

AGNEW MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

Mining operations at the Agnew Mine were carried forward from the first of the year to July 17th on a two-shift, 5-day a week basis, and at that time were increased to a two-shift, 6-day a week basis for the balance of the year. In addition to time lost on holidays, operations were slowed considerably all during April and May due to unseasonable blizzards coupled with thaws causing considerable flooding in the mine. A strike of trainmen on the Great Northern Railway made it necessary to stockpile all production from June 26th to July 10th. Production was suspended from December 18th to end of the year to allow for shaft repairs under E&A #CC-384. Ore was placed in stockpile from January 1st to May 2nd. Direct loading into cars from pocket started on May 2nd and continued until November 24th, at which time stockpiling was resumed for balance of the year. The stockpile was loaded out as cars were available from May 2nd to June 23rd.

The Hanna Company loaded ore intermittently all through the season under Agnew-South Agnew cross-mining agreement.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production - Crude Ore:

Agnew - South Agnew Crude ----- 36,297 tons

- Concentrates:

Agnew - South - Agnew Bess. Concentrates ----- 7,831 tons

Agnew - South - Agnew N.B. Concentrates ----- 18,749 tons

Total ----- 26,580 tons

- Direct Ore:

Agnew Bess. Shaft ----- 22,865 tons

Agnew N.B. Shaft ----- 296,438

Agnew-South-Agnew Bess. Direct ----- 1,302

Agnew-South-Agnew N.B. Direct ----- 5,560

Total ----- 326,165

b. Shipments - Concentrates:

Agnew-South-Agnew Bess. Concentrates ----- 7,831

Agnew-South-Agnew N.B. Concentrates ----- 18,749

Agnew Bess. Shaft ----- 22,865

Agnew N.B. Shaft ----- 303,176

Agnew-South-Agnew Bess. Direct ----- 1,302

Agnew-South-Agnew N.B. Direct ----- 5,560

Total ----- 359,483 tons

c. Stockpile Inventories:

Agnew Shaft ----- 27,361 tons

d. Production by Months: - Crude Ore:

<u>Month</u>	<u>Tons</u>
August	9,805
September	16,631
October	7,424
November	2,437

Total 36,297 tons

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2. PRODUCTION,
SHIPMENTS &
INVENTORIES:
(Continued)

e. Production by Months - Concentrates:

<u>Month</u>	<u>Agnew So. Agnew Concts.</u>	<u>Agnew So. Agnew Direct</u>	<u>Agnew Shaft</u>	<u>Total</u>
January			20,412	20,412
February			20,721	20,721
March			25,752	25,752
April			18,387	18,387
May			29,316	29,316
June			36,547	36,547
July			25,397	25,397
August	6,557	2,373	35,576	44,506
September	12,448		31,218	43,666
October	5,814	4,206	33,432	43,452
November	1,761	283	28,733	30,777
December			13,812	13,812
Total	26,580	6,862	319,303	352,745

f. Ore Statement:

The 1949 stockpile balance and the ore placed in stock during the winter of 1950 was loaded out completely by the end of June. Agnew-South-Agnew direct and concentrates were loaded for our account by Butler Bros.

3. ANALYSIS:

a. Tonnage & Analysis - Crude Ore:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Agnew-South-Agnew	36,297	50.34	.049	21.34

b. Tonnage & Analysis of ore Produced:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Net.</u>
Agnew-So.-Agnew Bess. Concts.	7,831	54.65	.033	17.42	.30	1.52	13.92	47.04
Agnew-So.-Agnew N.B. Concts.	18,749	53.85	.060	15.15	.66	1.63	12.31	47.22
Agnew Bess. Shaft	22,865	57.23	.037	10.79	.49	1.24	12.72	49.95
Agnew N.B. Shaft	296,438	56.59	.047	10.99	.57	1.32	12.64	49.44
Agnew-So.-Agnew Bess. Direct	1,302	50.00	.044	15.25	.96	3.86	12.04	43.98
Agnew-So.-Agnew N.B. Direct	5,560	54.33	.055	11.17	1.12	3.06	14.29	46.57
Total	352,745	56.38	.047	11.36	.57	1.37	12.68	49.23

c. Tonnage & Analysis of Ore Shipped:

Agnew-So.-Agnew Bess. Concts.	7,831	54.65	.033	17.42	.30	1.52	13.92	47.04
Agnew- So. Agnew N.B. Concts.	18,749	53.85	.060	15.15	.66	1.63	12.31	47.22
Agnew Bess. Shaft	22,865	57.23	.037	10.79	.49	1.24	12.72	49.95

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3. ANALYSIS:
(Continued)

c. Tonnage & Analysis of Ore Shipped: (Continued)

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Nat.</u>
Agnew N.B.								
Shaft	303,176	56.57	.047	10.99	.59	1.33	12.53	49.48
Agnew-So.-Agnew								
Bess. Direct	1,302	50.00	.044	15.25	.96	3.86	12.04	43.98
Agnew-So.-Agnew								
N.B. Direct	5,560	54.33	.055	11.17	1.12	3.06	14.29	46.57
Total	359,483	56.37	.048	11.36	.60	1.38	12.59	49.27

d. Mine Analysis of Ore in Stockpile:

Agnew N.B.								
Shaft	27,361	57.27	.047	10.48	.59	1.25	13.16	49.73

e. Complete Analysis of Season's Shipments:

	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mng.</u>	<u>Sulph</u>	<u>Loss</u>
Agnew-So.-Agnew									
Bess. Conct.	54.65	.033	17.42	.30	1.52	.34	.20	.010	1.87
Agnew-So.-Agnew									
N.B. Conct.	53.85	.060	15.15	.66	1.63	.34	.20	.010	4.59
Agnew Bess.									
Shaft	57.23	.037	10.79	.49	1.24	.33	.21	.011	4.80
Agnew N.B.									
Shaft	56.57	.047	10.99	.59	1.33	.34	.21	.011	5.28
Agnew-So.-Agnew									
Bess. Direct	50.00	.044	15.25	.96	3.86	.33	.21	.011	7.37
Agnew-So.-Agnew									
N.B. Direct	54.33	.055	11.17	1.12	3.06	.33	.21	.011	5.80

Concentration:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>
Crude Ore	36,297	50.34	.049	21.34			
Concentrates	26,580	54.09	.052	15.82	.56	1.60	12.78

4. ESTIMATE OF ORE RESERVES:

a. Factors Used:

Direct Ore

<u>Cu. Ft. Per</u>	<u>%</u>
<u>Ton Crude</u>	<u>Recovery</u>
14	100.00

b. Ore Reserve as of 12-31-50:

	<u>Reserve</u>	<u>Mined</u>	<u>Balance</u>	<u>Reserve</u>
	<u>12-31-49</u>	<u>1950</u>	<u>After Mining</u>	<u>12-31-50</u>
NE-NE 11,57-21	996,798	319,303	677,495	974,658 *

* 297,163 added by re-estimate.

c. Analysis of Ore Reserves:

	<u>Non-Bess.</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Fe.</u>
	<u>Ore</u>							<u>Nat.</u>
NE-NE 11,57-21	974,658	57.08	.054	9.53	.67	1.40	-	-

5. LABOR & WAGES:a. Comments:

The labor supply was ample throughout the year, but there continued to be a shortage of experienced miners. A program of training available men continued and no serious shortage developed for present operations. Local labor relations with the Union continued satisfactory. A general wage increase throughout the area went into effect on December 1st.

b. Comparative Statement of Production & Wages:Production:

Direct Ore -----	319,303 tons
Number of Days Operated -----	268 days
Average Daily Production -----	1,191.4 tons
Average number of men working -----	110 men
Tons per man - per miner -----	24.17 tons
Tons Per man - Total Underground -----	13.65 tons
Tons per man - Total Mine -----	10.77 tons
Average Rate per Day	
Surface -----	\$11.13
Underground -----	14.48
Contract Miners -----	15.85
Total Mine -----	13.87
Amount paid for labor -----	\$414,202.65
Cost per ton for labor -----	\$1.297

6. SURFACE:a. Buildings & Repair:

Minor maintenance repairs to buildings were carried on throughout the year. Loading pocket in shaft head frame relined.

b. Roads, Transmission Lines, Etc.:

None

7. UNDERGROUND
MINING:a. Shaft:

Approval was obtained on September 21 for E&A #CC-384, in the amount of \$12,000.00 for replacing of wooden shaft sets that had decayed beyond repair with steel sets from collar to ledge. This work was begun December 19th, 1950 and completed January 8th, 1951.

b. Development:

No extensive development. A few short drifts and raises were completed to open up new blocks for mining.

c. Mining:

Mining was carried forward during the year with an average of 12 gangs employed. Of these 12 gangs, 8 mined by slicing, 3 by sub-level caving and 1 on developing new blocks for mining. The average height of slices were 14 ft. and varied in width from 10 to 12 ft. In the sub-level caving places blocks approximately 28 ft. high and 25 ft. wide were caved. Pillars were mined back in an orderly manner on the various sub-levels.

The M. A. Hanna Company operated intermittently, mining both direct and wash ore from Agnew-South-Agnew line under cross-mining agreement. A total of 33,422 tons were mined, of which 6,862 tons were direct ore and 26,580 tons were concentrates.

7. UNDERGROUND

MINING:

(Continued) d. Timber, Explosives, Etc.

The supply of timber was ample and of good quality. Due to shortage of tamarack timber, elm was gradually substituted, proven satisfactory, and it is expected that in the future one-half elm will be used in place of tamarack.

Lineal feet of timber used per ton of ore ----	.78 ft.
Cost per ton for timber -----	\$0.113
Cost per ton for logging, poles and boards ---	\$0.097
Cost per ton for wire -----	\$0.010
Pounds of explosives per ton. -----	.55 lbs.
Cost per Ton for Explosives -----	\$0.102

e. Pumping & Drainage:

The pumping problem at this property, except during severe rain-storms and spring breakup has eased considerably. The pumping cost for 1950 was \$0.093 per ton, compared with \$0.165 in 1949. This was due entirely to increased Hanna Company pumping from the South Agnew and Morton properties, and as these properties are deepened the Agnew pumping will decrease. Extra cost due to floods was only \$0.001 per ton in 1950 compared to \$0.024 per ton in 1949.

8. COST OF OPERATION:

a. Comparative Cost Statement:

	1950 Budget	1950 Cost Per Ton	1949 Cost Per Ton
<u>Product:</u>			
Direct Ore - Tons	300,000	319,303	280,401
<u>Underground Costs:</u>			
Exploring in Mine	-	-	\$.032
Stoping	\$.812	\$.859	.813
Timbering	.348	.377	.339
Tramming	.136	.123	.138
Ventilation	.009	.008	.009
Pumping	.163	.093	.165
Compressors & Air Pipes	.029	.030	.030
Underground Superintendence	.067	.063	.067
Flood	.016	.001	.024
Maintenance: Compressors & Power Drills	.014	.013	.014
" Scrapers & Mech. Loaders	.063	.053	.065
" Tramming Equipment	.021	.029	.022
" Pumping Machinery	.014	.015	.014
<u>Total Underground Costs</u>	<u>\$1.692</u>	<u>\$1.634</u>	<u>\$1.732</u>
<u>Surface Costs</u>			
Hoisting	.038	.038	.039
Stocking Ore	.027	.024	.028
Dry House	.047	.050	.048
General Surface Expense	.040	.029	.040
Maintenance: Hoisting Equipment	.008	.009	.008
" Shaft	.003	.041	.003
" Top Tram Equip.	.002	.000	.002
" Docks, Trestles & Pocket	.002	.007	.002
" Mine Buildings	.001	.001	.001
<u>Total Surface Costs</u>	<u>\$.168</u>	<u>\$.199</u>	<u>\$.171</u>

8. COST OF OPERATION:
(Continued) a. Comparative Cost Statement (Continued)

	<u>1950 Budget</u>	<u>1950 Cost Per Ton</u>	<u>1949 Cost Per Ton</u>
<u>General Mine Expense</u>			
Geological	.001	.001	.000
Mining Engineering	.009	.011	.009
Mechanical & Elect. Engr.	.009	.010	.009
Analysis & Grading	.020	.016	.014
Safety Department	.008	.010	.008
Telephone & Safety Devices	.002	.003	.002
Special Expense	.005	.006	.004
Ishpeming Office	.005	.005	.005
Mine Office	.070	.072	.072
Insurance	.021	.021	.021
Personal Injury	.020	.009	.017
Social Security Tax	.020	.028	.019
Employees Vacation Pay	.035	.032	.034
Hibbing Office	.020	.033	.037
Additional Wage Adjustment	-	.005	-
<u>Total General Mine Expense</u>	<u>.245</u>	<u>.262</u>	<u>.251</u>
Cost of Production	\$2.105	\$2.095	\$2.154

The Cost of Production for 1950 was \$0.010 lower than the budget and \$0.059 lower than 1949 cost.

Total Underground Cost was \$0.058 under the budget and \$0.098 under 1949 costs. These reductions were almost entirely in the item "pumping", which greatly decreased during the year due to Hanna Company's increased pumping in the area.

Total Surface Cost was \$0.031 higher than the budget and \$0.028 higher than 1949 costs. These increases were due to the absorption of all charges on E&A #CC-384 for shaft repair in 1950 cost of production.

Total General Mine Expense was \$0.017 higher than budget and \$0.011 higher than 1949 costs. These differences, in both cases, were only nominal and spread throughout the various items making up this caption.

9. MAINTENANCE & REPAIR:

A continuous program of maintenance and repair was carried forward throughout the year as the need arose.

10. EXPLORATION AND FUTURE EXPLORATION:

No extensive program of exploration during the year 1950 was carried on. Several shallow test pits and test holes with augers were put down to test bottoms for operations.

11. TAXES:

The following is a statement of the taxes for the years 1950 and 1949:

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11. TAXES:
(Continued)

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Agnew Mine	\$15,841.92	\$16,693.98		\$852.06
Personal Property	<u>1,773.60</u>	<u>352.64</u>	\$1,420.96	
Total	\$17,615.52	\$17,046.62	\$568.90	
Average Tax Rate:	90.14	98.61		8.47

Ore Reserves were increased by the State 85,372 tons. Ore mined in 1949 and decrease in mill rate reduced ad valorem taxes.

Personal Property increased on account of direct ore stockpile on hand May 1st of 119,370 tons against no tonnage on hand May 1, 1949.

12. ACCIDENTS &
PERSONAL INJURY:

There were 110 slight accidents at the Agnew Mine during the year 1950 and 9 compensable injuries, which are described below:

- (1) Name: John Evancevich
Date of Injury: April 24, 1950
Cause:
Mr. Evancevich was opening the chute on top of grizzly rails. A large chunk mixed with the dirt rolled down, striking him on his right foot.
Nature of Injury: Severe bruise right instep
Time Lost: 80 days
Compensation Paid: \$405.00
- (2) Name: Wilfred Fayle
Date of Injury: June 8, 1950
Cause:
Mr. Fayle had just mopped up in Hoist House and was walking over to throw converter switch and slipped on a wet rubber mat, falling backwards. He put his arms up to prevent his fall and fell with his weight on his left arm.
Nature of Injury: Fractured wrist.
Time Lost: 15 days
Compensation: \$83.27
- (3) Name: John Simonovich
Date of Injury: June 19, 1950
Cause: Mr. Simonovich was lighting the fuses for a 17 hole blast in the slice but did not get all the holes lit when the lighter burned out. He lit another lighter and continued lighting the holes. While lighting the last bottom hole, the first hole went off. Simonovich twisted his left ankle in getting out of danger.
Nature of Injury: Swelling and tenderness left ankle.
Time Lost: 7 days.
Compensation Paid: \$10.00
- (4) Name: Lawrence Spangenberg
Date of Injury: June 19, 1950
Cause: Mr. Spangenberg was injured under the same circumstances as Mr. Simonovich - above. Dirt from the blast struck Spangenberg on the outside of the right leg.
Nature of Injury: Severe injury to right thigh. No fracture
Time Lost: 57 days
Compensation Paid: \$120.04

12. ACCIDENTS &
PERSONAL INJURY:
(Continued)

- (5) Name: John Vesel
Date of Injury: June 28, 1950
Cause: Vesel was loading timber onto timber truck by himself when he felt a pain in his left groin.
Nature of Injury: left inguinal hernia
Time Lost: Retired following injury
Compensation Paid: \$300.00
- (6) Name: Carl Peterson
Date of Injury: August 5, 1950
Cause: Mr. Peterson had one foot braced on ^{STAGING}stagine while in the act of blowing down loose dirt. A rock came down from the back, striking him on his right leg.
Nature of Injury: Fracture of lower leg.
Time Lost: 55 days
Compensation Paid: \$301.41
- (7) Name: Walfred Yoki
Date of Injury: October 4, 1950
Cause: It is a general practice for the miners to help one another, and Yoki was assisting Contract #7 miners in lighting fuses. He stepped on a block, causing him to twist his left knee.
Nature of Injury: Left knee tender and swollen.
Time Lost: 9 days
Compensation Paid: \$15.00
- (8) Name: Henry Markos
Date of Injury: October 18, 1950
Cause: While Mr. Markos was in the act of breaking a chunk, another chunk rolled from the side, striking him on his rightleg.
Nature of Injury: Bruised lower right leg.
Time Lost: 31 days.
Compensation Paid: \$160.00
- (9) Name: Ole Stone
Date of Injury: December 17, 1950
Cause: Mr. Stone was going to look at sump pump when he slipped on wet planks and fell on his right arm.
Nature of Injury: Strain of muscles of right arm.
Time Lost: 12 days
Compensation: \$60.00

13. PROPOSED NEW CONSTRUCTION:

No new construction contemplated

14. EQUIPMENT RECEIVED AND
PROPOSED NEW EQUIPMENT:

The following equipment was purchased and put into use in 1950:

- 2- Ingersoll-Rand RB-12 Jackhammers
- 1 - Disston Chain Power Saw

Proposed New Equipment:

- 1 - 5 H.P. Blower
- 2 - 15 H.P. Double Drum Scraper Hoists

ALWORTH RESERVE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

Pursuant to an agreement made in Cleveland between the Cleveland-Cliffs Iron Company and Pickands Mather & Company, two shovels were started by the latter company in surface stripping on NE-NW, 12-57,21 in February. This work was completed the latter part of March. The Oliver Iron Mining Company then started moving surface from this forty for establishment of track grades for Hull Rust operations, during April, and continued intermittently through May, completing the work in June. During the course of this operation some 1,404 tons of direct ore were loaded by Oliver Iron Mining Company for the Cleveland-Cliffs Iron Company account in June.

In May, Pickands Mather & Company requested an area on NW-NW, 12-57-21 for stocking of lean material encountered in their Alworth operations. By request of fee owners, two drill holes were put down in the area and the upper ore horizon proved barren. Area was then approved for dump purposes by all concerned. The Oliver Iron Mining Company then proceeded to clean up the area and Minnesota Power & Light Company made some transmission line changes to free this approved area for dump purposes.

During November, Pickands Mather & Company started construction of haulage road to dump area from pit across NE-NW. This work was suspended due to cold weather.

2. PRODUCTION, SHIPMENTS & INVENTORIES: NONE

3. ANALYSIS: NONE

4. ESTIMATE OF ORE RESERVES: Following is estimate of ore reserves as of 12-31-50:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mng.</u>	<u>Alu.</u>	<u>Moist.</u>
1,706,999		56.71	.069	9.90	.78	-	15.58

This estimate is to be revised when present drilling program is completed.

5. LABOR & WAGES: NONE

6. GENERAL SURFACE: NONE

7. UNDERGROUND MINING:

Development:

In December approval was received on E&A's CC#-408 and CC#421 for development of upper ore by belt conveyors on this property. All equipment is on order and drifting will start immediately after January 1st.

8. BENEFICIATION: NONE

9. MAINTENANCE AND REPAIRS: NONE

10. COST OF OPERATION: NO PRODUCTION

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11. EXPLORATION & FUTURE EXPLORATION:

During February and March Pickands Mather & Company drilled two holes from pit bottom in Northeast corner of NE-NW. These holes checked the known ore body but showed considerable wash ore present.

In May Pickands Mather & Company moved a drill rig onto NW-NW to drill two holes to prove barrenness of upper ore layer and obtain the area for dump room. This drilling was a joint operation with Pickands Mather & Company paying for drilling through upper ore horizon and the Cleveland-Cliffs Iron Company responsible for the remaining depth of holes to explore the lower ore layer. This drilling was completed in August and checked previous information.

In August, E&A #CC-379 was approved for a drilling program of some 4,503 feet of drilling to satisfy our commitments to fee owners and to definitely outline the ore body on this property. The Atkins-Walker Company were awarded a contract on a straight footage basis and started immediately with one rig on one shift. Up to the first of the year they had drilled 1,415 feet on 5 holes. These holes are checking very closely the old drilling.

12. TAXES:

Following is a statement of taxes for 1950 and 1949:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Alworth Land Reserve	\$11,439.98	\$12,388.34		\$948.36
Average Tax Rate	\$111.59	\$120.35		\$8.76

There was no change in valuation, reduced mill rate lowering total taxes.

13. ACCIDENT AND PERSONAL INJURY: NONE

14. PROPOSED NEW CONSTRUCTION: NONE

15. EQUIPMENT RECEIVED AND PROPOSED NEW EQUIPMENT:

Proposed new equipment:
Complete belt conveyor system
Air lines, water lines and power lines
Miscellaneous small equipment for developing

ATKINS MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

The activities of the mine consisted of pumping and repair to equipment, lowering of pit approach road, loading from stockpile for shipping, pit clean-up and ore production.

During April the pit approach road was changed from 8% to 12% grade and deepening of the West sump started. Ore shipments from stockpile were started in May and pit clean-up with little ore production continued until late June due to the late spring break-up.

To improve pit drainage a sump was sunk and pumps installed in the East end of the pit.

The favorable ore production months were July, August and September. Rains in October and November resulted in practically unusable pit roads. During late November haulage roads were firm due to the frost, but the high moisture ore tended to freeze in the truck boxes.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

Atkins N.B. Merritt Lease -----	1,248 tons
Atkins N.B. Extension Lease -----	<u>435,478 "</u>
Total -----	436,726 "

b. Shipments:

Atkins N.B. Merritt Lease -----	3,855 tons
Atkins N.B. Extension Lease -----	<u>399,538 "</u>
Total -----	403,393 "

c. Stockpile Inventories:

Atkins Extension Lease ----- 115,855 tons

d. Production by Months:

<u>Month</u>	<u>Atkins</u> <u>Merritt</u>	<u>Atkins</u> <u>Extension Lease</u>	<u>Total</u>
April		3,940	3,940
May		11,005	11,005
June		21,619	21,619
July	1,212	79,068	80,280
August	36	97,103	97,139
September		79,101	79,101
October		30,719	30,719
November		47,727	47,727
December		<u>65,196</u>	<u>65,196</u>
Total	1,248	435,478	436,726

f. Ore Statement:

As of January 1, 1950, there were in stock at the Atkins Mine 82,522 tons of ore. This amount was completely loaded out in Mid-July. Intermittent stocking and loading from the stockpile was conducted throughout the season and on December 31st there were 115,855 tons of ore in stock.

3. ANALYSIS:

b. Tonnage & Analysis of Direct Ore Production:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Nat.</u>
Atkins N.B.								
Merritt	1,248	46.16	.098	19.29	1.21	3.78	15.75	38.89
Atkins N.B.								
Ext. Lease	435,478	53.38	.080	10.89	.93	4.39	18.53	43.49
Total . .	436,726	53.36	.080	10.92	.94	4.39	18.52	43.48

c. Tonnage & Analysis of Shipments:

Atkins N.B.								
Merritt	3,855	48.22	.099	15.73	1.47	4.59	17.56	39.75
Atkins N.B.								
Ext. Lease	399,538	53.14	.083	11.03	1.01	4.42	18.59	43.26
Total . .	403,393	53.09	.083	11.08	1.01	4.42	18.58	43.23

d. Tonnage & Analysis of Ore in Stockpile:

Atkins N.B.				
Ext. Lease	115,855	52.04	11.64	4.73

e. Complete Analysis of Shipments:

	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Lime.</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>
Atkins N.B.									
Merritt	48.22	.099	15.73	1.47	4.59	.11	.10	.010	8.18
Atkins N.B.									
Ext. Lease	53.14	.083	11.03	1.01	4.42	.11	.10	.010	6.71

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Factors:

	<u>Cu. Ft. Per Ton Crude</u>	<u>Rock Deduction</u>	<u>Per Cent Recovery</u>
No. 1 Ore	14	10%	100.00
No. 2 Ore	14	10%	100.00

b. Reserve as of 12-31-50:

	<u>Reserve 12-31-49</u>	<u>Mined 1950</u>	<u>Bal. After Mining</u>	<u>Chngd. By Re-Estimate</u>	<u>Reserve 12-31-50</u>
<u>Merritt:</u>					
SE-NW 12-58-19	4,341	1,248	3,093	-3,093	-
<u>Wade:</u>					
NE-SW 12-58-19	251,738	190,037	61,701	✓10,227	71,928
NW-SE 12-58-19	255,921	245,441	10,480	✓1,737	12,217
Total Wade	507,659	435,478	72,181	✓11,964	84,145
Grand Total . .	512,000	436,726	75,274	✓8,871	84,145

4. ESTIMATE OF ORE RESERVES:

6. Estimated Analyses of Ore Reserves:

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>
<u>Merritt:</u>		<u>N O N E</u>				
<u>Wade:</u>						
No. 1 Ore						
NE-SW 12-58-19	57,895	56.49	.090	8.89	.70	2.12
No. 2 Ore	14,033	50.35	.129	7.95	2.05	5.99
NW-SE 12-58-19						
No. 1 Ore	4,837	57.98	.080	7.90	.74	2.37
No. 2 Ore	7,380	49.68	.116	11.01	1.46	6.07
Total Wade	84,145	54.95	.098	8.86	.99	3.13
Total No. 1 Ore	63,732	56.60	.089	8.81	.70	2.14
Total No. 2 Ore	21,413	50.12	.125	9.00	1.85	6.02
Grand Total	84,145	54.95	.098	8.86	.99	3.13

5. LABOR & WAGES:

a. Comments:

During the first part of the season an adequate supply of labor was available in the Kinney district. As the season advanced, operating schedules increased and men were employed from the State Employment Service, with a resultant high labor turnover and lessened efficiency.

b. Comparative Statement of Production & Wages:

Production:

Direct Ore -----	436,726 tons
Number of days operated-----	216 days
Average Number of Men Working-----	49 men
Average Wages Per Man-----	\$12.99
Production Per Man Per Day-----	30.54 tons
Labor Cost Per Man Per Ton-----	\$.425
Total Number of Man Days-----	14,300 days
Amount Paid for Labor-----	\$185,774.43

6. SURFACE:

a. Buildings & Repairs:

No buildings were constructed during the year and only minor repairs were made on the old buildings.

b. Roads, Transmission Lines, Etc.:

The 2300 volt line on the South side of the pit was extended Eastward and transformers to 440 volts installed for the East and sump pumps.

c. Miscellaneous Construction:

No construction except installation of pumps in the East end of the pit and laying of the required pipe lines.

