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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

The increases all resulted from an extension of the ore body beyond the pit limits and represents undeveloped ore. In the case of the West Snyder, the increase represents a shallow deposit of ore underlying deep stripping and extending from the present pit limits to the west property line. Due to the high ratio of stripping to wash ore concentrates, it will have to be considered as underground ore. Underground concentrates have not been included in the reserve estimate heretofore, but inasmuch as it will be picked up by the Tax Commission engineers, who will attempt to establish this tonnage as open pit ore, it was thought advisable to set it up in this instance.

5. LABOR & WAGES:

a. Comments:

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

On March 13th, an election was held at the Village Hall in Bovey, Minnesota, for the purpose of determining whether or not the employees of the Canisteo Mine desired to be represented by Local Union No. 2073 of the Steel Workers' Organizing Committee of the CIO, or by a local union, known as the "American Union". The results were overwhelmingly in favor of the CIO. Negotiations were then undertaken for a contract which was agreed upon and signed on May 13th and operations under same were satisfactory throughout the year.

A number of men left for military service throughout the year and a large number left our employment for other war industries; however, no serious shortage developed.

b. Comparative Statement of Wages and Product:

PRODUCTION:	
Direct Shipping Ore,	-
Concentrates Shipped,	800,576 tons
Concentrates in Stock 12-31-42	1,634 "
Concentrates in Stock 12-31-41	29,551
Total Production	772,659
Number of Days Operated	100
Number of Shifts and Hours	3 - 8-hour
Average Daily Product,	7,727
Average Number of Men Working	139
Average Wages Paid Per Day,	$ 7.37
Amount Paid for Labor,	$181,803.73

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6. SURFACE:

a. Buildings, Repairs:

In addition to the ordinary maintenance work on our mine buildings and dwelling houses, a new tailings pump-house was erected and a concrete block electric shovel repair shop was added to the east end of the main shop building.

c. Tracks, Roads, Transmission Lines, etc:

Road work consisted merely of necessary maintenance. There were no changes or additions to the mine transmission lines.

7. OPEN PIT:

a. Stripping:

Three main stripping jobs were undertaken at the Canisteo Mine during the year. First, the completion of the south side stripping program which had been started in the fall of 1941 on the south side of the pit; second, the removal of a large block of paint-rock and lean waste ore material from the so-called island area in the south side of the Snyder lease, extending across the east half of the East Snyder forty into the southwest quarter of the Mid-Snyder - and, third, the extension of the South Bovey stripping to the south and west, carrying the operations over into Parcel 3, (the Great Northern reserve).

The stripping on the south side of the pit, which had been carried over from a program started in the fall of 1940, covered an area approximately 800 feet long and 250 feet wide near the central part of the South Bovey lease, extending the stripping south and westward to a point approximately 100 feet east of the South Bovey-Parcel #3 line. The work was conducted on a 40-hour per week basis, using 2-three and one-quarter yard electric shovels and nine Euclid trucks. A total of 300,644 cubic yards of surface and waste materials were removed and placed on the south stripping dump. Operating conditions were very good and both the progress and the cost realized were satisfactory.

On completion of this work, early in February, one of the shovels and most of the trucks were shifted to the east side of the North Bovey, where a small block of surface stripping material was removed and hauled to the tailings basin to build a baffle dyke in the main basin. This work was completed late in February and the shovels and haulage units then moved to the shops for repairs.

Upon completion of the ore season in September, a large stripping program was undertaken, consisting of removing 175,000 cubic yards of paint-rock from the island area in the south side of the Snyder lease and 725,000 cubic yards of surface and waste materials from the South Bovey. Work on the former was started on September 15th, on a six

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

day per week basis, and working schedules were so arranged that each man received forty hours per week. Using two - three and one-quarter-yard shovels and all haulage units available, the operations were completed late in November. Approximately 100,000 cubic yards of this material were hauled to the tailings basin, where it was used in raising and reinforcing the existing dykes. The remaining 75,000 yards were deposited on waste dumps in the pit bottom, on the West Snyder forty. Due to the long haul and a shortage of haulage units, the progress was rather slow during the first several weeks, but, after the receipt of the three new Euclid trucks in the latter part of October, better progress was made. Upon completion of the work on the Snyder bottom, the equipment was shifted to the surface stripping area in the South Bovey lease. Starting near the east line of the forty, the top cut was carried westward across the line and approximately 100 feet into Parcel #3, stripping sufficient surface material over the property line to leave a 25-foot berm along the top of ore. Due to the fact that the bulk of material removed up to the first of the year was wet, blue clay and that haulage conditions were soft and slippery, progress made was quite slow and a total of 194,360 cubic yards of surface materials were removed to December 31, 1942.

These conditions had been anticipated, however, and stripping costs were within the estimated figure.

The following tabulation shows the classifications of the materials stripped from the various leases during the year 1942:

	SURFACE MATERIAL (Cu.Yds.)	PAINT ROCK (Cu.Yds.)	WASTE (Cu.Yds.)	LEAN ORE (Cu.Yds.)	TOTAL (Cu.Yds.)
Snyder,	-	198,930	25,911	1,530	226,371
Bovey,	527,266	1,135	-	-	528,401
Hemmens,	-	-	8,820	-	8,820
Total,	527,266	200,065	34,731	1,530	763,592

g. Open Pit Mining and Loading:

Ore mining operations at the Canisteo Mine were started on May 4th, and were conducted on a basis of three 8-hour shifts per day, five days per week, until the 14th of September. A total of 772,659 tons of concentrates were secured in the mining and treating of 1,384,042 tons of crude ore. A weight recovery of 55.83% was realized. Considerable wet weather and the necessity of stocking 118,941 tons of concentrates tended to slow operations at times, but, everything considered, the season's results were satisfactory. As in previous years, it was necessary to shift shovels considerably during the

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading: (Continued)
operating season in order to meet grading requirements. Two electric shovels were employed in loading and the crude ore was transported to the pit pocket by six 15-ton Euclid trucks, maintaining a constant flow of ore for the mill operations at all times.

Mining operations were conducted in seven different areas - four in the Snyder lease, one in the Hemmens and two in the Bovey. In the Snyder, 28,000 tons of concentrates were secured from the track bench along the north side of the pit; 25,000 tons were secured from the pit bottom, below the paint-rock; 214,084 tons from the West Snyder and - 201,256 tons from the south bank of the East Snyder forty, above the paint rock. There were 68,266 tons of concentrates secured from the southwest part of the Hemmens lease, in an area near the Snyder line. In the Bovey, 236,053 tons were taken from the South Bovey and from the west side of the North Bovey; the bulk of the material, however, was moved from the former.

Mining in the Snyder track bench area, which was quite rocky, required considerable sorting of rock and ore, but produced a fair grade of Non-Bessemer concentrates, with high Phosphorous content. This material was mixed with other ores to meet the non-Bessemer Bethlehem contract. In the Snyder bottom, a sinking cut was made just north of the island area, extending approximately twenty feet below the pit floor, and high grade non-Bessemer ore was secured. The operations in the West Snyder consisted of mining the block of ore in the extreme southwest corner of the pit, which was uncovered in the 1941 stripping operations. The material secured here was high grade, with a high weight recovery and was used mainly in producing both the Bessemer and non-Bessemer term contract grades for Bethlehem.

In the Hemmens, mining operations were carried down to within five feet of the water level of the pit and the small tonnage of Hemmens available in the southeast corner of the Hemmens lease was practically exhausted. The crude ore mined here produced a concentrate with a high natural iron content, but the silica was quite high.

A small tonnage of ore was secured from the south end of the track bench in the East Bovey, practically exhausting all of the ore in this area. The concentrates secured from this area were of low grade and were placed in either the Bessemer or non-Bessemer spot contracts. In the South Bovey and the Snyder south bank, the mining operations were conducted in two benches above the paint-rock. The bulk of the material moved from this area was rather lean, with a low recovery and the concentrates secured were generally placed in the spot contract grades.

It was necessary to shift the shovels continually from one area to another, in order to produce the various grades as the boats for the

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7. OPEN PIT
(Continued)

g. Open Pit Mining and Loading: (Continued)
same were named; however, the fact that both low grade Bessemer and non-Bessemer ore could be produced for the spot contracts, helped simplify the grading problems throughout the season. The lean ore and waste materials which were handled during the season was stocked in the various waste areas in the pit bottom.

k. Drainage:
The water level in the pit was maintained at an average of about 40 feet above the pit bottom in the southeast corner of the mine, having been lowered approximately 20 feet from the level maintained during previous years. There were no serious drainage problems incurred during the season.

Explosives, Drilling and Blasting:

Statement of Explosives Used:

ORE OPERATIONS:		QUANTITY	PRICE	AMOUNT
25% duPont Spec. Gel.	5 x 16	40,000#	$10.00	$ 4,000.00
40% duPont Quarry Gel.	3-1/2 x 10	7,500#	10.00	750.00
40% duPont R.C. Extra	5 x 14	78,750#	10.00	7,875.00
60% duPont Spec. Gel.	7/8 x 8	200#	11.50	23.00
60% duPont C S 1	1-1/8 x 8	300#	11.50	34.50
60% duPont C S 1	7/8 x 8	100#	11.00	11.00
Powertol 1 v	5 x 16	1,925#	11.00	211.75
Total and Average,		128,775#	$10.02	$12,905.25
Clover Fuse		3,000'	6.05	18.15
30' duPont #6 E.B. Caps		1,500	14.65	219.77
40' duPont #6 E.B. Caps		600	19.66	117.90
No. 20 Connecting Wire		50#	5.50	27.50
No. 14 Lead Wire,		500'	18.00	9.00
Total Caps, etc.,				$ 383.41
TOTAL ORE OPERATIONS, 1942 -				$13,288.66
STRIPPING OPERATIONS:				
25% duPont Spec. Gel.	5 x 16	16,750#	$10.00	$ 1,675.00
40% R.C. Extra	5 x 14	17,000#	10.00	1,700.00
40%	1-1/4 x 8	1,250#	10.00	125.00
Total and Average,		35,000#	10.00	$ 3,500.00

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7. OPEN PIT:

Explosives, Drilling and Blasting: (Continued)

Statement of Explosives Used:

STRIPPING OPERATIONS: (Continued)	QUANTITY	PRICE	AMOUNT
18' duPont #6 E.B. Caps	1,400	$ 8.34	$ 116.78
30' duPont #6 E.B. Caps	250	14.65	36.63
40' duPont #6 E.B. Caps	200	19.65	39.30
No. 20 Connecting Wire	50#	5.50	27.50
Total Caps, etc.,			$ 202.21
TOTAL STRIPPING OPERATIONS,			$ 3,702.21
GRAND TOTAL EXPLOSIVES, 1942 -			$16,990.87

8. COST OF OPERATION:

a. Comparative Mining Costs:

	BUDGET ESTIMATE	1942 COST PER TON	1941 COST PER TON
PRODUCT:			
Concentrates, (tons)	800,000	772,659	585,679
Average Tons per Shift		2,576	2,615
Tons Per Man Per Day		45.81	36.04
Days Operated		100	112
COST:			
Open Pit Crude Ore	$.146	$.133	$.151
General Pit Expense	.055	.041	.094
Concentrating	.108	.092	.113
Stocking and Loading Concentrates	.011	.007	.004
General Mine Expense	.060	.050	.063
Winter and Idle Expense	.137	.142	.161
Cost of Production	$.517	$.465	$.586
Depreciation, Plant and Equipment		.101	.101
Depreciation, Motorized Equipment		.044	.099
Amortization, Stripping		.250	.250
Taxes, Ad Valorem		.109	.147
Taxes, Occupational		.135	.141
Taxes, Royalty		.024	.026
Total Cost at Mine		$ 1.129	$ 1.350
Administrative Expense		.050	.050
Miscellaneous Expense and Income		-	.001
GRAND TOTAL, ----------		$ 1.179	$ 1.399

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison:

(1)- Product:

The 1942 and the 1941 costs have little basis for comparison, due to the fact that the operations during 1942 were on a 3-shift basis, while those in 1941 were conducted on but two shifts. The weight recovery and the average output of concentrates per shift were quite close during the two seasons and the average daily output during 1942 was consequently about 50% higher than that during the preceding year. This had little effect on the unit cost of open pit concentrates, but it had a marked effect on the costs under the other main captions. The total cost of production for the year 1942 was $.121 under that for 1941 and $.052 under the budget estimate. The savings over the 1941 costs were due to a small saving in open pit mining and to marked savings in General Pit Expense, Concentrating and General Mine Expense. The latter resulted from increased daily and total production, as a result of a three-shift operation. The saving of $.052 over the budget estimate was made up of: $.013 in Open Pit Mining; $.014 in General Pit Expense; $.016 in Concentrating; $.004 in Stocking and Loading Concentrates and $.010 in General Mine Expenses. These savings resulted from the fact that there was much less overtime than had been anticipated and that only a fraction of the estimated pit rock and lean materials were removed in the mining operations.

(2) - Open Pit Mining:

The total charges under this heading were $.013 under the budget and $.018 under the 1941 costs. A saving of $.007 per ton of crude ore, or $.013 per ton of concentrates in Drilling and Blasting, accounted for the greater part of this decrease. This was due to the fact that there was very little rocky wash ore mined in 1942 and the crude material moved required no heavy blasting. There was also a small saving in Shovels - Maintenance, Truck Maintenance and Pit Roads and Ramps over the 1941 figures. However, these items were close to the budget estimate. The decrease from the previous season's unit costs under these latter headings were merely the result of a larger production.

(3) - General Pit Expense:

The cost per ton under this caption was $.039 below the 1941 cost and $.014 below the estimated figure. In addition to the fact that the 1942 costs were one-third less than the 1941 figure, due to a 50% increase in production, with fixed overhead expenses, there was also a saving in the cost per ton for Structure Drilling, resulting from the fact that a much smaller amount was applicable to the 1942 ore operations. This saving alone was $.033 per ton over the 1941 figure. The decrease of $.014 below the budget cost was due almost entirely to the saving in Structure Drilling, with a much smaller charge applicable to the 1942 costs than had been anticipated. The other items under this heading were quite close to the budget figures.

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(4) - Concentrating:

The total cost per ton for Concentrating was $.016 under the budget and $.021 under the 1941 figure. The decrease from the estimated cost resulted in savings in Washing, General Expense and Maintenance of Buildings and Machinery, due to less overtime work than had been anticipated. The other items were close to the budget figure. The saving over the 1941 costs was due to a larger production in the case of the fixed costs and to a saving in power, with a better power factor through a three-shift operation.

(5) - Stocking and Loading Concentrates:

The 1942 costs per ton under this heading were $.004 under the budget and $.003 above the 1941 figure. The decrease from the budget figure was due to the fact that it had been estimated on a basis of using a smaller shovel, with considerable overtime work, in loading out the concentrates, whereas they were practically all loaded out in the month of October at a high rate of production, using a three and one-quarter-yard shovel and with very little overtime work required. The increase over the 1941 cost resulted from stocking and loading a much larger tonnage.

(6) - General Mine Expenses:

Under this caption the 1942 costs were $.010 below the budget and $.013 below the 1941 figure. The latter was due entirely to a larger season's production. The decrease from the budget was due to small savings in Safety Department, Mine Office Expense, Insurance and Social Security Taxes.

(7) - Winter and Idle Expense:

The cost per ton under this heading was $.005 above the budget and $.019 below the 1941 figure. The latter was due to the increased production for the year 1942.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

The extensive drilling program, which was undertaken during the year 1941, was continued throughout 1942 in an effort to outline the extension of the ore body south in the Hemmens and South Bovey leases, and west in the extreme west end of the pit. This consisted of 3,206 feet of exploratory drilling - 1,453 feet in the West Snyder, 748 feet in the Hemmens and 1,005 feet in the South Bovey. In addition to the above, there was a total of 2,321 feet of sample drilling, consisting of a number of holes put down in the Snyder, Hemmens and South Bovey to determine the grade of ore to be mined and to outline the rock and mining areas.

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9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

The drilling in the west end of the pit outlined a shallow layer of ore, extending from the present pit limits to the property line and underlying deep surface and waste material stripping. The ratio of stripping to wash ore concentrates was such that it will be necessary to consider this ore body as underground wash ore concentrates. In the South Bovey and the Hemmens, the drilling resulted in an increase in the total reserves on these two forties. The work of outlining the extreme limitations of the ore body on the south side of the pit are now practically completed, with a few drill holes which will have to be put down in the South Bovey lease during the 1943 season.

During the coming season, a drilling campaign will be undertaken in the east end of the pit to outline any possible connections between the present pit and the body of deep ore at the extreme east end of the Hemmens lease. There will also be a few structure drill holes on the north side of the Mid-Snyder forty to outline any possible extension in this area. This work should complete the exploratory drilling on the property in preparation for a review by the Tax Commission.

10. TAXES:

The following statement shows the Canisteo Mine taxes and the average rates for the years 1941 and 1942:

Statement of Taxes	1942	1941	Increase	Decrease
Canisteo Mine,	$79,573.13	$82,465.97	-	2,892.84
Washing Plant Lands,	525.13	497.87	27.26	-
Personal Property,	3,437.69	2,979.89	457.80	-
Total,	$83,535.95	$85,943.73	-	2,407.78
Village Lots,	-	-	-	-
GRAND TOTAL,	$83,535.95	$85,943.73	-	2,407.78
Average Tax Rate	101.87	96.85	5.02	

The decrease in the mine taxes was the result of deducting the 1942 shipments. There was a small increase in the value of washing plant lands, due to a higher tax rate. Personal Property taxes showed an increase of $457.80, resulting from the assessment of ore in stockpile in the spring of 1942, whereas there was none in stock in 1941.

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11. ACCIDENTS AND PERSONAL INJURY:

There were six lost-time accidents at the Canisteo Mine during the year 1942. These are described as follows:

NAME: Joseph Fait DATE: August 26th.
CAUSE: Lifting 6" pipe from ground to tractor. Rain had made the ground (paint-rock) very slippery and the injured man slipped.
NATURE: Sprained lumbar muscles
TIME LOST: Two days
COMPENSATION: None.

NAME: Robert L. Thornton DATE: September 3rd.
CAUSE: While helping other workmen carry a large beam, he stumbled over a piece of iron on the shop floor and the beam end hit him in the right groin.
NATURE: Contusion right side of pubic arch.
TIME LOST: Three days
COMPENSATION: None

NAME: Charles Wassberg DATE: September 25th.
CAUSE: Shovel cable boat being dragged behind shovel, ran over injured man's left foot.
NATURE: Contusion and bruising, no break in skin.
TIME LOST: Twenty-six days.
COMPENSATION: $104.00.

NAME: Lloyd Flatley DATE: October 14th.
CAUSE: Mr. Flatley was working at the stockpile site, spotting cars with a "caterpillar" tractor. He stooped to the ground to pick up a tow chain and he got a kink in his back.
NATURE: No. Obj. signs - pain on movement of lower back.
TIME LOST: One Day
COMPENSATION: None.

