

29,445 tons of crude wash ore mined from a thin cretaceous layer on the north side of the Hill-Walker lease produced 16,556 tons of wash concentrates.

Rock too large to pass through the screening plant was sorted and loaded out at the shovel during mining operations and amounted to 122,365 tons which, combined with 20,633 tons of sand and waste cleanup, produced a total of 142,998 tons of waste material removed during the operating season.

The 2-inch scalping in the pit and the lower recovery ores will necessitate more trucks operating per shift than in the past.

c. Pumping & Drainage

Main pit pumping was carried on during the season from the Trumbull pit bottom. The Oliver Iron Mining Division continued pumping from the Gross-Marble pit throughout the ore season. Pumping in the Hill-Walker was carried on only during the time that mining was carried on in this lease.

d. General Pit Activity

Pit activity consisted of mining crude ore in the Gross-Marble, Hill, and Hill-Walker leases. Surface stripping was carried on in the Hill, Hill-Walker, Trumbull, and Potter leases.

8. BENEFICIATION

a. Washing Plant

The washing plant started operations on April 25, 1960, on a 3-shift, 6-day schedule and continued on this schedule until June 18. The schedule was then reduced to 3-shifts, 5-days per week, and on July 3 was further reduced to 2-shifts, 5-days per week. Operations were suspended October 7, 1960, with 587,213 tons of concentrates produced.

The washing plant operated 306 shifts, treating 25,420 tons of crude wash and 1,699,259 tons of crude retreat ore for a total of 1,724,679 tons. The plant produced 16,556 tons of wash concentrates at an average recovery of 65.13 per cent and 880,766 tons of heavy-media feed at an average recovery of 51.83 per cent.

The $\frac{1}{2}$ " scalped material was 4.53 per cent of the total retreat crude and was considerably less than the 1959 season due to the $\frac{1}{2}$ " scalping screen in the pit screening plant. Most of the 2-inch scalp rock was discarded in the pit during the 1960 season.

The rate of net crude to the wash plant averaged 768.14 tons an hour, down from the 1959 rate of 910.09 because of handling of rockier material, insufficient trucks, and 2-inch scalping in the pit screening plant.

Delay time for out-of-ore was considerably higher than in 1959 because of mining rockier crude, scalping the $\frac{1}{2}$ "-4" material in the pit instead of at the plant, and operating insufficient trucks on the ore haul while scalping 2-inch material in the pit. The heavy-media and cyclone plant feed rates were higher than 1959 even though the wash plant feed rate was lower and delay time was higher than in 1959.

A summary of delay time at the wash plant follows:

<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of 24.80.00 Working Hours</u>
Out of Ore	210.50	89.66	8.50
5' x 14' Primary Screens	3.00	1.28	0.12
66" Classifiers	1.50	0.64	0.06
Miscellaneous Chutes & Launderers	1.00	0.43	0.04
Scalp Rock Pocket Full	0.50	0.21	0.02
Heavy-Media Surge Pile Full	5.00	2.13	0.20
Cyclone Feed Bins Full	5.00	2.13	0.20
Concentrate Stacker	3.75	1.60	0.15
Tailings Line	1.50	0.64	0.06
Electric Power	3.00	1.28	0.12
	<u>234.75</u>	<u>100.00</u>	<u>9.47</u>
<u>Recapitulation</u>			
Crude Ore to Head of Mill	210.50	89.66	8.50
Ore Processing Delays	<u>24.25</u>	<u>10.34</u>	<u>0.97</u>
	<u>234.75</u>	<u>100.00</u>	<u>9.47</u>

b. Heavy-Media Plant

The heavy-media plant was started up on April 25, 1960, and operated on the same schedule as the wash plant. From 1,699,259 tons of retreat crude delivered to the plant, 570,657 tons of retreat concentrates were produced at an average recovery of 33.58 per cent. 398,886 tons of heavy-media concentrates were produced from 880,766 tons of heavy-media feed for an average recovery of 45.29 per cent.

55 per cent of the total concentrates were shipped as a split product during the 1960 operating season. Actual grade of the concentrates produced exceeded the estimated grade with plant concentrates averaging 54 per cent iron natural.

A change in feed rates to the various plants was noted. A decrease in crude consumption of 15.60 per cent was accompanied by an increase of 11.74 per cent in consumption of heavy-media feed and an increase of 5.57 per cent in consumption of cyclone feed over the 1959 feed rates. Ferrosilicon losses compared favorably with 1959.

A summary of delay time follows:

<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of 2456.42 Working Hours</u>
Out of Ore	213.00	93.33	8.68
Surge Pile Feeder	1.00	0.43	0.04
Heavy-Media Reject Pocket Full	0.50	0.22	0.02
Concentrate Stacker	3.75	1.64	0.15
Magnetic Separators	5.00	2.19	0.20
DC Generator Set	<u>5.00</u>	<u>2.19</u>	<u>0.20</u>
	228.25	100.00	9.29
<u>Recapitulation</u>			
Crude Ore to Head of Mill	213.00	93.33	8.68
Ore Processing Delays	<u>15.25</u>	<u>6.67</u>	<u>0.61</u>
	228.25	100.00	9.29

Concentrating data for the Heavy-Media plant follows:

Walker-Hill Wash Ore	Tons	Per Cent Weight		Per Cent			Iron Units
		Plant	Pit	Iron	Phos	Silica	
Crude to Plant	25,420	100.00	86.33	47.88		26.53	100.00
Screen Plant Rock	4,025		13.67	29.70		52.60	
Pit Crude	29,445		100.00	45.39		30.09	
Total Concentrates Produced	16,556	65.13	56.23	58.06	.042	12.31	78.97
Unsize Concentrates Produced	16,556	65.13	56.23	58.06	.042	12.31	
Total Concentrates Produced & Shipped	16,556	65.13	56.23	58.06	.042	12.31	78.97
Total Fine Tailings (by difference)	8,864	34.87	30.10	28.87		53.09	

Gross-Marble Retreat

Crude to Plant	287,234	100.00	68.57	37.38		42.23	
Pit Rock	4,260		1.02	21.39		64.57	
Screen Plant Rock	127,425		30.41	22.57		63.41	
Pit Crude	418,919		100.00	32.71		48.90	
Total Concentrates Produced	103,446	36.01	24.69	57.41	.039	12.13	55.30
Unsize Concentrates Produced	40,221	14.00	9.60	57.57	.039	11.77	
Coarse Concentrates Produced	43,515	15.15	10.39	57.77	.040	11.17	
Fine Concentrates Produced	19,710	6.86	4.70	56.39	.037	14.88	
Total Concentrates Produced & Shipped	103,446	36.01	24.69	57.41	.039	12.13	55.30
Heavy-Media Concentrates	74,118	25.80	17.69	57.01		12.29	
Heavy-Media Rejects	70,967	24.71	16.94	22.38		65.09	
Heavy-Media Feed	145,085	50.51	34.63	39.89		38.08	
Cyclone Concentrates	30,967	10.78	7.39	56.54		14.51	
Cyclone Rejects	14,965	5.21	3.57	16.95		73.57	
Cyclone Feed	45,932	15.99	10.96	43.64		33.75	
2" Wash Plant Rejects	1,069	0.37	0.26	34.30		47.90	
Total Fine Tailings (by difference)	96,787	33.70	23.10	30.16		52.72	

Hill-Retreat

Crude to Plant	551,618	100.00	65.07	40.75		38.51	
Pit Rock	102,575		12.10	24.53		60.70	
Screen Plant Rock	193,575		22.83	26.02		58.50	
Pit Crude	847,768		100.00	35.42		45.75	
Total Concentrates Produced	193,510	35.08	22.83	59.10	.039	11.66	50.87
Unsize Concentrates Produced	76,070	13.79	8.97	59.18	.040	11.58	
Coarse Concentrates Produced	79,051	14.33	9.32	59.60	.039	10.72	

<u>Hill-Retreat (continued)</u>	Tons	Per Cent Weight		Per Cent			Iron Units
		Plants	Pit	Iron	Phos	Silica	
Fine Concentrates Produced	38,389	6.96	4.53	57.96	.038	13.73	
Total Concentrates Produced & Shipped	193,510	35.08	22.83	59.10	.039	11.66	50.87
Heavy-Media Concentrates	131,966	23.93	15.57	58.70		11.89	
Heavy-Media Rejects	120,776	21.89	14.25	27.18		58.21	
Heavy-Media Feed	252,742	45.82	29.82	43.64		34.02	
Cyclone Concentrates	64,856	11.76	7.65	57.58		14.17	
Cyclone Rejects	38,509	6.98	4.54	36.88		44.43	
Cyclone Feed	103,365	18.74	12.19	49.87		25.44	
1/2" Wash Plant Reject	48,530	8.80	5.72	27.99		55.64	
Total Fine Tailings (by difference)	150,293	27.25	17.73	33.14		50.20	