7. OPEN PIT:

a. Stripping:

No stripping was done and all cleanup as well as removal of surface and waste in certain East end areas was charged to cost of ore production.

b. Open Pit Mining:

In April pit operations started by changing the approach road from an 8% to a 12% grade to permit extraction of lower pit ore and placing of the road on more stable material for a greater portion of the road.

The initial 5-shift per week operation was stepped up to 10 shifts per week then 15 shifts per week, and in August to 21 shifts per week, if and when weather and road conditions permitted operation.

The pit being narrow, sump deepening could only be effected by dragline. Repeated deepening was necessary in June and July before systematic mining to rock bottom could be done. The steep North wall repeatedly caved in and filled the sump with rock and waste material.

Mining and cleanup was carried out by using a combination of dragline and shovel, usually alternating due to insufficient trucks for a two-shovel operation except during sump deepening or ditch digging periods, when the dragline was used. A backhoe was employed to cut ditches on each side of the pit following the dragline cut, these again deepened by dragline before initiating a new dragline cut.

In October rains prohibited actual production more than half time. Cat wagons were used to haul the material cleaned out of the filled-in ditches stockpiling in the pit. A dragline and backhoe operated to keep ditches open during the shutdown periods. It was also necessary to corduroy certain pit areas to permit truck haulage.

A total of 551,398 tons was mined and hauled from the pit. Of this, 436,726 tons was ore which was shipped in cars or placed in commercial ore stockpiles. Concurrently 114,672 tons of waste and lean material were removed with ore mining. Twenty per cent of the tonnage moved was non-commercial material.

1949 cost per ton was \$.526, compared with \$1.00 per ton in 1950. This higher cost was due to increased road grade, higher lift, narrow pit bottom, increased clean-up of waste material washed and caved into pit, mining to depletion both the East and West end of the pit and cleaning up of ore left on both the North and South banks of the pit. Fifty per cent of the operation was by dragline, which, due to the 180° swing, required necessarily slower operation than shovel operation.

c. Pumping & Drainage:

Pumping continued throughout the season from the two West end sumps. To eliminate some of the water in the mining areas a sump was sunk at the East end of the pit, and pumps were installed. The pumping costs in 1949 were \$.052 per ton, compared to \$.088 per ton in 1950. This increase was due to the additional power charges, East end pump installation and required increased vigilance at the pumps.

8. BENEFICIATION: NONE

9. MAINTENANCE & REPAIR:

During the period from January 1st to April 1st the 54B shovel received a thorough overhauling and all trucks and tractors were repaired and/or overhauled, as their individual conditions required. Much repair was necessary during the operating season due to the difficult conditions in which the equipment operated.

10. COST OF OPERATION:

a. Comparative Mining Cost Statement:

	<u>1950 COST</u> <u>PER TON</u>	<u>1949 COST</u> <u>PER TON</u>
<u>Direct Ore</u>	436,726 tons	453,221 tons
Drilling and Blasting	\$.043	\$.000
Power Shovel Operating	.100	.037
Power Shovel Maintenance	.067	.021
Trucks, Operating	.166	.075
Trucks, Maintenance	.125	.090
Tractors, Operating	.046	.013
Tractors, Maintenance	.048	.034
Pit Roads and Ramps	.057	.035
Conveyor Operation	.000	.002
Pumping & Drainage	.088	.052
Gen'l Open Pit Expense	.005	.004
Open Pit Superintendent	.026	.013
Stocking Lean Materials	.001	.000
Pit Cleanup	.001	.002
Loading Stockpile	.042	.011
Total Direct Ore	\$.815	\$.389
<u>General Mine Expense</u>		
Mining Engineering	.009	.005
Mech. & Electrical Engineering	.007	.008
Analysis & Grading	.039	.029
Safety Department	.004	.004
Special Expense	.008	.002
Ishpeming Office Expense	.004	.003
District Office Expense	.024	.027
Mine Office Expense	.036	.026
Insurance-Property, etc.	.006	.014
Personal Injury Expense	.009	.002
Social Security Taxes	.018	.010
Geological	.001	.000
Employees Vacation Pay	.017	.007
Additional Wage Adjustment, Est.	.003	-
Total General Mine Expense . . .	\$.185	\$.137
 COST OF PRODUCTION	 \$1.000	 \$.526

10. COST OF OPERATION:
(Continued)

b. Comparative Mining Cost:

In 1949 most of the tonnage was mined from the higher East end of the pit, which ore tonnage had been uncovered by 1948-49 winter stripping. The 1950 ore production was obtained from actual pit bottom, contending with water, soft roads and cleanup of caved waste material from the pit banks. The result was less ore loaded per shovel shift, less tonnage per truck hour and higher maintenance costs on all equipment. The pit cleanup costs for trucks and shovels are included in the per ton ore costs for those items.

11. EXPLORATION & FUTURE EXPLORATION:

No exploration drilling was done in 1950 nor is any future exploration drilling anticipated.

12. TAXES:

The following is a statement of taxes at the Atkins Mine for the years 1949 and 1950:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Atkins Mine	\$7,824.04	\$8,727.02		\$902.98
Personal Property	<u>2,321.36</u>	<u>2,640.52</u>		<u>319.16</u>
Total	\$10,145.40	\$11,367.54		\$1,222.14
Average Tax Rate	92.09	103.88		11.79

13. ACCIDENT & PERSONAL INJURY:

There were 44 slight accidents at the Atkins Mine during 1950 and two compensable accidents. Following are brief descriptions of the two compensable cases:

- (1) Name: Mike Hecomovich
Date of Injury: August 1, 1950
Cause: Mr. Hecomovich was helping to unload an acetylene tank from a truck. While in the act of helping with the tank he slipped in the mud and felt a sharp pain in the right groin.
Nature of Injury: Hernia, right side.
Time Lost: 16 days
Compensation: \$50.00
- (2) Name: August Gilbert
Date of Injury: November 10, 1950
Cause: Mr. Gilbert was cleaning up spillage on the track by the ramp. While in the act of doing this, a chunk fell from the top of the ore car, striking him on his left side.
Nature of Injury: Fracture of 5th rib on the left side.
Time Lost: 9 days
Compensation: \$10.00

14. PROPOSED NEW CONSTRUCTION:

No new construction is anticipated for 1951.

15. EQUIPMENT RECEIVED OR PROPOSED NEW EQUIPMENT:

1 - 6" Wemco pump purchased and installed in the East end of the pit.

There is no purchase of new equipment for 1951 anticipated.

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1. GENERAL:

On January 1, 1950, the stripping program begun in the fall of 1949 was carried through on a 20-shift per week basis until January 14, when this operation was closed down. Repairs to the washing plant were under way in 1949 and were also continued into 1950.

The repair program begun in the fall of 1949 was continued on a 5-day per week basis until April 17, when this program was completed and pit cleanup and stripping were started.

Ore mining was started May 8th on a two-shift, 5-day per week basis and continued through October 31st. A third shift was used on ore for five weeks alternating crews with the Holman Mine. During the two shift operation, the night shift was devoted to cleaning up lean ore, paint rock, and other waste materials. A total of 1,589,208 tons of gross crude ore, including 129,600 tons of coarse rock rejects, was produced from three areas in two leases, mining separate leases with no commingling of crude ore. Two shovels and seven to eight trucks were used.

The washing plant received a total of 1,459,608 tons of crude ore, which produced 759,958 tons of concentrates for a shift average of 2,745 tons. With the addition of 522 tons of stockpile overrun, total season production amounted to 760,480 tons of concentrates.

During the ore season, stripping was carried on concurrently in the Snyder Point area with a shovel and six bottom dump 22-ton Euclids. Following the ore production season the stripping program was started, using truck haulage. Shovel and truck stripping amounted to a total of 838,244 cu. yds.

Dragline conveyor stripping was started May 15th on a twenty shift per week basis and continued through the season to November 20th. 761,891 cu. yds. of surface was removed.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades - Crude:

Snyder Crude -----	162,326 tons
Bovey Crude -----	1,046,491
Bovey Retreat Crude -----	<u>250,791</u>
 Total Crude Ore -----	 1,459,608
-Concentrates:	
Snyder N.B. Concentrates -----	100,464
Bovey Bess. Wash Concentrates -----	114,270
Bovey N.B. Wash Concentrates -----	429,820
Bovey Bess. Retreat Concentrates -----	21,869
Bovey N.B. Retreat Concentrates -----	<u>94,057</u>
 Total Concentrates Produced -----	 760,480

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2. PRODUCTION, SHIPMENTS & INVENTORIES:
(Continued)

b. Shipments by Grades:

Snyder N.B. Concentrates -----	83,997 tons
Bovey Bess. Wash Concentrates -----	114,270
Bovey N.B. Wash Concentrates -----	424,504
Bovey Bess. Retreat Concentrates -----	21,869
Bovey N.B. Retreat Concentrates -----	<u>34,283</u>

Total Shipments ----- 678,923 tons

c. Stockpile Inventory:

Snyder Wash Concentrates -----	25,977 tons
Bovey Wash Concentrates -----	32,496
Bovey Retreat -----	<u>51,246</u>

Total ----- 109,719 tons

d. Production by Months - Crude Ore:

	<u>SNYDER</u>	<u>BOVEY</u>	<u>BOVEY RETREAT</u>	<u>TOTAL</u>
May	25,995	144,117		170,112
June	72,072	167,029		239,101
July		264,520		264,520
August		247,373	53,437	300,810
September	54,649	140,750	60,873	256,272
October	<u>9,610</u>	<u>82,702</u>	<u>136,481</u>	<u>228,793</u>
Total	162,326	1,046,491	250,791	1,459,608

e. Production by Months - Concentrates:

	<u>SNYDER WASH</u>	<u>BOVEY WASH</u>	<u>BOVEY RETREAT</u>	<u>TOTAL</u>
May	14,551	66,548		81,099
June	43,304	76,809		120,113
July		126,461		126,461
August	522	137,920	23,811	162,253
September	35,973	82,887	28,805	147,665
October	<u>6,114</u>	<u>53,465</u>	<u>63,310</u>	<u>122,889</u>
Total	100,464	544,090	115,926	760,480

f. Ore Statement:

The Snyder Wash stockpile balance of 9,510 tons and the Bovey Wash balance of 18,651 tons were cleaned up by mid-season. New stockpiles were built up during 1950 with Snyder Wash of 25,977 tons, Bovey Wash of 32,496 tons and Bovey Retreat of 51,246 tons making a total ore in stock of 109,719 tons.

3. ANALYSIS:

a. Tonnage and Analyses of Crude Ore:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Snyder -----	162,326	47.26	.064	24.78
Bovey -----	1,046,491	44.32	.064	30.19
Bovey Retreat -----	<u>250,791</u>	<u>43.52</u>	<u>.053</u>	<u>32.16</u>
Total	1,459,608	44.51	.062	29.93

3. ANALYSIS:
(Continued)

b. Tonnage and Analyses of Concentrates - 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>
Snyder N.B. Conct.	100,464	56.41	.070	10.28	.73	.32	7.70	52.07
Bovey Bess. Conct.	114,270	57.09	.035	11.37	.48	.41	7.89	52.59
Bovey N.B. Conct.	429,820	55.95	.073	12.02	.64	.43	7.71	51.64
Bovey Bess. Retreat	21,869	57.41	.036	11.51	.54	.37	7.54	53.08
Bovey N.B. Retreat	94,057	55.85	.063	13.10	.59	.42	7.71	51.54
Total	760,480	56.21	.065	11.81	.62	.41	7.74	51.86

c. Tonnage and Analyses of Concentrates - Shipments:

Snyder N.B. Conct.	83,997	56.38	.073	10.52	.68	.33	7.64	52.07
Bovey Bess. Conct.	114,270	57.09	.035	11.37	.48	.41	7.89	52.59
Bovey N.B. Conct.	424,504	55.91	.074	12.04	.64	.42	7.73	51.59
Bovey Bess. Retreat	21,869	57.41	.036	11.51	.54	.37	7.54	53.08
Bovey N.B. Retreat	34,283	56.13	.063	12.26	.70	.40	7.67	51.82
Total	678,923	56.23	.066	11.73	.62	.41	7.74	51.88

d. Tonnage & Analyses of Ore in Stockpile:

Snyder Conct.	25,977	56.26	.072	10.41	.77	.28	7.90	51.82
Bovey Conct.	32,496	56.64	.076	11.76	.48	.37	7.51	52.39
Bovey Retr.	51,246	55.62	.063	13.81	.50	.44	7.74	51.32
Total	109,719	56.07	.069	12.40	.56	.38	7.71	51.75

e. Complete Analyses of Season's Shipments:

	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>	<u>Alum.</u>
Snyder N.B. Conct.	56.38	.073	10.52	.68	.27	.18	.011	6.93	.33
Bovey Bess. Conct.	57.09	.035	11.37	.48	.27	.18	.011	5.36	.41
Bovey N.B. Conct.	55.91	.074	12.04	.64	.27	.19	.011	6.04	.42
Bovey Bess. Retreat	57.41	.036	11.51	.54	.25	.18	.010	4.74	.37
Bovey N.B. Retreat	56.13	.063	12.26	.70	.26	.19	.010	5.48	.40

4. ESTIMATE OF

ORE RESERVES: a. Developed Ore:

Factors Used: (All Leases)

	<u>Cu. Ft. Per Ton</u>	<u>Rock Deduction</u>	<u>% Recovery</u>
Wash Conct.	14	-	60.66
Lean Wash Conct.	14		46.54
Low Grade Wash Conct.	14		58.62
Lean Low Grade Wash Conct.	14		48.81
Retreat Conct.	14		33.25

4. ESTIMATE OF ORE RESERVES:
(Continued)

b. Ore Reserve as of 12-31-50

<u>LEASE</u>	<u>RESERVE</u> <u>12-31-49</u>	<u>MINED</u> <u>1950</u>	<u>BALANCE</u> <u>AFTER</u> <u>MINING</u>	<u>CHANGED</u> <u>BY RE-</u> <u>ESTIMATE</u>	<u>RESERVE</u> <u>12-31-50</u>
<u>Bovey:</u>					
S ₂ -NE 30-56-24	160,282	-	160,282	-	160,282
NW-SE 30-56-24	382,137	62,498	319,639	-	319,639
NE-SE 30-56-24	540,913	130,078	410,835	-	410,835
NE-NE 31-56-24	1,091,114	467,440	623,674	-	623,674
NW-NW 32-56-24	278,389	-	278,389	-	278,389
Total Bovey	2,452,835	660,016	1,792,819	-	1,792,819
<u>Hemmens:</u>					
SW-SW 29-56-24	3,070,932	-	3,070,932	-	3,070,932
<u>Snyder</u>					
SE-SW 30-56-24	1,171,854	-	1,171,854	-	1,171,854
SW-SE 30-56-24	308,834	74,752	234,082	-	234,082
SE-SE 30-56-24	405,300	25,712	379,588	-	379,588
Total Snyder	1,885,988	100,464	1,785,524	-	1,785,524
<u>GRAND TOTAL</u>					
CANISTEO . .	7,409,755	760,480	6,649,275	-	6,649,275

The reserve tonnage of 6,649,275 represents the reserve as of January 1, 1951 less the 1950 shipments. It is possible that some increase in reserve may be made by drilling now in progress to the North and East of the North Bovey.

c. Estimated Analyses:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alu.</u>
<u>Bovey:</u>						
Bess. Wash Conct.	365,358	57.33	.033	9.99	.30	.48
N.B. Wash Conct.	699,873	56.41	.094	10.34	.92	.46
Bess. Retreat Conct.	162,591	56.30	.040	12.00	.30	.48
N.B. Retr. Conct.	564,997	55.50	.055	12.50	.36	.47
Total Bovey	1,792,819	56.30	.064	11.10	.56	.47
<u>Hemmens:</u>						
Bess. Wash Conct.	1,197,233	57.70	.032	10.23	.30	.47
N.B. Wash Conct.	982,026	57.08	.032	10.23	.30	.47
Bess. Retr. Conct.	338,800	56.30	.040	12.00	.30	.47
N.B. Retr. Conct.	552,873	55.50	.055	12.50	.41	.41
Total Hemmens	3,070,932	56.95	.037	10.83	.32	.46
<u>Snyder</u>						
Bess. Wash Conct.	712,918	60.39	.037	8.94	.17	.28
N.B. Wash Conct.	910,718	60.30	.064	8.22	.26	.34
Bess. Retrest Conct.	33,950	56.30	.040	12.00	.25	.41
N.B. Retr. Conct.	127,938	55.50	.055	12.50	.44	.49
Total Snyder	1,785,524	59.92	.052	8.89	.24	.33

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4. ESTIMATE OF ORE RESERVES:

(Continued) c. Estimated Analyses: (Continued)

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alu.</u>
Total Bess.Wash Conc.	2,275,509	58.48	.034	9.79	.26	.41
Total N.B. Wash Conc.	2,592,617	58.03	.060	9.55	.45	.42
Total Wash Conc.	4,868,126	58.24	.048	9.66	.36	.42
Total Bess.Ret. Conc.	535,341	56.30	.040	12.00	.30	.47
Total N.B. Ret. Conc.	1,245,808	55.50	.055	12.50	.39	.45
Total Ret. Conc.	1,781,149	55.74	.050	12.35	.36	.46
Bessemer Conc.	2,810,850	58.06	.035	10.21	.27	.42
N.B. Conc.	3,838,425	57.21	.058	10.51	.43	.43
GRAND TOTAL	6,649,275	57.57	.048	10.38	.36	.43

5. LABOR & WAGES:

a. Comments:

The supply of labor was adequate throughout the year, even to the enlarged crew, when conveyor stripping and truck stripping were operating concurrently with mining ore. Good labor relations were maintained throughout the year.

A general increase of \$.125 per hour became effective December 1, 1950 with a 10% increase in salaries. A further addition of \$.085 per hour will also be charged retroactively to Dec. 1 upon completion of the study of job classifications now being carried on.

b. Comparative Statement of Production and Wages:

Product -----	760,480 tons*
Number of Days operated -----	124
Number of Shifts Operated -----	273
Average Daily Product -----	6,036 tons
Average Product per Shift -----	2,745 tons
Average Number of men Employed -----	169
Product per Man per Day -----	36.35 tons
Average Wages per Day -----	\$12.40
Total Amount paid for Labor -----	\$259,449.88
Labor Cost per Ton -----	\$0.341

*Includes overrun from 1949 Stockpile of 522 tons.

6. GENERAL SURFACE:

a. Buildings and Repairs:

Ordinary maintenance work on mine buildings was carried on during the year.

b. Roads, Transmission Lines, Etc.:

The drainage from pit pocket and rock reject road were unsatisfactory so a new road was constructed to the South with a pipe line buried on the side of the road for drainage. A new power transmission line was constructed along the South and East side of the conveyor stripping area to serve the pit pumps in their new location.

6. GENERAL SURFACE
(Continued)

c. Miscellaneous General Construction:

It has been found necessary to change the bleeding system on the tailings pond and a new area was dyked, using a 54B dragline casting up tailings for about one mile around the perimeter. The balance of the dykes were raised, using truck stripping to prepare the area for 1951 tailings.

7. OPEN PIT:

a. Stripping:

Truck stripping (E&A #CC303), underway on Snyder Point, was carried forward into the new year until January 14th, when operations were suspended to avoid extremely high cost of stripping during the severe cold weather. A total of 91,892 cu. yds. of surface and cretaceous waste were removed from the Snyder and Bovey leases on the North side of the pit. Two shovels and eight to ten trucks produced 2,625 cu. yds. per shift. As a result of this low production, the stripping cost was \$.424, which is \$.100 higher than the estimated cost for this work.

A new stripping program (E&A #CC352) was started April 17, 1950, which contemplated the stripping of 675,000 cu. yds. by shovel and truck and 800,000 cu. yds. by dragline and conveyor system. A supplemental E&A #CC413, took care of an increased program from November 7th to the end of the year.

The truck and shovel program of 675,000 yards consisted of:

	<u>PROGRAM</u>	<u>ACTUAL</u>
South Bovey	(40,000 Surface	29,563 Surface Slough
	(55,000 Paint Rock	39,608 Paint Rock
	(10,000 Lean Ore	3,455 Lean Ore
	105,000	72,626
		3,849 Lean Formation
Snyder Point	(405,000 Surface	533,783 Surface
	(116,000 Cretaceous	198,697 Cretaceous
	(23,000 Paint Rock	10,655 Paint Rock
	(26,000 Lean Ore	18,634 Lean Ore
	570,000	765,618

The operations started April 17th on the basis of three shifts per day, five days per week until the start of ore season, May 8th. On May 19th, when equipment was available, a stripping crew was started, using a lima shovel, five bottom dump trucks and working 15 shifts per week. Progress here was slow because the surface slough was fine and soupy and it was necessary to hay the bottom dumps for the long haul out of the pit to the North dumps. When this crew finished clean-up in the bottom, they were moved to the Snyder Point stripping. At the end of ore season end dump trucks were used. On December 1st, an extra crew was added to make twenty shifts per week with each crew working forty hours per week. The April costs were \$.437 per cu. yd. due to two blizzards and late thawing of roads causing two shutdowns. The removal of surface slough cost \$.411 per cu. yd. Better conditions during the summer with monthly costs down to \$.23 brought the total cost for 838,244 cu. yds. of truck stripping down to \$.323 per cu. yd., which was very satisfactory.

The stripping conveyor system continued the program started in 1949 as soon as a late spring permitted. Operations were started

7. OPEN PIT:a. Stripping: (Continued)

May 15th on single shift, using a heavy duty bucket to break the frost, then stepped up May 22nd to twenty shifts per week with four crews, each working forty hours per week and continued this schedule until November 16th. When the upper bench was completed, the dragline and screening plant were removed down an 11% grade to the bottom bench, which is sixty-five feet lower. The new transfer station was erected and as much of the two new belts installed as possible. Operations were delayed eight days moving this heavy equipment.

The material to be moved was more difficult to handle than anticipated. An old fill in the Oliver approach was encountered in the top bench and again in the bottom bench. This fill contained ties, rails and scrap iron, which plugged transfer points and ripped belts. A magnetic "searcher" was installed on the shuttle belt but took eight weeks for delivery. The 8 yd. perforated bucket could be used only a small part of the season. A layer of boulders forced the use of the heavy duty bucket and with a considerable flow of water near the top of ore, material washed off the teeth and cut the bucket factor to 5.65 cu. yds. per swing.

The screening plant is too heavy for the cats and propel machinery. The screen deck is not adequate to handle all the different materials encountered. The pan feeder and 60" belt are a source of high maintenance costs. The whole structure is to be rebuilt, making it lighter and lower and replacing the screen, pan feeder and 60" belt with a roll grizzly and light apron feeder.

The muskeg area under the dump was trenched with a dragline and, while there was some sliding, this area was crossed during the season.

Operations were continued into zero weather in November. Wet material freezing in the plant and on belts ran November costs to \$.36. The season cost \$.250 for 761,891 cu. yds. is higher than the estimated cost, but it is felt that material and conditions should improve next year.

b. Open Pit Mining:

The 1950 ore season was started May 8th on a two-shift, five-day per week basis and continued through October 31st except for five weeks of three shift operation, when a third swing crew alternated with the Holman Mine. The pit operated a total of 273 shifts and produced 1,589,208 tons of crude ore, from which 129,600 tons of coarse rejects were scalped at the pit screening plant, leaving 1,459,608 tons of crude ore, which was sent to the washing plant. The average production per shift of gross crude amounted to 5,821 tons and net crude 5,347 tons. The mining cost per ton of crude ore was \$.224, as compared with a budget estimate of \$.269 and a cost of \$.275 in 1949.

Ore was mined from three areas - the Snyder Point, both Bovey and Snyder leases; the East Bovey and from South side of the pit, mainly South Bovey bottom, but some Snyder bottom.

Some retreat ore came from all three areas, but the smallest percentage of retreat ore from the Snyder Point area. Bottom layers were mined and bank limits were pushed back, taking leaner ore, which could not be concentrated to merchantable grade by straight washing.

In the South Bovey an area was mined to rock, forty feet below the old sump, to form a new main sump. A heavy flow of water was encountered in this area, and a heavy rain September 17th flooded the bottom pumps, delaying this work two weeks. Ore was so wet from this area that it could

7. OPEN PIT:

(Continued) b. Open Pit Mining: (Continued)

not be conveyed up the pit belts until mixed with dry ore from Bovey Lean Ore Dump #4. The Snyder Point produced 212,278 tons of crude ore; the East Bovey 295,429 gross tons; the South Bottom 940,187 tons and Bovey Lean Ore Dump 141,314 gross tons. Of this total, 1,411,114 gross tons were taken from the Bovey lease and 178,094 tons from the Snyder.

In addition to the actual mining, a total of 230,047 tons of clean-up, lean ore and other waste materials encountered in mining were loaded and disposed of on the night shift, or when one shovel could serve the plant. This amounted to .30 tons per ton of concentrates at a cost of \$.031 per ton of shipping grade ore produced.

c. Pumping and Drainage:

During the mining out of the sump area in the South Bovey, the flow of water increased, and it was necessary to install a third pump at the main sump for a few weeks.

After the close of ore season, all pit pumping was stopped, the water allowed to raise, and pumps floated to the new sump, new pipe lines installed with intermediate pumps in series. All mine water is now being pumped north and flows into the Prairie River. Previous pumping over the southeast bank into Trout Lake was criticized by the State Conservation Commission. The cost of pumping was \$.034 per ton of shipping grade ore.

8. BENEFICIATION:

Plant Operations:

The washing plant was operated on the same schedule as open pit mining, and a total of 1,459,608 tons of crude was handled to produce 759,958 tons of concentrates. The average output per shift amounted to 2,784 tons, with a weight recovery of 52.06%.

644,544 tons of wash ore concentrates were produced from 1,208,817 tons of wash ore, recovery being 53.21%. 115,926 tons of retreat concentrates were produced from 250,791 tons of retreat ore, recovery being 46.22%.

