

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

g. Open Pit Mining and Loading:

Ore production was started in the pit on May 22nd, and continued through October 26th. Operations were conducted on a schedule of two 8-hour shifts per day and six days per week until September 2nd, when activities were reduced to a five day week basis. A total of 1,072,698 tons of crude ore was mined to produce 546,486 tons of concentrates. A low average weight recovery of 50.94% was realized because of the large proportions of low recovery limonites used throughout the year to combat the prevailing high silica of the hematite ores. Because of the spotty nature of the available ores, frequent shovel moves were necessary to solve the grading problems.

The persistent heavy rains during the first half of the season, flooded the pit bottom and disrupted the planned sequence of operations by delaying the accessibility of some bottom ores. This resulted in the upper wash ores being depleted ahead of the lean ore and waste material which was being removed by a small crew on the third shift. It was necessary, therefore, to suspend mining operations for five days during the latter part of July, to clean up 41,747 yards of lean and waste ore material.

Mining operations were conducted in all three leases and in four major, separate areas. The total Snyder concentrate production of 287,122 tons consisted of a credit in stockpile overrun of 20,660 tons and the remainder was mined in the Middle and East Snyder forties. Considerable tonnage was derived by scam operations along the bottom taconite in an area involving both forties, about their common property line. About equal portions were mined in the southwest corner of the east forty, where an extension of operations over the line lead to additional scam work in the Mid-Snyder, and the southeast corner of the east forty, where the line crossing resulted in a Hemmens production of 2,122 tons of concentrates. The 277,902 tons of South Bovey concentrates was mined in the upper layers, made available by the previous fall and winter stripping.

The Snyder operations were generally concentrated into the areas on each side of the main haulage road in the East Snyder forty. High silica ores from the formation immediately above the paint-rock were mixed with low silica limonitic ore from the lower horizon. Both Bessemer and Non-Bessemer concentrates were secured from the low weight recovery material. Approximately 50,000 tons of concentrate were produced in the scamming operations in the pockets and channels along the taconite bottom. After the excessive rock was sorted out, the resulting crude ore had a good weight recovery.

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

g. Open Pit Mining and Loading:

In the South Bovey, the ore operations were conducted in three general lifts, or horizons. The upper lift of lean limonitic ore had a low silica, low phosphorous content, which made it desirable for grading. The intermediate horizon consisted of high and low grade ores in the regular sand and ore layers, which graded into spotty horses of rock. The bottom lift yielded some high grade crude material in narrow concentration channels in the paintrock zone, with high grade ore at the center of the channel and lean rocky material near the blocky side walls. Most of the concentrates produced from the South Bovey were of Bessemer grade.

Throughout the entire season, the variable nature of the crude ore made it necessary to shift the shovels frequently. These never were stepped up considerably during the rainy season, when the lower limonitic ores were not available.

k. Drainage:

An attempt was made to lower the sump water about ten feet below last year's level, which was not successful until after the heavy rains during the first half of the ore season. Outside of the grading problems created by the high water of the first half, no serious drainage difficulties were encountered.

During the stripping season, in December, a channel was cut from the main sump to the basin on the west side of the main haulage road, to establish a free flow of water, thus reducing the amount of secondary pumping that will be required for future ore operations in the basin region.

8. COST OF OPER-  
ATION:

a. Comparative Mining Costs:

<u>PRODUCT:</u>	<u>BUDGET</u> <u>ESTIMATE</u>	<u>COST PER TON</u> <u>1 9 4 4</u>	<u>COST PER TON</u> <u>1 9 4 3</u>
Concentrates, (tons)	500,000	567,146	585,016
Average Tons Per Shift,		2,344	2,511
Tons Per Man Per Day,		34.74	31.77
Days Operated,		125	148

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

a. Comparative Mining Costs:

<u>COST:</u>	<u>BUDGET</u> <u>ESTIMATE</u>	<u>COST</u> <u>PER TON</u> <u>1944</u>	<u>COST</u> <u>PER TON</u> <u>1943</u>
Open Pit Crude Ore,	\$ .189	\$ .171	\$ .196
General Pit Expense,	.173	.168	.158
Concentrating,	.122	.113	.122
Stocking and Loading Concentrates,	.006	.003	.003
General Mine Expense,	.081	.076	.081
Idle and Winter Expense,	.150	.171	.178
Cost of Production,	\$ .721	\$ .702	\$ .738
Depreciation - Plant and Equipment,		\$ .116	\$ .108
Depreciation - Motorized Equipment,		.041	.043
Amortization - Stripping,		.250	.250
Taxes - Ad Valorem,		.141	.140
Taxes - Occupational,		.072	.144
Taxes - Royalty,		.033	.031
Total Cost at Mine,		\$1.353	\$1.454
Administrative Expense,		.050	.050
Miscellaneous Expense and Income,		.035	.003
GRAND TOTAL,		\$ 1.368	\$ 1.501

d. Detailed Cost Comparison:

(1) Product:

The annual production figures for 1944 and 1943 were similar enough to afford a good basis for cost comparisons. However, the 1944 production had the advantage of a credit in the stockpile overrun and 1943 was handicapped by a period of curtailment in production to the more expensive, single-shift operations; both contributing to a cost variation in favor of the 1944 operations. The budget estimate for 1944 was based, largely, on the previous year's costs, showing anticipated savings under the captions affected by a proposed elimination of any single shift operation. The actual saving, as compared to the budget, was due, largely, to the stockpile overrun credited to the 1944 operations.

(2) Open Pit Mining:

On the basis of crude ore mining, the budget showed an anticipated saving of \$.009 per ton below the 1943 costs, however, actual operations reflected a further improvement of four mills for a total cost reduction of \$.013. The "Drilling and Blasting" of 1944 was \$.002 under the budget and \$.004 under the 1943 costs, and likewise, "Power Shovels Maintenance" was \$.005 below both the estimated and previous year's costs. The savings

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

reflected under both captions was due, mainly, to the heavy development of limonitic layers in which the more effective horizontal drilling was possible and, subsequently, more convenient conditions for shovel excavations. On the other hand, the low tonnage recovery of the limonite reflects a disadvantage in the conversion of the crude ore to the concentrate cost which is directly proportional to the weight recovery. The concentrate cost was estimated at \$.189 per ton, as compared with the \$.196 of the 1943 costs. The large variation, indicated by the actual cost of \$.171 per ton, was due, largely, to the concentrate overrun of the stockpile, which was a credit over and above the actual tonnage recovered from the 1944 pit operations.

(3) General Pit Expense:

Under this heading, a budget cost of \$.173 per ton was set up higher than the \$.158 of 1943, due, mainly, to anticipated heavier lean ore and waste movements. The 1944 expenses amounted to \$.168; exceeding the previous year's costs, mainly, because of an increase of \$.013 in Stocking Lean Ore and Waste, and was under the estimate, mainly, because of a saving of \$.006 in Pumping and Drainage. The net totals of the lesser variations in the remaining captions favored the 1944 costs in this comparison.

(4) Concentrating:

The 1944 concentrating operations resulted in a saving of \$.009 as compared with both the estimated and previous year's costs. The largest difference, in the Maintenance of Buildings and Machinery, was \$.005 below the budget and \$.006 below the 1943 figure. Contributing heavily towards this saving was the overhauling of machinery with skeleton crews in July, during the five day period of lean material movement, which reduced considerably the total of delays encountered in plant operations.

(5) Stocking and Loading Concentrates:

The 1943 cost per ton was \$.002 for stocking only while the budget was set at \$.006 to cover the loading of the stockpile on hand and the anticipated stocking of a similar pile. The 1944 cost was \$.003, practically for loading only, as very little stocking took place.

(6) General Mine Expense:

Under this heading, the budget exceeded by \$.005 per ton, the equivalent total costs of 1944 and 1943, due to nominal variance in the numerous sub-headings.

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison: (Continued)

(7) Idle and Winter Expense:

The 1944 cost per ton was \$.007 below the 1943, but exceeded the estimated cost by \$.021. The excess was due, mainly, to an early arrival of material and supplies, for 1945, and the policy of immediate absorption into costs of all expenses incurred by such deliveries.

9. EXPLORATIONS  
AND FUTURE  
EXPLORATIONS:

A grand total of 5,219 feet and 9 inches in structural drilling, accomplished during the year, consisted of 4,387 feet in exploratory work and 822 feet and 9 inches for sample information. The exploration work, in the South Bovey, amounted to 1,546 feet of drilling and outlined quite definitely the south ore limits of the area. The 1,289 feet drilled in the Hemmens forty showed low grade ore extensions, but several additional holes will be required to define the outlines. Exploration holes, amounting to 1,479 feet and 6 inches of drilling, on the north side of the Mid-Snyder forty, revealed an additional half million tons of comparatively good ore in that area. A 72-1/2 foot hole was drilled into the barren formation in the northwest corner of the NE $\frac{1}{4}$ -NW $\frac{1}{4}$  Snyder forty, to verify the availability of the area to dump space. The sample holes were drilled in the Snyder and Hemmens forties to guide the season's ore operations.

Future drilling will be conducted to outline the ore boundaries of the Hemmens forty and probe the possibilities of ore extensions in the East Bovey forty. Quite an extensive sample drilling program will be required during the coming ore season in the South Bovey to outline the various grades of the spotty formation.

10. TAXES:

The following statement shows the Canisteco Mine taxes and the average annual rates for 1944 and 1943:

	1 9 4 4	1 9 4 3	Increase	Decrease
Canisteco Mine,	\$ 75,473.34	\$76,509.19		1,035.85
Washing Plant Lands,	525.08	499.28	\$ 25.80	-
Personal Property,	2,473.56	2,733.09		259.53
Total,	\$ 78,471.98	\$79,741.56		1,269.58
Village Lots,	\$ 191.59	\$ 179.12	\$ 12.47	
GRAND TOTAL,	\$ 78,663.57	\$79,920.68		\$1,257.11
Average Tax Rate,	108.14	101.12	7.02	

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

10. TAXES:  
(Continued)

The mine taxes were decreased by the deduction of the 1944 ore shipments. The taxes on Washing Plant Lands showed a small increase, due to a slightly higher tax rate. The Personal Property taxes were less because of the depletion of the concentrate stockpile prior to May 1st and the lower valuation on equipment.

11. ACCIDENTS  
AND  
PERSONAL  
INJURY:

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

Name: George Hoss Date: January 10th.  
Cause: The Ford V-8 truck was parked in the machine shop over the week-end. On Monday morning, the battery was dead and the electrician changed the battery, but the truck would not start, as the fuel line was plugged. Hoss laid under the truck, disconnected the pet cock from the tank, plugging the hole in the tank with a finger of his left hand, while another man blew out the pet cock and returned it to Hoss to replace. During the operation, some gasoline spilled into a container set on the floor for that purpose, some dribbled down his left hand and sleeve and onto the floor. Probably a spark from an acetylene cutting torch in operation 26 feet away, landed and ignited the spillage of gasoline on the floor. In his excitement, Hoss tried to beat out the flame on the floor and in so doing, released the remaining gasoline from the tank, which immediately ignited, setting fire to his clothes. Hoss got up and ran and before a fellow worker wrapped a coat over him, to extinguish the flames, some serious burns resulted, especially along his left forearm, and wrist.  
Nature: Third, second and first degree burns of left hand, wrist and forearm, first degree burns multiple areas of face.  
Time Lost: Twenty-four days.  
Compensation: \$80.00

Name: Onnie Koski Date: February 21st.  
Cause: Koski, engaged as a driller helper at the blast-hole drill, was carrying a drill bit, when it slipped out of his hands and onto his right foot.  
Nature: Contusion of dorsum of right foot, along first metatarsal and big toe.  
Time Lost: Two days

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY:  
(Continued)

Name: Clinton Siltberg Date: June 19th.  
Cause: Siltberg was going to dump with his loaded truck, when he noticed another truck, coming down empty from the dump, coming his way. Siltberg drove off the road as far as he dared, or could, to try to avoid collision. When he noticed this was inevitable, he jumped out of his truck cab, before the trucks met. His injury resulted either in striking his head against the truck cab, when he jumped, or in striking some object with his head, when he landed on the ground. Injured party does not know.  
Time Lost: Five days.

Name: Russell Goudge Date: July 13th.  
Cause: The pipe line from the main pit pumps, leading over the south bank of the Canisteco pit, was being changed. This pipe line ran over a rock ledge which protruded from the bank, about 25 feet from the pit bottom. Goudge was sitting on this rock ledge, about 16" thick, placing a clamp on the pipe line, when suddenly the rock broke loose and Goudge fell to the pit bottom, landing on his back.  
Nature: Fracture of four ribs, left chest, near spine; punctured lung; contusion and laceration about face; shock.  
Time Lost: Forty-two days.  
Compensation: \$147.22.

12. NEW CONSTRUCTION  
AND PROPOSED  
NEW CONSTRUCTION:

The only construction during 1944 was at the washing plant, where the Minerals Separation Company financed and installed a small, experimental plant for the concentration of wash ore tailings by flotation. Outside of the necessary erections at the washing plant, for the proposed new Stearns-Roger concentrators, no new construction is contemplated for 1945.

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

13. EQUIPMENT AND  
PROPOSED  
EQUIPMENT:

The new equipment received during 1944 were: four, 20-ton Euclid trucks and a mechanical furnace stoker for the office.

Scheduled for delivery in 1945 are: two more 20-ton Euclids and a stoker for the shop heating plant. Two new Stearns-Roger Concentrators are to be installed at the plant, to replace two of the Akins classifiers. A new centrifugal Carver pump, 600 G.P.M., was ordered for the additional water anticipated with the lowering of the pit bottom. Proposed, also, is a new 120-B Bucyrus-Erie electric shovel, to improve the efficiency of stripping operations and simplify the grading problems.

14. MAINTENANCE  
AND REPAIRS:

One of the Bucyrus-Erie shovels was overhauled during the time that the stripping crews were loaned to the Holman Mine, and the other immediately after, during the pre-ore season clean-up period.

Maintenance and repair work on the Euclid trucks was carried on continuously during the ore and stripping seasons.

The churn drills and tractors were overhauled completely during the winter and spring months.

The washing plant machinery and equipment received a complete overhauling prior to the 1944 ore season and post-season repairs were started again in the fall.

18. NATIONALITY OF  
EMPLOYEES:

<u>NATIONALITY:</u>	<u>NO. OF MEN</u>
American, -----	110 ?
Finnish, -----	9
Swedish, -----	3
Jugo-Slav, -----	2
Canadian, -----	2
Italian, -----	1
Norwegian, -----	1
Montenegrin, -----	1
Belgian, -----	1
Total, -----	130



CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:

The washing plant was operated a total of 121 days from May 22nd to October 26th, inclusive. Coinciding with schedules of ore operations in the pit, the plant worked two 8-hour shifts per day on the basis of six and five days per week. Only two shifts during the season were necessarily devoted to repairing equipment, due to a mid-season overhauling period afforded by the five days of lean material movement in the pit.

A total of 1,072,698 tons of crude ore was washed during the year, to produce 546,486 tons of concentrates, showing an average weight recovery of 50.94%. The low recovery was a result of the large proportions of limonites necessarily used in the crude mixtures to control the high silica tendencies of the hematite ores. Considering the low recovery and, at times, the slower handling wet ores from the bottom of the pit, the plant operated quite satisfactorily as very few machinery delays were encountered during the season.

The total stockpile, of 64,051 tons of concentrates, was loaded and shipped in April, showing an overrun of 20,660 tons. During the operating season, comparatively few periods of railroad car shortages developed. For the continuity of plant operations during the shortages, 3,729 tons of concentrates were stocked. This tonnage remains in the stockpile.

The tonnage and analyses of the plant rejects for the season are compiled below:

5 x 14 Screen Rejects				
<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Snyder,	14,969	27.73	.036	54.78
Bovey,	8,312	28.29	.027	54.02
Hemmens,	180	32.28	.028	47.24
Total,	23,461	27.96	.033	54.45
36" Belt Rejects				
<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Snyder,	11,541	24.61	.038	58.84
Bovey,	9,201	24.84	.024	58.17
Hemmens,	174	27.95	.029	55.96
Total,	20,916	24.74	.032	58.52

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

Tabulated below is the amount of pit rock removed and placed on the waste dump:

<u>Lease</u>	<u>Cubic Yards</u>	<u>Tons</u>	<u>Iron</u>
Snyder,	4,393	6,533	33.15

The following tabulation show the totals of lean materials sorted from the ore areas during mining operations and removed during the spring clean-up period:

<u>Lease</u>	<u>Lean Ore</u>		
	<u>Cubic Yards</u>	<u>Tons</u>	<u>Iron</u>
Snyder,	38,328	67,075	29.17
Bovey,	67,960	118,933	28.84
<b>Total,</b>	106,288	186,008	28.96

<u>Lease</u>	<u>Waste Materials</u>		
	<u>Cubic Yards</u>	<u>Tons</u>	<u>Total</u>
Snyder,	79,192	51,703	130,897
Bovey,	-	13,411	13,411
<b>Total,</b>	79,192	65,114	144,308

The analyses of products from the various mill machines for the year 1944, were as follows:

Snyder Mill Machines:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Log Washer,	56.78	.047	11.36
Classifier,	56.95	.042	11.99
Tailings,	23.60		

Bovey Mill Machines:

Log Washer,	56.34	.039	11.52
Classifier,	56.50	.036	12.06
Tailings,	25.17		

Hemmens Mill Machines:

Log Washer,	56.10	.045	12.13
Classifier,	56.78	.038	11.95
Tailings,	29.93		

CANISTEO MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

	<u>Tonnage</u>	<u>% of Total Mined</u>	<u>% Dried Iron</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Materials removed in mining operations (Exclusive of Surface)	1,288,700	100.00	39.38		
Less: Lean Ore Stocked in mining,	186,008	14.43	28.96		
	1,102,692	85.57	41.14		
Less: Pit Rock Wasted,	6,533	.51	33.15		
Total Transported to Mill,	1,096,159	85.06	41.19		
Less: Rock Rejects in Screening Plant,	23,461	1.82	27.96		
Crude Ore Entering Mill,	1,072,698	83.24	41.48		
Concentrates Produced,	567,146	44.01	56.61	52.87	72.16
Rock Rejects on Mill Picking Belt,	20,916	1.62	24.74		
Tailings - (by deduction),	484,636	37.61	24.49		
Total heads, as above (Entering Mill)	1,072,698	83.24	41.48		
Total Pit Rock, Screening Plant Re- jects and Lean Ore,	216,002	16.76	28.98		
Total,	1,288,700	100.00	39.38		

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

1. GENERAL:

The cycle of activities at the Holman-Cliffs Mine followed practically the same pattern as that existing in previous years. The major operations of mining, concentrating and stripping were carried on in proper season, with the related activities of pumping and exploration going on continuously. The incidental work of repairing, maintenance and building was performed at opportune times, or when immediately required.

