.42	.050
Total	$74,060.43	.693

Summary of Foregoing and Freight, Insurance, Purchasing Price, etc.	
Operating and Maintenance Cost	$ .430 Per Ton
General Expense	.023 " "
Taxes, Administration & Amo rtization	.240 " "
Purchase Price Based on 110,000 tons	1.000 " "
Rail Freight	.710 " "
Lake Freight	.835 " "
Insurance & Analysis	.010 " "
Total Cost of Ore Delivered	$ 3.248 " "

10. TAXES

Under the terms of the bill of sale which transferred the Champion Mine stockpiles to the Cleveland-Cliffs Iron Company, we are to pay the taxes in 1941 and 1942 on those piles. The State Tax Commission for years past had placed a valuation of $105,000.00 on them which makes the taxes in 1941 amount to $2,562.10.

Taxes for 1942 should only be levied on a $20,000.00 or $21,000.00 valuation as 80% of the piles were moved in 1941.

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11. ACCIDENTS AND PERSONAL INJURIES

We were very fortunate to be able to operate all season without a lost time accident. The contractor lost one man when his loading foreman at the ramps was run down and killed by a South Shore freight engine.

12. NEW CONSTRUCTION OR EQUIPMENT

E. & A. #CC-72 covering the Champion Mine Screening Plant showed expenditures totaling $16,114.76 compared with the estimate of $17,010.00, which leaves an unexpended balance of $895.24. Several of the items on the "E. & A." overran but conversely we were able to complete other items under the estimated cost.

18. NATIONALITY OF EMPLOYEES

Following is a list of the men, by nationality, employed on November 13, 1941.

Finnish	6
English	4
French	4
Swedish	1
German	1
Total	16

SPIES VIRGIL MINE
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1. GENERAL

For the fifth successive year there was a substantial increase in production at this property, from 143,727 tons in 1940 to 175,179 for the current year. Shipments were also greatly increased from 172,090 tons to 275,562. The five day per week schedule with two crews which was started in November of 1940 was continued throughout the year with some increase in the amount of over-time worked due to necessary inspections and repairs.

In spite of the increase in production the cost of operating was increased somewhat due to the general wage increase in April and to the fact that greater amounts of over-time pay were necessary. This increase in the cost of production was also reflected in the increased total cost.

Mining operations for the most part, were confined to the few remaining stoping areas between the 6th and 8th Levels. Some small amount of mining was done above the 6th Level prior to the reoccurrence of SO_2 fumes which made the continuation of this operation impossible. A very large proportion of the total production was obtained by pulling lean caved material from the old stopes and mixing it with newly mined ore. Without the addition of this lean material the production level would have been approximately two-thirds as great.

Ventilation conditions, as far as the actual mining areas were concerned, were entirely satisfactory with the exception of the areas above the 6th Level where operations were stopped due to the resumption of oxidation in the caved High Sulphur material in the old stopes. For the greater part of the year it was necessary to keep the entire ventilation system up-cast through the workings and the old Virgil air-shaft. This permitted mining to be continued without interruption but prevented reversing the air currents as a means of thawing the operating shaft except over the weekend. Heavy accumulations of ice were chopped out of the shaft when necessary.

2. PRODUCTION, SHIPMENTS & INVENTORIES

a. Production by Grades

	1941	1940
Virgil	173,868	143,360
Virgil High Sulphur	1,311	367
Total	175,179	143,727

The increase in production was 31,452 tons of which 944 tons were High Sulphur grade. Actual mining of this material was started in the latter part of the year.

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8. PRODUCTION SHIPMENTS & INVENTORIES (Cont.)

b. Shipments

Grade	Pocket	Stockpile	Total	Total Last Year
Virgil	106,667	168,895	275,562	172,090
Virgil High Sulphur	0	0	0	0
Total	106,667	168,895	275,562	172,090
Total Last Year	63,706	108,384	172,090	
Increase	42,961	60,511	103,472	

Shipments during 1941 were increased by 60% over the previous year and were about nine times as great as for 1939. This large increase in shipments made it possible to continue the five day per week work schedule.

c. Stockpile Inventories

Grade	Tons
Virgil	35,881
Virgil High Sulphur	6,209
Total	42,090

This figure compares with 142,473 tons at the end of 1940 and is a decrease of approximately 100,000 tons in spite of the large production.

d. Division of Product by Levels

No actual mining operations had been carried on above the 6th Level from February 1938 until mining in No. 10 stope reached this elevation early in 1941. Considerable quantities of ore were recovered by means of this stope on the 6th Level itself and the two sub-levels above. All of the ore so mined was trammed on the 8th Level.

Later in the year, development work was started above the 6th Level and a small amount of ore was actually mined and hoisted from this elevation. The tonnage so hoisted amounted to 793 tons.

Inasmuch as a very substantial portion of the year's production was obtained by pulling lean material from the old caved stopes, an accurate estimate of the tonnage from above the 6th Level is impossible. Inasmuch as several of these old stopes extended above the 6th Level elevation, a reasonable estimate of the total is listed below:

	Mined Ore	Pulled From Old Stopes	Total
6th Level	12,000	28,000	40,000
8th Level	Mined and Pulled From Old Stopes		135,179
Total			175,179

As previously mentioned, the reoccurrence of foul air and SO2 gas made it necessary to stop mining operations above the 6th Level early in the year. Later, a second attempt was made which was stopped toward the end of the year.

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2. PRODUCTION SHIPMENTS & INVENTORIES (Cont.)

e. Production by Months

Month	Shifts	Days	Virgil Ore	Hi-Sul. Ore	Total Ore	Tons Per Day Ore	Tons Per Man Per Day	Rock
January	2-8 Hr.	22	14,237		14,237	647	8.03	212
February	2-8 Hr.	20	12,282		12,282	614	7.63	96
March	2-8 Hr.	21	13,225	37	13,262	632	8.03	28
April	2-8 Hr.	22	14,760		14,760	671	9.11	228
May	2-8 Hr.	22	14,098	87	14,185	645	8.19	244
June	2-8 Hr.	22	14,485	18	14,503	659	8.74	104
July	2-8 Hr.	22	16,193		16,193	736	9.60	324
August	2-8 Hr.	22	15,811		15,811	719	9.21	380
September	2-8 Hr.	21	15,360		15,360	731	9.81	60
October	2-8 Hr.	22½	16,528	28	16,556	736	9.39	16
November	2-8 Hr.	20	13,320	23	13,343	667	8.29	
December	2-8 Hr.	22	13,569	1,118	14,687	668	7.92	
Total	2-8 Hr.	258½	173,868	1,311	175,179	677	8.662	1,692

f. Ore Statement

	Virgil	Virgil Hi-Sulphur	Total	Total Last Year
On Hand January 1, 1941	137,575	4,898	142,473	170,836
Output for Year	173,868	1,311	175,179	143,727
Total	311,443	6,209	317,652	314,563
Shipments	275,562	0	275,562	172,090
Balance on Hand	35,881	6,209	42,090	142,473
Increase in Output			31,452	
Decrease in Ore on Hand			100,383	

The operating schedule follows:

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

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

1940 - 2-8 Hr. Shifts 4 days per week Jan. 1 to Nov. 15 inclusive
2-8 Hr. Shifts 5 days per week Nov. 16 to Dec. 31 inclusive

1941 - 2-8 Hr. Shifts 5 days per week Jan. 1 to Dec. 31 inclusive.

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2. PRODUCTION, SHIPMENTS & INVENTORIES

g. Delays

There were only two reported operating delays during the year compared with six during 1940. The first, which was caused by a broken chute disc arm on the top landing, amounted to two hours but caused no loss of production. The second delay necessitated suspending operations for the entire night shift on October 30th and caused a loss of product of 350 tons. This delay was necessitated by the rapid deterioration of a worn spot on the skip rope. The rope was taken off immediately since it was not safe to continue its use until the weekend.

3. ANALYSIS

a. Average Mine Analysis on Output

The output analysis for the year 1941 is considerably lower than for the previous year. The iron content was 57.52% with a published guarantee of 57.50. The average sulphur was again decreased from .073 in 1940 to .059 for the current year. There was a slight increase in the amount of High Sulphur ore produced, most of which was mined during December. The iron content was increased from 55.41 to 58.00 and the sulphur from .200 to .244. In former years there was no actual mining done in the High Sulphur areas due to the lack of a market for this grade of ore. Toward the end of 1941 it was decided to start mining limited amounts of this grade since the reserves of Virgil grade were very nearly depleted.

Grade	Tons	Iron	Phos.	Silica	Sulphur
Virgil	173,868	57.52	3.81	5.75	.059
Virgil Hi-Sulphur	1,311	58.00	2.58	7.75	.244

b. Analysis of ore in Stock Dec. 31, 1941

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Virgil Dried	57.97	.369	5.76	.19	1.84	.58	.26	.076	6.86	
Virgil Nat.	52.50	.334	5.22	.17	1.67	.52	.24	.069	6.21	9.44
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

c. Composite Analysis of Shipments

The average analyses of the 1941 shipments were not materially different from those of the previous year with the exception that the iron and sulphur contents were slightly lower. The following table is the complete analysis.

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss
Virgil	57.90	.390	6.00	.20	2.06	.74	.27	.067	7.07

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3. ANALYSIS (Cont.)

c. Composite Analysis of Shipments (Cont.)

The analyses of straight cargoe shipments were practically the same as the average analyses for the year.

	Iron	Phos.	Sil.
Virgil	57.89	.396	.570

d. High Sulphur Ore

This grade of ore was not mined as such until December with the exception of small amounts which were hoisted and stocked separately during necessary development work in the High Sulphur areas. It was possible to mine small amounts from time to time for mixing with low sulphur ore from other areas, still keeping the sulphur content below the guarantee.

Toward the end of the year it was decided to start exploration and development work in the High Sulphur areas which, as a general rule, lie beneath the old Virgil grade stopes. The reserves of standard grade are so nearly depleted that it was decided to mine limited quantities of the High Sulphur material in order to maintain the volume of production. During December, some 1,100 tons were produced in the exploration and development work in advance of a small stope.

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

Estimate made Nov. 30, 1941 using a factor of 12 cu. ft. per ton.

Available Virgil Grade

	Northwest Orebody	Southwest Orebody	Middle Deposit	Total Tons
Between 4th and 6th Levels		40,102		40,102
Between 6th and 8th Levels	66,577	13,408	44,370	124,355
Gross Estimate	66,577	53,510	44,370	164,457
Less 10% Loss in Mining				16,446
Sub-Total				148,011
Less 10% for Rock				14,801
Net Total, Nov. 30, 1941				133,210
Less December Production				13,569
Total Developed Ore Dec. 31, 1941				119,641

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4. ESTIMATE OF ORE RESERVES (Cont.)

a. Developed Ore (Cont.)

The estimated ore reserves as of December 31, 1941 are 119,641 tons as compared with 401,159 tons at the beginning of the year. This is a decrease of 281,518 tons, of which 173,868 tons of Virgil grade were produced. The remainder of this decrease which amounts to 107,650 tons is due to changes in the ore areas as a result of development work in the last two stoping territories above the 8th Level. Further, it is very unlikely that it will be possible to do any additional mining above the 6th Level due to the reoccurrence of SO_2 gas in very large quantities. This will occasion a further decrease in reserves of 40,000 tons which were included in the above estimate.

b. Estimated Ore Reserve Analysis

	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist
Dried	56.50	.425	8.50	.17	1.83	.61	.29	.089	7.20	
Natural	50.85	.382	7.65	.15	1.65	.55	.26	.080	6.60	10.00

Although considerable mining of High Sulphur ore is contemplated for the coming year, an estimate of these reserves was not made since recovery depends entirely on mining this ore from small areas beneath the old stopes which are, for the most part, full of caved rock. The following is the estimated analyses of this production for the coming year.

	Iron	Phos.	Sil.	Mang.	Sul.	Loss	Moist
Dried	56.50	.425	8.50	.17	.220	7.50	
Natural	50.85	.382	7.65	.15	.198	6.75	10.00

In both of the above tables the estimated analyses of reserves are based on mixing low grade caved material in the old stopes with higher grade newly mined ore obtained from the operating areas. The total recovery from the property over the course of the next year or more depends entirely on the success with which this mixing can be accomplished. If production were limited to actual mining the volume would decrease to approximately one-half and the total recovery, up to the end of the mine, would probably be less than half of what can ultimately be obtained by proper mixing.

5. LABOR & WAGES

a. General

The average number of employees was increased from 72 to 75 in order to keep over-time payments at a minimum. In spite of this a large amount of over-time work was necessary in order to keep pace with the five day per week operation. There is still an abundance of both skilled and unskilled labor in the district but all too frequently men with proper experience for miners were not able to successfully meet our physical requirements. As a result, most of the new men employed during the year had had little or no underground experience. A relatively small number of the young men were either drafted or enlisted in the armed forces.

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5. LABOR & WAGES (Cont.)

a. General Cont.

The activity of the S. W. O. C., C. I. O. increased considerably during the year although no formal demand for recognition had been made by the end of the year.

Suits for alleged back-wages on behalf of the employees at this and other properties in the district were filed by lawyers known to represent this organization. These suits necessitated the gathering and preparation of an enormous amount of detailed information at a time when all efforts should have been directed toward obtaining maximum production. By the end of the year most of the data had been prepared for this property although it appeared that the suits would not actually be tried for some time.

b. Statement of Wages and Product

	1941	1940
PRODUCT	175,179	143,727
NUMBER OF SHIFTS AND HOURS	2-8	2-8
Avg. No. of Men Working		
Surface	24	25
Underground	51	47
Total	75	72
Avg. Wages Per Day		
Surface	6.33	5.54
Underground	7.33	6.45
Total	7.02	6.14
Avg. Wages Per Month	22 DAYS	18 DAYS
Surface	139.26	99.72
Underground	161.26	116.10
Total	154.44	110.41
Product Per Man Per Day		
Surface	27.58	25.55
Underground	12.61	13.24
Total	8.65	8.72
Labor Cost Per Ton		
Surface	.2297	.2168
Underground	.5816	.4873
Total	.8113	.7041
Avg. Product Breaking & Tramming	43.10	61.55
Avg. Wage Contract Miners	8.164	7.382

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5. LABOR & WAGES (Cont.)

b. Statement of Wages and Product (Cont.)

	1941	1940
Total No. of Days		
Surface	6,352	5,625½
Underground	13,889 3/4	10,852
Total	20,241 3/4	16,477½
Amount for Labor		
Surface	40,233.92	31,164.69
Underground	101,880.27	70,029.48
Total	142,114.19	101,194.17

Proportion Surface to Underground Men

1941 - 1 to 2.12
1940 - 1 to 1.88
1939 - 1 to 1.88
1938 - 1 to 1.81
1937 - 1 to 1.92
1936 - 1 to .50
1935 - 1 to .88
1934 - 1 to .88
1933 - 1 to 2.15

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6. SURFACE

a. Buildings, Repairs

Aside from routine clean-up, painting and repairs, there was very little new work done to the mine buildings during 1941 although plans for screening the doors and windows of the engine house were being made for early in 1942. Considerable repair work was necessary on the dry boiler including a new stack which was installed in September. A minor breakdown in the driving mechanism of the stoker made it necessary to hand fire for a short period early in the spring.

Due to the reoccurrence of the foul air and SO_2 fumes generated in the old areas above the 6th Level, it was necessary to keep the Spies shaft down-cast throughout the entire work-week and keep the ventilation currents in the working areas up-cast to the old Virgil shaft. For the most part, the weather was unseasonably mild and little or no difficulty was experienced with ventilating in the Spies shaft until the latter part of December. It then became apparent that it would be necessary to construct some type of air pre-heater since reversing the current over the weekend did not melt the ice sufficiently. The construction of a temporary heater was planned for January and it will probably be advisable to install a more elaborate, permanent heater next year.

b. Stockpiles

In the early months of the year stocking was completed along the east pile and begun on the new trestle in the main stocking area east of the remnant of the old main pile. Pocket shipments were begun on the first of April after which only small amounts of ore were stocked when cars were lacking. Shovel loading was begun on the 15th of April and continued intermittently up until the latter part of November. 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 outlook for 1942 shipments makes it appear that all of the stocked ore will be shipped with the possible exception of the High Sulphur grade which is in two piles along the east trestle. The continued use of two shovels will be necessary since it is not practical to attempt to load the High Sulphur ore from the pocket. When and if shipments of this grade are required, it will be necessary to pick it up from the pile.

No trouble was experienced with burning rock piles during 1941 due to the fact that this material is no longer dumped in a pile along a trestle. The handling of all rock by means of the new pocket and the mine truck has finally put an end to this particular nuisance.

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7. UNDERGROUND

a. Shaft Sinking

There were no shaft sinking operations during 1941.

b. Development

Development operations were considerably increased as compared with the previous year due to increased production and to the fact that the few remaining areas are very small and necessitate more development work per ton recovered. Practically all of the development work was done in stope development above the 8th Level with a relatively small amount on and above the 6th Level. The only actual work on the main 8th Level was the putting up of two new raises from the west side of the 840 crosscut in one of the last remaining pillars.

The work on the 6th Level consisted of the widening and extending of the first crosscut to the southwest. This work was done in advance of stope development operations on the 120 and 145' sub-levels in the pillar lying between two of the old caved areas. This work progressed very nicely up to the point where the SO_2 fumes made it necessary to completely close off the whole territory.

The remainder of the development work was in advance of stoping operations in the central and south pillars above the 8th Level adjacent to the Sherwood line. Only one new stope was developed with the remainder of the work being confined to exploration and the continuation of old stopes.

The average development contracts was increased from two to three due to the necessity of opening new areas at a greater speed. The footage completed was 4,632 as compared with 3,663 in 1940. Six hundred and twenty-seven feet of this work was in rock with the remainder in ore of both Virgil and High Sulphur grades. The detail of the development work will be found under heading 7e.

c. Stoping

Stoping operations were, for the most part, confined to the sub-levels above the 8th Level with a small amount of work being done on and above the 6th. At least one-third of the total recovery was effected by pulling lean caved material from the old stopes and mixing with High grade newly mined ore. Large quantities of this caved material run as high as 55% in iron with varying amounts of sulphur. Without the lowered guarantee and this caved material, production would decline very rapidly. Toward the end of the year the mining of the new High Sulphur grade was started. Of the operating stopes, Nos. 7 and 10 contributed most toward the total hoist with smaller amounts from 6, 12 and the pillars between the old north stopes. A tremendous quantity of caved material was obtained from old No. 12, the middle stope and old 6 and 9. The detailed description of operations follows:

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Subs Above the 6th Level

145' Sub-Level

Development operations reached this elevation late in November with two raises which were put up in the development of a new stope in this area. These two raises were connected during December prior to the closing down of the whole area due to an excess of SO_2 fumes. Earlier in the year, mining operations in No. 10 stope reached the 120' sub-level below from which a large quantity of ore was mined at this elevation and above. At the end of the year a mixture of caved and mined ore was still being pulled on the transfer above the 8th Level.

120' Sub-Level

The new transfer drift was driven at this elevation to the north from the new raise which was put up from the 6th Level below. This transfer drift was driven in ore along the east footwall and two mills were put up to the sub-level above. Operations were stopped in this territory in December.

Stoping operations in No. 10 reached this elevation early in the year. A large quantity of ore was mined in the area northwest of and adjacent to old No. 17 stope. Subsequent caving of lean mixed material in the hanging wall brought actual mining operations to a close although mixed ore and lean ore were pulled in small quantities throughout the entire year.

90' Sub-Level

A considerable amount of work was done on this elevation driving small drifts which connected a number of old raises. The ventilation system was controlled by a number of air doors after which the driving of the transfer drift was started on the sub above. This development operation was stopped in December.

A large amount of stoping was done in No. 10 at this elevation along the northeast sides of the opening which extended from the transfer on the -50' sub-level. This stope opening eventually caved and connected with old No. 17 to the south.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

6th Level

Stoping operations in No. 10 reached this elevation early in the year after which large quantities of ore were recovered from the main level and the sub-levels above. A small drift connection was driven west of the main air raise to the second crosscut and another between the second and third crosscuts to provide access to this stope. Prior to the cave which occurred in April, this opening had reached a size 120' by 70'. Subsequently, No. 10 stope was reopened west of the dividing pillar and later caved producing another opening at this elevation in the hanging wall.

Operations in No. 6 stope along the south footwall reached this elevation late in 1940 and were continued throughout the early portion of 1941. Originally, this stope caved through to the 6th Level introducing foul air and noxious gases into the workings. A short time later the ventilation system was rearranged and the stope reopened for production. After mining operations had been completed with the exception of a small dividing pillar, caving took place producing a very large opening at this elevation. Substantial amounts of caved material were recovered from this stope from time to time.