NAME: Armas Puro DATE: October 24th.
CAUSE: The injured slipped on the road in the pit; it had been snowing and as a result, made the road in the pit quite slippery.
NATURE: No Obj. signs of injury, strain of muscles when falling.
TIME LOST: Four days
COMPENSATION: None.

NAME: Elmer Dahlgren DATE: October 25th.
CAUSE: He was driving truck No.17 up the hill and stopped and then he was told by another driver to wait there until the tractor came to pull him up the hill, but he would not take this advice, so the truck ran back down the hill.
NATURE: Contusion of left hip and ribs, lower left side. Laceration and contusion of right Occiput area. General nausea.
TIME LOST: Twenty-six days.
COMPENSATION: $104.00.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

During the year, a new concrete block addition was made to the shop building for shovel repairs. A new 25,000-gallon water tank was erected to replace the old 50,000-gallon tank which had become unsafe through decay. The tailings pumps were shifted to a site somewhat nearer the washing plant and a new pump-house was erected at this site. No major construction programs are being planned for the year 1943.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

Three new 10-yard standard Euclid dump trucks, equipped with 150 H.P. Cummins-Diesel motors were received during the latter part of October, replacing the three oldest machines. At the mill, a new Hydroseal tailings pump was purchased as a stand-by in the handling of mill tailings, and the remaining Dorr classifier was replaced with two Akins machines. A Bucyrus-Erie drill sharpener was purchased and installed in the shop to eliminate the necessity of hauling drill bits to neighboring properties for sharpening. During the coming year it will be necessary to purchase a Diesel-powered road patrol, or grader, and one D-8 "caterpillar" tractor.

14. MAINTENANCE AND REPAIRS:

At the conclusion of the stripping program in the spring of 1942, extensive repairs were made to all equipment. The two Bucyrus-Erie shovels were carefully checked over and the crawling mechanism given the necessary repairs. This consisted mainly of building up the "caterpillar" links and fitting the same with new pins. The Euclid trucks were checked over; the chassis and bodies repaired and the motors reconditioned. Both churn drills and the two "caterpillar" tractors were given a complete overhauling.

18. NATIONALITY OF EMPLOYEES:

NATIONALITY:	NO. MEN 1941	NO. MEN 1942
American,	98	115
Jugo-Slav,	4	3
Finnish,	6	10
Italian,	2	2
Swedish,	3	3
Bulgarian,	1	-
Canadian,	4	4
Austrian,	1	1
Norwegian,	1	1
Danish,	1	1
Montenegrin,	1	1
Belgian,	1	1
Czecho-Slovaks,	1	-
Totals,	124	142

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19. WASHING PLANT OPERATIONS:

The washing plant was operated from May 4th to September 14th, inclusive, on the basis of three 8-hour shifts per day, five days per week, with a total of 100 days, or 300 shifts. There were comparatively few plant delays and the mill performance was very satisfactory. The two new Akins classifiers, which replaced the second Dorr bowl, performed as had been anticipated and their installation in place of the bowls made a convenient and efficient arrangement. The stand-by tailings pump tended further to cut down delays. In the screening plant, the installation of the heavy duty scalping screen eliminated the bar grizzly, the 5-foot pan conveyor and the 40 x 42 jaw crusher. This meant a saving of two men per shift, as well as a saving in power.

Due to an irregular boat schedule and a corresponding shortage of cars, it was necessary to stock 118,941 tons of Snyder concentrates during the season. This stocking was all done with one Euclid rear-dump truck and one Koehring dumptor, on a pile adjacent to the mill. During the month of October, all but 1,634 tons of the 118,941, which had been placed in stock during the 1942 season - and the 29,551 tons which remained over from the 1941 season, were loaded out and shipped.

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

	5 X 14 SCREEN REJECTS			
Lease:	Tons	Iron	Phos.	Silica
Snyder,	13,882	34.27	.057	57.35
Bovey,	7,200	25.21	.058	57.39
Hemmens,	2,060	25.91	.033	56.89
Total,	23,142	30.71	.055	57.32

	36" BELT REJECTS			
	Tons	Iron	Phos.	Silica
Snyder,	3,401	24.58	.060	59.01
Bovey,	2,174	24.47	.066	59.22
Hemmens,	542	26.76	.050	56.19
Total,	6,117	24.73	.061	58.83

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

Lease	Cu. Yds.	Tons	Iron
Snyder,	1,093	1,640	28.62
Bovey,	1,221	1,832	28.33
Hemmens,	20	30	28.50
Total,	2,334	3,502	28.47

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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,	11,831	19,640	36.46
Bovey,	2,606	4,326	33.89
Total,	14,437	23,966	36.00

The analysis of the product from the various machines for the year 1942 was as follows:

SNYDER MILL MACHINES:

	Iron	Phos.	Silica
Log Washer	56.06	.047	12.49
Classifier	58.36	.042	9.93
Tailings	20.85	-	-

BOVEY MILL MACHINES:

	Iron	Phos.	Silica
Log Washer	56.35	.045	11.72
Classifier	58.33	.043	9.83
Tailings	20.72	-	-

HEMMENS MILL MACHINES:

	Iron	Phos.	Silica
Log Washer	56.26	.043	12.06
Classifier	58.34	.043	9.90
Tailings	20.79	-	-

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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)	1,434,652	100.00	44.05		
Less: Lean Ore Stocked in Mining,	23,966	1.67	36.00		
	1,410,686	98.33	44.19		
Less: Pit Rock Wasted,	3,502	.24	28.47		
Total Transported to Mill,	1,407,184	98.09	44.23		
Less: Rock Rejects in Crusher House,	23,142	1.61	30.71		
Crude Ore Entering Mill,	1,384,042	96.48	44.46		
Concentrates Produced,	772,659	53.86	57.68	55.83	72.43
Rock Rejects on Mill Picking Belt,	6,117	.43	24.73		
Tailings (by deduction)	605,226	42.19	27.78		
Total Heads, as above (entering mill)	1,384,042	96.48	44.46		
Total Pit Rock, Crusher House Rejects and Lean Ore,	50,610	3.52	33.06		
Totals,	1,434,652	100.00	44.05		

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1. GENERAL:

Repair work at the washing plant was suspended during the holiday season and was resumed on January 5th. There was no lay-off at the shops, as the services of this department were required in support of the stripping operations.

During the first two months of the year some of the truck motors were repaired, in addition to the regular shop work. When stripping activities were curtailed on March 8th, (being reduced to a one-shovel operation), some of the trucks were brought in for a general overhauling; and the 120-B - 4-yard electric shovel was moved to the shops to receive necessary repairs. The 3-1/4-yard Marion shovel was repaired during the last week in March and the early part of April. The 30-yard cars and three locomotives were sent to the Hill-Trumbull shops for necessary attention.

At the washing plant, the repair work started in the fall of 1941, was continued. The 8' pan conveyor was given a thorough overhauling, the rollers of the belt conveyor were cleaned and greased, the electric motors were taken to the shop for necessary servicing, the logs, classifiers, vibrating screens and cone crushers were overhauled; and chutes, launders and lining plates were repaired. With the completion of the ore season, on November 6th, the general overhauling of the plant equipment was undertaken and continued to the end of the year.

Pumping operations were maintained on a twenty-four hour basis throughout the year. One 2000 G.P.M. pump, mounted on a raft, was utilized for handling the water. The problem of providing a sump has been greatly simplified, since the advent of truck haulage, by taking a shovel cut in ore, down a steep grade, until the desired depth is reached. The sump was lowered once during the 1942 season.

Stripping operations were carried on in January and February and during the first three weeks in March. Surface, paintrock and waste material were removed from an area on the south side of the pit, in the vicinity of the Holman-Brown #1 line and a layer of paintrock and taconite was taken out from the pit bottom on the Holman and Brown #2 properties.

Starting on November 9th and continuing through December and into 1943, stripping operations were conducted on the Bingham and North Star lands.

The 1942 ore season was opened with the loading of stockpiled concentrates on March 20th and regular mining and washing operations were started on April 14th. The production of the required tonnage for the year was completed on November 6th.

HOLMAN-CLIFFS MINE
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1. GENERAL:
(Continued)

The operating schedule varied during the year, according to the demands for ore. A five-day week was worked in April, August, September and October and a six-day week in May, June and July. A rate of three shifts per day was maintained throughout the year.

Pit mining conditions were generally good and a satisfactory daily average production was maintained.

Washing plant operations extended over a period of 158 days from April 14th to November 6th. A total of 1,732,209 tons of crude ore was treated, yielding 1,092,950 tons of concentrates. The average daily production was 6,917 tons, as compared to 7,068 tons in 1941. The decrease is accounted for by the fact that, although the analysis of the crude ore was practically the same for the two years, the percentage of weight recovery was appreciably lower in 1942.

Due to a shortage of empty railroad cars, it was necessary to stockpile 157,315 tons of concentrates. Trucks were used to transport the ore from the washing plant to the storage grounds.

Exploration work was carried on for eleven months of the year by one company drill and during part of that time, by a contractor's outfit. Holes were put down in the Brown #2 old pit bottom, in the south bench in the Holman pit and in the North Star property in three places, viz: in the Mt. Griffin mining area, in the dump area northeast of Mt. Griffin, and north of the main approach.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Holman Crude,	1,259,205	tons
Brown Crude,	365,875	"
North Star Crude,	107,129	"
TOTAL CRUDE,	1,732,209	"
Holman Non-Bessemer Concentrates,	468,987	"
Holman Bessemer Concentrates,	319,059	"
Brown Non-Bessemer Concentrates,	114,781	"
Brown Bessemer Concentrates,	114,252	"
North Star Non-Bessemer Concentrates,	5,795	"
North Star Bessemer Concentrates,	70,076	"
North Star Non-Bessemer Direct,	3,933	"
North Star Bessemer Direct,	8,060	"
TOTAL PRODUCTION - 1942,	1,104,943	"

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

b. Shipments:

Holman Non-Bessemer Concentrates, ----------	397,024	tons.
Holman Bessemer Concentrates, ----------	319,059	"
Brown Non-Bessemer Concentrates, ----------	109,944	"
Brown Bessemer Concentrates, ----------	114,252	"
North Star Non-Bessemer Concentrates, ---------	5,795	"
North Star Bessemer Concentrates, ----------	70,076	"
North Star Non-Bessemer Direct, ----------	3,933	"
North Star Bessemer Direct, ----------	8,060	"
TOTAL SHIPMENTS 1942 (including 1941 Stockpile)	1,028,143	"

c. Stockpile Inventories:

Holman Non-Bessemer Concentrates, ----------	115,542	"
Brown Non-Bessemer Concentrates, ----------	10,980	"
TOTAL, ----------	126,522	"

As of January 1, 1942, there was in stockpile a total of 49,722 tons. This was shipped in the spring of the year in the following quantity: Holman Concentrates 43,609 tons and Brown Concentrates 6,141 tons. This tonnage represents a net overrun of 28 tons over our book figures. This 28 tons is included in the 1942 production.

The following amount of lean material in now in stock:

Concentrating Material Above 25%

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

Coarse Non-Concentrating Material Above 40%.

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

e. Production by Months:

(1) Crude Ore:

	HOLMAN	BROWN	NORTH STAR	TOTAL
April, ----------	49,315	54,577	27,578	131,470
May, ----------	201,816	80,289	18,060	300,165
June, ----------	185,140	118,575	12,506	316,221
July, ----------	182,686	69,566	48,985	301,237
August, ---------	185,363	42,570	-	227,933
September, ------	239,230	-	-	239,230
October, --------	176,812	298	-	177,110
November, -------	38,843	-	-	38,843
TOTAL- 1942, ----	1,259,205	365,875	107,129	1,732,209

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

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

MONTH	HOLMAN CONCS.	BROWN CONCS.	NORTH STAR CONCS.	NORTH STAR DIRECT	TOTAL
April,	36,654	39,111	20,956	-	96,721
May,	137,577	54,009	13,006	-	204,592
June,	102,632	65,411	9,270	8,487	185,800
July,	111,488	43,253	32,639	3,506	190,886
August,	112,725	27,087	-	-	139,812
September,	148,212	-	-	-	148,212
October,	111,853	162	-	-	112,015
November,	26,905	-	-	-	26,905
TOTAL,	788,046	229,033	75,871	11,993	1,104,943

f. Ore Statement:

The washing plant stockpile, accumulated in 1941 and consisting of 43,579 tons of Holman Concentrates and 6,143 tons of Brown Concentrates, was shipped out prior to April 14th. During 1942 operations, a total of 157,315 tons of concentrates was stockpiled, made up of 146,335 tons of Holman ore and 10,980 tons of Brown ore. Of this amount, 30,793 tons of the Holman product were shipped, leaving a balance of 115,542 tons of Holman and 10,980 tons of Brown Concentrates, or a total of 126,522 tons.

g. Delays:

The following delays were reported during the year 1942:

Date	Time Lost Hours	Minutes	Cause:
April 14	3	-	Cleaning rock chute
	4	-	Symons crusher plugged. (Paintrock)
	1	-	Cleaning receiving bin
	1	-	Out of crude ore, shovel cable cut in pit.
15	3	30	Cleaning paintrock out of cone crusher hoppers.
	-	30	Repair air cylinder at rock pocket
16	1	-	Ore chute plugged
	2	50	No crude ore, slow loading in pit.
	1	25	Splicing 36" conveyor belt
20	2	-	Waiting for Great Northern empties
	-	45	Crusher screen rock chute plugged
	7	30	Repair 5 x 14 crusher screen
21	4	15	Repair 5 x 14 crusher screen
	1	30	Generator stopped - old log washer plugged
22	1	-	No Great Northern empties
23	2	-	Plugged with loads
24	2	30	Out of Great Northern empties

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YEAR 1942

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause:
April 27	-	30	Yards plugged with loads
May 1	-	30	Out of Great Northern empties
3	1	30	Rock stuck in pocket
	1	30	Oil pump broken on Symons crusher
	-	45	Out of Great Northern empties
4	-	45	Rock stuck in pocket
5	1	-	No crude ore, changing hoist cable on shovel
12	-	30	Power failure
13	1	30	Power failure
	-	45	No Great Northern empties
14	-	30	No Great Northern empties
15	-	30	No Great Northern empties
16	1	30	No Great Northern empties
18	-	20	No Great Northern empties
19	-	30	No Great Northern empties
	-	30	Change transverse spring on 5x14 screen
20	1	30	No Great Northern empties
21	1	-	Log washer plugged
	-	30	Rock stuck in screen pocket
22	1	15	Repairing 5 x 12 scalping screen
26	-	30	Cleaning loading track
27	-	40	No Great Northern empties
28	-	30	Cleaning loading track
	-	20	Rock stuck in crusher screen
29	4	45	Cleaning receiving bin and tailings pit
30	1	30	Cleaning under 36" conveyor and rock chute.
	-	20	Rock stuck in side plates on 8' pan conveyor.
	2	-	Repair side plates of 8' pan conveyor
	3	-	Running slow - paintrock plugging crushers
June 1	1	15	Drying and checking crusher motor
2	-	30	No Great Northern empties
3	1	-	No Great Northern empties
4	-	45	Repairing rock pocket
	-	30	Repair transverse on 5 x 14 screen
	2	-	Running slow due to electric storm
5	-	45	Repair transverse spring on 5 x 14 screen
9	-	45	Change transverse spring on 5 x 14 screen
10	-	30	No Great Northern empties
11	-	45	No Great Northern empties
	4	-	Running slow, power uncertain

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Time Lost Minutes	Cause:
June 13	3	-	Out of crude ore, moving shovels
16	1	-	No Great Northern empties
	-	45	Changing transverse spring on 5 x 14 screen
	-	30	No crude ore, derailment in pit.
	-	30	Change broken splicings on 36" conveyor
	-	30	Rock stuck in rock pocket
22	-	30	No Great Northern empties
25	-	30	Change transverse spring on 5 x 14 screen
	-	30	Change hanger in log screen
26	4	-	Running one side - Repair loading chute door and cleaning up ore, due to door failure
27	-	15	Yards plugged with loads
30	3	-	No crude ore- train derailment
July 2	3	-	No crude ore - trip motor trouble on both shovels
3	1	45	No Great Northern empties
4	5	-	No crude ore - train derailment
7	1	10	No Great Northern empties
10	1	-	No Great Northern empties
13	1	-	No Great Northern empties
14	3	35	No Great Northern empties
15	2	15	No Great Northern empties
16	4	-	No crude ore - train derailment
17	4	-	No crude ore - train derailment
	-	45	No electric power
18	-	45	No electric power
	1	45	Putting patch in conveyor belt
	2	-	No crude ore - moving shovels account storm drowning pumps
21	1	-	No Great Northern empties
23	1	30	Repair 8' pan conveyor
25	1	15	No Great Northern empties
	3	-	No crude ore, slow loading in pit
27	-	45	No Great Northern empties
31	2	-	No crude ore due to slow pit production
Aug. 6	-	30	No Great Northern empties
7	-	45	No Great Northern empties
	-	30	No power
11	1	-	No crude ore, moving shovels
13	-	50	Repair 8' pan conveyor
	-	20	No Great Northern empties

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Time Lost Minutes	Cause:
Aug. 14	9	-	Repair 8' pan conveyor
15	-	20	No Great Northern empties
25	4	-	Electric storm - no power
26	1	30	Moving shovel and blasting - digging out shovel and repairing plunger bar
	-	40	Rock chute plugged
27	1	40	Stocking truck breakdown.
	2	-	Moving shovels in pit
	1	30	Changing shovel cables on transformers
28	-	50	Changing shovel cables on transformers
	1	50	Moving shovels
31	2	-	Moving shovels and changing cable in transformers
	-	30	No Great Northern empties
Sept. 3	1	-	No Great Northern empties
4	-	30	No Great Northern empties
8	2	30	No crude ore, repairing power cable on #51 shovel
	1	40	No crude ore, repairing hoist on #51 shovel
9	-	40	No Great Northern empties
10	1	-	No crude ore, slow hauling in pit
11	1	-	No crude ore, moving shovels for grading
	1	-	No crude ore, casting rock in pit
16	2	30	No crude ore, repair latch plate and plunger bar on #51 shovel
17	-	45	36" conveyor stalled
	3	30	Cleaning up under 8' pan conveyor, due to wet material
	1	-	Hopper box above log washer plugged
18	1	-	No crude ore - moving shovel
	1	-	No crude ore - derailment
19	1	-	No crude ore - moving shovel for grading
22	1	-	Log washer plugged
23	3	-	Operations delayed due to storm
	1	-	No crude ore, changing hoist and trip cable on #51 shovel
24	1	-	Cleaning loading track at pit
	2	10	No Great Northern empties
28	2	-	No crude ore, derailment on haulage line
	2	-	No crude ore, moving shovels for grading

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Time Lost Minutes	Cause:
Oct. 1	2	-	No Great Northern empties
2	1	-	No crude ore, changing track under pit ramp
5	1	-	No crude ore, moving shovels and blasting
6	-	40	No crude ore, repair #32 shovel cable
8	1	30	No Great Northern empties
	1	-	No crude ore, slow loading in pit
9	-	30	No crude ore- loaded train stalled
13	2	-	No crude ore, slow loading in pit - putting new hoist cable on #32 shovel
	-	45	No Great Northern empties
14	-	40	Repairing 8' pan conveyor
15	1	-	Repairing 5 x 14 screen
	2	-	No Great Northern empties
20	2	-	Cleaning loading track at plant
	2	-	Slow washing, wet ore
21	2	-	No crude ore, broken cable on #32 shovel
	1	45	No crude ore, blasting and casting rock
22	-	45	No Great Northern empties
23	1	-	No crude ore, moving shovel in pit
	1	30	No crude ore, repairing saddle-back bolt on #51 shovel.
Total,	227	05	

The total delays amounted to practically 227 hours, which compares quite favorably with 336 hours for 1941, in which year the season was shorter by sixteen days. The hours lost through delays represents 6.02% of the total working time, of which 1.35% was attributable to a shortage of railroad cars, 2.15% to trouble in the pit and 2.52% to interruptions in washing plant operations. There was a decided improvement in the time lost due to a shortage of railroad cars, as arrangements had been made for stockpiling concentrates and plant operations were not interferred with so frequently on this account.