The 1944 ore season was opened with the loading of Bingham direct shipping ore, on April 19th, and loading from stockpile, at the washing plant, on April 20th. Direct ore was loaded continuously, on the day shift only, until the first of August. After this time the operation became intermittent, due to conditions in the pit, and was finally completed about the middle of November. Stockpile loading was continued until May 15th, and was resumed for a few days in November,

Full scale mining and washing operations were started on May 15th and continued until October 27th. Wash ore mining and concentrating was conducted on two, eight hour shifts per day, six days per week, until September 2nd, when the operating schedule was cut to five days per week for the balance of the season. During the months of May, June, July and into the latter part of August, all of the wash ore was produced from the Bingham and North Star properties. By this time the major portion of the available wash ore had been exhausted from the North Star and a one shovel operation was started in the Holman-Brown No. 2 pit bottom, in the vicinity of the line separating these two properties. During the remainder of the season, all of the wash ore was produced from the Bingham and Holman-Brown No. 2 leases, with the exception of small quantities from the Brown No. 1 and North Star.

The washing plant season extended over a period of 128 days, from May 15th, to October 27th. The same working schedule was in force here as in the pit. Operating conditions were generally satisfactory, and a fair average daily production was maintained. It was necessary to stockpile concentrates on numerous occasions, when railroad cars were not available for loading.

Stripping operations, continued from 1943, were confined to the Bingham property during January and February. On March 14th, activities were extended to the Holman-Brown No. 2, where one shovel was in service until the latter part of June, after which time lean ore and waste material were removed as mining conditions required.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

1. GENERAL:  
(Continued)

The major operations were conducted in the Bingham, where surface material was removed, back to the southern pit limits. The surface stripping was carried in three lifts; two of the benches being attacked at the same time. In addition to the work done in removing the original layer of overburden, considerable clean-up was done about the pit and the material from a filled-up erosian channel was removed, at the north end of the property.

The stripping in the Holman-Brown No. 2 area consisted in the removal of taconite, paintrock and lean ore, which occurred on top of the wash ore.

The pumps were operated continuously throughout the year, the water being handled in two stages and discharged over the north bank. It was not necessary to lower the sump during 1944, but subsequent deeper mining will require that the excavation be carried to a lower level.

Drilling, under contract, was carried on as a continuous program during 1944. Holes were put down on the Bingham, North Star and Brown No. 2 properties, with the greatest concentration of effort on the Bingham, where both exploratory and sample drilling was done. Only exploratory holes were drilled on the North Star and Brown No. 2 leases.

Repairing of equipment, which was started at the shops and washing plant in the fall of 1943, was continued during the winter and spring months of 1944. All of the pit equipment, including three locomotives, three power shovels, two blast hole drills and the thirty-yard cars, was given a complete overhauling. The washing plant machinery was taken apart and all necessary repairs made prior to the 1944 ore season.

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:

a. Production by Grades:

Holman Crude, -----	36,671 tons
Brown Crude, -----	68,487 "
North Star Crude, -----	153,895 "
Bingham Crude, -----	729,454 "
<b>TOTAL CRUDE, -----</b>	<b>988,507 "</b>

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

a. <u>Production by Grades: (Continued)</u>		
Holman-Non-Bessemer Concentrates, -----		8,543 tons
Holman Bessemer Concentrates, -----		17,343 "
Brown Non-Bessemer Concentrates, -----		6,539 "
Brown Bessemer Concentrates, -----		35,056 "
North Star Non-Bessemer Concentrates, -----		48,784 "
North Star Bessemer Concentrates, -----		62,975 "
Bingham Non-Bessemer Concentrates, -----		294,207 "
Bingham Bessemer Concentrates, -----		205,004 "
Bingham Bessemer Cone Concentrates, -----		6,344 "
Bingham Non-Bessemer Direct, -----		218,100 "
Bingham Bessemer Direct, -----		<u>143,290 "</u>
TOTAL PRODUCTION, -----		1,046,185 "
b. <u>Shipments:</u>		
Holman Bessemer Concentrates, -----		79,215 "
Holman Non-Bessemer Concentrates, -----		63,236 "
Brown Non-Bessemer Concentrates, -----		27,733 "
Brown Bessemer Concentrates, -----		50,684 "
North Star Non-Bessemer Concentrates, -----		48,784 "
North Star Bessemer Concentrates, -----		62,975 "
Bingham Non-Bessemer Concentrates, -----		252,650 "
Bingham Bessemer Concentrates, -----		205,004 "
Bingham Bessemer Cone Concentrates, -----		6,344 "
Bingham Non-Bessemer Direct, -----		218,100 "
Bingham Bessemer Direct, -----		<u>143,290 "</u>
TOTAL SHIPMENTS, -----		1,158,015 "
c. <u>Stockpile Inventories:</u>		
Bingham Non-Bessemer Concentrates, -----		41,557 "

The following is a statement of the lean material now in stock:

Concentrating Material Above 25%:

	Tons	Iron	Phos.	Silica
Holman,	26,896	32.16		
Brown,	256,908	30.85		
North Star,	20,658	26.29	.046	49.24
Bingham,	92,919	30.78	.038	50.60

Coarse Non-Concentrating Material Above 40%:

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

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

c. Stockpile Inventories: (Continued)

Paint Rock Above 45%

	Tons	Iron	Phos.	Silica
Bingham,	18,617	47.58	.040	25.98

e. Production by Months:

(1) Crude Ore:

	<u>HOLMAN</u>	<u>BROWN</u>	<u>NORTH STAR</u>	<u>BINGHAM</u>	<u>TOTAL</u>
May,			26,501	87,853	114,354
June,			58,856	148,262	207,118
July,			27,402	148,623	176,025
August,	17,526	18,023	21,088	121,124	177,761
September,	18,624	26,294	8,643	116,970	170,531
October,	521	24,170	11,405	106,622	142,718
<b>TOTAL,</b>	36,671	68,487	153,895	729,454	988,507

(2) Concentrates and Direct Ore:

	<u>HOLMAN</u> <u>CONCTS.</u>	<u>BROWN</u> <u>CONCS.</u>	<u>NORTH STAR</u> <u>CONCTS.</u>	<u>BINGHAM</u> <u>CONCTS.</u>	<u>BINGHAM</u> <u>DIRECT</u>	<u>TOTAL</u>
April,					25,599	25,599
May,			18,788	61,747	98,614	179,149
June,			43,647	110,202	81,245	235,094
July,			19,984	105,066	69,069	194,119
August,	10,399	10,324	15,677	86,348	28,702	151,450
September,	10,696	15,179	6,088	77,709	26,059	135,731
October,	439	15,368	7,575	64,483	19,230	107,095
November,					12,872	12,872
<b>TOTAL,</b>	21,534	40,871	111,759	505,555	361,390	1,041,109

f. Ore Statement:

On January 1st, 1944, we showed remaining in stockpile, 36,822 tons of Brown and 116,565 tons of Holman Concentrates. This tonnage was loaded out during April and May and a stockpile overrun of 4,352 tons of Holman and 724 tons of Brown Concentrates developed in cleaning up the pile. On December 31st, 1944, there remained in stockpile - 41,557 tons of Bingham Concentrates, which was stockpiled during the season.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

g. Delays:

The following is a statement, on a cumulative basis, of the delays reported during the year 1944:

<u>Time Lost</u>		<u>Cause</u>
<u>Hours</u>	<u>Minutes</u>	
26	10	Inadequate railroad service on empty cars and loads.
29	45	Transportation trouble - derailments, track cleaning, track repairs and locomotive repairs.
88	15	Shovel delays, moving and repairing.
7	35	Power failure due to storms and mechanical trouble.
16	30	Operations interrupted because of weather conditions - rain, fog, etc.
20	-	Trouble at the pit ramp, repairing ramp, air compressor and freeing material lodged in pockets.
19	30	Repairing washing plant equipment.
1	45	Euclid truck delays
25	-	Washing plant operating delays, due to power trouble during storms, chutes plugging on account of wet, sticky ore and motor trouble on the classifiers.
<u>234</u>	<u>30</u>	Total

The notes giving the cause of delays are self-explanatory.

3. ANALYSIS:

a. Mine Analysis of Production:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Fe. Nat.</u>
Holman N.B. Concts.	4,191	56.31	.046	12.56	.31	.77	8.21	51.69
Holman Bess. Concts.	17,343	57.73	.036	11.73	.24	.75	8.15	53.03
Brown N.B. Concts.	5,815	57.69	.042	11.33	.29	.71	8.07	53.03
Brown Bess. Concts.	35,056	57.43	.034	12.42	.18	.65	7.56	53.09
North Star N.B. Concs.	48,784	57.65	.051	10.95	.35	.58	7.74	53.19
North Star Bess. Concs.	62,975	58.89	.037	10.36	.26	.59	7.30	54.59
Bingham N.B. Concts.	294,207	57.96	.051	10.97	.40	.70	8.02	53.31
Bingham Bess. Concs.	205,004	59.23	.038	10.50	.31	.65	7.50	54.79
Bingham Bess. Cone Concs.	6,344	57.93	.036	13.26	.13	.60	5.99	54.46
Bingham N.B. Direct	218,000	57.78	.057	11.00	.51	1.61	11.83	50.95
Bingham Bess. Direct	143,290	59.15	.038	10.70	.31	1.47	11.34	52.44
<b>TOTAL</b>	<b>1,041,109</b>	<b>58.35</b>	<b>.046</b>	<b>10.89</b>	<b>.37</b>	<b>.81</b>	<b>9.09</b>	<b>53.05</b>



HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

3. ANALYSIS:(Continued) b. Mine Analysis of Shipments:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Fe. Nat.</u>
Holman N.B. Concts.	63,236	56.98	.048	11.59	.31	.65	6.56	53.24
Holman Bess. Concts.	79,215	57.34	.038	11.68	.28	.67	6.68	53.51
Brown N.B. Concts.	27,733	57.29	.043	11.48	.27	.66	7.07	53.24
Brown Bess. Concts.	50,684	57.43	.035	12.21	.20	.63	7.26	53.26
North Star N.B.Concs.	48,784	57.65	.051	10.95	.35	.58	7.74	53.19
North Star Bess.Concs.	62,975	58.89	.037	10.36	.26	.59	7.30	54.59
Bingham N.B. Concs.	252,650	57.96	.052	10.79	.41	.70	8.02	53.31
Bingham Bess.Concs.	205,004	59.23	.038	10.50	.31	.65	7.50	54.79
Bingham Bess. Cone Concs.	6,344	57.93	.036	13.26	.13	.60	5.99	54.46
Bingham N.B. Direct,	218,100	57.78	.057	11.00	.51	1.61	11.83	50.95
Bingham Bess.Direct	143,290	59.15	.038	10.70	.31	1.47	11.34	52.44
<b>TOTAL,</b>	<b>1,158,015</b>	<b>58.20</b>	<b>.046</b>	<b>10.95</b>	<b>.36</b>	<b>.94</b>	<b>8.77</b>	<b>53.10</b>

c. Mine Analysis of Ore in Stockpile:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Fe. Nat.</u>
Bingham Concts.	41,557	57.92	.043	12.06	.31	.71	8.03	53.27

d. Average Analysis of Crude Ore Production:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Holman,	36,671	46.32	.035	28.40
Brown,	68,487	46.21	.032	29.01
North Star,	153,895	49.59	.041	23.78
Bingham,	729,454	49.06	.043	25.05
<b>Total,</b>	<b>988,507</b>	<b>48.84</b>	<b>.042</b>	<b>25.25</b>

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

3. ANALYSIS:  
(Continued)

e. Complete Analyses of Season's Shipments:

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Holman N.B. Concs.	57.02	.048	11.52	.31	.64	.27	.17	.010	5.34
Holman Bess. Concs.	57.34	.038	11.68	.28	.67	.26	.16	.010	4.77
Brown N.B. Concs.	57.69	.042	11.33	.29	.71	.27	.15	.010	4.56
Brown Bess. Concs.	57.43	.035	12.21	.20	.63	.30	.15	.010	4.24
North Star N.B.Concs.	57.65	.051	10.95	.35	.58	.29	.14	.011	5.02
North Star Bess.Concs.	58.89	.037	10.36	.26	.59	.30	.16	.012	3.94
Bingham N.B.Concs.	57.96	.051	10.97	.40	.70	.33	.19	.011	4.27
Bingham Bess.Concs.	59.23	.038	10.50	.31	.65	.34	.20	.010	3.10
Bingham N.B.Direct	57.78	.057	11.00	.51	1.61	.32	.18	.012	3.44
Bingham Bess.Direct	59.15	.038	10.70	.31	1.47	.35	.20	.010	2.19
Bingham Bess. Cone Concs.	57.93	.036	13.26	.13	.60	.34	.20	.010	2.51

4. ESTIMATE OF  
ORE RESERVES:

a. Developed Ore:  
Factors Used:  
All Leases:

	<u>CU. FT.</u> <u>PER TON</u>	<u>RECOVERY</u>
Wash Ore, -----	14	60.21
Lean Wash, -----	15	47.25
Low Grade Wash, -----	14	58.28
Lean Low Grade Wash, -----	15	44.66
Rocky Wash, -----	14	58.50
Retreat, -----	14	39.20
Direct Ore, -----	13	-

The percentages of recovery shown in the above table are based on the results of actual hand-wash tests made on drill hole samples.

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

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

4. ESTIMATE OF  
ORE RESERVES:  
(Continued)

a. Developed Ore: (Continued)

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:

<u>PROPERTY</u>	<u>REPORTED</u> <u>1-1-44</u>	<u>MINED</u> <u>1944</u>	<u>BALANCE</u> <u>AFTER</u> <u>MINING</u>	<u>DEVELOPED</u> <u>BY</u> <u>DRILLING</u>	<u>RESERVE</u> <u>1-1-45</u>
Bingham,	2,329,443	866,945	1,462,498	175,089	1,637,587
North Star,	780,345	111,759	668,586	-	668,586
Brown No.1,	585,828	22,700	563,128	-	563,128
Brown No.2,	3,921,372	18,895	3,902,477	-	3,902,477
Holman,	2,838,611	25,886	2,812,725	-	2,812,725
Total Holman-Brown,	7,345,811	67,481	7,278,330	-	7,278,330
Total Bingham-North Star,	3,109,788	978,704	2,131,084	175,089	2,306,173
GRAND TOTAL,	10,455,599	1,046,185	9,409,414	175,089	9,584,503

The reserve estimate, as of January 1, 1945, was arrived at by deducting the quantities of ore produced from the several leases during 1944, from the reserve tonnages shown in the 1943 estimate and adding the 175,089 tons disclosed by drilling in the Bingham property.

The completed exploration data available on January 1st, 1945, shows no increase in the reserve tonnages on the Holman-Brown and North Star leases. However, in the case of the Bingham, a new estimate, based on the 1945 drilling, showed an increase of 175,089 tons.

b. Prospective Ore:

While the exploratory drilling at the Holman-Cliffs Mine has not been entirely completed, it is not anticipated that there will be any substantial increase in the reserve tonnage through additional drilling. However, it is expected that new developments in treating lean and jig ores will eventually increase the tonnage of jig, or retreat ore set up for this property.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

4. ESTIMATE OF  
ORE RESERVES:  
(Continued)

c. Estimated Analyses:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>
<u>North Star-Bingham:</u>						
Bessemer Direct,	34,782	58.00	.040	11.70	.40	2.50
Non-Bessemer Direct,	104,344	57.00	.050	12.30	.40	2.50
Bessemer Concentrates,	1,165,223	57.81	.039	11.32	.19	.71
Non-Bess. Concentrates,	1,001,824	57.48	.054	11.13	.31	.66
<u>Holman-Brown:</u>						
Bessemer Concentrates,	2,558,830	59.15	.034	9.83	.17	.44
Non-Bess. Concentrates,	4,719,500	57.12	.052	11.81	.16	.49
Total Bessemer Direct,	34,782	58.00	.040	11.70	.40	2.50
Total Non-Bess. Direct,	104,344	57.00	.050	12.30	.40	2.50
Total Direct,	139,126	57.25	.047	12.15	.40	2.50
Total Bess. Concentrates,	3,724,053	58.73	.035	10.30	.18	.52
Total Non-Bess. Concts.	5,721,324	57.18	.053	11.69	.18	.52
Total Concentrates,	9,445,377	57.40	.046	11.14	.18	.52
Total Bessemer,	3,758,835	58.72	.035	10.31	.18	.54
Total Non-Bessemer,	5,825,668	57.18	.053	11.70	.18	.55
Grand Total,	9,584,503	57.78	.046	11.15	.18	.55

It will be noted that the average analyses of the total reserve tonnage is slightly lower than that for 1943. This is the result of adjustments made on the Bingham ore analyses in consideration of the class of ore mined in 1944.

5. LABOR & WAGES:

a. Comments:

(1) Labor:

Labor conditions remained practically the same as during the previous year. There were no surplus men available at any time and required operating crews were maintained with difficulty. The shortage of labor leads men to take an attitude of indifference to their jobs and as a result, absenteeism is quite prevalent. The present class of labor is low, as compared to that of normal times.

The relationship between the union and management was quite satisfactory during 1944. There were only minor grievances, which were settled without difficulty.

There was no increase in wage rates during 1944.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

5. LABOR & WAGES:  
(Continued)

b. Comparative Statement of Wages & Product:

<u>PRODUCTION:</u>	
Concentrates,	684,795 tons
Direct Ore,	<u>361,390 "</u>
Total,	1,046,185 "
Number of Days Operated, (Three 8-hour shifts)	161
Average Number of Men Working,	192
Average Wages Per Day,	\$ 8.26
Product Per Man Per Day,	31.03 tons
Labor Cost Per Ton,	\$ .266
Total Number of Days,	33,713
Amount Paid for Labor,	\$278,617.95

6. SURFACE:

a. Buildings, Repairs:

General repairs were made on fifty-three of the houses in Taconite during 1944. The total expended for this purpose amounted to \$8,353.25. There were five of the dwellings that received rather extensive repairs and the work on the others was more or less in the nature of regular upkeep.

The work done on the houses consisted of plastering and interior decorating; chimney and roof repairs; exterior painting; foundation replacements; furnace repairs; electric wiring and plumbing repairs and installations.

The shop building received repairs to the extent of \$376.38.

c. Tracks, Roads, Transmission Lines, etc:

Due to a shortage of labor and but a skeleton track crew, it was impossible to properly maintain the main haulage tracks during the mining operation. However, at the close of the season, the crew was augmented by men from the concentrating plant and maintenance work was conducted as long as weather would permit.