In the latter part of the year, the first crosscut was widened and extended 95' to the southwest in the footwall slate. Two raises were put up on the north side of this drift to the 90 and 120' sub-levels above. The transfer drift on the 120' sub-level had been completed when a reoccurrence of foul air and SO_2 gas made it necessary to stop this entire project.

A large amount of work was done on the main level in removing old brattices and installing new air doors during the constant rearranging of the ventilation system which is necessary to this operation. The ventilation was satisfactory at all times since the dilution of the foul air and SO_2 gas is not serious when properly controlled. All of the working places are constantly supplied with fresh air, the gases being introduced above the working areas and taken out on this level and up to the old Virgil shaft.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Subs above the 8th Level

+50' Sub-Level

Development and mining operations were carried on during the early part of the year in No. 6 and 10 stopes. Most of the mining at this elevation was in No. 10 stope, however. Benching progressed to the east, and in January the floor pillar below 6th Level was mined in order to facilitate the development operations being carried on at 6th Level. Mining was discontinued in April when caving occurred and another stope was reopened west of the supporting pillar which eventually caved and produced an opening in the hanging wall at this elevation.

Operations in No. 6 consisted of development and a small amount of mining. The enlargement of the stope areas was due to heavy falls of ground which occurred in April. Subsequent to the caving which produced new openings to 6th Level, it was necessary to build brattices in the supporting pillar for ventilation control.

+25' Sub-Level

Operations at this elevation were carried on in No. 6, 7, and 10 stopes. A small amount of development work was done in No. 6 early in the year and shortly after, mining was started. Caving occurred, making it necessary to cease mining operations.

Development reached this elevation in No. 7 stope early in the year and stoping was started. Most of the mining shown at this elevation was actually carried on from the sub-level below. An enlargement of the stope to the north is shown, which is the result of caving in old No. 12 stope from which considerable quantities of lean ore and ore have been drawn off in the past few years.

After caving occurred east of the pillar in No. 10, the stope was again reopened to the west. Some development was necessary and a considerable amount of mining was done enlarging the opening to 75' by 90'.

00' Sub-Level

In addition to the development and stoping operations in stopes Nos. 6, 7, and 10, there was a considerable enlargement shown in No. 12 stope. This is the result of caving over a number of years and the mapping of this was made possible through development and mining in No. 7 stope.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Subs above the 8th Level (Cont.)

00' Sub-Level (Cont.)

Operations in No. 7 stope were extensive during the year and by the end of the year, the opening had reached a size 75' by 135'.

Mining in No. 10 stope just west of the supporting was completed late in the year. Subsequently, development to the northwest towards the boundary was speeded up, and by December stoping was again resumed in the area to the northwest under the hanging wall.

Development in No. 6 extended west toward the boundary, and in December stoping was started. This stope which is located under the hanging wall, will not be very large because pillars must be left between old No. 9 and No. 6 stopes.

Development in new No. 2 stope, which is located between No. 7 and No. 10 stopes, reached this elevation late in the year. A sub-level drift was advanced 55' east from No. 840 raise.

-25' Sub-Level

Development and stoping operations were carried on in Nos. 6, 7, and 10 stopes. A development drift was driven north from No. 7 traveling raise and it holed to old No. 12 stope.

This development is in the last pillar of ore remaining in this territory.

In addition to mining operations in Nos. 6, 7, and 10, No. 2 stope development reached this elevation late in the year.

The area shown mined on the south side of No. 12 stope is the result of caving in the stope.

-50' Sub-Level

Stoping operations at this elevation were carried on in stopes Nos. 6, 7, and 12. Development operations were carried on in Nos. 2 and 10.

This being the mill sub for No. 6, only a small amount of mining was done at this elevation.

A transfer drift for No. 10 stope northeast of No. 831 raise was driven on this sub-level and the necessary drifts and raises were completed. Several new mill raises were also put up from the transfer to the east.

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YEAR 1941

7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Subs above the 8th Level (Cont.)

-50' Sub-Level (Cont.)

No. 2 stope development reached this elevation and a connecting drift was driven to No. 10 transfer for traveling and ventilation purposes.

Considerable developing and mining was done in No. 7 stope area.

Some mining was also done on the southeast side of No. 12 stope from an old drift which connects No. 7 and No. 12 stopes.

A considerable amount of mining was also done in the pillar between the east and middle stopes.

-75' Sub-Level

The only work in the southwest area consisted of driving a new transfer west from No. 832 raise and putting up the necessary raises to mine the pillar of ore between No. 832 raise and the Sherwood boundary.

Two raises were put up east of the boundary in No. 2 stope development, and a connecting drift was driven for traveling and ventilation purposes.

No. 7 transfer was completed and the necessary raises were put up.

The pillar between No. 12 and the middle stope was mined by under-cutting it on a lower sub-level.

The supporting pillar between the middle and east stopes was also mined during the year.

-100' Sub-Level

Work in No. 7 stope consisted of the starting of a new transfer at this elevation, which will be driven north to No. 12 stope. This development is being done to mine the pillar of ore south of No. 12 stope and east of the Sherwood boundary.

The pillar between No. 12 and the middle stope was mined by under-cutting on the sub-level below.

A small amount of mining was also done in the pillar between the middle and east stopes.

Some stoping was also done in the high-sulphur ore body to the east.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Subs above the 8th Level (Cont.)

-115' Sub-Level

Operations on this sub-level were entirely in the northwest ore body and in the high-sulphur ore body to the east.

The pillar between No. 12 and the middle stopes was mined causing the ore on the sub-levels above to crush and cave into the stope.

A drift was driven southwest from No. 812 raise and a raise put up to the sub-level above to provide a traveling connection to the working area between the middle and east stopes.

A small amount of stoping was done in the high-sulphur ore body to the east.

-135' and -150' Sub-Levels

Operations on these two sub-levels consisted of development and a small amount of mining in the middle stope area, and in the pillar between No. 12 and the middle stopes.

8th Level

No. 840 raise was extended to the 00' Sub-Level and also, a short raise was put up south of No. 840 raise to provide a traveling connection into the raise while it was being advanced.

d. Timbering

Timber consumption and costs were slightly higher in 1941 than in 1940. This was due to an increase in the amount of development and repair work. The total cost per ton, including labor, increased from .035 to .041.

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7. UNDERGROUND (Cont.)

d. Timbering (Cont.)

Kind	Lineal Feet	Avg. Price Per Foot	Amount 1941	Amount 1940
6" to 8" Cribbing	6,037	.0282	170.00	137.13
8" to 10" Stull Timber	2,174	.0330	71.80	134.76
10" to 12" " "	372	.0881	32.76	25.70
12" to 14" " "	27	.1322	3.57	3.58
14" to 16" " "	36	.1625	5.85	13.16
Total Timber 1941	8,646	.0328	283.98	
Total Timber 1940	6,472	.0486		314.33
5' Cedar Lagging	11,270	.0076	85.54	105.94
Poles	18,660	.01273	237.53	114.09
Total Lagging & Poles			323.07	220.03

Product		175,179	143,727
Feet of Timber per Ton of Ore		.0493	.0450
Feet of Lagging per Foot of Timber		1.3035	2.1825
Cost per ton for Timber		.00162	.00219
Cost per ton for Lagging		.00049	.00074
Cost per ton for Poles		.00135	.00079
Cost per ton for Timber, Lagging & Poles		.00346	.00372
Equivalent of Stull Timber to Board Measure		11,829	9,230
Feet of Board Measure per Ton of Ore		.0675	.0642
Cost of Timber, Lagging & Poles 1941	607.05		
Cost of Timber, Lagging & Poles 1940	534.36		

e. Drifting and Raising

The following table shows the 1941 development footage classified as to size and material:

	Drifting			Raising			Combined
	Ore	Rock	Total	Ore	Rock	Total	Total
Full Size	80	132	212	0	0	0	212
Small Size	2,474	135	2,609	1,451	360	1,811	4,420
Total	2,554	267	2,821	1,451	360	1,811	4,632

The combined total of 4,632' compares with 3,663' in 1940 and 3,982' in 1939. The rock work was considerably higher than in the previous year, being 627' as compared with 335'. This rock footage consists of main level development on 6th Level and development above 8th Level which was done in advance of a new stope in the middle territory adjacent to the Sherwood boundary.

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7. UNDERGROUND

f. Explosives, Drilling and Blasting

The cost per ton for explosives used during 1941 was reduced slightly from .0482 per ton to .0463. These two figures compare with .0558 in 1939 and .0556 in 1938. This reduction is due, in part, to less development work and, to a further extent, to the fact that the reduced iron guarantee made it possible to recover larger amounts of caved material which are already broken.

The amount expended for explosives in rock development remained practically the same since only small amounts of this work were necessary. Total expenditures for all explosives used in the mine increased from $7,281.41 in 1940 to $8,468.79 for the current year. This increase was completely in line with the increased production.

Statement of Explosives Used

Ore Development & Stoping	Quantity	Average Price	Amount 1941	Amount 1940
No. 1 Gelamite 60%	60,468	.1150	6,953.82	6,010.26
No. 2 Gelamite 40%				11.50
Total Powder	60,468	.1150lb.	6,953.82	6,021.76
Fuse	141,091	5.1364M	724.70	597.60
No. 6 Blasting Caps	20,996	12.1978M	256.15	215.21
Hot Wire Fuse Lighters	5,500	.6745C	37.10	23.21
Powder Bags	30	1.35 Ea.	40.50	30.95
Master Fuse Lighters	1,100	1.8050C	19.86	8.04
Tamping Bags	15,100	2.265 C	34.20	28.00
Connecting Wire	6#	.40 lb.	2.40	
Cap Crimpers			49.33	
Total Fuse, Caps, etc.			1,164.24	903.01
Total Explosives, Ore Devel. & Stoping			8,118.06	6,924.77
Production, Tons			175,179	143,727
Lbs. Powder per Ton of Ore			.3452	.3644
Cost per Ton for Powder			.0397	.0419
Cost per Ton for All Explosives			.0463	.0482

Rock Development	Quantity	Average Price	Amount 1941	Amount 1940
No. 1 Gelamite Powder lbs.	2,415	.1150lb.	277.73	285.99
Fuse, feet	9,272	5.119 M	47.46	49.52
No. 6 Blasting Caps	1,375	12.20 M	16.78	15.98
Hot Wire Fuse Lighters	400	.675 C	2.70	1.80
Powder Bags	2	1.35 Ea.	2.70	1.35
Cap Crimper			1.56	
Tamping Bags	900	2.00 C.	1.80	2.00
Total All Explosives, Rock Devel.			350.73	356.64
Total All Explosives Used in Mine			8,468.79	7,281.41
Average Price per Pound for Powder			.1150	.1150
Total Cost per Ton, All Explosives			.0483	.0506

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7. UNDERGROUND (Cont.)

g. Ventilation

Generally, as far as mining conditions are concerned, ventilation was quite satisfactory, although some trouble was encountered at various times due to sulphur dioxide fumes. About the middle of the year sulphur dioxide fumes re-occurred on 6th Level and it was necessary to build several brattices in order to re-route the air to make conditions favorable for the stope development in the southwest area above 6th Level. After this work was done, conditions were good for about two months and then the fumes caused trouble again. The development contract in this area was out of production for most of a month, using their time in building brattices and air-doors. Development work was again resumed, and late in the year as development reached the upper sub-levels, extremely high temperatures existed, indicating that oxidation is still going on. After an inspection with Mine Reserve oxygen apparatus, it was decided to abandon this project for the time being. Conditions for the other mining contracts were very satisfactory.

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 because greater efficiency is obtained and this avoids any possibility of foul air being carried into the working areas. Over the week-end, these fans were reversed in order to melt the ice in the Spies shaft. At times, this was not sufficient to melt all the ice and it was necessary to chop ice in the shaft. There are three blower fans at the Virgil shaft - 2, 15 H.P. and 1, 5 H.P. fan. Under normal conditions, two fans are in operation - 1, 15 H.P. and 1, 5 H.P., the third being held in reserve. The addition of new air-ways reduced the back pressure so that the average volume of air was increased from 7,000 C.F.M. in 1940 to 8,000 C.F.M. in 1941.

The air travels down-cast in the Spies shaft and is introduced on 8th Level. From here it is diverted to the various working areas, and the amounts needed are regulated by the use of air-doors. After passing through the working places it eventually reached 6th Level and travels on up the ventilation raise to 4th Level. From 4th Level it goes on up to 3rd Level, then up to 1st Level and finally up the Virgil shaft.

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8. COST OF OPERATING

a. Comparative Mining Costs

	1941	1940	Incr.	Decr.
Product, Tons	175,179	143,727	31,452	
Underground Costs	.866	.760	.106	
Surface Costs	.181	.200		.019
General Mine Expense	.182	.223		.041
Cost of Production	1.229	1.183	.046	
Depreciation, Plant, & Equip.	.261	.388		.127
Taxes	.058	.067		.009
Loading & Shipping	.101	.062	.039	
Total Cost at Mine	1.649	1.700		.051
Budget Est. Cost at Mine	1.746	1.880		.134
Number of Operating Days	258½	212½	46	
Number of Shifts & Hours	258½, 2-8	212½, 2-8		
Average Daily Product	678	676	2	

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison

	1941		1940	
	Amount	Per Ton	Amount	Per Ton
Underground Costs				
1. Exploring in Mine	4523.76	.026	98.73	.001
3. Development in Rock	4140.02	.034	2946.65	.021
4. Development in Ore	18006.39	.103	16591.63	.116
5. Stoping	54504.06	.311	33569.51	.233
6. Timbering	7288.37	.041	5046.10	.035
7. Tramming	25181.97	.144	17194.99	.119
8. Ventilation	2932.90	.017	1668.83	.012
9. Pumping	11381.29	.065	9580.61	.067
10. Comp. and Air Pipes	10116.84	.058	9112.77	.063
12. Undg. Superintendence	8236.00	.047	7347.97	.051
14. Maint. Comp. and Power Drills	387.18	.002	556.59	.004
15. Scrapers & Mech. Loaders	666.92	.004	851.24	.006
16. Electric Tram Equipment	3204.05	.018	3567.15	.025
17. Pumping Machinery	1128.19	.006	1105.72	.007
Total Undg. Costs	151697.94	.866	109238.49	.760
Surface Costs				
18. Hoisting	8961.63	.051	7999.88	.056
19. Stocking Ore	6182.77	.035	6744.52	.047
20. Crushing at Mine	4076.60	.023	3230.43	.022
21. Dry House	3818.51	.022	4137.29	.029
22. General Surface Expense	3596.88	.021	2852.38	.020
23. Maint. Hoist. Equipment	1633.87	.009	928.13	.006
24. Shaft	706.24	.004	517.81	.004
25. Top Tram Equip.	608.53	.004	731.01	.005
26. Docks, Trestles & Pkts.	438.46	.003	746.68	.005
27. Mine Buildings	1583.19	.009	885.38	.006
Total Surface Costs	31606.68	.181	28773.51	.200
General Expense				
Vacation Expense	3600.81	.020	1084.54	.008
28. Insurance	634.84	.004	633.43	.004
29. Mining Engineering	924.16	.005	2077.74	.015
30. Mech. & Elect. Engineering	71.46	.001	147.25	.001
31. Analysis & Grading	2895.04	.017	2130.45	.015
32. Personal Injury	943.81	.005	4050.21	.028
33. Safety Department	676.18	.004	471.30	.003
34. Telephone, Safety Devices	911.72	.005	652.47	.005
35. Local & Gen. Welfare	1190.05	.006	1178.38	.008
36. Special Exp. Pension etc.	2640.36	.015	5159.61	.036
37. Ishpeming Office	3657.60	.021	3449.00	.024
38. Social Security Taxes	6440.98	.037	4495.34	.031
39. Mine Office	7355.39	.042	6462.02	.045
Total Gen. Mine Expense	31942.40	.182	31955.74	.223
COST OF PRODUCTION	215247.02	1.229	169967.74	1.183
40. Taxes	10168.72	.058	9681.50	.067
Total Cost	225415.74	1.287	179649.24	1.250
Budget Estimated Cost	156000.00	1.330	128400.00	1.497

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

	1941		1940	
	Amount	Per Ton	Amount	Per Ton
41. General Supplies	5,499.52	.031	9,594.68	.067
42. Iron and Steel	1,038.39	.006	1,075.87	.007
43. Oil and Grease	599.98	.003	499.96	.003
44. Machinery Supplies	3,842.48	.022	6,201.32	.043
45. Explosives	8,479.41	.048	7,284.11	.051
46. Lumber and Timber	2,549.18	.015	2,391.15	.016
47. Fuel	1,858.39	.011	3,094.89	.022
48. Electric Power	22,391.88	.128	21,470.14	.151
49. Sundries	5,251.67	.030	494.29	.003
50. Other Mines & Accounts	633.75	.004	4,392.28	.031
Michigan State Tax	3.08	.000	.00	.000
Supply Inventory Adj.	.00	.000	1.12	.000
Total per Cost Sheet	50,880.23	.290	47,715.25	.332

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

1. Exploring in Mine
This large increase was due to diamond drill exploration on the 1st Level near the Virgil shaft, originally done under E & A, CC-94.

3. Development in Rock
There was a considerable increase in cost under this heading which was due to the fact that a greater amount of development was necessary in advance of stoping operations.

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

	1941	1940	1939
Development in Rock - Feet	627	335	350
Cost per Foot	6.60	8.80	8.84
Cost per Ton	.034	.021	.028

4. Development in Ore
Although the total cost increased somewhat, the cost per ton decreased due to the fact there was an increase in production.

	1941	1940	1939
Development in Ore - Feet	4005	3328	3632
Cost per Foot	4.50	4.98	5.04
Cost per Ton	.103	.116	.163

The combined development work for 1941 was 4632' at $4.78 per foot and .137 per ton, as compared with 3663' at $5.33 per foot and .137 per ton in 1940.

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8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

6. Timbering
This increase is due to increased labor and supplies for ventilation control and also to an increase in development.

7. Tramming
This increase was the result of increased wages and overtime payments.

8. Ventilation
This increase was due to a greater amount of ventilation work necessary during the year.

9. Pumping
The increase in the total cost of pumping was due to the de-watering of the old Virgil stopes.

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

18, 19, 21, 25, and 26.
The decreases were due to the increase in production.

27. Mine Buildings

The increase was due to an increase in the amount of repairs and small additions to mine buildings.

Vacation Expense
Vacation expense increased considerably due to the fact that the number of years of service required for vacation eligibility was lowered, and as a result, a greater number of men received vacations.

32. Personal Injury
This large decrease was due to the fact that in the previous year a final settlement was made on an old injury claim which made that year's expense higher than usual.

35. Local & General Welfare
The amount was approximately the same as the previous year, therefore, the cost per ton decreased from .008 to .006 due to increased production.

38. Social Security Taxes
This increase was due to the increase in wages and additional overtime payments.

40. Taxes
This decrease was obtained due to the increase in production and inspite of increased valuation and total taxes.

41 to 50 Inclusive
This decrease was due to the increase in production.

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9. EXPLORATIONS AND FUTURE EXPLORATIONS

In addition to the unusually large program of exploratory raising and drifting during 1941, a small amount of diamond drilling was done on the 1st Level in the vicinity of the old Virgil shaft. This drilling was done under E & A, CC-94 which was originally authorized at $30,000, of which slightly more than $4,000 was expended. The drilling was done under contract by the E. J. Longyear Company in Holes Nos. 120 to 123 inclusive in which no ore of commercial importance was found. In addition, the geological information obtained was conclusive to the extent that this exploration was abandoned after spending about 13% of the total authorization.

In general, the routine exploratory work was disappointing in that reserves above the 8th Level in the vicinity of the Sherwood boundary were much less extensive than originally outlined by old diamond drilling. The footwall in this area which was pitching rather sharply to the west, became very flat with the result that the reserves are some 50' higher than expected. This has the effect of greatly diminishing the amount of mineable reserves in the two stopes which were planned for this area.

The only future exploration contemplated is a large program of surface diamond drilling in several forties east of the property in Section 24, the rights to which were acquired late in the year. This drilling will be done in the hope that new reserves can be developed and mined from the present operating shaft.