Walker-Hill Retreat

Crude to Plant	860,407	100.00	66.27	42.49		36.17	100.00
Pit Rock	15,145		1.17	25.58		59.60	
Screen Plant Rock	422,835		32.56	28.19		55.41	
Pit Crude	1,298,387		100.00	37.64		42.71	
Total Concentrates Produced	273,701	31.81	21.08	60.01	.048	9.93	44.93
Unsize Concentrates Produced	133,500	15.51	10.28	60.26	.048	9.60	
Coarse Concentrates Produced	90,824	10.56	7.00	60.01	.048	9.80	
Fine Concentrates Produced	49,377	5.74	3.80	59.35	.049	10.99	
Total Concentrates Produced & Shipped	273,701	31.81	21.08	60.01	.048	9.93	44.93
Heavy-Media Concentrates	192,802	22.41	14.85	59.70		10.29	
Heavy-Media Rejects	290,137	33.72	22.35	26.80		58.70	
Heavy-Media Feed	482,939	56.13	37.20	39.93		39.37	
Cyclone Concentrates	84,831	9.86	6.53	59.09		11.59	
Cyclone Rejects	66,207	7.69	5.10	36.16		44.92	
Cyclone Feed	151,038	17.55	11.63	49.04		26.20	
1/2" Wash Plant Rejects	27,357	3.18	2.11	27.55		56.84	
Total Fine Tailings (by difference)	203,005	23.60	15.63	45.36		33.71	

Total Retreat

Crude to Plant	1,699,259	100.00	66.25	41.06		37.95	
Pit Rock	121,980		4.76	24.55		60.70	
Screen Plant Rock	743,835		28.99	26.66		57.58	
Pit Crude	2,565,074		100.00	36.10		44.72	
Total Concentrates Produced	570,657	33.58	22.25	59.23	.043	10.91	48.47
Unsize Concentrates Produced	249,791	14.70	9.74	59.50	.044	10.55	
Coarse Concentrates Produced	213,390	12.56	8.32	59.40	.043	10.42	
Fine Concentrates Produced	107,476	6.32	4.19	58.31	.043	12.68	
Total Concts Produced & Shipped	570,657	33.58	22.25	59.23	.043	10.91	48.47

<u>Total Retreat (Continued)</u>	<u>Tons</u>	<u>Per Cent Weight</u>		<u>Per Cent</u>			
		<u>Plant</u>	<u>Pit</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Iron Units</u>
Heavy-Media Concentrates	398,886	23.47	15.55	58.87		11.19	
Heavy-Media Rejects	481,880	28.36	18.79	26.24		59.52	
Heavy-Media Feed	880,766	51.83	34.34	40.99		37.62	
Cyclone Concentrates	180,654	10.63	7.04	58.11		13.02	
Cyclone Rejects	119,681	7.04	4.67	33.99		48.35	
Cyclone Feed	300,335	17.67	11.71	48.50		27.10	
72" Wash Plant Rejects	76,956	4.53	3.00	27.92		55.96	
Total Fine Tailings (by difference)	450,085	26.49	17.54	38.01		43.30	

c. Cyclone Plant

The cyclone plant operated on the same schedule as the heavy-media and wash plants. An increase of 5.57 per cent in consumption of cyclone feed was made over 1959. The grade of concentrates from the cyclone plant is very close to that from the heavy-media plant.

Test work by the Metallurgical Department and the DSM screen installation at the Holman cyclone plant indicated changes should be made in the Hill plant. These changes were made prior to the 1960 operating season and included removing the Nordberg screens and replacing them with DSM and Aerovibe screens. As a result of these changes, improvement was seen in recovery, grade, and magnetite losses. A decided drop in magnetite consumption during 1960 was brought about because of the installation of a:

30" x 48" Jeffrey Indox unit in place of the existing
30" x 72" Dings Electro unit in a secondary sink separator
capacity, and

revised tank and feed box on the existing 30" x 72" Dings
Electro unit operating in a secondary float separator
capacity.

Over-all cyclone plant media losses dropped from approximately 12 pounds per ton of feed from July 1 to the end of the season. An E&A has been approved to remodel the Dings separators before the 1961 operation season. This E&A has been approved under E&A MC-381.

180,654 tons of cyclone plant concentrates were produced from 300,335 tons of feed for an average recovery of 60.15 per cent.

A summary of delay time follows:

<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of 2448.42 Working Hours</u>
Out of Ore	187.75	97.41	7.67
Plugged Cyclones (Wash Plant Spill)	5.00	2.59	0.20
	<u>192.75</u>	<u>100.00</u>	<u>7.87</u>

9. MAINTENANCE & REPAIRS

The winter repair program in progress at the start of the year was continued until the start of the 1960 ore season. Minor plant and equipment repairs were made as necessary throughout the ore season and were carried on in the plant on Saturdays and Sundays when the mine operated on a 3-shift schedule and on the third shift when the mine operated on a 2-shift schedule. All plants were cleaned out and repairs carried on after the close of the 1960 ore season until the end of the year. The repair program was speeded up to get as much of the necessary repair work done before the end of the year.

10. COST OF OPERATIONS

a. Comparative Cost

<u>Product</u>	1959 <u>Actual</u>	1960	
		<u>Budget</u>	<u>Actual</u>
Concentrates	291,948	580,000	587,213
Per Cent Gross Recovery	25.93	22.97	22.45
Per Cent Net Recovery	32.25	31.21	34.05
Average Shift Product	2,281		1,925
Average Daily Output	4,562		4,660
Tons per Man per Day	27.92		25.52
Shifts Operated	128		305
Days Operated	64		126

<u>Costs</u>	1959	1960	
	<u>Actual</u>	<u>Budget</u>	<u>Actual Cost</u>
Pit Operating	\$0.255	\$0.274	\$0.276
Beneficiation	0.323	0.276	0.300
Loading Stockpile	0.022	0.014	0.012
General Mine Expense	0.260	0.265	0.308
Winter & Idle	<u>0.243</u>	<u>0.560</u>	<u>0.740</u>
Cost of Production	<u>\$2.699</u>	<u>\$3.089</u>	<u>\$3.365</u>
<u>Depreciation</u>			
Plant & Equipment	0.127		0.163
Motorized Equipment	0.112		0.071
Movable Equipment	0.006		0.003
<u>Taxes</u>			
Ad Valorem	0.224		0.316
Occupational	0.147		0.242
Royalty	0.201		0.152
<u>Total Depreciation & Taxes</u>	<u>\$0.817</u>		<u>\$0.947</u>
Administrative Expense	0.100		0.100
Miscellaneous Expense & Income	0.016		0.010
Royalty	<u>1.761</u>		<u>1.538</u>
<u>Total Cost on Cars</u>	<u>\$5.393</u>		<u>\$5.960</u>

B. Detailed Cost Comparison

Pit Operating: \$0.002 over the budget and \$0.021 over 1959 costs. Items reflecting higher-than-budget costs are: purchase of shovel cable under R&M MC-10 for \$7600 or \$0.003 a ton of crude ore mined; a drop of .52 points in recovery from the estimate increased costs on a concentrate basis by \$0.036 a ton; 3.2 per cent more money was spent than estimated (excluding purchase of the shovel cable) for an increase of 3.6 per cent more material mined than estimated. Thus, the increase in money spent for pit operating was directly proportional to the increase in the material mined.

Beneficiation: \$0.024 over the budget and \$0.323 lower than 1959. Items contributing to higher costs were "Concentrating Maintenance-Buildings & Machinery" and "Electric Power." Only \$5420 or 1.06 per cent more money was spent on beneficiation than estimated, but 7.75

Beneficiation (continued)

per cent less tons of crude were treated than estimated. This being the first year for 2-inch scalping in the pit, less tonnage was treated than estimated because of no experience in evaluating the effect of 2-inch scalping in the pit. Actual cost of \$0.882 per ton of concentrates compares favorably with the estimated cost of \$0.883.

Miscellaneous Expense: \$0.014 over the budget. Personal injury expense, estimated at \$0.001 per ton of concentrates, was actually \$0.033 because of a fatality during the year which was not anticipated in the budget.

Total Pit & Beneficiation Plants: \$0.053 over the budget. Recovery was \$0.036 and personal injury expense \$0.032 for a total of \$0.068 per ton of concentrates over the budget.

General Mine Expense: \$0.043 over the budget and \$0.048 over 1959. Metallurgical & Geological, Hibbing Office, and Insurance Property, etc., raised costs over the budget, and test work to prove feasibility of 2-inch scalping in the pit to satisfy fee interests was not included in the estimate.

Winter & Idle: \$0.180 over the budget and \$0.497 over 1959. An anticipated poor year for 1961 made it necessary to speed up the repair program in 1960 and spend more money than estimated. This same situation was experienced in 1957 when it became known that 1958 would be a bad year.

Cost of Production: \$0.276 over the budget and \$0.666 over 1959. Cost of production would have been as estimated or lower except for reasons stated above and for an unusual amount of pit delays. It is expected that pit delays in 1961 will be reduced. Items raising costs were:

Pit Operating: Lower Recovery	\$0.036
Personal Injury-Fatality	0.032
General Mine Expense	0.043
Winter & Idle Expense	0.180
Per ton Concentrates	<u>\$0.291</u>

1960 costs do not include Cleveland office revisions.