A truck haulage road, for handling stripping from the Holman and Brown No. 2 properties, was established along the south and east banks of the Brown No. 2 pit.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

6. SURFACE:  
(Continued)

c. Tracks, Roads, Transmission Lines, etc: (Continued)

The south end of the road, leading from the pit to the shops, was reestablished to the west of the old location. This was accomplished by making a fill with stripping material from the pit.

A new section of transmission line was extended into the Bingham pit, to serve the shovels and pumps, and a line was built to supply power and light to the Testing Laboratory and Truck Shop.

A selective ground protective system was installed in the Holman-Cliffs pit, in connection with electric power delivered to shovels, pumps, etc. The purpose of this installation is to protect other units from interrupted service if some one unit has trouble and also is a protection against personal injury to workmen.

7. OPEN PIT:

a. Stripping:

Stripping operations, started in the fall of 1943, were continued during the winter and spring months on a full-scale and were carried through the ore operating season, as mining conditions required, in the removal of paintrock, waste and lean ore. Regular operations were conducted on a schedule of three shifts per day, seven days per week, until the middle of April, - and from this time to the start of the ore season, the work was on a six day basis. With the resumption of stripping as a major operation, at the close of the ore season, a schedule of three shifts, five days per week was put into effect.

Stripping material was removed from two areas in the Holman-Cliffs Mine during 1944. The greater activities were carried on in the Bingham property and a less extensive program in the Holman-Brown No. 2 area, in the vicinity of the north-south line separating these two leases.

The surface stripping in the Bingham was located at the south end of the property and was carried in three benches. The upper and middle benches were attacked simultaneously, by a four-yard shovel on each bench, and the upper lift was completed to the stripping limits by the end of January.

For a time, two shovels were operated on the second bench, but toward the middle of February, one of the machines was moved to the top of ore, to clean up the lower bench. A four-yard shovel was operated steadily in the second bench, which was carried back to the established limits by the end of March.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

a. Stripping: (Continued)

With the completion of the work on the upper and middle benches in the Bingham property, stripping activities were generally in the nature of clean-up work. Surface material was removed from the top of ore, at the south end of the pit, and an erosion channel, in the vicinity of the north property line, was cleaned out. The stripping of the surface material was completed early in May, while waste and lean ore was removed from the pit throughout the ore season, as they were encountered during the progress of mining operations.

The fall stripping in the Bingham property was started on November 1st and was conducted on a schedule of three shifts, five days per week. A total of 264,384 cubic yards were removed during November and December. This was a one-shovel operation and was located in the surface on the east side of the pit. The removal of the surface material, in this area, had been completed by the end of December. Progress was not very satisfactory during November and December, due to adverse weather, numerous truck delays, and truck driver absenteeism. For this reason, the cost of the stripping was \$.039 higher than had been estimated.

Stripping operations were started in the Holman-Brown No. 2 area on March 13th. This was essentially a one-shovel operation, although for several weeks two machines were used. The material removed from this area consisted of blocky taconite, paint-rock and lean, waste formation.

In order to carry on this additional work, without interrupting the Bingham program, the entire stripping crew from the Hill-Trumbull Mine, together with their drill, grader, tractor and seven Euclid trucks, was transferred to the Holman-Cliffs Mine. This crew handled the job for two weeks, when it was returned to the Hill-Trumbull and a similar force, from the Canisteo Mine, was used as a replacement until April 22nd, when a Holman-Cliffs crew took over the operation.

Progress in the Holman-Brown No. 2 area was generally slow, due to inadequate truck service, breakdowns of equipment and soft haulage roads, caused by rains and ground water. The operation was conducted as a regular activity until the opening of the ore season and was continued, intermittently, throughout the ore mining period.

The following table shows the classes and quantities of material stripped from the several properties:

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

a. Stripping: (Continued)

	<u>SURFACE</u> <u>CU.YDS.</u>	<u>WASTE</u> <u>CU. YDS.</u>	<u>LEAN ORE</u> <u>CU. YDS.</u>	<u>PAINTROCK</u> <u>CU.YDS.</u>	<u>TOTAL</u> <u>CU. YDS.</u>
Holman,		48,174			48,174
Brown No.2,		122,749			122,749
Bingham,	1,312,989	4,177	10	1,996	1,319,172
Total,	1,312,989	175,100	10	1,996	1,490,095

f. Explosives, Drilling & Blasting:

Statement of Explosives Used:

	<u>QUANTITY</u>	<u>PRICE</u>	<u>AMOUNT</u>
#6, 16' Electric Exploders,	850	\$8.65	\$ 73.52
#6, 30' Electric Exploders,	125	14.65	18.31
#6, 12' Electric Exploders,	1050	7.65	80.32
#6, 40' Electric Exploders,	20	19.65	3.93
#6 Blasting Caps,	800	1.22	9.76
Clover Fuse,	900'	.605	5.44
#20 Connecting Wire,	51#	.55	28.05
#2 Cap Crimpers,	1	1.00	1.00
Plain Primacord,	55,000'	32.00	1,760.00
Reinforced Primacord,	60,000'	33.00	1,980.00
Total Caps, etc.,			\$ 3,960.33
7/8 x 8 - 40% Red Cross Extra,	42#	10.00	4.20
1-1/2 x 8 70% Hi Velocity,	1,562#	14.25	222.60
3 x 10 60% Spec. Gel.	31,568#	11.50	3,630.32
5 x 16 25% Quarry Gel.	174,900#	10.00	17,490.00
5 x 16 60% Spec.Gel.	21,250#	11.50	2,443.75
#4 R.C. Blasting Bags,	139,050#	10.00	13,905.00
Total Powder,			\$37,695.87
TOTAL COST - ALL EXPLOSIVES,			\$41,656.20

g. Open Pit Mining and Loading:

The 1944 ore season was opened on April 19th, with the mining of Bingham direct ore, and wash ore operations were started on May 15th. Direct ore was loaded on the day shift only and wash ore on the afternoon and night shifts. The general operating schedule was on the basis of three shifts, six days per week until September 1st and from this time to the end of the season, the program was reduced to five days per week. A total of - 988,507 tons of crude ore was mined and treated, yielding 684,795 tons of concentrates. The Bingham direct ore loaded during the



HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

- g. Open Pit Mining and Loading: (Continued)  
season amounted to 361,390 tons, making a grand total from the pit of 1,349,897 tons.

Direct shipping ore was mined from the north and central sections of the Bingham pit. From the beginning of operations until the first of August, the bulk of the material was loaded from an upper layer in the center of the mining area and was fairly dry and of good average grade. During this period, a good rate of production was maintained. During the remainder of the season, production came from a lower layer of ore which was somewhat painty. This ore carried a fairly good iron and silica content, but the moisture was high, with a resultant lower natural iron. The last several months of the season showed a lower rate of production, due to the fact that the ore occurred in thin layers and it was necessary to uncover portions of it during the progress of wash ore mining operations.

Wash ore was mined from three areas in the Holman-Cliffs pit during 1944, viz: the Bingham, North Star and Holman-Brown No. 2. The heaviest production came from the Bingham property, throughout the season, with the North Star operation being dependent upon the Bingham, as the North Star ore required sweetening because of its high silica content. The Holman-Brown No. 2 ore did not come into the picture until the latter part of August, as the area was not ready for mining before this time.

In the Bingham operations, opening cuts were taken in a north-south direction, across the central part of the pit, where the best grade of wash ore occurred. The original top of ore was quite irregular and some variation in quality was present but, as depth was gained, the ore was generally of good grade. On the east and west sides of the central trough, the wash ore was of coarser structure and contained decomposed taconite, which produced a high silica concentrate. The ore from these areas was mined in limited quantities, from time to time, and mixed with the higher grade material from the central workings. The ore at the north end of the pit was all removed, down to the paint rock layer, early in the season and the operations were then confined to the more southerly section of the property. The general policy was to follow the paint rock layer down, to the south and slightly east, and this procedure resulted in carrying the cuts to considerable depth near the south bank. There was some design in this method of operation, as the deepest part of the excavation will be used as a sump for pit drainage.

A good average grade of wash ore was produced from the Bingham property.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

g. Open Pit Mining and Loading: (Continued)

The mining of wash ore from the North Star lease was a one-shovel operation and limited in scope, due to the fact that the concentrates produced carried high silica and required sweetening by the higher grade Bingham ores. The area available for mining consisted of a comparatively small pocket, near the west property line, and the trucks and shovel were in rather cramped quarters most of the time. The ore from this area was practically exhausted by the end of the season and only a small quantity remains in a roadway, leading to the Brown No. 1 property.

A very small amount of Brown No. 1 wash ore was mined in connection with the North Star operations.

The mining of Holman-Brown No. 2 wash ore was started during the latter part of August and continued to the end of the season. The material from this part of the pit was rather lean and low grade, and only limited quantities could be handled, because of grading difficulties. The approach to this area was established by developing a road along the south bank of the pit. This road was built above the water level so as to maintain the haulage-ways in as dry a condition as possible. The cuts were developed in a northeasterly direction and extended through the Holman onto the Brown No. 2 property.

k. Drainage:

The bottom of the pit was maintained at the same level as that established in 1943, and as a result, no change was made in the pumping installation. In order to control the pit water, the pumps were operated continuously.

A small pumping plant was installed in the deepest part of the Bingham pit, near the south bank, to handle the drainage in this area. The water is being discharged over the south bank.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF OPERATION:

a. Comparative Mining Costs:

	1944 BUDGET ESTIMATE	1944 COST PER TON	1943 COST PER TON
<u>PRODUCT:</u>			
Concentrates, (tons)	750,000	684,795	1,027,278
Direct Ore, (tons)	250,000	361,390	58,410
Total, (tons)	1,000,000	1,046,185	1,085,688
Average Shift Production, (tons)			
Concentrates and Direct,		2,775	2,314
Tons Per Man Per Day,		31.03	25.72
Days Operated,		161	149
<u>COST:</u>			
Direct Ore,	\$.138	\$1.140	\$.240
Open Pit Wash Ore,	.276	.235	.297
General Pit Expense,	.133	.187	.096
Concentrating,	.178	.167	.178
Stocking and Loading Concentrates,	.010	.008	.014
General Mine Expense,	.103	.082	.094
Idle and Winter Expense,	.120	.116	.145
Cost of Production,	\$.741	\$.700	\$.811
Depreciation - Plant and Equipment,		.140	.140
Depreciation - Motorized Equipment,		.059	.048
Amortization of Stripping,		.300	.230
Taxes - Ad Valorem,		.109	.115
Taxes - Occupational,		.030	.056
Taxes - Royalty,		.091	.073
Total Cost at Mine,		\$ 1.429	\$ 1.473
Administrative Expense,		.100	.100
Miscellaneous Expense and Income,		.029	.009
GRAND TOTAL,		\$ 1.500	\$ 1.582

d. Detailed Cost Comparison:

(1) Product:

The average grade of the merchantable product shipped from the Holman-Cliffs Mine in 1944 was somewhat higher than that for 1943 and was practically the same as the average of the reserve ore in the property. The crude ore mined in 1944 was of better quality than the 1943 product, both from the standpoint of analysis and structure, with the result that the concentrates were of superior grade and the percentage of tonnage recovery was higher. The fact

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison: (Continued)

(1) Product: (Continued)

that 89% of the crude ore mined was taken from the Bingham and North Star properties, accounts for the improvement in the 1944 product.

The direct ore mined from the Bingham lease was of practically the same grade as the average of the total concentrates produced.

(2) Open Pit Mining:

(a) Direct Ore:

The cost of mining direct ore in 1944 was \$.002 higher than the budget estimate and lower by \$.100 than the 1943 cost. The large difference between the 1944 and 1943 costs is accounted for by the fact that only a small tonnage was handled in 1943, under unfavorable conditions, while in 1944, more than one-third of the total merchantable product shipped from the mine was direct ore.

The increase of \$.002 in the 1944 costs, as compared to the budget estimate, is the balance between several items which were higher and three that were lower. No figure was set up in the budget for, "Drilling and Blasting", as it was estimated that the ore could be handled without shaking. However, conditions encountered during mining operations required that the ground be blasted, with a resultant cost of \$.011 per ton. The item, - "Power Shovels Operating" was \$.007 lower than the budget, due to the fact that operating conditions were more favorable than anticipated. Under "Locomotives and Cars Operating", the budget estimate was exceeded by the 1944 costs to the extent of \$.010. The 1943 limited operations did not provide sufficient data upon which to base a reliable estimate and the figure was set too low. "Locomotives and Cars- Maintenance" shows a nominal increase of \$.002 over the budget, while "Track Expense", carried a charge of \$.002 in 1944, where no charge had been set up in the budget. The cost for "Trucks Operating", was \$.018 higher than the estimate. The budget estimate was apparently set too low, as the 1944 costs, under this item, were about the same for both direct ore and wash ore, which were hauled under practically the same conditions. "Trucks- Maintenance", carried a cost of \$.011 under the budget estimate. The new 20-ton trucks were largely used on the direct ore haul and the required maintenance was less than anticipated. The 1944 cost for "Pit Roads and Ramps" was less than the budget estimate by \$.023. It developed, during the season, that most of the wash ore was hauled over the same roads used for direct ore and, as a result, the charges to direct ore benefited materially in the distribution of the cost under this item.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison: (Continued)

(2) Open Pit Mining: (Continued)

(b) Crude Ore:

The 1944 cost per ton was \$.041 under the budget and \$.064 under the 1943 cost, figured on a concentrate basis. All items under this heading were less than the budget estimate, or practically the same, excepting "Power Shovels Maintenance", which was \$.010 higher. This increase is accounted for by the fact that some heavy repairs were necessary, due to breakdowns, which were not anticipated. "Drilling and Blasting" was \$.017 lower because it was found that much of the ore could be mined with little or no blasting. "Power Shovels Operating" shows a decrease of \$.005, which is the result of more favorable operating conditions than was expected. "Locomotives and Cars Operating" was less by the nominal amount of \$.003. "Trucks- Operating" was under the budget by \$.007, due to the fact that less long haul ore was handled than was included in the estimate. "Truck-Maintenance" was lower by \$.019. The budget figure was based on 1943 experience, when haulage conditions were much less favorable than in 1944.

As compared with 1943 results, the 1944 costs were lower in all items, excepting two. "Power Shovels - Maintenance" was higher by \$.009, as more repairs were necessary in the latter years. "Track Expense" shows an increase of \$.004 and is accounted for by the fact that the tracks did not receive a great deal of attention in 1943, with the result that more work was required in 1944.

The item, "Drilling and Blasting" was \$.020 lower in 1944, as less blasting was required to handle the material. "Power Shovels - Operating" was \$.009 under the 1943 costs because the 1944 operations were of such nature that only occasional moving of the shovels was necessary, while in 1943, the machines were frequently moved all the way across the pit. "Trucks - Operating", and "Trucks - Maintenance" were lower by \$.023 and \$.020, respectively, due to the fact that the trucks operated over better and shorter roads and on easier average grades in 1944 than in the previous year.

(3) General Pit Expense:

The cost per ton under this heading was \$.054 higher than the budget and \$.091 higher than the 1943 figure. In both instances the increased cost in 1944 is reflected in just two items, viz: "Removing Waste Material - and "Exploratory and Sample Drilling". In the case of, "Removing Waste Material", the quantity handled was much larger in 1944 than in the previous year, which accounts for an increase of \$.059. In comparison with the budget, the

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison: (Continued)

(3) General Pit Expense: (Continued)

increase amounted to \$.029, due to the fact that the estimate did not contemplate the carrying on of stripping activities, to the extent necessary, during the ore operating season. "Exploratory Drilling and Sample Drilling" was higher than the budget by \$.024 and exceeded the 1943 cost by \$.032. In 1943, all exploratory drilling was carried as a deferred charge, while in 1944, during the ore season, this cost was charged directly to operating. Also, the deferred charges were taken up in 1944 costs. These conditions, together with the fact that considerably more drilling was done in 1944, accounts for the increase over the 1943 cost. When the budget was prepared, the taking up of deferred charges was not given consideration.

(4) Concentrating:

Compared with the budget and the 1943 costs, which were the same, the 1944 figure is \$.011 lower. The 1944 cost for "Transportation" was \$.003 under the budget and 1943 cost per ton, due to the fact that the same amount of equipment handled a much better average load per train than was possible during the previous year. The ore transported in 1944 was generally quite dry, as compared to that of 1943, which made it possible to load the cars more nearly to capacity. The item, "Washing" shows a decrease of \$.009 under the budget and 1943 figures. The handling of a higher grade and much dryer crude ore accounts for the improvement. The budget estimate anticipated the same results as were realized in 1943.

(5) General Mine Expense:

The 1944 cost per ton was \$.021 under the budget and \$.012 under the 1943 figure. In general, the decreases in both cases is the result of the accumulation of nominal differences in the numerous items under this heading. A number of the items are based on pay roll calculations and variations in the amount involved, from year to year, effect the unit costs.

(6) Idle and Winter Expense:

The 1944 cost per ton was less than the budget by \$.004 and under the 1943 cost by \$.029. The lower cost for 1944, as compared to 1943, is accounted for by the fact that in 1943 considerable work was done on the pit sump and pumping plant and special pay-rolls were carried, covering back pay. These items did not occur in 1944.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

9. EXPLORATIONS AND  
FUTURE  
EXPLORATIONS:

During the year, a total of 21 exploratory drill holes and 29 sample drill holes were put down in the Holman-Cliffs Mine. The exploratory drilling totaled 3,742 feet and the sample drilling amounted to 3,518 feet, making a grand total of 7,260 feet. The exploratory drilling was divided among the several parcels as follows: On the Brown No. 2 - 9 holes were drilled, totaling 1,921 feet; on the North Star - 6 holes, totaling 491 feet; on the Bingham - 6 holes, totaling 1,330 feet. The sample drilling was all done on the Bingham property and was for the purpose of filling in information as a guide to mining operations.

On the Brown No. 2, several holes were drilled east of the pit limits and others were located beyond the northeast corner of the pit, to determine a possible extension of the ore body in these areas. The results disclosed the existence of usable ore, but did not show an increase in the tonnage of reserve ore, as set up in the previous year.

The North Star holes were drilled in a narrow area along the east side of Mt. Griffin. This drilling was for the purpose of checking old information and, although it disclosed the presence of a desirable ore body, there was no increase over the anticipated tonnage.

The exploratory drilling on the Bingham was for the purpose of establishing the ultimate pit limits. The holes were put down in the southeast and southwest corners and along the east side of the pit. The increase of 175,089 tons in the reserve estimate was developed on the east side of the property.