The time lost in the pit was practically the same for both years, but the greater number of days worked in 1942 made the percentage lower. The delays at the washing plant amounted to considerably more in 1942 because of several series of breakdowns and the longer season.

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3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Holman N.B. Concs.	468,987	56.91	.053	11.00	.39	.88	8.51	52.07
Holman Bess. Concs.	319,059	58.44	.034	10.69	.24	.58	7.35	54.14
Brown N.B. Concs.	114,781	57.80	.049	10.98	.24	1.07	9.76	52.16
Brown Bess. Concs.	114,252	58.68	.035	10.74	.20	.62	7.90	54.05
North Star N.B.Concs.	5,795	59.43	.041	9.10	.14	.65	7.12	55.20
North Star Bess.Concs.	70,076	60.88	.033	7.97	.15	.53	6.59	56.87
North Star N.B.Direct	3,933	57.19	.046	12.86	.12	1.09	9.14	51.96
North Star Bess.Direct	8,060	55.65	.030	15.46	.16	.85	9.64	50.29
TOTAL,	1,104,943	57.88	.044	10.72	.29	.76	8.12	53.18

b. Mine Analysis of Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Net.
Holman N.B. Concs.	397,024	57.23	.054	10.62	.37	.91	8.59	52.31
Holman Bess. Concs.	319,059	58.44	.034	10.69	.24	.58	7.35	54.14
Brown N.B. Concs.	109,944	57.83	.050	10.86	.25	1.03	9.71	52.21
Brown Bess. Concs.	114,252	58.68	.035	10.74	.20	.62	7.90	54.05
North Star N.B.Concs.	5,795	59.43	.041	9.10	.14	.65	7.12	55.20
North Star Bess.Concs.	70,076	60.88	.033	7.97	.15	.53	6.59	56.87
North Star N.B.Direct	3,933	57.19	.046	12.86	.12	1.09	9.14	51.96
North Star Bess.Direct	8,060	55.65	.030	15.46	.16	.85	9.64	50.29
TOTAL,	1,028,143	58.08	.044	10.54	.28	.76	8.11	53.37

c. Mine Analysis of Ore in Stockpile:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Holman N.B. Concs.	115,542	55.65	.054	12.40	.44	.77	8.02	51.19
Brown N.B. Concs.	10,980	56.56	.043	12.67	.23	.85	8.94	51.50
TOTAL,	126,522	55.73	.053	12.42	.42	.78	8.10	51.22

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3. ANALYSIS:
(Continued)

d. Average Analysis of Crude Ore Production:

	Tons	Iron	Phos.	Silica
Holman,	1,259,205	46.39	.038	27.97
Brown,	365,875	47.53	.036	26.87
North Star,	107,129	51.26	.030	22.03
TOTAL,	1,732,209	46.93	.037	27.37

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Holman N.B. Concs.	57.20	.055	10.60	.36	.96	.16	.22	.012	5.60
Holman Bess. Concs.	58.50	.033	10.65	.22	.56	.14	.18	.011	3.75
Brown N.B. Concs.	57.80	.048	10.90	.23	1.06	.16	.18	.012	4.60
Brown Bess. Concs.	58.60	.034	10.80	.18	.66	.14	.22	.011	4.05
North Star N.B.Concs.	59.40	.041	9.15	.13	.68	.16	.24	.013	4.55
North Star Bess.Concs.	60.90	.032	7.95	.14	.52	.18	.24	.012	3.75
North Star N.B.Direct	57.20	.044	12.80	.11	1.06	.18	.28	.016	3.65
North Star Bess.Direct	55.70	.030	15.40	.14	.82	.16	.26	.016	3.45

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:
Factors Used:
All Leases:

	WASH		LEAN WASH		LOW GRADE WASH	
	Cu.Ft. Per Ton	% Recovery	Cu.Ft. Per Ton	% Recovery	Cu.Ft. Per Ton	Recovery
North Star	14	63.12	15	47.22	14	60.46
Brown #1	14	55.17	15	49.35	14	55.97
Holman	14	60.27	15	48.37	14	58.83
Brown #2	14	59.02	15	47.68	14	58.41

	LEAN LOW GRADE WASH		ROCKY WASH	
	Cu.Ft. Per Ton	% Recovery	Cu.Ft. Per Ton	% Recovery
North Star	15	-	14	63.30
Brown #1	15	50.53	14	59.26
Holman	15	47.54	14	58.11
Brown #2	15	42.63	14	58.40

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4. ESTIMATE OF ORE RESERVES:

a. Developed Ore: (Continued)

	Reported 1-1-42	Mined 1942	Total	Developed by Drilling	Reserve 1-1-43
Bingham,	2,387,853	-	2,387,853	-	2,387,853
North Star,	411,122	87,864	323,258	473,991	797,249
Brown No. 1	372,189	155,617	216,572	457,640	674,212
Brown No. 2	2,356,398	73,418	2,282,980	545,420	2,828,400
Holman,	2,848,351	788,046	2,060,305	1,188,186	3,248,491
Total Holman-Brown -	5,576,938	1,017,081	4,559,857	2,191,246	6,751,103
GRAND TOTAL,	8,375,913	1,104,945	7,270,968	2,665,237	9,936,205

The above table of factors, upon which the tonnage estimates were based, shows a variation in the percentage of recovery for the several parcels of land in the Holman-Cliffs Mine. These percentages are based on the results of actual hand-wash tests of drill hole samples and are used individually in order to show, more accurately, the estimated tonnage for each parcel.

A 10% rock reduction was made for rocky wash ore. In all other cases the rock reduction is reflected in the percentage of recovery.

Retreat ore was estimated at 14 cubic feet per ton and the tonnage of concentrates was arrived at by taking 70% of the recovery realized from hand-wash tests.

The reserve estimate, as of January 1, 1943, is greater by 1,560,292 tons than that for January 1, 1942. This increase prevails after deducting the ore produced in 1942, which amounted to 1,104,945 tons, and is accounted for by the fact that 2,665,237 tons of additional ore was brought into the picture, as a result of recent drilling.

All of the parcels of land comprising the Holman-Cliffs Mine show an increase in ore reserve tonnage, excepting the Bingham, which remained unchanged.

New estimates, based on the latest drilling information, raised the ore tonnage in the North Star property 473,991 tons; in the Brown No. 1 - 457,640 tons; in the Brown No. 2 - 545,420 tons and in the Holman, 1,188,186 tons, or a total of 2,665,237 tons. Deducting the 1,104,945 tons of ore produced in 1942 leaves a net increase of 1,560,292 tons.

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5. LABOR & WAGES:

a. Comments:

(1) Labor:

Generally speaking, the supply of labor was adequate to maintain full crews in all operating units, although, toward the end of the year the situation became somewhat acute, due to the inroads made on manpower by the draft and to vacancies created by those who left to accept higher-paid jobs in defense work. It is anticipated that the shortage of manpower may be somewhat serious in the spring of 1943.

Labor organizers, who started agitation for the recognition of the CIO in 1941, continued their activities in to 1942. They finally secured the privilege of putting to a vote the question of what organization should be the bargaining agent for The Mesaba-Cliffs Mining Company employees. An election was held on March 13th and the result of the voting was very decisively in favor of the CIO.

Subsequent to the election, a number of conferences were held between Company officials and Union representatives for the purpose of working out a satisfactory contract. The final draft of such an instrument was mutually agreed to and the contract signed on May 13, 1942.

Relationship between the Company and its employees, under the union contract, has been very harmonious and quite satisfactory.

b. Comparative Statement of Wages & Product:

Production:	
Concentrates, and Direct Ore,	1,104,945 tons
Concentrates and Direct Shipped,	1,028,143 tons
Number of Shifts and Hours,	3 - 8-hour
Average Number of Men Working,	235
Average Wages Per Day,	$ 7.52
Product Per Man Per Day,	27.01 tons
Labor Cost Per Ton,	$ .279
Total Number of Days,	158
Amount Paid for Labor,	$307,767.08

6. SURFACE:

a. Buildings, Repairs:

General repairs were made on the houses in Taconite and the mine buildings received such attention as was necessary.

Decayed material in the foundation of the office was replaced and new skirting was put on. The roof was repaired and alterations

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)
made on the interior, including new plastering and redecorating.

The house repairs consisted of plastering and interior decorating; chimney and roof repairs; exterior painting; foundation replacements and plumbing installations.

The following statement shows the houses, by number, the occupants and the nature and cost of repairs:

No.	Occupant	Description of work done	Amount
11-	Peter Baril,	Plumbing and floor repairs	$ 65.94
12-	Malkolm Olson,	Plumbing and step repairs	8.28
13-	Frank Deaton,	Repair windows and doors, carpentry (storm Shed)	10.67
14-	William Ansley,	Interior painting; exterior and interior carpentry, repairs to floors and doors, plastering; electric wiring and plumbing repairs,	800.43
15-	Thomas Wivell,	Interior carpentry work; electric wiring; screens; plumbing; chimney and interior painting,	180.22
16-	William LeClair	Repair door,	1.23
37-	William Wirtanen,	Plumbing and floor repairs,	8.24
39-	A. W. Jenkins,	Chimney and plumbing,	30.23
40-	T. J. O'Brien,	Window repairs,	3.65
41-	George Beasley,	Interior carpentry work, repair floors, foundation and skirting, exterior painting, repair doors	502.25
42-	Mike Shipka,	Interior carpentry work, basement stairway; electric wiring; plastering; interior painting and repair doors,	136.17
43-	Frank Nikich,	Interior woodwork repairs; plumbing; interior carpentry, plastering,	99.93
45-	Edwin Gustason,	Repair windows, floors and door	10.59

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of work done	Amount
47-	Emil Camilli,	Plumbing repair, chimney, cellar steps and plastering,	$ 91.35
48-	William Hanson,	Repairs to plumbing and interior woodwork,	8.34
53-	Claude Winkleblack,	Stairs, doors, floors and window repairs; interior painting; plumbing and roof repairs,	458.05
55-	Raymond Deshaw,	Plumbing,	57.48
56-	Grant Hess,	Foundation and siding repairs; plumbing repairs; doors, exterior painting; plastering and carpentry,	628.48
57-	August Mergele,	Interior painting; door, carpentry (storm sash)	35.30
58-	Felix Cartier,	Inside carpenter and basement work; plastering; interior painting; exterior painting and plumbing,	395.11
59-	Russell Barkla,	Plumbing (water line break)	75.11
60-	W. F. LeClair,	New storm shed; plumbing repairs; exterior painting; steps,	102.96
61-	John Laine,	Interior carpentry work; interior painting,	151.42
62-	Joseph Dolezel,	Electric wiring,	.11
63-	Matt Dosser,	Carpentry; plastering; electric wiring and chimney repairs,	116.70
65-	Edwin Johnson,	Interior painting; foundation repairs,	123.55
67-	Pat Maney,	Plumbing repairs,	7.98
70-	Ambrose Hoey,	Carpentry work, doors; plastering, interior painting; plumbing repairs,	558.06

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of work done	Amount
71-	Otto Mangseth,	Interior carpentry; roof repairs; plastering; plumbing; electric wiring; interior painting; door repairs,	$ 1,025.88
72-	Frank Dionne,	Basement posts, doors; electric wiring; plastering; interior painting,	391.19
73-	George Dunstan,	Basement posts and carpenter work; plastering; interior painting; door repairs,	346.19
74-	William Laine,	Plastering, basement posts and interior woodwork; interior painting; plumbing repairs,	350.58
78-	Lucien Decoster,	Carpentry,	.20
79-	John Winkleblack,	Repairs to floors and doors,	56.72
80-	H. J. Stephens,	Plumbing repairs; new storm shed; exterior painting,	160.31
81-	Lloyd Wetherell,	Interior carpentry; plastering; interior painting; electric wiring; plumbing repairs,	923.37
97-	William Saw,	New back porch; plumbing repairs, exterior painting,	279.11
101-	Loy Kolar,	Carpentry (cellar steps) door and window repairs,	44.08
102-	Myron Youngberg,	Carpentry, doors and screens; plastering; interior painting; plumbing; electric wiring,	182.30
107-	G. R. Whittington,	Doors; screens; miscellaneous carpentry; storm sash; interior plumbing repairs; plastering,	324.84
116-	Carl Eggebraaten,	Floors, doors, etc.	16.75
155-	Geo. Sullivan,	Plumbing; interior woodwork; interior painting,	95.21

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6. SURFACE:
(Continued)

a. Buildings, Repairs: (Continued)

No.	Occupant	Description of work done	Amount
156-	Lee Farr,	Insulation - screens,	$ 25.75
158-	W. S. McComber,	Interior woodwork, doors, windows, interior painting,	102.30
4-	Charles Flynn,	Carpentry,	15.56
5-	Harry Hart,	Floors,	32.21
7-	Sam Kerkes,	Plumbing, interior woodwork, floors, doors, steps; storm doors,	287.59
		TOTAL COST OF REPAIR WORK - YEAR 1942----------	$ 9,351.24

c. Tracks, Roads, Transmission Lines, etc.

In the spring, and again in the fall, the main line tracks from the pit to the washing plant, were given necessary attention, in the way of replacements and lining up.

The pit truck haulage roads were well established in 1942, only necessary extensions were made to follow the progress of mining operations.

The transmission lines were extended to accommodate stripping operations on the North Star and Bingham properties and a feeder line was run down from the south bank to the center of the pit. Lines for lighting both the North Star and Bingham dumps were installed.

7. OPEN PIT:

a. Stripping:

The stripping program, inaugurated in the fall of 1941, was continued through the first three months of 1942 and into the first week in April; on a three shift, six-day-per-week schedule. Both the 3-1/4-yard Marion shovel and the 4-yard Bucyrus shovel were engaged in the removal of paint-rock, waste material and taconite from the pit bottom, in the vicinity of the Holman-Brown #2 line, until the 12th of January, when the 3-1/4-yard machine was moved to the stripping area on the south side of the pit, near the Holman-Brown #1 line. The 4-yard shovel continued working in the pit bottom until January 18th, when operations in this area were completed. This machine was also moved to the south side of the pit, to engage in surface stripping. Both of the shovels were engaged in the removal of surface, paint-rock and lean waste material, in this area, until March 8th, when the 120-B electric shovel was taken to the shop for repairs. The 3-1/4-yard machine continued stripping and clean-up work, until just prior to the opening of the ore season.

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7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

The major portion of the stripping program, on the south side of the pit, had been completed prior to the suspension of operations. However, a layer of paint-rock and a quantity of frozen material, under the roadway extending eastward on an old track bench, were left, with the intention of devoting week-ends to their removal during the ore season. This plan did not work out because heavy ore demands required six days per week operations and, as a result, a contract at 30 cents per yard was let to Zontelli Brothers of Crosby, Minnesota. The contractor started operations in the middle of June and had finished the job early in August. A total of 72,082 cubic yards of material was handled.

The stripping program set-up for the fall and winter months of 1942-43 included three areas, as follows: the North Star - Mt. Griffin area, estimated at 555,437 cubic yards; the north end of the Bingham property, estimated at 501,452 cubic yards - and the pit bottom, in the vicinity of the Holman-Brown #2 line, estimated at 143,111 cubic yards.

Upon the completion of the ore season, on November 6th, the 3-1/4-yard Marion shovel was moved to the Bingham and the 120-B Bucyrus machine was moved to the North Star, operations starting at both places on November 9th.

The Bingham stripping was started by a sinking cut from surface, on approximately an 8% grade, to serve as a truck road in to the pit. This was later dug out and was replaced by a more permanent grade, leading from the south side of the area. During the first two weeks, progress was slow, due to the fact that a layer of fine sand in the pit and soft roads from the pit to the dumps made the operation of the trucks very difficult. When the sand layer had been removed and the road surface became frozen, good haulage ways were maintained, with a resultant substantial improvement in the yardage handled. The stripping removed from the Bingham was hauled to a dump, approximately three quarters of a mile south of the property. The North Star stripping shovel started the first cut near the top of Mt. Griffin, and worked down in successive stages. A short haul was established by locating a dump on the east side of the hill and another on the north side. Only four trucks were required to handle the material. Operating conditions were generally good and the first lift had been completed and the second lift was well underway, by the first of the year.

The following table shows the yardages of material stripped, under the several classifications, for the various leases:

	SURFACE MATERIAL (Cu. Yds.)	WASTE ORE (Cu.Yds.)	ROCK Cu.Yds.)	TOTAL (Cu.Yds.)
Holman,	119,909	33,097		153,006
Brown #1,	201,817	31,308	-	233,125
Brown #2,	-	42,410	5,005	47,415
North Star,	291,106	-	-	291,106
Bingham,	208,804	-	-	208,804
TOTAL,	821,636	106,815	5,005	933,456

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7. OPEN PIT:
(Continued)

d. Timbering:

Statement of Railroad Ties Used:

	QUANTITY	PRICE	AMOUNT
Standard #1 Green Tamarack,	307	.95	291.77
Standard White Oak Ties,	30	1.11	32.97
Standard Oak Switch Sets, *	208	105.00	420.00
Total, ----------			744.74

(* 4 Sets)

Ties on Hand:

Standard #1 Green Tamarack,	1,737	.95	1,650.15
Standard White Oak,	358	1.11	397.38
Standard Oak Switch Sets,	-	-	-
Totals, ----------			$2,047.53

f. Explosives, Drilling & Blasting:

Statement of Explosives Used:

	QUANTITY	PRICE	AMOUNT
#6, 8' Electric Exploders,	200	$6.65	$ 13.30
12' Electric Exploders,	1,050	10.95	114.98
#6, 12' Electric Exploders,	500	7.65	38.25
#6, 24' Electric Exploders,	3,025	10.65	322.19
#6, 40' Electric Exploders,	1,840	19.65	361.56
#6 Blasting Caps,	1,400	1.22	17.08
#20 Connecting Wire,	183#	.55	100.65
Clover Fuse,	2,800'	.60	16.83
#2 Cap Crimpers,	2	1.00	2.00
Total Caps, etc.			$986.84
1-1/8 x 8 - 60% Straight Gel.	750#	14.00	105.00
1-1/8 x 8 - 60% Special Gel.	500#	11.50	57.50
7/8 x 8 - 40% R. C. Extra,	200#	10.88	21.75
1-1/8 x 8 - 70% Hi-Velocity,	750#	14.25	106.87
3 x 10 - 25% Quarry Gel.	50,350#	10.00	5,035.00
3 x 16 - 60% Spec. Gel.	3,100#	11.50	356.50
5 x 14 - 40% R. C. Extra,	6,000#	10.00	600.00
5 x 16 - 25% Quarry Gel.	157,050#	10.00	15,705.00
#4 R.C. Blasting Bags,	135,750#	10.00	13,575.00
Total Powder,			$35,562.62
TOTAL COST - ALL EXPLOSIVES,			$36,549.46

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7. OPEN PIT:
(Continued)

g. Open Pit Mining and Loading:

The 1942 operating season was started on April 14th, and continued through November 6th., with an interruption from October 23rd to November 2nd, due to freezing weather. A total of - 1,732,209 tons of crude ore was mined and treated, yielding - 1,092,950 tons of concentrates. In addition to the crude ore - 11,993 tons of North Star merchantable ore was loaded out.