11. EXPLORATION & FUTURE EXPLORATION

Three structure drill holes were put down in the Gross-Marble lease on the south side of the pit. Test work on two of the holes indicates good retreat ore, while the third hole looks unsatisfactory by visual observation with very little, if any, retreat ore. More drilling should be done in the near future on this lease.

Areas requiring exploratory drilling are:

<u>Lease</u>	<u>Area</u>
Gross-Marble	Bottom and South Side
Trumbull	North Bank
Hill	Bottom and North Bank
Potter	Western Half

12. TAXES

<u>Real Estate</u>	<u>1960</u>		<u>1959</u>		<u>Increase-Decrease</u>	
	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>
Mineral	\$606,989	\$123,224.84	\$202,809	\$ 52,841.88	404,180	70,382.96
Lands, Bldgs, Machinery	170,928	44,016.51	146,138	46,152.73	24,790	- 2,136.22
Accounts Receivable	33,526	6,806.13	28,995	7,554.66	4,531	- 748.53
<u>Personal Property</u>						
Equipment	93,128	18,940.84	111,188	28,970.03	- 18,060	- 10,029.19
Stockpile Concentrates	659	133.78	151	39.34	508	94.44
	<u>\$905,230</u>	<u>\$193,122.10</u>	<u>\$489,281</u>	<u>\$135,558.64</u>	415,949	57,563.46
<u>Average Mill Rate</u>		213.34		277.06	-	63.72

Note: Mineral valuation increased by present worth basis in 1960 making an average valuation per ton of \$.1974 compared to a fixed class rate per ton average of \$.0601 in 1959. Buildings took an across-the-board increase of 20 per cent in the villages of Marble, Calumet, and Greenway Township. Personal property equipment valuation decreased by a new depreciation schedule which allows faster writeoff. The mill rate decreased because of greater valuation in Itasca County.

Primarily, minerals were placed on a present-worth basis and a general over-all across-the-board increase on other real estate occurred in most Range taxing districts.

Tax Commission Reserve as of
May 1, 1960

1959	3,375,794
1960	<u>3,074,922</u>
	-290,872

13. ACCIDENTS & PERSONAL INJURY

Charles Hron, Truck Driver, Age 18

On June 14, 1960, about 5:30 p.m., Charles Hron was driving truck #245 loaded with ore from the #87 shovel to the screening plant pocket in the pit. Hron had driven down the grade and started around the gradual curve where the haulage road levels off. It appears that he did not straighten out the wheels and the truck crossed the road, ran over a 7' x 5' bank, and came to rest in 4 or 5 feet of water. Hron was found lying in the water along side the truck. Compensation Paid: \$17,500 plus \$550 burial.

Lloyd Danielson, Truck Driver, Age 27

On August 30, 1960, at 2:50 p.m., Danielson fractured his ankle when he stepped on a small rock while getting off a 34-ton truck at the screening plant in the pit. He lost 18 days and was paid \$157.50 compensation.

14. PROPOSED NEW CONSTRUCTION

A new rock reject conveyor system for the coarse rejects from the concentrating plant has been approved and should be completed prior to the 1961 ore season.

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

a. New Equipment Received

- 1 60 hp Westinghouse Electric Motor
- 14 5 hp Allis-Chalmers Motors
- 2 7½ hp Westinghouse Motors
- 1 15 hp Westinghouse Motor

- 1 Double-Deck Lecco 8'6" x 14' Screen
- 12 3' x 7' Allis-Chalmers Screens
- 2 4' x 7' Allis-Chalmers Screens
- 1 3' x 7' Vibrex Dewatering Screen

- 2 Denver Solids-Handling Pumps
- 1 1½ x 2 x 8 Peerless Fluidyne Pump
- 2 8" Wilfley Sand Pumps

- 16 10" Cyclones
- 1 5-ton Robins & Meyer Hoist
- 1 4-ton Robins & Meyer Hoist
- 1 IlCo Electric Sprayer
- 1 230 volt Joy Cable Vulcanizer

- 4 Load Rollers for 8' Pan
- 1 C/H 440-volt United Motor Control Center
- 2 400-amp Lincoln Welders
- 1 Type F-122 West Oil Circuit Breaker
- 1 Rigid #400A Power Pipe Drive

- 1 D8 Caterpillar Tractor-Repaired
- 1 GE Syn Converter-Repaired
- 3 GE Electrical Transformers-Repaired

- 2000' #4 & #3 Conductor Shovel Cable
- 1000' 30" Goodyear Belting
- 1247' 36" Goodyear Belting
- 700 Railroad Ties
- 500 1/2 x 8 x 31 Open-Type Hinges

b. Proposed New Equipment

- 1 Trackmobile
- 2 Pickup Trucks
- 1 60-ton Production Truck
- 1 D8 Caterpillar Tractor
- 1 9 KVA Transformer
- 3 50 KVA Transformers
- 4 Cutler Hammer Starters
- 2 Dings Separator Drums for Redesign

- 1000' #10 Neoprene Wire
- 1200' 5 KVA Anaconda Cable
- 1350' #12 Stationary Control Cable
- 1000' #12C Stationary Control Cable
- 500' #14 Stationary Control Cable
- 500' 600-volt Cable
- 3272' 30" Conveyor Belting
- 60' 24" Conveyor Belting

- 1 set 42" Heavy-Duty Feeder Chain

WESTON BO
25% COTTON FIBRE

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HOLMAN-CLIFFS MINE

ANNUAL REPORT

YEAR 1960

I. GENERAL

Mine activity at the start of the year consisted of a limited repair program on shovels and trucks. Repaired trucks were rented to the Canisteco and Hawkins mines, and all trucks were returned after the middle of March. On March 7, a repair program was started in the concentrating plants. All repairs were conducted on a 1-shift, 5-day-week schedule.

Loading of concentrates from stockpile was started on April 11 and all stocked ore was loaded out by April 20, showing an overrun of 51,812 tons.

Stripping was resumed on April 11 under E&A MC-367 on a 2-shift, 5-day-week schedule. Stripping and cleanup were carried out in the Brown #1 lease along the pit conveyor system and along the north end of the tail track. One shovel, serviced by 5 to 6 trucks, was used per shift. 33,750 cubic yards were moved before the start of the ore season.

Ore production started April 21 on a 2-shift, 6-day-week schedule and continued on this schedule until June 19 when it was reduced to a 2-shift, 5-day-week schedule. Under full load, the scrubber unit vibrated terrifically due to a defective 14-foot gear which was then removed and sent to Philadelphia to be recut. When the unit was placed back in operation on June 5, and with normal operating conditions, the grade was noticeably improved. Ore production was completed on October 7 with a production of 577,190 tons plus an overrun of 51,812 tons, making a grand total of 629,002 tons of concentrates.

Intermittent loading of concentrates from stockpile was carried forward until November 11, with a balance left in stock of 53,414 tons.

The fall stripping program was started October 10 under E&A MC-367. 4,500 cubic yards were moved to complete this E&A, and stripping was then continued under E&A MC-378 until December 3 when it was discontinued for the year. The areas stripped were: north side of the North Star; north side of the tail track of the Brown #1; the southwest corner and a small amount from the east side of the Bingham.

The stripping program was interrupted for one week while the Oliver Iron Mining Division removed its conveying system from the southwest corner of the Bingham lease. Crews were moved to dyke work for this period. 396,875 cubic yards were moved under E&A MC-378. On December 5, under

E&A MC-379, crews raised and widened the north and west sides of the present dyke, moving 94,300 cubic yards of material and completing dyke work on December 16.

The plant and shop repair program was carried forward through the 23d of December when all repairs were discontinued. The mine was placed on standby basis on December 24 with 5 hourly employees in the test laboratory.

2. PRODUCTION-INVENTORIES-SHIPMENTS

a. Production by Grades

<u>Crude</u>	<u>Wash</u>	<u>Retreat</u>	<u>Total</u>
Bingham	22,913	547,411	570,324
North Star		258,466	258,466
Brown		630,787	630,787
Holman		96,274	96,274
	<u>22,913</u>	<u>1,532,938</u>	<u>1,555,851</u>

<u>Concentrates</u>	<u>Wash</u>		<u>Retreat</u>		<u>Total</u>
	<u>Non-Bessemer</u>	<u>Bessemer</u>	<u>Non-Bessemer</u>	<u>Bessemer</u>	
Bingham	12,198	77,229	137,045		226,472
North Star		62,008	58,436		120,444
Brown		44,917	192,053		236,970
Holman		1,040	44,076		45,116
	<u>12,198</u>	<u>185,194</u>	<u>431,610</u>		<u>629,002</u>

b. Shipments

Bingham	12,198	77,229	135,977	225,404
North Star		62,008	74,500	136,508
Brown		44,917	144,075	188,992
Holman		1,040	44,076	45,116
	<u>12,198</u>	<u>185,194</u>	<u>398,628</u>	<u>596,020</u>

c. Inventories

	<u>Retreat</u>	<u>Tons</u>
Bingham		1,068
Brown		<u>52,346</u>
		53,414

d. Production by Months

<u>Month</u>	<u>Crude Ore</u>					<u>Total</u>
	<u>Wash</u>	<u>Retreat</u>				
	<u>Bingham</u>	<u>Bingham</u>	<u>North Star</u>	<u>Brown</u>	<u>Holman</u>	
April		46,462	64,695			111,157
May		107,980	165,230	7,121		280,331
June	3,866	141,774	28,541	81,947	42,361	298,489
July	19,047	109,082		106,297	22,940	257,366
August		99,444		155,780	30,973	286,197
Sept		42,669		220,643		263,312
Oct				58,999		58,999
	<u>22,913</u>	<u>547,411</u>	<u>258,466</u>	<u>630,787</u>	<u>96,274</u>	<u>1,555,851</u>