There is no extensive exploratory drilling program contemplated for 1945. During January, several holes were completed in the Bingham and there are three holes to be drilled on the east side of the Brown No. 2 property.

Sample drilling in the Bingham will be continued.

10. TAXES:

The following statement shows the Holman-Cliffs Mine taxes and the average rates for the years 1943 and 1944:

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

10. TAXES  
(Continued)

	1944	1943	<u>Increase</u>	<u>Decrease</u>
Holman-Brown Mine,	\$67,740.10	\$76,738.85		8,998.75
Bingham Mine,	24,632.63	16,870.96	7,761.67	
North Star Mine,	7,700.76	11,560.44		3,859.68
Holman-Cliffs Aux.Lands,	2,138.81	1,958.44	180.37	
Bingham-North Star Wash. Plant Lands,	61.79	62.84		1.05
Holman-Brown Lands,	24.06	23.26	.80	
Holman-Cliffs Shops and Office,	1,099.95	246.80	853.15	
Holman-Cliffs Personal Property,	<u>7,024.68</u>	<u>5,022.33</u>	<u>2,002.35</u>	
Total,	\$110,422.78	112,483.92		2,061.14
Rented Buildings,	<u>893.62</u>	<u>823.98</u>	<u>69.64</u>	
GRAND TOTAL,	\$111,316.40	\$113,307.90		1,991.50
Average Tax Rate,	98.97	93.46		5.52

The decrease in taxes for the Holman-Brown and North Star properties is accounted for by a lower valuation, as a result of the ore mined in 1944.

The tax increase on the Bingham property is due to the fact that the status was changed from an inactive to an active class, with a resultant higher rate.

The addition of new buildings and equipment accounts for the increase on the Holman-Cliffs Shops and Office.

A larger tonnage of ore in stockpile in 1944, as compared to 1943, explains the tax increase on Holman-Cliffs Personal Property.

11. ACCIDENTS  
AND  
PERSONAL  
INJURY:

The following is a list of the lost-time accidents which occurred during 1944:

Name: Henry Carno Date: March 7th.  
Cause: While employee was pressing out old bushings from shovel idlers, bushing slipped out and dropped three feet, on to instep of employee's right foot.  
Nature: Contusion dorsum of right foot, first metatarsal area. Fracture of first metatarsal.  
Time Lost: One Week, four days.  
Compensation: \$ 33.33.



HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

11. ACCIDENTS  
AND PERSONAL  
INJURY:  
(Continued)

Name: Oliver Toven Date: May 9th.  
Cause: While removing front tire on Euclid truck, employee was holding the tire, while the man he was working with, struck the rim with a sledge hammer to break it loose from the wheel. When doing this, the lock ring, which is a part of the rim holding one side of the tire, flew off and hit employee in pit of stomach and legs.  
Nature: Laceration over middle tibia, right leg, to the bone. Skin laceration similar point to the bone, left side, left leg. Abrasion and laceration about 3" above the symphysis rather extensive. Hematoma both inguinal and femoral areas.  
Time Lost: Four weeks - two days.  
Compensation: \$ 86.67.

Name: Francis L. Parker Date: August 31st.  
Cause: Locomotive #106 was not supplying sufficient air to dump ore cars, making it necessary for injured to use a bar to pry cars to dump them. The car started to dump and then dropped back, causing bar to flip up, striking injured on chest and catching in his clothing and throwing him several feet into the air.  
Nature: Contusion of chest, sternal area, and contusion of left shoulder. Small chips from lower right second tricuspid and left central incisor teeth.  
Time Lost: Four weeks.  
Compensation: \$ 80.00.

12. NEW CONSTRUCTION  
AND PROPOSED  
NEW CONSTRUCTION:

The construction of the repair shop for motorized equipment and the testing laboratory, which was started in the fall of 1943, was completed in the early summer and late fall, respectively.

A small office building was built to accommodate the Safety and Personnel departments.

There is no new construction, of major importance, contemplated for 1945.

13. EQUIPMENT AND  
PROPOSED  
EQUIPMENT:

The new equipment purchased for the Holman-Cliffs Mine in 1944, consisted of, - seven 20-ton Euclid trucks.

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

13. EQUIPMENT AND  
PROPOSED  
EQUIPMENT:  
(Continued)

The purchase of the following equipment is anticipated for 1945: One 27T Bucyrus-Erie blast-hole drill; two 20-ton Euclid trucks; one, vertical Parmanco blast-hole drill; one Dorr Hydro-sizer and one Hydrotator, with auxiliary equipment for treating tailings at the washing plant.

14. MAINTENANCE  
AND REPAIRS:

The general overhauling of the Holman-Cliffs locomotives was done at the Hill-Trumbull shops and the 30-yard cars received necessary repairs at the home shops.

During the early months of 1944, Shovels No. 51 and No. 32 - and the 2-1/2-yard diesel machine were given complete overhauls. In the fall, after the ore season, the 54-B, the 57-B and the 2-1/2-yard diesel shovels were brought to the shop in turn, and thoroughly repaired. One of the blast-hole drills received a complete overhauling.

During the winter and spring, and again in the fall, the washing plant equipment was thoroughly inspected and given such repairs as were necessary.

18. NATIONALITY  
OF EMPLOYEES:

<u>Nationality:</u>	<u>Number of Men</u>
American, -----	154
Finnish, -----	8
Jugo-Slav, -----	8
Italian, -----	5
Austrian, -----	4
Swedish, -----	3
Norwegian, -----	3
Canadian, -----	2
Bulgarian, -----	1
Croatian, -----	1
Montenegrin, -----	1
Belgian, -----	1
Bohemian, -----	1
Total, -----	192

19. WASHING PLANT  
OPERATIONS:

The Holman-Cliffs washing plant was operated from May 15th, to October 27th, on a schedule of two shifts per day, six days per week, until September 1st, and from this time to the end of

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

the season, a five day work week was in effect. A total of 988,507 tons of crude ore was treated, producing 684,795 tons of concentrates. The average production per shift amounted to 2,685 tons. This is a higher rate per shift than was realized in 1943 and is accounted for by the fact that a generally dryer and higher grade crude ore was handled in 1944.

Operating conditions at the plant were generally satisfactory, there being very few serious delays experienced. Most of the ore treated during the season came from the Bingham and North Star properties. These ores yield a high average weight recovery and are comparatively easy to handle in the various machines. Only a small percentage of the total crude ore came from the leaner Holman-Brown No. 2 area.

When the Great Northern Railway was unable to provide sufficient empty cars for loading, it was necessary to place the concentrates, produced during that time, in stockpile. The quantity of concentrates accumulated in stock during the season amounted to 41,557 tons.

In the course of mining operations in the Bingham pit, a rather large block of low grade, siliceous material was outlined, on the west side of the property. As it was not possible to make a desirable grade of concentrates by mixing this material with the better wash ore from other parts of the pit, it was decided to attempt to make a suitable product by treatment in the heavy density plant at the Hill-Trumbull Mine. During the month of October, - 12,511 tons of the low grade ore were mined and given preliminary washing at the Holman-Cliffs washing plant. The product from this treatment was loaded into cars and shipped to the Hill-Trumbull heavy density plant, for final treatment. A total of 6,344 tons of finished concentrates was produced from this test, but they were not satisfactory, on account of the high silica content. It was found that the coarser sizes in the concentrates were shot through with fine particles of silica, which cannot be released, except by finer crushing than is possible by the equipment now available. The low grade siliceous ore must be removed from the pit to uncover underlying wash ore and will be stockpiled for future use.

The tonnage and analysis of the plant rejects for 1944 were as follows:

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

5 x 14 Screen Rejects

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Holman,	1,392	31.76	.029	48.61
Brown,	2,615	31.14	.030	49.92
North Star,	6,925	31.70	.039	48.56
Bingham,	30,995	33.11	.041	47.01
Total,	41,927	32.71	.040	47.50

36" Belt Rejects

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Holman,	78	26.65	.028	48.94
Brown,	150	27.00	.027	55.61
North Star,	379	32.29	.037	47.79
Bingham,	1,656	33.01	.040	47.12
Total,	2,263	32.28	.038	47.86

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

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>
Brown,	1,824	33.83
North Star,	6,768	32.63
Bingham,	1,724	32.40
Total,	10,316	32.80

The following material was removed during the shipping season and charged to mining operations:

<u>LEASE</u>	<u>CLEAN-UP.</u>	<u>LEAN ORE</u>	<u>PAINTROCK</u>	<u>WASTE</u>	<u>SURFACE</u>	<u>TOTAL</u>
	<u>CU. YDS.</u>	<u>CU. YDS.</u>	<u>LEAN ORE</u>	<u>CU. YDS.</u>	<u>CU. YDS.</u>	<u>CU. YDS.</u>
Holman,	-	15,369	-	3,226	-	18,595
Brown,	924	146,805	-	42,135	-	189,864
North Star,	756	-	-	-	-	756
Bingham,	5,824	53,086	8,642	17,439	4,624	89,615
Total,	7,504	215,260	8,642	62,800	4,624	298,830

The analysis of the product from the various machines for the year 1944 were as follows:

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

Lease	Log Washer			Classifier			Tailings
	Iron	Phos.	Silica	Iron	Phos.	Silica	Iron
Holman,	57.88	.039	10.78	57.79	.034	12.32	23.83
Brown,	57.47	.038	11.84	57.24	.033	12.95	25.02
North Star,	58.90	.044	9.92	58.77	.041	10.59	27.64
Bingham,	58.76	.046	10.13	58.47	.044	11.18	27.13

The concentration data for the Holman-Cliffs Mine for the year 1944, was as follows:

	Tonnage	Percentage of Total Mined	Per Cent. Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined,	1,028,239	100.00	48.08		
Less Rock re- moved in Mining,	10,316	1.00	32.80		
Crude Ore trans- ported to Mill,	1,017,923	99.00	48.23		
Less Rock re- jects in Crusher House,	41,927	4.08	32.71		
Crude Ore enter- ing Mill,	975,996	94.92	48.89		
Concentrates Produced,	678,451	65.98	58.36	69.51	82.98
Rock Rejects on Mill Pick- ing Belt,	2,263	.22	32.28		
Tailings (by deduction)	295,282	28.72	27.27		
Total heads, as above,	975,996	94.92	48.89		

Concentration data covering Bingham ore sent to the Hill  
Cone Plant:

HOLMAN-CLIFFS MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

	<u>Tonnage</u>	<u>Percentage of Total Mined</u>	<u>Per Cent. Iron Dried</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude and Rock Mined,	13,046	100.00	44.91		
Less Rock removed in Mining,	-	-	-		
Crude Ore trans- ported to Mill,	13,046	100.00	44.91		
Less Rock re- jects in Crusher House,	535	4.10	35.56		
Crude Ore enter- ing Mill,	12,511	95.90	45.31		
Cone Feed Produced,	7,486	57.38	55.32	59.84	73.05
Tailings (by deduction)	5,025	38.52	30.40		
Cone Concentrates Produced,	6,344	48.63	57.93	50.71	64.83
Cone Rejects,	594	4.55	43.78		
Tailings (by deduction)	548	4.20	37.59		

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944.

1. GENERAL:

The usual program of repair work at the mine shops and beneficiation plants was continued from the first of the year until the first week in May. A schedule of one shift per day, six days per week was maintained.

Major repairs were made to Holman-Cliffs steam locomotives Nos. 104 and 106, Hill-Trumbull 120-B four-yard electric shovels Nos. 34 and 35, 16-B 5/8-yard dragline and 30-yard cars. A general checkup and minor repairs were made on the electric locomotives Nos. 301, 302 and 303, - 2-yard electric shovels and blast drills.

The repairs at the washing plant were of a general nature. The machines were dismantled, cleaned, inspected and worn parts repaired or replaced as necessary.

In the retreat plant, all machines were given a thorough overhauling, a heavier shaft, allowing for a greater load, was installed in the 60" classifier. Wash screens were widened for more efficient operation, and a bucket elevator installed in place of pump for recirculating medium.

Construction of dykes for a new tailings basin, which had been started in November, 1943, was completed on January 8, 1944. All piping, pumps and equipment for the use of this basin were completed and installation put into use upon opening of the ore season.

The 1944 ore shipments were started on March 30th, 1944, with the loading of concentrates from the stockpile at the washing plant. This material was stocked during the 1943 ore season and amounted to 81,055 tons.

Actual mining operations were started on May 8th, and continued through October 27th. Operations were started on a schedule of three 8-hour shifts, six days a week and continued on this basis until September 1st, at which time the schedule was reduced to five days per week. While on a six-day schedule, Monday day shift was utilized for plant repairs and movement of direct ore and rock in the pit. The loading of crude ore was divided into approximately 12 hours per day on wash ore and the same on retreat ore, in order that retreat feed would have time to drain before being fed to the plant. A very small tonnage of direct ore was shipped during the season, as only a small amount of this material was available from scram operations, due to the high silica content.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

1. GENERAL:  
(Continued)

The washing plant operated 134 days, producing 475,369 tons of wash ore concentrates and 410,789 tons of retreat feed. This was accomplished through the treatment of 798,405 tons of wash ore crude and 716,996 tons of retreat crude. The retreat plant was operated 129 days on Hill-Trumbull ore, producing 305,884 tons of concentrates. The average daily production of wash ore concentrates was 6,744 tons, of retreat concentrates 2,371 tons, and the daily average of all concentrates was 5,830 tons.

Owing to an inadequate supply of railroad cars, it was necessary at various times, to stockpile wash ore concentrates, and 81,240 tons were placed in stock. There remained in stock from the 1943 season, 81,055 tons, which made available 162,295 tons for the 1944 season, of which 137,829 tons were shipped, leaving a balance of 24,466 tons in stock.

Stripping operations, which were in progress the first of the year, were continued until the start of ore season and then were resumed upon completion of ore movement. During the winter months, surface was removed from the north bank of the Hill pit and lean and waste ore from the East Trumbull. The fall work entailed the stripping of surface from the East Trumbull forty.

The drilling program was carried forward by the contractor during the year and was started the latter part of May and continued until the middle of October, when the drill was shifted to one of the other properties. Exploration holes were put down on the north side of the Hill pit and sample holes in the Trumbull pit bottom and east side.

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:

a. Production by Grades:

Hill Crude, -----	294,104 tons
Trumbull Crude, -----	504,301 "
Trumbull Retreat Crude, -----	<u>716,996 "</u>
 TOTAL CRUDE ORE, -----	 1,515,401 "
 Hill Non-Bessemer Concentrates, -----	 113,896 "
Hill Bessemer Concentrates, -----	69,294 "
Hill Non-Bessemer Direct Shipping, -----	5,897 "
Trumbull Non-Bessemer Concentrates, -----	156,693 "
Trumbull Bessemer Concentrates, -----	135,486 "
Trumbull Non-Bess. Cone Concentrates, -----	160,711 "
Trumbull Bess. Cone Concentrates, -----	<u>145,173 "</u>
 TOTAL PRODUCTION, -----	 787,150 "



HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

b. Shipments:

Hill Non-Bessemer Concentrates, -----	100,629 tons
Hill Bessemer Concentrates, -----	70,110 "
Hill Non-Bessemer Direct Shipping, -----	5,897 "
Trumbull Non-Bessemer Concentrates, -----	197,536 "
Trumbull Bessemer Concentrates, -----	160,213 "
Trumbull Non-Bess. Cone Concentrates, -----	160,711 "
Trumbull Bessemer Cone Concentrates, -----	145,173 "
 TOTAL SHIPMENTS, -----	 840,269 "

c. Stockpile Inventories:

As of January 1st, 1944, there was in stock 77,585 tons of concentrates. This stockpile was shipped in April and a stockpile overrun of 3,470 tons developed. The stockpile balance on December 31, 1944, was 24,466 tons. This tonnage was put into the pile during the season, when the railroad could not supply cars.

Concentrating Material Above 25%:

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Hill,	55,439	29.37	.037	52.71
Trumbull,	377,109	28.08	.032	54.54
 Total,	 432,548	 28.25	 .033	 54.31

Non-Concentrating Material Above 35%:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Hill,	142,833	48.50	.081	21.90

Coarse Non-Concentrating Material Above 40%:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Hill,	7,527	33.23	.028	43.33

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

e. Production by Months:  
(1) Crude Ore

<u>MONTH</u>	<u>HILL</u>	<u>TRUMBULL</u>		<u>TOTAL</u>
		<u>WASH</u>	<u>RETREAT</u>	
May,	57,202	30,568	99,696	187,466
June,	62,338	80,823	147,082	290,243
July,	-	133,767	130,897	264,664
August,	83,612	88,364	143,511	315,487
September,	48,160	67,879	118,880	234,919
October,	42,792	102,900	76,930	222,622
<b>TOTAL,</b>	<b>294,104</b>	<b>504,301</b>	<b>716,996</b>	<b>1,515,401</b>

(2) Concentrates & Direct Ore:

<u>MONTH</u>	<u>HILL</u>		<u>TRUMBULL</u>		<u>TOTAL</u>
	<u>DIRECT</u>	<u>CONCTS.</u>	<u>CONCTS.</u>	<u>CONE CONCS.</u>	
May,	-	33,546	16,888	37,579	88,013
June,	-	37,423	47,467	61,411	146,301
July,	2,084	-	80,058	57,531	139,673
August,	3,813	53,008	49,391	67,145	173,357
September,	-	31,893	40,402	49,766	122,061
October,	-	27,320	57,973	32,452	117,745
<b>TOTAL,</b>	<b>5,897</b>	<b>183,190</b>	<b>292,179</b>	<b>305,884</b>	<b>787,150</b>

f. Ore Statement:

As of December 31, 1944, there is in stockpile 13,267 tons of Hill and 11,199 tons of Trumbull concentrates, for a total of 24,466 tons.

g. Delays:

The following delays, as effecting production, are shown on a cumulative basis for the season and are placed under four classifications: viz: Pit Delays, Railway Haulage Delays, Washing Plant Delays and Retreat Plant Delays:

Pit Delays

<u>Hours</u>	<u>Minutes</u>	<u>Cause:</u>
7	30	Repairs to pan conveyor screening plant
2	-	Wet ore on conveyor belts
1	30	Mechanical repairs to shovels
9	-	Moving shovels for grading ore
2	-	Power failure - electrical storm
<u>22</u>	<u>-</u>	

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

2/ PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

g. Delays: (Continued)

Railway Haulage Delays

<u>Hours</u>	<u>Minutes</u>	<u>Cause</u>
2	-	Derailment- broken axle on car
5	30	Derailment- broken journal on car
<u>7</u>	<u>30</u>	

Washing Plant Delays

32	45	Repairs to 5' x 14' screen
6	-	Low water pressure
1	45	Repairs to main water pumps
5	-	Repairs to main water lines
2	-	Repairs to classifiers
8	30	Repairs to logs
3	-	Crushers plugged
9	50	Repairs to conveyors
9	05	M. P. & L. power failure- storms
1	50	Repairs to tailings pump
1	-	Great Northern Railway car derailment
2	-	Miscellaneous repairs
<u>82</u>	<u>45</u>	

Retreat Plant Delays

12	50	No Great Northern Railway cars
3	-	Great Northern Railway derailment
21	35	Power failure, electrical storms
43	45	Machines plugged- power failures
54	25	Machines plugged- operating
27	25	No feed- tractor repairs
22	20	Mechanical repairs
38	50	Electrical repairs
10	30	Charging medium
8	-	Tailings pipe repairs
1	30	Low water pressure- pump repair
<u>244</u>	<u>10</u>	

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

g. Delays: (Continued)

Pit Delays and Railway Haulage Delays:

Items under these headings are self-explanatory.