Increasing the speed and the power on the three motors on the main conveyor from pit to plant gave a steady, maximum feed and improved efficiency noticeably. However, the 5' x 14' screen at the top of the mill became overloaded with certain ores. This will be remedied during the winter by adding another 5' x 14' screen and splitting the load.

The two 6' x 16' double deck screens which replaced the logs and 4' x 6' dewatering screens handled an increased tonnage and produced a dryer concentrate which was easier to convey to bin and stockpile. The rearrangement of classifiers for double classification of fines was very satisfactory.

The stockpile stacker carried more than rated capacity and permitted maximum continuous production through the switchman's strike in June. Some mechanical difficulties with propel and swing mechanisms developed, but corrections will be made before next season.

The single unit high density, or retreat plant, which was built during the winter was delayed until late July by equipment delivery. Two shift operation for the last three months of the season permitted satisfactory concentration of all the poorer ores encountered.

8. BENEFICIATION:
(Continued)

Plant Operations: (Continued)

This plant worked exceptionally well on $\frac{1}{2}$ " material (top deck oversize), but when all $\frac{1}{8}$ " material (including bottom deck oversize) was added, both load and quality of concentrates dropped. Some time in the near future it will be necessary to add another sink-float unit to treat the fines. Media losses were very low, due to adequate Crockett capacity.

During the season it was necessary to stockpile an abnormally large amount of ore, load from pile when cars and boats were available and then stockpile again. 243,948 tons of concentrates were stockpiled, from which 134,229 tons were loaded out, leaving a balance of 109,719 tons at the end of the year. The 1949 pile of 28,161 tons yielded an overrun of 522 tons, which was credited to 1950 production.

The delays at the washing plant during the 1950 season amounted to 221.56 hours, or a total of 9.92% of the total working hours. A classification of the delays and the per cent of total working hours is listed below:

	Total Hours	% of Total Working Hours
Pit delay - no crude ore	116.76 hrs.	5.22
Delays due to wash plant equip.	33.74	1.51
Electrical delays	3.74	0.17
Pump and Pipeline Delays	2.58	0.12
Transportation & Conveying Delays	13.49	0.59
Delays for Lack of Railroad Cars	8.41	0.38
Delays for Stockpiling	42.84	1.93
Total	221.56 hours	9.92%

The tonnage and analyses of the plant rejects were as follows:

5' x 14' Screen Rejects

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Silica</u>
Snyder	15,768	40.24	38.02
Bovey	79,722	38.86	40.27
Total	95,490	39.08	39.90

36" Belt Rejects

Snyder	36	39.40	40.05
Bovey	4,698	38.95	40.37
Total	4,734	38.95	40.37

8. BENEFICIATION:
(Continued)Plant Operations: (Continued)

The concentration data for the year was as follows:

	<u>Tons</u>	<u>Per Cent of Total Mined</u>	<u>Per Cent Iron Dried</u>	<u>Recoveries Tonnage</u>	<u>Iron Unit</u>
Crude Ore & Rock Mined	1,356,323	100.00	44.10		
Less: Rock Removed in Mining	52,016	3.84	39.09		
Crude Ore Trans. to Screen Plant	1,304,307	96.16	44.30		
Less: Rock Rejects in Screen Plant	95,490	7.04	39.08		
Crude Ore Trans. to Mill	1,208,817	89.12	44.71		
Conct. Produced	644,554	47.52	56.23	53.32	67.06
Rock Rejects on Mill Picking Belt	4,734	.35	38.95		
Tailings (by Deduction)	559,529	41.25	31.49		
<u>Retreat Plant</u>					
Crude Ore & Rock Mined	328,117	100.00	42.17		
Less: Rock Removed in Mining	43,216	13.17	37.78		
Crude Ore Trans. to Plant	284,901	86.83	42.84		
Less Rock Rejects in Screen Plant	34,110	10.40	37.78		
Crude Ore Entering Mill	250,791	76.43	43.53		
Conct. Produced	115,926	35.33	56.15	46.22	59.63
Heavy Density Rejects	33,408	10.18	40.16		
Tailings (By Deduction)	101,457	30.92	30.22		

9. MAINTENANCE
AND REPAIRS:

The winter repair program at the shops and concentrating plant was carried forward from the first of the year until the start of mining operations May 8th, and all pit and mining equipment were given complete repairs that were necessary. The repair program at the plant and stripping conveyor was resumed in November and carried forward until the end of the year.

10. COST OF OPERATION:

A. Comparative Mining Costs:

<u>Product</u>	<u>Budget Estimate</u>	<u>Cost Per Ton-1950</u>	<u>Cost Per Ton -1949</u>
	700,000	760,480	565,072
Average tons per shift		2,745	2,580
Tons Per Man per Day		36.72	42.94
Number of Shifts Operated		277	219
<u>Cost</u>			
Open Pit Mining (Crude Ore)	\$.269	\$.231	\$.276
Concentrating	.223	.142	.112
Stocking & Loading Conct.	.013	.007	.012
General Mine Expense	.187	.170	.195
Winter & Idle Expense	.295	.377	.430
Cost of Production	\$1.246	\$1.179	\$1.291
Amortization of Leasehold		.151	.147
Depreciation - Motorized Equipment		.065	.055
Depreciation - Movable Equipment		.006	.006
Depreciation - Plant & Equipment		.100	.031
Amortization of Stripping		.534	.515
Taxes - Ad Valorem		.168	.247
Taxes - Occupational		.266	.159
Taxes - Royalty		.036	.045
Total Cost at Mine		\$2.505	\$2.498
Misc. Expense & Income		.001	.013
GRAND TOTAL		\$2.506	\$2.483

b. Detailed Cost Comparison:

(1) Product:

There is very little basis of comparison between the 1949 and 1950 operations due to the fact that the 1949 production was reduced by the strike to 565,072 tons.

The budget estimate was made for 700,000 tons, while the actual production was increased to 760,480 tons. A continuous high production during the season reduced most cost items below the budget.

(2) Open Pit Mining:

Open pit mining in 1950 showed a net cost of \$.231 per ton of crude ore as compared with a budget estimate of \$.269.

(3) Concentrating:

The concentrating costs of \$.142 per ton of concentrates is approximately \$.081 under the budget. The cost of operating the retreat plant, which had been estimated at \$.110, was only operated half the season at a cost of \$.055. A credit to concentrating by the Cleveland office of about \$17,000, which had been charged to maintenance washing plant machinery in 1949, lowered the 1950 costs by about \$.02.

10. COST OF OPERATION:

(Continued) b. Detailed Cost Comparison: (Continued)

(4) General Mine Expense:

The general mine expense in 1950 was \$.017 under the budget due principally to insurance credits.

(5) Idle & Winter Expense:

The idle and winter expense is \$.377, which is \$.082 above the budget estimate. This increase was due to several factors not in the budget estimate: building of a Hemmens road during December; repair to stripping conveyor and 7W dragline; wage increase of \$.125 per hour in December, plus an additional wage adjustment of approximately \$.085 per hour more. All of which were charged to idle and winter expense.

11. EXPLORATION & FUTURE EXPLORATION:

Twenty-six holes were drilled during the year, seven by contract drill and nineteen by company drill. The contract drills explored and outlined a trough of retreat ore which extends from the Bovey No. 2 lease Northeast, connecting with the Morrison Walker. E. J. Longyear drilled 353 ft. in two holes. Leach Exploration Company drilled 918 ft. in five holes.

The company drill put down three exploration holes, one in West Snyder, one in the Hemmens conveyor stripping area and one in the Morrison NE-NW of 30 to prove the area barren before using this forty for tailing pond. The Company drill put down eight short holes from 9 ft. to 23 ft. testing the pit bottom for possible retreat ore to outline the final pit bottom. Company drill also put down four sample holes in the South Bovey, two in Snyder Point and two in the Hemmens under dragline stripping. These holes are to aid in the plans for mining. Total company drilling amounted to 1,199 ft.

Under future exploration, the Leach Drill will continue in the Morrison walker trough and the Company drill continues sample drilling in the conveyor stripping area.

It is also planned to do some further diamond drilling over the whole pit bottom to make sure we do not leave any stringers of retreat ore under a hard layer of taconite.

12. TAXES:

The following statement shows the Canisteco Mine taxes and the average annual rates for 1950 and 1949:

(Continued on next page)

12. TAXES:
(Continued)

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Canisteo Mine (& Shops)	\$110,793.41	\$121,981.67		\$11,188.26
Wash. Pl. & Aux. Lands	4,659.31	4,941.93		282.62
Personal Property	<u>12,534.98</u>	<u>12,632.91</u>		<u>97.93</u>
Total	\$127,987.70	\$139,556.51		\$11,568.81
Village Lots	<u>214.59</u>	<u>237.80</u>		<u>23.21</u>
GRAND TOTAL	\$128,202.29	\$139,794.31		\$11,592.02
Average Tax Rate	120.25	134.58		14.33

A flat increase of 10% per ton on mineral value plus increase of 107,800 tons over depletion of reserve was offset by a decrease in mill rate to lower ad valorem taxes.

Personal property in Coleraine & Bovey was increased flat 20% by State, and stockpile of 28,161 tons in 1950 in excess of 1949 was offset by normal depreciation, retirement of equipment and reduction of mill rate to give a slight decrease in personal property taxes paid.

13. ACCIDENT & PERSONAL INJURY:

There were 81 slight accidents at the Canisteo Mine during 1950. There were two lost-time accidents during the year, which are described as follows:

Name: Sam Latkovich
Date of Injury: April 12, 1950
Cause:

Mr. Latkovich was helping to slide an I-beam across a 7 ft. opening at rear end of feeder on a 2 x 6 plank. The plank slipped off, letting one end of I-beam drop down on 48" shuttle conveyor, catching Latkovich's left hand between angle brace and I-beam.

Nature of Injury:

Severe contusion of left hand and 3rd and 4th fingers. Fractured 4th finger.

Time Lost: 63 days
Compensation Paid: \$753.60

.....

Name: Clifford Stone
Date of Injury: July 13, 1950
Cause:

Stone got out of his truck and walked around in front to see how he was spotted at the shovel. He then returned to left side of truck, tightened the fuel cap, turned and started away from truck. At that time a rock fell off dipper teeth and struck him on his back.

Nature of Injury: Severe back injury

Time Lost: 25 days
Compensation Paid: \$130.00

14. PROPOSED NEW CONSTRUCTION:

The proposed new construction at the Canisteo Washing Plant will consist of the installation of a second 5' x 14' screen, which will necessitate some change in floor plan and the installation of a separate conveyor for retreat concentrates to stockpile. This will permit the retreat plant to operate from surge pile while treating another type of ore in the washing plant.

The stripping conveyor screening plant will be rebuilt, lightening the structure and simplifying the flow of material.

15. EQUIPMENT RECEIVED AND PROPOSED NEW EQUIPMENT:

New equipment received during 1950 consisted of:

- 2 - 39TD Euclid trucks
- 1 - TD24 International Tractor
- 2 - Ford pickup trucks
- 1 - Lull Loader
- 1 - Gas Portable Air Compressor
- 1 - Wagon Drill
- 7 - Tailings Dyke Forties

Proposed new equipment in 1951:

- 1 - 29T Blast Hole Drill
- 1 - 54B shovel with dragline attachment and bucket
- 2 - 1800 GPM Allis-Chalmers Pumps
- 1 - 5' x 14' Allis-Chalmers Screen
- 1 - 5 cu. yd. Marion shovel
- 3 - 39TD Euclid Trucks
- 4080 ft. 36 in. Conveyor Belting for Stripping Conveyor.

HAWKINS MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

Stripping operations and general repair work in progress at the close of 1949 were continued in 1950, with stripping conducted on a 20 shift per week basis until January 15th, when the operations were discontinued on account of cold weather.

Winter repair work at the shop was carried forward on a 5 day per week basis, including repairing, cleaning and painting of shovels, drills, trucks, tractors, dump cars and other pit equipment. Equipment in the pit screening plant and the conveyor system were overhauled and completed and ready for the start of the ore season on May 15th. Necessary shop repairs on all Hawkins washing plant equipment and on underground mining equipment, including the Sargent Mine washing plant equipment, were also included in the schedule. At the Hawkins concentrating plant the winter repair work was discontinued on January 27, 1950 and resumed again on March 20th.

During the early part of May, 29,860 tons of stockpile concentrates were loaded and shipped.

Due to weather conditions the 1950 ore season was started late on May 15, 1950 on a single 8-hour shift basis and on May 22nd on a 5-day per week, two-shift basis for the balance of the year. A total of 1,339,430 gross tons of crude ore, including scalped coarse rejects, was produced, using two 85B shovels and six 20-ton trucks.

The washing plant received 1,294,595 net tons of crude ore after the removal of 44,835 tons of coarse screen rejects and produced 672,986 tons of concentrates.

Car shortage resulted in stocking 186,949 tons of concentrates during the shipping season, and of this amount 105,566 tons was loaded out as needed throughout the season, leaving 113,162 tons in stock. Shipping closed on October 27th, with the concentrating operations also closing down on this date. During the early part of May, 1950, come cleanup stripping was done along with mining operations. Stripping on the third shift commenced October 2nd, and on October 30th stripping went on a 20-shift per week basis with the new 5-yard Marion shovel being used in this operation.

The exploratory drilling program started during the year, with two contract drillers and a company drill, however, as the work progressed this was cut to one contract driller and the company drill. This drilling program has shown additional wash and retreat ores and drilling will be continued to define limits and for sample drilling.

The work of lining the pit drainage shaft was done the latter part of December.

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grades: Crude Ore:	<u>Tons</u>
Hawkins Crude -----	1,294,595
Concentrates:	
Hawkins Bess. Coarse Concentrates -----	188,604
Hawkins N.B. Coarse Concentrates -----	353,048
Hawkins N.B. Fines -----	<u>131,334</u>
Total Production -----	672,986

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2. PRODUCTION, SHIPMENTS & INVENTORIES:

b. <u>Shipments by Grade:</u>	<u>Tons</u>
Hawkins Bess. Coarse Concts.-----	192,219
Hawkins N.B. Coarse Concts. -----	248,481
Hawkins N.B. Fines -----	<u>150,903</u>
Total Shipments -----	591,603

c. <u>Stockpile Inventories:</u>	
Hawkins Coarse Concentrates -----	113,162

d. <u>Production by Month - Crude Ore:</u>	
May -----	92,312
June -----	229,955
July -----	240,961
August -----	271,538
September -----	236,983
October -----	<u>222,846</u>
Total -----	1,294,595

e. Production by Month - Concentrates:

	<u>HAWKINS</u> <u>COARSE</u>	<u>HAWKINS</u> <u>FINES</u>	<u>TOTAL</u>
May -----	39,548	4,938	44,486
June -----	103,188	17444	120,632
July -----	104,101	23,532	127,633
August -----	117,060	23,457	140,517
September -----	87,891	30,777	118,668
October -----	89,864	29,609	119,473
November -----	-----	<u>1,577</u>	<u>1,577</u>
Total	541,652	131,334	672,986

f. Ore Statement:

As of January 1, 1950, there was in stock 12,210 tons of coarse concentrates and 19,569 tons of fines, concentrates, both balances being shipped out early in the season. During the course of the 1950 operating period a net coarse tonnage of 113,162 remained.

3. ANALYSIS:

a. Tonnage & Analysis of Crude Ore Produced:

	<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>
Hawkins	1,294,595	39.88	.029	37.69				

b. Tonnage & Analysis of Concentrates Produced:

Hawkins Bess. Coarse	188,604	56.76	.037	11.19	.46	.39	6.83	52.88
Hawkins N.B. Coarse	353,048	56.89	.045	11.10	.70	.41	6.89	52.97
Hawkins N.B. Fines	<u>131,334</u>	<u>54.80</u>	<u>.033</u>	<u>16.22</u>	<u>.43</u>	<u>.43</u>	<u>8.61</u>	<u>50.08</u>
Total	672,986	56.45	.040	12.12	.58	.41	7.21	52.38

c. Tonnage & Analysis of Concentrates Shipped:

Hawkins Bess. Coarse	192,219	56.78	.037	11.18	.46	.39	6.84	52.90
Hawkins N.B. Coarse	248,481	56.90	.047	11.14	.78	.42	6.95	52.95

(Continued on next page)

3. ANALYSIS:
(Continued)c. Tonnage & Analysis of Concentrates Shipped:(Continued)

	<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>
Hawkins N.B. Fines	150,903	54.85	.033	16.23	.43	.44	8.70	50.08
Total	591,603	56.34	.040	12.45	.59	.41	7.36	52.19

d. Tonnage & Analysis of Ore in Stockpile:

Hawkins N.B. Coarse	113,162	56.94	.041	11.01	.49	.40	6.84	53.045
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e. Complete Analysis of Shipments:

	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>
Hawkins Bess. Coarse	56.78	.037	11.18	.46	.39	.28	.20	.011	6.01
Hawkins N.B. Coarse	56.90	.047	11.14	.78	.42	.27	.21	.012	5.36
Hawkins N.B. Fines	54.85	.033	16.23	.43	.44	.28	.21	.011	3.71

4. ESTIMATE OF
ORE RESERVE:a. Developed Ore:
Factors Used:

	<u>Cu. Ft.</u> <u>Per Ton</u>	<u>Rock</u> <u>Deduction</u>	<u>%</u> <u>Recovery</u>
Wash Concentrates	14	-	60.00
Lean Wash Concentrates	14	-	38.00
Low Grade Wash Concentrates	14	-	54.00
Lean Low Grade Wash Concentrates	14	-	40.00
Retreat Concentrates	14	-	40.00

b. Ore Reserves as of 12-31-50:

	<u>Reserve</u> <u>12-31-49</u>	<u>Mined</u> <u>1950</u>	<u>Bal. After</u> <u>Mining</u>	<u>Changed</u> <u>by Re-Est.</u>	<u>Reserve</u> <u>12-31-50</u>
<u>SW-NW 32</u>					
Wash Conct.	1,021,056	444,776	576,280	-	576,280
Ret. Conct.	698,844	-	698,844	-	698,844
Total	1,719,900	444,776	1,275,124	-	1,275,124
<u>NW-SW 32</u>					
Wash Conct.	245,380	-	245,380	-	245,380
Retreat Conct.	89,420	-	89,420	-	89,420
Wash Conct. (U.G.)	161,002	-	161,002	-	161,002
Total	495,802	-	495,802	-	495,802
<u>NE-SE 31</u>					
Wash Conct.	863,633	72,885	790,748	-	790,748
Retreat Conct.	822,967	-	822,967	-	822,967
Total	1,686,600	72,885	1,613,715	-	1,613,715
<u>SE-NE 31</u>					
Wash Conct.	540,766	155,325	385,441	-	385,441
Retreat Conct.	217,934	-	217,934	-	217,934
Total	785,700	155,325	603,375	-	603,375
TOTAL HAWKINS	4,661,002	672,986	3,988,016	-	3,988,016

4. ESTIMATE OF ORE RESERVES:
(Continued)

The reserve tonnage of 3,988,016 tons represents the reserve as of January 1, 1951 less the 1950 shipments.

By May 1, 1951 a new estimate will be made for tax purposes which will show a considerable increase in reserves.

c. Estimated Analyses of Ore Reserves:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
<u>Hawkins:</u>				
Bess. Wash Concentrates	1,463,092	58.35	.031	9.60
N.B. Wash Concentrates	534,757	58.31	.056	9.74
Bess. Retr. Concentrates	1,293,554	57.16	.032	11.41
N.B. Wash Concentrates	535,611	57.51	.052	11.42
Bess. Wash Conct. (U.G.)	161,002	58.23	.032	8.67
Total	3,988,016	57.84	.037	10.41
Bess. Wash Conct.	1,463,092	58.35	.031	9.60
Bess. Wash Conct. (U.G.)	161,002	58.23	.032	8.67
N.B. Wash Conct.	534,757	58.31	.056	9.74
Total Wash Conct.	2,158,851	58.33	.037	9.57
Bess. Retr. Concts.	1,293,554	57.16	.032	11.41
N.B. Retr. Concts.	535,611	57.51	.052	11.42
Total Retr. Concts.	1,829,165	57.26	.038	11.41
Bessemer Concts.	2,917,648	57.82	.031	10.35
N.B. Concentrates	1,070,368	57.91	.054	10.58
Total	3,988,016	57.84	.037	10.41

5. LABOR & WAGES:

a. Comments:

With the exception of a time in the fall after students returned to school or were called to the service, there was an ample supply of labor during the year, and was of about the same quality. Labor relations were good throughout the whole year.

b. Comparative Statement of Wages & Product:

Product -----	672,986 tons
Number of days operated	122
Number of Shifts Operated	239
Average Daily Product	5516
Average Product for Shift	2816
Average number of men working	141
Average Wages Per Hour (Ore Season)	\$1.515
Amount Paid for Labor (Ore Season)	\$245,418.03
Labor Cost Per Ton	\$.365

6. SURFACE:

a. Buildings, Repairs:

The exteriors of three Hawkins swellings were painted this year, some interior painting and repairs made to others, and the district office reroofed and exterior painted. In addition to the Hawkins Mine Office, two houses were reroofed. There were no major construction projects during the year. The shop building roofs were repaired and the buildings painted. One of the small buildings at the washing plant was moved to the pit shaft collar, repaired and used as a dry house for the shaft repair.

b. Roads, Transmission Lines and Tracks:

Roads in pit and to dumps were improved where possible during the year and grades kept to a minimum. Re-arrangement of power line at the shops was made so that both steam and mobile crane could operate without danger of contact with power lines.

A small amount of rail was removed from dumps at washing plant during the year.

7. OPEN PIT:

a. Stripping:

The stripping program, which had been started in November under E&A #325, was continued in January 1950, until the 15th, when operations were closed on account of cold weather. The program consisted of stripping blocky paint rock, taconite and waste ore material from the northeast portion of the pit to release wash ore for the 1950 ore season. This operation was conducted on a 20-shift per week basis, with four complete crews, the men working 40 hours per week. Two 3 1/4 yd. shovels and eight to nine 20-ton trucks were used and the materials hauled to the main stripping dumps south of the pit towards the washing plant.

Stripping in the same area was again resumed on May 9, 1950, and continued until May 15th. It consisted mostly of paint rock cleanup on the road in the North end of the pit and cleanup of spill on lower levels from winter stripping operations. Due to the late spring all pit work was hindered.

From January 1st to May 15th, a total of 86,686 cu. yds. was removed at an average cost of \$.436. This compares to a cost of \$.429 on the total of E&A #325 up to this date and the budget estimate of \$.413 per cu. yd. The haul from the pit to dumping area south of the Great Northern tracks is over 8,000 feet in length.

On October 2, 1950, stripping was again begun with the new Marion 5-yd. shovel in the northeast portion of pit operating on the third shift on a 5-day per week basis until October 30th, when operations were put on a 20-shift per week basis for the balance of the year. E&A #325 was completed the early part of December and E&A #397 was used to January 1, 1951. During this period of October 2 to December 31, 1950, 321,664 cu. yds. was removed at a cost of \$.446. E&A #325 of 479,116 cu. yds. closed out at a cost of \$.410 per cu. yd. with the budget cost being \$.413. It must be taken into consideration that wages were raised on December 1, 1950. On December 28th the crawler frame on the new Marion shovel broke and this shovel was down the balance of the year. The two 3 1/4 yd. 85B shovels were used to keep the trucks moving, the material handled being taconite and blocky paintrock.

The following tabulation shows the stripping removed during the year.

(Continued on next page)

7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

Lean Ore & Waste Material	3,317 cu. yds.
Paint Rock	194,593 cu. yds.
Taconite	210,440 " "
Total	408,350 cu. yds.

b. Open Pit Mining:

Due to the unseasonable spring weather, operations did not commence until May 15th on one 8-hour shift, 5 shifts per week basis, and on May 22nd on a two, 8-hour shift, 5-day per week basis, and the operations were continued until October 27, 1950. Mining in the pit was conducted for a total of 122 days of 239 shifts and produced 1,339,430 gross tons of crude ore and from this 44,835 tons of coarse rejects were scalped at the pit screening plant. The net crude to the washing plant was 1,294,595 tons. The average output per shift amounted to 5,604.3 tons of gross crude and 5,416.7 tons of net crude. The weight recovery from the crude ore - gross 50.24% and net was 51.98%. The cost per ton crude mining was \$.253. In 1949 this cost was \$.230.

About one-half of production of crude ore in 1950 was obtained in bottom areas of the pit and the other half in the Northeast portion which had been stripped. The ores from the various areas were mixed to effect the proper grading, using two 85B - 3 1/4 cu. yd. shovels and six 22-ton trucks. The bottom area of the pit was lowered to the drainage drift bottom.

In addition to the crude ore mined, a total of 22,375 tons of lean and waste material was handled, consisting of 15,000 tons of pit rock and 7,375 tons of lean and waste material. The approximate cost fo removing this material per ton of concentrates produced was \$.008.

Production during the season of 1951 will necessitate mining below the drainage drift elevation, and in so doing, pumping will have to be done from the pit to the shaft to get proper drainage. The approximate cost of pumping per ton of concentrates produced was \$.033 in 1950. Repairs in the drainage shaft were completed in December.

8. BENEFICIATION:

Washing plant operations were conducted on the same general basis as the open pit mining and a total of 672,986 tons of concentrates was obtained from 1,339,430 tons of crude ore treated at the mill. The average production per shift amounted to 2,815.8 tons of concentrates, with a weight recovery of 50.24%. In general, the washing plant operations were about the same as in 1949, but with a noticeable decline in recovery from 55.20% in 1949 to 50.24% in 1950. There were no serious delays at themill, the largest delay being delay waiting for crude ore.

It was necessary to stockpile during the year on account of car shortage 186,949 tons of concentrates during the shipping season. Of this amount, 105,566 tons were loaded and shipped, leaving a balance of 81,383 tons in stock from 1950 production. This, added to a carry-over from 1949 production of 31,779 tons, left a balance in stock as of December 31, 1950, of 113,162 tons. This tonnage is entirely of the coarse or regular ore.