	<u>Concentrates</u>					
April		27,126	40,614	27,646	7,576	102,962
May		41,975	66,735	1,760		110,470
June	2,255	49,971	12,790	26,897	15,876	107,789
July	9,943	44,830	305	42,579	8,635	106,292
Aug		37,826		51,183	13,029	102,038
Sept		12,546		68,150		80,696
Oct				18,755		18,755
	<u>12,198</u>	<u>214,274</u>	<u>120,444</u>	<u>236,970</u>	<u>45,116</u>	<u>629,002</u>

3. ANALYSIS

a. Tonnage & Analysis of Crude Ore Produced

<u>Crude Ore</u>	<u>Tons</u>	<u>Iron</u>	<u>Silica</u>
Bingham Wash	22,913	39.10	42.53
Bingham Retreat	547,411	38.49	42.10
North Star Retreat	258,466	44.45	30.84
Brown Retreat	630,787	36.08	43.88
Holman Retreat	96,274	37.02	41.98
	<u>1,555,851</u>	<u>38.42</u>	<u>40.95</u>

b. Tonnage & Analysis of Concentrates Produced

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moisture</u>
<u>Bingham</u>							
Non-Bessemer Wash	12,198	57.73	.037	13.10	.12	.47	6.22
Bessemer Retreat	77,229	57.67	.038	12.70	.16	.48	5.98
Non-Bessemer Retreat	137,045	58.44	.041	11.93	.15	.48	6.26
<u>North Star</u>							
Bessemer Retreat	62,008	58.25	.034	10.18	.27	.44	6.08
Non-Bessemer Retreat	58,436	57.90	.038	10.32	.28	.45	6.23
<u>Brown</u>							
Bessemer Retreat	44,917	57.10	.037	12.19	.20	.47	5.62
Non-Bessemer Retreat	192,053	57.06	.044	12.19	.21	.54	6.33
<u>Holman</u>							
Bessemer Retreat	1,040	57.95	.033	12.38	.17	.46	6.00
Non-Bessemer Retreat	44,076	58.20	.057	9.92	.21	.50	5.96
	<u>629,002</u>	<u>57.73</u>	<u>.041</u>	<u>11.68</u>	<u>.20</u>	<u>.49</u>	<u>6.16</u>

c. Tonnage & Complete Analysis of Concentrates Shipped

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulf</u>	<u>Ign Loss</u>	<u>Moisture</u>
<u>Bingham</u>											
Non-Bessemer Wash	12,198	57.73	.037	13.10	.12	.47	.10	.16	.008	3.36	6.22
Bessemer Retreat	77,229	57.67	.038	12.70	.16	.48	.11	.16	.008	3.77	5.98
Non-Bessemer Retreat	135,977	58.44	.041	11.93	.15	.48	.11	.16	.008	3.45	6.26
<u>North Star</u>											
Bessemer Retreat	62,008	58.25	.034	10.18	.27	.44	.24	.20	.014	5.17	6.08
Non-Bessemer Retreat	74,500	57.89	.039	10.74	.26	.45	.24	.20	.014	5.12	6.23
<u>Brown</u>											
Bessemer Retreat	44,917	57.10	.037	12.19	.20	.47	.20	.24	.027	4.86	5.62
Non-Bessemer Retreat	144,075	57.03	.044	12.21	.21	.54	.20	.24	.027	4.84	6.16
<u>Holman</u>											
Bessemer Retreat	1,040	57.95	.033	12.38	.17	.46	.12	.22	.027	3.62	6.00
Non-Bessemer Retreat	44,076	58.20	.057	9.92	.21	.50	.12	.22	.027	5.57	5.96
	<u>596,020</u>	<u>57.77</u>	<u>.041</u>	<u>11.66</u>	<u>.20</u>	<u>.49</u>	<u>.17</u>	<u>.20</u>	<u>.17</u>	<u>4.33</u>	<u>6.11</u>

d. Mine Analysis of Ore in Stockpile

<u>Retreat Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moisture</u>
Bingham	1,068	58.48	.041	11.79	.14	.47	6.38
Brown	<u>52,346</u>	<u>57.17</u>	<u>.043</u>	<u>12.18</u>	<u>.20</u>	<u>.56</u>	<u>6.76</u>
	<u>53,414</u>	<u>58.00</u>	<u>.042</u>	<u>11.70</u>	<u>.19</u>	<u>.51</u>	<u>6.63</u>

4. ESTIMATE OF ORE RESERVES

a. Developed Ore - Factors Used

	<u>Concentrates</u>	<u>Cubic Feet per Ton</u>	<u>Per Cent Recovery</u>
Wash		14	50
Retreat		14	30

b. Ore Reserves as of December 31, 1960

<u>Lease</u>	<u>Reserve 12-31-59</u>	<u>Mined 1960</u>	<u>Balance after Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-60</u>
<u>North Star</u>					
N $\frac{1}{2}$ -NE $\frac{1}{4}$ 21-56-24	254,417	120,444	133,973	133,973	288,970
<u>Brown No. 1</u>					
SW $\frac{1}{4}$ -NE $\frac{1}{4}$ 21-56-24	477,989	205,039	272,950	60,111	333,061
<u>Holman</u>					
SE $\frac{1}{4}$ -NE $\frac{1}{4}$ 21-56-24	999,260	45,116	954,144	26,716	980,860
<u>Bingham</u>					
NW $\frac{1}{4}$ -SE $\frac{1}{4}$ 21-56-24	1,021,444	226,472	794,972	- 30,618	764,354
<u>Brown No. 2</u>					
SW $\frac{1}{4}$ -NW $\frac{1}{4}$ 22-56-24	1,280,472	31,931	1,248,541	-107,126	1,141,415
	<u>4,033,582</u>	<u>629,002</u>	<u>3,404,580</u>	<u>104,080</u>	<u>3,508,660</u>

c. Estimated Analysis of Ore Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
<u>North Star</u>				
Non-Bessemer Wash	20,900	58.60	.050	9.90
Bessemer Retreat	177,656	56.40	.030	11.70
Non-Bessemer Retreat	<u>90,414</u>	<u>56.40</u>	<u>.050</u>	<u>11.70</u>
	<u>288,970</u>	<u>56.56</u>	<u>.038</u>	<u>11.57</u>

c. Estimated Analysis of Ore Reserves (continued)

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
<u>Bingham</u>				
Bessemer Wash	162,500	60.40	.030	9.20
Non-Bessemer Wash	82,402	60.30	.050	8.40
Bessemer Retreat	295,968	58.30	.030	12.00
Non-Bessemer Retreat	<u>223,484</u>	<u>58.30</u>	<u>.050</u>	<u>12.00</u>
	764,354	58.96	.038	11.02
<u>Holman</u>				
Bessemer Wash	206,300	59.70	.030	9.30
Non-Bessemer Wash	96,400	59.30	.050	8.90
Bessemer Retreat	453,832	57.80	.030	11.10
Non-Bessemer Retreat	<u>224,328</u>	<u>57.80</u>	<u>.050</u>	<u>11.10</u>
	980,860	58.35	.037	10.51
<u>Brown No. 1</u>				
Bessemer Wash	11,900	59.00	.030	9.10
Bessemer Retreat	<u>321,161</u>	<u>57.60</u>	<u>.030</u>	<u>12.50</u>
	333,061	57.65	.030	12.38
<u>Brown No. 2</u>				
Bessemer Wash	213,800	59.20	.030	9.30
Non-Bessemer Wash	55,600	58.40	.050	9.00
Bessemer Retreat	476,198	57.80	.030	11.10
Non-Bessemer Retreat	<u>395,817</u>	<u>57.80</u>	<u>.050</u>	<u>11.10</u>
	1,141,415	58.09	.038	10.66
<u>North Star & Bingham</u>				
Bessemer Wash	162,500	60.40	.030	9.20
Non-Bessemer Wash	103,302	59.96	.050	8.70
Bessemer Retreat	473,624	57.59	.030	11.89
Non-Bessemer Retreat	<u>313,898</u>	<u>57.75</u>	<u>.050</u>	<u>11.90</u>
	1,053,324	58.30	.038	11.17
<u>Holman & Brown</u>				
Bessemer Wash	432,000	59.43	.030	9.30
Non-Bessemer Wash	152,000	58.97	.050	8.93
Bessemer Retreat	1,251,191	57.75	.030	11.46
Non-Bessemer Retreat	<u>620,145</u>	<u>57.80</u>	<u>.050</u>	<u>11.10</u>
	2,455,336	58.13	.036	10.83

c. Estimated Analysis of Ore Reserves (continued)

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
<u>Total Wash</u>				
Bessemer	594,500	59.70	.030	9.27
Non-Bessemer	<u>255,302</u>	<u>59.37</u>	<u>.050</u>	<u>8.84</u>
	849,802	59.60	.036	9.14
<u>Total Retreat</u>				
Bessemer	1,724,815	57.71	.030	11.58
Non-Bessemer	<u>934,043</u>	<u>57.78</u>	<u>.050</u>	<u>11.37</u>
	2,658,858	57.73	.037	11.51
<u>Total Holman-Cliffs</u>				
Bessemer	2,319,315	58.22	.030	10.99
Non-Bessemer	<u>1,189,345</u>	<u>58.12</u>	<u>.050</u>	<u>10.83</u>
	3,508,660	58.19	.037	10.94

5. LABOR & WAGES

a. Comments

There were practically no labor turnovers during the year and labor relations were satisfactory. Students were hired after the close of the spring college term to fill necessary replacements. During the first weeks of stripping, and with students gone, replacements were made from the Hawkins mine on a preferential-hiring basis.