Washing Plant Delays:

The loss of time due to "Repairs to 5' x 14' screen" was due, almost entirely, to replacing bearings which failed on this equipment. A heavy-duty Allis-Chalmers screen will be installed to overcome this trouble. "Low Water Pressure" and "Repairs to Main Water Line" were due to piston type pump, causing leaks in pipe, due to "water pound". A centrifugal pump was substituted and no further trouble was encountered. "Power Failure" delays were excessive this season because of the greater number of electrical storms experienced throughout the year.

Other items were about normal for a season's operation.

Retreat Plant Delays:

The total time lost in this plant, although less than last year, was large and the greater portion of the delays was from machines "plugging". About one-half of this occurred when power failure caused machines to stop, allowing medium to settle before the machine could be drained. This entailed long delays while the units were being washed out and the circuit charged again. This "plugging" also occurred when treating the finer ores during experimental periods and also due, in part, to the necessity of breaking in two new operators during the season. In the item "Electrical Repairs" delays were due partly to ferro-silicon getting into electrical equipment and also to excessive number of electrical storms during the season.

Other delays are self-explanatory.

3. ANALYSIS:

a. Mine Analysis of Production:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess.Concs.	113,896	58.75	.052	10.69	.14	.52	6.19	55.11
Hill Bess. Concs.	69,294	59.15	.047	10.22	.14	.45	6.10	55.54
Hill N.B.Direct Ship.	5,897	56.23	.078	14.96	.15	.88	8.69	51.34
Trumbull N.B.Concs.	156,693	57.05	.048	10.60	.13	.50	7.61	52.71
Trumbull Bess.Concs.	135,486	57.32	.042	9.90	.14	.47	7.33	53.12
Trumbull Non-Bess. Cone Concs.,	160,711	56.29	.046	11.85	.15	.48	5.50	53.19
Trumbull Bess. Cone Concs.	145,173	56.35	.040	11.45	.15	.46	6.54	52.66
Total,	787,150	57.24	.046	10.90	.14	.48	6.60	53.46

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

b. Analysis of Shipments:

	Tons	Iron	Phos.	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Non-Bess.Concs.	100,629	58.78	.052	10.57	.14	.51	6.17	55.15
Hill Bess. Concs.	70,110	59.08	.047	10.25	.14	.45	6.11	55.47
Hill Non-Bess. Direct Shipping,	5,897	56.23	.078	14.96	.15	.88	8.69	51.34
Trumbull Non-Bess. Concs.	197,536	56.72	.046	11.10	.13	.49	7.34	52.56
Trumbull Bess.Concs.	160,213	57.12	.041	10.26	.14	.47	7.25	52.98
Trumbull Non-Bess. Cone Concts.	160,711	56.29	.046	11.85	.15	.48	5.50	53.19
Trumbull Bess. Cone Concts.	145,173	56.35	.040	11.45	.15	.46	6.54	52.67
Total,	840,269	57.09	.045	11.04	.14	.48	6.61	53.32

c. Mine Analysis of Ore in Stockpile December 31, 1944:

Hill Concentrates,	13,267	58.49	.049	11.59	.13	.59	6.32	54.79
Trumbull Concts.	11,199	56.76	.044	10.87	.15	.52	7.89	52.28
Total,	24,466	57.70	.047	11.26	.14	.56	7.04	53.64

d. Average Analysis of Crude Ore Production:

Hill Crude,	294,104	41.10	.038	37.20
Trumbull Crude,	504,301	39.99	.033	37.19
Total Wash Ore Crude,	798,405	40.40	.035	37.19
Trumbull Retreat Crude,	716,996	35.93	.032	43.21
Total Crude,	1,515,401	38.29	.034	40.04

e. Complete Analysis of Season's Shipments:

	Iron	Phos.	Sil.	Mang.	Alu.	Lime	Mag.	Sul.	Loss
Hill Non-Bess. Concts.	58.75	.052	10.69	.14	.52	.27	.18	.010	4.04
Hill Bess.Concs.	59.08	.047	10.25	.14	.45	.29	.17	.010	4.08
Hill Non-Bess. Direct Shipping	56.23	.078	14.96	.15	.88	.28	.17	.010	2.97
Trumbull Non- Bess.Concts.	56.72	.046	11.09	.13	.49	.22	.15	.011	6.67
Trumbull Bess. Concts.	57.12	.041	10.26	.14	.47	.25	.16	.010	6.91
Trumbull Non-Bess. Cone Concts.	56.29	.046	11.85	.15	.48	.24	.15	.010	6.50
Trumbull Bess. Cone Concts.	56.35	.040	11.45	.15	.46	.23	.16	.011	6.84

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

4. ESTIMATE OF  
ORE RESERVES:

a. Developed Ore:

Assumption:

Class of Material	Per Ton Cu. Ft.	Rock Deduction	Recovery
Merchantable Ore,	13	10%	100.00%
Wash Ore,	14	-	60.81%
Lean Wash Ore,	15	-	45.15%
Low Grade Wash Ore,	14	-	59.80%
Lean Low Grade Wash Ore,	15	-	42.60%
Rocky Wash Ore,	14	-	54.85%
Jig Ore,	14	-	38.84%

The above factors were used in the preparation of the revised estimate. They are based on actual experience in mining and on data secured from hand-wash tests of drill samples. Rock reductions on the wash and jig ores have been taken into account in the calculation of the percentage of recovery.

The following tabulation shows the estimate of January 1, 1944, the ore mined during 1944 and the ore reserve estimate as of January 1st, 1945:

	REPORTED JAN. 1, 1944	MINED 1944	RESERVE JAN. 1, 1945
<u>Trumbull Mine:</u>			
NE $\frac{1}{4}$ -SE $\frac{1}{4}$ , Sec. 18,	10,893	-	10,893
NW $\frac{1}{4}$ -SW $\frac{1}{4}$ , Sec. 17,	669,315	297,158	372,157
NE $\frac{1}{4}$ -SW $\frac{1}{4}$ , Sec. 17,	1,722,956	300,905	1,422,051
Total Trumbull,	2,403,164	598,063	1,805,101
<u>Hill Mine:</u>			
SE $\frac{1}{4}$ -NW $\frac{1}{4}$ , Sec. 17,	447,370	130,384	316,986
SW-NE $\frac{1}{2}$ , Sec. 17,	464,875	18,643	446,232
SE $\frac{1}{2}$ -NE $\frac{1}{4}$ , Sec. 17,	512,961	40,060	472,901
Total Hill,	1,425,206	189,087	1,236,119
GRAND TOTAL - HILL-TRUMBULL MINE,	3,828,370	787,150	3,041,220

The estimated ore reserve, as of January 1, 1944, was reduced by the amount mined during the 1944 season and no other adjustments were made to establish the reserve as of January 1, 1945.

In the above reserve figure there is, however, an estimated tonnage of 561,942 tons (shipping ore) tied up in slope ore and benches around the limits of the pit and along adjoining property lines. This ore will be inaccessible until adjoining properties are opened up and ore is removed in conjunction with these operations.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

4. ESTIMATE OF  
ORE RESERVES:  
(Continued)

b. Prospective Ore:

There is not much likelihood that there will be any further extensions of the Hill-Trumbull ore body. It is intended that further exploration along the north side of the pit will be carried forward to satisfy the fee owners, but it is doubtful if any ore will be found.

c. Estimated Analysis:

<u>Lease</u>	<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
<u>Hill:</u>					
Non-Bessemer Direct,		239,237	56.59	.076	14.11
Bessemer Concentrates,		399,782	58.48	.042	11.44
Non-Bessemer Concentrates,		597,100	58.25	.048	11.07
<u>Trumbull:</u>					
Bessemer Concentrates,		443,037	57.09	.041	10.60
Non-Bessemer Concentrates,		1,362,064	56.91	.045	10.98
TOTAL DIRECT,		239,237	56.59	.076	14.11
Total Bessemer Concentrates,		842,819	57.32	.041	10.74
Total Non-Bess. Concentrates,		1,959,164	57.16	.046	11.00
TOTAL CONCENTRATES,		2,801,983	57.23	.044	10.88
Total Bessemer,		842,819	57.32	.041	10.74
Total Non-Bessemer,		2,198,401	57.15	.046	11.03
GRAND TOTAL,		3,041,220	57.23	.044	10.90

The above analyses are not from drill holes, but are the result of mining experiences during the past two seasons, and are more near an average of the ore remaining than a drill hole estimate.

5. LABOR & WAGES:

a. Comments:

(1) Labor:

Minimum crews in all departments were maintained with difficulty during the season. A high rate of absenteeism, coupled with an excessive turnover, due to men entering service and going to higher pay defense jobs, lead to a very unsettled condition throughout the season.

Relations between management and the labor union were good during 1944.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

5. LABOR & WAGES:

(Continued)

b. Comparative Statement of Wages and Product:

PRODUCT, -----	787,150 Tons
Number of Shifts and Hours, -----	3 - 8-hour
Average Number of Men Working, -----	217
Average Wages Per Day, -----	\$ 8.32
Product Per Man Per Day, -----	\$26.08 — \$?
Labor Cost Per Ton, -----	\$ .319
Total Number of Days, -----	139
Amount Paid for Labor, -----	\$251,009.00

6. SURFACE:a. Buildings, Repairs:

Only minor necessary repairs were made to buildings during the year.

c. Tracks, Roads, Transmission Lines, etc:

The usual maintenance work was carried on in connection with tracks and roads. A few changes, due to stripping operations, were made to transmission lines on the south side of the pit.

7. OPEN PIT:a. Stripping:

Stripping operations, which were in progress the first of the year, were continued on a 3-shift, 6-day per week basis, with one 4-yard shovel, serviced by from six to seven trucks. These operations were carried on from the first of the year to the eleventh of March, removing surface material from the wash ore body on the north side of the Hill (SE $\frac{1}{4}$  of the NW $\frac{1}{4}$ ). This material was dumped to the north on a barren area.

Equipment and crews were then moved to the Holman-Cliffs Mine for a two-weeks' period to assist in the removal of stripping from the Brown #2 property. Upon returning to the Hill-Trumbull, stripping was resumed in the southeast corner of the Trumbull (NE $\frac{1}{4}$  of the SW $\frac{1}{4}$ ), where surface waste ore and lean ore were moved, exposing wash ore, until the start of ore season on May 8th. Waste ore and surface was deposited on stripping dumps on the Oliver Iron Mining Company - SW $\frac{1}{4}$  of the SE $\frac{1}{4}$ , and the lean ore stocked on approved areas on the Trumbull NE $\frac{1}{4}$  of the SW $\frac{1}{4}$ .

The following tabulation shows the stripping material removed from the various leases during 1944:

<u>LEASE</u>	<u>SURFACE</u> <u>CU. YDS.</u>	<u>WASTE ORE</u> <u>CU. YDS.</u>	<u>LEAN ORE</u> <u>CU. YDS.</u>	<u>TOTAL</u> <u>CU. YDS.</u>
Trumbull,	304,285	137,603	48,959	490,847
Hill,	304,346	-	-	304,346
Total,	608,631	137,603	48,959	795,193



HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

<u>d. <u>Timbering:</u></u>	<u>QUANTITY</u>	<u>AMOUNT</u>
Tamarack Ties, -----	725	\$ 978.75
White Oak Ties, -----	232	387.44
Total, -----	957	\$1,366.19

f. Explosives, Drilling and Blasting:

		<u>QUANTITY</u>	<u>AMOUNT</u>
#4 Bag Blasting Powder, -----	Lbs.	100,300	10,030.00
3 x 10 - 25%, -----	"	23,750	2,375.00
5 x 16 - 25%, -----	"	50,600	5,060.00
5 x 16 - 60%, -----	"	63,660	7,290.10
7/8 x 8- 40%, -----	"	1,550	162.75
1-1/8 x 8 - 60%, -----		300	34.50
1-1/4 x 8 - 40%, -----		200	20.00
#6 Blasting Caps, -----		600	7.31
6' Electric Exploders, -----		400	24.59
12' Electric Exploders, -----		950	72.72
20' Electric Exploders, -----		175	16.87
Clover Fuse Wire, -----	Rolls	11	6.63
#20 Connecting Wire, -----		46	25.30
Plain Primacord, -----		44,500	1,424.00
Reinforced Primacord, -----		33,000	1,089.00
#2 Cap Crimpers, -----		3	3.00
TOTAL, -----			\$27,641.77

g. Open Pit Mining and Loading:

The 1944 ore season was started on May 8th and carried forward on a 3-shift, 6-day per week basis until September 1st, at which time operations were reduced to 3 shifts, 5 days per week and carried on this basis through October 27th. All wash and retreat operations entailed the use of two shovels, in order to mix ores for proper grading. These shovels were serviced by an average of six trucks.

While on the 6-day schedule, ore operations were conducted on 17 shifts per week, using the eighteenth shift for pit clean-up work while repairs were being made at the beneficiation plants.

A total of 1,521,298 tons of ore material was mined from the pit, of which 5,897 tons was direct ore and 1,515,401 tons of crude ore, requiring beneficiation. Of the crude ore, 798,405 tons was treated by washing only and 716,996 tons were washed and then further treated in the retreat plant. The concentrates obtained from the straight wash ore amounted to 475,369 tons and from the retreat ore, 305,884 tons, making a total of 781,253 tons of concentrates for the season. These concentrates, together with the direct shipping ore, amounted to 787,150 tons of shipping grade ore for the 1944 season.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

7. OPEN PIT:  
(Continued)

g. Open Pit Mining & Loading: (Continued)

Wash ore was mined from both Hill and Trumbull leases, with operations being shifted from one lease to the other as grading schedules required. In the Trumbull, from which approximately sixty per cent of the wash ore crude was obtained, mining was carried forward on both east and west forties, with approximately fifty per cent of the ore being obtained from each property. In general, following the ore body, one 4-yard shovel operated in the pit bottom along the south line, loading high grade ore, and a second 4-yard machine mixed in a low grade material from benches along the north side of the pit. This low grade wash ore is encountered in mining retreat ore and is very "spotty", requiring frequent shifting of shovels in order to maintain proper grades.

Operations in the Hill wash ore were spread over three general areas. The first of these, from which the bulk of the tonnage was obtained, was an area of good grade wash ore which had been uncovered by stripping the previous winter. This area is located on the north side of the Hill, SE $\frac{1}{4}$  of NW $\frac{1}{4}$ , north of the pit screening plant. A second area, from which a rocky high silica ore was obtained, is located on the north side of the pit, directly east of the rock dump. Drill holes indicated ore in this area, but upon progressing north with the shovel, this ore was found to be in narrow fissures in rock and not economical to mine, due to the necessity of moving excessive amounts of rock to obtain the ore. The third area operated in this season was in the extreme east end of the Hill pit. Two ore troughs, between rock, were mined in the northeast corner of the pit, and in this operation, cuts were taken over the line onto the Hill-Annex property for the purpose of balancing a trespass account along this property line. In the southeast corner of the forty, the 5/8-yard drag-line operated all season, one shift a day, scrambling direct shipping ore from crevices in the rock. Upon loading this material for shipment, it was found that approximately fifty per cent was too high in silica for direct shipping ore and was, therefore, sent to the plant for treatment. This condition accounted for the decrease in direct ore available for the season's shipments. Operations in the Hill pit from now on will be of necessity, slow, because all ore remaining is in small isolated pockets between rock horses and in fissures entailing the movement of considerable rock to obtain the ore, and also causing this ore to be of high silica content, due to contamination from small pieces of rock.

The retreat, or jig ore, was all obtained from the Trumbull lease, with approximately equal amounts from the east and west forties. The greater part of this material was mined from benches along the north side of the pit and mixed with what was considered a low grade wash ore, but from mining experience, was found to be retreat, occurring under the wash ore layer in the pit bottom.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF OPERATION:

a. Comparative Mining Cost:

	<u>1944</u> <u>BUDGET</u>	<u>1 9 4 4</u> <u>COST PER TON</u>	<u>1 9 4 3</u> <u>COST PER TON</u>
<u>PRODUCT:</u>			
Direct Shipping Ore, Tons	25,253	5,897	4,268
Concentrates Tons	<u>757,575</u>	<u>781,253</u>	<u>866,961</u>
Total Production, Tons	782,828	787,150	871,229
Average Daily Product, Tons Per Man Per Day,	-	5,663	5,514
Days Operated,	-	26.08	22.24
	-	139	158
<u>COST:</u>			
Open Pit Direct Ore,	\$ .142	\$ .120	\$ .139
Open Pit Crude Ore,	.245	.231	.219
General Pit Expense,	.057	.043	.058
Concentrating,	.287	.265	.292
Stocking Concentrates,	.008	.010	.012
General Mine Expense,	.112	.096	.107
Winter and Idle Expense,	<u>.166</u>	<u>.165</u>	<u>.227</u>
Cost of Production,	\$ .863	\$ .807	\$ .913
Amortization - Defense Facilities,	-	.036	.098
Depreciation - Plant and Equipment,	-	.120	.100
Depreciation - Motorized Equipment,	-	.025	.028
Amortization - Stripping,	-	.250	.127
Taxes - Ad Valorem,	-	.108	.103
Taxes - Occupational,	-	.020	.057
Taxes - Royalty,	-	<u>.083</u>	<u>.088</u>
Total Cost at Mine,		\$ 1.421	\$1.513
Administrative Expense,	-	.100	.100
Miscellaneous Expense & Income,	-	<u>.014</u>	<u>.008</u>
Grand Total,	-	\$ 1.535	\$ 1.621

The figures for 1943 and 1944 were taken from the December cost sheets, which were prepared before the final charges were received from the Cleveland office and are, therefore, comparable. Charges made by the inclusion of the Cleveland figures would not materially effect the cost per ton used in the above table.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison:

(1) Product:

The estimated ore schedule for 1944 called for the production of 25,255 tons of direct shipping ore and 757,575 tons of concentrates, making a total of 782,828 tons. The actual results realized in the season's operations were over by 4,323 tons.