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8. BENEFICIATION:
(Continued)

Following is a summary of the plant operations for the 1950 season:

	<u>Tonnage</u>	<u>% of Total Mined</u>	<u>% of Iron Dried</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore & Rock Mined	1,354,430	100.00	39.51		
Less: Rock Re- moved in Mining	15,000	1.11	31.07		
Crude Ore Trans. to Screen Plant	1,339,430	98.89	39.60		
Less: Rock Re- jects in Screen Plant	44,835	3.31	31.61		
Crude Ore Enter- ing Mill	1,294,595	95.58	39.88		
Concts. Produced					
Coarse	541,652	39.99	56.84	41.84	59.63
Fines	131,334	9.70	54.80	10.14	13.94
Rock Rejects on Mill Picking Belt	-	-	-		
Tailings (By De- duction)	621,609	45.89	21.95		

Washing Plant Delays:

<u>Source of Delay</u>	<u>Total</u>	<u>Per Cent</u>	<u>% of 1,896 Working Hours</u>
No crude ore	123.78	78.45	6.52
Crude ore pocket	1.00	0.63	0.05
Crude Conveyor	12.08	7.66	0.64
Power Failure	8.99	5.70	0.47
Picking Belt	0.51	0.32	0.03
Crudher	0.75	0.48	0.04
Primary Screen	0.25	0.16	0.01
Log Washers	1.75	1.11	0.09
Log Dewatering Screen	0.50	0.32	0.03
Tailing Line	1.50	0.95	0.08
R.R. Cars & Tracks	6.17	3.91	0.33
Stockpile Conveyor	0.50	0.31	0.03
Total	157.78	100.00	8.32

9. MAINTENANCE
& REPAIRS:

From the first of the year to the beginning of the ore season, the pit mining equipment and the washing plant equipment were given the necessary winter repairs. The winter repair program at the concentrator was shut down for a time on account of the cold weather. At the close of the ore season, the repair program was again resumed and continued to the end of the year.

10. COST OF
OPERATION:a. Comparative Mining Costs:

	<u>1949 Cost Per Ton</u>	<u>1950 Cost Per Ton</u>
<u>Crude Ore</u>		
Drilling & Blasting	\$.039	\$.054
Power Shovels - Operating	.024	.026
Power Shovels - Maintenance	.002	.001
Trucks - Operating	.034	.037
Trucks - Maintenance	.020	.021
Tractors - Operating	.004	.007

(Continued on next page)

10. COST OF OPERATION:
(Continued) a. Comparative Mining Costs: (Continued)

	<u>1949 Cost</u> <u>Per Ton</u>	<u>1950 Cost</u> <u>Per Ton</u>
<u>Crude Ore (Continued)</u>		
Tractors - Maintenance	\$.006	\$.003
Crushing & Screening	.013	.013
Conveyors Operating	.008	.009
Pit Roads & Ramps	.003	.005
Pumping & Drainage	.013	.017
General Open Pit Expense	.011	.010
Open Pit Superintendent	.003	.006
Structure Drilling & Sampling	.053	.070
E&A #281 - Rebuilding Bridges	<u>.000</u>	<u>.012</u>
Total Pit Operating	\$.233	\$.265
<hr/>		
<u>Concentrating:</u>		
Transportation	\$.098	\$.081
Washing	.058	.056
Electric Power	.023	.022
General Expense	.004	.001
Buildings & Machinery - Maint.	.033	.020
Stocking Concentrates	<u>.002</u>	<u>.007</u>
Total Concentrating	\$.218	\$.187
<hr/>		
<u>Loading Stockpile Ore:</u>	<u>\$.020</u>	<u>\$.015</u>
<hr/>		
Total Pit, Concentrator and Rewash Plant	<u>\$.659</u>	<u>\$.730</u>
<hr/>		
<u>General Mine Expenses:</u>		
Mining Engineering	\$.013	\$.016
Mechanical & Electrical Engr.	.005	.006
Analysis and Grading	.022	.025
Safety Department	.002	.003
Special Expense	.001	.003
Ishpeming Office Expense	.004	.003
District Office Expense	.023	.021
Mine Office Expense	.026	.028
Insurance - Property, Etc.	.014	.006
Personal Injury Expense	.006	.007
Social Security Taxes	.004	.008
Geological & Metallurgy	.010	.010
Employees Vacation Pay	<u>.017</u>	<u>.019</u>
Total General Mine Expenses	\$.147	\$.155
Idle & Winter Expense:	<u>.373</u>	<u>.333</u>
Cost of Production	\$1.179	\$1.218

10. COST OF OPERATION:
(Continued)

b. Detailed Cost Comparison:

The mining of crude ore showed an increase of \$.032 due to structural and sample drilling and also due to increased cost in drilling and blasting. Powder prices were raised August, 1950, and considerable footage of drilling through top rock and paint rock was done for the structural drills.

The Concentrating Costs in 1950 were \$.031 lower than in 1949, due mainly to transportation - \$.017 - and Buildings and Machinery, Maintenance - \$.013.

The General Mine Expense costs were \$.008 higher spread over the various items of this expense though the Ishpeming and District Office Expense and the Insurance - Property, etc. were lower in 1950 than in 1949.

Idle and Winter Expense was \$.040 lower in 1950 than in 1949.

11. EXPLORATION & FUTURE EXPLORATION:

An extensive drilling program was carried on in 1950 and a total of 9,572½ feet of drilling was completed during the year. This work was done by the Leach Company, E. J. Longyear Company and the Company drill. Following is a tabulation of the drilling:

Leach Co. Structure Drilling in Pit	2,104½ ft.
Leach Company, Structure Drilling for dump area	403 ft.
Longyear Co. Structure Drilling in Pit	4,051½ ft.
Company Drill Structure Drilling in Pit	1,557 ft.
Company Drill Churn Drilling in Pit	<u>1,456½ ft.</u>

Total all Drilling 9,572½ ft.

The results so far have added considerably to ore reserves and have indicated the necessity of a retreat plant for the ore season of 1952. Additions to the reserves at the Hawkins merit the present concentrating plant be moved to a site near the pit to save \$.12 to \$.15 a ton. With recovery lower on the remaining wash ore and the lower recovery on the retreat ore, this saving will be larger.

12. TAXES:

The following is a statement of the taxes for the Hawkins Mine for the years 1950 and 1949:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Hawkins Mine (Incl. Shops, & Locations)	\$142,521.72	\$102,882.00	\$39,639.72	
Hawkins Mine Wash. Plant	5,985.93	5,100.17	885.76	
Hawkins Mine Aux. Lands	1,281.97	1,030.67	251.30	
Hawkins Mine Pers. Property	<u>13,494.49</u>	<u>12,811.68</u>	<u>682.81</u>	
Total	<u>\$163,284.11</u>	<u>\$121,824.52</u>	<u>\$41,459.59</u>	
Average Tax Rate	215.16	248.14		32.98

12. TAXES:
(Continued)

Taxes increased because of a flat 10% per ton increase on ore reserve. Reserve tonnages increased by 1,532,513 tons. 1,919,791 tons of U.G. ore at \$.01 per ton in 1949 reclassified as retreat at \$.048 and concentrates undeveloped at \$.1584.

Personal property in Village of Nashwauk was increased a flat 30% over our return, which was a flat increase on all personal property in the Village, including both mining and individually owned property. Also a flat increase of 40% on all building values.

Concentrate stockpile value was increased about 50% in value over 1949 on account of increase in ore value and larger tonnage on hand.

Average mill rate was reduced because of increased valuations on all property in the Village and School District and levy limited by per capita law.

13. ACCIDENTS AND
PERSONAL INJURY:

There were 47 slight accidents at the Hawkins Mine during 1950 and no compensable injuries, although there was one fatality, as set out below:

Name: Victor Sterbenc
Date of Injury: October 12, 1950
Cause:

While Mr. Sterbenc was in the act of cleaning a heavy duty wheel (Euclid) the lock rim and ring flange flew off from a tire, striking Mr. Sterbenc on right side of forehead and chest. The tire carried 65 lbs. pressure.

Nature of Injury: Fatal

14. PROPOSED NEW
CONSTRUCTION:

Plans are underway for the construction of a high density plant and the moving of the present washing plant to a site near the bank of the pit. The actual construction and moving are to be completed before the 1952 ore season opens.

15. EQUIPMENT AND
PROPOSED
NEW EQUIPMENT:

The following equipment was received at the Hawkins Mine during the year:

- 1 - Spare Buda 22-ton truck motor
- 1 - Core Drill attachment for structural drill
- 1 - tractor and Lull Loader
- 1 - Ford 1/2 ton pickup truck
- 1 - LeTourneau Tournadozer
- 1 - 5 yd. Marion electric shovel
- 1 - Lorain Moto-Crane
- 1 - TD-24 International Tractor & Dozer
- 1 - 1/2 ton International Pickup Truck
- 2 - 22-ton rear dump Euclid trucks

15. EQUIPMENT AND
PROPOSED
NEW EQUIPMENT:
(Continued)

Proposed New Equipment for 1951:

- 1 - 2 ton KBS-6 International truck
- 1 - 1/2 ton KB-1 International truck
- 3 - 22-ton rear dump Euclid trucks
- 1 - Bucyrus-Erie 29T Electric Churn Drill
- 1 - 120B Bucyrus-Erie 6 cu. yd. Electric Shovel
- 1 - Spare Buda 22-ton truck motor

HILL-TRUMBULL MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL

The year 1950 started with no stripping in progress. Mine activity consisted of a normal winter repair and construction program which was conducted on a 5-day week basis until ore season.

At the mine shops, trucks, tractors and road patrol were given a fairly complete overhaul. Locomotives and cars were inspected and repaired where necessary. Drills were torn down for a thorough overhaul. The shovels, which were left in the pit, were checked over for repairs, both electrical and mechanical. Repairs to shovels were not extensive, since running repairs had been made through the season that kept them in good condition.

In the pit, normal repairs to the screening and conveying system were continued. In addition, the major project involving the re-design of the pit screening plant and construction of an 1800' extension to the existing pit conveyor occupied a crew from the start of the year until ore season began.

Wash plant repairs were of a general nature and followed a normal pattern. Some improvements were made in the flowsheet, but there were no major revisions made.

In the retreat plant, in addition to normal repairs to all equipment, a new tripl-deck feed preparation screen was installed to replace an overloaded double deck. A new 48" magnetic separator was added to the medium cleaning circuit. As in the wash plant, there were no major changes in the flowsheet.

Early plans envisioned loading of stockpile ore in April and resumption of pit and plant operations on May 1. However, an unusually late and severe spring forced a revision of these plans. Stockpile loading was begun on May 3 and continued spasmodically through the month, with 34,180 tons loaded out.

The pit started operations on May 10, working on cleanup of the stripping area and in the other areas where excessive surface sluff was evident. Ore mining began on May 15 on a 3-shift, 5-day week schedule, continuing through the season on this basis, working a sixth day when necessary. Two shovels, serviced by six to eight trucks, were used, producing 1,850,787 tons of crude ore.

No direct ore was produced in 1950. Only a small amount of this material remains and its inaccessibility made efforts to mine it inadvisable at present.

Wash ore crude, produced entirely from the Hill-Delaware trespass area, totalled 84,523 tons. Because of a change in mining plans, anticipated Trumbull wash ore production did not materialize. Washed concentrates totalled 45,246 tons, with shift production averaging 2,258 tons.

TLT

I. GENERAL
(Continued)

Retreat crude ore was produced from several large areas of the Hill and Trumbull leases and totalled 1,766,264 tons. From this, 1,033,974 tons of retreat feed was obtained, which was further concentrated by heavy density and spirals to produce 596,049 tons of retreat concentrate. Average concentrate production per shift was 1,866 tons, a fair improvement over 1949 figures.

Due mainly to railroad car shortages, 195,746 tons of concentrates were stockpiled during the 1950 season.

A scam crew, consisting of one shovel and two trucks, worked intermittently throughout the season in the Hill scam area sorting ore from rock. The ore was stocked, or, by agreement with the fee owners, mixed with other ores for immediate concentration.

Stripping plans, in the southeast Trumbull area, required removal of the 300,000 tons on the Trumbull lean ore dump. Research work and a mill test indicated that a low recovery concentrate of acceptable grade could be obtained from this lean ore. The scam crew was transferred to this dump in September and moving of it into the pit was begun. This work was conducted through the fall and completed by the end of the year.

The 1950 ore season closed on October 13, well ahead of schedule. The crews were immediately transferred to stripping. Two stripping projects were planned. The first, on the North side of the West Trumbull forty, involving 400,000 yards of surface and the second, on the Southeast Trumbull, involving removal of 800,000 yards of surface and 700,000 yards of lean ore and waste. The first project was completed on December 10, and by the close of the year all stripping activities had shifted to the Southeast Trumbull area where good progress was being made. Total material moved to Dec. 31 amounted to 585,279 yards.

Following the close of the ore season, plants were immediately washed out and winter repairs begun. No major changes in the flow-sheet were involved and repairs were normal.

Stockpile loading, begun after the plants shut down, was completed in November, with 74,225 tons loaded out. This completed shipment for the year.

Early in 1950, a drilling option was obtained on the Hill-Walker reserve, located Northwest of the Trumbull lease. Drilling was begun on these lands in May and continued through the year. In anticipation of the full stripping program, exploratory drilling was done on both the West and Southeast Trumbull areas and on the North side of the Hill lease, in the possible extension toward the Barbara pit.

2. PRODUCTION
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

Hill Wash Crude -----	34,961 tons
Trumbull Wash Crude-----	2,427 "
Hill Retreat Crude-----	250,549 "
Trumbull Retreat Crude -----	1,390,680 "
Total Hill-Trumbull Crude -----	1,678,617 tons
Delaware Crude -----	44,090 "
Grand Total Crude -----	1,722,707 tons

2. PRODUCTION
SHIPMENTS &
INVENTORIES:
(Continued)

Hill Wash Bessemer Concentrates -----	10,112 tons
Hill Wash Non-Bessemer Concentrates -----	9,115 "
Trumbull Bessemer Wash Concentrates -----	962 "
Trumbull Non-Bessemer Wash Concentrates -----	253 "
Hill Bessemer Retreat Concentrates -----	51,065 "
Hill Non-Bessemer Retreat Concentrates -----	47,732 "
Trumbull Bessemer Retreat Concentrates -----	104,764 "
Trumbull Non-Bessemer Retreat Concentrates -----	392,488 "
Total Concentrates Produced -----	616,491 Tons
Delaware Concentrates -----	24,804 "

Grand Total Concentrates Produced ----- 641,295 Tons

b. Shipments:

Hill Bessemer Wash Concentrates -----	10,874 Tons
Hill Non-Bessemer Wash Concentrates -----	10,540 "
Trumbull Bessemer Wash Concentrates -----	962 "
Trumbull Non-Bessemer Wash Concentrates -----	253 "
Hill Bessemer Retreat Concentrates -----	51,065 "
Hill Non-Bessemer Retreat Concentrates -----	39,142 "
Trumbull Bessemer Retreat Concentrates -----	131,833 "
Trumbull Non-Bessemer Retreat Concentrates -----	298,739 "
Total Hill-Trumbull Shipments -----	543,408 Tons

Delaware Conct. Shipments to Oliver Iron
Mining Company 24,804 Tons

c. Stockpile Inventories:

2,187 tons Hill Wash, 11,576 tons Hill Retreat and 89,446 tons of Trumbull Retreat in stock January 1, 1950 were loaded out in 1950. Shortage of railroad cars at various times, along with a few other reasons, caused stockpiling of ore which totaled 176,292 tons at the end of the 1950 season.

The following amount of lean material is now in stockpile:

Concentrating Material Above 25%

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Hill	55,439	29.37	.037	52.71
Trumbull	539,106	29.50	.034	52.42
Total	594,545	29.49	.034	52.45

Non-Concentrating Material Above 35%

Hill	142,833	48.50	.081	21.90
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Coarse Non-Concentrating Material Above 40%

Hill	7,527	33.23	.028	43.33
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d. Production by Months

(1) Crude Ore

<u>MONTH</u>	<u>HILL WASH</u>	<u>HILL RETREAT</u>	<u>TRUMBULL WASH</u>	<u>TRUMBULL RETREAT</u>	<u>TOTAL</u>
May				149,950	149,950
June	11,074	90,840	-	218,226	320,140
July	4,523	31,243	-	282,679	318,445
August	14,095	17,588	-	372,261	403,944
Sept.	5,269	110,878	2,427	207,993	326,567
October	-	-	-	159,571	159,571
Total	34,961	250,549	2,427	1,390,680	1,678,617

2. PRODUCTION
SHIPMENTS &
INVENTORIES:
(Continued)

a. Production by Months: (Continued)

(2) Concentrates:

MONTH	HILL WASH	HILL RETREAT	TRUMBULL WASH	TRUMBULL RETREAT	TOTAL
May				58,269	58,269
June	6,063	36,289	-	85,020	127,372
July	2,462	13,446	-	109,009	124,917
August	7,791	7,711	-	129,088	144,590
September	2,911	41,351	1,215	69,106	114,583
October	-	-	-	46,760	46,760
Total	19,227	98,797	1,215	497,252	616,491

f. Ore Statement:

As of December 31, 1950. there is in stockpile the following ores:

Hill Retreat Concentrates -----20,166 tons
Trumbull Retreat Concentrates -----156,126 "

Total Hill-Trumbull Concentrates -- 176,292 tons

3. ANALYSIS:

a. Analysis of Crude ore:

	Tons	Iron	Phos	Silica
Hill Wash Ore	34,961	41.65	.030	36.51
Hill Retreat Ore	250,549	38.93	.031	39.63
Trumbull Wash Ore	2,427	41.36	.023	36.43
Trumbull Retreat Ore	1,390,680	35.97	.032	43.94
Total	1,678,617	36.54	.032	43.13

b. Tonnage and Analysis of Concentrate Production:

	Tons	Iron	Phos	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Bess.Wash.Conc.	10,112	59.36	.040	10.50	.11	.42	7.63	54.83
Hill N.B. Wash Conc.	9,115	59.39	.046	10.38	.11	.44	7.04	55.21
Trumbull Bess. Wash	962	57.87	.032	13.30	.10	.54	6.60	54.05
Trumbull N.B. Wash	253	62.63	.033	6.36	.10	.40	6.10	58.81
Hill Bess. Retreat	51,065	55.81	.038	13.67	.12	.41	6.19	52.36
Hill N.B. Retreat	47,732	56.36	.043	13.04	.12	.40	5.81	53.09
Trumbull Bess. Retr.	104,764	56.47	.043	12.13	.15	.49	6.59	52.75
Trumbull N.B. Retr.	392,488	56.25	.048	12.50	.14	.48	5.87	52.95
Total	616,491	56.36	.046	12.51	.14	.47	6.06	52.94

c. Tonnage and Analysis of Shipments:

Hill Bess.Wash Conc.	10,874	59.04	.041	10.81	.11	.42	7.61	54.55
Hill N.B.Wash Conc.	10,540	58.54	.046	11.27	.12	.44	7.01	54.44
Trumbull Bess. Wash	962	57.87	.032	13.30	.10	.54	6.60	54.05
Trumbull N.B. Wash	253	62.63	.033	6.36	.10	.40	6.10	58.81
Hill Bess. Retreat	51,065	55.81	.038	13.67	.12	.41	6.19	52.36
Hill N.B. Retreat	39,142	56.28	.046	13.90	.13	.40	5.67	53.09
Trumbull Bess. Retr.	131,833	56.27	.043	12.47	.15	.48	6.35	52.70
Trumbull N.B. Retr.	298,739	56.40	.049	12.23	.14	.49	5.81	53.12
Total	543,408	56.41	.046	12.42	.14	.47	6.03	53.01

3. ANALYSIS:
(Continued)

d. Mine Analysis of Ore in Stockpile:

	Tons	Iron	Phos	Sil.	Mang.	Alu.	Moist.	Fe. Nat.
Hill Retr. Conc.	20,166	56.09	.040	13.49	.11	.40	5.94	52.76
Trumbull Retr. Conc.	56,126	55.77	.046	13.31	.13	.46	5.77	52.55
Total	176,292	55.81	.045	13.33	.13	.45	5.79	52.58

e. Complete Analysis of Shipment:

	Iron	Phos	Sil.	Mang.	Alu.	Lime.	Mag.	Sul.	Loss
Hill Bess. Wash	59.04	.041	10.81	.11	.42	.26	.17	.010	3.66
Hill N.B. Wash	58.54	.046	11.27	.12	.44	.27	.17	.011	3.86
Trumbull Bess. Wash	57.87	.032	13.30	.10	.54	.25	.17	.011	2.77
Trumbull N.B. Wash	62.63	.033	6.36	.10	.40	.26	.16	.010	3.04
Hill Bess. Retreat	55.81	.038	13.67	.12	.41	.27	.17	.011	5.41
Hill N.B. Retreat	56.28	.046	13.90	.13	.40	.27	.17	.010	4.49
Trumbull Bess. Retr.	56.27	.043	12.47	.15	.48	.25	.16	.010	5.86
Trumbull N.B. Retr.	56.40	.049	12.23	.14	.49	.24	.17	.011	5.91

4. ESTIMATE OF
ORE RESERVES:

a. Developed Ore:

Factors:

	Cu. Ft. Per Ton	Rock Deduction	% Recovery
Merch Ore	14	-	100.00
Wash Conc.	14	-	59.58
Lean Wash Conc.	14	-	47.40
Low Grade Wash Conc.	14	-	59.51
Lean Low Grade Wash Conc.	14	-	49.70
Retreat Conc.	14	-	40.00

	RESERVE 12-31-49	MINED 1950	BAL. AFTER MINING	CHANGED BY RE-EST.	RESERVE 12-31-50
<u>Trumbull Mine</u>					
NW-SW 17,56-23	444,052	413,415	30,637 /	404,627	435,264
NE-SW 17,56-23	648,965	85,052	563,913 /	652,556	1,216,469
Total Trumbull	1,093,017	498,467	594,550 /	1,057,183	1,651,733
<u>Hill Mine</u>					
SE-NW 17,56-23	107,355	85,183	22,172	-	22,172
SW-NE 17,56-23	362,332	32,841	329,491	-	329,491
SE-NE 17,56-23	282,782	-	282,782	-	282,782
Total Hill	752,469	118,024	634,445	-	634,445
Grand Total	1,845,486	616,491	1,228,995 /	1,057,183	2,286,178

b. Prospective Ore:

The above reserve of 2,286,178 tons at the property represents the balance from the former estimate after deducting shipments. Prior to May 1, 1951 there will be a re-estimate for tax purposes of the Hill-Trumbull Mine by the State Tax Department and it will therefore be necessary that Cleveland-Cliffs completely re-estimate this property prior to that time. This will mean a sizeable increase in the reserves, due almost entirely to the inclusion of ores which now can be useable through the rapid progress that has been made in the past two years in the treatment of the low grade retreat ores.

4 . ESTIMATE OF
ORE RESERVES:
(Continued)

c. Estimated Analyses:

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Mang</u>	<u>Alu</u>
<u>Hill</u>						
Non-Bess. Direct	21,257	59.63	.062	9.39	.20	.43
Bess. Wash Concs.	260,621	61.74	.029	9.19	.11	.48
Non-Bess. Wash Concs.	152,136	60.05	.047	9.09	.11	.42
Bess. Retreat Concs.	141,683	57.49	.041	12.00	.13	.46
Non-Bess. Retreat Conc.	58,748	57.09	.046	12.98	.13	.47
Total Hill	634,445	59.88	.039	10.15	.12	.46
<u>Trumbull</u>						
Bess. Wash Conc.	152,229	60.02	.039	6.05	.15	.49
Non-Bess. Wash Concs.	248,195	59.19	.056	7.67	.12	.51
Bess. Retreat Concs.	367,873	56.89	.042	10.80	.14	.49
Non-Bess. Retreat Concs.	883,436	56.31	.046	11.64	.14	.49
Total Trumbull	1,651,733	57.21	.046	10.34	.14	.49
Total Direct	21,257	59.63	.062	9.39	.20	.43
Total Bess. Wash Conc.	412,850	61.11	.033	8.03	.12	.48
Total Non-Bess. Wash Conc	400,351	59.52	.053	8.21	.12	.48
Total Wash Concs.	813,181	60.33	.043	8.12	.12	.48
Total Bess. Retr. Concs.	509,556	57.06	.042	11.13	.14	.48
Total Non-Bess. Retr. Conc.	942,184	56.36	.046	11.72	.14	.49
Total Retreat Conc.	1,451,740	56.61	.045	11.51	.14	.49
Total Bessemer	922,406	58.87	.038	9.74	.13	.48
Total Non-Bessemer	1,363,772	57.34	.048	10.65	.14	.49
GRAND TOTAL	2,286,178	57.95	.044	10.28	.14	.49

5. LABOR & WAGES:

a. Comments:

Although labor was plentiful early in the ore season, a shortage existed later which was alleviated by mines being shut down and various road and pipe line contracts shutting down for the winter. However, it seems apparent that with men going into service and defense plants starting up, a serious labor shortage will exist in 1951.

On December 1, there was a general wage increase of \$.125 per hour. In addition, an average increase of an additional \$.085 was granted, application of which was to be negotiated by Company and Union, retroactive to Dec. 1, 1950.

There were no labor disturbances during the year and Company - Union relations were good.

5. LABOR & WAGES:
(Continued)

b. Comparative Statement of Production & Wages:

<u>PRODUCTION</u>	641,295 tons
Number of Shifts & Hours	3 - 8-hour
Average Number of Men Working	208 3/4
Average Wages Per Day	\$12.61
Product Per Man Per Day	26.17
Labor Cost Per Ton	.632
Total number of days	111
Amount Paid for Labor	\$405,576.25

6. GENERAL SURFACE:

a. Buildings & Repairs:

The sample crushing house at the wash plant was moved to a better location and enlarged to accomodate more sample handling equipment. Other than this, only minor and necessary repairs were made to mine buildings.

b. Roads, Transmission Lines, Tracks and Construction:

The construction of an 1800' extension to the existing conveyor system, with resultant changes in roads, transmission lines and tracks, was continued from January 1 until the start of the ore season. This work, as explained in the 1949 report, was made necessary by the encroachment of the Gross-Marble Mine on the existing road and track facilities. Most of this work was completed by ore season. Minor work was done on this project during the remainder of the year, and the job is complete save for the construction of a quarter of a mile of road which will be done in early 1951 when material is available.

A rock reject conveyor was installed at the heavy density plant to convey reject rock to the dump. This installation was not extended to its desired length due to a shortage of material, but will be completed for the 1951 season.

7. OPEN PIT:

a. Stripping

At the start of the year there was no stripping in progress and, save for a small amount of cleanup immediately before and during the ore season, no stripping was done until the close of the ore operation.

On October 13, immediately following the close of the ore season, the crews were shifted to stripping. The first project, undertaken (E&A MC-195) involved the removal of 400,000 cu. yds. of surface material from an area along the North bank of the West Trumbull lease.

Estimates obtained from drill hole information indicated that this project would develop a low recovery detreat ore body yielding 200,000 tons of concentrates, giving a 2 to 1 stripping ratio.