A new labor contract was signed effective as of January 1, 1960. Under the terms of this agreement, the basic wage schedule remained unchanged until December 1, 1960. Effective December 1, 1960, the basic rate (Job Class 1 and 2) was increased by \$0.07 to \$2.030 an hour. The increment above the basic rate was increased by \$0.002 from \$0.067 to \$0.069 per job class. The cost of living increase is now \$0.17.

b. Comparative Statement of Production & Wages

	<u>1960</u>	<u>1959</u>
Wash & Retreat Concentrates	577,190	397,774
Number of Days Operated	130	66
Average Number of Men Working	148	173
Average Wages per Day	\$26.25	\$27.39

b. Comparative Statement of Production & Wages (continued)

	<u>1960</u>	<u>1959</u>
Production per Man per Day (Tons)	29.99	34.89
Labor Cost per Ton	\$0.875	\$0.785
Total Number of Man Days	19,247	11,399
Amount Paid for Labor	\$505,247.46	\$312,248.39

6. GENERAL SURFACE

a. Building & Repairs

Normal maintenance work was carried on throughout the year on mine buildings. The Central Warehouse was remodeled and the District Office personnel moved in April 1.

b. Roads, Transmission Lines, etc.

No major changes during the year.

c. Miscellaneous General Construction

Dyke construction under E&A MC-379 for \$25,000 was completed during 1960.

7. OPEN PIT

a. Stripping

The following table shows material moved from the various leases and the actual and estimated costs during 1960:

<u>Lease</u>	<u>E&A No.</u>	<u>Cubic Yards Surface</u>	<u>Cost</u>	
			<u>Estimated</u>	<u>Actual</u>
North Star	MC-367	7,281	\$0.496	\$0.590
Brown No. 1	MC-367	54,549	0.496	0.590
Brown No. 1	MC-378	52,241	0.484	0.363
North Star	MC-378	96,333	0.484	0.363
Bingham	MC-367	3,500	0.496	0.590
Bingham	MC-378	<u>248,301</u>	0.484	0.363
		462,205		

a. Stripping (continued)

On April 11, under E&A MC-367, a pit cleanup and stripping program was started on a 2-shift schedule and continued thus until the start of the ore season on April 21. A few extra shifts of stripping were carried on during the summer to clean out erosion channels and wash-outs. The regular stripping program started October 10 under E&A MC-367, but was continued under E&A MC-378 on a 15-shift-a-week schedule using two shovels and ten trucks per shift, except when stripping the southwest Bingham when the crews were reduced to one shovel and seven trucks because of the limited room. Stripping was interrupted for one week while the Oliver Iron Mining Division removed its conveying system from the southwest corner of the Bingham lease. The stripping program was discontinued for the year on December 3.

Surface and cleanup were removed from:

North Star: Along north pit approach and northwest corner.
Brown No. 1: West and north side of tail tracks.
Brown No. 2: Bottom
Bingham: Southwest corner and east side along approach road.

An average of 4782 cubic yards per shift was maintained for this program.

The purchase of the second 40-acre tract for \$30,000 was completed under E&A MC-363 and a supplement.

b. Open Pit Mining

Ore production was started April 21 on a 2-shift, 6-day-week schedule and continued thus until June 19 when the schedule was reduced to a 2-shift, 5-day-week schedule. Two to three shovels and seven to eight trucks hauling ore and pit rock were used per shift. One truck was required for disposal of screen rock and two trucks for heavy density reject hauls. Ore production for the year was discontinued on October 7.

1,984,717 tons of gross crude were produced on 261.5 shifts at an average rate of 7590 tons a shift. 349,160 tons of screen rock and 79,706 tons of pit rock were removed and a balance of 1,555,851 tons sent to the plant for a shift average rate of plant feed of 5950 tons. Screen rock made up 17.59 per cent of the total ore mined in 1960.

b. Open Pit Mining (continued)

The following table shows material mined from various leases:

<u>Lease</u>	<u>Gross Crude</u>	<u>Screen Rock</u>	<u>Net Crude</u>	<u>Pit Rock</u>	<u>Waste</u>	<u>Total Tons</u>
Brown No. 1*	649,335	114,785	534,550	6,540		655,875
Brown No. 2*	116,892	20,655	96,237	17,640	24,572	159,104
Holman**	118,684	22,410	96,274	8,186		126,870
North Star	336,496	108,030	258,466	43,710		410,206
Bingham	653,604	83,280	570,324	3,630	7,800	665,034
	<u>1,905,011</u>	<u>349,160</u>	<u>1,555,851</u>	<u>79,706</u>	<u>32,372</u>	<u>2,017,089</u>

*Includes 239,243 tons mined from Lean Ore Dump #12

**Includes 31,877 tons mined from Lean Ore Dump #12

The following leases and areas were mined:

Brown No. 1

Mining from north end of plant tail tracks.

Brown No. 2

North side of approach road leading to bottom of pit and southeast corner of pit. 239,243 tons mined from lean ore dump #12 and absorbed in production of both Brown leases. All ore mined in both Brown leases was retreat ore.

North Star

All crude ore mined along north side of lease. Crude ore rocky with high percentage of screen rock and pit rock, but concentrate product of good grade.

Bingham

Most of crude ore mined from bottom of pit. Small tonnage wash ore separated in mining pit bottom.

c. Pumping & Drainage

There was no change in the main pit pumping facilities and the flow of water remained constant. Another pump was used to pump water out of the Bingham lease while mining the pit bottom. The main pit pump

c. Pumping & Drainage (continued)

located in the Brown No. 2 lease was completely overhauled during the latter part of the ore season. The additional pumping and over-haul increased pumping and drainage costs per ton of concentrates from \$0.029 in 1959 to \$0.056 in 1960.

d. General Pit Activities

Only minor road and transmission line changes were necessary during the year. Cost was \$0.025 per ton of concentrates as compared to \$0.022 in 1959.

8. BENEFICIATION

a. Pit Plant

Operating the same schedule as the pit, the plant treated wash and retreat ore as required. Repairs were conducted nightly from 11 to 7. When repairs of a larger nature were needed, they were conducted on the Saturday shift on a 5-day schedule or on the Sunday shift on a 6-day schedule.

The scrubber unit installed the previous year was placed in operation at the start of the season; however, under full load the unit was subject to severe vibration due to a faulty 14-foot gear. This gear was then sent to Philadelphia to be recut and returned to service on June 5. With the scrubber unit back in operation and with normal operating conditions, downtime was held to a minimum for the season.

1,555,851 tons of crude treated produced 577,190 tons of concentrates at an average shift rate of 2207 tons and a net weight recovery of 37.10 per cent—down 1.96 per cent from the 1959 recovery of 39.06. Average crude feed was 5950 tons per shift as compared to 5303 tons in 1959. Concentrates were produced at the rate of 2207 tons a shift as compared to 2072 tons in 1959. 467,933 tons of ore were split intermittently during the season — 66.18 per cent coarse and 33.82 per cent fines.

Difficulty was encountered in making grade with some types of crude ore prior to getting the scrubber unit back in operation. With the scrubber operating, a grade higher than estimated was attained.

a. Pit Plant (continued)

The 577,190 tons of concentrates produced averaged 54.09 natural iron and 10.83 natural silica as compared to an estimated 53.50 natural iron and 11.20 natural silica.

During the season it was necessary to stockpile 169,803 tons of concentrates. Added to this were 20,432 tons carried over from 1959, making a total of 190,235 tons in stock. 136,821 tons were loaded and shipped intermittently from April 11 to November 10, leaving 53,414 tons in stock as of December 31, 1960.