There was, however, a deficit in the direct ore product of 19,355 tons, which was made up by the larger production of wash ore concentrates. The tonnage of direct ore was small, owing to the fact that scrambling operations were more difficult than anticipated, shortage of labor for this work, and it was found that approximately fifty per cent of the ore scrambled was of too high silica content for direct shipping ore and, therefore, was sent to the plant for concentrating.

The production of retreat, or jig, concentrates fell short by 13,932 tons, due to the treating of this type of material from the Holman-Cliffs Mine in the retreat plant for one week.

(2) - Open Pit Mining:

No cost comparison is being made for the production of direct shipping ore, as the tonnages were too small for accurate figures. The open pit crude ore costs in the table above are on a concentrated basis and show a decrease of \$.014 under the budget and an increase of \$.012 over the 1943 costs.

The actual costs, on a crude ore basis, were \$.119 for 1944, as against \$.111 for 1943 and \$.116 for the budget. These show that the 1944 costs were \$.008 and \$.003 higher than 1943 and the budget costs, respectively. These increases are largely in items "Trucks Operating" and "Trucks Maintenance" and are due to operation of old trucks, as replacements were not received until the middle of September. Also, due to the rubber shortage, a great deal more tire repairing and recapping was done during the past season, than formerly.

(3) General Pit Expense:

The cost per ton under this caption was \$.014 and \$.015 under the budget and the 1943 figures, respectively. This decrease is accounted for largely in the item "Exploratory Drilling". Drilling at this property was curtailed considerably, due to drill crews being sent to other properties, where drill hole information was required immediately. There were only nominal differences in all other items.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

8. COST OF  
OPERATION:  
(Continued)

d. Detailed Cost Comparison: (Continued)

(4) Concentrating:

The cost for concentrating was \$.022 lower than the budget and \$.027 lower than the 1943 costs. The low cost for retreat plant of \$.001 under the budget and \$.003 under the 1943 costs, is due to the larger tonnage treated. The saving of \$.023 in Transportation over the year 1943 is due to the electric haulage being in use for the full season. The construction of a new tailings basin, which did away with expensive dyke construction on the old basin, accounts for the decrease of \$.011 in washing costs. An increase of \$.002 over 1943 in the item "Power-Pumping" is accounted for by the necessity of pumping tailings to the new basin, which was not the case in 1943. Experimental work with the selective media concentrator in the retreat plant and installation of larger motors on the classifiers in the double classification circuit in this plant, caused "Power-Mill Machinery" to be higher by \$.005 than in 1943 and the budget costs. In all other items there were only nominal differences.

In the loading of concentrates from stockpile, it is often necessary to load during the ore washing season, due to boat schedules, and, therefore, rather than have a shovel tied up in the stockpile for this occasional loading, a portable conveyor, fed by a tractor with bulldozer, was installed during the season, the installation of which accounts for the increase of \$.002 over the budget. The use of this equipment also accounted for the saving of \$.002 over the 1943 figure.

(5) General Mine Expense:

The 1944 cost was \$.016 per ton less than the budget and \$.011 less than the 1943 costs. The decrease is made up of nominal differences in the numerous items under this caption.

(6) Idle and Winter Expense:

In 1944, the cost per ton under this caption was \$.001 under the budget and \$.062 under the 1943 cost. The decrease from the budget figure was only nominal. The 1943 cost was abnormally high, due to heavy repairs and alterations to plant equipment, coupled with the wage increase, which was absorbed in this item. The 1944 costs were back to normal.

9. EXPLORATIONS:

The drilling program for 1944 was considerably curtailed, due to crews being shifted to other properties, where drilling information was needed at once. During the year, sixteen holes were put down, totaling 1,044 feet. Four of these holes, totaling 432 feet,

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

9. EXPLORATIONS:  
(Continued)

were exploratory holes through surface on the north side of the Hill pit, to outline known ore body in this area. The remaining twelve holes, totaling 612 feet, were sample holes in the formation in the Trumbull pit bottom, to check the nature of the material and define the bottom of the ore body.

10. TAXES:

The following table shows a comparative statement of the taxes and average rate at the Hill-Trumbull Mine for the years 1943 and 1944:

	1944	1943	Increase	Decrease
Hill Mine,	\$24,390.55	25,300.04		\$ 909.49
Trumbull Mine,	30,164.01	42,407.69		12,243.68
Hill-Trumbull Shops,	979.63	941.39	\$38.24	-
Hill-Trumbull W.P.Lands,	7,118.29	7,846.42		728.13
Personal Property,	4,025.99	7,846.20		3,820.21
<b>Total,</b>	<b>\$66,678.47</b>	<b>\$84,341.74</b>		<b>17,663.27</b>
Village Lots,	\$ 365.28	\$ 346.63	\$18.65	-
<b>GRAND TOTAL,</b>	<b>\$67,043.75</b>	<b>\$84,688.37</b>		<b>\$17,644.62</b>
Average Tax Rate,	105.53	103.86	1.67	

The decrease on mine taxes for 1944 is due to reduction in ore reserves by tonnage mined this year.

Slight increase on the shops, account of higher tax rate in 1944 over 1943.

Due to lower tax rate in the Village of Calumet, the taxes paid in 1944 on Washing Plant Lands is less than that for 1943.

Less ore in stock on May 1st, 1944, accounts for decrease in Personal Property taxes.

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY:

There were four lost-time accidents during 1944, which are described as follows:

NAME: Francis X. Blanchard                      DATE: January 9th.  
CAUSE: While changing tires on truck, he was pulling on a rim, which was frozen in tire, and it loosened unexpectedly, dropping on his foot.  
NATURE: Contusion and laceration of great and second toes.  
TIME LOST: One week  
COMPENSATION: None.

NAME: Eli Travica                                      DATE: March 30th.  
CAUSE: Travica had spotted Truck #39 and while this truck was dumping, he walked approximately 12 feet from the truck and started spotting Truck #42. The dump was partly plugged where the #39 was dumping and a chunk of waste ore, approximately 4' x 3' x 20" came off Truck #39 while dumping, hit pile along edge of dump, and rolled backwards approximately the 12 feet and struck Travica across both legs below the knees from behind, causing him to fall forward, hitting his head on Truck #42, cutting his forehead and knocking him out momentarily and injuring his legs. It is customary, in stripping with trucks, to plug the dump. This is done by unloading several trucks at edge of dump on the dump level. This pile on the edge of the dump is then pushed off by the tractor. The #39 truck was unloading at this particular spot.  
NATURE: Cominuted fracture middle 1/3 of right fibula. There is a fracture of small bones left foot, with extensive swelling.  
TIME LOST: Twenty weeks  
COMPENSATION: \$400.00.

NAME: Hugo Hepola                                      DATE: March 30th.  
CAUSE: He slipped on ice, as he was going down the tracks to the sample cars.  
NATURE: Injury to medial ligaments of right knee.  
TIME LOST: Two days  
COMPENSATION: None

NAME: Peter Berger                                      DATE: May 5th.  
CAUSE: He twisted his back while unloading drill samples from a pick-up truck. Injury did not bother him until May 11th, when he reinjured his back while riding in a light truck.  
NATURE: Back strain.  
TIME LOST: One week  
COMPENSATION: None

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

12. NEW CONSTRUCTION  
AND PROPOSED  
NEW CONSTRUCTION:

Construction of dykes for a new tailings basin at the south end of the old Oliver Iron Mining Company dumps, was completed. A ditch was also excavated from this basin to upper Penaciac Lake to allow return water to flow by gravity to the lake. A 12" tailings discharge line, together with a pump and pump-house, was constructed for this new tailings disposal set-up.

13. EQUIPMENT AND  
PROPOSED  
EQUIPMENT:

The following equipment was received in 1944:

- 4 - 20-ton Euclid Trucks
- 1 - Hydroseal Tailings Pump
- 1 - 4-1/2 Cubic Yard Bucyrus-Erie Electric Shovel
- 2 - Coal Stokers

New equipment, which has been purchased for delivery early in 1945, includes the following:

- 2 - 20-ton Euclid Trucks
- 1 - D-8 "Caterpillar" Tractor and Dozer
- 1 - Hydroseal Pump
- 2 - Selective Media Concentrators
- 1 - Coal Stoker

18. NATIONALITY  
OF EMPLOYEES:

<u>Nationality:</u>	<u>Number of Men</u>
American, -----	44
Finnish, -----	30
German, -----	25
Swedish, -----	19
English, -----	19
Jugo-Slav, -----	15
Norwegian, -----	15
Croatian, -----	10
Canadian, -----	10
Italian, -----	9
Irish, -----	9
Czecho-Slav, -----	5
Bulgarian, -----	4
Austrian, -----	1
Macedonian, -----	1
Swiss, -----	1
Total, -----	217



HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:

Washing operations were started on May 8th, and completed October 27th, covering a period of 134 days. Operations were on a schedule of three 8-hour shifts, six days per week from May 8th through September 1st, at which time they were reduced to a five-day per week basis for the balance of the season. The day shift on Monday of each week, while on the six-day schedule, was utilized as a repair shift.

The plant operated on a schedule of approximately 12 hours per day, treating straight wash ore and 12 hours on washing crude ore for feed to the retreat plant.

Washing plant operations, as a whole, were satisfactory and 798,405 tons of wash ore crude and 716,996 tons of retreat crude were treated for a total of 1,515,401 tons. There was produced from this total tonnage of crude ore, 475,369 tons of wash ore concentrates and 410,789 tons of retreat plant feed, or a total of 886,158 tons at a daily average of 6,613 tons and a recovery of 58.5%, compared with a daily average of 6,239 tons and 56.5% recovery for the 1943 season.

Due to an inadequate supply of railroad cars, it was necessary to stockpile 81,240 tons of wash ore concentrates during the season. Late shipments in the fall necessitated loading out 56,774 tons of this material. The complete concentrating data for 1944 is as follows:

Screening Plant Rejects

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Hill,	5,380	27.41	.040	55.36
Trumbull,	4,210	25.91	.031	57.15
Total,	9,590	26.75	.036	56.15

36" Belt Rejects:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Hill,	562	26.23	.035	56.69
Trumbull,	768	26.45	.032	55.87
Total,	1,330	26.36	.033	56.22

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

	<u>Tons</u>	<u>Iron</u>
Hill,	3,150	29.93
Trumbull,	210	27.15
Total,	3,360	29.76

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

Other removals during mining operations were:

<u>Lease</u>	<u>Surface Cleanup</u>	<u>Lean Ore</u>	<u>Waste</u>	<u>Total Cu. Yds.</u>
Hill,	7,222	-	180	7,402
Trumbull,	10,462	28,387	-	38,849
Total,	17,684	28,387	180	46,251

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

Hill Mill Machines:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Log Washer,	60.12	.052	8.90
Classifier,	57.77	.047	12.55
Tailings,	13.16	-	-

Trumbull Mill Machines:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Log Washer,	57.46	.046	9.52
Classifier,	55.51	.041	12.92
Tailings,	11.31	-	-

The complete concentrating data for the year 1944 was as follows:

	<u>Tonnage</u>	<u>% of Total Mined</u>	<u>% Dried Iron</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore and Rock Mined,	811,355	100.00	40.19		
Less: Rock Removed in Mining,	3,360	.41	29.76		
Crude Ore Trans- ported to Mill,	807,995	99.59	40.23		
Less: Rock Rejects in Screening Plant,	9,590	1.18	26.75		
Crude Ore Entering Mill,	798,405	98.41	40.40		
Concentrates Produced,	475,369	58.60	57.69	59.54	85.02
Rock Rejects on Mill Picking Belt,	1,330	.16	26.36		
Tailings (By Deduction)	321,706	39.65	14.91		
Total Heads, as above,	798,405	98.41	40.40		

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

19. WASHING PLANT  
OPERATIONS:  
(Continued)

The weight recovery for 1944 was 59.5%, as compared to 56.5% for 1943. The average grade of crude wash ore handled in 1944 was higher by 1.69% than the previous year. The iron unit recovery for 1944 was 85.02%, which was 1.38% higher than that for 1943. These slight increases for the 1944 season are due to the treatment of a high grade ore from the north side of the Hill pit. The iron content of the tailings in 1944 was 14.91% as compared with 14.28% in 1943.

20. HEAVY DENSITY  
PLANT  
OPERATIONS:

Operations in this plant were started on May 8th and carried forward on the same working schedule as the washing plant. The actual season extended over a period of 134 days, of which the plant treated Hill-Trumbull ore on 129 days and 410,789 tons of feed material were treated, with a resulting product of 305,884 tons of concentrates. The average daily production amounted to 2,371 tons. On the remaining five days during October, retreat ore from the Bingham property was processed as an experiment.

The average rate of production during the season was up to expectations, but the grade was off slightly, due to the inability of the double classification to concentrate the finer portions of the ore. Installation of the selective media concentrators is expected to rectify this trouble during the 1945 season.

The following is complete concentrating data for the heavy density plant:

	<u>Tonnage</u>	<u>% of Total Mined</u>	<u>% Dried Iron</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore and Rock Mined,	734,526	100.00	35.66		
Less: Rock Removed in Mining,	-	-	-		
Crude Ore Transported to Mill,	734,526	100.00	35.66		
Less: Rock Rejects-Screening Plant,	17,530	2.39	25.02		
Crude Ore Entering Mill,	716,996	97.61	35.92		

HILL-TRUMBULL MINE  
ANNUAL REPORT  
YEAR 1944

20. HEAVY DENSITY  
PLANT  
OPERATIONS:  
(Continued)

	<u>Tonnage</u>	<u>% of Total Mined</u>	<u>% Dried Iron</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Cone Plant Feed Produced,	410,789	55.93	51.11	57.29	81.52
Tailings (By Deduction)	306,207	41.69	15.54		
Cone Concentrates Produced,	305,884	41.64	56.32	42.66	66.89
Cone Rejects,	23,318	3.17	29.37		
Tailings, (By Deduction),	81,587	11.11	37.79		

The overall weight recovery realized from crude ore to concentrates was 42.66%. This is based on a 57.29% recovery of cone feed from the washing of the original crude ore and a subsequent recovery of 74.5% from the feed. The ultimate iron unit recovery was 66.89%.

Safety Department

Annual Report

Year 1944

ACCIDENTS AND PERSONAL INJURY

INDEX

<u>Title</u>	<u>Page</u>
a. Description of Fatal Accidents .....	1 - 5
b. Non-Fatal Accidents .....	6 - 22
Table I- Fatal Accident Record 1898 - 1944, inclusive .....	8 - 9
Table II- Classification of Causes of Fatal Accidents Dec. 1, 1898 - Dec. 31, 1944 .....	10
Table III-Classification of Fatal Accidents 1911 - 1944 by the Central Safety Committee .....	11
Table III-A Classification of Compensable Accidents .....	12
Table IV- Number of Man-Shifts Worked and Tons of Ore Produced Per Fatality .....	13
Table V- Number of Accidents of all Kinds .....	14
Table VI- Causes of Compensable Accidents, Not Including Fatalities . Underground .....	15
Surface, Open-Pit Mines, Other Operations .....	16
Table VII-Frequency Rates, All Compensable Accidents .....	17
Table VIII-Severity Rates, " " " " .....	17
Table VIII-A Compensable Accidents, Including Fatalities - by Mines..	18
Table VIII-B Compensable Accidents, Including Fatalities .....	19
Table VIII-C Frequency - Severity Ratings, Taken from Available Statistics, N.S.C. ....	20
Table IX- Showing Group Ages of Injured Workers .....	21
Table X- Showing Time Periods When Compensable Accidents Occurred ..	21
Table XI- Showing Occupation of Injured Workers .....	22
c. Safety Inspection .....	23 - 39
Fire Patrol Inspection .....	23
Idle and Abandoned Properties .....	24
Blasting Inspections .....	24
Table XII-Number of Safety Recommendations and Suggestions .....	25
Table XIII- " " " " " " .....	25
Table XIV-Number of Inspections Made on Blasting Procedure in Various Mining Contracts .....	26
Table XV- Number and Kind of Safety Inspection Reports Made by Mine and Plant Foremen and Checked by this Department .....	27
Table XVI Number of Fire Extinguishers Inspected .....	28
Rules and Regulations .....	29
Table XVII Rule Books Distributed at Michigan Mines & Plants New Combined Surface Rule Books .....	30
Table XVII New Combined Underground Rule Books .....	30
Disciplinary Action .....	31
Table XVIII Causes and Number of Disciplinary Action .....	31
Central Safety Committee .....	32 - 34

Safety Department

Annual Report

Year 1944

INDEX (Cont'd.)

<u>Title</u>	<u>Page</u>
General Foreman's Conference .....	35
Foreman's Safety Conferences at Mines .....	35
Mining Club .....	36
Lake Superior Mining Section, National Safety Council .....	36
National Safety Council .....	36
Safety Banner Flags .....	37
Miners' Safety Bulletin .....	37
Foreman's Bonuses .....	37
Table XIX Safety Bonuses Paid to Foremen .....	38
Table XX Occupations of Men Participating in Bonus .....	39
d. Ventilation .....	40 - 52
Summary of Ventilation at Each Mine .....	40 - 42
Dust Elimination and Analysis .....	42
Table XXI Dust Samples Collected in Rock and Ore Work .....	44
Table XXII Various Occupations Where Dust Samples were Collected ....	45
Table XXIII Average Light Field Count of All Samples Taken .....	46
Table XXIV Comparison of Dust Counts in Raising to Drifting .....	47
Table XXV Averages in Ore compared to Averages in Rock .....	48
Comments on Dust Counts at Each Mine .....	49 - 51
e. Mine Safety and Mine Rescue Courses .....	53 - 55
First Aid Training .....	53
Mine Rescue Training .....	53
Table XXVI Men Trained by the Safety Department and Examined by the U.S. Bureau of Mines - 1944 .....	53
Table XXVII First Aid Supplies Distributed .....	54
Lecture - "Magic of Fire" .....	55
Job Relations Training .....	55
f. Miscellaneous .....	56 - 59
Stench Warning Tests .....	56
Cambria-Jackson Fire .....	56
Carbon Monoxide Gas in Brownstone Shops .....	58
Exhibits of Safety Devices .....	58
Mine Rescue Station .....	58
Summary .....	59
Table XXVIII .....	59
Expenses for Year - 1944 .....	60

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

a. Fatal Accidents

Falls of ground caused all three fatal accidents which occurred at the company's properties during the year 1944. It has often been said that if falls of ground accidents could be eliminated in mining, accident rates would drop to a satisfactory low. As it is, prevention of falls of ground is up to the individual more so than to any group or the companies. At the present time, rules call for certain precautions, such as trimming, forepoling, lagging, etc. After following all the rules, the employee then must use his judgement. Most of the time his judgement is good but at times he fails. Of the three fatal accidents, one occurred because the miner was unable to detect or sound the large piece of loose rock. In the second case, the employees were unable to see loose ground in the hanging of a stope which had been idle for about two years. During the two years the ground had not moved and there seemed no reason for ground to loosen at just the first time men worked in the scraper drift below. In the third case, the ground was known to be bad but there was a failure on the part of supervision to instruct men in time and also failure on the part of the miners to heed instructions given them by the shift boss during the preceeding shift when he instructed them how to use poles and headboards in the raise when ground was too dangerous.