Although the originally scheduled season's tonnage was exceeded, there were a number of factors that contributed to the slowing down of operations. The inadequate number of trucks available for the long haul, mostly on steep grades, caused considerable delay in the delivery of ore to the trains. This condition was relieved, to some extent, by the delivery of two new units in October. Water conditions in the bottom of the Holman-Brown #2 pit have always been severe and the maintenance of roadways in this area has been most difficult. As a result, the surface over which the trucks were required to move was very rough and necessitated slow traveling. The ore mined from the wet pit bottom and the painty material from the south bank had a tendency to stick to equipment and was difficult to handle. The necessity of mixing ores, especially for Bessemer grade, required the frequent moving of shovels from the Holman to the North Star-Brown #1 end of the pit, (approximately 2,000 feet) - and several hours were lost each time this was done. The combination of these factors resulted in a substantial loss in production.

Mining operations were conducted, principally, in three areas, - viz: the North Star-Brown #1 area at the extreme west end of the property; the Holman-Brown #2 pit bottom and the south bank, practically all on the Holman.

Some of the earlier mining was carried on at the east end of the Holman and onto the Brown #2, as it was desirable to have this ore removed in preparation for the lowering of the drainage sump. The excavation for the sump was started in June and was accomplished by taking a sinking cut in ore, on approximately an 8% grade, and carrying it to the limits of mining on the Brown #2 property. The depth attained was 35 feet below the then existent pit bottom.

Mining in the pit bottom was alternated between the east and west ends, depending on whether non-Bessemer or Bessemer ore was desired, the Bessemer ore being at the West end. Cuts were taken, generally, over the entire area and a total lift of 25 feet was removed during the season. A substantial quantity of rock was handled in mining the ore.

The south bank was attacked, both from the top and from the pit floor level. The ore from this section of the mine was low grade and was used only when grading conditions would permit. The occurrance of seams of rock and waste material made considerable sorting necessary.

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7. OPEN PIT: (Continued)

g. Open Pit Mining and Loading: (Continued)

The North Star-Brown #1 area is located in the northeast corner of the property and is narrow and deep. Access to the deposit is gained by a road, leading northward down a steep grade, on the east side of the pit and then turning sharply southward onto the mining level. The ore from the North Star was largely non-Bessemer; however, a small tonnage of Bessemer was produced. During the course of the season's operations, a small zone of enrichment was encountered and 11,993 tons of high silica merchantable ore was loaded out. The major portion of the Brown #1 ore was of Bessemer grade, but carried a fairly high silica. This material was used to mix with the lower silica Bessemer ore from the Holman.

k. Drainage:

Drainage of the Holman-Cliffs pit is accomplished by leading all of the flows of water into the main sump, and pumping it over the north bank. It has been the practice, during the past several years, to lower the sump by shovel cuts as the mining operations progressed. However, a depth has now been reached which exceeds the head for which the pumping equipment is designed and it has been decided to establish a permanent sump, in the location of the one used prior to 1942, and pump from the lower levels into this basin and from this point, through the pipe line, out of the pit. A new pump has been purchased for the second stage.

8. COST OF OPERATION:

a. Comparative Mining Costs:

	1942 BUDGET ESTIMATE	1942 COST PER TON	1941 COST PER TON
PRODUCT:			
Concentrates, (Tons)	1,010,101	1,092,950	989,669
Direct Ore (Tons)	-	11,993	-
Average Shift Production (Tons)	-	2,331	2,356
Tons Per Man Per Day,		27.01	29.35
Days Operated,		158	140
COST:			
Open Pit Wash Ore,	$.205	$.230	$.206
General Pit Expense,	.059	.074	.093
Concentrating,	.143	.162	.135
Stocking and Loading Concentrates,	.010	.012	.002
General Mine Expense,	.068	.066	.064
Idle and Winter Expense,	.110	.114	.111
Cost of Production,	$.595	$.658	$.611

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8. COST OF OPERATION: (Continued)

a. Comparative Mining Costs: (Continued)

	1942 BUDGET ESTIMATE	1942 COST PER TON	1941 COST PER TON
Depreciation- Plant & Equipment,	-	$.150	$.150
Depreciation- Motorized Equipment,	-	.013	.013
Amortization of Stripping,	-	.224	.350
Taxes - Ad Valorem,	-	.089	.090
Taxes - Occupational,	-	.100	.091
Taxes - Royalty,	-	.055	.034
Total Cost at Mine,	-	$1.289	$1.339
Administrative Expense,	-	.098	.100
Miscellaneous Expense & Income,	-	.004	.015
GRAND TOTAL, ----------	-	$1.391	$1.454

d. Detailed Cost Comparison:

(1) Product:

The average analysis of the concentrates produced in 1942, compares very favorably with that for 1941, there being only a slight difference. However, there was considerable difference in the quality of the crude ore loaded in the two years, especially in that from the Holman property, from which the major portion of the season's tonnage was mined. The ore taken from the Holman pit bottom was generally of good grade, but that from the south bank consisted, largely, of lean wash ore and painty material, which made the resultant mixture a somewhat poorer product than that handled in 1941. This is reflected in the substantially lower percentage of weight recovery and iron units recovery realized in 1942.

(2) Open Pit Mining:

The 1942 cost per ton was higher by $.025 and $.024 than the budget estimate and that for 1941, respectively, figured on a concentrated basis. Compared with the budget figure, the increase for 1942 is the accumulation of small differences in cost for the various items making up this account. The largest variation was in, "Trucks Operating", which amounted to $.005 and resulted from more difficult hauling conditions than were anticipated.

The increase of $.024 over the 1941 costs is accounted for, principally, in three items under this caption, namely: Power Shovels Operating, Trucks Operating and Trucks Maintenance. Power shovels Operating is $.004 higher on account of frequent moving and the necessity of loading more crude ore per ton of concentrates, because of the lower percentage of weight recovery. Trucks Operating shows an increase of $.015. The longer haul and the inadequate number of trucks was responsible for the rise in cost. The cost for Trucks Maintenance was $.019 over that for 1941, due to the fact that the

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

equipment was a year older and after the severe service during the ore season and on stripping operations, more repairs were necessary. The total increase for the three items amounted to $.038, but this was partially offset by decreases in the cost of Locomotives and Cars Operating and Locomotives and Cars Maintenance, which amounted to a total of $.019. A reapportionment of the length of haul, as between the pit and transportation to the mill, accounts for the decrease. The distance designated as, "Pit Haul", was made considerably shorter.

(3) General Pit Expenses:

The 1942 costs were higher than the budget estimate by $.015. The item, "Stocking Lean Materials", accounts for $.012 of the increase, as there was a substantial amount of this material disposed of during 1942 operations, which was not anticipated when the estimate was made. General Open Pit Expense shows an increase of $.005, due to the placing of several large charges to this account, which were not provided for. The 1942 cost is lower by $.019 than that for 1941. Pumping and Drainage accounts for $.014 of the decrease, as the rearranging and extension of the discharge pipe line and the transfer of the pumping equipment from the old sump to the new location in 1941 resulted in heavy charges to this item. Also, the volume of inflowing water in 1941 was much greater and required the service of a 7,000-gallon pump to handle it. This was not necessary in 1942.

The cost for Exploratory Drilling was less by $.032. The program undertaken in 1942 was less extensive than in the previous year.

The total decrease amounted to $.046, but this was partially offset by a total increase of $.027, reflected in four items. General Open Pit Expense was higher by $.008. Comparatively heavy charges for repairs to the office building, improvements in the truck repair shop, compensation for the mine guards and extensions of the telephone and power lines were carried in this item, and did not appear in 1941. The entire amount of $.012, under "Stocking Lean Materials", was extra in 1942, as there was no charge in 1941. Waste Pipe Expense shows an increase of $.006, as there was only a small amount charged in 1941. There was a nominal increase of $.001 for Open Pit Superintendent.

(4) Concentrating:

Compared with the budget estimate, the 1942 costs were higher by $.019. There was an increase of $.006 under "Transportation", due to the reapportionment of the length of haul in the pit and to the mill. The total for washing and power was higher by $.011, due to an unanticipated lower weight recovery and Maintenance - Building and Machinery was up $.002, on account of several major break-downs.

8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(4) Concentrating: (Continued)

There was an increase of $.027 in the 1942 costs, as compared to those for 1941. The reapportionment of the haulage distance as between the pit and to the mill accounts for $.022 of this, under "Transportation". Maintenance - Building and Machinery, was higher by $.006, as the result of break-downs on several of the larger machines.

(5) General Mine Expense:

The 1942 cost exceeded that for 1941 by $.002 and was lower, by the same amount, than the budget estimate. In both cases, the differences are the result of the accumulation of nominal variations in costs for the several items under this heading.

(6) Idle and Winter Expense:

There was an increase of $.004 and $.003 over the budget and 1941 costs, respectively. The repairs to both the pit and washing plant equipment were heavier than in 1941 and those anticipated in the budget estimate.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

Exploration work in 1942 consisted in putting down 44 holes, totaling 7,483 feet. The major portion of the drilling was done in the Holman-Brown #2 pit bottom (present operating area), and in the old Brown #2 pit, to the east. The work done in the Holman-Brown #2 pit bottom was in the nature of sample drilling; the results of which were to be used for guidance of immediate mining operations. That done in the old Brown #2 pit was strictly exploratory drilling, for the purpose of determining the eastern limits of the ore body on this property. In addition to the above, two holes were drilled in the North Star open pit area; nine holes were put down on the North Star property, north of the approach, to check the possible extension of ore pockets there, and three holes were drilled northeast of Mt. Griffin, to determine whether or not the ground might be used for dumping purposes.

Exploration in 1943 will be less extensive than in 1942. It is intended to complete the drilling in the old Brown #2 pit, requiring approximately five holes. The area being stripped on the Bingham property will require the drilling of several holes to more accurately disclose the character of ore to be mined and several holes will be put down on the approach bench, to check the possible occurrence of ore in that area.

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10. TAXES:

The following statement shows the Holman-Cliffs Mine taxes and the average rates for the years 1941 and 1942:

	1942	1941	Increase	Decrease
Holman-Brown Mine,	$72,468.62	55,319.43	17,149.19	
Bingham Mine,	17,239.53	16,824.00	415.53	
North Star Mine,	1,666.80	10,106.40	-	8,439.60
Holman-Cliffs Aux.Lands,	2,091.38	1,996.04	95.34	-
Bingham-North Star Wash. Plant Lands,	48.64	46.24	2.40	-
Holman-Brown Lands,	24.84	23.60	1.24	-
Holman-Cliffs Shops and Office,	252.20	238.38	13.82	
Holman-Cliffs Personal Property,	3,894.21	3,955.94	-	61.73
Total, -	$97,686.22	88,510.03	9,176.19	-
Rented Buildings,	875.99	856.75	19.24	-
GRAND TOTAL,	$98,562.21	89,366.78	9,195.43	-
Average Tax Rate,	95.55	93.16	2.39	

The increase in the Holman-Brown taxes for 1942, as compared to 1941, is accounted for by the fact that a new reserve estimate was made, which brought more tonnage into the picture. The taxes on the Bingham property are higher as a result of an increased tax rate. The lesser amount paid for North Star taxes is due to the deduction of the tonnage shipped.

The average tax rate in 1942 was lower by 2.39, than in 1941.

11. ACCIDENTS AND PERSONAL INJURY

The following list describes the seven lost-time accidents which occurred at the Holman-Cliffs Mine during 1942:

NAME: William Voight DATE: February 28th.
CAUSE: While truck #33 was standing, loaded and stalled, due to mechanical breakdown, on haulage road at foot of grade approach to waste material dumps, William Voight, driving truck No. 41, loaded and on the way to the dump, blinded by the sun's rays shining directly down the road and consequently unable to see the truck, rammed into the rear of truck No. 33, crushing in the cab of truck No. 41 on the drivers side, with the resulting injury and damage.
NATURE: Contusion of right thigh, laceration and contusion of left knee.
TIME LOST: Returned to work April 10th, 1942.
COMPENSATION: $116.67.

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: Nick Hecimovich DATE: March 10th.
CAUSE: While he was making a powder charge hole under a large chunk of frozen surface material, for the purpose of blasting it into smaller fragments, a piece of the frozen surface material broke loose and fell upon his leg.
NATURE: Contusion right knee and strain and contusion of right foot.
TIME LOST: Returned to work March 16th, 1942.
COMPENSATION: None

NAME: Ray A. Barcus DATE: May 12th.
CAUSE: He was trying to straighten out a steel cable. He hit it with a short piece of rail and as he hit the cable, the rail glanced off and hit him on the knuckles of his left hand.
NATURE: Lacerations on left hand and fracture of little finger and ring finger of left hand.
TIME LOST: Returned to work June 29th, 1942.
COMPENSATION: $136.67.

NAME: Alfred E. Johnson DATE: June 8th.
CAUSE: He was cranking a gas engine on a water pump, the motor back-fired and caused the crank to kick back against his right hand.
NATURE: Contusion and sprain of right wrist- Fracture of terminal third of right radius.
TIME LOST: Returned to work June 30, 1942.
COMPENSATION: $43.33.

NAME: Chester A. Lee DATE: July 18th.
CAUSE: A tractor was being used to pull loaded trucks up a steep road grade. After having unhooked the cable from the tractor, Lee stepped to one side and as the tractor turned around, the blade on the bull-dozer hit his right leg.
NATURE: Contusion and sprain of right ankle.
TIME LOST: Returned to work August 3rd.
COMPENSATION: $19.33.

NAME: Axel Hendrickson DATE: August 17th.
CAUSE: While mowing lawn, slipped on wet grass and fell on right side against table on the lawn.
NATURE: Fracture of tenth rib, right side.
TIME LOST: Returned to work August 31st.
COMPENSATION: $19.33.

NAME: William J. Davey DATE: December 25th.
CAUSE: Possibly leaking gasket in exhaust line.
NATURE: Doctor non-commital on nature of injury.
TIME LOST: Returned to work December 31st.
COMPENSATION: None.

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12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

There was no new construction in 1942.

In order to provide facilities for the more efficient handling of electrical repairs, it is proposed to build an addition on the north end of the present machine shop building to serve as electrician's quarters.

Plans have been made for the construction of a truck repair shop. The present arrangement, in the old round house, has proven unsuitable for the purpose.

The proposal to move the washing plant from its present location to the edge of the pit, is still being discussed, but no definite decision has been reached.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

The following equipment was acquired at the Holman-Cliffs Mine during 1942: five new Euclid trucks; two second-hand Euclid trucks; one second-hand pick-up truck.

The need of a portable, gasoline engine driven, electric welding machine has been recognized for some time and a unit of this kind will be purchased.

As replacements for some of the older machines, two Euclid trucks will be required.

The present four-yard 120-B electric shovel, having been in continuous service for thirteen years, it is deemed advisable to make plans for the purchase of a new one.

A new tractor and road patrol are other pieces of equipment that will be required in the near future.

14. MAINTENANCE AND REPAIRS:

The general overhauling of the locomotives and cars was done at the Hill-Trumbull shops, as the facilities at the local shops were required for regular maintenance work in connection with stripping operations and for washing plant repairs. The Euclid trucks were sent in for overhauling, from time to time, as opportunity offered.

The two electric shovels were removed from stripping operations, one at a time, and taken to the shops for a general overhauling. Washing plant repairs were carried on during January, February and March and again in November and December. All of the machines were opened up for inspection and such repairs and replacements, as were necessary, were made. The liners in chutes and pockets, which were worn out, were replaced by new material.

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18. NATIONALITY OF EMPLOYEES:

Nationality:	Number of Men.
American,	197
Finnish,	8
Jugo-Slav,	6
Italian,	4
Swedish,	4
Canadian,	4
Norwegian,	4
Austrian,	3
Bulgarian,	1
Croatian,	1
German,	1
Greek,	1
Montenegran,	1
Total,	235

19. WASHING PLANT OPERATIONS:

The Holman-Cliffs washing plant was operated from April 14th, to November 6th, inclusive, making a total of 158 days, or 471 shifts. A basic schedule of three shifts, five days per week was adopted; however, it was necessary to work week-ends, on numerous occasions, to meet the demands for ore. A total of 1,732,209 tons of crude ore was treated, producing 1,092,950 tons of concentrates. Of this total production, 966,428 tons were shipped and - 126,522 tons remained in stockpile.

Generally speaking, the operations were quite satisfactory, although production was slowed down at times on account of treating lean ore and wet, sticky material. Several major breakdowns resulted in considerable loss of time during the season.

The shortage of Great Northern railroad cars was again quite serious and would have materially effected production had not stocking facilities been provided. Trucks were used to transport the concentrates from the loading pocket at the plant to the stocking grounds. This worked very well, except that it was necessary to use some of the equipment from the mine and this resulted in a reduction of the tonnage of crude ore produced. During the season - 157,315 tons of concentrates were stocked, but of this amount, 30,793 tons were shipped before the close of navigation, leaving a total of 126,522 tons.

The average daily production amounted to 6,917 tons, or 2,306 tons per shift, as compared with 7,068 tons per day and 2,356 tons per shift in 1941. The decreased production per day and per shift is accounted for by the lower percentage of weight recovery realized in 1942.