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10. TAXES

The following tabulation is a complete statement of valuations, taxes and comparison for the years 1941 and 1940:

	1941		1940	
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)	150,000	3,075.00	90,000	1,873.80
Stockpile, Supplies & Equip.	275,000	5,637.50	310,000	6,454.20
Total Spies Virgil	425,000	8,712.50	400,000	8,328.00
Spies Dwellings	5,000	102.50	5,000	104.10
Total Iron River Twshp.	430,000	8,815.00	405,000	8,432.10
Rate		2.050		2.082
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)	150,000	513.96	90,000	304.54
Stockpile, Supplies & Equip.	275,000	942.26	310,000	1,048.96
Total Spies Virgil	425,000	1,456.22	400,000	1,353.50
Spies Dwellings	5,000	17.13	5,000	16.92
Total Mineral Hills	430,000	1,473.35	405,000	1,370.42
Rate		.3426		.33837
Ravenna Prickett Houses				
Total Rav. Prickett Houses#	700	22.75	700	22.75
Rate		3.25		3.25

These taxes were paid by the Inland Steel Co. and billed to the C.C.I. Co.

The recapitulation of the above taxes is shown below:

Operating Virgil Mine				
Iron River Township	425,000	8,712.50	400,000	8,328.00
Village of Mineral Hills		1,456.22		1,353.50
Total		10,168.72		9,681.50
Operating Spies Dwellings				
Iron River Township	5,000	102.50	5,000	104.10
Village of Mineral Hills		17.13		16.92
Total		119.63		121.02
Tax per Ton Produced		.058		.067
Tax per Ton Shipped		.037		.056

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11. ACCIDENTS AND PERSONAL INJURY

There were two lost-time accidents at the mine during 1941, both occurring underground. This compares with two lost-time accidents in 1940, one of which was a fatality.

The time lost from these two injuries was 75 days which compares with 1836 days in 1940. The total days worked during the year were 21,862 which brings the severity rate to 3.43 days per 1000 and the frequency rate to .0915 days per 1000 man-shifts.

The above compares with a severity rate of 106.6 and a frequency rate of .116 per thousand man-shifts in 1940. The unusually low rates entitle the Spies Virgil Mine to the Safety Banner Award for the year 1941 since both the severity and frequency rate were the lowest for the Company's underground properties.

The following is a record of the two accidents:

Accident No. 151 - Victor Siedleski, Chuteman and spare brakeman, age 54. At the time of the accident, which occurred on March 25, this employee was acting in the capacity of brakeman, since the regular man was not at work. While engaged in replacing a derailed car, he was squeezed between the edge of the car and the timber, and suffered a rather severe injury to his right chest which included the fracture of three ribs. The lost-time was 65 days.

Accident No. 152 - Frank Bridson, Miner, age 61. This accident, which occurred on June 30, was a minor one which resulted in lost-time because of a slight infection. Bridson suffered minor lacerations of the scalp when a small chunk of ore fell down a raise and struck the edge of his hard hat. This first chunk knocked his hat off and was immediately followed by a second which caused a slight cut in his scalp. An infection set in later which caused 10 days lost-time.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

With the exception of the usual stockpile trestle construction, there was very little work of this nature done during 1941. A small addition was built onto the east side of the office building for a shower and change-room for the captain. In addition, a number of roof ventilators were installed on the engine house. The only new construction contemplated for 1942 is the erection of an addition to a shop building which will house the small boiler plant which is being considered for pre-heating the ventilating air at the shaft.

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13. EQUIPMENT AND PROPOSED EQUIPMENT

There were no large pieces of equipment added to the inventory during 1941. The minor items are listed below:

1. H10WHJ - wet Jackhammer	$210.00
1. 5 H.P. Ventilating Fan Motor	206.80
1. #2½ Anaconda Mine Fan	132.00
1. 3 ton Coffing Hoist	109.28
1. Jackleg Mounting	65.00
1. Cap Crimper	50.81

14. MAINTENANCE & REPAIRS

a. Mine

Maintenance and repair work at this property during 1941 were all of minor, routine nature.

b. Location

The maintenance and repair work to the Spies Location houses were of a routine nature and approximately the same as for the previous year. There was a considerable increase in the amount expended for location maintenance due for the most part to the necessity for erecting new fences, and to a large amount of necessary work on the location sewers. The total expenditure under this heading was approximately twice as much as for the previous year.

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

Spies Virgil Dwellings	Labor	Supplies	1941 Total Amount	1940 Total Amount
Repairs to Houses	142.51	403.36	545.87	291.28
Interior Decorating		57.87	57.87	77.28
Shed Repairs	31.15	14.60	45.75	293.70
Total, Dwellings	173.66	475.83	649.49	662.26
Location Maintenance				
Repairs to Sewers	294.00	138.72	432.72	59.78
Repairs to Street Lights	5.24	51.92	57.16	64.93
Fire Protection & Water	1.36	7.59	8.95	95.38
Mail Boxes		9.84	9.84	
New Wire Fence	287.60	217.20	504.80	
Repairs to Garage	9.20	1.01	10.21	
Total Location Maint.	597.40	426.28	1,023.68	220.09
Total Amount for Dwellings & Loc. Exp.	771.06	902.11	1,673.17	882.35

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15. ELECTRIC POWER

Electric power, which is purchased from the Wisconsin Michigan Power Company was very satisfactory throughout 1941. 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 and the increase in total consumption had the effect of reducing the maximum demand load from 398 to 379 K.W.H. The cost per ton was reduced from .151 to .128.

16. WATER SUPPLY

This property continued to obtain its water supply from the Homer Mine of the M. A. Hanna Company. This service was satisfactory with the exception of several unavoidable interruptions when the water was shut off for a short time.

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.

18. NATIONALITY OF EMPLOYEES

	American Born		Foreign Born			
	Number	%	Number	%	Total	Per Cent
Parentage						
English	6	8	11	14	17	22
Finnish	5	6	7	9	12	15
Swedish	9	11	-	-	9	11
Italian	2	3	6	8	8	11
American	7	9	-	-	7	9
French	5	6	1	1	6	7
Danish	6	7	-	-	6	7
Polish	2	3	3	3	5	6
German	1	1	2	3	3	4
Irish	2	3	-	-	2	3
Austrian	-	-	2	3	2	3
Belgian	-	-	1	1	1	1
Welsh	1	1	-	-	1	1
Total	46	58%	33	42%	79	100%

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OPERATING AGENT FOR CANISTEO MINING COMPANY
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1. GENERAL:

All work at the Canisteo Mine, with the exception of the washing plant repairs, were continued throughout the holiday season. The washing plant repair program was resumed on January 6th, following the usual Christmas lay-off.

The stripping program on the south side of the pit was carried forward on the basis of twenty operating shifts per week, using two 3-1/4-yard electric shovels and approximately ten trucks in line at all times. The surface and waste material stripping on the south side program was completed early in February, after having moved 429,219 cubic yards of material from this area during the first part of the year. The shovels were then moved to two paint rock stripping areas, one shovel going to the Snyder bottom in the so-called Snyder island, located in the Mid-Snyder forty and the other to the East Bovey track bench. Paint rock stripping operations were conducted in these two areas until March 17th, when the entire program was completed. The stripping material from the Snyder area was hauled to an adjacent paint rock dump, located on a barren portion of the pit bottom in the West Snyder forty. Part of the material from the paint rock stripping on the East Bovey track bench was hauled to the tailings pond to raise and reinforce the dykes. The balance was hauled to a worked-out area on the pit bottom in the North Bovey.

Immediately following the stripping program, the motorized equipment was overhauled and repaired at the shops and the two electric shovels were given some needed repairs in the pit. The repair work on the latter was confined to that which was absolutely necessary, due to the limited time allowed for repairs between the close of the stripping and an early opening of the ore season. The motorized equipment repairs consisted of completely overhauling the tractors and giving the truck bodies and chassis the needed repairs, the majority of the motors having been overhauled during the operating season through the use of a spare Cummins-Diesel engine.

Ore mining operations were started on May 5th and continued through October 8th, on the basis of two 8-hour shifts per day and five days per week and very satisfactory progress was made throughout the season.

The washing plant was operated 112 days, treating 1,070,247 tons of crude ore, from which 585,679 tons of concentrates were secured. The average daily output of 5,229 tons was equivalent to 2,615 tons per shift, as compared with 2,505 tons per shift in the previous year.

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1. GENERAL:
(Continued)

There were but few major delays during the entire season and the operation of the plant, as a whole, was quite satisfactory.

Concentrates were stocked by truck from time to time during the season, due to a car shortage, and a small tonnage was loaded out from the pile at the end of the operating season.

Stripping operations were again resumed, following the completion of the ore season. The program undertaken consisted in removing approximately 220,000 cubic yards of paint rock and waste material from an area in the extreme southwest corner of the Snyder pit, and in extending the surface stripping on the south side to make available a large block of South Bovey ore. The south side stripping program called for the removal of approximately 430,000 cubic yards of surface and waste ore material, all from the South Bovey lease. The work was conducted on a basis of three shifts, five days per week, using the two 3-1/4-yard shovels and the seven haulage units available at the Canisteo Mine. The paint rock stripping was completed in November and the equipment was shifted to the south side of the pit where the South Bovey operations will be conducted until the latter part of February, 1942.

The winter repair program at the washing plant was started immediately after the ore season and carried forward until December 19th, when the work was suspended during the holiday season.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Snyder Crude,	733,914	tons.
Bovey Crude,	314,869	"
Hemmens Crude,	21,464	"
TOTAL CRUDE ORE,	1,070,247	"
Snyder Non-Bessemer Concentrates,	248,924	"
Snyder Bessemer Concentrates,	150,306	"
Bovey Non-Bessemer Concentrates,	156,994	"
Bovey Bessemer Concentrates,	17,139	"
Hemmens Non-Bessemer Concentrates,	1,764	"
Hemmens Bessemer Concentrates,	10,552	"
TOTAL CANISTEO MINE,	585,679	"

Ore operations were started on May 5th and were completed on October 8th.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Shipments:

Snyder Non-Bessemer Concentrates,	219,373	tons.
Snyder Bessemer Concentrates,	150,306	"
Bovey Non-Bessemer Concentrates,	156,994	"
Bovey Bessemer Concentrates,	17,139	"
Hemmens Non-Bessemer Concentrates,	1,764	"
Hemmens Bessemer Concentrates,	10,552	"
TOTAL SHIPMENTS,	556,128	"

c. Stockpile Inventories:

There is a balance of 29,551 tons of Snyder Non-Bessemer Concentrates in stockpile as of December 31st, 1941.

e. Production by Months:

(1) Crude Ore:

	SNYDER	BOVEY	HEMMENS	TOTAL
May,	96,699	97,579	-	194,278
June,	129,778	65,600	2,745	198,123
July,	158,665	60,855	1,603	221,123
August,	140,038	67,029	2,651	209,718
September,	158,723	18,830	14,465	192,018
October,	50,011	4,976	-	54,987
TOTAL 1941,	733,914	314,869	21,464	1,070,247

(2) Concentrates:

	SNYDER	BOVEY	HEMMENS	TOTAL
May,	47,880	53,550	-	101,430
June,	68,394	36,745	1,735	106,874
July,	88,821	33,508	998	123,327
August,	78,658	37,063	1,232	116,953
September,	87,169	10,306	7,890	105,365
October,	28,308	2,961	461	31,730
TOTAL 1941,	399,230	174,133	12,316	585,679

f. Ore Statement:

Snyder Non-Bessemer Concentrates in stockpile, December 31st, 1941 - 29,551 tons.

g. Delays:

The following delays were reported during the 1941 shipping season:

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Time Lost Minutes	Cause:
May 6th,	-	20	Waiting for Great Northern cars.
7th,	-	30	Repairing 8' pan conveyor.
8th,	-	40	Waiting for Great Northern empties.
	-	25	Repairing rock gun.
9th,	-	20	Repairing 8' pan conveyor.
14th,	-	45	Great Northern load track plugged.
15th,	1	55	Waiting for Great Northern empties.
16th,	1	-	Waiting for Great Northern empties.
19th,	1	-	Waiting for Great Northern empties.
20th,	1	20	Waiting for Great Northern empties.
	-	20	Repairing 5' x 14' Screen.
21st,	1	-	Waiting for Great Northern empties.
24th,	-	45	Cleaning log washer.
26th,	1	15	Dorr classifier plugged: Power off.
28th,	1	25	Waiting for Great Northern empties.
29th,	-	40	Waiting for Great Northern empties.
	-	35	Great Northern load track plugged.
30th,	-	20	Waiting for Great Northern empties.
	-	30	Repairing 5' x 14' screen.
June 4th,	-	25	Waiting for Great Northern empties.
5th,	1	45	Waiting for Great Northern empties.
6th,	1	20	Waiting for Great Northern empties.
13th,	1	50	Repairing Dorr Classifier motor.
	4	30	Tailings Pipe plugged.
19th,	1	-	36" conveyor stalled due to heavy wet ore.
24th,	-	40	Changing tailings pump.
25th,	-	25	Motor on 5' x 14' screen running hot.
26th,	-	30	Waiting for Great Northern empties.
27th,	-	25	Waiting for Great Northern empties.
30th,	1	25	Electric trouble on log motor.
July 1st,	1	-	Waiting for Great Northern empties.
3rd,	1	30	Waiting for Great Northern empties.
11th,	2	30	Waiting for Great Northern empties.
16th,	1	-	Waiting for Great Northern empties.
17th,	1	-	Waiting for Great Northern empties.
18th,	1	30	Waiting for Great Northern empties.
21st,	1	-	Waiting for Great Northern empties.
30th,	-	40	Coil on log starter burned out.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost: Hours	Minutes	Cause:
Aug. 4th,	-	40	Fuse burned out on log washer.
7th,	-	40	Large rock stuck in chute at crusher house.
11th,	-	30	Electric power off.
13th,	-	45	Waiting for Great Northern empties.
14th,	-	30	Waiting for Great Northern empties.
20th,	-	45	Fuse burned out on log washer.
27th,	-	50	Waiting for Great Northern empties.
28th,	1	30	Electric power off (lightning)
Oct. 2nd,	1	-	Ore stocking truck broken down.
7th,	-	30	Welding hinges on 8' pan.
Total,	47	10	

3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Snyder Non-Bess.Concs.	248,924	58.14	.053	10.16	.21	.55	8.34	53.29
Snyder Bess. Concs.	150,306	58.47	.036	9.62	.19	.58	8.74	53.36
Bovey Non-Bess.Concs.	156,994	57.87	.057	10.60	.21	.62	8.08	53.19
Bovey Bess.Concs.	17,139	58.54	.040	9.58	.17	.72	8.27	53.70
Hemmens Non-Bess.Concs.	1,764	56.67	.043	12.98	.16	.64	8.34	51.94
Hemmens Bess.Concs.	10,552	58.69	.035	11.18	.18	.69	6.37	54.95
TOTAL 1941,	585,679	58.17	.049	10.15	.21	.59	8.34	53.32

b. Mine Analysis of Shipments:

Snyder Non-Bess.Concs.	219,373	58.13	.054	10.19	.20	.58	8.32	53.29
Snyder Bess.Concs.	150,306	58.47	.036	9.62	.19	.58	8.74	53.36
Bovey Non-Bess.Concs.	156,994	57.87	.057	10.60	.21	.62	8.08	53.19
Bovey Bess.Concs.	17,139	58.54	.040	9.58	.17	.72	8.27	53.70
Hemmens Non-Bess.Concs.	1,764	56.67	.043	12.98	.16	.64	8.34	51.94
Hemmens Bess.Concs.	10,552	58.69	.035	11.18	.18	.69	6.37	54.95
TOTAL 1941,	556,128	58.17	.049	10.16	.20	.60	8.33	53.32

c. Mine Analysis of Ore in Stockpile:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist	Fe.Nat.
Snyder Non-Bess.Concs.	29,551	58.25	.044	9.93	.31	.35	8.50	53.30

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3. ANALYSIS:
(Continued)

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Snyder,	733,914	43.87	.041	31.98
Bovey,	314,869	43.80	.048	31.87
Hemmens,	21,464	41.84	.029	35.77
TOTAL CRUDE ORE,	1,070,247	43.81	.043	32.02

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Snyder Non-Bess.Concs.	58.10	.053	10.05	.21	.56	.14	.12	.012	5.82
Snyder Bess. Concs.	58.40	.035	9.55	.22	.57	.18	.14	.015	5.71
Bovey Non-Bess.Concs.	57.80	.057	10.55	.24	.60	.16	.14	.012	5.65
Bovey Bess. Concs.	58.50	.039	9.55	.18	.68	.16	.14	.011	5.73
Hemmens Non-Bess.Concs.	56.70	.043	12.98	.19	.61	.20	.14	.012	4.80
Hemmens Bess. Concs.	58.60	.033	11.05	.20	.67	.18	.16	.011	4.04

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%

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore: (Continued)

LEASE:	RESERVE JAN.1,1941	MINED 1 9 4 1	RESERVE JAN.1,1942
Bovey:			
S½-NE¼- Sec.30,	106,307	-	106,307
NW¼-SE¼- Sec.30,	240,403	-	240,403
NE¼-SE¼- Sec.30,	487,172	174,133	313,039
NE¼-NE¼- Sec.31,	799,642	-	799,642
Total Bovey,	1,633,524	174,133	1,459,391
Hemmens:			
SW¼-SW¼- Sec.29,	1,288,610	12,316	1,276,294
Snyder:			
SE¼-SW¼- Sec.30,	196,963	48,616	148,347
SW¼-SE¼- Sec.30,	674,343	123,555	550,788
SE¼-SE¼- Sec.30,	1,609,149	227,059	1,382,090
Total Snyder,	2,480,455	399,230	2,081,225
GRAND TOTAL,	5,402,589	585,679	4,816,910

The estimated tonnage of reserve ore in the Canisteo Mine, as of January 1st, 1942, shows a decrease of 585,679 tons which represented the amount of ore mined during the season. The drilling undertaken during the year merely confirmed our former estimates and resulted in neither an increase nor a decrease of reserves.

c. Estimated Analysis:

Lease:	Grade	Tons	Iron	Phos.	Silica
Bovey:					
	Bessemer Concentrates,	379,000	57.38	.037	8.25
	Non-Bess.Concentrates,	1,080,391	57.53	.073	10.83
Hemmens:					
	Bessemer Concentrates,	955,905	57.48	.032	11.30
	Non-Bess.Concentrates,	320,389	57.24	.064	11.55
Snyder:					
	Bessemer Concentrates,	1,155,075	58.19	.035	10.37
	Non-Bess.Concentrates,	926,150	58.11	.069	10.41
	Grand Total Bess.Concs.	2,489,980	57.79	.034	10.40
	Grand Total Non-Bess. Concentrates -	2,326,930	57.72	.070	10.76

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5. LABOR & WAGES:

a. Comments:

There was no shortage of skilled or unskilled labor during the entire year and no time was lost due to strikes or labor troubles.

However, there was considerable agitation by the S.W.O.C., during the entire year. A C.I.O. local was formed in Bovey of employees of the Mesaba-Cliffs and Canisteo Mining Companies and early in the spring a meeting was requested to enter into negotiations for a contract. In a series of meetings with the representatives of the C.I.O., the S.W.O.C., and later with Federal and State Labor Conciliators, it developed that no agreement could be reached. A strike notice was filed in August and the matter was referred to a fact-finding commission appointed by the Governor, in accordance with State labor laws. This commission reported in favor of the mining companies and a meeting in the Governor's office again failed to reach any agreement. At the end of a 30-day cooling-off period, a strike failed to develop. During the meantime an independent union had been formed among the employees of the Canisteo Mining Company. This was called the "American Union" and it claimed a membership of approximately 60% of the employees of the Canisteo Mining Company. The growth of this independent union and its stand in regard to a strike were probably the main factors in defeating the strike which had been called in August. In October, a petition was filed by the S.W.O.C., and C.I.O., with the National Labor Relations Board for a determination of the proper bargaining agent at the mines and the case was set for December 3rd. It was postponed until December 11th, and again continued until sometime during the early part of the year 1942.

b. Comparative Statement of Wages and Product:

Production:	
Direct Shipping Ore,	-
Concentrates Shipped,	556,128 tons
Concentrates in Stock,	29,551 "
Total Production,	585,679 "
Number of Days Operated,	112
Number of Shifts and Hours,	2 - 8-hour
Average Daily Product,	5,229 tons
Average Number of Men Working,	126
Average Wages paid Per Day,	$ 7.04
Amount Paid for Labor,	$ 114,533.47

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6. SURFACE:

a. Buildings, Repairs:

The repairs to the mine buildings, the dwelling houses and the washing plant structures consisted merely in the necessary maintenance work.

c. Tracks, Roads, Transmission Lines, etc:

The road leading to the mine was resurfaced during the year with some gravel which was procured in the stripping operations on the south side of the pit.