7. OPEN PIT:
(Continued)

a. Stripping (Continued)

Stripping operations were begun on a 3-shift, 5-day week basis and, as new men were obtained and trained, the schedule was increased by November 1st to 3 shifts, 7 days per week, which schedule was maintained for the balance of the year. Two shovels, serviced by 12 to 14 trucks, were used, moving 430,129 yards in 50 days, at an average rate of 2,877 cu. yds. per shift. Included in the total is 37,476 cu. yds. removed from adjoining Gross-Marble lands under contract with the Oliver Iron Mining Company.

This job involved a one-way haul of approximately 5,200 ft. This long haul, coupled with considerable truck delays, due to inexperienced men, poor road conditions and some large shovel delays reduced production considerably and adversely affected costs.

This job was completed on December 10 and all equipment was moved to the Southeast Trumbull where a second project was begun, a continuation of E&A MC-195. This involved removal of 800,000 yards of surface and 700,000 yards of lean ore and waste to expose a lean retreat ore yielding 400,000 tons of concentrate, for a 3.8 to 1 ratio. Part of the lean ore dump previously deposited on this area had to be moved in conjunction with the stripping, causing considerable delay and reducing stripping yardage moved. At the close of the year, 155,150 yards had been moved on this project, giving a total for the year of 585,279 yards. Cost of stripping at \$.290 (not including depreciation), was \$.019 over the budget. This increase was due to delays, as mentioned above, and in part to the wage increase for the month of December, which was not taken into consideration when estimates were made.

The following tabulation shows the stripping material moved in 1950:

<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>
Hill	-	-	-	-
Trumbull	578,249	7,030	-	585,279

b. Open Pit Mining:

The 1950 ore season, after considerable delay due to very unseasonable weather, opened on May 15 on a 3-shift, 5-day week basis. This schedule was maintained throughout the season, working extra days as necessitated by grading and shipping requirements. With two shovels, serviced by 6 - 8 trucks, the pit produced 1,850,787 tons of crude ore in 109 days, for an average production per shift of 5,660 tons, an increase of 1,114 tons over 1949. Of the total crude, 6.92%, or 128,080 tons, of rock was rejected at the screening plant, leaving 1,722,707 tons as net crude to the mill, for an average production of 5,265 tons per shift. Mining cost per ton of crude ore was \$.202.

Ore produced in 1950 was mainly of retreat grade, with 1,766,264 tons of retreat produced as compared with 84,523 tons of wash crude. Trumbull retreat crude amounting to 1,494,310 tons was produced, mainly from the North bank of the pit. Hill retreat crude, 271,594 tons, came mainly from the North side, with some production from the scam area. The wash ore was obtained entirely from the trespass area. No direct ore was mined in 1950.

7. OPEN PIT
(Continued)

B. Open Pit Mining (Continued)

Trumbull retreat ores, while producing a fair grade of concentrate, showed a steady decline in recovery as evidenced by a reduction in recovery of 34.8% in May and June to 28.15% in October.

Indications are that much of the future production from the Trumbull lease will be of the same lean material.

Hill retreat ores showed fair recovery, but were rather difficult to concentrate and gave a silica content above that desired. These harder ores require additional crushing to liberate ore seams from the rock attached to them.

Mining conditions were, in general, good. Operations were conducted entirely above the water table and as a consequence were well drained. Because of increased hardness of the ores encountered, additional drilling and blasting were required.

Scramming in the Hill lease was conducted on a one-shift, rather intermittent basis. Breakdown of other shovels, or mill requirements, often made necessary movement of this crew to other areas of the pit. A fair tonnage of retreat ore was mined in this area and stocked or mixed with other ores for treatment. By request of the fee interest, a much heavier program of scrambling is planned for 1951.

Rock encountered in mining and sorted and loaded out at the shovel amounted to 28,785 tons for the year. In general, this material did not greatly affect the operation and cost of its removal was minor. There was no other lean ore moved during the season.

c. Pumping & Drainage:

Pit drainage was handled by an 800 gallon pit pump. Since inflow was small and sump area relatively large, pumping was no problem and its cost of \$.001 was minor.

d. General Pit Activities:

Pit activities at the Hill-Trumbull Mine were confined to the mining of iron ore. Except for rock sorted out in mining and some clean-up of surface sluff, there was no lean ore or waste movement of any consequence.

8. BENEFICIATION:

a. Washing Plant:

The washing plant began operations on May 15 and followed the same schedule as the pit. In 327 shifts of operation, this plant handled 1,722,707 tons of crude ore, of which 81,478 tons was wash and 1,641,229 tons retreat. From this was produced 45,246 tons of washed concentrate and an estimated 1,033,974 tons of retreat feed. On wash ore, the plant averaged 2,258 tons of concentrates per shift, at a weight recovery of 55.5%. On retreat feed, the washing plant produced 3,165 tons per shift with average recovery at 63%.

Operation of the washing plant was satisfactory during the season. Finer secondary screen cloth had been installed in an attempt to reduce the size range of spiral feed and to put more fine ore in the heavy density plant. It was soon apparent, however, that more wash water was necessary and that secondary screening capacity was not sufficient to do an efficient job of fine sizing.

8. BENEFICIATION
(Continued)

a. Washing Plant: (Continued)

Present plans call for installation of a larger fresh water pump and another secondary screen, in an attempt to overcome this problem. Crusher capacity is still not sufficient to do a proper job on the oversize material, but until further reserve information is available no changes will be made.

Washing plant delays were, except for crude ore delays, of minor nature and not serious. Plant delays alone amounted to 3.6% of the working time. Delays due to crude ore alone constitute 3.9% of working time. A crude ore surge pile would go far to eliminate this delay, but until definite plans are made regarding the location of the Hill-Trumbull plant, further construction at the present plant site is considered inadvisable.

Following is a brief statement showing lost time and percentage of total operating time:

<u>Source of Delay</u>	<u>Hours Lost</u>	<u>% of Total Work Hours</u>
1. No crude ore	105.93	3.92
2. Power Failure	1.91	0.07
3. Screens	18.08	0.67
4. Crushers	5.16	0.19
5. Spiral Tailing Pump	25.48	0.94
6. Conveyors	15.93	0.58
7. Ball Mill & Spirals	6.01	0.23
8. R. R. Cars & Track	8.84	0.33
9. Surge Pile	15.82	0.58
10. Crude Ore Pocket & Feeder	1.59	0.06
11. Misc.	1.75	0.06
	<u>206.50</u>	<u>7.63</u>

The complete concentration data for the year 1950 was as follows:

	<u>Tonnage</u>	<u>% Total Mined</u>	<u>% Iron Dried</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore & Rock mined	38,978	100.00	40.90		
Less: Rock Removed in Mining	-	-	-		
Crude Ore transported to Screen Plant	38,978	100.00	40.90		
Less: Rock Rejects in Screen Plant	1,590	4.08	23.75		
Crude Ore Entering Mill	37,388	95.92	41.63		
Concentrates produced	20,442	52.44	59.34	54.68	77.93
Rock rejects on picking belt	-	-	-		
Tailings (by deduction)	16,946	43.48	20.27		

b. Retreat Plant:

The retreat plant also began operations on May 15 and followed, in general, the same schedule as the pit and wash plant. The plant worked 325 shifts during the season, working some shifts while the wash plant was down or on wash ore. The plant was fed on these shifts from the surge pile. Feed to this plant totalled 1,033,947 tons, from which 596,049 tons of retreat concentrates were produced, at an average rate of 1,866 tons per shift and a net weight recovery of 36.32%. Concentrates stockpiled totalled 195,746 tons.

8. BENEFICIATION
(Continued)

b. Retreat Plant: (Continued)

The heavy density section of the retreat operation continued to give satisfactory results, especially in view of the low grade of feed. Finer crushing is still indicated, particularly on Hill ores which are hard and carry much "frozen" silica. Improvements are planned in the wash water installations. Heavier pumps have been installed to handle larger amounts of wash water. A big problem of fines in the feed should be solved, in large measure, by improved cleaning in the wash plant. A magnetic separator is being installed to replace a Hardinge wash water thickener in an effort to simplify this process and improve medium recovery.

Fine ore treatment continued to be a major problem. With the grade of feed down, the spiral plant could not produce the desired grade of concentrate. However, there is still no other concentrating machine available that will do a better job and the spirals will be run until a better process is developed. Experiments have been made using the heavy density process to handle the plus 60 mesh portion of the spiral feed and an experimental plant is proposed for this work.

The only major change at the retreat plant was installation of a conveyor for handling heavy density rejects. Due to a shortage of material, this installation was not completed, but will be available for the 1951 season.

Plant delays were generally of a minor nature and not excessive. Following is a brief classification of retreat plant delays, showing time lost and percentage of total time:

<u>Source of Delay</u>	<u>Hours Lost</u>	<u>% of Total Work Hours</u>
1. No crude ore	25.82	0.96
2. Surge pile	19.25	0.71
3. Power Failure	5.34	0.20
4. Conveyors	13.49	0.50
5. Screens	19.98	0.75
6. Pumps & Pipelines	13.25	0.48
7. Media Cleaning	8.50	0.31
8. R. R. Cars & Tracks	1.50	0.05
9. Charging, Media & Shutdowns	33.42	1.25
10. Misc.	4.35	0.16
	144.90	5.37

The concentration data for the year 1950 is as follows:

	<u>Tonnage</u>	<u>% Total Mined</u>	<u>% Iron Dried</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude ore & Rock mined	1,805,595	100.00	35.01		
Less: rock removed in mining	39,331	2.18	23.33		
Crude ore transported to screen plant	1,766,264	97.82	35.27		
Less rock rejects in screen plant	125,035	6.92	20.24		
Crude ore entering mill	1,641,229	90.90	36.42		
Concentrates produced	596,049	33.01	56.26	36.32	56.10
Heavy Density Rejects	375,750	20.81	22.35		
Tailings (by deduction)	669,430	37.08	26.65		

9. MAINTENANCE
& REPAIRS:

An intensive program of repair to all equipment, begun at the close of the 1949 stripping, was carried on through the winter and spring of 1950. Trucks, tractors and graders were gone over thoroughly. Locomotives and cars were brought in for a general overhaul. Shovels, although not brought up to the shop, were given general repairs.

The pit screening and conveying system were given a general overhaul. New construction of conveying equipment has been covered elsewhere. A crude ore feeder was installed in the pit screening plant and proved of great benefit in increasing and controlling the feed to the scalping screen.

Plant repairs have been covered under Beneficiation.

Following the 1950 ore season, work was begun on installation of a rock feeder in the pit screening plant to facilitate the handling of the large quantities of rock rejected at this plant.

Equipment operation was in general satisfactory during the year with few major breakdowns in either pit or plants.

10. COST OF
OPERATION:

a. Comparative Mining Costs:

<u>PRODUCT</u>	<u>1950</u> <u>BUDGET</u>	<u>1950 COST</u> <u>PER TON</u>	<u>1949</u> <u>COST PER TON</u>
Direct Shipping Ore	2,000	-	3,638
Wash Concentrates	69,000	45,246	53,875
Retreat Concentrates	540,000	596,049	502,852
Total Production	611,000	641,295	560,365
Recovery	41.4%	34.65%	40.1%
Average Daily Output	-	5,777	5,189
Tons Per Man Per Day	-	26.17	26.24
Days Operated	-	111	108
<u>COST</u>			
Pit Operating	.181	.202	.173
Concentrating	.486	.487	.532
Loading Stockpile Ore	.010	.011	.012
General Mine Expense	.176	.224	.178
Idle & Winter Expense	.300	.480	.624
Cost of Production	1.408	1.780	1.773
Depreciation-Plant & Equip.	-	.178	.056
Depreciation - Motorized Equip.	-	.062	.057
Amortization - Stripping	-	.318	.314
Taxes - Ad Valorem	-	.105	.097
Taxes-Occupational	-	.177	.097
Taxes-Royalty	-	.082	.082
Total Cost at Mine	-	2.702	2.476
Administrative Expense	-	.098	.098
Misc. Expense & Income	-	.013	.006
GRAND TOTAL	-	2.813	2.580

10. COST OF OPERATION:

A. Comparative Mining Costs (Continued):

The cost per ton figures for 1949 and 1950 are both taken from the mine cost sheets before revision by the Cleveland office and are, therefore, comparable.

b. Detailed Cost Comparisons:

The 1950 budget estimate indicated that a small amount of direct would be produced and a greater amount of wash ore would be produced than actually was obtained. This is due entirely to a change of mining plans which eliminated operations in the area where the direct and some of the wash ore would have been obtained. This had an adverse affect on costs generally.

The pit operating cost shows an increase of \$.021 over the budget and \$.029 over the 1949 cost. Major increases occurred in drilling and blasting at \$.057 up \$.007 over 1949 and \$.012 over the budget, and in structure drilling at \$.019, up \$.016 over 1949, and \$.009 over the budget. Harder ore, the necessity for more blasting, and a slight rise in the cost of explosives account for the former increase, and an accelerated exploratory program explains the latter. Shovel operating and maintenance costs are almost identical. Truck operation and maintenance shows a rise of \$.005 over the budget, but is \$.002 under 1949. An anticipated saving in haulage was offset by greater maintenance costs due to breakdowns, possibly caused by steadier operation. Tractor operation and maintenance at \$.010 showed a rise of \$.005 over both budget and 1949 costs and was due mainly to high maintenance charges. In other items cost differences were minor and tended to balance out.

Concentrating costs were \$.001 over the budget but \$.045 below 1949 costs. Comparisons of cost and budget figures show increases over budget of \$.012 in transportation and \$.010 in power, which were offset by reductions of \$.008 in washing, \$.004 in general expense and \$.009 in maintenance. Increases in haulage and power were due to the heavy volume of crude ore handled at a low recovery. Washing reduction is the result of higher tonnage and more efficient operation. Reductions in general expense and maintenance are due to reduction in maintenance required. The reduction below the 1949 costs was due mainly to savings of \$.011 in washing; \$.005 in general expense; \$.016 in maintenance and \$.026 in retreat plant operation. These savings were offset in some part by increases in hauling of \$.006 and power \$.007. The large decrease in operation of the retreat plant was due, in large measure, to the slightly reduced media loss and greater output. Decrease in washing cost was also due to increased production per unit time. Increased haulage cost was due to track maintenance and lower recovery, while power costs went up because of increase in pumping, more machinery in operation and greater tonnage of crude feed handled.

General mine expense showed a rise of \$.048 over the budget and \$.046 over 1949 costs, due to increases in engineering, analysis and grading, office expenses and vacation pay. Increases or decreases in other accounts were minor.

Idle and winter expenses showed a large increase of \$.180 over the budget, but a decrease of \$.144 below 1949 costs. The increase over the budget is due to the excessively large amount of winter repair work on trucks, tractors and pit and plant equipment. It was also adversely affected by the late opening of the ore season, when 3 to 4 weeks' work was charged to W&I that might otherwise have gone into production. Winter & Idle costs in 1949 were unduly high because of the big plant revision program and reduced production, due to a strike in that year and the reduction from the 1949 figure is due mainly to the excessive cost in 1949, countered by an increased production and reduction in winter work in 1950.

10. COST OF OPERATION:
(Continued)

b. Detailed Cost Comparison (Continued):

A very important factor which had an adverse affect on costs generally was the low recovery of 34.6% experienced this year, as compared with the 40% anticipated and the 40.1% obtained in 1949. Despite increased production, the handling of a much larger amount of crude ore increased costs. This low recovery was not anticipated because most of the ore came from an area in which exploratory work was very inadequate and didn't give a true picture of the material to be mined. The effect of this low recovery can best be shown by assuming a 40% recovery on the crude ore mined, with no increase in other costs. (Justifiable because a higher recovery ore would have cost no more to process). A reduction of \$.238 below this year's cost of production would be obtained by the addition of 5.4% in recovery.

11. EXPLORATION AND FUTURE EXPLORATION

At the start of the year, a contract driller was employed, drilling on the North extension of the Hill lease, continuing a drilling program begun in 1949. Owing to difficulty in supplying this drill with water, the work was stopped in February and resumed the latter part of May. In May a new drilling program was begun on the Hill-Walker reserve, which was carried on in conjunction with exploration on both Hill and Trumbull leases. On this work, two contractors were employed, supplemented by one company drill, with five drills in operation for part of the season.

Exploratory work on Hill, Trumbull and Hill-Walker leases was discontinued in December owing to water difficulties. These drills were moved into the Trumbull pit for sample drilling in the bottom and along the North bank.

Drilling on the North bank of the Hill lease continues to show the possibility of an extension in that area. Sufficient drilling is planned in 1951 to definitely outline and establish the possible ore reserve in this area.

Drilling on the North bank of the West Trumbull lease indicated sufficient ore to warrant a stripping program, completed in December. Further drilling is contemplated in this area and along the entire North bank of the pit to determine, if possible, the definite North limit of the ore body. This area was drilled several years ago and a limit defined, but metallurgical practice has advanced so rapidly in the ensuing years that what was formerly considered a lean, rocky North bank limit is now thought to have good possibilities for developing further ore.

The drilling option on the Hill-Walker reserve requires that 3,207 feet of drilling be completed by Jan. 1, 1952. Therefore, exploration work in this lease was pushed, with two drills working part of the time on two shifts. Drilling indicates a very lean re-treat ore. Test pits are being sunk to check the drilling and to obtain large samples of material for test purposes.

Drilling completed for the year 1950 is as follows:

11. EXPLORATION AND FUTURE EXPLORATION:
(Continued)

	<u>Lease</u>	<u>Footage</u>
Exploratory Drilling:	Hill	731' 6"
	Trumbull	1802' 6"
	Hill-Walker	2492' 0"
Total -		5026' 0"
Sample Drilling	Hill	142' 0"
	Trumbull	854' 6"
Total		996' 6"
GRAND TOTAL		6022' 6"

Because future plans for location and expansion of the Hill-Trumbull plant and other facilities rest heavily on the size of the reserve, present plans call for a thorough exploration of all possible reserves on Hill, Trumbull, Hill-Walker and Potter leases. Drilling, so far as it has already gone, indicated substantial reserves in all leases of low grade, low recovery, retreat ore. A large drilling program is planned for 1951, to continue the exploration on all leases, and by the end of 1951 reliable information should be available on the reserves of the Hill-Trumbull Mine.

12. TAXES:

The following table shows a comparative statement of taxes and average rate at the Hill-Trumbull Mine for the years 1950 and 1949:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Hill Mine	\$13,528.34	\$17,017.27		\$3,488.93
Trumbull Mine	15,301.75	20,034.70		4,732.95
Hill-Trumbull Shops	1,126.98	1,330.71		203.73
Hill-Tr. W. Plant & Aux.	12,246.00	10,476.10	\$1,769.90	
Potter Forty	40.06	-	40.06	
Hill-Walker Option	463.90	-	463.90	
Personal Property	18,347.96	5,697.61	12,650.35	
Total	\$61,054.99	\$54,556.39	\$6,498.60	
Village Lots	466.05	550.31		\$84.26
GRAND TOTAL	\$61,521.04	\$55,106.70	\$6,414.34	
Average Tax Rate	140.37	146.31		5.94

Reserve tonnage increased by 936,512 tons and flat increase of 10% on ore values per ton, however reduction of values was obtained on basis of overall low recovery on crude ore to a value of 39.5% of full and true instead of 50% as in 1949.

Village of Calumet mill rate increased 30.15 mills and increased the tax on the washing plant.

Personal Property tax in Marble had a flat 10% increase and Calumet a flat 20% increase on Personal Property values.

Stockpile in 1950 had 20,013 tons at a value of \$2.506 per ton (lower lake value) and 79,738 tons more than 1949 at a value of \$1.912 per ton.

The overall decrease in mill rates over 1949 was on account of increase in values in Marble where the greater part of valuation is assessed and the mill rate decreased 21.68 mills.

1,912

13. ACCIDENTS &
PERSONAL INJURY:

There were 68 slight accidents at the Hill-Trumbull Mine during 1950, however there were only 4 lost-time accidents, which are described below:

Name: Gerald Krasky
Date of Injury: April 5, 1950
Cause: While Mr. Krasky was working on a truck motor he slipped and twisted his right knee.
Nature of Injury: Severe bruise to right knee.
Time Lost: 15 days
Compensation: \$45.00

Name: Frantz Johnson
Date of Injury: Sept. 5, 1950
Cause: Tractor blade struck Johnson on left hand and right leg.
Nature of Injury: Crushed left ring finger and bruised right thigh
Time Lost: 22 days
Compensation: \$360.00

Name: Nick Rapich
Date of Injury: Dec. 12, 1950
Cause: Mr. Rapich was helping to take down a 12 in. water line, which was fastened under No. 3 transfer station house. Apparently the line had been disconnected for winter drainage. The men overlooked this and proceeded to cut the pipe line. On completion of the cut, the loose end of the pipe, which was 40 ft. long, fell, striking Mr. Rapich on his left side.
Nature of Injury: Fracture left clavicle, fractured ribs, left side.
Time lost: 16 days
Compensation: \$30.00

Name: William S. Loeffert
Date of Injury: Dec. 14, 1950
Cause: While Mr. Loeffert was climbing down a ladder he slipped and fell, landing on his left arm.

Nature of Injury: Fractured left wrist
Time Lost: 14 days
Compensation: \$60.00

15. EQUIPMENT RECEIVED
AND PROPOSED
NEW EQUIPMENT:

During the year, the following new equipment was received at the mine:

- 1800 ft. - 30" conveyor belt (pit conveyor)
- 1 - 5 x 14 double-deck screen
- 500 ft. - 24" conveyor belt
- 1 - 48" magnetic separator
- 3 - 22-ton rear dump trucks
- 1 - Austin-Western Grader
- 1 - 1/2 ton pickup truck
- 1 - 125 h.p. electric motor
- 1 - 5" sand pump
- 1 - 6" sand pump
- 1 - LeTourneau Tornadoizer
- 1 - 4D mechanism
- 1 - 3D Mechanism
- 1 - 6" Thor Electric Grinder

Proposed New Equipment:

- 1 - Mobile Crane, 20 ton
- 2-29T Bucyrus-Erie 9" drills
- 2-electric drill cables
- 3-22-ton rear dump trucks
- 1-1 1/2 ton service truck
- 1-motor generator set (pit feeder)
- 1-1000 GPM pit pump
- 1-Stephens-Adamson Retreat Tailings Slinger
- 2-48" Crockett Separators
- 1-6 cu. yd. 120-B Bucyrus-Erie Electric Shovel
- 1-5 cu. yd. 4161 Marion electric shovel
- 1-NHRBIS - 300 h.p. Cummins engine
- 1500 - ft. 3 cond. shovel cable.

HOLMAN-CLIFFS MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

No stripping was done at the Holman Mine for the first four months of 1950. Equipment repair programs only were conducted during that period, and due to an unusually heavy spring runoff and flood water conditions, the start of ore season was delayed about a week after the 1st of May. The spring stripping program was delayed further and did not get underway until the latter part of May, but with some concurrent operations was maintained in advance of the ore production and was stepped up to a seven day week following ore operations through to the close of the year.

1950 ore shipments were started on May 3rd with the loading of concentrates from the stockpile. Stockpile loading was resumed again following ore production and continued until November 27.

Mining of ore for plant production got underway on the 8th of May, working on a schedule of 5 days per week and 2 shifts per day. With increased demands for ore, operations were stepped to 3 shifts per day during the last 6 weeks of the season, which was brought to a close on October 27th, showing about a 10% increase over the scheduled production.

Concentrating plant operations were conducted on the same schedules established for the pit. Less than 10% of the material processed was wash ore, consequently the heavy density plant was used continuously, with very few serious equipment delays encountered and schedules were met satisfactorily. However, a local lack of rain after July created a critical water shortage. The spirals were shut down most of the time and all possible means of water conservation was practiced thereafter, especially during the 3-shift operations at the end of the season. Intermittent shortages of railroad cars throughout the season and the two week railroad strike period in June and July entailed the heavy stockpiling of concentrates, some of which were reloaded during the season at intervals of heavy boat requirements.

The stripping program, E&A MC-166, was scheduled to start in the middle of April but, due to the spring floods, did not get under way until May 22nd, and was conducted on the off shift throughout the ore season, except for a two week period from July 24th to August 5th, when crews were established for three shift operations temporarily to speed up because of the delayed start. After the ore season the program was stepped up to 20 shifts per week schedule and completed by the end of November. A new program, E&A MC-197, was set up for December and was carried forward on the 20-shift basis to completion at the close of the year. The weather was comparatively mild and both programs were completed with an overrun of yardage removed, well under the budget costs.

Exploratory drilling was carried on throughout the year using company and contractor drills. The work was conducted on a single shift basis in mild weather, but was stepped up to 2 and 3 shifts per day during the winter months and was well up to schedule at the close of the year. Holes in the Brown, Holman and North Star forties proved up the possible outlying extensions, but the drilling in the Bingham showed very lean possibilities for easterly development.

Repairs to equipment were conducted throughout the year and, during the 4 month idle period, the trucks, tractors and shovels requiring a thorough job were completely overhauled.

KT

1. GENERAL:
(Continued)

Most of the construction work took place at, or pertinent to, the concentrating plant. The laying of 8,400 feet of new 18" tailings line started late in 1949 on E&A MC-152, and was completed in February. About 2,000 feet of the reclaimed 14" line was laid from the pit to the clear water reservoir as an independent auxiliary. The 30 ft. hydro-separator from the fine ore plant was set up to replace the 22 ft. Dorr Bowl for large volume feed preparation for the spirals. The transformers from the fine ore plant were reinstalled at the heavy density plant for the necessary additional power distribution. During the water shortage in August, 1700 ft. of the reclaimed 14 in. line was laid from the Bingham pit bottom to the plant reservoir as an emergency water supply, while the Hill Lake 16 in. water line was extended 2,000 feet to a deeper area on the lake shore for a suitable pump location. On E&A MC-159, about 750 feet of trench was excavated to lay in a new 6 in. water line extension with 3 hydrants for adequate fire protection in the district laboratory, shop and central warehouse vicinity. By the beginning of October, on E&A MC-176, the old roundhouse was torn down and the piers and floors were poured for the new shop building, but due to steel shortages the contract erectors did not move in until the close of the year.