Following is a tabulation of delay time:

<u>Washing Plant Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of Total Working Hours</u>
Out of Ore	1.50	4.01	0.07
Crude Ore Pocket	0.58	1.55	0.03
8' Pan Conveyor	0.83	2.21	0.04
5 x 12' Pit Screens	3.00	8.02	0.15
Crude Conveyor	2.08	5.56	0.10
Primary Screens	0.67	1.79	0.03
Crushers	1.08	2.89	0.05
Secondary Screens	1.25	3.34	0.06
Scrubber Discharge Screens	1.50	4.01	0.07
Akins Classifiers	1.50	4.01	0.07
Coarse Concentrate Conveyor	4.00	10.70	0.19
Cyclone Feed Conveyor	0.25	0.67	0.01
Railroad Cars & Tracks	0.83	2.22	0.04
Tailings Pumps	1.67	4.47	0.08
Miscellaneous Chutes & Launderers	0.25	0.67	0.01
Electric Power	5.25	14.04	0.25
Air Compressor	0.50	1.34	0.02
Sealing Water Pump	0.25	0.67	0.01
Miscellaneous Heavy-Media Plant Delays	<u>10.41</u>	<u>27.83</u>	<u>0.51</u>
	<u>37.40</u>	<u>100.00</u>	<u>1.79</u>
<u>Recapitulation</u>			
Crude Ore to Head of Mill	7.99	21.35	0.39
Ore Processing Delays	<u>29.41</u>	<u>78.65</u>	<u>1.40</u>
	<u>37.40</u>	<u>100.00</u>	<u>1.79</u>

Pit Plant (continued)

<u>Heavy-Media Plant</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of Total Working Hours</u>
Out of Ore & Misc. Wash Plant	27.00	72.20	1.31
Coarse Heavy-Media Feed Conveyor	0.33	0.88	0.02
Fine Heavy-Media Feed Conveyor	0.83	2.22	0.04
Fine Circulating Media Pump	0.33	0.88	0.02
Magnetic Separators	1.75	4.68	0.08
Densifiers	2.00	5.35	0.10
Electric Power	2.83	7.57	0.14
Miscellaneous Chutes & Launderers	0.17	0.45	0.01
Adjust Gravity	0.33	0.88	0.02
Waiting for Rock Truck	<u>1.83</u>	<u>4.89</u>	<u>0.09</u>
	37.40	100.00	1.81
<u>Recapitulation</u>			
Crude to Head of Mill	28.16	75.30	1.37
Ore Processing Delays	<u>9.24</u>	<u>24.70</u>	<u>0.44</u>
	37.40	100.00	1.81
<u>Cyclone Plant (No Delays)</u>			

Concentrating data for the wash and retreat product is as follows:

<u>Bingham Wash</u>	<u>Tons</u>	<u>Per Cent Weight</u>		<u>Per Cent</u>			<u>Iron Units</u>
		<u>Plant</u>	<u>Pit</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	
Crude to Plant	22,913	100.00	92.94	39.10		42.53	
Pit Rock	-						
Screen Plant Rock	1,740		7.06	27.47		55.73	
Pit Crude	24,653		100.00	38.28		43.46	
Total Concentrates Produced	12,198	53.24	49.48	57.76	.037	13.09	78.64
Unsize Concentrates Produced	6,433	28.08	26.09	56.90	.039	13.62	
Coarse Concentrates Produced	3,603	15.72	14.61	57.87	.039	13.36	
Fine Concentrates Produced	2,162	9.44	8.77	60.13	.031	11.01	
Total Concentrates Produced & Shipped	12,198	53.24	49.48	57.76	.037	13.09	78.64
Total Fine Tailings (by difference)	10,715	46.76	43.46	17.85		76.05	

Note: 5520 tons North Star wash pit rock assaying 25.60 per cent iron and 58.09 per cent silica removed. No wash ore production from this lease in 1960.

	Tons	Per Cent Weight		Per Cent			Iron Units
		Plant	Pit	Iron	Phos	Silica	
<u>Bingham Retreat</u>							
Crude to Plant	547,411	100.00	86.54	38.49		42.10	
Pit Rock	3,630		0.57	24.71		60.57	
Screen Plant Rock	81,540		12.89	26.14		59.25	
Pit Crude	632,581		100.00	36.82		44.42	
Total Concentrates Produced	207,212	37.85	32.76	58.16	.040	12.25	57.18
Unsized Concentrates Produced	40,774	7.44	6.45	57.90	.042	12.82	
Coarse Concentrates Produced	108,037	19.74	17.08	57.98	.043	12.10	
Fine Concentrates Produced	58,401	10.67	9.23	58.67	.036	12.18	
1959 Stockpile Overrun	7,062	1.29	1.11				
Total Concentrates Produced & Shipped	214,274	39.14	33.87	58.16	.040	12.25	59.13
Heavy-Media Concentrates	127,986	23.38	20.23	57.17		13.16	
Heavy-Media Rejects	87,110	15.91	13.77	31.01		52.24	
Heavy-Media Feed	215,096	39.29	34.00	46.58		28.99	
Cyclone Concentrates	64,502	11.79	10.20	58.98		11.67	
Cyclone Rejects	20,708	3.78	3.27	43.81		33.06	
Cyclone Feed	85,210	15.57	13.47	55.29		16.87	
1/2" Wash Plant Rejects	-						
Total Fine Tailings (by difference)	232,381	42.46	36.74	23.28		65.71	
<u>Brown Retreat</u>							
Crude to Plant	630,787	100.00	79.80	36.08		43.88	100.00
Pit Rock	24,180		3.06	23.00		63.03	
Screen Plant Rock	135,440		17.14	25.63		59.26	
Pit Crude	790,407		100.00	33.89		47.10	
Total Concentrates Produced	209,324	33.18	26.48	57.06	.044	12.02	52.47
Unsized Concentrates Produced	34,756	5.51	4.40	56.87	.040	12.13	
Coarse Concentrates Produced	116,291	18.44	14.71	57.18	.046	11.70	
Fine Concentrates Produced	58,277	9.24	7.37	56.94	.042	12.59	
1959 Stockpile Overrun	27,646	4.38	3.50				
Total Concentrates Produced & Shipped	236,970	37.57	29.98	57.06	.044	12.02	59.42
Heavy-Media Concentrates	135,723	21.52	17.17	56.48		12.38	
Heavy-Media Rejects	92,188	14.61	11.66	31.79		49.37	
Heavy-Media Feed	227,911	36.13	28.83	46.49		27.34	
Cyclone Concentrates	76,050	12.06	9.62	56.28		12.61	
Cyclone Rejects	16,195	2.57	2.05	37.52		39.49	
Cyclone Feed	92,245	14.62	11.67	52.99		17.33	
1/2" Wash Plant Rejects	-						
Total Fine Tailings (by difference)	313,080	49.64	39.61	23.38		63.79	

	Tons	Per Cent Weight		Per Cent			Iron Units
		Plant	Pit	Iron	Phos	Silica	
<u>Holman Retreat</u>							
Crude to Plant	96,274	100.00	75.88	37.02		41.98	
Pit Rock	8,186		6.45	23.05		62.88	
Screen Plant Rock	22,410		17.67	24.94		60.37	
Pit Crude	126,870		100.00	33.98		46.58	
Total Concentrates Produced	37,540	38.99	29.59	58.37	.060	9.45	61.48
Unsize Concentrates Produced	18,978	19.71	14.96	58.66	.052	9.51	
Coarse Concentrates Produced	13,286	13.80	10.47	58.11	.072	9.10	
Fine Concentrates Produced	5,276	5.48	4.16	58.01	.059	10.09	
1959 Stockpile Overrun	7,576	7.87	5.97				
Total Concentrates Produced and Shipped	45,116	46.86	35.56	58.37	.060	9.45	73.88
Heavy-Media Concentrates	24,304	25.24	19.16	57.79		9.40	
Heavy-Media Rejects	9,669	10.05	7.62	34.05		44.33	
Heavy-Media Feed	33,973	35.29	26.78	51.03		19.34	
Cyclone Concentrates	10,653	11.07	8.40	57.55		9.67	
Cyclone Rejects	3,659	3.80	2.88	42.37		30.78	
Cyclone Feed	14,312	14.87	11.28	53.67		15.07	
1/2" Wash Plant Rejects	-						
Total Fine Tailings (by difference)	45,406	47.16	35.79	19.57		69.28	
<u>North Star Retreat</u>							
Crude to Plant	258,466	100.00	64.38	44.45		30.84	
Pit Rock	34,980		8.71	27.84		55.49	
Screen Plant Rock	108,030		26.91	28.27		54.78	
Pit Crude	401,476		100.00	38.65		39.43	
Total Concentrates Produced	110,916	42.91	27.63	58.06	.036	9.97	56.04
Unsize Concentrates Produced	8,316	3.22	2.07	58.37	.029	9.90	
Coarse Concentrates Produced	68,466	26.49	17.05	58.08	.040	9.73	
Fine Concentrates Produced	34,134	13.20	8.50	57.95	.030	10.44	
1959 Stockpile Overrun	9,528	3.69	2.37				
Total Concentrates Produced & Shipped	120,444	46.61	30.00	58.06	.036	9.97	60.88
Heavy-Media Concentrates	62,013	23.99	15.45	58.95		8.97	
Heavy-Media Rejects	62,721	24.27	15.62	37.18		37.07	
Heavy-Media Feed	124,734	48.26	31.07	48.00		23.10	
Cyclone Concentrates	23,785	9.21	5.92	58.80		9.28	
Cyclone Rejects	9,833	3.80	2.45	44.44		25.24	
Cyclone Feed	33,618	13.01	8.37	54.60		13.95	
1/2" Wash Plant Rejects	-						
Total Fine Tailings (by difference)	74,996	29.02	18.68	30.41		57.22	