Aside from a small amount of maintenance, there was no transmission line alteration nor construction.

7. OPEN PIT:

a. Stripping:

The stripping undertaken at the Canisteo Mine during the year consisted in removing waste material from five different areas, viz: the completion of the surface and waste material stripping on the south side of the pit, which had been started immediately after the 1940 ore season; the removal of the paint rock from the remaining portion of the Snyder island in the West end of the Mid-Snyder forty; the stripping of the paint rock and other waste material from the track bench on the east side of the North Bovey forty; a paint rock stripping operation in the extreme southwest corner of the pit on the West Snyder forty; and an extension of the south side surface stripping into the South Bovey lease.

On the south side of the pit the stripping job, which had been started in the fall of 1940, covered an area about 1,300 feet in length and 400 feet in width, with an average depth of 135 feet. This area extended from a point 300 feet east of the Hemmens line westward across the Snyder lease and 300 feet into the South Bovey.

Two 3-1/4-yard Bucyrus-Erie electric shovels and ten Euclid hauling units in line were used on this work and the operations were conducted on the basis of twenty shifts per week. The program was completed during the early part of February. With good loading and ideal stripping and hauling conditions, excellent progress was made and a very good stripping cost secured. A total of 429,219 cubic yards of surface and lean waste material were removed from this area during January and part of February. This consisted of 335,071 yards from the South Bovey; 66,067 yards from the Snyder and 28,081 yards from the Hemmens leases.

Upon completion of the south side operations one shovel, one tractor and several of the haulage units were shifted to the west end of the Snyder island in the pit bottom. The other shovel, one tractor and the remaining haulage units were taken to the track bench in the East Bovey at the north end of the pit. Stripping operations at these two

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

areas were conducted simultaneously, the paint rock material which was removed being hauled to nearby paint rock dumps in barren, or worked-out areas on the respective leases. A total of 134,732 cubic yards of paint rock and lean waste material was removed from the Snyder island area and deposited on the paint rock dump in the bottom of the West Snyder forty. A total of 89,391 cubic yards were removed from the East Bovey track benches and approximately 5,000 yards of this material was hauled to the tailings pond to reinforce and raise the tailings dykes. The work in these two areas was carried forward three 8-hour shifts per day and five days per week and was completed on March 17th. Good progress was made and the costs realized were under the amount estimated for this program.

On completion of the ore program in October, the equipment was moved to a small triangular area in the extreme southeast corner of the Snyder pit. This area extended approximately 600 feet north along the west bank and about the same distance along the south bank of the pit. A total of 226,933 cubic yards of paint rock and lean waste ore material were taken from this section and placed on adjacent dumps in the Snyder pit bottom. The work was conducted on a basis of three 8-hour shifts per day and five days per week, using the two 3-1/4-yard electric shovels and seven 15-ton Euclid haulage units. With a short haul, good progress was made and a favorable cost was secured.

Upon the completion of this work, the equipment was shifted to the south side of the pit, where an extension of the surface stripping into the South Bovey lease would make available a large block of Bovey ore. This surface stripping program consisted in the removal of approximately 430,000 cubic yards of material from an area approximately 800 feet long and 250 feet wide in the western end of the South Bovey lease. The work was carried forward on a basis of three shifts per day and five days per week. However, since there were only sufficient haulage units to serve one shovel on this long haul, the work was conducted with but one machine until the three new Euclid trucks were received during the fore part of December. The second shovel was then placed in operation and the work was conducted with two shovels and nine trucks in line until the end of the year. A total of 196,736 cubic yards of South Bovey surface material were removed and taken to the stripping dump, South of the pit. The progress was fairly slow during the one-shovel operation, but there was a decided improvement after the new trucks were received and the second shovel was used in loading. The progress, as a whole, was quite satisfactory and the stripping costs were well within the estimated figure.

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

The following tabulation shows the classification of the materials stripped from the various leases during the year 1941:

Lease:	SURFACE	ROCK	OTHER MATERIAL	TOTAL
Bovey,	531,807	89,391	-	621,198
Hemmens,	28,081	-	-	28,081
Snyder,	66,067	134,732	226,933	427,732
Total,	625,955	224,123	226,933	1,077,011

f. Explosives, Drilling & Blasting:

Statement of Explosives Used:

ORE OPERATIONS:

	QUANTITY	PRICE	AMOUNT
25% duPont Quarry Gel. 5 x 16,	33,750#	10.00	$ 3,375.00
25% duPont Quarry Gel. 3 x 10,	6,350#	10.00	635.00
40% duPont Quarry Gel. 3-1/2 x 10,	4,900#	10.00	490.00
40% duPont RC Extra 5 x 14,	85,600#	10.00	8,560.00
60% duPont RC Extra 1-1/4 x 8,	100#	14.00	14.00
40% duPont Spec. Gel. 5 x 16,	650#	10.50	68.25
60% duPont Spec. Gel. 1-1/8 x 8,	200#	11.50	23.00
Total and Average,	131,550#	10.01	$ 13,165.25
30' duPont #6 E. B. Caps,	750	12.652	94.89
40' duPont #6 E. B. Caps,	400	19.000	70.60
No. 14 Lead Wire, (feet)	250	15.00	3.75
No. 20 Connecting Wire, (lbs.)	50	45.00	22.50
Total Caps, etc. -			191.74
TOTAL ORE OPERATIONS 1941,			$ 13,356.99

STRIPPING OPERATIONS:

25% duPont Quarry Gel. 5 x 16,	71,250#	9.986	7,115.63
25% duPont Quarry Gel. 3 x 10,	5,000#	9.9374	496.87
40% duPont R.C.Extra 5 x 14,	22,000#	10.000	2,200.00
40% duPont R.C.Extra 1-1/4 x 8,	1,550#	10.000	150.00
40% duPont R.C.Extra 1-1/4 x 8,	500#	10.00	50.00
40% duPont R.C.Extra 4-1/2 x 14,	5,300#	10.00	530.00
50% duPont R.C.Extra 5-1/2 x 16,	200#	10.00	20.00
Total and average,	105,800#	9.9834	$ 10,562.50

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7. OPEN PIT:
(Continued)

f. Explosives, Drilling & Blasting: (Continued)

Statement of Explosives Used: (Continued)

STRIPPING OPERATIONS: (Continued)

	QUANTITY	PRICE	AMOUNT
No. 6 duPont Blasting Caps,	1,000	12.20	12.20
16' #6 duPont E.B.Caps,	2,500	8.65	216.25
30' #6 duPont E.B.Caps,	250	12.652	31.63
36' #6 duPont E.B.Caps,	600	12.65	75.90
40' #6 duPont E.B.Caps,	400	17.65	70.60
No. 20 Connecting Wire, (lbs.)	50	55.00	27.50
Total Caps, etc. -			$ 434.08
TOTAL STRIPPING OPERATIONS - 1941,			$10,996.58
GRAND TOTAL EXPLOSIVES - 1941,			$21,559.08

g. Open Pit Mining & Loading:

Mining operations were started on May 5th and conducted on a basis of two 8-hour shifts per day, five days per week until the 8th of October. A total of 1,070,247 tons of crude ore was mined and 585,679 tons of concentrates were secured in the treatment of the same. The operations, as a whole, were quite satisfactory, despite slow loading conditions on numerous occasions, resulting from heavy rains. The sinking cuts in the pit bottom required extra pumping facilities and there was the usual shifting of shovels for grading purposes.

Two 3-1/4-yard electric shovels furnished ample loading capacity and five to six haulage units were required for the ore, depending on the length of haul. A constant flow of ore to the mill was maintained at all times.

The mining operations were conducted in six different areas in the pit - three in the Snyder, two in the Bovey and one in the Hemmens lease. In the east half of the East Snyder forty, ore was mined from the upper and lower benches in the south bank of the pit. In the West end of the East Snyder forty and the East end of the Mid-Snyder, the operations extended into the Snyder island and a sinking cut was made into the pit bottom. In the West Snyder forty a cut in the pit bottom followed the rock along the south bank, westward to the paint rock stripping area in the southwest corner of the pit. The operations in the Bovey consisted in mining a small tonnage of rocky wash ore in the bottom of the North Bovey extension, exhausting this area, and in mining the greater part of the East Bovey track bench. In the Hemmens, a small tonnage of ore was taken from a sinking cut on the south side of the pit, immediately east of the Hemmens-Snyder line. A total of 733,914 tons of crude ore was mined from the Snyder leases, - 314,869 from the Bovey and 21,464 tons from the Hemmens.

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)

To insure proper grading, it was necessary to shift the shovels continually among the several loading places. Most of the Bessemer ore was secured from the south bank operations in the Snyder. The ore in the latter was a mixture of lean, low-recovery material in the upper bench and a higher grade product in the lower horizon. A mixture of the material from the two benches could be graded by itself; however, ores from this area were mixed with material mined in the other parts of the pit as grading requirements necessitated this mixture. In the mining operations in the bottom of the Snyder lease the ore from the island area was mixed with a higher grade product which was obtained in the sinking cut. Both non-Bessemer and Bessemer materials were secured here and a fair grade of concentrate was produced. In the cut along the bottom of the West Snyder a high grade, high recovery product was obtained. The material not only afforded a good "sweetener" for the other materials, but the operations cleaned up an area which could be later used as a dump for paint rock stripping from the West Snyder. In the North Bovey, the mining in the north extension consisted in deepening and cleaning up the pit bottom. The ore secured here was mostly rocky wash and required some sorting. The tonnage removed was small and the extra work required was not very extensive. In the East Bovey track bench the operations were conducted at both the north and south ends, leaving a small block of ore near the center of the bench. Both non-Bessemer and Bessemer material were secured here. The crude ore mined from this area ranged from a very lean to a fairly high grade material, with a good weight recovery. Only a small tonnage was mined from the Hemmens, due to the fact that the high Silica content in the ore required mixing with material from other leases and the amount mined was definitely limited by grading requirements.

The rock and lean waste material which was encountered during the season was dumped in areas provided for that purpose in the barren sections of the pit. This material was disposed of either on the night shift or on week-ends.

k. Drainage:

The water level in the pit was maintained at an elevation about 60 feet above the pit bottom at the east end. No unusual draining problems were encountered, although the sinking cuts and the heavy rains necessitated the use of auxiliary pumps on numerous occasions.

8. COST OF OPERATION:

a. Comparative Mining Costs:

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8. COST OF OPERATION: (Continued)

a. Comparative Mining Costs:

	BUDGET ESTIMATE	1941 COST PER TON	1940 COST PER TON
PRODUCT:			
Concentrates, (Tons)	570,000	585,679	478,339
Average Shift Product, (Tons)		2,615	2,505
Tons Per Man Per Day,		36.04	33.18
Days Operated,		112	103
COST:			
Open Pit Crude Ore,	$ .150	$.151	$.150
General Pit Expense,	.050	.094	.071
Concentrating,	.109	.113	.134
Stocking Concentrates,	.006	.004	-
General Mine Expense,	.063	.063	.057
Idle and Winter Expense,	.080	.161	.156
Adj.Labor (10¢ per hr. Incr.)	.032	-	-
Cost of Production,	.490	.586	.568
Depreciation, Plant & Equipment,	.103	.101	.103
Depreciation, Motorized Equipment,	.087	.099	.087
Amortization, Stripping,	.250	.250	.250
Taxes, Ad Valorem,	.132	.147	.167
Taxes, Occupational,	.141	.141	.124
Taxes, Royalty,	.030	.026	.024
Total Cost at Mine,	$ 1.233	$ 1.350	$ 1.323
Administrative Expense,	.050	.050	.050
Miscellaneous Expense & Income,	.002	.001	.002
GRAND TOTAL, ----------	$ 1.285	$ 1.399	$ 1.375

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:

The 1941 and the 1940 costs have a very good basis for comparison, for although the tonnage mined and shipped during the past season was much larger than in 1940, the advantage was offset by a lower weight recovery and by a higher labor rate. The actual mining problems were very similar and the same system of mining used. There was a much smaller tonnage of rocky wash ore moved than in 1940, resulting in less

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(1) Product: (Continued)

time lost and a higher cost of sorting and handling rock. This was the result of mining only a small tonnage in the North Bovey extension, where the ore was sorted from the rock formation. The total cost of production for the year 1941 was $.014 above that for 1940 and $.096 above the budget estimate. The increase over the 1940 costs was found in a small increase in General Pit Expense, General Mine Expenses and Winter and Idle Expense, the increased costs being due almost entirely to the small difference from the increased labor cost. The increase over the budget estimate was a result of increased labor costs, a much higher pumping cost than had been anticipated and to an increase of $.081 in the Winter and Idle Expense, the repairs necessary on the washing plant equipment and the shovels having been more extensive than had been estimated.

(2) Open Pit Mining:

The cost per ton of concentrates under this caption was practically the same as the budget estimate and the 1940 costs. The cost per ton of crude ore was $.007 under the budget and the 1940 figure, but this was offset by a lower rate of recovery, resulting in practically the same costs per ton for the washed product. There was a saving of $.007 and $.008 over the budget and the 1940 costs, respectively, in Drilling and Blasting, due to the fact that there was a much smaller percentage of rocky material mined. This was offset, however, by an increase in Power Shovels Maintenance and Truck Maintenance. The other individual items under this caption were extremely close, or practically the same as the budget estimate and the 1940 figures.

(3) General Pit Expense:

The total charges under this caption were $.023 above the 1940 costs and $.044 above the budget estimate. This increase was due, almost entirely, to a higher cost for Pumping and Drainage and Explratory Drilling. The higher cost of Pumping and Drainage, which amounted to $.015 and $.016, respectively, above the 1940 and the budget costs, was due to the necessity of rebuilding the raft for the main pit pumps on the south side and placing the high-head pump, which furnishes water for washing purposes, on the raft. This construction was all charged to the year's pumping and drainage costs. There was likewise the added cost for the auxiliary pumping, due to heavy rains. General Open Pit Expense, while slightly below the 1940 figure, was $.006 over the budget estimate, due to numerous pit improvements which were necessitated during the year and which had been unforseen at the time of the estimated figures. Open Pit Superintendence and Waste Pile Expenses were practically the same as the 1940 and budget costs. The charges for Structure Drilling were $.012 over 1940 and $.021 over the budget. This increase was accounted for merely in a much larger exploratory drilling program and to some charges from a deferred drilling account.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(4) Concentrating:

Under this caption the total cost per ton was $.021 below the 1940 figures and $.004 above the budget estimate. Washing and Conveying costs were practically the same in all instances. There was a saving of $.003 over the 1940 costs and the budget in Power, due to an increased tonnage. The charges for General Expense and Maintenance of Buildings and Machinery were $.011 and $.006, respectively, under those for 1940. This was the result of a much larger improvement program undertaken in 1940 in the complete painting and general improvement of the washing plant buildings and grounds. The increase in these two items of $.003 and $.004, respectively, over the budget estimate were the result of improvements which were undertaken at the change house and extra repairs necessitated on washing plant machinery. Stocking and Loading Concentrates was $.002 under the budget, due to the fact that it was not necessary to stock as large a tonnage as had been anticipated.

(5) General Mine Expenses:

The 1941 costs under this caption were only $.002 above that for 1940 and was the same as the budget estimate. Small increases in some items were offset by savings in others and the small difference in the total cost over 1940 was the result of an increase in Vacation Pay, due to a more liberal ruling, and to an increase in Social Security Taxes occasioned by higher labor rates.

The charges for Winter and Idle Expense in 1941 were $.004 above those for 1940 and $.080 above the budget estimate. The increase over the latter was due almost entirely to a higher labor cost and to the extra cost of rushing repairs in the spring in order to complete the overhauling of equipment in the short time allotted between the concluding of the stripping program and the opening of the mining season. This resulted in considerable overtime work. It was also found that the repairs to the shovels and to the Washing Plant equipment were much larger than had been anticipated.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

A rather large drilling program was undertaken at the Canisteo Mine during the year 1941. In the south bank a number of holes were put down to definitely outline the existing ore, to check the extension of the ore body to the south, and to definitely establish the ore limits near the stripping dump. In the pit bottom numerous holes were put down to outline the ore and rock areas and to facilitate the mining and grading operations. In the southwest corner of the pit in the Snyder lease a number of holes were drilled to outline the paint rock stripping program and to establish the tonnage of ore under this paint rock capping.

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9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

In all, a total of 5,250 feet of drilling were completed; - 1,697 feet being drilled under contract with the Schultze Drilling Company of Grand Rapids. This consisted of seven holes, all put down from surface on the south side of the pit; five in the South Bovey lease, in the NE¼ of the NE¼ of Sec. 31; one in the Hemmens, just east of the west line and immediately north of the south line of Section 29 - and one in the South Bovey lease in Section 32, immediately south of the Hemmens. This hole was located in the old Oliver approach and a short distance north of the south side stripping dump. The 3,553 feet of drilling which was accomplished with the Canisteo Mine drill rig was all put down in the ore formation in the Snyder and Bovey leases on the south side of the pit; in the pit bottom in the southeast corner of the Snyder lease; in the pit bottom in the West Snyder and in the proposed paint rock stripping area in the southwest corner of the Snyder lease. The holes drilled in the latter area not only outlined the stripping program but developed approximately 150,000 tons of high grade ore, which will be used for grading purposes during the next two seasons. The drilling completed in the pit bottom and in the south bank merely confirmed information which had been formerly set up as to the ore in these areas.

During the coming season the drilling contemplated will include checking the extension of the ore body at the west end of the pit and some further drilling on the south side to definitely establish whether or not it will be necessary to move the D. M. & N. main line to the south. These will all be surface holes and will undoubtedly be drilled under contract. Drilling in the pit bottom will be continued with one Company machine to facilitate mining and grading.

10. TAXES:

The following statement shows the Canisteo Mine taxes and the average rates for the years 1940 and 1941:

Statement of Taxes:	1941	1940	Increase	Decrease
Canisteo Mine,	$82,465.97	80,193.40	2,272.57	
Washing Plant Lands,	497.87	477.42	20.45	
Personal Property,	2,979.89	3,320.00	-	340.11
Total,	$85,943.73	83,990.82	1,952.91	
Village Lots,	-	-	-	-
GRAND TOTAL,	$85,943.73	83,990.82	1,952.91	
Average Tax Rate,	96.85	93.33	3.52	-

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10. TAXES: (Continued)

The increase in total taxes was the result of raising the valuation on the ore remaining in the West Snyder ($SE\frac{1}{4}$-$SE\frac{1}{4}$-Sec.30,56-24), due to a change in classification from an inactive to an active forty. This raised the valuation rate from $14\frac{1}{2}¢$ to 18.3¢ per ton. The small decrease in Personal Property taxes is represented by depreciation.

The increased tax rate was the result of an increase in the county and the school assessments.

11. ACCIDENTS AND PERSONAL INJURY:

There were nine lost-time accidents at the Canisteo Mine during the year 1941. These are described as follows:

NAME: Neil Workman Date: January 7th, 1941.
CAUSE: Pulling away from the shovel with a load of surface stripping. Front wheel of the truck struck a sand hole, causing the steering wheel to jack-knife and steering wheel spoke struck Workman a violent blow on the left wrist.
NATURE: Fracture of distal radial head and tip of ulnar styloid.
TIME LOST: Forty-four days.
COMPENSATION: $173.33

NAME: Wayne Hayes, Date: February 25, 1941.
CAUSE: Hayes was driving truck #30. When going down hill approximately on a 15% grade, Hayes stepped on the brakes and slid the truck wheels, the truck getting out of control and headed for the bank side of the road. The left front wheel went up the slope sufficiently to overbalance the truck and it tipped sideways. Hayes bumped his right elbow and left knee.
NATURE: Abrasion right posterior elbow - bruising of left knee. No break in skin.
TIME LOST: Four days.
COMPENSATION: None.

NAME: Dellwood M. LeClair Date: June 12, 1941.
CAUSE: A rock ledged in the rollers of the sample crusher. Injured man was attempting to loosen the rock with a small bar. The crusher rolls are protected by a grizzly screen of about 2" mesh. LeClair had inserted the bar through the safety screen and into the crusher rolls in his attempt to dislodge the rock. The bar caught in the rolls, was pulled downward very quickly and LeClair's right hand was caught between the handle of the iron bar (stove poker) and the grizzly.
TIME LOST: Thirty-one days.
COMPENSATION: $124.00.