HOLMAN-CLIFFS MINE
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19. WASHING PLANT OPERATIONS: (Continued)

The tonnage and analysis of the plant rejects for 1942 were as follows:

5 x 14 Screen Rejects:

Lease	Tons	Iron	Phos.	Silica
Holman	59,445	30.36	.036	50.39
Brown	17,115	31.07	.033	49.62
North Star	7,213	33.25	.028	46.67
Total	83,773	30.75	.035	49.91

36" Belt Rejects

	Tons	Iron	Phos.	Silica
Holman	5,788	28.91	.037	52.42
Brown	1,738	29.55	.036	51.90
North Star	518	31.86	.028	48.37
Total	8,044	29.24	.036	52.05

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

Lease	Tons	Iron
Holman	54,885	31.23
Brown	7,575	35.39
North Star	8,610	33.81
Total	71,070	31.98

The analysis of the product from the various machines for the year 1942 were as follows:

	Iron	Phos.	Silica
HOLMAN MILL MACHINES:			
Log Washer	58.01	.048	10.15
Classifier,	57.41	.042	11.40
Tailings,	23.41	-	-
BROWN MILL MACHINES:			
Log Washer	58.38	.046	10.14
Classifier	57.86	.041	11.26
Tailings	23.39		
NORTH STAR MILL MACHINES:			
Log Washer	60.53	.037	7.88
Classifier	60.68	.032	8.44
Tailings	24.02	-	-

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19. WASHING PLANT OPERATIONS: (Continued)

The concentrating data for the Holman-Cliffs Mine for the year 1942, was as follows:

	Tonnage	Percentage of Total Mined	Per Cent. Iron Dried	Recovery Tonnage	Iron Unit Recovery
Crude Ore and Rock Mined,	1,887,052	100.00	45.65		
Less: Rock removed in Mining	71,070	3.77	31.98		
Crude Ore transported to Mill	1,815,982	96.23	46.18		
Less: Rock rejects in Crusher House,	83,773	4.44	30.76		
Crude Ore Entering Mill,	1,732,209	91.79	46.94		
Concentrates produced -	1,092,950	57.92	57.90	63.09	77.83
Rock rejects on mill picking belt,	8,044	.42	29.24		
Tailings (by deduction)	631,215	33.45	28.17		
Total Heads - as above,	1,732,209	91.79	46.94		

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1. GENERAL:

Repair work at the shops and washing plant was continued from the first of the year until the first week in April. A schedule of one shift per day, five days per week, was maintained.

Holman-Cliffs locomotives Nos. 104, 105 and 106 were given a thorough overhauling, the work on the Hill-Trumbull 30-yard cars was completed and necessary repairs were made on eleven Holman-Cliffs 30-yard cars.

General repairs were made on the 120-B four-yard electric shovel #35 and also on the two-yard electric shovel #47.

Washing plant repairs were of a general nature. The machines were opened up for inspection and worn and broken parts were reconditioned, or replaced, as necessary.

Two new Akins classifiers were received and installed in the washing plant. Material for the new heavy density plant was unloaded and stored as it came forward. Steel erection for this plant was started on June 22nd and the first ore was treated in this unit on October 9th.

The tunnel, fills and foundations for the pit conveyor system were completed in March and April and the equipment was installed and ready for operation by the middle of July.

The necessary roads, leading to the screening plant of the conveyor system, were prepared during the spring and early summer months and the approach tracks were removed as soon as the belt was ready for the handling of ore.

The 1942 ore shipments were started on March 19th, with the loading of concentrates from the washing plant stockpile. This material was from 1941 washing operations and amounted to 39,527 tons.

Actual mining operations were begun on April 13th and continued through November 6th. The mining program was conducted on a basic schedule of three 8-hour shifts, five days per week. However, it was necessary to work practically every week-end, in order to meet the heavy demands of the ore schedule and to load direct ore without interfering with wash ore operations.

The washing plant was operated 162 days, producing 1,143,043 tons of concentrates, (including the cone plant product) in the treatment of 1,848,318 tons of crude ore. The daily average production of concentrates amounted to 7,055 tons. Due to a shortage of railroad cars, it was necessary to place 258,102 tons of concentrates in stockpile, of which, 61,665 tons were loaded out before the close of navigation, leaving a remainder of 196,437 tons.

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1. GENERAL: (Continued)

The loading of direct shipping ore was a minor activity in 1942 and a comparatively small tonnage was produced. The entire operation consisted in scramming the ore from among the rock horses in the east end of the Hill pit and the resultant tonnage was necessarily low. A total of 80,070 tons of direct ore was produced on 30 shifts, making an average output of 2,669 tons per shift.

Stripping operations were started immediately after the completion of the ore season. A small yardage was removed from the extreme west end of the Trumbull pit and a more extensive operation was undertaken in the approach area of the East Trumbull forty. In addition to the above, a rock removal program was conducted in the ore areas at the bottom of the Hill pit.

Exploration work was carried on throughout the year 1942. This was accomplished by the use of one Company structure drilling outfit and by two machines, under contract, during the first half of the year; and by one such during the last half. The major portion of the work was done on the west half of the East Trumbull forty, but holes were also put down in the vicinity of the old approach in the central part of the Hill pit bottom and on the north bank of the pit.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Hill Crude,	877,399	tons
Trumbull Crude,	958,384	"
TOTAL CRUDE ORE,	1,835,783	"
Hill Cone Crude,	3,342	"
Trumbull Cone Crude,	9,193	"
TOTAL CONE CRUDE,	12,535	"
Hill-Non-Bessemer Direct Shipping Ore,	70,351	"
Hill Bessemer Direct Shipping Ore,	9,719	"
Hill Non-Bessemer Concentrates,	274,119	"
Hill Bessemer Concentrates,	262,301	"
Hill Non-Bessemer Cone Concentrates,	1,593	"
Trumbull Non-Bessemer Concentrates,	473.191	"
Trumbull Bessemer Concentrates,	127,875	"
Trumbull Non-Bessemer Cone Concentrates,	3,964	"
TOTAL 1942 PRODUCTION,	1,223,113	"

b. Shipments:

The shipments from the Hill-Trumbull Mine during 1942 were as follows:

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Shipments: (Continued)

Hill-Non-Bessemer Direct Shipping Ore, ----------	70,351	tons
Hill Bessemer Direct Shipping Ore, ----------	9,719	"
Hill Non-Bessemer Concentrates, ----------	206,088	"
Hill Bessemer Concentrates, ----------	262,301	"
Hill Non-Bessemer Cone Concentrates, ----------	1,593	"
Trumbull Non-Bessemer Concentrates, ----------	375,890	"
Trumbull Bessemer Concentrates, ----------	127,875	"
Trumbull Non-Bessemer Cone Concentrates, ----------	3,964	"
TOTAL 1942 SHIPMENTS, ----------	1,057,781	"

c. Stockpile Inventories:

As of January 1st, 1942, there remained in stockpile 3,196 tons of Hill concentrates and 36,331 tons of Trumbull concentrates, or a total of 39,527 tons. This material was all loaded out by April 4th.

During the 1942 ore operations, 85,311 tons of Hill concentrates and 172,791 tons of Trumbull concentrates were placed in stockpile, making a total of 258,102 tons. Prior to the close of navigation, a total of 61,665 tons was shipped from stockpile - made up of 17,007 tons of Hill ore and 44,658 tons of Trumbull ore. The material remaining in stock as of December 31, 1942 consisted of 68,304 tons of Hill concentrates and 128,133 tons of Trumbull concentrates, or a total of 196,437 tons.

The following statement shows the quantities of lean material in stock as of December 31st, 1942:

	Tons	Iron	Phos.	Silica
Concentrating Material Above 25%:				
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%:				
Hill,	142,833	48.50	.081	21.90
Coarse Non-Concentrating Material Above 40%:				
Hill,	7,527	33.23	.028	43.33

e. Production by Months:

(1) Crude Ore:

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

e. Production by Months: (Continued)

(1) Crude Ore: (Continued)

MONTH	HILL	HILL CONE	TRUMBULL	TRUMBULL CONE	TOTAL
April,	136,728				136,728
May,	145,309		120,844		266,153
June,	97,293		166,966		264,259
July,	228,308		102,422		330,730
August,	217,728		72,457		290,185
September,	49,183		248,350		297,533
October,		3,342	204,370	9,193	216,905
November,	2,850		42,975		45,825
TOTAL 1942,	877,399	3,342	958,384	9,193	1,848,318

(2) Concentrates & Direct Ore:

	HILL DIRECT	HILL CONCTS.	HILL CONE CONTS.	TRUMBULL CONCS.	TRUMBULL CONE CONCS.	TOTAL
April,	2,303	89,037		5,499		96,839
May,	30,300	92,132		70,746		193,178
June,	6,599	65,485		107,571		179,655
July,	5,499	133,864		65,272		204,635
August,	22,315	125,944		46,950		195,209
September,	11,094	28,330		153,797		193,221
October,	1,960		1,593	123,403	3,964	130,920
November,		1,628		27,828		29,456
TOTAL,	80,070	536,420	1,593	601,066	3,964	1,223,113

f. Ore Statement:

There is in stockpile, December 31, 1942, - 128,133 tons of Trumbull concentrates and 68,304 tons of Hill concentrates.

g. Delays:

The following delays were reported during the year 1942:

Date	Time Lost Hours	Time Lost Minutes	Cause.
April 15	2	30	Rock chute plugged
16	2	45	No crude ore, sorting rock in pit
17	6	-	No crude ore, sorting rock in pit. Broken center pin No. 35 shovel.
20	-	30	Repairing motor on 36" conveyor
		30	Splicing 36" conveyor
		45	Log washer plugged. Rock chute plugged.
21	-	30	Broken spring on 5' x 14' screen
	3	40	No crude ore, sorting rock in pit.
22	4	30	No crude ore, sorting rock in pit.

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause
April 23	-	45	Broken spring on 5' x 14' screen.
24	2	-	No crude ore, sorting rock in pit
28	1	-	Rock chute plugged
29	2	-	No crude ore, power cable on #34 shovel broken
30	4	-	No crude ore, sorting rock in pit
May 1	1	-	Minnesota Power & Light Co. power failure.
4	5	-	No crude ore, sorting rock in pit
5	3	-	No crude ore, sorting rock in pit
	-	45	Minnesota Power & Light Co. power failure
6	2	-	No crude ore, sorting rock in pit
12	-	30	Minnesota Power & Light Co. power failure
13	-	35	Minnesota Power & Light Co. power failure
14	3	-	No crude ore, sorting rock in pit
15	1	-	No crude ore, sorting rock in pit
	1	-	Repairing rock gun
16	1	-	No crude ore, sorting rock in pit
20	-	50	Electrical repairs 5' pan conveyor
	2	-	No crude ore, sorting rock in pit
21	3	-	No crude ore, sorting rock in pit
25	-	30	Replacing spring on 5' x 14' screen
27	2	-	No crude ore, repairing shovel cable anchor.
28	-	30	Repairing rock gun
30	2	-	No crude ore, repairing shovel sway brace and friction band
June 1	-	30	Broken spring on 5' x 14' screen
	1	15	No crude ore, repairing #47 shovel
2	1	-	No crude ore, sorting rock in pit
3	1	-	No crude ore, sorting rock in pit
	1	45	Rock gun and stacker belt repairs
4	2	30	No crude ore, sorting rock in pit
5	2	-	No crude ore, sorting rock in pit
8	3	-	No crude ore, sorting rock in pit and repairing #47 shovel.
9	2	-	No crude ore, sorting rock in pit and repairing #35 shovel.
10	2	-	No crude ore, sorting rock in pit
11	1	-	No crude ore, sorting rock in pit
12	1	-	No crude ore, sorting rock in pit
13	1	-	No crude ore, sorting rock in pit
16	1	-	No crude ore, sorting rock in pit
18	-	30	Repairing rock gun

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause.
July 1	1	-	No crude ore, sorting rock in pit
3	1	-	No crude ore, sorting rock in pit
6	2	40	Repairing hinges on 8' pan conveyor
7	1	-	Repairing relay on #47 shovel
8	2	-	No crude ore, sorting rock in pit
9	1	30	Repairing friction band on #47 shovel
	1	30	No power, connecting conveyor system
11	1	30	Changing hoist cable on #34 shovel
15	1	30	No crude ore, sorting rock in pit
16	1	-	Repairing brake bands and hoist cable - #47 shovel
17	1	45	Logs plugged, Minnesota Power & Light Co. failure
20	1	-	Repairs to picking belt drive
21	1	30	Logs plugged, Minnesota Power & Light Co. failure
23	1	-	Splicing belt to crushers
24	1	15	Changing pinion on picking belt motor
31	-	30	Repairing spring on 5' x 14' screen
Aug. 5	2	30	36" conveyor tail pulley, pit flooded
6	-	30	Repairing spring on 5' x 14' screen
12	1	30	Repairing pan on 8' conveyor
13	1	-	No crude ore, moving shovels
15	1	-	Welding pan on 8' conveyor
19	-	30	Changing roller on 36" conveyor
	1	-	No crude ore, sorting rock in pit
20	2	-	No crude ore, sorting rock in pit
21	2	30	No crude ore, sorting rock in pit
25	1	30	No crude ore, sorting rock in pit
26	2	-	No crude ore, sorting rock in pit
28	2	-	No crude ore, shovel power cable repairs
29	2	-	No crude ore, sorting rock in pit
Sept. 3	2	-	Bearing repair, pit conveyor motor
5	1	-	No crude ore, sorting rock in pit
6	1	-	No crude ore, sorting rock in pit
8	1	-	No crude ore, sorting rock in pit
9	1	-	No crude ore, sorting rock in pit
10	-	30	Welding on 8' pan conveyor
11	1	30	No crude ore, changing hoist cable #35 shovel
14	1	-	Changing spring on 5' x 14' screen
15	1	-	No crude ore, sorting rock in pit
17	1	30	Power trouble, transfer belt motor

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2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

g. Delays: (Continued)

Date	Time Lost Hours	Minutes	Cause.
Sept. 21	1	30	No crude ore, changing hoist cable No.34 shovel.
Oct. 3	1	-	Replacing wire cloth on 5' x 14' screen
6	1	-	Welding hinge on 8' pan
9	1	-	No crude ore, derailment
14	1	-	Splicing picking belt
	-	55	Changing spring on 5' x 14' screen
16	1	30	Running slow, south crusher plugged
19	2	-	Washing slow, wet ore
21	2	-	Washing slow, wet ore
23	2	-	Washing slow, wet ore freezing on belts
Nov. 3	1	-	Levelling stockpile
5	2	50	No Great Northern empties, too cold to stock.
6	2	45	No Great Northern empties, too cold to stock.

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3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess.Direct,	70,351	58.57	.061	11.45	.16	.99	8.38	53.66
Hill Bessemer Direct,	9,719	57.16	.046	13.25	.16	1.05	7.62	52.80
Hill Non-Bess.Concs.	274,119	60.44	.050	9.44	.10	.51	6.27	56.65
Hill Bessemer Concs.	262,301	59.97	.036	10.52	.10	.54	6.41	56.13
Hill Non-Bess.Cone Concs.	1,593	54.73	.046	14.41	.10	.39	5.01	51.99
Trumbull Non-Bess.Concs.	473,191	58.19	.048	8.40	.12	.46	6.56	54.37
Trumbull Bess. Concs.	127,875	58.24	.044	8.38	.12	.45	6.97	54.18
Trumbull Non-Bess. Cone Concts.	3,964	57.17	.048	10.95	.11	.45	5.33	54.12
Total, ----------	1,223,113	59.09	.046	9.32	.11	.52	6.61	55.18

b. Mine Analysis of Shipments:

Hill Non-Bess. Direct,	70,351	58.57	.061	11.45	.16	.99	8.38	53.66
Hill Bess. Direct,	9,719	57.16	.046	13.25	.16	1.05	7.62	52.80
Hill Non-Bess.Concs.	206,088	60.86	.044	8.85	.11	.51	6.32	57.01
Hill Bess. Concts.	262,301	59.97	.036	10.52	.10	.54	6.41	56.13
Hill Non-Bess.Cone Concs.	1,593	54.73	.046	14.41	.10	.39	5.01	51.99
Trumbull Non-Bess.Concs.	375,890	58.39	.048	8.17	.12	.46	6.68	54.49
Trumbull Bess. Concts.	127,875	58.24	.044	8.38	.12	.45	6.97	54.18
Trumbull Non-Bess. Cone Concts.	3,964	57.17	.048	10.95	.11	.45	5.33	54.12
Total, ----------	1,057,781	59.24	.045	9.19	.13	.53	6.69	55.27

c. Mine Analysis of Ore in Stockpile December 31, 1942:

Hill Concentrates,	68,304	59.16	.039	11.21	.10	.51	6.12	55.54
Trumbull Concentrates,	128,133	57.89	.047	8.62	.12	.44	6.34	54.22
Total, ----------	196,437	58.33	.044	9.52	.11	.46	6.26	54.68

d. Average Analysis of Crude Ore Production:

Hill Crude,	877,399	46.60	.033	29.88
Trumbull Crude,	958,384	43.44	.037	31.88
Total, ----------	1,835,783	44.95	.035	30.92
Hill Cone Crude,	3,342	35.46	.037	44.27
Trumbull Cone Crude,	9,193	36.24	.034	43.92
Total Cone Crude,	12,535	36.03	.035	44.01

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Hill Non-Bess. Direct,	58.60	.063	11.40	.14	1.04	.16	.24	.012	3.05
Hill Bess.Direct	57.10	.044	13.30	.15	1.08	.18	.22	.012	3.25
Hill Non-Bess. Concts.	60.90	.043	8.80	.10	.48	.14	.20	.010	3.10

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3. ANALYSIS:
(Continued)

e. Composite Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Hill Bess.Concs.	60.00	.035	10.50	.10	.52	.16	.18	.010	2.65
Hill Non-Bess. Cone Concs.	54.70	.046	14.45	.10	.42	.18	.22	.011	6.30
Trumbull Non-Bess.Concts.	58.40	.046	8.20	.11	.44	.14	.20	.010	7.25
Trumbull Bess. Concts.	58.20	.044	8.40	.11	.42	.16	.22	.011	7.35
Trumbull Non-Bess. Cone Concs.	57.20	.048	10.95	.10	.42	.14	.20	.010	6.35

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. 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, 1942, the ore mined during 1942 and the ore reserve estimated as of January 1st, 1943:

	REPORTED JAN. 1,1942	MINED 1942	RESERVE JAN.1-1943
Trumbull Mine:			
NE¼-SE¼, Sec. 18,	12,779	-	12,779
NW¼-SW¼, Sec. 17,	1,554,286	441,895	1,112,391
NE¼-SW¼, Sec. 17,	2,035,988	163,135	1,872,853
TOTAL TRUMBULL,	3,603,053	605,030	2,998,023

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4. ESTIMATE OF ORE RESERVES: (Continued)

a. Developed Ore: (Continued)

	REPORTED JAN. 1,1942	MINED 1942	RESERVE JAN.1-1943
Hill Mine:			
SE¼-NW¼, Sec.17,	625,400	126,311	499,089
SW¼-NE¼, Sec.17,	739,229	165,972	573,257
SE¼-NE¼, Sec.17,	944,373	325,800	618,573
TOTAL HILL,	2,309,002	618,083	1,690,919
GRAND TOTAL - HILL-TRUMBULL MINE,	5,912,055	1,223,113	4,688,942

The ore reserve figures,as of January 1st, 1942,were reduced by the amount mined during the 1942 ore season and no other adjustments were made to establish the reserve as of January 1st, 1943.