2. PRODUCTION
SHIPMENTS &
INVENTORIES:

a. Production by Grades:

<u>Crude</u>	<u>Tons</u>
Holman Retreat Crude-----	109,186
Brown Wash Crude -----	138,511
Brown Retreat Crude;-----	1,377,183
Total Crude	<u>1,624,880</u>
<u>Concentrates</u>	
Holman Bessemer Retreat Concentrates -----	49,115
Holman Non-Bessemer Retreat Concentrates -----	14,183
Brown Bessemer Wash Concentrates -----	13,005
Brown Non-Bessemer Wash Concentrates -----	70,582
Brown Bessemer Retreat Concentrates -----	252,566
Brown Non-Bessemer Retreat Concentrates -----	480,302
Total Concentrates	<u>879,753</u>

b. Shipments:

Holman Bessemer Retreat Concentrates -----	49,115
Holman Non-Bessemer Retreat Concentrates -----	14,183
Brown Bessemer Wash Concentrates -----	13,330
Brown Non-Bessemer Wash Concentrates -----	63,319
Brown Bessemer Retreat Concentrates -----	255,298
Brown Non-Bessemer Retreat Concentrates -----	477,421
Total	<u>872,666</u>

c. Inventories:

The Brown Wash and retreat stockpiles of 38,426 tons were shipped early in the season and a new balance of 45,513 tons was built up for the 1951 season.

2. PRODUCTION
SHIPMENTS &
INVENTORIES:
(Continued)

d. Production by Months:

(1) Crude Ore

	<u>Holman</u> <u>Retreat</u>	<u>Brown</u> <u>Wash</u>	<u>Brown</u> <u>Retreat</u>	<u>Total</u>
May		43,174	148,636	191,810
June	2,479	60,127	165,016	227,622
July	3,159	13,689	225,794	242,642
August		21,521	315,124	336,645
September	11,057		309,415	320,472
October	92,491		213,198	305,689
Total	109,186	138,511	1,377,183	1,624,880

e. (2) Concentrates

May		23,058	73,107	96,165
June	1,568	37,863	89,096	128,527
July	1,886	8,312	127,323	137,521
August		14,354	166,030	180,384
September	6,106		166,018	172,124
October	53,677		111,275	164,952
November	61		19	80
Total	63,298	83,587	732,868	879,753

f. Ore Statement

As of December 31, 1950, there is in stock the following ores:

Brown Wash Concentrates	-----	13,949 tons
Brown Retreat Concentrates	-----	31,564 "
Total	-----	45,513 tons

Due to the spring flood conditions, railroad cars were not available for stockpile service until May; consequently, the 38,426 tons of concentrates remaining in stock at the close of 1949 was belatedly loaded out during plant production. An additional 224,946 tons were stocked at intervals of car shortages throughout the season and especially during about a two week period of railroad strike which started on June 26th of the 1950 season. 105,889 tons were reloaded and shipped during the season and 73,544 tons were shipped post-season, leaving a balance of 45,513 tons of Brown concentrates in stockpile for early 1951 shipments.

3. ANALYSIS

a. Tonnage & Analysis of Crude Ore Produced:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Holman Retreat	109,186	40.45	.033	37.13
Brown Wash	138,511	41.47	.040	35.62
Brown Retreat	1,377,183	39.56	.040	38.11
Total	1,624,880	39.78	.040	37.83

3. ANALYSIS:
(Continued)

b. TONNAGE & Analysis of Concentrates Produced:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Nat.</u>
Holman Bess. Ret. Conct.	49,115	56.98	.036	12.12	.20	.43	7.08	52.95
Holman N.B. Ret. Conct.	14,183	56.09	.041	12.73	.17	.45	7.07	52.12
Brown Bess. Wash Conct.	13,005	56.91	.034	12.60	.14	.38	7.16	52.84
Brown N.B. Wash Conct.	70,582	57.01	.054	11.72	.16	.40	7.76	52.59
Brown Bess. Ret. Conct.	252,566	56.92	.035	12.72	.16	.41	7.03	52.92
Brown N.B. Ret. Conct.	480,302	56.54	.061	12.06	.17	.47	7.27	52.43
Total	879,753	56.71	.051	12.25	.17	.44	7.23	52.61

c. Tonnage & Analysis of Ore Shipped:

Holman Bess. Ret. Conct.	49,115	56.98	.036	12.12	.20	.43	7.08	52.95
Holman N.B. Ret. Conct.	14,183	56.09	.041	12.73	.17	.45	7.07	52.12
Brown Bess. Wash Conct.	13,330	56.88	.035	12.63	.14	.38	7.14	52.82
Brown N.B. Wash Conct.	63,319	56.97	.054	11.81	.16	.40	7.61	52.63
Brown Bess. Ret. Conct.	255,298	56.91	.035	12.74	.16	.41	7.02	52.91
Brown N.B. Ret. Conct.	477,421	56.54	.060	12.04	.17	.47	7.28	52.42
Total	872,666	56.70	.051	12.25	.17	.44	7.21	52.61

d. Mine Analysis of Ore in Stockpile:

Brown Wash Conct.	13,949	56.85	.052	11.79	.17	.41	7.96	52.32
Brown Retreat Conct.	31,564	56.46	.057	12.27	.16	.44	7.38	52.29
Total	45,513	56.58	.055	12.12	.16	.43	7.56	52.30

e. Complete Analysis of Season's Shipments:

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Holman Bess. Ret.	56.98	.036	12.12	.20	.43	.26	.16	.011	5.18
Holman N.B. Ret.	56.09	.041	12.73	.17	.45	.27	.17	.010	5.83
Brown Bess. Wash	56.88	.035	12.63	.14	.38	.26	.17	.011	4.94
Brown N.B. Wash	56.97	.054	11.81	.16	.40	.26	.16	.011	5.55
Brown Bess. Retreat	56.91	.035	12.74	.16	.41	.25	.16	.010	4.75
Brown N.B. Retreat	56.54	.060	12.04	.17	.47	.25	.17	.011	5.84

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

<u>Factors:</u>	<u>Cu. Ft. Per Ton</u>	<u>Rock Deduction</u>	<u>% Recovery</u>
Merch. Ore	14	-	100.00
Wash Conc.	14		58.63
Lean Wash Conc.	14		47.80
Low Grade Wash Conc.	14		58.58
Lean Low Grade Wash Conc.	14		45.06
Retreat Conc.	14		40.00

4. ESTIMATE OF
ORE RESERVES:
(Continued)

a. Developed Ore: (Continued)

	Reserve 12-31-49	Mined 1950	Balance After Mining	Changed by Re-Estimate	Reserve 12-31-50
<u>North Star</u>					
N $\frac{1}{2}$ -NE $\frac{1}{4}$ 21,56-24	958,427	-	958,427	-	958,427
<u>Bingham</u>					
NW $\frac{1}{4}$ -SE $\frac{1}{4}$ 21,56-24	1,686,464	-	1,686,464	-	1,686,464
<u>Holman</u>					
SE $\frac{1}{4}$ -NE $\frac{1}{4}$ 21,56-24	2,420,394	63,298	2,357,096	-	2,357,096
<u>Brown No. 1</u>					
SW $\frac{1}{4}$ -NE $\frac{1}{4}$ 21,56-24	862,042	79,277	782,765	-	782,765
<u>Brown No. 2</u>					
SW $\frac{1}{4}$ -NW $\frac{1}{4}$ 22,56-24	4,497,891	737,178	3,760,713	-	3,760,713
Total	10,425,218	879,753	9,545,465	-	9,545,465

b. Prospective Ore:

The above reserve estimate of 9,545,465 tons represents 1950 production deducted from a reserve of 10,425,218 tons as of 12-31-49. Additional ore has been developed on the South side of the Holman, Brown No. 2 and Bingham lesses. It is possible that additional retreat ore will be developed on the extreme North end of both North Star forties.

c. Estimated Analysis of Ore Reserves:

	Tons	Iron	Phos.	Sil.	Mng.	Alu.
<u>North-Star Bingham:</u>						
Non-Bess. Direct	67,728	58.00	.051	11.82	-	-
Bess. Wash Conc.	768,778	59.60	.031	10.28	.18	.50
N.B. Wash Conc.	722,173	58.21	.056	10.29	.23	.59
Bess. Retreat Conc.	413,922	57.82	-	11.22	-	-
N.B. Retreat Conc.	672,290	57.84	-	11.10	-	-
Total North Star-Bingham	2,644,891	58.45	.044	10.68	.20	.54
<u>Holman-Brown</u>						
Bess. Wash Conc.	2,379,217	58.98	.029	10.28	.17	.43
N.B. Wash Conc.	1,497,951	57.82	.062	10.05	.19	.57
Bess. Retreat Conc.	1,726,004	57.18	-	11.82	-	-
Non-Bess. Ret. Conc.	1,297,402	56.88	-	11.72	-	-
Total Holman-Brown	6,900,574	57.88	.042	10.99	.18	.48
Total Direct	67,728	58.00	.051	11.82		
Bess. Wash Conc.	3,147,995	59.13	.029	10.28	.17	.45
Non-Bess. Wash Conc.	2,220,124	57.95	.060	10.13	.20	.49
Total Wash Conc.	5,368,119	58.64	.042	10.22	.18	.47
Bess. Retreat Conc.	2,139,926	57.30	-	11.70	-	-
N.B. Retreat Conc.	1,969,692	57.21	-	11.51	-	-
Total Retreat Conc.	4,109,618	57.26	-	11.61	-	-
Total Bessemer	5,287,921	58.39	.029	10.85	.17	.45
Total Non-Bessemer	4,257,544	57.61	.060	10.79	.20	.49
Total Holman-Cliffs	9,545,465	58.04	.043	10.83	.18	.47

5. LABOR & WAGES

a. Comments:

The supply of labor was ample throughout the year and the class of labor accumulated in the normal turnover was of much higher standard than has been encountered in the last several years. A general raise of 12 1/2¢ an hour became effective as of December 1st, with an additional average 8 1/2¢ raise for classification inequities which will be applied when the distribution of inequities is settled.

b. Comparative Statement of Production & Wages:

<u>Production</u>	<u>Operating Season Only</u>	<u>Operating & W&I Season</u>
Wash & Retreat Concentrates	879,753	879,753
No. of Days Mine Operated	130	263
Average No. of Men Working	162	115
Average Wages Per Day	12.41	12.04
Product Per Man Per Day	41.824	29.21
Labor Cost Per Ton	.297	.412
Total Number of Days	21,034	30,121
Amount Paid for Labor	\$261,049.67	\$362,761.89

6. GENERAL SURFACE:

a. Building, Repairs:

A total of \$6,432.88 was expended during the year in the maintenance of office, shops and the 58 rented houses in Taconite, which were leased from the Oliver Iron Mining Company. Late in the year the Oliver sold all but 9 of the houses to the tenant employees. The 9 houses bought by the company for key employees had some paint and foundation improvements; otherwise, house maintenance was held at a minimum. Of the shop buildings bought from the Oliver, the old round house was torn down completely and piers and floors were poured preparatory to the new shop erection, E&A MC-176.

b. Roads, Transmission Lines, Etc:

Additional to the constant shifting and rebuilding of roads in the pit for ore and stripping developments, about a half mile of road was built from the plant to the South dump for heavy density rock disposal, and about a quarter mile of road was developed to the North dumps from the pit as a shorter route for South side stripping, spanning the gully and laying about 200 feet of 5 ft. concrete culvert to accommodate the north side drainage.

A new "A" frame was installed on the South side for power feed to the pit over a 900 ft. span during the ore season, with about 3,000 ft. of relocated transmission lines to clear the post season stripping extensions. About a half mile of line was built to accommodate the emergency pump move at Hill Lake in August, but the line loss was found to be exorbitant and another line was started, post season, from the old plant site to the pumps for a better future distribution of power on the new line, involving a distance of about 9,000 feet. All the poles were erected by the close of the year, preparatory to the stringing of wires for the start of next ore season.

c. Miscellaneous General Construction:

With the advent of cold weather, after tearing down the old round house, it became necessary to insulate the truck service shop in the pit to house some of the winter repair work and the wash rack house was insulated for tractor repairs. Additional facilities will be required for truck repair. The 1400 feet of ditch along Highway #169 sloughed in somewhat and was cleaned out and deepened about a foot with a backhoe to release the water impounded by the tailings basin. A 54-B dragline was used to widen the crude ore conveyor trench from the pit, to

6. GENERAL SURFACE:

(Continued)

c. Miscellaneous General Construction: (Continued)

release the side pressure which was slowly wrecking the gallery and throwing the conveyor out of line.

7. OPEN PIT:

a. Stripping:

The stripping operations conducted during the year comprised two E&A programs (MC-166 and MC-197) both of which were started and completed in 1950. Starting after the first four month idle period, a total of 792,393 cubic yards of overburden was removed, in north and south pit extensions, by the close of the year.

Due to spring flood conditions, the first stripping program, which was scheduled to start about the middle of April, did not get under way until May 22nd. Most of the stripping was conducted in the Northeast pit extension of Brown #2, with a lesser movement from the South side involving Brown No. 2 and Holman, and some from Brown #1, most of which was encountered in the development of the new stripping road to the North dumps. During the ore season stripping operations were carried forward on the night shift, or the off shift of ore production, except for a 2-week period from July 24th to August 5th, when it became necessary to accelerate stripping to 3-shift operations temporarily because of the belated start. The stripping, concurrent with ore production, involved the removal of taconite and lean formation benches to release ore for current production, and in post season work a Norwheast extension was started anew with the removal of surface material. During the last 6 weeks of ore season, with ore operations stepped up to 3-shift production, very little stripping was accomplished, but post season progress was accelerated considerably when the 20-shift per week schedules were put into effect. Single shovel operations were conducted in stripping throughout the ore season, with 6 to 8 trucks on the haul. Post season activities were carried forward mainly on single shovel operations, except for an extra shovel crew in November that worked intermittently between stockpile loading and stripping, with 8 to 9 trucks in service. Some major shovel breakdowns were encountered, but with a spare shovel in stripping at all times very few delays to operations were involved. The weather was quite favorable to stripping and only one shift on November 22nd was lost to production due to a blinding sleet storm. On 202 shifts of operation, a total of 518,672 cubic yards of overburden was removed, showing an average movement of 2,568 yards per shift, at a cost of \$0.315 per yard as compared with the estimated budget of \$0.400 per yard (both excluding the 5¢ cost for depreciation.) Due mainly to favorable post season weather conditions, very satisfactory progress was made, and instead of the 400,000 yards of material estimated to be moved on E&A program MC-166, a total of 518,672 yards was moved for the allotted budget by the end of November.

With the completion of the first program, stripping was carried forward on another E&A program, MC-197, which was set up for December only, in an effort to establish stripping programs by the calendar year hereafter. The December program was set up for a movement of 150,000 yards in anticipation of some adverse weather delays and a complete shutdown between Christmas and the New Year's Day. However, the weather continued comparatively mild and only a six shift shutdown was effected over the Holidays, resulting in a large overrun of yardage removed, but at an actual cost of \$0.302 per yard instead of the budgeted \$0.390 per yard. On 80 shifts of operations, a total of 273,721 cubic yards were removed, showing an average movement of 3,422 yards per shift. Eight or nine trucks were in service most of the time, and although only one shovel was scheduled, two shovels were operated whenever conditions warranted the additional excavation to utilize the maximum truck availability. During some cold spells several major breakdowns were encountered, such as a broken boom and cracked dipper bail on the No. 80 Marion and a broken bail and cracked dipper sticks on the No. 69 Marion. However, the old No. 32 Bucyrus was transferred from the stockpile to the pit as

7. OPEN PIT:
(Continued)

a. Stripping: (Continued)

a spare, and operations were delayed very little by the breakdowns. The spare shovel was operated in the Brown #1 forty where 25,228 yards of slough were removed to make a protective berm alongside the pit conveyor preparatory to the spring break-up and, subsequently, was operated in the North Star stripping area while shovel repairs were conducted in the Brown No. 2 area, where most of the month's operations were concentrated in taconite removal.

The combined total of both programs involved the movement of 792,393 yards of overburden on 282 shifts of operation, reflecting an average movement of 2,810 yards per shift at a cost of \$0.310 per yard. Compiled below are the yardages of materials stripped in 1950, by leases:

	Surface	Taconite	Lean Ore	Paint Rock	Lean Form.	Total
Brown #2	351,266	167,888	53,496	60,351	35,184	668,185
Holman	8,340	724	5,496	11,662	10,596	36,818
Brown #1	29,996	14,532		1,308	17,292	63,128
North Star	24,262					24,262
Total	413,864	183,144	58,992	73,321	63,072	792,393

b. Open Pit Mining:

Due to the spring floods, the opening of the 1950 ore season was retarded about a week, but got under way on the 8th of May. Operations were started on a 5-day per week and 2 shift per day schedule until after the railroad strike, when 2 and 3-shift days were alternated weekly, until September 17th, when production was stepped up to 3-shift per day until the close of the season on October 27th. On 301 shifts of ore operations, a total of 1,772,975 tons of gross crude was mined at an average rate of 5,890 tons per shift at a cost of \$0.192 per ton. Of the gross crude, 148,095 tons of rock was scalped at the screening plant and hauled out of the pit, leaving a net crude to the mill of 1,624,880 tons, reflecting an average mill feed of 5,398 tons per shift. The proportion of net crude, by leases, was 1,378,931 tons from Brown #2, 136,763 tons from Brown #1, and 109,186 tons from the Holman forty. Mostly retreat crude was mined during the year, as reflected by the net crude totals of 1,486,369 tons of retreat and 138,511 tons of wash ore.

The Brown #2 production involved mainly the northward retreat of benches to the bottom taconite from under the newly-stripped area along the north side, and the depletion of the old 300,000 tons low grade retreat crude ore stockpile from the pit. All of the Brown #1 ore was sorted out of the bottom rock areas along the east side, with some good Bessemer grades being released by the taconite movement in the development of the new stripping approach. A small amount of the Holman production was from the upper benches of the South side, but the main tonnagewas from the northerly widening of the pit along the taconite bottom. Single shovel operations were used throughout the season, except for short intervals while completing or starting new cuts when a second shovel was operated to maintain production, and at times when it was necessary, to mix ores from two shovels for grading purposes. Dependent on the length of haul, 6 or 7 trucks were used for ore haulage, with an additional 2 or 3 trucks on the long haul out of the pit to the North rock dump because of the heavy rock rejection at the pit screening plant.

Several shovel failures were encountered during the season, but a spare shovel was always available, and outside of the short time lost in transferring crews or moving in another shovel, very little delay time developed. Operations were deliberately retarded during the start of the season while breaking in the newly overhauled plant equipment and at times it was necessary to cut down the feed of some of the paint-contaminated crude from the retreat stockpile, which retarded plant operations. Otherwise, a comparatively good rate of production was maintained until

7. OPEN PIT:
(Continued)

b. Open Pit Mining: (Continued)

the last month of operations when belated, heavy demands for the Bessemer grade only necessitated frequent moves of shovels to various isolated and scattered pockets of low phosphorous areas throughout the pit.

Additional to the gross crude ore mined, was 74,684 tons of pit rock and 140 tons of lean ore, which were sorted out and hauled to their respective dumps on the North side of the pit. Also 9,940 tons of slough was cleaned up and hauled out of the ore areas.

c. Pumping and Drainage:

The excessive spring runoff threatened to flood the mine completely and created considerable drainage and pumping problems. High water reversed the flow so that Swan River flowed into Hill Lake, which rose about $3\frac{1}{2}$ feet to an elevation where the elevated road around the North-east side of the pit was the only barrier preventing complete submersion. A ditch was dug along the south side for the south drainage, and the north side road was bulldozed out and replaced after the north drainage subsided. The ditching proved successful, since no washouts developed over the pit edge, but considerable excavations were conducted in land slides in the vicinity of the pit conveyors and the fast rate of seepage from general ground saturation washed out the dyke of the upper pit sump. Temporary changes were made in pit drainage pipe lines while the dyke was rebuilt. Both the upper and lower sumps were clammed of sloughed material several times during the year, and after the spring runoff the bottom sump was maintained at about a 440 elevation and was making an average of about 2,000 gallons per minute.

d. Other General Pit Activities:

The long haul out of the pit to the rock dump for the disposal of rejects from the screening plant, requiring 2 or 3 trucks in service, entailed considerable added expense. The lower recovery ores cleaned off the bottom taconite involved a greater proportion of scalping, however the bottom clean-up was effected wherever possible in anticipation of establishing rock dump areas in the pit. The removal of the retreat stockpile released considerable area for this purpose, although a small amount of underlying original ore still remains to be cleaned up early in 1951 in that vicinity.

8. BENEFICIATION

a. Washing Plant:

The concentrating plant operated on schedules established for ore operations in the pit from May 8th to October 27th. On 301 shifts of operations, a total of 1,624,880 tons of crude ore was treated, to produce 879,753 tons of concentrates, showing a combined weight recovery of 54.14 per cent, and an average rate of production of 2,925 tons per shift. The wash crude portion of 138,511 tons produced 83,587 tons of product, with a recovery of 60.35 per cent. The 1,486,369 tons of retreat crude produced 796,166 tons of concentrates at an average of 49.06 per cent recovery. Of the 796,166 tons of retreat concentrates only 352,075 tons were beneficiated by the heavy density process. The balance of 444,091 tons was the minus 1/8" material concentrated through the washing plant classifiers only.

8. BENEFICIATION:
(Continued)

a. Washing Plant: (Continued)

Considering the large proportion of retreat material handled at the concentrating plant, a comparatively good average rate of production was attained, although it was frequently necessary to retard the feed while processing crude from the painty retreat stockpile. In the washing plant proper the logs were often a bottleneck when handling the coarse material from the blocky horizons, but as a rule when the logs were overloaded the higher weight recovery boosted production enough to compensate for the slower feed. The double classification showed some improvement in silica analyses, but the pump arrangement of transferring the coarse feed from the primary to the secondary classifiers proved unsatisfactory, and to conserve water during the dry spell it became necessary to revert back to the single classification. Plans are to raise the two outside classifiers to establish gravity feed for future double classification. Some good iron values were recovered from the current tailings with the spiral hook-up, but due to rotted wood and debris encountered in the old retreat stockpile, which plugged the spirals, the system was shut down during the stockpile excavation. The retreat plant operated very satisfactorily and good concentrates were secured from the plus 1/8" materials, but the large proportion of minus 1/8" sizes, which were treated only in the classifiers, was a constant source of grading problems due to high silica. A single unit plant to treat the fine sizes by the heavy media process will be erected for the coming season if the necessary structural materials can be obtained.

The following is a statement showing the time lost to production and percentage of total operating hours:

<u>Source of Delay</u>	<u>Hours Lost</u>	<u>% of Total Work Hours</u>
Repairing and resplicing pit conveyor belt	55	2.28%
Repairing and unplugging log washers	20	0.83%
Failure of Stockpile Conveyor System	11	0.46%
Repair Tailings Pumps & Weld Tailings line	6	0.25%
Electric Power Failures	5	0.21%
Shovel Moves for Grade Purposes	<u>14</u>	<u>0.58%</u>
Total	111 hrs.	4.61%

Compiled below are the tonnages and analyses of the various mill rejects and products:

	<u>5' x 14' Screen Rejects</u>	
<u>Lease</u>	<u>Tons</u>	<u>Iron</u>
Holman	-	-
Brown	11,865	31.07

The rock removed from the pit was as follows:

Holman	-	-
Brown	1,494	31.07

8. BENEFICIATION:
(Continued)

a. Washing Plant: (Continued)

The concentration data for the Holman-Cliffs for the year 1950 was as follows:

	<u>Tonnage</u>	<u>% Total Mined</u>	<u>% Iron Dried</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore & Rock Mined	151,870	100.00	40.56		
Less: Rock Removed in Mining	1,494	.98	31.07		
Crude Ore Transported to Screening Plant	150,376	99.02	40.66		
Less: Rock Rejects in Screen Pl.	11,865	7.81	31.07		
Crude Ore Entering Mill	138,511	91.21	41.47		
Concentrates Produced	83,587	55.04	57.00	60.35	82.95
Tailings (by deduction)	54,924	36.17	17.84		

Compiled below are the tonnages and analyses of the various mill rejects and products:

Retreat Screen Rejects

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>
Holman	9,060	29.91
Brown	127,170	30.79
Total	136,230	30.73

Rock Removed from Pit During Mining

	<u>Tons</u>	<u>Iron</u>
Holman	72,452	23.43
Brown	738	20.49
Total	73,190	23.40

	<u>Tonnage</u>	<u>% Total Mined</u>	<u>% Iron Dried</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore & Rock Mined	1,695,789	100.00	38.21	-	-
Less: Rock Removed in Mining	73,190	4.32	23.40		
Crude Ore Transported to Screening Plant	1,622,599	95.68	38.88		
Less: Rock Rejects in Screen Plant	136,230	8.03	30.73		
Crude Ore Entering the Mill	1,486,369	87.65	39.63		
Concentrates Produced	796,166	46.95	56.69	53.56	76.62
Heavy Density Rejects	117,962	6.96	40.51		
Tailings (by Deduction)	572,241	33.74	15.75		

9. MAINTENANCE
AND REPAIRS:

The concentrating plant equipment was reconditioned prior to the ore season, with the installation of the hydroseparator tank for improved feed to the spirals and the pump installation incidental to secondary classification. Repairs were started anew at the close of ore season, and structural remodeling was started for the installation of the two 6' x 20' screens to replace the log washers. Work was started in elevating the outside classifiers to establish gravity feed for double classification. The shovels received moderate but adequate overhauling during the pre-season idle period. Both the bottom and end dump trucks were thoroughly overhauled preparatory to the ore season, with a resultant efficiency in operation due to a high truck availability. Tractors, graders and drills received repairs as required to meet their individual needs.

10. COST OF
OPERATION:

a. Comparative Mining Costs:

<u>Product</u>	1950 Budget Estimate	1950 Cost Per Ton	1949 Cost Per Ton
Wash Concentrates	400,000	83,587	326,914
Retreat Concentrates	400,000	796,166	297,561
Fine Ore Concentrates	-	-	83,281
	<u>800,000</u>	<u>879,753</u>	<u>707,756</u>
Average Shift Production		2,923	3,061
Tons per Man per Day		29.21	25.75
Days Operated		130	103
<u>Cost</u>			
Fine Ore Concentrates	-	-	\$.766
Open Pit Optg.-Crude Ore	\$.238	\$.192	.214
Concentrating	.312	.281	.319
General Mine Expense	.177	.169	.164
Winter & Idle Expense	.350	.363	.490
Loading out Stockpile	.002	.008	.011
Cost of Production	\$1.341	\$1.208	\$1.412
Depreciation-Plant & Equipment		.142	.174
-Motorized Equipment		.058	.047
-Movable Equipment		.004	.006
Amortization of Stripping		.346	.329
Taxes-Ad Valorem		.232	.278
-Occupational		.210	.144
-Royalty		.113	.027
Amortization of Leasehold		.218	.112
Total Cost at Mine		<u>\$2.531</u>	<u>\$2.529</u>
Administrative Expense		.100	.100
Misc. Expense and Income		.001	.002
GRAND TOTAL		<u>\$2.630</u>	<u>\$2.627</u>

10. COST OF OPERATION:

(Continued) b. Detailed Cost Comparison:

(1) Product

Due to the large tonnage of retreat concentrates produced in 1949 with its low moisture characteristics, some improvement was shown in the natural iron content, but the absorption of the huge retreat stockpile reflected a slight increase in silica ratios as compared with the previous year's product. The 1950 analyses of natural iron, silica and gross weight recovery were 52.61%, 12.25% and 49.62%, respectively, where 1949 showed 52.26%, 11.69% and 54.06%. With the large development of low grade retreat ore, an increase in costs was anticipated, but due to a general development of efficiencies in all phases of operations, the 1950 season showed up quite favorably in the comparative costs.