Usually, when a work place is dangerous and the hazard is easily seen, the employee is very careful. Very few accidents have happened in these places except when employees are not experienced in their work. Because of the shortage of labor, inexperienced men have been put to work on jobs where in normal times only experienced men would be placed.

Following is a description of the fatal accidents which occurred during the year.

Description of Fatal Accidents

Fatal Accident No. I

Mather Mine

Gust Maki, miner, was instantly killed at approximately 11:55 P.M., March 9th, in the main drift, 2nd level, Mather Mine by a fall of ground.

Number one contract had been stripping the main drift and installing timber because the rock had been peeling after the drift had been driven. Twenty-five sets of timber had been

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

a. Fatal Accidents (Cont'd.)

installed and lagged.

The afternoon shift on March 9th had blasted the sides of the drift when going off shift. At no time had it been necessary to drill and blast the back. Men of number one contract, coming on shift, talked to those going off shift and discussed conditions. The night shift crew of number one contract was composed of Gust Maki, James P. Marrietti, Amelino Rovedo, Howard Hill and Robert Richards. Maki had underground mining experience since 1922 and was considered as a safe and good miner. Marrietti also was considered a good safe worker and had had 12 years underground experience. Rovedo, Hill and Richards had very little experience and for that reason, Maki was the leader and Marrietti was next in line.

On going to the work place, Marrietti, Hill and Richards went into the first cross-cut to bring in the mechanical loader and the locomotive and haulage cars. Maki and Rovedo walked ahead to the work place with the intention of making the place safe. There was still some smoke from blasting so the compressed air was turned on to clear the place. At about the same time that Rovedo started to trim the back, the other men had arrived and were making ready to load. Rovedo took down one piece of loose rock with his bar at about the center of the back just ahead of the timber set and then moved to the right rib where he scaled down a few small pieces. From this place he intended to work forward and to the center of the drift but did not have time to do so before the fall of rock occurred. Rovedo had been facing the last timber set and his hat had been knocked off when the rock fell. Also, he was confused for a time and did not realize exactly what had happened. Marrietti, who was coupling water hoses a few feet back, also was confused and this confusion probably was caused because of the noise made by blowing compressed air. When it was noticed that Maki was missing, a search was made and he was found under a large piece of rock which measured about 20 feet by 3½ feet by 3 feet. Maki's entire left side had been crushed and death was instantaneous. Apparently, when Rovedo was barring the rib, Maki moved to a position about 9 feet ahead of the timber. It is not known if he tested and barred but because of his experience, it is believed he sounded the back but got no sound because of the great size of the chunk. A wet red slip along the right rib disappeared before



Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

a. Fatal Accidents (Cont'd.)

it reached the timbered section of the drift which would indicate that it was impossible to see any openings or cracks in the rock.

This accident was the first compensable one underground at the Mather Mine for 692 days which shows that great care must have been used during the development work.

Gust Maki was 44 years of age and left a wife, 42 years of age and three sons Richard, 20; Norman, 18; and William, aged 16 years.

The accident was classified number I - Trade Risk.

Fatal Accident No. II

Spies-Virgil Mine

John Puskala, scraper operator, was fatally injured at about 2:40 P.M., March 28th, when a fall of ground from a stope came through a mill and crushed his leg causing great loss of blood. He died at the Stambaugh Hospital at 1:00 P.M., March 29th.

On March 28th, Puskala and his partner, Victor Siedleski, went to the -50 scraper transfer drift which is about 200 feet above the 8th level. They turned the scraper hoist around and prepared to clean out the drift which had been idle for two years. After lunch, they scraped out some ore in the bottom of the drift and found some loose ore in the last mill and decided to bar it. This done, both men started for the ore raise. Puskala had just passed the middle mill on the east side of the drift when the fall occurred. Apparently, the scraper hoist cable struck him first and he fell with his body lying in a stub drift on the west side of the scraper drift. His legs were exposed in the scraper drift so that chunks which came through the mill, struck them, breaking both legs and almost severing his right leg below the knee. Siedleski had been knocked down and was buried in fine ore to the waist-line and was unable to help either himself or Puskala. Siedleski was not hurt but badly frightened.

The shift boss was the first man to arrive at the scene of the accident, probably about 10 minutes after it happened. He called the two miners who were on the -25 sub-level and put

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

a. Fatal Accidents (Cont'd.)

on a tourniquet. Puskala was rushed to the hospital where everything possible was done to save him but death came the following day from loss of blood and shock.

Because of this accident, three new rules have been made up to prevent this type of accident and it is now believed if the rules are followed by scraper operators and assistants, we should not have a repetition of this accident.

John Puskala was 56 years of age and leaves a wife. A step-child, aged 14, does not live with the family. By a former marriage there were 5 children, none at home. He had been working at the Spies-Virgil Mine since 1923 and previous to that time had worked at the Republic Mine from 1912 to 1923.

The accident was classified Number I - Trade Risk.

Fatal Accident No. III

Lloyd Mine

Julius George LaFreniere was fatally injured June 9, 1944 at approximately 4:45 P.M. by a fall of ground in #9 contract which was putting up a raise from the 8th level.

The accident occurred in a double cribbed raise about 15 feet above the level. The ground in this area had proven to be quite treacherous and required the utmost care and watching.

The mid-night shift in #9 contract on June 8th had blasted a round of holes when going off shift which spread the covering cribbing on the ladder road side and allowed about five or six cars of dirt to block the haulage way. The day shift loaded this material but did not go up into the raise. During the day however, they heard fine dirt dribbling from the breast of the raise so they knew it was dangerous. The shift boss was at the contract at 2:00 P.M. He was able to see up into the raise and warned his men not to go up into the breast but to clean up material under the raise so the on coming shift could easily bring up cribbing and necessary material to catch up the raise. The mining captain was at the place 35 to 40 minutes before quitting time and inspected the breast from the ladder road and seeing that conditions were poor in the breast, advised the miners not to enter the place. The captain, returning to surface, told the Foreman of the afternoon shift to

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

a. Fatal Accidents (Cont'd.)

send an experienced miner, Jalmer Linna, to #9 contract to help the on coming shift. This message was not carried through soon enough to prevent the accident.

The day shift boss and miners told the on coming shift of #9 contract the conditions in the raise but failed to tell the shift boss of the conditions.

The two miners of the afternoon shift, LaFreniere and Roland St. Andre, went to their place immediately and began work, not knowing that another miner was to help them. In a very short time after starting to trim and bar the breast, the fall occurred and LaFreniere was caught. He was taken to the hospital immediately and died June 17, 1944.

LaFreniere is survived by his wife, Betty M., aged 25, and two daughters Julie Ann, aged 4, and Sandra L., aged 1.

The accident was classified II-5 - Failure to instruct men as to method of doing work and hazards incident thereto; and III-A-4 - Improper act or selection of improper method of doing work (by workman).

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

b. Non-Fatal Accidents

During the year our accident experience was somewhat different than 1943 in that the severity was much less. We had 121 compensable accidents compared to 155 during the previous year. 124 accidents caused less than 7 days lost time compared to 16 in the same category in 1943 and 823 accidents in 1944 caused no loss of time compared to 877 in 1943.

The total of all accidents including fatals was 1072 in 1944 compared to 1052 in 1943.

Our frequency rate for compensable accidents for 1944 is 15.61 and for 1943 was 20.30 which is quite an improvement.

The severity comparison is 3.24 compared to 3.986 during 1943 which also is quite a decrease.

Including all accidents which caused a loss of one or more days, the 1944 Frequency is 34.67 and severity 3.610.

During the first half of 1944, operations were almost identical with 1943 but the last half of 1944 saw quite a change when most of the mines went to two shifts per day. This caused a drop in accidents and made a big difference in the attitude of the men. Difference in the attitude of the men came mainly because when two shifts are working in one contract, each shift knows what the other is doing but with three shifts, no one is sure who does things wrong and it is hard to place the blame, also there is the chance that one of the three shifts will take advantage of the other two and perform very little work. Probably the greatest advantage in two shifts is that the gob has more time to settle which certainly increases the safety of the place. Many of the new who were employed during the rush times were men who knew very little or nothing about mines and mining and just wanted to keep out of the armed services. Most of these men have already left the company to return to their old jobs or positions and I'm inclined to believe we are fortunate to get rid of them as most of them were not good employees and not interested in the work.

Our fatality rate for the year, .84, is an improvement over 1943 and is one of the better records since 1898. The average fatality rating from 1898 to 1910 is 4.99 compared to 2.36 for the period 1911 to 1944. This last rating includes the Barnes-Hecker accident of 1926. Falls of ground still take the

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Cont'd.)

greatest toll of life in the mines and during the period from 1898 to 1944, inclusive, has caused slightly more than 34% of all fatal accidents.

It is interesting to note under Table VIII-A that four operations had no compensable accidents, ten operations bettered their frequency rating and three operations had a higher frequency rating than 1943.

Only four operating properties had a higher severity rating than 1943. One of these, the Maas Mine, increased its rating from 0.603 to 0.75 which is still an excellent rating and one of the best for all properties. Four properties had no lost time accidents. All other properties had a lower severity rating during 1944 and all these ratings are excellent for the mining industry.

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE I

FATAL ACCIDENT RECORD  
Cleveland Cliffs Iron Co. and Cliffs Power & Light Co.  
1898 - 1944, inclusive

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NUMBER FATALITIES</u>	<u>FATALITY RATE</u>
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

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE I (Cont'd.)

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NUMBER FATALITIES</u>	<u>FATALITY RATE</u>
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	55	25.96
1927	1969	4	2.03
1928	1784	4	2.25
1929	2000	4	2.00
1930	2566	5	1.95
	10,438	72	6.90
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
1943	3609	4	1.11
1944	3584	3	.84
1911 - 1944		207	2.36

Based on per thousand employees

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE II

Classification of Causes of Fatal Accidents  
From December 1, 1898 to December 31, 1944

A.	Fall of Ground .....	105	
	Run of Mud or Sand .....	60	
	Fall of Chunk of Ore from Chute .....	2	
	Stray Chunk or Stick Down Raise or Stope .....	4	171
B.	<u>Shaft Accidents:</u>		
	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.	<u>Use of Explosives:</u>		
	Explosion of Powder .....	16	
	Premature Blast .....	3	
	Fall of Ground or Timber Due to a Blast .....	4	
	Overcome by Gas .....	3	
	Miscellaneous Causes .....	2	28
D.	<u>Mine and Railroad Cars:</u>		
	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.	<u>Miscellaneous Causes:</u>		
	Falling in Raise, Stope or Pocket .....	9	
	Electric Shock .....	11	
	Falling from Ladder, Stage, Trestle, etc. ....	8	
	By Moving Machinery .....	6	
	Mine Fires .....	3	
	Stockpile Slide .....	3	
	Miscellaneous Causes .....	3	43
	Total .....		328



## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE III

Classification of Fatal Accidents 1911 to 1944, inclusive,  
by the Central Safety Committee

I. Trade Risks .....		115
II. <u>Negligence of the Company</u>		
<u>Violation of Rules</u> .....	5	
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 .....	<u>5</u>	33
III. <u>Negligence of Workmen:</u>		
A. <u>Injured Men:</u>		
Improper Method of Work .....	21	
Violation of Rules .....	10	
Failure to Use Tools or Appliances Provided .....	4	
Failure to Use Safety Devices .....	<u>3</u>	38
B. <u>Other Workmen:</u>		
Improper Method of Doing Work .....	14	
Violation of Rules .....	4	
Failure to Use Tools or Appliances Provided .....	<u>1</u>	<u>19</u>
Total .....		207

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE III-A  
CLASSIFICATION OF COMPENSABLE ACCIDENTS

	Athens	Maas	Negunee	C.S.	Lloyd	Tilden	Spies	Mather	Princeton	Cambria	Canisteco	H. Cliffs	H. Trumbull	Shops	Sthse.	C.F.&L. Co.	Totals
I. Trade Risk, (Incidental & Non-preventable)	2	1	4	4	3		4	1	2	3							24
II. Negligence of Company																	
4. Improper Act or Selection of Improper Method of Doing Work. (by Foreman)											1						1
5. Failure to Instruct Men as to Method of Doing and Hazards Incident Thereto.												1					1
6. Failure to Provide Safety Devices.				2						1							3
7. Failure to Provide Proper Tools, Appliances or Place to Work.			1	1	1			1				1					5
III. Negligence of Workmen: (A- Injured Men)																	
1. Failed to Use Safety Devices Provided.	1																1
2. Failed to Use Proper Appliances or Tools provided.					2												2
3. Violation of Rules.	2		2		3		1										8
4. Improper Act or Selection of Improper Method of Doing Work. (by Workman)	12	7	10	6	5		2		8	6		1	1				58
(B- Other Workmen)																	
3. Violations of Rules.	1				1					1							3
4. Improper Act or Selection of Improper Method of Doing Work. (by Workman)	2			1													3
III - A - 4 and III - B - 4		5	2	1	1				1								10
III - A - 3 and III - B - 3											1						1
III - A - 1 and III - B - 4							1										1
III - A - 4 and II - 7														1			1
III - A - 4 and II - 5					1												1
III - A - 4 and III - B - 4 and II - 7	1																1
<b>Totals</b>	<b>20</b>	<b>14</b>	<b>19</b>	<b>15</b>	<b>17</b>	<b>0</b>	<b>8</b>	<b>2</b>	<b>11</b>	<b>11</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>124</b>

Safety Department  
Annual Report  
Year 1944

12

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE IV

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

<u>Year</u>	<u>Number of Fatalities</u>	<u>Number of man-days worked per fatality</u>	<u>Number of tons of ore mined per fatality</u>
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
1943	4	269,351	1,624,315
1944	<u>3</u>	<u>331,090</u>	<u>1,995,787</u>
Average	2.64	281,551	1,729,317

\* Man-shifts worked

\*\* Amount of ore mined

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Cont'd.)

TABLE V

NUMBER OF ACCIDENTS OF ALL KINDS

<u>Mine or Plant</u>	<u>Slight</u>	<u>Less than 7 days</u>	<u>7 days or more</u>	<u>Fatal</u>	<u>Total</u>
Athens	80	17	20		117
Maas	105	24	14		143
Negaunee	85	15	19		119
Cliffs Shaft	77	16	15		108
Lloyd	80	14	16	1	111
Tilden	6	1	0		7
Spies Virgil	18	1	7	1	27
Mather	38	6	1	1	46
Princeton	31	17	11		59
Cambria Jackson	36	4	11		51
Canistec	26	3	2		31
Holman Cliffs	39	3	3		45
Hill Trumbull	30	4	1		35
General Shops	21	0	1		22
Gar. & Gen. Sthse.	4	1	0		5
Cliffs Power & Light Co.	5	0	0		5
Laboratory	2	0	0		2
Ishpeming Hospital	1	0	0		1
Engineering Dept.	1	0	0		1
General Office	0	0	0		0
Totals	685	126	121	3	935

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

b. Non-Fatal Accidents (Cont'd.)

TABLE VI

CAUSES OF COMPENSABLE ACCIDENTS,  
NOT INCLUDING FATALITIES

Cause	<u>UNDERGROUND</u>								Total	
	<u>Athens</u>	<u>Maas</u>	<u>Neg.</u>	<u>C.S.</u>	<u>Lloyd</u>	<u>Spies</u>	<u>Camb.</u>	<u>Princeton</u>		<u>Mather</u>
Falls of ground	4	7	4	2	1	2	3	1		24
Chunks rolling down pile	1			1						2
Haulage	2				1					3
Loading at chutes	1	1	2		2	1				7
Falls of persons slipping & stumbling	1	1	3	4			1	2		12
Falling or moving material - machinery	5	1	5	3	5		2	2	1	24
Flying or bounding objects			1	3	1	2	1			8
Using or handling tools, machinery or materials	3	4	3	1	3		2	1		17
Stepping on spikes	2									2
Wire ropes								1		1
Miscellaneous					1		1			2
<b>Totals</b>	<b>19</b>	<b>14</b>	<b>18</b>	<b>14</b>	<b>14</b>	<b>5</b>	<b>10</b>	<b>7</b>	<b>1</b>	<b>102</b>

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Cont'd.)

TABLE VI (Cont'd.)