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: Tillman W. Brown Date: August 18, 1941.
CAUSE: Brown, with other workmen, was rip-rapping bank at the corner of the crusher house with old pieces of rail. He caught his finger between two rails, squeezing same.
NATURE: Contusion and laceration, terminal phalanx left small finger.
TIME LOST: Four days.
COMPENSATION: $19.33

NAME: Hilding George Johnson Date: September 11, 1941.
CAUSE: Johnson, a Euclid truck driver, was going down into the pit with truck #13. His truck got out of control and when it gathered speed and hit a bump, he was thrown from the truck to the ground.
NATURE: Contusion of left side of chest, lower rib margin.
TIME LOST: Twenty days.
COMPENSATION: $80.00.

NAME: Chris Spoo Date: September 4, 1941.
CAUSE: Muscular strain while pulling electric cable of shovel #1, which was being moved to another position in the pit.
NATURE: Pacio iliac strain.
TIME LOST: Four days.
COMPENSATION: None.

NAME: Clyde W. Blair Date: September 23, 1941.
CAUSE: Blair was loading a dipper tooth shank from a wheelbarrow onto his truck. The shank slipped through his arms, falling onto his left foot.
NATURE: Fracture of distal third left first metatarsal - left foot.
TIME LOST: Twenty days.
COMPENSATION: $80.00.

NAME: Walter Liimatainen Date: October 16, 1941.
CAUSE: Liimatainen was driving a Koehring dumptor. He turned too sharp and was driving too fast around a bend in the road and could not avoid hitting truck #14, coming from an opposite direction. The impact threw Liimatainen from the dumptor to the ground.
NATURE: Bruised left lower back over left fland and left iliac crest, posterior; muscle strain right neck area. Bruise and abrasion of skin of scalp occpital region near vertex.
TIME LOST: Twenty-two days.
COMPENSATION: $88.00.

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: Ernest Longmore Date: November 17, 1941.
CAUSE: Longmore, after having spotted a truck alongside the shovel, walked away, approximately 10 feet from the truck. A chunk of clay hit the ground and rolled against Longmore's leg. He thinks the chunk fell off of the dipper teeth as the dipper was swinging over the truck to dump at the time.
NATURE: Contusion and bruising of posterior leg and ankle. No break in skin.
TIME LOST: Twenty-two days.
COMPENSATION: $88.00.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

Very little new construction was undertaken during the year 1941. The new change house under E&A #AC-36 was completed and placed in operation. The former pit service garage, which was constructed in the pit for the 1939 operations, was moved to the shop site, where it will be used for shovel repairs. No major construction projects are being planned for the year 1942.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

One Koehring 6-yard dump truck was received during the early part of the year and was used for rock disposal from the crusher house in the pit during the ore season.

Two new Akins classifiers were received and erected in the washing plant, replacing one Dorr bowl classifier, just previous to the ore season. A "Parmanco" horizontal drill was purchased in order to facilitate the drilling of stripping banks and to effect a saving in the drilling and blasting of numerous ore banks. A second-hand "International" truck chassis was purchased for the use of a sprinkler, replacing an obsolete machine for which it was impossible to purchase repair parts.

In December, three new 15-ton Euclid rear-end dump trucks, equipped with 200 H.P. super-charged Cummins Diesel engines, were received. They were immediately placed in the stripping operations on the south side. These will replace three of the standard machines and will effect a time saving on the haul from the south side of the pit.

During the coming year the second Dorr classifier will be replaced with two new Akins and it is planned to replace three additional Euclid trucks with super-charged units.

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14. MAINTENANCE AND REPAIRS:

As the stripping program was continued until the 17th of March, the repairs to the two electric shovels and the motorized equipment had to be crowded into the short time available between then and the opening of the 1941 season. The repairs to the shovels were limited to what was absolutely necessary and there was not sufficient time to overhaul the crawling mechanism. The repairs necessary on the latter during the 1942 season will be rather extensive. The two - "D-8" tractors were completely overhauled in the shop, replacing worn parts and overhauling motors. The repair work on the trucks consisted mainly in checking over and overhauling the boxes and chassis, for the majority of the motors had been overhauled during the stripping season through the use of a spare Cummins-Diesel engine. The washing plant repairs were completed in time for the ore season, these having consisted mainly in checking over and building up worn equipment and the renewal of the rollers on the 8' pan conveyor.

18. NATIONALITY OF EMPLOYEES:

NATIONALITY:	NO. MEN 1941	NO. MEN 1940
American,	98	139
Jugo-Slav,	4	8
Finnish,	6	9
Italian,	2	2
Swedish,	3	4
Bulgarian,	1	2
Canadian,	4	5
Austrian,	1	1
Norwegian,	1	1
Danish,	1	1
Montenegrin,	1	1
Belgian,	1	1
German,	-	1
Russian,	-	1
Czecho-Slavica,	1	-
Totals,	124	176

19. WASHING PLANT OPERATIONS:

The washing plant operated from May 5th to October 8th, inclusive, on the basis of two 8-hour shifts per day, five days per week, totaling 112 days or 224 shifts. The mill performance was very satisfactory. No long delays were occasioned by the conveying equipment, nor by the tailings pump. The installation of a large sump box on the latter insured a smooth, continuous operation at all times.

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19. WASHING PLANT OPERATIONS: (Continued)

A site was prepared for stocking concentrates immediately southwest of the concentrator and facilities were provided for handling the material by truck. A small tonnage of ore was stocked from time to time during the season, thereby eliminating long delays due to poor car service and insuring a continuous and efficient plant operation.

A total of 45,226 tons of Snyder concentrates were placed in stockpile throughout the season and 15,675 tons were loaded out in November, leaving a balance of 29,551 tons.

The production for the season amounted to 585,679 tons of concentrates and the average output per shift amounted to 2,614 tons, as compared with 2,505 during the previous year. This was very satisfactory and well above the anticipated output of 2,500 tons per shift.

The amount and analysis of the plant rejects for the year 1941 were as follows:

	5-FT. PAN REJECTS:			
Lease:	Tons	Iron	Phos.	Silica
Snyder,	22,275	22.41	.028	64.69
Bovey,	21,722	22.69	.026	64.26
Hemmens,	1,235	25.75	.019	60.59
Total,	45,232	22.64	.027	64.37

	36" BELT REJECTS:			
Lease:	Tons	Iron	Phos.	Silica
Snyder,	2,055	22.23	.029	64.81
Bovey,	1,737	23.51	.031	63.05
Hemmens,	105	20.52	.022	65.35
Total,	3,897	22.75	.030	64.04

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

Lease:	Cu. Yds.	Tons	Iron
Snyder,	1,521	2,281	29.03
Bovey,	8,833	13,250	27.91
Hemmens,	233	350	28.40
Total,	10,587	15,881	28.08

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19. WASHING PLANT OPERATIONS: (Continued)

The lean ore removed and stocked in the pit during mining operations was as follows:

Lease:	Cu. Yds.	Tons	Iron
Snyder,	7,757	13,574	31.18

The analysis of the product from the various machines for the year 1941 was as follows:

SNYDER MILL MACHINES:

	Iron	Phos.	Silica
Log Washer,	57.66	.048	10.90
Akins Classifier,	58.53	.044	10.26
Dorr Classifier,	57.48	.043	11.78
Akins Tailings,	20.76		
Dorr Tailings,	19.64		

BOVEY MILL MACHINES:

	Iron	Phos.	Silica
Log Washer,	57.93	.055	10.55
Akins Classifier,	57.87	.049	10.98
Dorr Classifier,	56.89	.048	12.27
Akins Tailings,	20.61		
Dorr Tailings,	19.54		

HEMMENS MILL MACHINES:

	Iron	Phos.	Silica
Log Washer,	57.27	.039	12.54
Akins Classifier,	59.10	.036	10.96
Dorr Classifier,	58.19	.033	12.22
Akins Tailings,	19.85		
Dorr Tailings,	18.54		

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19. WASHING PLANT OPERATIONS: (Continued)

	Tons	Percentage of Total Mined	Iron Dried	Tonnage Recovery	Iron Unit Recovery
Material removed in mining operations (exclusive of surface)	1,144,934	100.00	42.61		
Less: Lean Ore Stocked in Mining,	13,574	1.19	31.18		
	1,131,360	98.81	42.74		
Less: Pit rock wasted,	15,881	1.38	28.08		
Total transported to Mill,	1,115,479	97.43	42.95		
Less rock rejects in Crusher House,	45,232	3.95	22.64		
Crude ore entering Mill -	1,070,247	93.48	43.81		
Concentrates produced,	585,679	51.15	58.17	54.72	72.66
Rock rejects on mill picking belt,	3,897	.34	22.75		
Tailings (by deduction)	480,671	41.99	26.48		
Total Heads, as above (entering mill)	1,070,247	93.48	43.81		
Total pit rock, crusher house rejects and lean ore,	74,687	6.52	25.35		
Totals,	1,144,934	100.00	42.61		

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1. GENERAL:

Following the usual holiday lay-off, the winter work was resumed at the Holman-Cliffs Mine on January 6th, 1941, continuing the repair work which had been started late in 1940.

Three locomotives and twenty 30-yard dump cars were completely repaired; renewing the worn and broken parts and checking over of the operating mechanism. The blast hole drill and structure drills were also carefully checked over and repaired, special attention being given to the crawling mechanism.

The 120-B electric shovel, (#32), was completely overhauled. A new crawling mechanism was installed; the propelling and hoisting machinery carefully checked over; the motors and motor generator set being repaired in the shops. A new 3-1/4-yard Model 4101 "Marion" electric shovel was received and assembled, ready for use in the spring operations.

The winter repair program at the washing plant consisted in moving the washing plant pumps to a new location and placing them on a concrete foundation, checking over all plant equipment and giving it the necessary repairs; dismantling and taking out the electric haulage system for waste rock and preparing the plant for truck haulage.

Pumping with the 7,000-gallon per minute unit was continued 24 hours per day until the latter part of March, when the water in the Holman pit had been dropped 78 feet to the original sump cut. It was maintained at this elevation until a deeper sump had been prepared late in the mining season.

The West half of the bridge over the highway and D. M. & I. R. tracks on the main line to the washing plant was rebuilt. A new meter station was constructed at the junction with the Minnesota Power & Light Company's high tension line and the lines were rearranged so that all power for the Holman-Cliffs Mine could be purchased through one meter.

Pit preparations were started early in March and the work was rushed in anticipation of an early opening. A new pit loading pocket, with air-controlled bin gates was constructed on the upper haulage bench, just north of the narrows leading into the west end of the Brown No. 1. Roads connecting this ramp with the Holman and Brown No. 1 pits were constructed and a main haulage road was graded in to the Holman-Brown No. 2 bottom, following the rock, down on an 8% grade. Track repairs were resumed, replacing old ties and improving the main haulage lines.

HOLMAN-CLIFFS MINE
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1. GENERAL:
(Continued)

The mining season opened April 21st and was continued through October 21st. Operations were conducted on a basis of three 8-hour shifts per day, five days per week. Production during the first two months was quite slow, due to poor haulage conditions resulting from newly-constructed roads and an extremely wet pit bottom. With the improvement of the drainage conditions, the pit operations were quite satisfactory during the balance of the season.

The washing plant operated 140 days and 989,669 tons of concentrates were secured in the treatment of 1,501,249 tons of crude ore. The average daily output of 7,068 tons was equivalent to 2,356 tons per shift, as compared with 2,250 tons per shift in the 1940 season. Plant results were quite satisfactory, but the delays at the mill amounted to 10% of the total working time. This was a slight improvement over that in 1940. The time lost in delays as a result of Great Northern car service amounted to 5% of the total, and pit operating delays accounted for 3% of the same. The other 2% was confined to plant delays. During the operating season, 49,722 tons of concentrates were put in stockpiles, using truck haulage for stocking. This material will be shipped out in the spring of 1942.

Following the ore season, a large stripping program was undertaken, using the two electric shovels and six Euclids and two dumptor trucks. Actual stripping operations got underway following a week of preparation during the first part of November and will be continued until the latter part of February, 1942.

A very comprehensive structure drilling program was undertaken during the year. The drilling campaign started early in March and was continued throughout the season. The Holman pit bottom was completely drilled and a number of holes were put down in the bottom of the Brown No. 2 to check the extension of the deep ore body to the southeast. Several surface holes were drilled in the south bank, near the Holman-Brown No. 1 line, to outline a location for a future conveying system which would eliminate rail haul through moving the washing plant to the south side of the pit. During the year a total of 12,389 feet of sample drilling was accomplished, using two Company drills and two contractor's outfits.

Winter repairs on the mill equipment were started immediately after the ore season and carried forward with a small crew through the balance of the year.

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Holman Crude,	979,393	tons
Brown Crude,	312,399	"
North Star Crude,	209,457	"
TOTAL CRUDE,	1,501,249	"
Holman Non-Bessemer Concentrates,	530,964	"
Holman Bessemer Concentrates,	117,217	"
Brown Non-Bessemer Concentrates,	81,949	"
Brown Bessemer Concentrates,	120,770	"
North Star Non-Bessemer Concentrates,	18,589	"
North Star Bessemer Concentrates,	120,180	"
TOTAL PRODUCTION - 1941,	989,669	"

b. Shipments:

Holman Non-Bessemer Concentrates,	487,385	"
Holman Bessemer Concentrates,	117,217	"
Brown Non-Bessemer Concentrates,	75,806	"
Brown Bessemer Concentrates,	120,770	"
North Star Non-Bessemer Concentrates,	18,589	"
North Star Bessemer Concentrates,	120,180	"
TOTAL SHIPMENTS,	939,947	"

c. Stockpile Inventories:

Holman Non-Bessemer Concentrates,	43,579	"
Brown Non-Bessemer Concentrates,	6,143	"
TOTAL,	49,722	"

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

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

e. Production by Months:

(1) Crude Ore:

	HOLMAN	BROWN	NORTH STAR	TOTAL
April, ----------	38,344	15,875	6,341	60,560
May, ----------	199,613	1,786	7,022	208,421
June, ----------	165,658	32,748	38,645	237,051
July, ----------	81,915	41,177	111,557	234,649
August, ----------	135,928	86,348	-	222,276
September, ----------	91,956	130,334	45,892	268,182
October, ----------	265,979	4,131	-	270,110
TOTAL 1941, ----------	979,393	312,399	209,457	1,501,249

(2) Concentrates:

April, ----------	26,256	10,723	4,225	41,204
May, ----------	131,900	1,054	4,905	137,859
June, ----------	118,044	21,453	26,277	165,774
July, ----------	56,293	29,374	75,326	160,993
August, ----------	95,597	60,085	-	155,682
September, ----------	58,747	76,963	28,036	163,746
October, ----------	161,344	3,067	-	164,411
TOTAL 1941, ----------	648,181	202,719	138,769	989,669

f. Ore Statement:

A total of 43,579 tons of Holman Concentrates and 6,143 tons of Brown concentrates were stocked during 1941. No shipments were made from stockpile during the year.

g. Delays:

The following delays were reported during the year 1941:

Date:	Time Lost Hours	Time Lost Minutes	Cause:
April 1st,	7	-	Waiting for ore - reinforcing ramp.
	-	30	Waiting for ore - derailment.
22nd,	2	-	Waiting for ore - wet ore sticking in hopper.
23rd,	2	-	Waiting for ore - slow loading with manual operation of chutes at crude ore hopper.
	-	30	Spilled ore on tracks under hopper.
25th,	2	-	Loading track plugged with Great Northern loads.
	3	55	Waiting for Great Northern empties.
28th,	1	25	Repairing 5' x 14' screen.
	-	55	Waiting for Great Northern empties.
	1	-	Waiting for crude ore - repairing and moving shovels.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time lost: Hours	Minutes	Cause:
April 29th,	6	30	Waiting for Great Northern empties.
		25	Broken bolt, washing plant air compressor.
May 1st,	5	45	Waiting for Great Northern empties.
	1	55	Repairing generator set on Marion shovel.
2nd,	3	20	Waiting for Great Northern empties.
	2	45	No crude ore, slow loading in pit.
5th,	6	-	No crude ore, slow loading in pit.
6th,	4	45	No crude ore, one truck down.
7th,	2	5	Waiting for Great Northern empties.
	2	30	No crude ore, truck haulage slow.
8th,	6	-	Waiting for Great Northern empties.
9th,	-	25	Waiting for Great Northern empties.
12th,	3	-	No crude ore - derailment.
	-	45	No crude ore, slow pit operations.
13th,	1	45	No crude ore, moving shovel and repairing road.
	2	55	No crude ore, repairing yoke block on Marion shovel.
14th,	3	30	No crude ore, building road, repairing and moving shovel.
15th,	5	50	Waiting for Great Northern empties.
	1	35	No crude ore, moving shovels and repairing roads.
16th,	6	30	No crude ore, train collision.
17th,	2	30	Waiting for Great Northern empties.
20th,	1	10	No crude ore, moving shovels.
21st,	-	40	Waiting for Great Northern empties.
22nd,	1	55	No crude ore, car off track at ramp.
	1	-	Waiting for Great Northern empties.
	-	30	No crude ore, rock in hopper chute.
	-	30	No crude ore, sorting rock at shovel.
23rd,	1	55	Waiting for Great Northern empties.
	1	45	No crude ore, moving shovel and casting.
26th,	-	55	Power off and Log Washer Plugged.
	1	-	No crude ore, water tank empty due to lake pump stopping when power failed.
27th,	3	45	Waiting for Great Northern empties.
	-	40	No crude ore, rock stuck in ramp pocket in pit.
28th,	--	45	Repairing 5' x 14' screen.
	4	15	Waiting for Great Northern empties.
29th,	2	50	Waiting for Great Northern empties.
	-	45	No crude ore, moving shovel.
30th,	1	-	Waiting for Great Northern empties.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time lost: Hours	Minutes	Cause:
June 2nd,	1	-	Symons crusher plugged.
	1	-	No crude ore, moving shovel and digging sump.
3rd,	1	50	Waiting for Great Northern empties.
4th,	1	20	No crude ore, moving and repairing shovel.
6th,	1	-	No crude ore, repairing Marion shovel.
9th,	3	30	Delay in rock haulage.
10th,	3	-	Symons cone crusher plugged.
	1	45	Waiting for Great Northern empties.
11th,	1	30	Waiting for Great Northern empties.
12th,	4	40	Waiting for Great Northern empties.
16th,	1	-	No crude ore, electric trouble on "Marion" shovel.
17th,	1	-	Waiting for Great Northern empties.
	-	50	No crude ore, moving shovel and casting.
18th,	2	30	No crude ore, shifting shovels and casting.
20th,	-	45	No Great Northern empties.
	1	30	Power off.
23rd,	1	-	Repairing rock gun.
25th,	-	30	Delay in rock haulage.
	-	30	No crude ore, derailment.
26th,	1	-	No crude ore, moving shovels account of pump failure.
27th,	-	40	Repairing 5' x 14' screen.
30th,	1	-	Great Northern track plugged with loads.
	-	30	Waiting for Great Northern empties.
July 1st,	8	35	Waiting for Great Northern empties.
2nd,	5	30	Waiting for Great Northern empties.
3rd,	10	50	Waiting for Great Northern empties.
8th,	1	45	No crude ore, electric trouble on shovel.
	1	35	Power off.
9th,	1	-	No crude ore, shifting shovels.
	1	-	Trouble with locomotives.
11th,	1	30	No crude ore, shifting shovels and moving pumphouse in sump cut.
14th,	3	20	Waiting for Great Northern empties.
15th,	5	-	Waiting for Great Northern empties.
16th,	4	-	Waiting for Great Northern empties.
17th,	3	-	Waiting for Great Northern empties.
18th,	4	45	Waiting for Great Northern empties.
22nd,	2	45	Waiting for Great Northern empties.
	-	30	Repairing belt on 8-ft. pan conveyor.