(2) Open Pit Mining:

The production of crude ore in 1950 was \$0.192 per ton as compared with \$0.238 of the budget and \$0.214 for 1949. The budget was estimated in anticipation of a 24 mill increase over the 1949 costs due to the prevailing rise in prices of material and labor. However, as a result of efficiencies realized throughout by the higher production and the high availability of trucks and shovels after the thorough overhaul period, the 1950 costs reflected a saving of 22 mills under the 1949 costs. The greatest saving was shown as 11 mills in truck maintenance and 7 mills in shovel maintenance, which are not true to the full extent, since the overhauling costs of these units were charged to Winter & Idle Expense.

(3) Concentrating:

The budget for concentrating was estimated at \$0.312 per ton, anticipating a net saving of 7 mills mainly in reduced power costs because of the elimination of the booster pump on the tailings line and the stabilization of building and machinery maintenance costs, which were high in 1949 due to the new plant addition and alterations. A resultant saving of 38 mills was realized under the 1949 costs, 17 of which were involved in the power and maintenance costs, with an additional saving of 21 mills in retreat plant operations due to efficiencies in heavy retreat production. However, more credit is due the 1950 operations than is shown in the comparative costs because a greater proportion of higher cost retreat concentrates were produced than was anticipated with reference to the ratio of retreat to wash products.

(4) General Mine Expense:

Under this heading the 1949 cost per ton was \$0.164, and due to the general trend of increasing costs was budgeted at \$0.177 per ton. The actual cost for 1950 was \$0.169, showing the general trend increase at 5 mills, which was minimized somewhat by the greater than anticipated production.

(5) Winter & Idle Expense:

As compared to the high Winter & Idle Expense of \$0.490 per ton in 1949, the budget was estimated at \$0.350 in anticipation of reducing the cost by charging new expenditures as incurred to its respective phase of operation. The actual cost of \$0.363 for 1950 showed considerable decrease from 1949, but was still 13 mills above the budget due to the flood-prolonged idle period which entailed an additional absorption of equipment repair costs in the Winter & Idle caption.

10. COST OF OPERATION:

(Continued) b. Detailed Cost Comparison: (Continued)

(6) Loading Stockpile Ore

Loading out stockpile in 1949 amounted to \$0.011 per ton of production, which was high due to a comparatively large tonnage of concentrates loaded out under frost conditions. The budget was estimated at \$0.002 per ton, which involves the normal amount of stockpile loading. However, a total of 217,859 tons of stockpile concentrates were loaded in 1950, about 2½ times the 1949 volume, with a resultant cost of \$0.008 per ton of production.

11. EXPLORATION AND FUTURE EXPLORATION:

During the year a total of 5,328 feet of structural drilling was accomplished, of which 2,973 feet were in the Brown #2 forty, 1,076½ feet in the Bingham, 900½ feet in the Holman, 212 feet in the North Star and 166 feet in the Brown #1 forty. The Schultze Drilling Company drilled 2,947½ feet of the total, while 2,380½ feet were drilled with the company outfit. Both rigs were operated on 2 or 3 shift per day schedules when necessary during the cold spells and good progress was made.

The drill holes to the North and South of the pit in all forties involved, justified extensions and developments in those directions. However, the Bingham drilling showed very lean possibilities for easterly extensions in that area.

During 1951 it is planned to explore to depth the South side of the Holman forty for current work and to probe further the Northeast extension of Brown #2 and the North limits of the North Star forties.

12. TAXES:

The following is a statement of the taxes for the years 1950 and 1949:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Holman-Brown Mine	\$123,868.75	\$130,466.39		\$6,597.64
Bingham Mine	23,681.79	24,018.99		337.20
North Star Mine	11,399.23	11,566.45		167.22
Test Lab. & Truck Shop	1,147.05	1,066.25	\$80.80	
Washing Plant Site	5,260.65	5,866.65		606.00
Auxiliary and Dump Lands	692.44	482.84	209.60	
Holman-Cliffs Shops, Office				
Fuel Oil Plant & Central Whse.	441.25	500.58		59.33
Holman-Cliffs Pers. Property	10,631.92	11,997.75		1,365.83
Holman-Cliffs Fine Ore Plant	-	978.12		978.12
Holman-Cliffs Tailings Basin				
Fines, Personal Property Tax		10,208.72		10,208.72
Total	<u>\$177,123.08</u>	<u>\$197,152.74</u>		<u>\$20,029.66</u>
Rented Buildings	1,205.08	1,416.82		211.74
Grand Total	<u>\$178,328.16</u>	<u>\$198,569.56</u>		<u>\$20,241.40</u>
Average Tax Rate	116.99	130.77		13.78

12. TAXES: (Continued)

Ore values increased a flat 10% per ton, 10,766 tons merchantable ore reclassified from undeveloped to developed, 1,953,349 tons retreat re-classified from undeveloped to developed. Ore removed in 1949 and decrease in mill rate gave an overall reduction in total taxes.

Personal property, depreciation on equipment, reduction of inventories and lower mill rate gave decrease. Fine ore plant and removal of fines tailings basin in 1949 eliminated fine ore plant and stockpile fines personal property taxes in 1950.

13. ACCIDENTS AND
PERSONAL INJURY:

The accident record showed one compensable accident encountered during the year:

Name: Theodore Anderson
Date of Injury: November 3, 1950
Cause: While Mr. Anderson was piling lumber a sliver became imbedded in palm of left hand.

Nature of Injury: Infection - left hand.

Time Lost: 11 days

Compensation: \$30.00

14. PROPOSED NEW
CONSTRUCTION:

The new shop will be completed in place of the dismantled old round house, with the machinery to be released from the present shop after the winter overhaul period for re-installation in the early summer. With the machine shop moved out, the present building will have the required space for expanding the electric and carpenter shops. With the old round house gone, where the overflow of tractor and truck repairs was done in the past, about a two stall addition will have to be made to the present truck repair shop, with provisions to house the continually expanding district motor work. At the washing plant the erection of the proposed pilot plant for the heavy media treatment of fines will get underway as soon as the necessary structural materials are obtained.

Preparatory work was started on the clear water return pipe line project from the tailings basin to Hill Lake to be installed prior to 1951 ore operations.

15. EQUIPMENT REC'D
AND PROPOSED
NEW EQUIPMENT:

Itemized below are the new pieces of major equipment purchased by the Holman-Cliffs Mine in 1950:

3 Mack end-dump trucks
1 Model 12 Caterpillar Motor Grader
1 LeTourneau Tournadozer
1 1½ ton line truck
4 pick-up trucks
2 1½ ton dump trucks
2 pick-up trucks for test laboratory
1 48" Crockett Magnetic Separator
2 300 h.p. induction motors
1-36" Akins Classifier for Media Feed

15. EQUIPMENT REC'D
AND PROPOSED
NEW EQUIPMENT: (Continued)

1 Marion Shovel sheave block assembly

On order for 1951 delivery are the following:

3 22-ton Euclid end dump trucks
1 1500 gallon tank truck
2 29T Bucyrus-Erie 9 inch churn drills
2 6' x 20' Allis Chalmers double deck screens
1 Complete stockpiling conveyor system
1 heavy media fine ore pilot plant.

SALLY MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

This property has merely been explored and no mining operations have been conducted to date.

2. PRODUCTION SHIPMENTS & INVENTORIES:

NONE

3. ANALYSIS:

NONE

4. ESTIMATE OF ORE RESERVES:

a. Factors:

	<u>Cu. Ft.</u> <u>Per Ton</u>	<u>Rock</u> <u>Deduction</u>	<u>Recovery</u>
Merch	14	-	100.00
Wash	14	-	56.76
Low Wash	14	-	45.85
Low Grade Wash	14	-	58.38
Lean, Low Grade Wash	14	-	50.50
Retreat	14	-	40.00

b. Reserves as of 12-31-50

	<u>Reserve</u> <u>12-31-49</u>	<u>Mined</u> <u>1950</u>	<u>Bal. After</u> <u>Mining</u>	<u>Changed</u> <u>by Re-Est.</u>	<u>Reserve</u> <u>12-31-50</u>
Bovey #1					
NW-SE, 21-56-24	1,507,801	-	1,507,801	#243,778	1,751,579

c. Estimated Analyses of Ore Reserve:

	<u>Tons</u>	<u>Iron</u>	<u>phos</u>	<u>Sil.</u>
<u>Bovey #1</u>				
NW-SW, 21-56-24				
Bess. Merch.	88,457	64.01	.020	5.50
N.B. Merch	63,657	62.12	.078	5.59
Bess. Wash Conc.	755,429	60.92	.026	7.85
N.B. " "	450,438	58.89	.067	8.65
Bess. Retr. Conc.	229,073	58.33	.031	11.73
N.B. " "	164,525	57.73	.061	10.03
Total . .	1,751,579	59.96	.042	8.57
Total Bess.	1,072,959	60.62	.027	8.48
Total N.B.	678,620	58.91	.067	8.70
Total				
Bovey #1	1,751,579	59.96	.042	8.57

5. LABOR & WAGES: NONE

6. GENERAL SURFACE: NONE

7. OPEN PIT: NONE

8. BENEFICIATION: NONE

9. MAINTENANCE & REPAIRS: NONE

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10. COST OF OPERATION: NO PRODUCTION

11. EXPLORATION & FUTURE EXPLORATION:

A series of 12 holes have been drilled in the Sally Mine. This program was completed in 1949 and proved up the reserve of 1,751,579 tons. Future exploration on this property will be to define limits of the ore body to the West and should provide an increase in reserves.

12. TAXES:

The following is a statement of 1950 and 1949 taxes:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Sally Mine	\$24,109.27	\$21,339.03	\$2,770.24	
Auxiliary Lands	25.91	27.17		\$1.26
Total	\$24,135.18	\$21,366.20	\$2,768.98	
Average Tax Rate . .	\$119.76	\$134.20		\$14.44

13. ACCIDENT AND PERSONAL INJURY: NONE

14. PROPOSED NEW CONSTRUCTION: NONE

15. EQUIPMENT RECEIVED AND PROPOSED NEW EQUIPMENT: NONE

SARGENT MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

Mining operations at the Sargent Mine were carried forward from the first of the year to July 17th on a two-shift, 5-day a week basis and were then increased to a two shift, 6-day week for the balance of the year. In addition to the time lost on holidays, operations were slowed considerably all during April and May due to unseasonable blizzards, coupled with thaws causing flooding in the mine. It was necessary in April to suspend all mining in the Northeast corner of the mine for the summer months due to danger of mud runs from old caves. A flash flood in July and again in August hampered production. A strike of Great Northern Railway trainmen made it necessary to stockpile all production from June 26th to July 10th. Production was also suspended the last week of the year to allow for timber and equipment repairs. Ore was placed in stockpile from January 1st to May 2nd. Loading of direct ore into cars from pocket started on May 2nd and continued until November 10th, at which time stockpiling was resumed for the balance of the year. The direct ore stockpile was loaded out as cars were available from May 2nd to June 23rd. The washing plant was put into operation on June 20th and operated until November 9th.

The underground drilling program was completed in May and a program of drilling to outline the so-called "isolated ore body" on N $\frac{1}{2}$ -SE 23-57-22 was started immediately and temporarily suspended on November 15th.

2. PRODUCTION,
SHIPMENTS,
& INVENTORIES:

a. Production - Crude Ore ----- 152,134 tons
Direct Ore ----- 140,644 "
Concentrates ----- 78,665 "

b. Shipments: Direct Ore ----- 163,871 "
Concentrates ----- 78,665 "
Total ----- 242,536 "

c. Stockpile Inventory;
Sargent Direct ----- 7,584 tons

d. Production by Months:

	Sargent Crude	Sargent Concls.	Sargent Direct	Total Merchantable
January -----	15,357	-	2,076	2,076
February -----	11,439		5,112	5,112
March -----	15,240		7,767	7,767
April -----	13,521		5,082	5,082
May -----	1,287		18,479	18,479
June -----	5,745	4,126	21,003	25,129
July -----	7,356	17,127	16,620	33,747
August -----	13,620	23,939	18,589	42,528
September -----	15,496	18,873	24,231	43,104
October -----	18,996	12,630	15,427	28,057
November -----	19,407	1,970	5,160	7,130
December -----	14,670		1,098	1,098
Total -----	152,134	78,665	140,644	219,309

e. Ore Statement:

Crude ore production, after depletion by the amount of feed to concentrating plant, left a crude balance in the pile of 32,769 tons as of December 31, 1950. From the underground direct, ore was loaded from both the shaft and the milling pit.

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3. ANALYSIS:a. Tonnage & Analysis - Crude Ore:

<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
152,134	52.88	.057	17.27

b. Tonnage & Analysis of Concentrates & Direct Produced:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Wat.</u>
Concentrates	78,665	57.05	.061	11.06	.68	1.48	11.71	50.37
U.G. Direct	140,644	55.65	.063	12.09	.75	1.82	13.15	48.33

c. Tonnage & Analysis of Ore Shipped:

Concentrates	78,665	57.05	.061	11.06	.68	1.48	11.71	50.37
U.G. Direct	163,871	55.44	.062	12.49	.75	1.80	13.01	48.23
Total	242,536	55.96	.062	12.03	.73	1.70	12.59	48.91

d. Mine Analysis of Ore in Stockpile:

U.G. Direct	7,584	54.59	.062	14.01	.79	1.77	13.98	46.96
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e. Complete Analysis of Ore Shipped:

	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>
Sgt. U.G. Direct	55.44	.062	12.49	.75	1.80	.34	.20	.012	4.67
Sgt. N.B. Conct.	57.05	.061	11.06	.68	1.48	.34	.21	.011	4.21

4. ESTIMATE OF ORE RESERVES:a. Factors:

	<u>Cu.Ft. Per</u>	<u>%</u>
	<u>Ton</u>	<u>Recovery</u>
Merch.	14	100.00
Wash Conct.	14	60.00

b. Ore Reserves as of 12-31-50:

	<u>Reserve</u>	<u>Mined</u>	<u>Bal. After</u>	<u>Changed by</u>	<u>Reserve</u>
	<u>12-31-49</u>	<u>1950</u>	<u>Mining</u>	<u>Re-Estimate</u>	<u>12-31-50</u>
NW-SE, 23-57-22-Merch	99,715	-	99,715	-	99,715
NE-SE, 23-57-22-Merch	317,772	-	317,772	-	317,772
SW-SE, 23-57-22-Merch	397,264	66,360	330,904	+10,480	341,384
" Wash Conct.	-	43,500	-43,500	+335,196	291,696
Total	397,264	109,860	287,404	+345,676	633,080
SE-SE, 23-57-22-Merch	221,442	59,575	161,867	- 54,098	107,769
" Wash Conct.	-	20,165	-20,165	+307,949	287,784
Total	221,442	79,740	141,702	+253,851	395,553
NW-NE, 26-57-22-Merch	95,850	14,709	81,141	- 36,613	44,528
" Wash Conct.	-	15,000	-15,000	+ 88,785	73,785
Total	95,850	29,709	66,141	+ 52,172	118,313
Total Sargent Merch.	1,132,043	140,644	991,399	- 80,231	911,168
Total Wash Conct.	-	78,665	-78,665	+ 731,930	653,265
GRAND TOTAL	1,132,043	219,309	912,734	+ 651,699	1,564,433

4. ESTIMATE OF ORE RESERVES:

c. Analysis of Ore Reserves:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>
NW-SE,23-57-22 -Merch	99,715	57.94	.060	9.80	.88	1.42
NE-SE,23-57-22 -Merch	317,772	57.94	.060	9.80	.88	1.42
SW-SE,23-57-22 -Merch	341,384	56.00	.059	11.87	.78	2.56
" Wash.Conct.	291,696	57.50	.054	10.00	.93	1.27
Total	633,080	56.69	.057	11.01	.85	1.97
SE-SE,23-57-22-Merch	107,769	56.10	.073	11.30	1.27	2.56
" Wash Conct.	287,784	57.50	.054	10.00	.93	1.27
Total	395,553	57.12	.059	10.35	1.02	1.62
NW-NE,26-57-22-Merch	44,528	55.80	.075	11.50	.90	3.16
" Wash Conct.	73,785	57.50	.054	10.00	.93	1.27
Total	118,313	56.86	.062	10.52	.92	1.98
Total Sargent Merch	911,168	56.89	.062	10.84	.89	2.07
" " WashConct.	653,265	57.50	.054	10.00	.93	1.27
GRAND TOTAL . . .	1,564,433	57.14	.059	10.49	.91	1.74

5. LABOR & WAGES:

a. Comments:

The labor supply was ample throughout the year but there continued to be a shortage of experienced miners. A program of training available men on the job was continued and no serious shortage developed for present operations. Local labor relations continued satisfactorily. A general wage increase throughout the area went into effect on December 1st.

b. Comparative Statement of Production and Wages:

Production:

Direct Ore -----	140,644 tons
Crude Ore -----	152,134 "
Total Direct and Crude-----	292,778 "
Concentrates -----	78,665 "
Total Concentrates & Direct -----	219,309 "
Number of days operated -----	276 days
Average Daily Production -----	1,061 tons
Average Number of men working -----	122 men
Tons per man per miner -----	20.57 tons
Tons per Man Total Underground -----	12.15 tons
Tons per man total mine -----	8.87 tons
Average Rate per Day	
Surface -----	\$11.38
Underground -----	\$14.33
Contract Miners -----	\$15.79
Total Mine -----	\$13.66
Amount Paid for labor -----	\$437,198.04
Labor Cost Per Ton -----	\$1.493

6. SURFACE:

a. Buildings & Repair:

Minor maintenance repairs to buildings were carried on throughout the year.

b. Roads, Transmission Lines, Etc.

During May, water backing up into swamp, due to flood conditions caused the road into the mine to become impassable for about 600 feet and it became necessary to completely rebuild it.

The telephone company constructed a new line onto the property. Company power lines were re-arranged for servicing the new washing plant.

c. Miscellaneous General Construction:

Construction of small 100 TPH washing plant, started in 1949, was

6. SURFACE:
 (Continued) C. Miscellaneous General Construction (Continued)
 completed on June 20th and plant put into operation.

7. UNDERGROUND
MINING:

a. Shaft:

Only minor repairs to shaft timbers during the year.

b. Development:

There was no extensive development during the year. A few short drifts and raises were completed to develop new blocks for mining.

c. Mining:

Mining was carried forward during the year with an average of 13 gangs employed. Of these 13 gangs, 8 mined by slicing, 2 by sub-level caving and 3 developing and making timber repairs. The average height of slices was 14 feet and varied in width from 10 to 12 feet. In the sub-level caving places, blocks approximately 28 feet high and 25 feet high were caved. Pillars were mined back in an orderly manner on the various sub-levels.

Considerable trouble with water and mud was experienced in April and May due to the excess moisture from late blizzards and thaws. It was necessary to shut down three working places in the northeast corner of the mine due to danger of mud runs from old caves in this area. It was not feasible to resume mining in this area until November. Flash floods in July and August partly flooded the mine and hampered production with a resulting increase in cost.

d. Timber, Explosives, etc.:

The supply of timber was ample and of good quality. Due to shortage of tamarack timber, elm was gradually substituted, proved satisfactory, and it is expected that in the future one-half elm will be used in place of tamarack.

Lineal feet of timber used per ton of ore	----	.63 ft.
Cost per ton for timber	-	-----\$0.103
Cost per ton for logging, poles and boards	--	\$0.105
Cost per ton for wire	-----	\$0.012
Pounds of explosives per ton of ore	-----	.484 lbs.
Cost of explosives per ton of ore	-----	-----\$0.091

e. Pumping & Drainage:

There were no changes in pumping arrangements. All pumps were completely overhauled during the year. Due to the unusually severe spring breakup and necessity of extra pumping from resulting floods, the cost per ton for pumping in 1950 was \$0.062, compared to \$0.049 in 1949.

8. BENEFICIATION:

Washing plant started operating on June 20th on a one-shift basis until June 26th, when it was stepped up to two shifts per day. Due to the railroad strike on June 25th, it was necessary to suspend operations until June 28th while preparations were made to stockpile concentrates. The plant continued on a two-shift per day basis until the end of September, when exhaustion of the crude ore stockpile made it necessary to curtail to one shift per day treating ore as hoisted. Due to cold weather, washing was discontinued for the season on November 9th.

During the season this plant operated 188 shifts, treating 119,365 tons of crude ore and producing 78,665 tons of concentrates, for an average weight recovery of 65.9%. An average feed of 79.4 TPH was maintained, with a resulting product of 52.3 TPH of concentrates.

8. BENEFICIATION:
(Continued)

In general the plant worked satisfactorily, but it soon became apparent that more screening area was necessary and the single deck Symons screen was replaced by a double deck Robbins screen. This improved operations considerably, but trouble continued to be experienced with the wet, sticky ore in the chutes.

Mill samples indicated that considerable fine iron was being lost in the tailings and to rectify this a 22 ft. diameter Dorr bowl classifier will be installed to replace the Akins for 1951 season. This should increase the recovery without materially lowering the grade of concentrates.

The following represents the plant product distribution for the Sargent Mine:

	<u>Tonnage</u>	<u>% Tonnage Mined</u>	<u>% Iron Mined</u>	<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
Crude Ore Through plant	119,365	100.00	53.05		
Total Concts.	78,665	65.90	57.05	65.90	70.87
Total Fine Tailings	40,700	34.10	45.32		

9. COST OF OPERATION:

a. Comparative Cost Statement:

<u>Product</u>	<u>1950 Budget</u>	<u>1950 Cost Per Ton</u>	<u>1949 Cost Per Ton</u>
Direct Ore	132,816	140,644	315,341
Crude Ore	131,711	152,134	-
Total Direct & Crude	264,527	292,778	315,341
Concentrates	95,000	78,665	-
Total Concts. & Direct	227,816	219,309	315,341
<u>Underground Costs</u>			
Structure Drilling	\$.040	\$.105	\$.002
Milling	.060	.041	.059
Stoping	.705	.887	.710
Timbering	.410	.442	.408
Tramming	.160	.181	.160
Ventilation	.002	.008	.003
Pumping	.050	.062	.049
Compressor & Air Pipes	.030	.035	.030
Underground Superintendence	.050	.059	.047
Flood	.005	.009	.007
Maintenance: Compressor & Drill.	.004	.006	.004
" Scraper & Mech. Loaders	.077	.051	.078
" Tramming Equipment	.040	.041	.036
" Pumping Machinery	.006	.017	.008
Total Underground Costs	\$1.639	\$1.944	\$1.601
<u>Surface Costs:</u>			
Hoisting	.035	.038	.036
Stocking Ore	.047	.039	.024
Dry House	.030	.038	.033
General Surface Expense	.020	.036	.025
Maint: Hoisting Equipment	.003	.006	.004
Shaft	.005	.005	.006
Top Tram Equipment	.006	.003	.006
Docks, Trestles & Pocket	.000	.000	.000
Mine Buildings	.004	.002	.005
Total Surface Costs	\$.212	\$.167	\$.139

9. COST OF OPERATION:

a. Comparative Cost Statement: (Continued)

General Mine Expense:

Geological	.005	.001	.004
Mining Engineering	.020	.022	.018
Mech. & Electr. Engineering	.010	.010	.009
Analysis & Grading	.021	.020	.019
Safety Department	.008	.012	.007
Telephone & Safety Devices	.007	.010	.006
Special Expense	.002	.005	.002
Ishpeming Office	.003	.006	.003
Mine Office	.072	.082	.064
Insurance	.020	.023	.020
Personal Injury	.036	.040	.030
Social Security Tax	.021	.035	.019
Employees Vacation Pay	.037	.037	.033
Hibbing Office	.037	.035	.033
Additional Wage Adjustment	-	.006	-
Total General Mine Expense	\$.299	\$.344	\$.267
Cost of Production	\$2.150	\$2.455	\$2.007
Deferred Wash Ore	-	3.634	-
Net Total Cost	-	2.049	-
Concentrating Cost	.150	.256	-
Cost of Production-Merch.Ore	...	\$2.827	\$2.007

The cost of production for 1950 was \$0.217 higher than the budget and \$0.820 higher than 1949 cost.

These increases were spread proportionately throughout the various items under the captions "Underground Costs", "Surface Costs" and "General Mine Expense".

The unprecedented amount of water during the spring breakup, together with several "flash floods" later in the year, kept the ground and old caves saturated with water almost the entire summer. Due to danger of mud runs from these conditions it was necessary to suspend four working places and open up safe areas for operations. During April and May five out of the thirteen gangs were engaged in repairing and propping the long timbered drifts in this property. The loss in production and extra expenditures for repair and mud cleanup due to these conditions resulted in the higher cost.

This increase was reflected also in the "Cost of Production - Merchantable Ore", which was \$0.217 higher than the budget.

10. MAINTENANCE & REPAIR:

A continuous program of maintenance and repair was carried on throughout the year as the need arose.

11. EXPLORATION & FUTURE EXPLORATION:

A program of structure drilling from underground below the main level in the West end of mine by E. J. Longyear Company was continued from 1949. A total of 852 feet in 7 holes were drilled and the program completed in May. The results of this drilling were very disappointing as no additional merchantable grade of ore was found.

On June 13th the same company started structure drilling on

11. EXPLORATION & FUTURE EXPLORATION:

NW-SE and NE-SE, 23,57-22 to further check outlines of an open pit ore area on the North side of the Sargent property. This drilling was temporarily suspended November 15 after 1,688 feet were drilled in 9 holes during 1950. To date this drilling indicates some increase in tonnage in this area, but the ore is of wash structure instead of direct ore as shown in the old drilling.