Complete information on the results of the drilling done during 1942 was not available at the end of the year; however, it is quite apparent that the general effect will be an increase in the total reserve for the property.

In the Hill section of the mine, drilling and actual mining operations disclosed that the ore body was not a continuous layer across the pit, but rather a number of pockets, lying between horses of rock. This condition resulted in a reduction in the tonnage which had been expected in this area. On the other hand, exploratory work on the East Trumbull forty indicates that there will be a substantial increase over the tonnage estimated for this area last year, with a resultant increase in the total tonnage for the entire property.

b. Prospective Ore:

A program of structure drilling has been underway in the area on the north side of the Hill pit but, to date, no conclusive results have been obtained. Enough work has been done, however, to demonstrate that the ore deposit will not be very extensive.

c. Estimated Analysis:

Lease Grade	Tons	Iron	Phos.	Silica
Hill:				
Bessemer Direct,	23,952	59.11	.037	10.94
Non-Bessemer Direct,	278,395	60.24	.063	9.07
Bessemer Concentrates,	756,805	60.76	.031	9.75
Non-Bessemer Concentrates,	631,767	58.95	.054	7.87

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4. ESTIMATE OF ORE RESERVES: (Continued)

c. Estimated Analysis: (Continued)

Lease — Grade	Tons	Iron	Phos.	Silica
Trumbull:				
Bessemer Concentrates,	925,238	58.23	.037	8.67
Non-Bessemer Concentrates,	2,072,785	59.30	.053	7.38
TOTAL DIRECT, -	302,347	60.15	.061	9.22
Total Bessemer Concentrates,	1,682,043	59.37	.034	9.16
Total Non-Bessemer Concentrates,	2,704,552	59.22	.053	7.49
TOTAL CONCENTRATES,	4,386,595	59.28	.046	8.13
Total Bessemer,	1,705,995	59.36	.034	9.17
Total Non-Bessemer,	2,982,947	59.31	.054	7.65
GRAND TOTAL HILL-TRUMBULL MINE,	4,688,942	59.33	.047	8.20

The above table was prepared by making adjustments in the 1941 figures, for the ore mined in 1942. Due to the extensive mining program carried on in 1941 and 1942, more of the better class of ore was consumed than would have been the case under ordinary conditions; also in some parts of the property the quantity and quality of the ore did not come up to expectation. As a result, the reserve ore will be of a somewhat lower grade than the table indicates and a new estimate, now being prepared, based on the results of mining operations and extensive exploratory work, will show the true status of the ore body as of January 1, 1943.

5. LABOR & WAGES:

a. Comments:

(1) Labor:

Generally speaking, the supply of labor was adequate to maintain full crews in all operating units, although, toward the end of the year, the situation became somewhat acute, due to the inroads made on manpower by the draft and to vacancies created by those who left to accept higher paid jobs in defense work. It is anticipated that the shortage of manpower may be somewhat serious in the spring of 1943.

Labor organizers, who started agitation for the recognition of the CIO in 1941, continued their activities into 1942. They finally secured the privilege of putting to a vote the question of what organization should be the bargaining agent for Mesaba-Cliffs employees. An election was held on March 13th and the result of the voting was very decisively in favor of the CIO.

Subsequent to the election, a number of conferences were held between Company officials and Union representatives for the purpose of working out a satisfactory contract. The final draft of such an instrument was mutually agreed to and the contract signed on May 13th, 1942.

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5. LABOR & WAGES: (Continued)

a. Comments: (Continued)

(1) Labor: (Continued)

Relationship between the Company and its employees, under the union contract, has been very harmonious and quite satisfactory.

b. Comparative Statement of Wages & Product:

PRODUCT,	1,223,113 Tons
Number of Shifts and Hours,	3 - 8-hour
Average Number of Men Working,	217
Average Wages Per Day,	$7.62
Product Per Man Per Day,	30.93
Labor Cost Per Ton,	$.246
Total Number of Days,	182
Amount Paid for Labor,	$301,452.27

6. SURFACE:

a. Buildings, Repairs:

The two boarding houses and three of the dwellings owned by the company, in the Village of Marble, were sold during the year. The company has retained possession of seven houses in the Village. Six of these received exterior repairs and two coats of paint and five of them were insulated.

The office, garage and research laboratory, of the mine buildings, were painted. Also, the shop walls and floors were repaired and the windows and woodwork painted.

c. Tracks, Roads, Transmission Lines, etc:

The only tracks remaining in service, after the 1941 operations, were the main lines from the pit to the washing plant and the approach tracks leading to the ramp. These received necessary attention in April.

The new tracks, leading from the yards to the loading pocket at the head of the pit conveyor, were put in shape for service in the spring and early summer months. Some trouble was experienced with the grade for the tail track on account of soft ground, but this was overcome by filling with dry material.

The installation of the branch power lines and electrical connections to serve the conveyor system, was completed early in July.

Practically all of the road building was in connection with extending the truck haulage roads in the pit. After the main approach pillar was cut through, the road leading to the screening plant pocket was connected to the one serving operations in the bottom of the West Trumbull pit.

7. OPEN PIT:

a. Stripping:

The 1942-43 stripping program was laid out to include the removal of surface material from a small area at the extreme west end of the Trumbull pit; the removal of surface, waste and lean ore from the East

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7. OPEN PIT: (Continued)

a. Stripping: (Continued)
Trumbull forty, in the vicinity of the coal dock and the sorting and disposal of taconite, associated with the wash ore, in the bottom of the Hill pit.

When it seemed that the ore season had been terminated by severe weather conditions, on October 27th, one of the four-yard shovels was moved to the west end of the Trumbull and started loading out surface material from this area. The work was continued for only three days, when the weather moderated and the shovel was moved back to the bottom of the pit to continue ore operations. When the ore season was finally concluded on November 6th, the shovel was again moved to the west end of the Trumbull and continued the interrupted job. The work was completed on November 19th, with the removal of 51,252 cubic yards of stripping in the total operation.

The four-yard shovel was moved from the west end of the Trumbull pit to the stripping area in the vicinity of the coal dock and operations were started here on November 23rd. The first cuts were taken on the east side of the area and were started from the top of the old bank and carried down to the level of the approach. From this point, successive cuts were carried downward and the top of the iron formation was reached by the first of the year. There is a heavy layer of waste and lean ore to be removed before wash ore is available for mining.

Only a small yardage of rock has been handled in the bottom of the Hill pit. Early in the season there were not enough trucks to adequately serve both the surface stripping and rock removal operations and, at a later period, a serious break-down tied up one of the shovels.

The surface stripping was continued as the more important of the two jobs.

d. Timbering:	QUANTITY	AMOUNT
Cedar Ties,	200	$120.00
Tamarack Ties,	1,420	1,491.00
Cedar Poles 7 x 55 (used for bridge)	4	120.00

f. Explosives, Drilling and Blasting:	QUANTITY	AMOUNT
No. 4 Bag Blasting Powder,	98,050#	9,805.00
25% Quarry Gelatin,	44,800#	4,480.00
40% Red Cross Explosives,	9,050#	905.00
60% Special Gelatin,	43,400#	4,991.00
40-ft. Electric Exploders,	1,500	294.75
20-ft. Electric Exploders,	1,000	96.50
12-ft. Electric Exploders,	1,000	76.50
No. 20 Connecting Wire,	207#	113.85

g. Open Pit Mining and Loading:
The 1942 ore season was started on April 13th, on a three shift, five days per week basis, and was continued through November 6th. A

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7. OPEN PIT: (Continued)

g. Open Pit Mining and Loading:

total of 1,928,388 tons of ore material was mined from the pit, of which 80,070 tons was direct ore and 1,848,318 tons was crude ore, requiring concentration. Of the crude ore - 1,835,783 tons was treated by washing only and 12,535 tons was washed and then further treated in the cone plant. The concentrates realized from the treatment of the straight wash ore amounted to 1,137,486 tons and those from the cone plant amounted to 5,557 tons, making a total of 1,143,043 tons for the season. The total production of shipping grade ore was 1,223,113 tons.

At the beginning of the ore season, the two - four-yard electric shovels were operated in the Hill property. One of the machines was located in the northeast corner of the pit and the other in the ore pocket, just east of the ramp. Both of these areas consisted of rocky wash ore, but the proportion of rock was greater than anticipated and it was found difficult to keep up a good average production. It became apparent, early in May, that a high-producing area should be made available and accordingly, one of the four-yard machines was moved into the West Trumbull.

Throughout the season, operations in the Hill pit consisted in mining out pockets of ore, as they were found among the innumerable horses of rock. The method of procedure was to start the shovel in a known deposit of ore, disclosed by structure drilling, and follow this out to its full extent. These sometimes proved to be fairly long stringers, of irregular shape, and others were of comparatively small volume. This type of operation was necessarily slow and involved the handling of large quantities of rock. At times it was necessary to load the rock, when it was encountered, to keep the operation clear; at other times the material was cast to one side and loaded out on week-ends.

Operations in the Hill pit were pretty well scattered across the property. As a matter of fact, ore had been extracted from eight places before the season's schedule was completed. Three pockets were mined out along the east property line; three others were located in the benches on the north side of the pit and the most extensive of the areas was found in the central portion of the pit bottom. In addition to these, benches of ore were taken immediately north of the crushing and screening plant and this operation was extended to the west, to include the approach track pillar, after the conveyor was placed in operation. The quality of the wash ore mined from the rocky areas was generally good, after the rock had been sorted out.

The principal production of Trumbull ore came from the area immediately west of the approach. Early in the season, one of the four-yard electric shovels was used here, but toward the end of the season, when rock conditions became too severe in the Hill pit, and lesser quantities of Bessemer ore were required, both of the four-yard machines were utilized in loading Trumbull ore. Cuts were taken across

7. OPEN PIT: (Continued)

g. Open Pit Mining and Loading: (Continued)

the entire pit. Those on the north side boardered on retreat material and yielded only a fair grade of wash ore, but as the operations were carried to the south, high-grade material was encountered and this continued to the south boundary. As the cuts gained depth it was found that the rock and retreat material pushed farther to the south and by the end of the season, the operations were pretty well concentrated on the south side of the pit. During the last few months the shovels were working at the level of the ground water and it was necessary to arrange the cuts so as to provide proper drainage.

When the pit conveyor was placed in operation, mining was started in the available portion of the approach track pillar, located on the Trumbull property. The upper part of the pillar was very high grade ore and was used to sweeten lower grade material, but when the level of the old Trumbull approach was reached, the material developed into retreat ore and was left for future mining.

The heavy density plant was not ready for service until late in the season and as a result, only a small tonnage of retreat ore was mined. The major portion of this material was taken from a bench on the north side of the West Trumbull pit and a smaller amount from the Hill property, in the vicinity of the approach.

Direct ore production, throughout the season, was largely in the nature of a scram operation. There was one fairly large deposit of direct ore in the southeast corner of the pit, but it was necessary to make cuts through rock to reach this. Most of the direct ore mined in 1942 was taken from pockets, of varying size, found among the rock horses. This material was gathered into piles by the use of a small dragline, a tractor and, at times, by men cleaning up isolated places by hand. When sufficient ore had been accumulated to provide work for a shift or more, a shovel was moved in and the material loaded into trucks for transportation to railroad cars.

In 1941, some direct ore was left, about half way up, in the high bank, on the south side of the Hill pit. This was inaccessible, when using the Model 350 Marion steam shovel, because of a layer of rock beneath it. An attempt was made to win this ore by starting a shovel cut on an up-grade from the east, but the bench became so narrow it was not safe to continue and the project was abandoned.

The pit conveyor system was placed in operation on July 15th. Original plans anticipated having this equipment in service at the beginning of the ore season, but delays in the delivery of material set it back to the later date.

During the early months of the season all of the ore was carried by trucks to the ramp, on the north side of the Hill pit, and dumped into cars for transportation to the yards or washing plant. This

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7. OPEN PIT: (Continued)

g. Open Pit Mining and Loading: (Continued)
arrangement required some long truck haul, on heavy grades, and also necessitated the use of three trains to handle wash ore. With the introduction of the conveyor into the transportation system, the average length of haul was reduced materially, part of the steep grades were eliminated and only two trains were required to supply the washing plant with crude ore. A further production advantage was attained, in that rocky wash and direct ore could be loaded without fine sorting at the shovel, as the rock was efficiently removed in the screening plant at the head of the conveyor system.

With the exception of the usual adjustments required on new installations, all of the equipment operated in a satisfactory manner and there is no doubt that it is equal to the capacity for which it was designed. During the eighty-seven days that the belt was in operation, it handled a total of 1,052,829 tons of ore, or a daily average of 12,101 tons. The greatest quantity carried in any one day was 15,120 tons.

8. COST OF OPERATION:

a. Comparative Mining Cost:

	1942 BUDGET	1942 COST PER TON	1941 COST PER TON
PRODUCT:			
Direct Shipping Ore, Tons	202,020	80,070	279,030
Concentrates, Tons	909,090	1,143,043	1,006,651
Total Production, Tons	1,111,110	1,223,113	1,285,681
Average Daily Product "	-	6,720	7,264
Tons Per Man Per Day,	-	30.93	39.29
Days Operated,	-	182	177
COST:			
Open Pit Direct Ore,	$.119	$.145	$.118
Open Pit Crude Ore,	.177	.177	.149
General Pit Expense,	.035	.045	.020
Concentrating,	.132	.156	.130
Stocking Concentrates,	.005	.004	.003
General Mine Expense,	.071	.066	.054
Winter and Idle Expense,	.081	.105	.084
Cost of Production,	$.466	$.544	$.405
Amortization- Defense Project,	-	.013	-
Depreciation - Plant and Equipment -	-	.100	.150
Depreciation- Motorized Equipment,	-	.012	.012
Amortization - Stripping,	--	.130	.150
Taxes - Ad Valorem,	-	.096	.089

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8. COST OF OPERATION: (Continued)

a. Comparative Mining Cost: (Continued)

	1942 BUDGET	1 9 4 2 COST PER TON	1 9 4 1 COST PER TON
Taxes - Occupational,	-	$.080	$.113
Taxes - Royalty,	-	.094	.091
Total Cost at Mine,	-	$1.069	$1.010
Administrative Expense,	-	.100	.100
Miscellaneous Expense and Income,	-	.005	.007
Grand Total,		$1.174	$1.117

The figures for 1941 and 1942 were taken from the December cost sheets which were prepared before the final charges were received from the Cleveland office and, therefore, are comparable. Charges made by the inclusion of the Cleveland figures would not materially effect the cost per ton used in the above table.

d. Detailed Cost Comparison:

(1) Product:

The original estimate for the 1942 ore schedule called for the production of 202,020 tons of direct shipping ore and 909,090 tons of concentrates, making a total of 1,111,110 tons. Due to war requirements, operations were not discontinued when the scheduled tonnage was reached, but the season was continued until the definite freeze-up, on November 6th. As a result, the estimate was exceeded by 112,003 tons.

The proportion of direct shipping ore and concentrates, set up in the budget estimate, was not maintained in actual operations. The season's output of direct ore was under the estimate by 121,950 tons, while the quantity of concentrates, resulting from the treatment of crude ore, exceeded the estimate by 233,953 tons.

The tonnage of direct ore was small, as compared to the budget, due to the fact that mining conditions in the area were much worse than anticipated. There were no large deposits that could be attacked by intensive operations, but most of the ore was extracted from pockets in the rock and accumulated in piles for later loading.

The deficiency in the tonnage of direct ore was made up in concentrates and this, together with the extended season, accounts for the surplus over the budget estimate.

(2) Open Pit Mining:

The cost per ton for producing direct shipping ore in 1942 was $.026 over the budget and $.027 above the 1941 figure. The very unfavorable mining conditions encountered were not anticipated when the

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

budget was prepared, which accounts for the increase over the estimated amount. The increase of $.027 in the 1942 cost, as compared to that for 1941, is reflected largely in four items. Drilling and Blasting was higher because of the rock work necessary in mining the ore. The frequent moving of the shovel in and out of the area and the slow production, raised the cost for Shovel Operating. Truck Maintenance was high in 1942, due to the fact that the machines were used throughout the winter of 1941-42 and were not given the usual overhauling. This work was done, from time to time, during the early months of the ore season, as a direct charge to operating. The tonnage of direct shipping ore mined in 1941 was 3.5 times as large as that mined in 1942 - and this has a definite bearing on the difference in cost. The item "Conveyors Operating" is an additional charge for 1942, as there was no conveying equipment in 1941.

The wash ore cost per ton for 1942 was identical with the budget, but was higher by $.028 than that for 1941. The items - Drilling and Blasting - Power Shovels Operating - Power Shovel Maintenance were higher in 1942 than in 1941, due to the fact that severe rock conditions were encountered in all of the wash ore.areas in the Hill pit and, to some extent, in the Trumbull. The cost for Trucks-Operating and Trucks-Maintenance showed an increase for the reason that two additional trucks were used in 1942, because of the longer haul. During 1941 a large tonnage of the ore mined was loaded directly into cars which reduced the length of haul by truck. The cost of $.010 for "Conveyors Operating" appears only in the 1942 figures, as there was no conveyor equipment in the mine in 1941. The items - Locomotives and Cars Operating, Locomotive and Cars Maintenance and Track Expense showed a total increase of $.035 in 1941, as compared with 1942. The elimination of all of the loading tracks in the pit, the shortened haul on easy grades from the ramp, and later from the conveyor loading pocket; and the reduced amount of track work required on only the main lines, accounts for the savings in these items in 1942.

(3)- General Pit Expense:

The cost per ton under this caption was $.010 and $.025 above the budget and the 1941 figure, respectively. The increase of $.010 over the budget is accounted for in one item, "General Open Pit Expense", there being only a nominal difference in all other items. A number of heavy expenditures were charged in this account that were not foreseen when the estimate was made. The increase of $.025 over the 1941 cost is reflected in three particular items, viz: "Scramming" - "General Open Pit Expense" and "Exploratory Drilling". The charge of $.003 for "Scramming" is peculiar to 1942, because of the cleaning out of ore pockets in the direct ore area. There was no such charge in 1941. In the case of "General Open Pit Expense", the cost for 1942 exceeded that for 1941 by $.015. The total expenditure

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(3)- General Pit Expense: (Continued)

under this heading was unusually high because of comparatively heavy charges for the following: house repairs; an addition to the office and repairs to mine buildings; alterations and extensions in the pit power lines and the purchase of new fire-fighting equipment. In addition to the foregoing, compensation for the mine guards was carried in this account. Exploratory drilling was higher in 1942 by $.007, due to the fact that a more extensive program was carried on than in 1941.

(4)- Concentrating:

The cost for 1942 was higher by $.026 than for 1941 and exceeded the budget by $.024. When the budget was prepared it was anticipated that the pit conveyor would be in operation at the beginning of the ore season and only two trains would be required to haul from the loading pocket. However, the use of the conveyor was delayed until the middle of July and three trains were in service up to that time. This, and a large amount of necessary track work on the main lines, accounts for $.014 - (under "Transportation"), of the total increase for 1942. Under "Washing", the cost in 1942 exceeded the budget by $.014. This is largely due to the fact that the quantity of rock handled at the mill was practically three times as great as in 1941 and the budget figure was based on 1941 costs.