HOLMAN-CLIFFS MINE
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YEAR 1941

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date		Time Lost Hours	Time Lost Minutes	Cause:
July	23rd,	2	15	Power off, electric storm.
		2	30	Repairing washing plant pump.
			45	Repairing 5' x 14' screen.
	24th,	1	-	Power off.
	25th,	2	15	Waiting for Great Northern empties.
	28th,	2	-	No crude ore, shifting shovels and moving pump in sinking cut.
	31st,	1	45	Waiting for Great Northern empties.
Aug.	1st,	-	25	Waiting for Great Northern empties.
	4th,	-	25	Waiting for Great Northern empties.
	5th,	1	20	Waiting for Great Northern empties.
		1	-	No crude ore, moving shovels.
	6th,	1	50	Waiting for Great Northern empties.
	7th,	3	20	Waiting for Great Northern empties.
	8th,	-	30	No crude ore, moving shovels
	12th,	-	30	Waiting for Great Northern empties.
	13th,	2	-	No crude ore, overheated bearing on shovel No. 51.
	14th,	2	-	No crude ore, moving shovels.
	15th,	2	20	Waiting for Great Northern empties.
		1	-	No crude ore, moving shovels.
	18th,	-	30	Repairing 5-ft. pan conveyor.
	19th,	-	30	No crude ore, moving shovels.
	20th,	-	20	Waiting for Great Northern empties.
	22nd,	1	-	Waiting for Great Northern empties.
	26th,	3	-	Waiting for Great Northern empties.
	27th,	1	30	No crude ore, moving shovels.
	28th,	2	-	No crude ore, moving shovels.
		-	30	Waiting for Great Northern empties.
	30th,	1	30	Waiting for Great Northern empties.
Sept.	2nd,	1	-	Waiting for Great Northern empties.
		1	-	Broken bearing bolts on 8-ft. pan conveyor.
		1	30	Motor out of order on 8 ft. pan conveyor.
	3rd,	16	-	Washing one side only, Symons crusher plugged and being repaired.
	4th,	11	-	Washing one side, Symons crusher oil pump being repaired.
	5th,	-	30	Waiting for Great Northern empties.
	6th,	4	-	Out of crude ore, derailment on crude ore line.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost: Hours	Minutes	Cause:
Sept. 8th,	2	-	Out of crude ore, derailment on crude ore line.
	-	30	Waiting for Great Northern empties.
9th,	1	55	Waiting for Great Northern empties.
10th,	-	25	Waiting for Great Northern empties.
11th,	1	10	Waiting for Great Northern empties.
12th,	-	40	Waiting for Great Northern empties.
15th,	1	-	Out of crude ore, moving shovels.
16th,	1	50	Waiting for Great Northern empties.
17th,	-	35	Waiting for Great Northern empties.
	1	30	Out of crude ore, moving shovels.
18th,	-	30	Waiting for Great Northern empties.
	1	-	Out of crude ore, moving shovels.
20th,	-	45	Waiting for Great Northern empties.
22nd,	-	45	Waiting for Great Northern empties.
23rd,	1	-	Plugged with loads.
24th,	3	-	Waiting for Great Northern empties.
25th,	2	50	Waiting for Great Northern empties.
	-	30	Plugged with loads.
26th,	-	35	Waiting for Great Northern empties.
	-	40	Out of crude ore, moving shovels.
29th,	1	-	Waiting for Great Northern empties.
30th,	1	30	Waiting for Great Northern empties.
Oct. 2nd,	-	45	Out of crude ore, moving pumps in sump cut.
3rd,	-	40	Out of crude ore, moving pumps in sump cut.
6th,	3	55	Cleaning conveyor belt, wet ore.
9th,	-	55	Waiting for Great Northern empties.
10th,	2	-	Waiting for Great Northern empties.
13th,	2	20	Waiting for Great Northern empties.
14th,	1	20	Waiting for Great Northern empties.
15th,	2	-	Waiting for Great Northern empties.
16th,	3	45	Waiting for Great Northern empties.
17th,	3	20	Waiting for Great Northern empties.
23rd,	1	30	Repairing stocking truck.
	--	55	No crude ore, repairing shovels.
24th,	-	45	Cleaning track after stockpiling.
27th,	3	-	Thawing out pipes, chutes, etc. - Freezing weather.
28th,	1	-	Repairing stocking truck
	1	-	Out of crude ore, moving shovel.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause:
Oct. 31st,	-	30	Out of crude ore, fog in pit.
		30	Cleaning track after stockpiling.
Total,	336	05	-

The total delays amounted to 336 hours, which was 10% of the total working time. Interrupted car service by the Great Northern Railway was accountable for 172 hours, or 5%; pit delays for 102 hours, or 3%, and actual plant delays for only 61 hours, or 2%. The latter was satisfactory, but the Great Northern delays were the result of a car shortage and the fact that there were no stocking facilities available until late in the season. The pit delays were occasioned by difficult mining conditions in a wet pit bottom; by adjustments and re-arrangements of the new pit pocket and in the delays in shifting shovels for grading purposes.

3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Holman N.B. Concs.	530,964	57.25	.064	9.95	.35	.75	7.92	52.72
Holman Bess. Concs.	117,217	58.86	.033	10.04	.28	.50	6.52	55.02
Brown B.B. Concs.	81,949	57.30	.061	11.25	.24	.74	7.89	52.78
Brown Bess. Concs.	120,770	58.90	.032	10.93	.19	.47	7.35	54.57
North Star N.B.Concs.	18,589	57.75	.040	12.14	.15	.44	6.79	53.83
North Star Bess.Concs.	120,180	59.36	.035	10.25	.16	.46	6.79	55.33
TOTAL,	989,669	57.91	.052	10.27	.29	.64	7.52	53.56

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Mine Analysis of Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Holman N.B. Concs.	487,385	57.33	.064	9.85	.35	.75	7.92	52.79
Holman Bess. Concs.	117,217	58.86	.033	10.04	.28	.50	6.52	55.02
Brown N.B. Concs.	75,806	57.29	.061	11.18	.24	.73	7.85	52.79
Brown Bess. Concs.	120,770	58.90	.032	10.93	.19	.47	7.35	54.57
North Star N.B. Concs.	18,589	57.75	.040	12.14	.15	.44	6.79	53.83
North Star Bess.Concs.	120,180	59.36	.035	10.25	.16	.46	6.79	55.33
TOTAL,	939,947	57.99	.052	10.22	.28	.64	7.50	53.64

c. Mine Analysis of Ore in Stockpile:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Holman N.B. Concs.	43,579	56.41	.061	11.05	.34	.80	7.91	51.95
Brown N.B. Concs.	6,143	57.36	.056	12.07	.24	.80	8.42	52.53
TOTAL,	49,722	56.53	.060	11.18	.33	.80	7.97	52.02

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Holman,	979,393	47.23	.050	25.83
Brown,	312,399	45.33	.035	30.42
North Star,	209,457	47.16	.031	28.33
TOTAL,	1,501,249	46.82	.044	27.13

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss.
Holman N.B. Concs,	57.25	.064	9.95	.35	.75	.16	.14	.011	6.45
Holman Bess. Concs.	58.86	.033	10.04	.28	.50	.16	.14	.010	4.55
Brown N.B. Concs.	57.30	.061	11.25	.24	.74	.18	.16	.011	5.35
Brown Bess. Concs.	58.90	.032	10.93	.19	.47	.16	.14	.010	3.75
North Star N.B.Concs.	57.75	.040	12.14	.15	.44	.16	.14	.014	5.25
North Star Bess.Concs.	59.36	.035	10.25	.16	.46	.18	.14	.016	3.85

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Factors Used:

All Leases:

	Rock Deduction	Cu. Ft. Per Ton	Recoveries
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%

	Reported 1-1-41	Mined 1941-	Total	Developed by Drilling.	Reserve 1-1-42-
North Star,	549,891	138,769	411,122	-	411,122
Bingham,	2,387,853	-	2,387,853	-	2,387,853
Brown No.1,	535,784	155,263	380,521	8,332	372,189
Brown No.2,	1,891,533	47,456	1,844,077	512,321	2,356,398
Holman,	2,798,873	648,181	2,150,692	697,659	2,848,351
Total Holman-Brown -	5,226,190	850,900	4,375,290	1,201,648	5,576,938
Grand Total,	8,163,934	989,669	7,174,265	1,201,648	8,375,913

The estimated tonnage of reserve ore in the Holman-Cliffs Mine, as of January 1, 1942, shows an increase of 211,979 tons, as compared with the estimated reserve for the previous year, after taking into account the 989,669 tons mined during the year 1941.

There was no change in the Bingham and North Star reserve, aside from the deduction for mining in the latter. However, as a result of a very thorough drilling program, there was a loss of 8,332 tons in addition to the deduction for ore mined in the Brown No. 1 and an additional 697,659 tons was developed in the Holman lease and 512,301 tons in the Brown No. 2. The 1,209,791-ton increase thus developed made a net increase of 211,979 tons after deducting the loss in the Brown No. 1 and the total ore mined.

5. LABOR & WAGES:

a. Comments:

(1) Labor:

With an abundance of labor available, there was no difficulty in maintaining full crews of experienced men at all times.

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5. LABOR & WAGES:

a. Comments:

(1) Labor:

Labor agitation by the C.I.O. was quite active during the entire year. An attempt was made to organize the Mesaba-Cliffs mine employees and early in the spring, representatives of the S.W.O.C. and local C.I.O. requested a meeting to enter into negotiations for a contract. In a series of meetings with them, and later with the Federal and State Labor Conciliators, it developed that no agreement could be reached. A strike notice was filed in August and the matter was referred to a fact-finding commission appointed by the Governor, in accordance with State labor laws. This commission reported in favor of the mining company and a meeting in the Governor's office again failed to reach any agreement. At the end of the 30-day cooling-off period, the strike failed to develop, for it was found that the majority of the employees were absolutely opposed to a strike. A petition was then filed with the National Labor Relations Board for a determination on representation and the case was set for December 3rd. It was postponed until December 11th and then again continued until some time during the early part of the year 1942.

b. Comparative Statement of Wages and Product:

Production:	
Concentrates Produced,	989,669 tons.
Concentrates Shipped,	939,947 tons.
Number of shifts and hours,	3 - 8-hour.
Average Number of Men Working,	211
Average Wages per Day,	$ 7.14
Product Per Man Per Day,	29.35
Labor Cost Per Ton,	$ .243
Total Number of Days,	140
Amount Paid for Labor,	$ 240,868.13

6. SURFACE:

a. Buildings, Repairs:

A crew of carpenters and painters, and a mason were busy throughout the year on the necessary repairs to the mine buildings and dwellings leased from the Oliver Iron Mining Company. The work on the mine buildings consisted of a few changes necessary for our own convenience, such as re-arranging the central laboratory for a heavy warehouse for the storage of supplies and equipment, and the installation of toilets, lavatories and lockers in the shop wash and change room.

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

A few minor alterations were necessary in adapting the shops and locomotive house to truck operations.

The repair work on the houses consisted, mainly, of plastering and redecorating dwellings in which the foundations had been repaired during the previous year and during the early part of the season, and in the installation of inside toilets to replace outhouses which had been a source of trouble and expense. In the case of the latter, the rent was increased to pay for the added facilities. Some repairs were necessary on roofs, chimneys, floors and foundations. The repairs during the coming year will show a decided reduction and will be held within the rental income.

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

No.	Occupant	Description of Work Done:	Amount
1	J. T. Hughey,	Kitchen and bathroom cabinets, etc. bathroom fixtures and plumbing; interior painting and plastering,	$589.91
11	- Peter Baril,	Rebuild chimney complete; plastering; interior painting complete; interior woodwork repairs; window repairs,	556.57
12	- Malkolm Olson,	Install bathroom fixtures, plumbing complete; foundation repaired completely and bathroom addition; electric wiring; exterior painting and plastering, interior painting,	1,053.18
13	- Frank Deaton,	Repairs to porch, doors, storm sash and roof,	21.08
15	- Thos. Wivell,	Plumbing; plaster repairs; storm sash and screens; electric wiring,	65.02
16	- William LeClair,	Exterior painting; repairs to doors, siding, etc.	68.28
17	- Allen Shegrud,	Repairs to interior woodwork; doors, toilet installed and plumbing; exterior painting and plastering,	131.65
37	- William Wirtanen,	Window repairs; interior painting exterior painting,	60.89

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done:	Amount
39	A. W. Jenkins,	Plumbing; new roof; plastering; electric wiring; interior painting complete; exterior painting,	$561.52
40	T. J. O'Brien,	Repairs to windows,	3.21
41	G. H. Beasley,	Repairs to plumbing and plaster,	10.24
42	Mike Shipka,	Repairs to doors and floors; closed-in front porch,	48.62
43	Lee Poore,	Roof repairs; door repairs; interior painting,	82.78
44	B. P. Axford,	Storm doors; interior woodwork; storm sash; toilet installed, plumbing; plastering; electric wiring; interior painting,	201.50
45	Edwin Gustason,	Window repairs,	28.31
46	Russell Wivell,	New chimney complete; plastering; repairs to doors, windows; electric wiring; interior painting,	659.28
47	Emil Camilli,	Bathroom fixtures and plumbing; foundation repaired and bathroom addition; repairs to doors and windows; electric wiring; exterior painting, plastering; interior painting,	916.76
48	William Hanson,	Plumbing; plastering -	38.73
50	Linas Berg,	Plumbing repairs,	17.65
51	Oscar Engstrom,	Repairs to doors and windows,	15.62
53	Claude Winkleblack,	Storm shed repairs; exterior painting; new chimney complete; doors, windows, interior repairs; plastering,	270.65
55	Raymond Deshaw,	Repairs to doors, windows, storm sash; new water line to house from main; install toilet and plumbing; exterior painting; electric wiring and plastering,	248.09

HOLMAN-CLIFFS MINE
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YEAR 1941

6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No. Occupant	Description of Work Done:	Amount
56 - Grant Hess,	New water line to house from main; exterior painting; repairs to windows and doors;	$220.37
57 - August Mergele,	Interior painting complete; exterior painting; repairs to doors, windows, interior woodwork; plumbing - sewer; plastering,	573.28
58 - Felix Cartier,	Repairs to siding; repairs to windows and doors; exterior painting; interior painting;	138.00
59 - Russell Barkla,	New rear shed, repairs to siding, beam, filling and coal bin; exterior painting; interior painting complete; new hardwood floors throughout upstairs, interior woodwork; plumbing; electric wiring; plastering; repairs to windows,	851.67
60 - W. F. LeClair,	Repairs to doors and interior woodwork; interior painting; plumbing; exterior painting; repairs to siding and porches -	225.10
61 - John Laine,	Electric wiring; new toilet installed; repairs to siding; exterior painting; plastering -	104.45
62 - Joseph Dolezel,	Interior woodwork and window repairs; plastering; front porch rebuilt; interior painting complete; exterior painting; plumbing -	607.01
63 - Matt Dosser,	Exterior painting; plumbing; plastering complete; interior painting complete; repairs to doors,	459.56
64 - Vincent Soleture,	Exterior painting; plastering; repairs to windows and doors; interior painting complete; plumbing-	281.82
65 - Edwin Johnson,	Repairs to windows and doors; interior painting - exterior painting -	84.87

HOLMAN-CLIFFS MINE
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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done:	Amount
67	- Pat Maney,	Repairs to storm sash and doors; plumbing; plastering; chimney repairs -	$121.32
68	- George Lee,	Repair doors, windows, interior woodwork and provision to install toilet; toilet and plumbing; plastering; electric wiring; new storm shed; exterior painting; interior painting complete -	557.62
69	- Arnold Lawson,	Interior painting complete; plumbing; repairs to doors,	281.89
70	- Ambrose Hoey,	Repairs to porch; exterior painting; new rear storm shed -	141.88
71	- Charles James,	New toilet installed and plumbing; exterior painting; plastering; repairs to windows -	153.44
72	- Frank Dionne,	Repairs to doors and screens; plumbing; exterior painting -	70.99
73	- George Dunstan, Jr.,	Exterior painting; repairs to doors,	37.87
74	- William Laine,	Toilet installed and plumbing; repairs to windows and doors; repairs to siding; exterior painting,	120.56
78	- Lucien Decoster,	Exterior painting; repairs to windows and screens -	10.88
79	- John Winkleblack,	Repairs to screens, doors and windows; plumbing; toilet installed and plastering -	65.69
80	- H. J. Stephens,	Toilet installed and plumbing; plastering; repairs to doors -	77.79
81	- Lloyd Wetherell,	Repairs to windows,	1.14
97	- William Saw,	New roof complete; repairs to windows and woodwork -	66.47
98	- Dan Fitzhenry,	Repairs to doors and windows,	21.44

HOLMAN-CLIFFS MINE
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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of Work Done:	Amount
101	- Loy Kolar,	Repairs to floors, interior woodwork and doors; plastering; interior painting; plumbing -	$189.83
102	- Myron Youngberg,	Kitchen cabinets, windows and screens; plastering; interior painting; plumbing; electric wiring; exterior painting -	700.32
105	- Dennis Chamberlain,	Repairs to doors and windows,	7.79
106	- William Ryser,	Repairs to doors and windows and interior woodwork and provision for toilet; exterior painting; toilet installed and plumbing; electric wiring; interior painting -	283.50
107	- George Whittington,	Repairs to garage; new hardwood floor in kitchen; plumbing; plastering; interior painting; repairs to windows and doors,	217.29
116	- Carl Eggebraaten,	Repairs to windows, doors, interior woodwork; toilet installed and plumbing; plastering -	132.29
155	- George Sullivan,	Foundation beam filling; exterior painting; garbage stand; plumbing; repairs to windows; interior painting,	136.32
156	- Lee Farr,	Foundation beam filling; kitchen cabinets, etc; interior painting; repairs to windows, doors, interior woodwork; plumbing; exterior painting -	518.54
157	- C. D. Anderson,	Foundation beam filling; repairs to windows, doors, interior woodwork; interior painting complete; electric wiring; exterior painting -	278.40
158	- W. S. McComber,	Foundation beam filling; interior woodwork, doors, coal bin; electric wiring; plastering -	117.06
4	- Charles Flynn,	Porch repairs; roof repairs; plumbing and repairs to windows -	43.88

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No. Occupant	Description of Work Done:	Amount
5 - Harry Hart,	Repairs to plumbing; repairs to windows -	$ 17.87
7 - Sam Kerkes,	Electric wiring; plumbing; repairs to windows -	59.58
10 - Harley Point,	Repairs to doors and windows - chimney repairs -	31.18
	TOTAL COST OF REPAIR WORK - YEAR 1941 - - - - - - - -	$ 13,658.50

c. Tracks, Roads, Transmission Lines, Etc:

Reconditioning of the main haulage lines and the yard tracks was continued throughout the season, replacing ties and improving road beds when men were available for this work.

The new road, which had been constructed into the pit on the south side, was graded and surfaced. During the latter part of the season a new stripping road was constructed at the east end of the pit, from the Brown No. 2 bottom to a stripping dump north of the approach tracks and approximately 1,000 feet east of the pit.

In order to effect a saving by measuring the entire electric current purchased through one meter, a new meter station was constructed on the Minnesota Power & Light Company main high tension line, about 2,000 feet south of the pit. A new connecting line was built to the pit sub-station and the line leading to the washing plant was purchased from the Minnesota Power & Light Company.

7. OPEN PIT:

a. Stripping:

Following a week of preparation, immediately after the completion of the ore season, a large stripping program was undertaken at the Holman-Cliffs Mine in November. The proposed program consisted of removing 747,000 cubic yards of material, made up of: 200,000 yards of taconite, 268,000 yards of paint rock and waste ore material - and 279,000 yards of surface stripping and clean up. The program contemplated a small clean-up on top of the ore bench in the north end of the North Star lease; pushing back the taconite and paint rock stripping in the pit bottom in the east end of the Holman and the west end of the Brown No. 2; cleaning up the upper track benches along the south side of the pit in the Holman and Brown No. 1 leases; and an extension in the south side of the pit, near the Brown No. 1-Holman line, extending approximately 150 feet on either side of the line and mining out the ore from the site of a proposed future conveying system.

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

This proposed program consisted in removing 21,000 yards of surface from the North Star; 76,000 yards of surface and 192,000 yards of paint rock and waste material and 35,000 yards of taconite from the Holman; 182,000 yards of surface and 46,000 yards of paint rock and waste material from the Brown No. 1 and - 300,000 yards of paint rock and 165,000 yards of taconite from the Brown No. 2. The program was conducted on a basis of 20 operating shifts per week, stripping three 8-hour shifts per day on each week day and two shifts on Sunday, leaving the Sunday day shift for checking over equipment and repairing. One 4-yard and one 3-1/4-yard electric shovels, six Euclid rear-dump trucks and two dumptor trucks were used in the operation. Additional trucks were to be made available on completion of the road and track grading at the Hill-Trumbull Mine.

The operations were quite slow during the month of November, due to the construction of haulage roads and to the shallow clean-up cuts in the North Star and the south side of the Holman leases. Lack of sufficient haulage equipment to properly service two shovels was also accountable for a rather low average daily production. However, in order to take advantage of the lack of haulage units, the difficult taconite stripping, the clean-up work, and the preparation of the surface stripping was undertaken so that a slow shovel operation would partially off-set the lack of trucks. During the balance of November and December the clean-up was completed in the North Star, the surface stripping operations were opened up to provide working spaces for two loading units, when trucks were available after the first of the year and a good start was made on the taconite stripping. The material was all hauled to rock and surface dumps, located 1,000 and 1,600 feet, respectively, east of the extreme east end of the pit, making the average haul approximately 4,500 feet each way. In view of the equipment available and the nature of the stripping work, the operations were satisfactory during November and December and a decided improvement is anticipated, following the receipt of the Hill-Trumbull Mine trucks. The entire program should be completed late in February, 1942.