<u>Total Retreat Product</u>	<u>Tons</u>	<u>Per Cent Weight</u>		<u>Per Cent</u>			<u>Iron Units</u>
		<u>Plant</u>	<u>Pit</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	
Crude to Plant	1,532,938	100.00	78.56	38.41		40.93	100.00
Pit Rock	70,976		3.64	25.48		59.17	
Screen Plant Rock	347,420		17.80	26.53		57.94	
Pit Crude	1,951,334		100.00	35.83		44.62	
Total Concentrates Produced	564,992	36.86	28.95	57.75	.042	11.53	55.43
Unsize Concentrates Produced	102,824	6.71	5.27	57.73	.042	11.74	
Coarse Concentrates Produced	306,080	19.97	15.68	57.70	.045	11.29	
Fine Concentrates Produced	156,088	10.18	8.00	57.84	.038	11.88	
1959 Stockpile Overrun	51,812	3.38	2.66				
Total Concentrates Produced & Shipped	616,804	40.24	31.61	57.75	.042	11.52	60.51
Heavy-Media Concentrates	350,026	22.83	17.94	57.26		11.85	
Heavy-Media Rejects	251,688	16.42	12.90	32.95		47.10	
Heavy-Media Feed	601,714	39.25	30.84	47.09		26.60	
Cyclone Concentrates	174,990	11.42	8.97	57.70		11.63	
Cyclone Rejects	50,395	3.29	2.58	41.81		33.43	
Cyclone Feed	225,385	14.70	11.55	54.14		16.51	
1/2" Wash Plant Rejects	-						
Total Fine Tailings (by difference)	665,863	43.43	34.13	23.80		64.09	

9. MAINTENANCE & REPAIRS

A limited repair program was conducted in the shops on pit equipment from January to the start of the ore season. A plant repair program was started March 7 to ready the plant for the 1960 season. Usual maintenance of mine and plant equipment was carried on throughout the operating season.

After the ore season, a full-scale repair program was conducted in the plants and a limited shop repair program was conducted in conjunction with the stripping program.

Because of the strike in 1959, no repairs were conducted during the fall so that two separate repair programs were carried on in one year. Winter & Idle costs were high because of this situation.

10. COST OF OPERATIONS

a. Comparative Costs

<u>Pit Product</u>	1959	1960	
	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>
Net Tons Crude Ore	1,018,251	1,510,000	1,555,851
Tons Concentrates	397,774	570,000	577,190
Per Cent Recovery	39.1	37.8	37.1
Average Shift Product	2,072	2,099	2,207
Tons per Man per Shift	34.90		30.0
Shifts Operated	192	271.5	261.5
<u>Costs</u>			
Pit Operating	\$0.243	\$0.259	\$0.252
Beneficiating	0.247	0.311	0.313
Loading Stockpile	0.019	0.017	0.015
Sampling & Analysis	0.045	0.055	0.050
Safety & First Aid	0.003	0.002	0.002
Employee Vacation	0.082	0.096	0.057
Personal Injury	0.006	0.004	0.007
Social Security	0.049	0.043	0.041
Total Pit & Beneficiating	<u>\$1.654</u>	<u>\$1.944</u>	<u>\$1.898</u>
General Mine Expense	0.231	0.268	0.304
Winter & Idle	0.383	0.588	0.692
Cost of Production	<u>\$2.268</u>	<u>\$2.800</u>	<u>\$2.894</u>
<u>Depreciation</u>			
Plant & Equipment	0.334		0.513
Motorized Equipment	0.088		0.080
Movable Equipment	0.001		0.002
<u>Taxes</u>			
Ad Valorem	0.218		0.294
Occupational	0.158		0.280
Royalty	<u>0.318</u>		<u>0.157</u>
Total Depreciation & Taxes	<u>\$1.117</u>		<u>\$1.326</u>
Miscellaneous Expense & Income	0.014		0.012
Administrative Expense	0.100		0.100
Royalty	<u>1.614</u>		<u>1.586</u>
Total Cost on Cars	<u>\$5.113</u>		<u>\$5.918</u>

b. Cost Comments

Pit Operating: \$0.007 below budget and \$0.009 above 1959 costs. All items under pit operating very close to estimated budget.

Beneficiation: \$0.002 above budget and \$0.066 above 1959 costs. Electric power \$0.011 above budget, with other costs close to budget. Concentrating-Operating, Concentrating-Maintenance, and Electric Power all increased from 1959 due to operating the scrubber unit. Power costs alone increased \$0.030 a ton of crude above 1959 costs.

Total Pit & Beneficiation: \$0.046 a ton below budget and \$0.244 above 1959 costs.

General Mine Expense: \$0.036 above budget and \$0.073 above 1959 costs. Metallurgical & Geological, Ishpeming, Hibbing, and Mine Offices all slightly above budget. Special Expense increased from an estimated \$0.007 to \$0.016 per ton of concentrates. Insurance increased from an estimated \$0.039 and 1959 cost of \$0.021 to \$0.057 per ton of concentrates.

Winter & Idle: \$0.104 above estimated budget and \$0.309 above 1959 costs. No repairs were carried on in fall of 1959 because of the strike. Consequently, two repair programs were carried on in 1960-- the first to ready the plant and equipment prior to the ore season, and the second a heavy plant repair program to avoid plant expenditures during the anticipated low season in 1961.

Cost of Production: \$0.094 above estimated budget and \$0.626 above 1959 costs. A drop in net recovery of 2 per cent and a heavier Winter & Idle repair program increased costs in 1960.

11. EXPLORATION & FUTURE EXPLORATION

Brown No. 2 Lease: Several holes required on east bank to definitely outline ore in this area for future mining.

Bingham Lease: Future drilling necessary in southeast corner to outline ore below paint rock layer.

North Star Lease: Several holes necessary in northwest corner to determine north limits of ore body.

12. TAXES

	1960		1959		Increase-Decrease	
	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
<u>Real Estate</u>						
Mineral	\$595,522	\$118,097.97	\$329,946	\$ 85,139.27	/\$265,576	/\$32,958.70
Lands, Bldgs, Mach	183,340	36,393.24	135,569	34,994.95	/ 47,771	/ 1,398.29
<u>Personal Property</u>						
Equipment	90,254	17,898.27	80,871	20,867.95	/ 9,383	- 2,969.68
Stockpile Concts	461	91.42	4,028	1,039.39	- 3,567	- 947.97
	<u>\$869,577</u>	<u>\$172,480.90</u>	<u>\$550,414</u>	<u>\$142,041.56</u>	<u>/\$319,163</u>	<u>/\$30,439.34</u>
Average Mill Rate:		198.35		258.06		- 59.71

Note: Mineral reserve increased 74,769 tons by new estimate. The State is now using present worth value on mine instead of fixed class rate which increases mineral value and average rate per ton from \$0.0745 to \$0.1476. Across-the-board increases on buildings in Taconite of 10 per cent and in Iron Range Township 25 per cent.

Tax Commission Reserve
as of May 1, 1960

<u>Year</u>	<u>Tons</u>
1959	4,431,356
1960	<u>4,034,700</u>
	- 396,656

Personal property equipment valuation increased by purchase of two new 40-ton Mack trucks.

13. ACCIDENTS & PERSONAL INJURIES

Bert Jones, Plant Repairman Helper, Age 52

Tripped over piece of wire frozen in ground. Injured cartilage right knee. Compensation paid: \$1,394

Art Karppi, Shovel Oiler, Age 52

Stepped on loose chunk, turned ankle, fractured lower third fibula. Compensation paid: \$577.50

G. R. Brandenburg, Plant Repairman Helper, Age 62

Hurt back while washing out cyclone plant with hose. Compensation paid: \$217.50

14. PROPOSED NEW CONSTRUCTION

2-inch screening in pit screening plant
Replace 4 Nordberg screens for tramp service

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

Received in 1960

- 1 30RC 7½ Bucyrus Erie diesel-powered drill
- 1 Blackhawk electric jack with 50-ton ram
- 2 3/4-ton International pickup trucks
- 1 12" Hazleton media circulating pump
- 1 400 amp Lincoln welding machine
- 1 Lincoln powermaster pump

Proposed New Equipment for 1961

Strengthen 3 magnetic separators
Audio communications system
New bucket for #99 shovel
1829 feet conveyor belt (pit)

- 2 each DSM and Aerovibe screens
- 1 3/4-ton pickup truck

W

ESTON BOND
25% COTTON FIBER

SALLY MINE

ANNUAL REPORT

YEAR 1960

I. GENERAL

Sally stripping under way in the fall of 1959 under E&A CC-32 was completed on January 20. Hauling of Sally crude ore to the Canisteco was then started and continued until February 14. A 20-shift schedule was maintained on stripping and on the ore haul with all hourly employees working 5 days a week. For the period from January 1 to 20, 333,200 yards of surface were moved. For the period from January 20 to February 14, 690,716 tons of crude were hauled to the Canisteco bringing the crude stockpile to 1,056,692 tons which included 365,976 tons carried over from the previous year. During the operating season, 903,862 tons of crude, including 76,625 tons of screen rock, were mined from the Sally stockpile leaving 152,830 tons of crude in stock at the end of the year.