12. TAXES:

a. Statement of Taxes:

	<u>1950</u>	<u>1949</u>	<u>Increase</u>	<u>Decrease</u>
Sargent Mine	\$33,427.76	\$42,308.54		\$8,880.78
Auxiliary Lands	56.74	61.48		4.74
Personal Property	<u>3,363.78</u>	<u>1,074.93</u>	<u>\$2,288.85</u>	
Total	\$36,848.28	\$43,444.95	-	\$6,596.67
Average Tax Rate.	213.39	213.49		.10

Re-classification of U.G. ore from U.G. Merch @ \$.15 per ton and U.G. Concentrates class at \$.02 per ton gave reduction in ad valorem taxes.

Personal property taxes increased on account of direct ore stockpile on hand May 1st of 12,083 tons. In 1949 all ore was shipped prior to May 1st.

13. ACCIDENTS & PERSONAL INJURY:

There were 101 slight accidents at the Sargent Mine, and 16 compensable accidents, one of these being fatal. Described below are the compensable accidents:

- (1) Name: Matt Sikich
Date of Injury: April 3, 1950
Cause: Mr. Sikich was in the act of picking dirt when a chunk fell from the back, striking him on his right foot.
Nature of Injury: Fractured right foot.
Time Lost: 22 days
Compensation: \$120.00
- (2) Name: Matt Sikich
Date of Injury: August 4, 1950
Cause: Miners were told to breast off slice as it had caved down. Apparently Sikich wished to get some more dirt out so he proceeded to put in a pole for pulling, against Shift Boss's orders. While picking the dirt down for a pole, a chunk rolled down and struck him on his left leg above his ankle.
Nature of Injury: Fractured lower left leg.
Time Lost: 36 days
Compensation: \$252.13
- (3) Name: Henry Johnson
Date of Injury: March 30, 1950
Cause: Mr. Johnson was loading car couplings onto a truck when he felt a pain in his right side.
Nature of Injury: Hernia - right side.
Time Lost: 28 days.
Compensation: \$140.00

13. ACCIDENTS &
PERSONAL INJURY:
(Continued)

- (4) Name: Matt Briske
Date of Injury: April 13, 1950
Cause: Mr. Briske was hitting a sprag with an axe. The axe glanced off a prop and struck him on his left thumb.
Nature of Injury: Fractured left thumb.
Time Lost: 14 days.
Compensation: \$40.00
- (5) Waino Lind:
Date of Injury: May 5, 1950
Cause: Lind had finished drilling top holes. He was moving down from stage plank to drill the bottom holes when he dropped the jack hammer on his left foot.
Nature of Injury: Fractured left foot.
Time Lost: 7 days
Compensation: \$10.00
- (6) Peter Bjellos
Date of Injury: May 11, 1950
Cause: Mr. Bjellos was helping miners to lift a 9 ft. cap timber and was standing alongside of raise. He slipped and fell into the raise, which was approximately 26 ft. to bottom. No grizzly over raise as miners were hoisting the timbers.
Nature of Injury: Fractured ribs
Time Lost: 39 days
Compensation: \$195.00
- (7) Name: Wallace Strom
Date of Injury: May 23, 1950
Cause: Mr. Strom was helping load rails and had a rail up onto the main level track. He had his right foot on the rail and the haulage motor, which apparently did not have the brakes set tight, moved, catching Strom's right foot between loose rail and frame of motor.
Nature of Injury: Bruised right foot.
Time Lost: 19 days
Compensation: \$65.00
- (8) Name: Frank Rebrovich
Date of Injury: May 25, 1950
Cause: Mr. Rebrovich was helping to load a 5 ft. scraper onto a timber truck, when he felt a pain in his lower right side.
Nature of Injury: Hernia - right side.
Time Lost: 33 days
Compensation: \$165.00
- (9) Name: Alfred Nelson
Date of Injury: June 10, 1950
Cause: Mr. Nelson was in the act of picking up a loose chain which was used to pull a rail with. His partner was holding the rail up with a bar. The bar slipped and the rail dropped onto his right foot.
Nature of Injury: Fractured small toe - right foot.
Time Lost: 7 days.
Compensation: \$5.00

13. ACCIDENTS &
PERSONAL INJURY:
 (Continued)

- (10) Name: Alex Hulti
Date of Injury: Sept. 16, 1950
Cause: Mr. Hulti was loading 12 ft. posts onto a Lull Loader. While in the act of loading the posts, one post slipped and fell on his right foot.
Nature of Injury: Severe bruise right foot.
Time Lost: 18 days
Compensation: \$60.00
- (11) Name: Nick Samarzea
Date of Injury: October 24, 1950
Cause: Mr. Samarzea was getting timber ready to pull into place. He had the posts and cap placed in a pile and was putting the cable around the pile when the cap rolled off the pile, striking him on his left foot.
Nature of Injury: Bruise left big toe
Time Lost: 16 days
Compensation: \$181.88
- (12) Name: Joe Verzich
Date of Injury: November 7, 1950
Cause: Mr. Verzich was in the act of lifting a piece of timber onto a timber truck when he felt a sharp pain in his back.
Nature of Injury: Mid-back sore and tender
Time lost: 12 days.
Compensation: \$45.00
- (13) Name: Jack Puska
Date of Injury: November 24, 1950
Cause: Mr. Puska was in the act of picking down dirt from a pile, when a chunk rolled down and hit him on his right foot.
Nature of Injury: Fractured 3rd and 4th toes.
Time Lost: 19 days.
Compensation: \$65.00
- (14) Name: Stephen Lucas
Date of Accident: December 21, 1950
Cause: Mr. Stephen Lucas and Mr. Matt Sametz, both shift bosses, were going to inspect the runners in the shaft as the skip had been sticking at times. They were both on the skip and the signal had been given to the hoisting engineer to lower the skip. The engineer raised the skip up first, which is the regular practice in the winter, before lowering it. Mr. Sametz, for some unknown reason, jumped off the skip, landing on the ground at the collar of the shaft. After Mr. Sametz hit the ground he jumped up and stopped the skip with the signal bell. Mr. Lucas could not be seen, and later was found in the bottom of the shaft.
Nature of Injury: Fatal
- (15) Name: Matt Sametz
Date of Injury: December 21, 1950
Cause: Mr. Matt Sametz and Mr. Stephen Lucas, both shift bosses, were going to inspect the runners in the shaft, as the skip had been sticking at times. They were both on the skip and the signal had been given to the hoisting engineer to lower the skip. The engineer raised the skip up first, which is the regular practice in the winter, before lowering it. Mr. Sametz, thinking the skip was going to be pulled to the top of the shaft, jumped, caught his foot in the safety chain and fell to the ground, landing on his face. He then jumped up and rang the signal to stop the skip and called for help. He was helped to dry house by Arnold Carlson and Lewis Milanovich.

13. ACCIDENTS & PERSONAL INJURY:
(Continued)

Nature of Injury: Head injuries, laceration of face and internal injuries.

Time Lost: 8 days

Compensation: None during 1950.

(16) Name: Peter Lubine

Date of Injury: March 24, 1950

Cause: Mr. Lubina was picking dirt, when a piece of lagging fell from the back, striking him on his left thigh. Lubina then started out of the place, and in doing so stumbled and felt a pain in his right side.

Nature of Injury: Injury to spermatic cord right side.

Time Lost: 6 days

Compensation: \$30.00

14. PROPOSED NEW CONSTRUCTION:

There is no new construction contemplated.

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT:

The following new equipment was received in 1950:

- 1 - Aerodyne Midget Blower
- 1 - Joy Carpuller
- 1 - Ingersoll-Rand RB-12 Jackhammer

Proposed new equipment:

- 2 - 15 H.P. double drum scraper hoists

WANLESS MINE
ANNUAL REPORT
YEAR 1950

1. GENERAL:

The operations for the year consisted of stripping with some ore production by selective mining from the lean ore areas. Stripping was done the first 9 days of January, followed by an operation shut-down for equipment repairs. Actual stripping operations were not resumed until May 11th, due to the late spring break-up. Pit operations on either stripping or ore production continued until the end of the year.

Certain areas in the pit assumed to be ore from the drill records, proved to be lean ore. A total of 171,122 tons of ore too high in silica to be absorbed in shipments due to lateness of production were stockpiled and will be available for future shipment.

2. PRODUCTION,
SHIPMENTS,
& INVENTORIES:

a. Production:

Wanless -----	59,486 tons
Woodbridge -----	<u>5,848 "</u>
Total -----	65,334 "

b. Shipments:

Wanless N.B. Direct -----	36,845 tons
Woodbridge N.B. Direct -----	<u>2,934 "</u>
Total -----	39,779 tons

c. Stockpile Inventories

Wanless N.B. Direct -----	22,641 tons
Woodbridge N.B. Direct -----	<u>2,914 "</u>
Total -----	25,555

d. Production by Months:

<u>Months</u>	<u>Wanless</u>	<u>Woodbridge</u>	<u>Total</u>
July	12,100		12,100
August	4,686	262	4,948
September	26,873		26,873
October	10,388	4,428	14,816
November	<u>5,439</u>	<u>1,159</u>	<u>6,597</u>
Total	59,486	5,848	65,334

f. Ore Statement:

Since this was the first year of ore operation, there was no stockpile balance at the start of the year. The balance at the end of 1950 amounted to 25,555 tons.

3. ANALYSIS:

b. Tonnage & Analysis - Production:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Nat.</u>
Wanless N.B. Direct	59,486	48.79	.086	13.48	.86	8.55	21.14	38.48
Woodbridge N.B. Direct	<u>5,848</u>	<u>44.88</u>	<u>.090</u>	<u>15.42</u>	<u>1.00</u>	<u>10.32</u>	<u>21.91</u>	<u>35.05</u>
Total . . .	65,334	48.44	.087	13.66	.88	8.71	21.21	38.17

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3. ANALYSIS:(Continued) c. Tonnage & Analysis - Shipments

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Moist.</u>	<u>Iron Nat.</u>
Wanless N.B.								
Direct	36,845	48.52	.086	12.70	.86	8.55	21.14	38.26
Woodbridge N.B.								
Direct	<u>2,934</u>	<u>45.24</u>	<u>.090</u>	<u>15.21</u>	<u>1.00</u>	<u>10.01</u>	<u>21.91</u>	<u>35.33</u>
Total . .	39,779	48.28	.087	12.89	.87	8.66	21.20	38.04

d. Tonnage & Analysis of Ore in Stockpile:

Wanless N.B.					
Direct	22,641	49.23		14.75	8.55
Woodbridge N.B.					
Direct	<u>2,914</u>	<u>44.52</u>		<u>15.64</u>	<u>10.63</u>
Total . .	25,555	48.69		14.85	8.79

e. Complete Analysis of Shipments:

	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mn.</u>	<u>Alu.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>
Wanless	48.52	.086	12.70	.86	8.55	.05	.07	.010	7.81
Woodbridge	<u>45.24</u>	<u>.090</u>	<u>15.21</u>	<u>1.00</u>	<u>10.01</u>	<u>.08</u>	<u>.11</u>	<u>.012</u>	<u>8.25</u>
Total . .	48.28	.087	12.89	.87	8.66	.05	.07	.010	7.84

4. ESTIMATE OF ORE RESERVES:a. Factors:

	<u>Cu. Ft.</u>	<u>Rock</u>	<u>%</u>
	<u>Per Ton</u>	<u>Deduction</u>	<u>Recovery</u>
No. 1 Ore	14	0	100.00
No. 2 Ore	14	0	100.00

b. Reserves as of 12-31-50:

	<u>Reserve</u>	<u>Mined</u>	<u>Bal. After</u>	<u>Chngd. By</u>	<u>Reserve</u>
	<u>12-31-49</u>	<u>1950</u>	<u>Mining</u>	<u>Re-Estimate</u>	<u>12-31-50</u>
Woodbridge	421,714	5,848	415,866	-35,752	380,114
Wanless O.P.	1,251,874	59,486	1,192,388	4282,812	1,475,200
" U.G.	-	-	-	91,772	91,772
Total	<u>1,251,874</u>	<u>59,486</u>	<u>1,192,388</u>	<u>374,584</u>	<u>1,566,972</u>
Grand Total	1,673,588	65,334	1,608,254	338,832	1,947,086

c. Estimated Analyses of Ore Reserves:

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>
Woodbridge						
No. 1 Ore	249,257	55.40	.096	7.02	1.24	2.28
No. 2 Ore	<u>130,857</u>	<u>48.78</u>	<u>.106</u>	<u>10.88</u>	<u>2.34</u>	<u>6.10</u>
Total	380,114	53.12	.099	8.35	1.62	3.60

(Continued on next page-

4. ESTIMATE OF ORE RESERVES:
(Continued)

c. Estimated Analyses of Ore Reserves: (Continued)

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alu.</u>
<u>Wanless:</u>						
O.P. No. 1 Ore	1,033,943	54.92	.119	7.33	1.61	3.41
No. 2 Ore	441,257	48.46	.100	12.85	1.31	7.65
U.G. No. 1 Ore	38,743	54.50	.151	8.22	.90	2.65
No. 2 Ore	53,029	50.05	.092	13.03	1.78	3.81
Total	1,566,972	52.93	.114	9.10	1.51	4.60
Total No. 1 Ore	1,321,943	55.00	.116	7.30	1.52	3.17
Total No. 2 Ore	625,143	48.66	.101	12.45	1.57	7.00
Grand Total	1,947,086	52.96	.111	8.95	1.54	4.40

5. LABOR & WAGES:

a. Comments:

During spring and summer an adequate supply of labor was available, however during the fall it was necessary to solicit labor through the State Employment Service and employ others from the immediate outside area. This was the result of the draft call causing many seasoned employees to enlist and the required stepped-up schedule to effect continuous operations in the cold weather. The result was much absenteeism and a big labor turnover with consequent less efficient operation.

b. Comparative Statement of Production & Wages:

Production:

Direct Ore ----- 65,334 tons
 Number of Days Operated ----- 38 days
 Average Number of men working ----- 51
 Average Wages per man ----- \$13.72
 Production per man per day ----- 46.62
 Labor Cost per Man per ton ----- \$.294
 Total number of man days ----- 1,401 days
 Amount paid for labor ----- \$19,232.39

6. GENERAL SURFACE:

a. Buildings & Repairs:

Erection of the truck unloading pocket, screening & crushing plant, conveyor system and car loading bin commenced in June, but due to slow delivery of material this was not completed until August 21st.

b. Transmission Lines & Roads:

The 2300 volt line was extended to the pit edge in December to service the 85B electric shovel.

7. OPEN PIT:

a. Stripping:

The 1949 stripping program continued into January and until January 9th, at which time a tieup was necessary to effect repairs of the two diesel shovels. Major equipment repairs were also made during this shutdown period. Stripping was resumed on a two-shift per day, 5-day per week basis on May 11th, and in June stepped up to a 3-shift, 5-day per week basis. The late spring break-up did not permit an earlier start.

Through the end of October the stripping cost was \$.384 per cu. yd., compared to the estimated budget of \$.365, an average of 1453 cu. yds. being stripped per shift. This normally would have completed the stripping for the year; however, the scheduled ore for 1950 was not ore but lean ore, and to uncover ore for 1951

7. OPEN PIT:

(Continued)

A. Stripping (Continued)

it was necessary to continue stripping through December. The result was high costs in November and December. In November the 111M Marion shovel failed and was taken out of the pit, however the Canisteo 85B to replace it had not been yet completely erected. In December the 54B spare shovel had a breakdown before the 85B was erected; consequently the resultant average cost for the year was \$.455 per cu. yd., compared to the estimated budget of \$.379. The Marion shovel, which was to be the heart of the operation, was available only 50% of the operating time during the summer season due to breakdowns, necessitating operating with the smaller shovel the remainder of the time, resulting in low yardage but high shovel maintenance. This property, furthermore, is deficient in tractors and is operating without sufficient shop space for winter operation.

Actual stripping conditions were much different than those scheduled. It was necessary to go through lean ore 50 feet deeper than anticipated to reach ore, as well as the final decision to reduce stripping along the East limit, all of which increased costs. This lowered stripping efficiency, since it was necessary to strip selectively with shallow and narrow cuts.

During the year, 614,283 cu. yds. was stripped on E&A's #CC-337, CC#377 and CC#412.

b. Open Pit Mining:

Nearly all material scheduled as ore was below grade except such tonnage as could be selected in the lean ore horizons. In an effort to obtain ore production and meet the schedule, a narrow area with steep haulage road was opened on the East limit of the property and ore was uncovered. This being late in October and the ore being low iron and high in moisture, only a limited amount could be absorbed, and 65,334 tons of ore was produced compared to the budget of 150,000 tons. Much sub-grade material has, however, been placed in separate stockpiles with the aim of absorbing some tonnage each year during the life of the mine.

c. Pumping & Drainage:

During the winter shutdown period, operating on ice, several 6 inch holes were drilled with churn drills and cased to various underground drifts. These holes effected drainage of the Wanless cave area and the artificial Woodbridge lake to the North. However, during the spring break-up, water from floods to the North commenced entering the pit due to a caved-in timbered railroad culvert on the West. This condition was remedied by trenching through the railroad fill, thus again controlling the flood waters. The pit was effectively drained by the Wanless and Woodbridge shaft pumps and the water controlled during the remainder of the season.

Water from the East has been curtailed by drilling into and blasting drifts from the Dean Mine. Similar caving of the drifts from the Margaret Mine to the West will be done. The Wanless shaft, which is aimed for control of the water, is caving below elevation 750 and it may be necessary to use sump pumps to effect dewatering below this elevation.

8. BENEFICIATION:

NONE

9. MAINTENANCE & REPAIRS:

During the shutdown period from January 9th to May 11th, general overhauling and repairs to equipment were made. Both the Marion and Lima shovels had major overhaul jobs and many factory defects on both machines were remedied. On the bottom dump trucks both engine and chassis were put into A-1 condition; however as end dump trucks were required, these were exchanged for end dump trucks, many of which had not been put into proper shape. Therefore, excessive repair was required and increased the number of delays during operating season.

10. COST OF OPERATIONS:

Mining Cost Statement:

	1950 COST PER TON
<u>Direct Ore:</u>	65,334 tons
Drilling & Blasting	\$.009
Power Shovels, Operating	.056
Power Shovels, Maintenance	.065
Trucks, Operating	.195
Trucks, Maintenance	.068
Tractors, Operating	.028
Tractors, Maintenance	.071
Crushing & Screening	.037
Conveyors, Operating	.051
Pit Roads & Ramps	.050
Pumping & Drainage	.679
General Open Pit Expense	.024
Open Pit Superintendents	.063
Structure & Sample Drilling	.254
Loading Stockpile Ore	.001
Total Direct Ore	\$1.651

<u>General Mine Expense</u>	
Mining Engineering	\$.055
Mech. & Electrical Engineering	.033
Analysis & Grading	.039
Safety Department	.014
Personnel	.005
Special Expense	.026
Ishpeming Office	.004
District Office	.022
Mine Office	.093
Insurance-Property, Etc.	.074
Personal Injury	.010
Social Security Taxes	.052
Geological & Metallurgical	.006
Employees Vacation Pay	.031
Additional Wage Adjustment Estimate	.015
Total General Mine	\$.479

COST OF PRODUCTION\$2.130

10. COST OF OPERATIONS:
(Continued)

The high winter & idle charged to the low tonnage produced as compared to the budget, the exploration drilling charged to ore and not anticipated, plus high pumping and other fixed charges against this low tonnage make the costs out of balance and any comparison practically valueless.

11. EXPLORATION & FUTURE EXPLORATION:

Exploration drilling was done to the extent of 13 holes and 2273 feet were drilled in 1950. In 1951, 4 exploration holes are scheduled to be drilled, totaling 880 feet.

12. TAXES:

The following is a statement of taxes at the Wanless Mine for the years 1950 and 1949:

	<u>1950</u>	<u>1949</u>	<u>Increased</u>	<u>Decreased</u>
Wanless Mine	\$16,919.72	\$15,464.86	\$1,454.86	
Personal Property	<u>2,514.24</u>	<u>2,857.78</u>		<u>\$343.54</u>
Total	\$19,433.96	\$18,322.64	\$1,111.32	
Average Tax Rate	79.62	91.23		11.61

An increase in reserve tonnage of 94,526 tons, plus a flat 10% increase by State on per ton value increased ad valorem taxes.

Personal property tax decreased on account of mill rate.

13. ACCIDENTS & PERSONAL INJURY:

There were 23 slight accidents at the Wanless Mine during 1950 and no compensable accidents.

14. PROPOSED NEW CONSTRUCTION:

In 1951 it is proposed to make some extension to the small mine shop to serve as a welding room. Adjacent to this extension there will also be a change and lunch room for the shop men.

14. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT:

During the year the following equipment was received and put into service:

- 1 - second hand 3¼ cu. yd. Bucyrus Erie 85B shovel

Purchase of additional equipment for 1951 is not anticipated.

Safety Department

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Year 1950

11. ACCIDENTS
AND
PERSONAL
INJURY

a. Fatal Accidents

The fatality rate for the Year of 1950 is 1.15 and is based on per thousand employees. There were five fatal accidents during the year; two of them occurred on the Mesaba Range and three on the Marquette Range. Total number of employees was 4,344.

The fatality rate for the five-year period of 1946 to 1950, inclusive, is .83, which is the best in the history of the company.

Three of the fatal injuries were from falls of ground. Two of these injuries occurred where timber was not used because it was thought the ground was strong enough to support itself. The other occurred where timber was used in the slice, but forepoles were not used to support the ground ahead of the timber. This indicates that ground should be supported at all times in all mines except the hard-ore mines of the Cliffs Shaft and Spies-Virgil; exception being made for drifts, raises, etc. in solid rock.

A brief summary of fatal accidents for the past year follows:

CAMBRIA-JACKSON MINE - NESTOR BLOMQUIST, MINER

Blomquist was instantly killed by a fall of ground in a small scam stope at 10:00 A.M., January 13th, 1950.

Blomquist and his partner, Anderson, were trimming loose ground in Number 21 Stope. Anderson was out on the bench, trimming towards the stope entrance when Blomquist noticed some loose chunks in the brow over the stope entrance. He told Anderson to wait while he took down the chunks. Blomquist used a pick and while in a crouched position, started to pry out the chunk, which in turn loosened a chunk of ore directly over his head. This chunk struck Blomquist and caused the fatal injury. Most of the ore in the stope was soft and grey and a seam of hard blue ore ran directly across the back of the stope. The mixture of the two is nearly always an indication of treacherous ground, but apparently these men did not recognize that fact.

Future mining of this type will be done from under timber, using long hole drilling. This ruling was agreed upon by the members of the Central Safety Committee.

HAWKINS MINE - VICTOR STERBENC

Sterbenc and his partner, Francis Belanger, servicemen in the Hawkins Garage, had to repair a tire for a heavy-duty Euclid truck and in so doing, had apparently followed the accepted safe procedure. After inflating the tire to 65 pounds the men spent about 20 minutes for lunch. The tire was placed on the hub, after which Belanger went to work on another tire. He had just turned away from Sterbenc when the tire blew out; the lock rim struck Sterbenc, causing a skull fracture and injuries to the face.

Investigation did not show the exact cause of the accident but it is believed that the lock rim was not seated properly or there was dirt in the gutter into which the lock rim must set securely.

The hazards in connection with this work have been known for a long time and many precautions are taken, but now the tires will be inflated only to 15 or 20 pounds, placed on the wheel or hub, the lug bolts tightened and then the tire inflated to the required high pressure.

Safety Department

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11. ACCIDENTS
AND
PERSONAL
INJURY

a. Fatal Accidents (Continued)

MAAS MINE - JACK O. HILL

This accident happened in a slice on the -50 sub-level, eight feet west of #6063 Raise, above the 6th Level, 6,000 Cross-cut in the Maas Mine. The accident occurred at about 9:00 P.M. on October 28th, 1950. The injuries received caused death a few minutes after the accident.

The miners, Jack Hill and Richard Toms, were making room for a set of timber. The ground on one side was firm but the other side was soft with water seeping through. No forepoles or headboards were used. A chunk of ore came out from the back, struck the dirt pile and rolled against Hill's legs, apparently knocking him down and as he fell forward, another chunk fell and struck him on the back, causing fatal injuries.

Forepoles, side support or other protection should always be used in ground of this type.

SARGENT MINE - STEPHEN LUCAS

This accident occurred at 12:00 Noon on December 21, 1950 when Lucas fell to the bottom of the shaft, a distance of 260 feet.

Lucas, Shift Boss, and Matt Sametz, Shift Boss, were to inspect the shaft from surface to the bottom to find the cause of noise in the shaft when the skip was being lowered or hoisted. They informed the hoist engineer of their intentions, walked to the collar of the shaft, signalled for the skip and then stopped it at the collar. Sametz gave the bell signal to lower the skip slowly and got on the skip with Lucas. Instead of the skip being lowered, it was hoisted. This excited Sametz, so he jumped from the skip when it was probably two feet above the collar of the shaft. His legs struck the safety chain in front of the shaft, causing him to fall on the sollar and against the wooden door to the outside of the headframe. He immediately jumped up, caught hold of the bell cord and rang a stop bell. The skip, in the meantime, had been lowered to 9 feet below the shaft sollar. Lucas was nowhere to be seen and was found later at the bottom of the shaft. He apparently became excited at the same time as Sametz and jumped from the skip immediately after Sametz, but instead of falling on the shaft sollar, he rolled into the shaft. After the lowering signal, the hoist engineer had raised the skip from six to eight feet and then started to lower. This is generally done in cold weather to make sure the skip is not frozen to the runners. It was not necessary at this particular time, but it is not unusual. Sametz had had a previous experience at a mine in Butte, Montana where the skip on which he was standing had been hoisted to the dump so this may have caused his excitement.

These men should have had a third man to ring bell signals for them. They should have had a platform hung in the skip to stand on and should have worn their safety belts.

Safety Department

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11. ACCIDENTS
AND
PERSONAL
INJURY

a. Fatal Accidents (Continued)

MATHER MINE, "B" SHAFT - WALLACE HEWETT

Hewett was struck by a fall of ground in Number 15 Raise, which was an exploration raise above the -700' Transfer Sub. The raise, which was untimbered, had been completed to the -625' Sub-level and a drift connection made to the east to #13 Raise.

At about 3:00 P.M. on December 12, 1950, the miners were about to lower a drill machine to a lower sub where they were to drill an eye-pin hole near #13 Raise. Hewett climbed about 10 feet below the stage in the raise and started to untangle the air and water hoses of the machine. His partner, Luoma, who was on the stage, was about to pick up the drill machine when he felt a jar and saw a large chunk fall directly on Hewett, knocking him down the raise. Hewett had fallen to the next sub and no doubt, was killed instantly.

Investigation showed that water had seeped into a crevice behind the chunk and probably loosened it. The raise had been trimmed a short time before.

It is the opinion of the committee that variable ground of this kind should have some support.