While the work was somewhat slow, the cost was kept well within the budget estimate figures of $.20 per cubic yard for surface, paint rock and waste ore material and $.40 per cubic yard for hard taconite.

The following tabulation shows the classification of the material stripped from the various leases during the year 1941:

	SURFACE MATERIAL (Cu. Yds.)	WASTE ORE (Cu. Yds.)	TACONITE (Cu. Yds.)	TOTAL (Cu. Yds.
Holman,	11,575	56,481	4,844	72,900
Brown No. 1,	26,311	-	-	26,311
Brown No. 2,	-	88,069	78,697	166,766
North Star,	21,474	-	-	21,474
TOTAL,	59,360	144,550	83,541	287,451

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7. OPEN PIT:
(Continued)

d. Timbering:

Statement of Railroad Ties Used:

	QUANTITY	PRICE	AMOUNT
Standard No.1 Green Tamarack,	616	$.9498	$ 585.08
Standard White Oak Ties,	47	1.1094	52.14
Standard Oak Switch Sets,	3	105.00	315.00
Total, ----------			952.22

Ties on Hand:

Standard No.1 Green Tamarack,	2044	.95006	1941.92
Standard White Oak Ties,	388	1.1094	430.45
Standard Oak Switch Sets,	4	105.00	420.00
Total, ----------			$2792.37

	Oak	Tamarack	Oak Switch Sets-52 Ties Each.
Loading track at pit ramp,			156
Tracks to washing plant,	47	213	
Repairing pit tracks,		209	
Repairing shop yard tracks,		60	
Building foundation for W.P.Pumphouse		30	
Building washing plant stockpiler framework -		17	
Totals, ----------	47	616	156

f. Explosives, Drilling & Blasting:

Statement of Explosives Used:

	QUANTITY	PRICE	AMOUNT
#6, 8' Electric Exploders,	1,500	6.65	99.75
#6, 24' Electric Exploders,	875	10.65	93.20
#6, 40' Electric Exploders,	2,900	17.79	515.85
#6 Blasting Caps,	700	1.22	8.54
#20 Connecting Wire,	184	0.46	84.75
Fuse, Clover -	1,300	0.59½	7.73
Prime Cord, Plain -	500	3.85	19.25
Prime Cord, Reinforced -	500	3.95	19.75
Cap Crimpers,	2	1.00	2.00
#50 Blasting Machine,	1	40.00	40.00
Total Caps, Etc. -			$ 890.82

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7. OPEN PIT:
(Continued)

f. Explosives, Drilling & Blasting: (Continued)

Statement of Explosives Used:

	QUANTITY	PRICE	AMOUNT
1-1/8 x 8 - 60% Straight Gel.	50	14.00	7.00
1-1/8 x 8 - 60% Special Gel.	2,200	11.28	248.25
7/8 x 8/ 40% Red Cross Extra,	750	10.03	75.25
5 x 14- 40% Red Cross Extra,	8,000	10.00	8000.00
5 x 16- 25% Quarry Gel.	214,700	10.00	21470.00
3 x 10- 25% Quarry Gel.	40,000	10.00	3999.63
Total Powder,	337,700	10.01	33800.13
TOTAL COST - ALL EXPLOSIVES, -			$34690.95

		Crude Ore 1941	Concs. 1941
Product,	(Tons)	1,501,249	989,669
Pounds of Powder per ton of ore,		.1599	.24255
Cost per ton for powder,		.0160	.02426
Cost per ton for caps, etc.		.0003	.00051
Cost per ton for all explosives,		.0163	.02477

g. Open Pit Mining and Loading:

Ore operations, commencing on April 21st, were carried forward on a three 8-hour shift per day, five days per week basis through October 31st. A total of 1,501,249 tons of crude ore were mined and treated, producing 989,669 tons of concentrates. In view of the difficult mining conditions, the operations, as a whole, were satisfactory and the daily output increased gradually throughout the season as the haulage and general pit conditions improved.

Mining operations were conducted in two main areas, in the west end of the pit, the Brown No. 1 and North Star pit bottoms were extended to the north and deepened, cleaning up practically all of the available ore in this area. In the main body of the pit, operations were carried to the southeast, deepening the Holman pit bottom and carrying the mining into the Brown No. 2 lease.

A new pit pocket, or ramp, had been constructed previous to the mining season and connected with a road leading to the truck operations in the west end of the pit. A main haulage road from the top of the ramp to the pit bottom, near the south end of the sump, was constructed along the rock floor on an 8% grade, following the north side of the pit. To speed up operations a steep run-down was made from the ramp to the pit bottom, near the south side of the pit, on a 16% to 20% grade. Mining was conducted with a 4-yard Bucyrus-Erie 120-B shovel and a 3-1/4-yard Marion Type #4101 electric shovel, which were serviced by six Euclid dump trucks and two Koehring

HOLMAN-CLIFFS MINE
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YEAR 1941

7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)
dumptors, the latter being used on the work in the Holman-Brown No. 2 bottom, when additional units required on account of the long haul. Operating conditions in the pit bottom were extremely difficult during the first few months of the season, due to the fact that this part of the pit had been pumped out just previous to the operating season and there was a constant infiltration of water from all directions leading out from the surrounding banks and seepage areas. This, in addition to numerous rains, made hauling conditions very severe, for it was practically impossible to build and maintain roads in the presence of so much water. For this reason the production was quite low on the days when operations were conducted in this area. In the west end of the pit, with the short haul and good conditions, a very good production was maintained at all times from these operations. In addition to the pit delays, occasioned by poor haulage conditions, much time was lost during the first few weeks in the adjustment of the new pit pocket and the changing of the bin gates, and throughout the season numerous long delays were occasioned by the necessity of shifting both shovels from the pit bottom to the west end, or vice versa, meaning, in each case, a move of over one-half mile. This occurred quite frequently, due to the fact that the greater part of the Bessemer ore was mined in the west end of the pit and that it was necessary to load with both shovels at all times. The mining in the west end of the pit, in the Brown No. 1 and North Star leases deepened the pit bottom and carried the mining operations to the north limits of the North Star. The ore from the latter was practically exhausted and a small tonnage was left in the bottom of the Brown No. 1. Mining operations were conducted here intermittently as cargoes for Bessemer ore were needed. This material, which has a low Phosphorous and high Natural Iron and high Silica content, was mixed with low Silica, higher Phosphorous ores from the Hill-Trumbull Mine for the Hill Bessemer grades.

In the bottom of the Holman and Brown No. 2 pits, the operations extended the mining into the deep ore body. Small deposits of ore were cleaned up along the rock to make available lean ore and rock dumps for future operations and the mining was conducted so as to provide a new pit sump immediately south of the existing sump and 50 feet deeper. A series of sinking cuts carried this work down to the depth indicated and mining was conducted in the adjacent ore bank, south of the sump, as the sinking cuts were undertaken. The sump work was completed late in the season and the pumps were shifted to the new sump during the latter part of September. Numerous rains and a constant infiltration of water made mining conditions extremely difficult during the entire year, but as the drainage cuts progressed, the conditions improved gradually throughout the season, with a resulting improvement in production. The ore produced from the Holman and Brown No. 2 areas was a mixture of high grade wash, with both lean and low grade crude materials. The greater part of the material was non-Bessemer, although some small Bessemer areas were

HOLMAN-CLIFFS MINE
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7. OPEN PIT: (Continued)

g. Open Pit Mining and Loading: (Continued)
developed and mined. The operations extended southeast across the bottom of the Holman and into the Brown No. 2 lease.

Due to a shortage of railway cars it was necessary to stock concentrates at the washing plant from time to time. This necessitated moving the two dumptor haulage units to the mill for this purpose, resulting in a decreased production while these units were away from the pit. This will be overcome during the next season through the acquisition of two used Euclid rear-end dump trucks from the Canisteo Mining Company. These machines will be used as extra haulage units at times when the equipment is working in the Holman-Brown No. 2 bottom.

k. Drainage:
The water level in the Holman pit was lowered 78 feet during the year to the elevation of the former sump in the Holman pit bottom. A 7,000 G.P.M., pumping unit was operated continuously 24 hours a day from the first of the year until the latter part of March, when this elevation was reached and the water level was maintained at that elevation through intermittent pumping with the 7,000 G.P.M., unit, until the new deep sump was available during the latter part of September, when a 4,500 G.P.M., unit was installed to take care of the pumping requirements.

8. COST OF OPERATION:

a. Comparative Mining Costs:

	1941 BUDGET ESTIMATE	1941 COST PER TON	1940 COST PER TON.
PRODUCT: (Tons)			
Concentrates, "	909,090	989,669	425,274
Average Shift Production, (Tons)		2,356	2,250
Tons Per Man Per Day,		29.35	30.04
Days Operated,		140	97
COST:			
Open Pit Wash Ore	$.167	$ .206	$ .229
General Pit Expense,	.074	.093	.113
Concentrating,	.118	.135	.151
Stocking Concentrates,	-	.002	-
General Mine Expense,	.056	.064	.064
Idle and Winter Expense,	.110	.111	.108
Adj. Labor (10¢ per hr. incr.)	.035	-	-
Cost of Production,	$.560	$.611	$.665

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8. COST OF OPERATION: (Continued)

a. Comparative Mining Costs: (Continued)

	1941 BUDGET ESTIMATE	1941 COST PER TON	1940 COST PER TON
Depreciation, Plant & Equipment,		$ .150	$ .150
Depreciation, Motorized Equipt.		.013	-
Amortization, Stripping,		.350	.390
Taxes, Ad Valorem,		.090	.173
Taxes, Occupational,		.091	.076
Taxes, Royalty,		.034	.060
Total Cost at Mine,		$1.339	$1.514
Administrative Expense,		.100	.100
Miscellaneous Expense and Income,		.015	.003
GRAND TOTAL, ----------		$1.454	$1.617

d. Detailed Cost Comparison:

(1) Product:

Due to the fact that the operating conditions during the 1941 season were so different from those in 1940 and that the production in the former year was more than twice that of the latter, there was no real basis for comparison of the detailed cost. The latter will, therefore, be confined to the estimated cost only.

The total cost of production was $.051 above the budget estimate. This was mainly in the accounts Open Pit Wash Ore, General Open Pit Expenses and Concentrating. The increased cost per ton in these accounts having been occasioned by an hourly wage increase and a low average daily production during the early part of the season.

(2) Open Pit Mining:

The charges per ton under this account were $.039 above the budget estimate. This difference was made up, mainly, in higher costs for Trucks Operating, Trucks Maintenance and Pit Roads and Ramps, which were $.006, $.001 and $.014, respectively, above the estimated cost. The high expense in Maintenance and in Pit Roads and Ramps was due to a higher tire cost and high cost of upkeep on trucks operating in the wet conditions in the Holman pit. The added cost for Roads and Ramps was occasioned by the fact that a timber pit pocket was built to replace a steel structure which had been ordered for the ramp, but which was not received at the start of the season. It was necessary, therefore, to build a similar structure of timber and to charge this cost into the operation. The extreme wet conditions of the pit bottom, both from incoming water and from constant rains made the cost of building and maintaining roads extremely high.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

The other items under this caption, including Drilling and Blasting, Power Shovels Operating, Power Shovels Maintenance and Locomotives and Cars Operating and Maintenance were very close to the budget estimate. The charges for Track Expense were $.009 below the budget estimate, due to the fact that the small track gang were unable to devote the anticipated time to track maintenance.

(3) - General Pit Expenses:

There was an increase of $.019 over the estimated cost under this caption. Pumping and Drainage alone was $.022 above the budget estimate for the 1941 season. This was due to the fact that the volume of incoming water was much greater than had been anticipated and it was necessary to operate a 7,000 G.P.M., pump intermittently to take care of the flow. The normal flow of water in the Holman pit has been between 1,200 and 1,600 gallons per minute, whereas during the first part of the 1941 season the flow averaged between 3,000 and 4,000 gallons per minute. In addition to the actual cost of pumping, it was necessary to include a part of the cost of developing and re-arranging a new sump which would provide for deeper mining operations. The increased cost in Pumping was partially offset by a decrease of $.001 each in Water Supply, General Open Pit Expense and Exploratory Drilling. The charges for Open Pit Superintendence and Waste Pile Expense were the same as the budget estimate.

(4) Concentrating:

The total charges per ton under this account were $.017 above the budget. This entire amount was reflected in the increased cost of Washing, which was $.019 above the budget figure. This increase is due to a higher labor cost, resulting from increased wages and from a lower average daily production than had been anticipated for the season. There was a decrease of $.001 in Transportation and $.004 in Power over the budget estimate. However, these were partially offset by an increase of $.003 in the Maintenance of Machinery and Equipment. The higher cost of the latter item was due to increased labor cost and to some dyke expense during the season.

(5) General Mine Expenses:

There was an increase of $.008 per ton over the budget estimate in this account. This was the result of an increase of $.003 in Personal Injury Expense and $.006 in Social Security Taxes, due to a higher labor cost. An increase of $.002 under the account - Employees' Vacation Pay is due to a higher average rate of pay and to a more liberal ruling covering vacation pay. The above increases were partially offset by a small decrease in the other items, due to a larger production than had been anticipated.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(6) Winter and Idle Expense:

The charges under this caption were practically the same as the budget estimate, showing an increase of only $.001 over the latter.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

A very extensive drilling campaign was undertaken at the Holman-Cliffs Mine during the year 1941. The drilling in the entire Holman pit bottom was completed. The area adjacent to the future conveyor site on the south side of the pit, near the Holman-Brown No. 1 line, was drilled and a number of holes were put down through the taconite formation, immediately above the ore in the west end of the Brown No. 2. In the Holman pit bottom, 100 holes, with an average depth of 105.5 feet and a total footage of 10,549 feet were completed. Drilling in the Brown No. 2 bottom consisted of four holes, totaling 1,001 feet and averaging 250 feet in depth. On the south side of the pit, near the Holman-Brown line, four surface holes, totaling 839 feet, were completed.

The entire program, consisting of 108 holes and a total of 12,389 feet of drilling, was larger than had been estimated, due to the fact that several additional holes were put down in the east end of the Holman and the west end of the Brown No. 2, in order to definitely outline the taconite and waste ore stripping for the fall program. Of the total drilling, 6,794 feet were completed under contract with the Schultze Drilling Company and 5,595 feet were drilled by the Holman-Cliffs crews.

The ore area under the conveyor site was definitely outlined; a large tonnage was added in the Holman; and the drilling in the Brown No. 2 showed an extension of the deep ore body to the southeast, with a large addition to the Brown No. 2 tonnage.

The drilling contemplated for the 1942 season will include a number of holes in the Brown No. 2 pit body to outline the extent of the ore body and a few holes in the North Star and Brown No. 2 leases, north of the approach tracks. The latter will check the possible extension of the ore body under the north bank of the pit.

10. TAXES:

The following statement shows the Holman-Cliffs Mine taxes and the average rates for the years 1940 and 1941:

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10. TAXES:
(Continued)

	1941	1940	Increase	Decrease
Holman-Brown Mine,	$55,319.43	$43,310.05	12,009.38	
Bingham Mine,	16,824.00	17,006.47	-	182.47
North Star Mine,	10,106.40	9,055.68	1,050.72	
Holman-Cliffs Aux.Lands,	1,996.04	1,924.35	71.69	
Bingham-North Star Wash. Plant Lands,	46.24	44.57	1.67	
Holman-Brown Lands,	23.60	22.76	.84	
Holman-Cliffs Shops and Office,	238.38	240.97		2.59
Holman-Cliffs Personal Property,	3,955.94	2,163.81	1,792.13	-
Total, -	$88,510.03	73,768.66	14,741.37	
Rented Buildings,	856.75	866.06	-	9.31
GRAND TOTAL, -	$89,366.78	74,634.72	14,732.06	-
Average Tax Rate,	93.16	94.13		.97

The increase in the total taxes was due largely to the placing of the Holman and the adjacent North Star forty in the active list, with a resulting increase in taxes. The increase in Personal Property taxes was occasioned by the addition of the motorized equipment. The other changes were all nominal.

There was a small decrease in the average tax rate.

11. ACCIDENTS AND PERSONAL INJURY:

There were but six lost-time accidents during 1941 at the Holman-Cliffs Mine, a description of which follows:

Name: Horace C. Riddell Date: March 24, 1941.
Cause: To move stringer timbers into place on empty track bridge under construction, a dolly was used to roll each piece forward on nearest rail of parallel load track. Six men were used in pairs with come-alongs to roll and balance the 9" x 18" timber which was placed on edge upon the dolly. Riddell was on the forward end on the side nearest the new bridge, walking along the outside extension of ties beyond the rail, as the timber was advanced. When the stringer had been rolled forward to the desired point, the come-alongs were released and the stringer overbalanced on the dolly and tipped

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11. ACCIDENTS AND PERSONAL INJURY: (Continued:)

Name: Horace C. Riddell Date: March 24, 1941:
Cause: (Continued)
toward Riddell's side. Being on end of the ties next to the new bridge opening, he was unable to step sideways into the clear and the timber fell upon his foot with the resulting injury as described.
Nature: Fracture (2) Terminal Phalanx. Phalanx right big toe.
Time Lost: March 24th, 9:00 A.M. - Returned to work April 7,1941.
Compensation - $ 18.33.

Name: Oscar Tenhunen, Jr. Date: May 16, 1941:
Cause: Four empty 30-yard dump cars started from a point at the pit surface and ran wild down the approach tracks of mine and crashed into train being loaded at the pit ramp loading pocket. Oscar Tenhunen, Jr., who was the fireman of locomotive No. 105, which was connected to the cars being loaded, was standing in the gang-way between the locomotive and tender when the run-away cars crashed into the locomotive. He was crushed between the tender and the head of the locomotive boiler.
Nature: FATAL:
Compensation: $374.55.

Name: Albert A. Mottonen Date: May 28, 1941.
Cause: While barring a large rock sturk between the rails of the grizzly over loading pocket; he slipped and straddled one of the rails of the grizzly. Rain during the night had caused a slippery condition:
Nature: No break in skin - swelling - pain - urin negative. Frequent urination.
Time Lost: Injured May 28, 1941 - Returned to Work May 20, 1941. Off May 31st, 1941 and returned to work June 2, 1941.
Compensation: None.

Name: Earl J. Luoma Date: May 26, 1941:
Cause: While lifting a tie for use in setting up the blast drill, he felt a sharp pain in his back.
Nature: Strained back.
Time Lost: Injured May 26,1941 - returned to work June, 3, 1941.
Compensation: None

Name: Herbert A. Hillis Date: June 23, 1941.
Cause: While barring down a chunk of ore through grizzly on pit ramp pocket, he slipped and fell and his leg slipped down between the rails of grizzly.
Nature: Bruise of left shin and of muscles of inner left thigh.
Time Lost: Injured June 23, 1941 - returned to work June 30, 1941.
Compensation: None.

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

Name: George L. Newbauer - Date: July 28th, 1941.
Cause: Slipped on a ramp and fell and hurt left hip.
Nature: Contusion of left hip.
Time Lost:
Compensation: $60.00.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

Due to the fact that the steel loading pocket, which had been ordered for the pit truck operations was not received until late in May, it was necessary to build a timber pocket just previous to the start of the operations in April. It was built quite similar to the proposed steel structure and was equipped with air-controlled gates. After some changes in adjustment it worked out very satisfactory and will be used until the conveyor system replaces locomotives and car haulage. The steel bin will be used as a loading pocket for jig concentrates at the Hill-Trumbull Mine.

Plans are now being prepared to move the Holman-Cliffs concentrating plant to the south side of the pit and to install a belt conveyor system to replace steam haulage. In addition to affording a more simple and satisfactory operation, it would effect a direct saving of approximately 10¢ per ton of concentrates produced.

13. EQUIPMENT AND PROPOSED EQUIPMENT.

The new equipment received and placed in operation during the year consisted of: One Marion Model 4101 electric shovel, equipped with a 3-1/4-yard welded dipper; one Bucyrus-Armstrong Model T-27 blast hole drill, completely equipped with structure drilling attachments; three Euclid 15-ton rear-end dump trucks, with the standard 150 H.P. Cummins-Diesel motors; one D-8 "caterpillar" tractor, with a dozer and a 5-yard capacity LaPlant-Choate "Carrimor" scraper; one used model 12 "caterpillar" road patrol and one Koehring 6-yard Model WD-60 dumptor truck for rock disposal at the mill.