SURFACE

Cause	Spies- Camb.							Total
	<u>Athens</u>	<u>Maas</u>	<u>Neg. C.S.</u>	<u>Lloyd</u>	<u>Virgil</u>	<u>Jack.</u>	<u>Princeton</u>	
Falling or moving material, machinery			1		2	1	1	5
Falls of persons slipping or stumbling				1				1
Using or handling tools machinery or materials							1	1
Bumping against objects	1						2	3
Miscellaneous				1	1			2
<b>Totals</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>12</b>

OPEN PIT MINES

<u>Causes</u>	<u>Canisteco</u>	<u>Hill Trumbull</u>	<u>Holman Cliffs</u>	<u>Tilden</u>	<u>Total</u>
Falling or moving machinery, materials			3		3
Falls of persons slipping or stumbling	1				1
Dumping cars		1			1
From fire	1				1
<b>Totals</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>6</b>

OTHER OPERATIONS

<u>Cause</u>	<u>General Shops</u>	<u>Total</u>
Falls of persons slipping or stumbling	1	1
<b>Total</b>	<b>1</b>	<b>1</b>

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Continued)

TABLE VII

## FREQUENCY RATES

All Compensable Accidents

Year	Total Man Days Worked	Number of Compensable Accidents		Frequency** Rate
		Non-Fatal	Fatal	
1935	393,967	35	2	11.74
1936	567,891	33	2	7.70
1937	765,701	58	1	9.65
1938	491,303	46	3	12.49
1939	564,542	44	1	9.96
1940	714,391	59	5	11.19
1941	918,300	79	5	11.43
1942	1,024,713	75	2	9.39
1943	1,077,402 $\frac{1}{4}$	171	4	20.30
1944	993,272 $\frac{2}{3}$	121	3	15.61

\*\* Based on 1 million man-hours of labor

TABLE VIII

## SEVERITY RATES

All Compensable Accidents

Year	Non-Fatal	Rate	Fatal	All Accidents	Rate
	Days Lost		Days Lost	Days Lost	
1935	3,225	1.023	12,000	15,225	4.830
1936	3,509	.772	12,000	15,509	3.413
1937	7,881	1.286	6,000	13,881	2.266
1938	6,290	1.600	18,000	24,290	6.181
1939	3,264	.723	6,000	9,264	2.051
1940	3,442	.602	30,000	33,442	5.852
1941	5,403	.735	30,000	35,403	4.819
1942	5,851	.500	12,000	17,851	2.177
1943	10,355	1.201	24,000	34,355	3.986
1944	7,759	.976	18,000	25,759	3.242

Based on days lost by accidents per 1,000 man-hours of labor

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

b. Non-Fatal Accidents (Continued)

TABLE VIII-A

COMPENSABLE ACCIDENTS, INCLUDING FATALITIES

BY MINES

<u>Mine or Plant</u>	<u>Frequency</u>	<u>Severity</u>
Athens	25.86	1.05
Cliffs Shaft	13.60	0.66
Canisteco	6.94	0.22
C.P. & L. Co.	0.00	0.00
Sthse. & Shops	4.47	0.28
Hill Trumbull	2.25	0.27
Holman Cliffs	5.63	0.12
Lloyd	28.36	11.97
Maas	14.34	0.75
Miscellaneous	0.00	0.00
Negaunee	23.11	1.32
Princeton	30.08	1.78
Spies Virgil	43.83	43.42
Tilden	0.00	0.00
Mather	5.29	16.08
Cambria Jackson	24.07	0.56
General	<u>0.00</u>	<u>0.00</u>
All Properties	15.61	3.24



11. ACCIDENTS  
AND  
PERSONAL  
INJURY

TABLE VIII-B  
COMPENSABLE ACCIDENTS, INCLUDING FATALITIES

<u>Mine or Plant</u>	<u>Days of Labor</u>	<u>Hours of Labor</u>	<u>Tons of Ore Mined</u>	<u>Number of Compensable Accidents</u>	<u>Fatalities</u>	<u>Days Lost</u>	<u>Frequency Rates</u>	<u>Severity Rates</u>
Spies-Virgil	22810 $\frac{1}{2}$	182484	68434	7	1	7925	43.83	43.42
Mather	47249 $\frac{1}{4}$	377994	54721	1	1	6080	5.29	16.08
Lloyd	74931 $\frac{3}{4}$	599454	376863	16	1	7178	28.36	11.97
Negaunee	102730 $\frac{1}{4}$	821842	759855	19		1085	23.11	1.32
Athens	96680 $\frac{1}{4}$	773442	421883	20		813	25.86	1.05
Princeton	45713 $\frac{1}{2}$	365708	216512	11		652	30.08	1.78
Cliffs Shaft	137909 $\frac{3}{4}$	1103278	601243	15		724	13.60	0.66
Maas	122013 $\frac{1}{2}$	976108	580122	14		734	14.34	0.75
Cambria	57125	457000	292424	11		255	24.07	0.56
Tilden	8053 $\frac{3}{4}$	64430	214824	0		0	0.00	0.00
Hill Trumbull	55690	445520	787150	1		120	2.25	0.27
Holman Cliffs	66546	532368	1046185	3		66	5.63	0.12
Canisteeo	36029	288232	567146	2		64	6.94	0.22
C.P. & L. Co.	15562 $\frac{1}{2}$	124500		0		0	0.00	0.00
Sthse. & Shops	27943 $\frac{1}{2}$	223548		1		63	4.47	0.28
Miscellaneous	13708	109664		0		0	0.00	0.00
General (Est.)	62574 $\frac{3}{4}$	500598		0		0	0.00	0.00
<b>TOTALS</b>	<b>993272<math>\frac{1}{2}</math></b>	<b>7946180</b>	<b>5987362</b>	<b>121</b>	<b>3</b>	<b>25759</b>	<b>15.61</b>	<b>3.24</b>

Safety Department  
Annual Report  
Year 1944

## Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Cont'd.)

TABLE VIII-C

FREQUENCY - SEVERITY RATINGSTaken from Available Statistics, N.S.C.

					<u>Frequency</u>	<u>Severity</u>
1943	National	Ratings,	all	mining	45.56	8.23
1943	"	"	"	Metal Mining	23.85	6.17
1943	"	"	"	Open Cut Mining	17.85	4.57
1944	Cleveland	Cliffs	Iron	Company, Compensable Accidents	15.61	3.24
1944	"	"	"	" All Accidents	34.67	3.61
1944	"	"	"	" Open Cut Mining	12.78	0.223
1944	"	"	"	" Top Slicing	43.69	3.886
1944	"	"	"	" Stopping	31.11	6.749
1944	"	"	"	" General Shops	8.95	0.295
1944	"	"	"	" General Roll	0.00	0.000
1944	"	"	"	" Miscellaneous	0.00	0.000
1944	Cliffs	Power	&	Light Company	0.00	0.000

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Continued)

TABLE IX

SHOWING GROUP AGES OF INJURED WORKERS  
(Compensable Accidents)

<u>Age</u>	<u>Number injured</u>
16 to 25 years of age .....	11
26 to 30 years of age .....	11
31 to 35 years of age .....	18
36 to 40 years of age .....	14
41 to 45 years of age .....	14
46 to 50 years of age .....	11
51 to 55 years of age .....	16
56 to 60 years of age .....	20
61 to 65 years of age .....	5
66 to 70 years of age .....	1
	<u>121</u>

TABLE X

SHOWING TIME PERIODS WHEN  
COMPENSABLE ACCIDENTS OCCURRED

<u>Time</u>	<u>Number</u>	<u>Working Period</u>
8:00 A.M. to 12:00 Noon.....	37.....	First half of day shift
12:00 Noon to 4:00 P.M.....	36.....	Second half of day shift
4:00 P.M. to 8:00 P.M.....	20.....	First half of afternoon shift
8:00 P.M. to 12:00 M.N.....	19.....	Second half of afternoon shift
12:00 M.N. to 4:00 A.M.....	3.....	First half of night shift
4:00 A.M. to 8:00 A.M.....	6.....	Second half of night shift
	<u>121</u>	

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Continued)

TABLE XI

SHOWING OCCUPATION OF INJURED WORKERS  
(Compensable Accidents)

<u>Underground</u>	<u>Surface</u>
Miner.....69	Laborer.....13
Scraper Operator... 4	Truck Driver..... 2
Timberman..... 6	Pocketman..... 2
Skip Tender..... 1	Timber Frammer..... 1
Timber Hoister..... 3	Motor Repairman.... 1
Motor Brakeman..... 5	Miner..... 2
Trammer..... 4	Blacksmith..... 2
Chuteman..... 2	Repairman..... 1
Cage Rider..... 1	Lander..... 2
Motorman..... 5	Dumper..... 1
Shift Boss..... 1	Machinist..... 2
U.G. Laborer..... 1	<u>19</u>
<u>102</u>	

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection

The Marquette and Menominee Range properties were inspected on an average of once a month by Mr. Harry F. Rogers, Safety Inspector, and myself. During the year, we paid particular attention to loose ground and made it a point not to leave a work place where there was any sign of loose ground until the place was made safe. We firmly believe that this method of inspection contributed to the smaller number of accidents from falls of ground. Also, it caused the supervisors and miners to be more alert to this greatest of all mining hazards. Mr. Rogers made most of his inspection trips in company of the shift bosses. My trips were made mostly with the superintendent or mining captain but I also changed to the shift boss at times to enable me to see each boss's procedure and method of handling men.

Good cooperation was had from all officials and most of our supervisors are very much safety minded.

Mr. George Whittington, Safety Inspector on the Mesaba Range, made a total of 167 inspections during the year. These were evenly divided between the Hill Trumbull, Holman Cliffs and Canisteo Mines. Table number XIII gives the number of inspections, recommendations and violations of safe practices on the Mesaba Range.

Fire Patrol Inspection

These inspections are made at the beginning of any idle period underground and once every 24 hours thereafter to check for fire which may have started after the men left their work places and to see that all power lines are dead.

These patrols again more than paid for themselves when they discovered an incipient fire in the Cambria-Jackson Mine. The loss from this fire was negligible.

548

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

c. Safety Inspection (Cont'd.)

All idle properties were inspected twice during the year. Certain repairs to fences had to be made and was taken care of by Julien Payen and his crew. Repairs to fences were delayed for a considerable time but all repairs were completed before the fall of the year. At the Michigamme Mine, people have continually broken down fencing in order to take ice from the old workings during the summer months. Makeshift ladders are used to descend the 25 to 30 feet to chop the ice. Warning signs have also been torn down. In order to safe-guard the place permanently, it would be necessary to blast down the overhanging ledges which would be quite an expensive job requiring a portable air compressor drill machine, drills and powder.

Blasting Inspections

The company rules require that each shift boss observe and report blasting practices of each of his mining contracts at least twice during the year. Total number of inspections reported for the year was 1,711 with 362 minor violations. There were no reports of serious trouble with any of the blasting equipment. An electric blasting switch developed by the company, which has now been in use for over a year, has proven very successful. In the future it should prevent misfires and greatly lessen the hazards connected with blasting. During the year, a new fuse blasting cap replaced the old one. The container is of aluminum, it is somewhat shorter and required an adjustment to the cap crimper and is less sensitive to shock. The change was made without trouble and many of our miners still do not know of the change. We believe this was a change for the better, first because the cap is smaller and less likely to scrape the sides of the bore holes and second, because it is less sensitive to shock.

Table number XIV gives Blasting Inspection Reports from each mine.

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XII

<u>Mine or Plant</u>	<u>Violations of Standards</u>	<u>Safety Suggestions</u>	<u>Recommendations</u>	<u>Fire Hazard</u>	<u>Total</u>
Athens	33	21	7		61
Maas	39	14	8	2	63
Negaunee	33	16	2	3	54
Cliffs Shaft	22	24	7	3	56
Lloyd	17	13	8	2	40
Tilden	2	4	1		7
Spies-Virgil	6	10	2		18
Mather	22	12	8		42
Princeton	29	19	4	3	55
Cambria Jackson	51	24	7	7	89
General Shops		7	5	2	14
Garage & Storehouse		1	1	1	3
Ishpeming Hospital		1	2	1	4
Totals	254	166	62	24	506

TABLE XIII

<u>Mine or Plant</u>	<u>Number of Inspections</u>	<u>Recommendations</u>	<u>Violation of Standards</u>
Holman Cliffs	57	44	0
Hill Trumbull	55	24	0
Canisteo	55	10	0
Totals	167	78	0

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Cont'd.)

TABLE XIV

NUMBER OF INSPECTIONS MADE DURING THE BLASTING  
PROCEDURE IN VARIOUS MINING CONTRACTS

<u>Mine</u>	<u>Number of Inspections</u>	<u>Number of Violations Reported</u>
Athens	201	22
Cambria-Jackson	198	79
Cliffs Shaft	520	21
Lloyd	44	0
Maas	256	53
Mather	35	0
Negaunee	447	187
Princeton	6	0
Spies-Virgil	4	0
	—	—
TOTALS	1,711	362



## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Cont'd.)

Following are tables showing the kind and number of safety inspection reports made by the mine and plant foremen, which were received and checked by this department.

TABLE XV

Type of Inspection	Ath.	C.S.	Lloyd	Maas	Neg.	Spies	Prince- ton	Math.	Tild.	Camb. Jack.	Hill Can.	Holman Trumb.	Cliffs	Total
Hoisting Rope	214	301	262	273	292	261	333	257		266				2,459
Skip and Cage Roads	95	102	95	99	50	65	39	47		84				676
Ladder Roads	51	100	46	50	52	49	20	48		9				425
Safety Catches	10	26	8	12	12	14	11	12		6				111
Fire Doors(U.G.)			1	10										11
Slack Rope Device		12	10	10	12	12	8	12						76
Hoist Inspection	24	24	24	24	24	23	24	24		24				215
Fire Extinguishers	1	2	1	1	1	1	1	2	2	1	1	1	1	16
Fire Equipment	2		2	2	4	4				1	3	3	3	24
Fire Prevention	18	21		37	20		17	3	14	14	7	15	13	179
Totals	415	588	449	518	467	429	453	405	16	405	11	19	17	4,192

	Hibbing Dist. Office	Negaunee Dispensary	Storehouse and Shops	Rented Bldgs.	Ishpeming Hospital	General Office	Total
Fire Extinguishers			2	2	2	2	8
Fire Prevention	2	3					
Totals	2	3	2	2	2	2	13

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Cont'd.)

TABLE XVI

NUMBER OF FIRE EXTINGUISHERS INSPECTED

<u>Mine or Plant</u>	<u>2½ Gal. Soda Acid</u>	<u>2½ Gal. Non- Freezing</u>	<u>2½ Gal. Foamite</u>	1 Gal. 1-1½ Qt. Carbon Tetra- chloride	Dry Powder Type 15-30	Dry Powder Type 150	3 Gal. Carbon Dioxide Type	3 Gal. Carbon Tetra- chloride
Athens Mine	5			16	4			2
Maas Mine	7			22	5			5
Negaunee Mine	6			17	5			3
Mather Mine	4			28	18			
Cliffs Shaft Mine	10		2	30	2			2
Lloyd Mine	2		1	18	2			4
Princeton	3			20	3			3
Cambria Jackson	11			14	5			1
Spies-Virgil	3			18	9			4
Tilden Mine	1	4		36	3			1
Canisteo Mine	7		1	16	17			
Holman Cliffs				21	17			
Hill Trumbull				14	24			1
Hibbing District	3							1
Ishpeming Hospital	9			12				
Ishpeming Residences				17				
Negaunee Dispensary	3			4				
North Lake Residences	3			7				
Spies Location				18				
Shops & Sthse.	14	11		39				
Central Office	6		1	6				
C.P. & L. Co.	4	2		13	11	1		15
Gwinn District	1			5				
Totals	102	17	5	391	125	1	0	42

All Carbon Tetrachloride Type fire extinguishers are tested and inspected twice annually.

Soda Acid type, discharged and recharged once annually.

All other types inspected once annually.

Safety Department

Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

c. Safety Inspection (Cont'd.)

Rules and Regulations

During the year, three new rules were added to the safety rule books for Foremen. These rules are to prevent accidents in Scraper Transfer Drifts. Copies were sent to all mines to be distributed to superintendents, captains and bosses. The new rules are quite a radical change for scraper drifts and should give employees working in these drifts the fullest of protection. The new rules are quoted below and from them it can easily be seen that each superintendent can use a method which will suit the particular condition he has at his mine which will cause him the least hardship and expense.

SCRAPER TRANSFER DRIFTS

1. In order that persons will not be exposed to falling material, Scraper Transfer Drifts fed by open raises directly connected with an open stope, shall be guarded by leaving broken material in blocked chutes or provided with separate or guarded travelways.
2. The drawing of ore onto a Scraper Transfer Drift shall be limited to active raises on one side of the drift only.
3. The minimum pillar distance between active mills shall be 15 feet.

A total of 147 rule books were distributed during the year to new employees and those changing jobs. The books are given out by the employment office when the man is hired and the receipt he signs is sent to this office where it is filed.

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Cont'd.)

TABLE XVII

RULE BOOKS DISTRIBUTED AT MICHIGAN MINES & PLANTSNew Combined Surface Rule Books

<u>Mine or Plant</u>	<u>For Foreman</u>	<u>Surface Employees</u>	<u>Totals</u>
Cambria-Jackson		1	
Princeton		4	
Lloyd		2	
Negaunee		2	
Spies-Virgil		1	
Cliffs Shaft		4	
Athens		3	
Maas		1	
Tilden		5	
Mather		3	
Gen. Shops		5	
Sthse.		9	
Miscellaneous		0	
Cliffs Power & Light		1	
Laboratory		9	
TOTALS		50	50

New Combined Underground Rule Books

<u>Mine or Plant</u>	<u>For Foreman</u>	<u>Employees</u>	<u>Totals</u>
Cambria-Jackson		5	5
Princeton		8	8
Lloyd	1	6	7
Negaunee	1	6	7
Spies-Virgil		7	7
Cliffs Shaft	2	18	20
Athens		6	6
Maas		13	13
Tilden			0
Mather	4	19	23
Gen. Shops		1	1
Miscellaneous			0
TOTALS	8	89	97

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Cont'd.)Disciplinary Action

There were only 38 cases of disciplinary action taken during the year compared to 32 during 1943. It is realized that disciplinary measures were not used as they would be during normal times.

Table number XVIII gives causes and places where action was taken.

TABLE XVIII

CAUSES AND NUMBER OF DISCIPLINARY ACTION

<u>Cause</u>	<u>Cliffs</u>			<u>Neg.</u>	<u>Mather</u>	<u>Athens</u>	<u>Camb.</u>		<u>Gen. Sthse.</u>	<u>Til- den</u>	<u>C.P. &amp; L.</u>	<u>Total</u>
	<u>Maas</u>	<u>Lloyd</u>	<u>Shaft</u>				<u>Jack.</u>	<u>Spies</u>				
Losing time	4		1	4			5	1	1			16
Infraction of rules	3			1		5	4					13
Reporting to work in an intoxicated condition	1				1							2
Disregarding instructions							1					1
Insubordination		3	1		1	1						6
Totals	8	3	2	5	2	6	10	1	1	0	0	38

## Safety Department

## Annual Report

Year 1944

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Cont'd.)Central Safety Committee

This committee met four times during the year with Mr. G.R. Jackson as chairman of the March meeting, Mr. W.W. Graff, chairman of the June meeting and Mr. H.O. Moulton, chairman of the September and December meetings.

Accidents were classified at all the meetings. Other subjects taken up during the year were:

Temporary Man Cars

Permission was granted use of man cars with stipulation that they will be used only by men who must travel more than 1,000 feet. During the year, one car was used at the Mather Mine and one at the Spies-Virgil Mine with a great saving of time and travel.

New Selective Service Procedures

Mr. C.J. Stakel explained these procedures and asked superintendents to notify Miss Persons in case a man was hired and was registered in another county.

Fire Control at Mines

The safety department requested certain information on equipment which could be used for fire fighting in each mine. Superintendents were requested to check water pipe lines and the special water tank cars to make sure each was in condition and available in case of fire.

Foreman's Report of Slight Accidents

Mr. Johnson of the Compensation Department presented a new form on which to report slight accidents. This form was accepted by the committee as an improvement over the old one.

Scraper Transfer Drifts

These drifts came up for considerable discussion and a subcommittee composed of Allen, Stromquist, Marjama, Haller and Westwater was appointed to investigate and propose new rules. This committee later reported and three new rules were accepted by the committee and entered into the rule books.