The increase of $.026 in 1942, as compared to 1941, is explained by the reasons given for comparison with the budget.

(5)- General Mine Expenses:

In 1942, the cost per ton was less than the budget by $.005, but exceeded the 1941 figure by $.012. The decrease of $.005 under the budget is an accumulation of nominal differences in the numerous items under this caption. The increase of $.012 over the 1941 cost is practically all reflected in four items. "Mining Engineering" is $.003 higher because of additions to the personnel in that department. "Analysis and Grading" is higher by $.002, due to additional sampling done in connection with the pit and washing plant operations. Additions to the office force and some new furniture account for the $.004 increase under "Mine Office". A substantial increase in the payroll in 1942, as compared to 1941, explain the higher "Social Security Tax".

(6)- Winter and Idle Expense:

The 1942 cost exceeded the budget by $.024 and the 1941 figure by $.021. The budget estimate was based on 1941 costs and some large expenditures were not anticipated. The Euclid trucks were operated to the end of the year in 1941 and the repair cost was carried into 1942, which placed a heavy charge against "Trucks-Maintenance". There was no charge to this item in 1941. Under "General Open Pit Expense", the alterations and extension of the pit power lines, repairs to houses and the addition to the office and repairs

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8. COST OF OPERATION: (Continued)

d. Detailed Cost Comparison: (Continued)

(6)- Winter and Idle Expense: (Continued)

to mine buildings resulted in a large expenditure, with but a comparatively small amount charged in 1941. At the washing plant, - "Maintenance - Buildings and Machinery" was considerably higher in 1942 than in 1941, due to the fact that the jaw crusher and five-foot pan conveyor were dismantled and removed, the eight-foot pan conveyor is being shortened; the receiving bin is undergoing extensive repairs and considerable alterations are being made in the heavy density plant. The above explanations account for the increased cost of $.021 in 1942.

9. EXPLORATIONS:

The 1941 drilling programs, carried on in the Hill pit bottoms and on the East Trumbull forty, were continued into 1942 and completed before the end of the year. In addition to the above, holes were put down in the approach area, after the ore in the track pillar had been removed, and also in the old track benches, on the Hill and Trumbull properties, along the north side of the Trumbull approach. One hole had been started from surface, on the Hill property, north of the approach, and west of the north bank pumping station.

In the Hill pit bottom - twenty-nine holes, totaling 1,035 feet, were put down. On the average, these holes were comparatively shallow and are classed as "Sample Drilling", as they were drilled for the purpose of disclosing the grade and volume of ore remaining in this area. Augmented by the results of the 1941 program, this information has pretty well outlined the extent of the ore pockets and rock horses in the entire pit bottom.

After the ore had been mined from the approach track pillars, it was deemed advisable to put down some holes in this area, as mining operations made it apparent that the material here was a mixture of wash ore, rock and retreat ore. Consequently, ten holes were drilled, totaling 726 feet.

The work in the old track benches, on the north side of the Trumbull approach, was done to determine the depth and possible extension to the north of the ore exposed in these banks. The results were somewhat disappointing, as a smaller volume of treatable ore was disclosed, than was expected. However, there was enough encouragement in one section of the area to warrant some drilling, from surface, to the north. There were five holes put down in the benches on the Hill property, totaling 384 feet and three holes on the Trumbull, totaling 221 feet, or a grand total of 605 feet.

The most extensive program of exploratory drilling was conducted in the southwestern portion of the East Trumbull forty. This work was a continuation of that undertaken in 1941 and was done for the purpose of determining the extent to which the present pit limits might be carried to the south and east. As a result of this drilling a com-

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9. EXPLORATIONS: (Continued)

paratively narrow area, 100 feet wide at the south property line and extending northward along the approach for a distance of approximately 900 feet - where it reaches a width of 250 feet - was brought into the picture, and is being stripped for mining in 1943.

The drilling campaign was carried on by one company-owned structure drilling outfit and by two units of contractor's equipment, during the early months of the year, and by one of these units during the latter part of the year.

The total footage drilled by the company machine amounted to 2,366 feet and that by the contractor - 5,278 feet, making a grand total of 7,644 feet.

10. TAXES:

The following table shows a comparative statement of the taxes and average rate at the Hill-Trumbull Mine for the years 1942 and 1941:

	1942	1941	Increase	Decrease
Hill Mine,	$39,377.26	49,044.77		9,667.51
Trumbull Mine,	49,980.94	60,145.33		10,164.39
Hill-Trumbull Shops,	943.17	901.99	41.18	-
Hill-Trumbull W.P.Lands,	3,780.95	3,396.60	384.35	-
Personal Property,	3,953.78	4,386.25	-	432.47
TOTAL, ----------	$98,036.10	117,874.94	-	19,838.84
Village Lots,	347.28	542.91	-	195.63
GRAND TOTAL, ---------	$98,383.38	118,417.85	-	20,034.47
Average Tax Rate,	101.35	97.61	3.74	

The decrease in mine taxes for 1942 is due to depletion of ore reserves and a change of rate in certain classification.

The increase in Shops and Washing Plant Lands is accounted for by a higher rate having been put into effect.

Depreciation of personal property represents a reduction in the valuation of equipment, which explains the decrease in 1942.

The item, "Village Lots" is lower in 1942, due to the fact that several pieces of property were sold.

Included in the Hill Mine taxes is the amount of $5,154.61 levied against the tonnage in the Hill-Barbara Mine.

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11. ACCIDENTS AND PERSONAL INJURY:

There were seven lost-time accidents in 1942, which are described as follows:

NAME: Philip Iver DATE: April 11th.
CAUSE: Injured was heading shovel bucket pins with air power hammer. While placing a pin under hammer head, the pressure released, due to use of other air equipment in the shop and caused the hammer head to drop on the finger of his glove. He gave a sudden jerk to release glove from under the hammer, and this act broke his right forefinger.
NATURE: Closed comminuted fracture of proximal phalanx, right index finger.
TIME LOST: 39 Weeks - 3 Days.
COMPENSATION: $790.00

NAME: Ignace Zupancic DATE: April 27th.
CAUSE: While hooking rock from grizzly, a big rock struck his hook, knocking him into rock pocket.
NATURE: Contusion of right thigh and buttock.
TIME LOST: 4 Weeks - 2 Days.
COMPENSATION: $ 86.67.

NAME: William Ryser DATE: May 16th.
CAUSE: The night was dark and it was misting. Ryser was apparently walking down the empty track to take over his duties, on the night shift - (11:00 P.M. to 7:00 A.M.), as operator of Shovel #47, and, unseen by the locomotive crew, was run over and decapitated.
NATURE: FATAL.

NAME: Emil H. Salo DATE: July 30th.
CAUSE: While they were moving the shovel, he was in the act of engaging the clutch, when it flew back against the left hand.
NATURE: Fracture at the carpal end of second metacarpal, left hand.
TIME LOST: 5 Weeks.
COMPENSATION: $100.00.

NAME: John F. Kassler DATE: August 28th.
CAUSE: Kassler took a small connection off his arc welding torch cord for the purpose of reaming the hole larger. He held the piece in place on the drill table with his left hand, and when the reamer took hold, it twisted the piece around, carrying his hand and arm with it, breaking the left arm and cutting the left hand.
NATURE: Comminuted fracture, middle third left ulna. Fracture with marked displacement of left radius. Numerous contusions and abrasions about left chest. Severe lacerations palmar surface base right thumb, mild shock.
TIME LOST: 6 Weeks - 1 Day.
COMPENSATION - $123.33.

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11. ACCIDENTS AND PERSONAL INJURY: (Continued)

NAME: Louis Jelicich DATE: December 17th.
CAUSE: In cold weather, stripping dirt will sometimes freeze to the truck box. On this occasion, some dirt did freeze to the box, and in it was embedded a rock. In cleaning, the box is left in a dumping position so that the loosened dirt will slide down and out. The rock embedded in the dirt, when it slid down, struck Jelicich on his right foot, crushing it.
NATURE: Contusion of great and second toes. X-ray shows- "fracture of distal phalanx".
TIME LOST: 4 Weeks - 2 Days.
COMPENSATION: $83.76.

NAME: C. W. French DATE: December 27th.
CAUSE: Was working on power line in pit. While walking from one pole to another, over rough, icy ground, he slipped and fell, injuring his right knee.
NATURE: Tearing of menal lateral ligament of right knee.
TIME LOST: 4 Days
COMPENSATION: None.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

New construction in 1942 consisted of the installation of the pit conveyor system and the erection of the heavy density concentrating plant.

The receiving end of the pit conveyor system is located practically in the center of the Hill-Trumbull pit. The conveyor extends south from this point and runs just to the west of and parallel to the North-South center line of Section 17; coming to the surface, through the tunnel, just short of the south line of the East Trumbull forty. This equipment is made up of five principal parts, viz: the loading pocket at the upper end, the tunnel, the conveyor gallery, the 36" belts and auxiliary equipment and the crushing and screening plant. The excavation for the tunnel was started in November of 1941 and was completed in March, 1942. Gangs of miners, on a three-shift schedule, worked from both the upper and lower ends and holed through exactly on line when the two sections were joined. The tunnel is timbered with sets placed at five-foot centers and the back and side walls are lined with two inch plank. The sets are made up of 10" x 10" fir, with a cap ten feet long, legs eight feet long and a sill twelve feet long. All of the timber and planking was treated with creosote at the rate of eight pounds per cubic foot. The tunnel has a horizontal length of 169 feet and an inclined length of 757 feet, making a total of 926 feet. Included in the tunnel are two

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

transfer stations, each twenty feet square and sixteen feet high. The lower one is located where the horizontal belt meets the incline and the other, half way up the incline, where the second flight of belt delivers onto the third flight.

The crushing and screening plant is a steel structure, forty feet high, including a hopper at the top into which the trucks deliver the ore; a Ross feeder for controlling the flow of material; a 5' x 12' heavy duty scalping screen for the purpose of eliminating coarse rock; a chute with a door in its bottom through which the coarse material, when it is ore, can be by-passed to the crusher; a four foot apron feeder for delivering the ore onto the belt conveyor and a rock pocket from which the material is delivered to the trucks by a second Ross feeder. The 40" x 42" jaw crusher is located on the west side of the screening plant and the oversized ore is delivered to it by a five-foot pan conveyor. The crushed product is carried back to the main conveyor by a short 36" belt.

The conveyor gallery is a steel housing for the protection of the equipment and extends from the crushing and screening plant to the lower mouth of the tunnel. There is also a short section of gallery leading from the upper mouth of the tunnel to the loading pocket. The lower gallery has not been covered with sheeting, as the material was not available. The upper section has been enclosed.

The conveyor is divided into three sections of 36" belt. The first flight is horizontal and is 609.33 feet long - center to center of pulleys. The second flight is on an incline, with a length of 402.1 feet. The third flight is also on the incline and covers a distance of 405.8 feet. Each of the belts was made endless by making a vulcanized splice at the joint and each has an independent drive. The supporting frame for the conveyor is all steel and carries the 6" diameter troughing and return rollers. Rubber-cushioned rollers are used at the loading point and at both transfer points to take up the shock of the falling ore.

The loading pocket, which receives the ore from the belt, is a steel structure and has a capacity of 300 tons. The ore is delivered into 30-yard cars through chutes which are controlled by air-operated gates.

Summary of data pertaining to the pit conveyor system:

Length of horizontal tunnel, - - - - - - - - - - - - - - -	169 feet
Length of inclined tunnel, - - - - - - - - - - - - - - -	757 feet
Total Length, -	926 feet.

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

Tunnel dimensions, inside of timber - 8'-4" at top; 10'-4" at bottom; 7'-8" high.

Length of first flight of conveyor,	609.33 feet
Length of second flight of conveyor,	402.10 feet
Length of third flight of conveyor,	405.80 feet
Total Length,	1,417.23 feet.
Width of belt,	36 inches.
Speed of Belt,	400 ft.per minute
Rated capacity of belt,	700 tons per hour.
Inclination of second and third flights of belt	130.07 feet
Total lift,	184 feet
Capacity of loading pocket,	300 tons

Horse power of drive motors: Horizontal belt 40 H. P.; second flight 100 H.P.; third flight - 100 H.P.

Material and equipment for the heavy density plant were received over a period of several months, starting in February. The foundations were placed in 1941 and actual construction of the building was started on June 22, 1942. As the erection of the steel progressed, such units of machinery as could be accommodated were set in place. The first ore was treated in the plant on October 9th.

A new bridge, using a steel span, is being erected in the main line railroad, over the Township highway, just west of the washing plant.

There has been under consideration the replacement of steam haulage with electrical equipment. If a favorable decision is reached, the construction of trolley lines, transformer stations and a short feeder line will be necessary. In the event the electric haulage plan is not adopted, it will be necessary to re-set the water tank and provide new locomotive-coaling facilities.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

The following equipment was received in 1942:

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13. EQUIPMENT AND PROPOSED EQUIPMENT: (Continued)

1 - RD-8 "Caterpillar" Tractor, equipped with bulldozer.
1 - 5/8-yard Dragline - (second-hand)
3 - Euclid Trucks
1 - "Pioneer" Portable Conveyor
1 - Air Compressor for pit service - (second-hand)
1 - "International" 2-ton Truck for road sprinkler - (second-hand)
2 - 66" Akins Classifiers for the washing plant.

It is proposed that the following new equipment be purchased in 1943:

1 - Tailings pump - (second-hand)
600 - feet 24" Conveyor (second-hand)
1 - "Pioneer" Portable Conveyor
2 - Euclid Trucks
3 - Electric Locomotives and auxiliary equipment

18. NATIONALITY OF EMPLOYEES:

Nationality:	Number of Men
Finnish,	38
English,	32
German,	32
Swedish,	23
Norwegian,	22
Jugo-Slav,	19
French,	11
Irish,	10
Italian,	6
Austrian,	6
Bulgarian,	5
Croatian,	5
Dutch Irish,	2
Czeck-Slav,	2
Polish,	2
Bohemian,	1
Welsh,	1
Total,	217

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19. WASHING PLANT OPERATIONS:

Washing operations were started on April 13th and completed on November 6th, covering a period of 162 days. A basic working schedule of three, 8-hour shifts, five days per week, was adopted for the season; however, it was necessary to work week-ends on numerous occasions to supply the heavy demand for ore. Conditions at the mill were generally quite satisfactory and an average daily production of 7,022 tons was maintained. This compares with 7,190 tons per day for 1941. The fact that practically three times as much rock was handled in 1942, as compared with 1941, accounts for the lower tonnage.

Railroad facilities were not adequate to handle the concentrates as fast as they were produced and, as a result, it was necessary to place 258,102 tons in stockpile. Late shipments in the fall necessitated loading out 61,665 tons of this material.

The crude ore treated in the plant during the 1942 season amounted to 1,835,783 tons, from which 1,137,486 tons of concentrates were produced. In addition to the washing plant product, a total of 5,557 tons of concentrates came from the heavy density plant. The rejects from the mill amounted to 94,332 tons.

The complete concentrating data for 1942 is as follows:

	Tonnage	% Of Total Mined	% Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined,	1,988,990	100.00	43.95		
Less: Rock Removed in Mining,	67,240	.05	33.01		
Crude Ore Transported to Mill,	1,921,750	99.95	44.34		
Less Rock Rejects in Crusher House,	85,967	1.55	31.18		
Crude Ore Entering Mill,	1,835,783	98.40	44.95		
Concentrates Produced,	1,137,486	61.72	59.15	61.96	81.54
Rock Rejects on Mill Picking Belt,	8,365	.25	29.73		
Tailings (By Deduction) -	689,932	36.43	22.18		
Total Heads - (as above)	1,835,783	98.40	44.95		

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19. WASHING PLANT OPERATIONS: (Continued)

The analysis of the product from the various machines for 1942 was as follows:

	Iron	Phos.	Silica
HILL MILL MACHINES:			
Log Washer	60.99	.039	8.90
Classifier	59.73	.036	11.08
Tailings	18.39	-	-
TRUMBULL MILL MACHINES:			
Log Washer	58.93	.049	7.31
Classifier	57.42	.044	9.66
Tailings	14.29	-	-

The analysis of the plant rejects for the year 1942 was as follows:

8' Pan and Screen Plant Rejects

	Tons	Iron	Phos.	Silica
Hill	70,898	31.64	.030	49.40
Trumbull	15,069	29.02	.034	54.29
Total,	85,967	31.18	.031	50.26

36" - Belt Rejects:

Hill	5,879	30.22	.031	51.14
Trumbull	2,486	28.57	.035	52.33
Total,	8,365	29.73	.032	51.49

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

	Tons	Iron
Hill,	66,798	33.03
Trumbull,	442	29.89
Total,	67,240	33.01

The weight recovery for 1942 was 61.96%, as compared to 61.39% in 1941. This slight increase for 1942 is accounted for by the fact that some higher concentrating material from the approach pillar, the direct ore area and a larger tonnage from the West Trumbull was used in 1942.

The average iron content of the crude ore was 0.82 higher in 1942, than in 1941.

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19. WASHING PLANT OPERATIONS: (Continued)

The iron unit recovery for 1942 was 81.54%. This compares with 82.35% for 1941. The crude ore treated in 1942 carried a greater percentage of decomposed taconite and ore and the washing of the material results in a higher loss of iron in the tailings.

20. HEAVY DENSITY PLANT OPERATIONS:

The heavy density plant was placed in service on October 9th and was operated, somewhat intermittently, on a one-shift basis, until October 23rd. During this short time, only 12,535 tons of crude ore was treated, which yielded 5,557 tons of concentrates. The operation rather resolved itself into a trial run which disclosed weaknesses in the flow-sheet, requiring some changes in equipment. It was found that the 30" Akins classifier, which was used as a dewatering device for the returned heavy density medium, lacked the required capacity for this purpose. Further than this, the 48" Akins classifier, used in the double-classification circuit, proved inadequate to handle the volume of fine material in the ore, which was larger than anticipated. As a result, it was decided to remove the 30" classifier, (this was sold to Butler Brothers) - and replace it with the 48" classifier. A new 60" Akins classifier was purchased, for use in the double-classification process, in place of the 48" machine.

Originally, pumping equipment was chosen for the purpose of introducing the heavy density medium into the cone concentrating circuit. This arrangement was a source of trouble, in that, the dense mass of medium tended to clog the pump and a steady flow could not be maintained. A bucket elevator is to be substituted for the pump.