During the coming year a 5' x 12' Allis-Chalmers heavy-duty scalping screen will be installed at the mill to replace the bar grizzlies. This will not only furnish better screening, with a savings in fine ore, but it will also effect a direct saving in labor by the replacing of two men. In order to augment the haulage units in the deep ore operations in the Holman-Brown pit bottom, two used 15-ton Euclid trucks will be purchased and placed in operation during the 1942 season.

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14. MAINTENANCE AND REPAIRS:

The winter repair work at the shops consisted in completing the overhauling of all the locomotive and car equipment and in checking over and making the necessary repairs on the blast hole and structure drills.

The No. 120-B shovel was completely overhauled, renewing the entire crawling mechanism, repairing the boom, replacing the pinions and racking on the same and completely checking over and repairing all the electric equipment.

The repair program at the washing plant consisted in checking over and repairing all the plant equipment, dismantling and salvaging the electric haulage equipment for waste rock and preparing the truck haulage and in relocating the pump-house and placing the pumps on a new concrete foundation.

Upon completion of the ore season, winter repair work was undertaken at the washing plant. Due to an extensive stripping program and the necessity of using the locomotive house for truck repairs and storage, the locomotives and cars were all shipped to the Hill-Trumbull Mine, where the necessary repairs are being made. It will not be possible to check over and overhaul the motorized equipment until the completion of the stripping late in February. However, in order to minimize this work, a spare Cummins motor was acquired to permit the overhauling of some motors during the stripping season.

18. NATIONALITY OF EMPLOYEES:

Nationality:	Number of Men:
American,	198
Finnish,	12
Italian,	6
Jugo-Slav,	6
Swedish,	4
Austrian,	3
Canadian,	3
Norwegian,	3
Bulgarian,	1
Croatian,	1
German,	1
Greek,	1
Montenegran,	1
Total,	240

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19. WASHING PLANT OPERATIONS:

The operating season at the Holman-Cliffs concentrating plant extended from April 21st to October 31st, inclusive, a total of 140 days, or 340 shifts. The operations were conducted on the basis of three 8-hour shifts per day and five days per week. A total of 1,501,249 tons of crude ore were concentrated, producing 989,669 tons of merchantable ore. Of the total production, 939,997 tons were shipped and 49,722 tons placed in a concentrate pile adjacent to the mill.

The performance of the mill equipment was quite satisfactory, for the delays due to washing operations were only 2% of the total working time. The major part of the time lost was due to poor Great Northern car service and to waiting for crude ore resulting from pit delays.

Due to a car shortage and a peak year, the time lost waiting for Great Northern empties during the first part of the season was so large that it was necessary to provide stocking grounds. An area was prepared on the rock dump, immediately east of the plant and arrangements were made to stock ore with two dumptor trucks which would be taken from the ore hauling operations in the Holman Mine. However, the stocking still meant a loss in production, due to the fact that there was always some lost time in moving these trucks from the mine to the mill and the loss of two haulage units meant a lower production of crude ore in the pit and a resulting loss in concentrate production. This will be remedied during the coming season through the acquisition of two used Euclid trucks, leaving the dumptor units at the plant for rock removal and for stocking concentrates.

The average daily production amounted to 7,068 tons per day, or 2,356 tons per shift, as compared with 2,250 tons per shift in 1940. In view of the numerous long delays, this was satisfactory, but it should normally be approximately 7,500 tons per day, or 2,500 tons per shift.

The amount and analysis of the plant rejects for 1941 were as follows:

	5-ft. Pan Rejects:			
Lease	Tons	Iron	Phos.	Silica
Holman, ----------	60,329	29.62	.046	51.31
Brown, ----------	16,489	28.14	.037	53.57
North Star, ----------	10,289	28.89	.029	52.76
Total, ----------	87,107	29.25	.042	51.91

	36" Belt Rejects:			
	Tons	Iron	Phos.	Silica
Holman, ----------	7,712	29.97	.047	50.80
Brown, ----------	1,909	28.89	.038	52.81
North Star, ----------	945	30.63	.026	49.94
Total, ----------	10,566	29.83	.043	51.09

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19. WASHING PLANT OPERATIONS: (Continued)

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

Lease	Tons	Iron
Holman,	9,612	33.14
Brown,	2,306	31.17
North Star,	1,296	34.31
Total,	13,214	32.91

The analysis of the product from the various machines for the year 1941 was:

	Iron	Phos.	Silica
HOLMAN MILL MACHINES:			
Log Washer,	57.44	.060	9.71
Classifier,	57.57	.053	10.35
Tailings,	23.24		
BROWN MILL MACHINES:			
Log Washer,	57.87	.052	10.61
Classifier,	57.98	.047	10.89
Tailings,	23.29	-	-
NORTH STAR MACHINES:			
Log Washer,	59.19	.039	9.82
Classifier,	59.11	.035	10.50
Tailings,	23.06		

	Tonnage	Percentage of Total Mined	Per Cent. Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined,	1,601,570	100.00	45.75		
Less: Rock removed in Mining	13,214	.83	32.91		
Crude Ore transported to Mill,	1,588,356	99.17	45.86		
Less: Rock rejects in Crusher House,	87,107	5.44	29.25		
Crude entering mill	1,501,249	93.73	46.82		
Concentrates produced -	989,669	61.79	57.92	65.92	81.55
Rock rejects on mill picking belt,	10,566	.66	29.83		
Tailings (by deduction,	501,014	31.28	25.25		
Total Heads as above	1,501,249	93.73	46.82		

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1. GENERAL:

Repair work at the shops and the washing plant was resumed on January 6th, following the holiday lay-off. The work was conducted on the day shift from Monday through Friday, the men receiving forty hours per week.

The locomotives were given a thorough overhauling, replacing badly worn or broken parts and checking over and adjusting the mechanism. The 30-yard cars were repaired, replacing or building up worn wheels and overhauling the trucks and the air equipment. The locomotive crane and the drills were also given some necessary repairs. This work was pushed through in anticipation of an early opening.

The three electric shovels, two 120-B, 4-yard and one Marion 2-yard machines, were overhauled and some repairs were made on the #28 steam shovel. A few minor repairs were necessary on the #350-B Marion steam shovel.

At the mill, the machinery in general was checked over and reconditioned. Worn plate liners and chutes were replaced and two new Akins classifiers were installed, replacing one of the Dorr bowl classifiers.

In the pit, during the early part of April, a ramp, or pit loading pocket was completed. Tracks to serve the pocket were laid and the main haulage lines were checked over. The truck roads were improved and construction was started on a pit service garage.

The 1941 mining program was started on April 18th and continued through October 31st. Throughout the season the mining of wash ore and the production of concentrates were conducted on the basis of three 8-hour shifts per day, five days per week. However, due to the car shortage and the necessity of using the trucks and the ramp for loading, the mining of direct ore was carried over into the week-ends during the entire season. Throughout the month of November, concentrates were shipped from stockpiles which were accumulated during the car shortage in the mining season.

The washing plant was operated 140 days, producing 1,006,651 tons of concentrates in the treatment of 1,639,779 tons of crude ore. During the operating season, 168,501 tons of concentrates were placed in stockpile and 137,396 tons were loaded out in November, leaving 31,105 tons in stock. The average output of concentrates per day was 7,190 tons.

Direct shipping ore was loaded intermittently throughout the season. The loading in general was confined to week-ends, or at times when the haulage trucks and the pit pocket could be used.

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1. GENERAL:

A total of 297,030 tons of direct shipping ore was mined in 108 operating shifts, with an average output of 2,583 tons per shift.

Upon completion of the ore season a small stripping job was started in the East end of the Hill pit to remove approximately 12,000 yards of surface material. The latter had sloughed and washed down from the stripping banks into the pit bottom. The work was suspended after one shift, however, due to the necessity of using the shovels and trucks for the grading of the tracks to serve the new conveyor system and to construct a roadway into the pit.

An extensive structure drilling program was undertaken during the year. Starting in June, one Company drill was operated three shifts per day and continued on that basis throughout the balance of the year. For a short while a second drill was used when crews for the same were available. The Hill pit bottom, East of the center line of Section 17 was completely drilled, with a total of 3,200 feet of drilling. In addition to the holes in the pit bottom, six sample holes were put down through the surface in the southeast corner of the Trumbull, immediately East of the approach and four holes were drilled in the extreme West Trumbull. The surface holes were all drilled under contract by the Schultze Drilling Company of Grand Rapids, Minnesota. This work totaled 1,808 feet, with a grand total of 5,008 feet of drilling.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Hill Crude,	538,888	tons.
Trumbull Crude,	1,100,891	"
TOTAL CRUDE,	1,639,779	"
Hill Non-Bessemer Direct Shipping Ore,	251,385	"
Hill Bessemer Direct Shipping Ore,	25,885	"
Hill Non-Bessemer Concentrates,	238,467	"
Hill Bessemer Concentrates,	93,305	"
Trumbull Non-Bessemer Direct Shipping Ore,	1,492	"
Trumbull Bessemer Direct Shipping Ore,	268	"
Trumbull Non-Bessemer Concentrates,	546,791	"
Trumbull Bessemer Concentrates,	128,087	"
TOTAL PRODUCTION,	1,285,680	"

b. Shipments:

The shipments from the Hill-Trumbull Mine during 1941 were as follows:

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Shipments: (Continued)

Hill Non-Bessemer Direct Shipping Ore, ----------	251,385 tons.
Hill Bessemer Direct Shipping Ore, ----------	25,885 "
Hill Non-Bessemer Concentrates, ----------	238,194 "
Hill Bessemer Concentrates, ----------	93,305 "
Trumbull Non-Bessemer Direct Shipping Ore, ------	1,492 "
Trumbull Bessemer Direct Shipping Ore, ----------	268 "
Trumbull Non-Bessemer Concentrates, ----------	515,959 "
Trumbull Bessemer Concentrates, ----------	128,087 "
TOTAL SHIPMENTS, ----------	1,254,575 "

c. Stockpile Inventories:

There was no ore in stock on January 1st, 1941. However, during the year a total of 168,501 tons was put in stock. This tonnage was made up of 60,643 tons of Hill Concentrates and 107,858 tons of Trumbull Concentrates.

During the year 60,370 tons of Hill Concentrates and 77,026 tons of Trumbull Concentrates were shipped from the stockpiles. As of December 31st, 1941 there remained in stock 273 tons of Hill Concentrates and 30,832 tons of Trumbull Concentrates.

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
April, ----------	4,471	102,365	106,836
May, ----------	52,961	213,738	266,699
June, ----------	90,229	140,259	230,488
July, ----------	89,782	171,085	260,867

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

e. Production by Monthd: (Continued)

(1) Crude Ore:

MONTH	HILL	TRUMBULL	TOTAL
August, ----------	110,450	143,304	253,754
September, ----------	115,242	147,972	263,214
October, ----------	75,753	182,168	257,921
TOTAL 1941, ----------	538,888	1,100,891	1,639,779

(2) Concentrates & Direct Ore:

MONTH	HILL DIRECT	HILL CONCS.	TRUMBULL DIRECT	TRUMBULL CONCS.	GRAND TOTAL
April,	10,008	2,656	-	56,107	68,771
May,	41,251	32,370	-	114,886	188,507
June,	36,868	57,173	-	72,228	166,269
July,	33,359	56,684	1,100	114,054	205,197
August,	57,877	70,767	-	98,097	226,741
September,	59,159	68,876	660	100,045	228,740
October,	38,748	43,246	-	119,461	201,455
TOTAL 1941,	277,270	331,772	1,760	674,878	1,285,680

f. Ore Statement:

Balance in stockpile December 31, 1941 of 273 tons Hill Non-Bessemer Concentrates and 30,832 tons Trumbull Non-Bessemer Concentrates.

g. Delays:

The following delays were reported during the year 1941:

Date	Time Lost Hours	Time Lost Minutes	Cause:
Apr. 18th,		50	Shortage of Great Northern cars.
May 1st,	1		Plant down, sheared key on pinion of picking belt motor.
7th,	-	35	Broken eye bolt on vibrating screen.
8th,	-	45	Broken spring in clamp on screen
	-	45	Log washer plugged
12th,	-	45	No power
	1	-	Broken 5-ft. pan roller
13th,	-	45	Broken 8-ft. pan roller
19th,	1	15	No crude ore - slow loading in pit.
20th,	2	20	Repairing vibrating screen
21st,	2	-	Wash-out in dike
26th,	-	45	Repairing 36" conveyor oil switch
28th,	-	40	Repairing vibrating screen
	1	40	Cleaning out fine ore chute
29th,	-	45	Jaw crusher fuse blew out
30th,	-	45	No crude ore, slow loading in pit.

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause:
June 4th,	1	-	Broken spring and bolt on 5' x 14' screen.
5th,	1	15	Power off
10th,	-	45	Log plugged
	1	20	No crude ore, slow loading in pit.
20th,	2	30	Wet belt and power failure
23rd,	1	-	Broken spring on 5' x 14' screen
July 2nd,	1	15	Broken spring on 5' x 14' screen
7th,	3	30	Changing thimble on North log
8th,	1	-	No power
9th,	-	45	Broken transverse spring on 5' x 14' screen.
	1	-	Broken valve on washing plant pump
	2	-	Repairing pump
25th,	2	-	No crude ore, repairing #35 shovel
30th,	-	45	Broken transverse spring on 5' x 14' screen.
Aug. 8th,	2	-	No crude ore, moving #35 shovel
13th,	-	30	Repairing pump at washing plant
15th,	-	45	Broken transverse spring on screen
20th,	-	45	Welding hinge on pan
22nd,	-	25	Broken spring on screen
25th,	4	45	No crude ore, derailment in pit
27th,	-	45	Broken transverse spring on screen
28th,	-	35	Broken transverse spring on screen
29th,	-	50	Power off
Sept. 3rd,	1	20	Broken hinge on 8' pan conveyor
4th,	2	20	No crude ore, repairing trip motor #34 shovel
5th,	2	30	No crude ore, delay in pit operations
10th,	-	40	Broken transverse spring on 5' x 14' screen
12th,	-	30	Broken hinge on 8' pan conveyor
17th,	3	-	Repairing plant motor generator set
18th,	3	25	Plant running one side for 6 hours - 50 minutes - replacing log washer bearing.
24th,	-	25	Repairing 5' x 14' screen
25th,	-	25	Repairing splice in conveyor belt

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays: (Continued)

Date	Time Lost: Hours	Minutes	Cause:
Oct. 6th,	3	-	No crude ore, broken rail on main line.
7th,	-	45	Repairing 8-ft. pan
	-	50	Splicing beam on stacker
8th,	-	30	Splicing 36" conveyor belt
	-	30	Tightening bearing on South log
23rd,	-	45	Broken spring on 5'x14' screen
24th,	5	-	No crude ore, derailment on main line.
27th,	2	50	Broken gasket on water line
28th,	1	-	Repairing 8' pan conveyor
30th,	1	-	Repairing 5' x 14' screen
	2	-	Mill running one side for 4 hours, due to log washer break down.
Total,	80	45	

3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess.Direct,	251,385	59.88	.054	8.99	.17	1.05	8.56	54.75
Hill Bessemer Direct,	25,885	59.65	.038	10.20	.15	1.00	7.67	55.07
Hill Non-Bess.Concs.	238,467	59.32	.048	8.33	.12	.54	8.34	54.38
Hill Bess.Concs.	93,305	60.12	.035	9.36	.12	.57	7.37	55.69
Trumbull Non-Bess.Direct,	1,492	50.92	.046	18.83	.10	.59	8.13	46.78
Trumbull Bess.Direct,	268	45.10	.039	28.50	.12	.60	8.30	41.36
Trumbull Non-Bess.Concs.	546,791	59.13	.047	6.44	.13	.48	7.28	54.83
Trumbull Bess. Concs.	128,087	58.62	.040	7.20	.13	.46	8.43	53.68
Total,	1,285,680	59.33	.047	7.67	.14	.62	7.85	54.67

b. Mine Analysis of Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess.Direct,	251,385	59.88	.054	8.99	.17	1.05	8.56	54.75
Hill Bess. Direct,	25,885	59.65	.038	10.20	.15	1.00	7.67	55.07
Hill Non-Bess.Concs.	238,194	59.32	.048	8.33	.12	.54	8.34	54.38
Hill Bess. Concs.	93,305	60.12	.035	9.36	.12	.57	7.37	55.69
Trumbull Non-Bess.Direct,	1,492	50.92	.046	18.83	.10	.59	8.13	46.78
Trumbull Bess.Direct,	268	45.10	.039	28.50	.12	.60	8.30	41.36
Trumbull Non-Bess.Concs.	515,959	59.12	.047	6.46	.13	.48	7.30	54.80
Trumbull Bess.Concs.	128,087	58.62	.040	7.20	.13	.46	8.43	54.67
Total,	1,254,575	59.33	.047	7.71	.14	.62	7.88	54.66

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3. ANALYSIS:

c. Mine Analysis of Ore in Stockpile December 31, 1941:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess. Concs. -	273	59.92	.043	8.45	.13	.53	7.49	55.43
Trumbull Non-Bess.Concs.	30,832	59.27	.046	6.05	.12	.46	6.90	55.18
Total,	31,105	59.28	.046	6.07	.12	.46	6.91	55.18

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Hill Crude,	538,888	45.51	.038	29.75
Trumbull Crude,	1,100,891	43.51	.036	30.91
Total,	1,639,779	44.13	.037	30.53

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Hill Non-Bess. Direct,	59.88	.054	8.99	.17	1.05	.18	.14	.011	3.65
Hill Bess.Direct	59.65	.038	10.20	.15	1.00	.16	.14	.010	2.90
Hill Non-Bess. Concs.	59.32	.048	8.33	.12	.54	.20	.16	.010	5.70
Hill Bess.Concs.	60.12	.035	9.36	.12	.57	.18	.14	.010	3.65
Trumbull Non-Bess.Direct,	50.92	.046	18.83	.10	.59	.20	.14	.010	7.20
Trumbull Bess. Direct,	45.10	.039	28.50	.12	.60	.22	.19	.010	5.75
Trumbull Non-Bess.Concs.	59.13	.047	6.44	.13	.48	.22	.18	.010	7.85
Trumbull Bess. Concs.	58.62	.040	7.20	.13	.46	.18	.16	.010	7.90

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 the preparation of the revised estimates and have been accepted by the State Tax Commission engineers.

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

They are based on actual experience in mining at the Hill-Trumbull Mine and on data secured from hand-wash tests of drill samples. The rock deduction on the wash and jig ores has been taken into account in the calculation of the percentage of recovery.

The following tabulation shows the estimate of January 1st, 1941, the ore mined during 1941 and the ore reserve estimated as of January 1st, 1942:

	REPORTED JAN. 1,1941	MINED 1941	RESERVE JAN.1-1942
Trumbull Mine:			
NE¼-SE¼, Sec. 18,	12,779	-	12,779
NW¼-SW¼, Sec. 17,	1,921,015	366,729	1,554,286
NE¼-SW¼, Sec. 17,	2,345,898	309,910	2,035,988
TOTAL TRUMBULL,	4,279,692	676,639	3,603,053
Hill Mine:			
SE¼-NW¼, Sec. 17,	638,427	13,027	625,400
SW¼-NE¼, Sec. 17,	893,824	154,595	739,229
SE¼-NE¼, Sec. 17,	1,385,793	441,420	944,373
TOTAL HILL,	2,918,044	609,042	2,309,002
GRAND TOTAL - HILL-TRUMBULL MINE -	7,197,736	1,285,681	5,912,055

Although there was a comprehensive drilling program conducted in the bottom of the Hill pit during the year, there was no change in the estimated tonnage of ore. The drilling completed at the end of the year merely outlined the ore and the rock areas. Small increases in some areas were offset by a decrease in tonnage in other parts of the pit. The information secured was of value mainly for the future mining and grading. The drilling in the southeast corner of the Trumbull will be continued into the next season and, to date, there was not sufficient information available for a re-estimate of this area.

b. Prospective Ore:

The possible extension of the ore body on the North side of the Hill pit and in the extreme southeast corner of the Trumbull lease will have to be proven by a thorough drilling program. The information on the latter area will be available late in the 1942 season. No definite drilling program has been laid out on the North side of the Hill pit at this time. The new drilling programs and the tests in the new jig, or cone plant, will undoubtedly result in a larger estimated tonnage of jig ore.