The two Hummer screens, used in connection with the double-classification, were removed from the ground floor and located above the 66" classifier. This arrangement eliminates one pumping unit. Concentration of the retreat ore is accomplished in three stages. The material is first put through the washing plant to remove the fine waste, which cannot be handled in the heavy density process. The product from this treatment is placed in stockpile, by means of the stacker, and is fed to the new plant by belt conveyor. When the feed reaches the top of the mill it passes over a 5' x 14' vibrating screen, where it is separated into plus and minus one-quarter inch sizes. The oversize goes directly to the 6-foot cone, where the principle of sink and float is utilized for concentrating. The cone is filled to the level of the overflow ring with a mixture of ferro-silicon and water, which has been built up to the proper density for the ore being treated. When the feed enters the machine the lighter rock and waste material is held in suspension and is carried over the discharge lip by the flow of medium. The heavier ore settles through the medium into a pipe line, equipped as an air lift, and is elevated back to the level

HILL-TRUMBULL MINE
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YEAR 1942

20. HEAVY DENSITY PLANT OPERATIONS: (Continued)

of the cone. At this point it is discharged onto a drain screen and thence onto a washing screen, from which it passes through a chute onto a 24" belt conveyor and thereby carried to the concentrate loading bin. The tailings also pass over a drain screen and washing screen and are discharged from the plant by means of a 24" conveyor. The battery of screens mentioned above is for the purpose of recovering the medium.

The minus one-quarter inch material is fed to the 66" Akins classifier, which is the primary step in the double-classification. The overflow from this machine is discharged as tailings, while the concentrates are delivered to the 60" Akins classifier for final treatment. The concentrates from this unit pass onto the 24" conveyor to be carried to the loading hopper and the overflow material is delivered onto the two Hummer screens. The oversize from these machines is discarded as waste and the undersize is returned to the 66" Akins classifier for recirculation.

Auxiliary equipment consisting of a 16' thickener, a 30' thickener, two Crockett Magnetic Separators and numerous pumps is all for the purpose of recovering the used medium.

The following are the complete data for the heavy density plant:

	Tonnage	% of Total Mined	% Dried Iron	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined,	12,885	100.00	35.79		
Less: Rock Removed in Mining,	-	-	-		
Crude Ore Transported to Mill,	12,885	100.00	35.79		
Less: Rock Rejects in Crusher House,	350	2.72	27.21		
Crude Ore Entering Washing Plant,	12,535	97.28	36.03		
Cone Plant Feed Produced	7,283	56.52	49.53	58.10	79.87
Tailings (By Deduction)	5,252	40.76	17.31		
Cone Concentrates Produced,	5,557	43.13	56.47	44.33	69.48
Cone Rejects,	976	7.57	35.36		
Tailings (By Deduction)	750	5.82	16.51		

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20. HEAVY DENSITY PLANT OPERATIONS: (Continued)

The final weight recovery realized from crude ore to concentrates was 44.33%. This is based on a 58.10% recovery of cone plant feed from the washing of the original ore and a subsequent recovery of 76.30% of concentrates from the feed.

The ultimate iron units recovery was 69.48%, based on 79.87% recovery in the initial treatment and 86.99% in the final concentration.

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In outlining the ore body of the Barbara Mine, formerly the Adgate property, Butler Brothers found that the ore extended south into the Hill lease in the W½ of the NE¼ of the NE¼ of Section 17, 56-23. Since this was entirely isolated from the Hill open pit with no connection, arrangements were made to have Butler Brothers develop the ore body and mine the same in connection with their Barbara Mine. The drilling was completed early in April, 1942 and it was developed that the ore body, about 500 feet long, extended approximately 400 feet south into the Hill lease and that the south limits were about 900 feet north of the Hill open pit. The ore body was about 60 feet in depth and overlying it were 50 feet of surface material and a layer of rock which varied in depth from 5 feet on the north side to approximately 30 feet on the south.

Stripping operations were started late in April and by the end of May, sufficient ore had been uncovered to start mining operations. The remaining surface material and rock were removed during the ore season when equipment was available. The lean ore, which was encountered and removed during mining operations, was likewise charged to stripping. A total of 411,933 cubic yards of material were moved. This consisted of 375,287 yards of surface material, 14,783 yards of lean ore and - 21,863 yards of rock. This material was all deposited on dumps located in the Northern part of the Hill forty, immediately west - that is - the NW¼ of the NE¼ of Sec. 17, 56-23.

Mining operations were started on June 2nd and were continued intermittently until September 1st, when the wash ore was exhausted. A total of 280,635 tons of concentrates were recovered in the mining and treating of 472,013 tons of crude ore. The tonnage produced was not quite as large as had been anticipated, due to the occurrence of numerous rock fingers which did not show up in the drilling and to the fact that the lower layer of ore was found to be a re-treat material. The crude ore mined had a good weight recovery and the concentrates a high natural iron and a high silica content. The latter was to be expected in a shore-line deposit. With the wash ore exhausted, it was estimated that there were approximately 50,000 tons of re-treat, or jig concentrates uncovered in the pit and available on the lean ore dump. This will be mined and concentrated during the 1943 ore season with some new agreement with Butler Brothers.

Washing operations were carried on intermittently when cars were available for Hill-Barbara ore and the operations were shifted to the Barbara alone when it was necessary to stock. The tailings were dumped into a common tailings pond and an agreement covering the same was worked out between the various fee interests.

The following tables show the statistical data on production, shipments and inventories:

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a. Production by Grades:

	Tons
Hill-Barbara Crude Ore,	472,013
Hill-Barbara Non-Bessemer Concentrates,	106,662
Hill-Barbara Bessemer Concentrates,	173,973
TOTAL 1942 PRODUCTION,	280,635

b. Shipments:

Hill-Barbara Non-Bessemer Concentrates,	106,662
Hill-Barbara Bessemer Concentrates,	173,973
TOTAL 1942 SHIPMENTS,	280,635

c. Stockpile Inventories:

None.

The following amount of lean ore and waste material was stocked during the year:

	Cu. Yds.	Tons	Iron
Lean Ore,	14,783	29,565	42.80
Pit Rock,	21,863	43,725	33.47
Grizzly Rock,	-	20,592	37.03

e. Production by Months:

(1) - Crude Ore:

MONTH	TONS
June,	119,942
July,	165,132
August,	178,963
September,	7,976
Total,	472,013

(2) - Concentrates:

MONTH	TONS
June,	71,311
July,	98,180
August,	106,402
September,	4,742
Total,	280,635

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ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Hill-Barbara Non-Bess.Concs.	106,662	60.51	.054	8.85	.12	.83	9.10	55.00
Hill-Barbara Bess.Concs.	173,973	59.11	.033	12.14	.12	.68	7.84	54.48
Total,	280,635	59.64	.041	10.89	.12	.74	8.32	54.68

b. Mine Analysis of Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe.Nat.
Hill-Barbara Non-Bess.Concs.	106,662	60.51	.054	8.85	.12	.83	9.10	55.00
Hill-Barbara Bess.Concs.	173,973	59.11	.033	12.14	.12	.68	7.84	54.48
Total,	280,635	59.64	.041	10.89	.12	.74	8.32	54.68

d. Mine Analysis of Crude Ore:

	Tons	Iron	Phos.	Silica
Hill-Barbara Crude,	472,013	44.95	.032	32.23

STRIPPING:

	Cubic Yards:
Surface Material,	375,287
Lean Ore,	14,783
Rock,	21,863
Total,	411,983

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YEAR 1942

The complete contentrating data for the year 1942 was as follows:

	Tonnage	Percent of Total Mined	Percent Dried Iron	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined,	526,090	100.00	44.45		
Less: Lean Ore Stocked in Mining	29,565	5.62	42.80		
Less: Rock Removed in Mining,	3,920	.75	35.85		
Crude Ore Transported to Mill,	492,605	93.63	44.62		
Less: Rock Rejects in Crusher House	20,592	3.91	37.03		
Crude Ore Entering Mill,	472,013	89.72	44.95		
Concentrates Produced,	280,635	53.34	59.64	59.45	78.89
Rock Rejects on Mill Picking Belt	-	-	-	-	-
Tailings (By Deduction)	191,378	36.38	23.41		
Total Heads, as Above,	472,013	89.72	44.95		

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11. ACCIDENTS AND PERSONAL INJURY

a. Fatal Accidents

Two fatal accidents occurred; one at the Hill-Trumbull Mine on the Mesaba Iron Range and one at the Negaunee Mine on the Marquette Iron Range.

Description of Fatal Accidents

Fatal Accident No. 1

Hill-Trumbull Mine

William Ryser, shovel runner, was instantly killed the night of May 16, 1942 when an empty train passed over him.

Ryser was on his way to work and apparently walking down the empty track to take over his duties on the night shift (11:00 P.M. to 7:00 A.M.) as operator of Shovel #47 and, unseen by the locomotive crew, was run over and decapitated. The night was dark with a slight mist. Although the locomotive headlights were in good condition and the fireman and engineer were able to see a considerable distance down the track, they were unable to see Ryser. The crew of a loaded train coming out of the pit found the body. The accident was classed as "improper act or selection of improper method of doing work by deceased" because of the fact that he was familiar with the dangers of railroading and should have walked the road into the pit instead of the railroad.

Ryser was a widower, 59 years of age, no dependents, and had worked at the mine since 1932.

Fatal Accident No. II

Negaunee Mine

Leslie Wertanen, a miner, was fatally injured at 8:30 A.M. July 5, 1942 at the 10th level measuring pocket, and died about 3:00 A.M. July 7, 1942.

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11. ACCIDENTS AND PERSONAL INJURY

a. Fatal Accidents (Continued)

Wertanen, who usually worked as a raise miner, had frequently worked in the shaft so the job was not new to him.

Wertanen, David Pynnonen, shaft foreman, Herman Saastamoinen, and Jalmer Mattson started removing the measuring pocket on the south side of the shaft on Saturday morning July 4th. All the lower one-third section was taken out that day and work was started on the middle section. The method used was to burn off about a third of the pocket, starting on the lower side, for it was impossible to start on top. An eye-bolt was placed in a burnt hole, then a chain block was used to pull the section out far enough so it could be fastened to the bottom of the skip. The section was then hoisted to the level station and removed. On Sunday morning the middle section had been removed and was swung under the skip. The bolts holding the top section were inspected and seemed to be strong. There were three 5/8-inch bolts on each side of the top section of the pocket through 8 x 8 inch fir timber and the bottom or slide was bolted to a 12 x 12 inch fir timber with two 7/8-inch bolts. All these bolts were rusted and could not be moved with a wrench. Believing the top section of measuring pocket was held firmly in place, Pynnonen, Wertanen, and Saastamoinen, in order named, were about to climb the ladder to the level to land the middle pocket section when the top section let loose, striking a 2-inch plank which caused it to turn and pin Wertanen's head between it and the concrete wall of the shaft. Pynnonen and Saastamoinen immediately removed the section which weighed about 600 to 700 pounds and released Wertanen, who was unconscious. He was taken to the Ishpeming Hospital after first aid treatment. A specialist from Milwaukee was called but Wertanen died on July 7th.

Investigation showed that all bolts in the top section were rusted between the heavy timbers and the steel plates. The heads of the bolts and the nuts were only slightly rusted. The accident was classified as a trade risk.

Wertanen was thirty years old, married, and had one child, a son about five years of age. He had worked at the mine about eight years.

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11. ACCIDENTS AND PERSONAL INJURY

b. Non-Fatal Accidents

During the year all mining operators were faced with the demand for more production. Nearly all mines were operated three eight-hour shifts a day, which meant that in our top slicing method of mining our hazards would increase because the timber mat probably would not follow the mining as fast as it should. Many employees entered the armed services of the country and these employees had to be replaced with new men, many of them without experience, who had to be trained. In spite of this fact some of our operations worked through the year without a compensable accident. Much credit for these fine records must be given the supervisory forces at the mines.

The total number of accidents during the year was 1034, of which 933 were slight and only required first aid treatment. 24 caused loss of less than 7 days and 75 were compensable accidents. Most of these accidents could have been prevented, which is shown in the following tables of classifications. The human element still is the principal factor in the causes of accidents and an old experienced employee is as liable to be hurt because of his carelessness or thoughtlessness as the new employee. In fact, most new employees are very careful and observant until they become used to the job and environment. Poor attitude or indifference also is the cause of accidents and is hard to overcome. As a whole, most men are cooperative and certainly want to avoid injury. Our severity rate, compared with that of all mining in the United States, is very good but can be improved by using many different methods, especially education.

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11. ACCIDENTS AND PERSONAL INJURY

TABLE I

FATAL ACCIDENT RECORD
Cleveland-Cliffs Iron Co. and Cliffs Power & Light Co.
1898--1942, inclusive

YEAR	NO. MEN EMPLOYED	NUMBER FATALITIES	FATALITY RATE
1898	1065	6	5.63
1899	1174	4	3.41
1900	1427	4	2.80
	3,666	14	3.79
1901	1317	9	6.83
1902	1485	8	5.38
1903	1551	8	5.15
1904	1338	4	2.97
1905	2038	12	6.54
	7.729	41	5.30
1906	2418	10	4.13
1907	2843	17	6.00
1908	2340	6	2.52
1909	2520	13	5.15
1910	2907	20	6.88
	13,028	66	5.06
1898 - 1910		121	4.99
1911	2633	5	1.90
1912	2335	4	1.71
1913	2621	11	4.19
1914	2435	10	4.10
1915	3308	5	1.51
	13,332	35	2.70
1916	3063	8	2.61
1917	3457	6	1.73
1918	3765	13	3.45
1919	3938	11	2.79
1920	4125	5	1.21
	18,348	43	2.36

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11. ACCIDENTS AND PERSONAL INJURY

TABLE I (Continued)

YEAR	NO. MEN EMPLOYED	NUMBER FATALITIES	FATALITY RATE
1921	2309	6	2.60
1922	2301	1	.43
1923	2728	6	2.20
1924	2472	5	2.02
1925	2472	2	.81
	12,282	20	1.61
1926	2119	4*	1.88
1927	1969	4	2.03
1928	1784	4	2.25
1929	2000	4	2.00
1930	2566	5	1.95
	10,438	21	2.02
1931	1651	3	1.82
1932	630	0	0.00
1933	631	2	3.17
1934	1073	4	3.74
1935	1313	2	1.53
	5,298	11	2.05
1936	2125	2	.94
1937	2763	1	.36
1938	2590	3	1.17
1939	2457	1	.41
1940	2756	5	1.88
	12,691	12	.94
1941	3570	5	1.40
1942	3562	2	.56
1911 - 1942		149	1.88
Including deaths in Barnes-Hecker Accident		200	2.60

* Not including loss of lives in Barnes-Hecker Accident.

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TABLE II

Classification of Causes of Fatal Accidents
From December 1, 1898 to December 31, 1942

A.	Fall of Ground	101	
	Run of Mud or Sand	60	
	Fall of Chunk of Ore from Chute	2	
	Stray Chunk or Stick down Raise or Stope	3	166
B.	Shaft Accidents:		
	Falling down Shaft	14	
	Rock or Timber Falling down Shaft	3	
	Struck or Caught by Cage, Skip, Bucket, Tool	8	
	Falling from Cage, Skip, or Bucket	11	
	Falling from Ladder in Shaft	5	
	Carried or Pushed into Shaft by Car	3	
	Jumping on or Off Cage, Skip, or Bucket	3	
	Struck by Crosshead	5	
	Struck by Falling Material	1	53
C.	Use of Explosives:		
	Explosion of Powder	16	
	Premature Blast	3	
	Fall of Ground or Timber Due to a Blast	4	
	Overcome by Gas	3	
	Miscellaneous Causes	1	27
D.	Mine and Railroad Cars:		
	Caught by Haulage Cars	13	
	Riding or Attempting to Ride Cars	6	
	Falling with Car from Trestle	4	
	Run over by Railroad Car	8	
	Struck by Locomotive	1	
	Miscellaneous Causes	1	33
E.	Miscellaneous Causes:		
	Falling in Raise, Stope or Pocket	9	
	Electric Shock	10	
	Falling from Ladder, Stage, Trestle, etc	8	
	By Moving Machinery	6	
	Mine Fires	3	
	Stockpile Slide	3	
	Miscellaneous Causes	3	42
	Total		321

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TABLE III

Classification of Fatal Accidents 1911 to 1942, inclusive, by the Central Safety Committee

I.	Trade Risks		113
II.	Negligence of the Company:		
	Violation of Rules	4	
	Failure to Provide Safety Devices	6	
	Improper Method of Doing Work	12	
	Failure to Provide Tools or Safe Place to Work	5	
	Failure to Instruct Men	4	31
III.	Negligence of Workmen:		
A.	Injured Men:		
	Improper Method of Work	21	
	Violation of Rules	9	
	Failure to Use Tools or Appliances Provided	4	
	Failure to Use Safety Devices	3	37
B.	Other Workmen:		
	Improper Method of Doing Work	14	
	Violation of Rules	4	
	Failure to Use Tools or Appliances Provided	1	19
	Total		200

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TABLE IV

NUMBER OF MAN-SHIFTS WORKED
AND TONS OF ORE PRODUCED PER FATALITY

Year	Number of Fatalities	Number of man-days Worked per fatality	Number of tons of Ore mined per fatality
1931	3	165,137	529,680
1932	0	189,000*	486,750**
1933	2	94,689	398,357
1934	4	80,477	451,046
1935	2	196,883	1,136,215
1936	2	283,945	1,850,898
1937	1	765,702	5,216,879
1938	3	163,434	385,954
1939	1	564,433	3,713,389
1940	5	142,878	1,156,387
1941	5	182,340	1,456,528
1942	2	512,356	3,808,258
Average	2.5	278,439	1,715,861

* Man-shifts worked

** Amount of ore mined

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b. Non-Fatal Accidents (Continued)

TABLE V

NUMBER OF ACCIDENTS OF ALL KINDS

Mine or Plant	Slight	Lost-time: Less than 7 days	Lost-time: 7 days or more	Fatal	Total
Athens	140	4	12		156
Maas	196	1	11		208
Negaunee	149	7	19	1	176
Cliffs Shaft	105	3	5		113
Lloyd	104	1	6		111
Tilden	8	1	1		10
Spies-Virgil	10				10
Mather	27				27
Canisteo	33	3	3		39
Holman-Cliffs	46	1	5		52
Hill-Trumbull	44		5	1	50
General Shops	14		1		15
General Storehouse	5				5
Cliffs Power & Light	11				11
Princeton Mine	35	3	7		45
Laboratory	4				4
Ishpeming Hospital	2	—	—	—	2
	933	24	75	2	1034

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11. ACCIDENTS AND PERSONAL INJURY

b. Non-Fatal Accidents (Continued)

TABLE VI

CAUSES OF COMPENSABLE ACCIDENTS, INCLUDING FATALITIES

UNDERGROUND

Cause	Athens	C.S.	Lloyd	Maas	Mather	Neg.	Princeton	Spies	Totals
Falls of ground	6		4	4		7	2		23
Chunks rolling down pile			1						1
Handling timber and other materials	1			1		1	1		4
Loading at chutes		1							1
Falls of persons slipping or stumbling		2		2		3			7
Falling or moving material	2	1	1	3		3	2		12
Stepping on nails						1			1
Handling or using machinery	1			1					2
Flying or bounding objects			1			2			3
When using tools							1		1
Total underground	10	4	7	11		17	6		55