Stripping was resumed under E&A CC-82 on October 23 on a 20-shift schedule and completed November 30 with 557,831 cubic yards of surface moved. Total yardage moved from the Sally in 1960 was 891,031 cubic yards.

The Canisteco plant received 831,237 tons of crude to produce 359,031 tons of concentrates. The fine ore plant received 384,309 tons of tailings from the main plant to produce 33,467 tons of concentrates.

The Henry Schultze Company put down three structure drill holes for a total depth of 626 feet during 1960.

II. PRODUCTION-SHIPMENTS-INVENTORIES

a. Production by Grades

	Crude retreat ore	831,237 tons		
	<u>Concentrates</u>	<u>Bessemer</u>	<u>Non-Bessemer</u>	<u>Total</u>
Retreat		38,603	353,895	392,498

b. Shipments by Grades

Retreat	40,107	334,732	374,839
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c. Inventories

23,425 tons retreat

d. Production by Months

<u>Month</u>	<u>Crude Retreat</u>	<u>Concentrates</u>
April	93,978	45,045
May	274,865	137,015
June	257,496	114,211
July	182,328	82,744
Aug		529
Sept	<u>22,570</u>	<u>12,954</u>
	831,237	392,498

3. ANALYSIS

a. Crude Ore Produced - Retreat

<u>Tons</u>	<u>Iron</u>	<u>Silica</u>
831,237	44.39	31.70

b. Concentrates Produced

<u>Retreat Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moist</u>
Bessemer	38,603	57.81	.038	12.48	.29	.42	6.69
Non-Bessemer	<u>353,895</u>	<u>57.77</u>	<u>.049</u>	<u>11.58</u>	<u>.36</u>	<u>.49</u>	<u>6.58</u>
	392,498	57.77	.048	11.67	.36	.48	6.59

c. Tonnage & Complete Analysis of Concentrates Shipped

<u>Retreat Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulf</u>	<u>Ign Loss</u>	<u>Moist</u>
Bessemer	40,107	57.76	.038	12.48	.29	.46	.28	.19	.010	3.49	6.73
Non-Bessemer	334,732	57.76	.049	11.55	.36	.50	.28	.19	.010	4.26	6.60
	374,839	57.76	.048	11.65	.35	.50	.28	.19	.010	4.17	6.62

d. Analysis of Ore in Stockpile

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moist</u>
Retreat	23,425	57.47	.047	12.32	.39	.46	6.38

4. ESTIMATE OF ORE RESERVES

a. Developed Ore - Factors Used

<u>Concentrates</u>	<u>Cubic Feet per Ton</u>	<u>Per Cent Recovery</u>
Wash	14	50
Retreat	14	40

b. Ore Reserves as of December 31, 1960

<u>Lease</u>	<u>Reserve 12-31-59</u>	<u>Mined 1960</u>	<u>Balance after Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-60</u>
Bovey #1	1,065,505	392,498	673,007		673,007

c. Estimated Analyses of Ore Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Bessemer Wash	135,000	61.52	.029	7.47
Bessemer Retreat	303,973	58.59	.026	11.45
Non-Bessemer Retreat	<u>234,034</u>	<u>57.12</u>	<u>.053</u>	<u>10.42</u>
	673,007	58.67	.036	10.30
Total Wash Bessemer	135,000	61.52	.029	7.47
Total Retreat	538,007	57.95	.038	11.00
<u>Total Concentrates</u>				
Bessemer	438,973	59.49	.027	10.23
Non-Bessemer	<u>234,034</u>	<u>57.12</u>	<u>.053</u>	<u>10.42</u>
	673,007	58.67	.036	10.30

5. LABOR & WAGES

a. Comments

During the year labor relations were satisfactory and three grievances were processed--all minor and none appealed beyond Step 2.

A new labor contract was signed effective January 1, 1960. Under the terms of this agreement, the basic wage schedule remained the same until December 1, 1960. Effective December 1, 1960, the basic rate (Job Classes 1 and 2) was increased by \$0.07 to \$2.030 an hour. The increment above the basic rate was increased by \$0.002 from \$0.067 to \$0.069 per job class. The cost of living increase is now \$0.17.

b. Comparative Statement of Production & Wages

	<u>1960</u>	<u>1959</u>
Production-tons	392,498	147,663
Number of days operated	49	18.5
Number of shifts operated	97	37
Average product per shift	4,046	3,991
Average number of men employed	134	130
Tons per man per day	69.63	63.85
Average wages paid per day	\$24.08	\$23.22
*Total Amount of labor	\$210,461.46	\$122,297.32
Labor cost per ton	\$0.536	\$0.828

*Includes cost of hauling Sally ore to Canisteo

6. GENERAL SURFACE

- a. Buildings & Repairs - None
- b. Roads, Transmission Lines, etc.

In line with general practice on the Mesabi range for more efficient power distribution in the open pits, a new substation was erected in the Canisteo-Sally pit under E&A CC-74 in the amount of \$15,029 to convert the pit power system from 2300 to 4160 volts and as part of this change, about 1000 feet of new power line was installed.

- c. Miscellaneous General Construction - None

7. OPEN PIT

- a. Stripping

Surface stripping authorized under E&A CC-32 which started in the fall of 1959 was continued from January 1 to January 20 on a 20-shift schedule with two shovels and twelve trucks. 333,200 cubic yards were moved at an average rate of 6,170 yards per shift and a cost of \$0.303 a yard for a total expenditure of \$99,447.99.

Surface stripping was resumed October 23 and completed November 30 under E&A CC-82 which authorized removal of 600,000 cubic yards at \$0.365 a yard for an estimated \$219,000. Operating on a 20-shift schedule using 2 shovels and 12 to 14 trucks, and with hourly employees on a 5-day-week schedule, 557,831 cubic yards were moved at \$0.370 a yard and an actual expenditure of \$206,180.

891,031 cubic yards of stripping were moved in 1960 at an average rate of 5,466 yards a shift and a cost of \$0.337 a yard for a total cost of \$300,196.

b. Open Pit Mining

Operating on a 20-shift schedule with hourly employees working 5 days a week, hauling of Sally ore to the Canisteo was started on January 21 and completed February 14. Using 2 shovels and 14 trucks, 690,716 tons were stocked in the Canisteo pit, bringing the total to 1,056,692 tons which included 365,976 tons remaining in pile from the previous year.

Ore operations started April 22 on a 2-shift, 6-day-week schedule. On June 19, this schedule was reduced and a 2-shift, 5-day-week schedule was effected until shutdown of operations on September 9.

903,862 tons of crude were mined from the Sally stockpile in 97 shifts at an average rate of 9,318 tons a shift, leaving 152,830 tons of Sally crude in pile as of January 1, 1961.

c. Pumping & Drainage

No pit pumping was needed and surface drainage was directed into the natural flowage to the west.

8. BENEFICIATION

a. Plant Operation

The Canisteo concentrating plant received 831,237 tons of retreat crude and produced 359,031 tons of concentrates at an average rate of 3,701 tons a shift and a weight recovery on pit and plant crude of 39.72 and 43.19 per cent respectively.

The heavy-media plant received 223,325 tons of feed and produced 155,994 tons of concentrates at a weight recovery of 69.49 per cent. The fine ore plant, operating on current tailings from the main plant, received 384,309 tons of feed and produced 33,467 tons of fine ore concentrates at a weight recovery on plant crude and plant tailings of 4.03 per cent and 8.71 per cent respectively.

During the operating season it was necessary to stockpile 139,893 tons of concentrates. 116,468 tons were shipped from pile, leaving 23,425 tons of concentrates in stock as of January 1, 1961.

Of the total regular concentrates produced, 66 per cent was split coarse and fine; and of the split ore, 46 per cent was coarse and 54 per cent fine.

1960 concentration data follows:

Retreat Product	Tons	Per Cent Weight		Per Cent			Iron Units
		Plant	Pit	Iron	Phos	Silica	
Crude to Plant	831,237	100.00	91.96	44.39		31.70	
Screen Rock	22,625		8.04	27.39		57.14	
Pit Crude	903,862		100.00	43.02		33.74	
Concentrates Produced	357,785	43.04	39.58	57.67	.049	11.66	
Stockpile Overrun	1,246						
Total Concentrates Produced	359,031	43.19	39.72	57.67	.049	11.66	
Heavy-Media Concentrates	155,994	18.77	17.26	57.75		10.64	
Heavy-Media Rejects	67,331	8.10	7.45	37.28		39.78	
Heavy-Media Feed	223,325	26.87	24.71	52.02		18.86	
Total Fine Tailings (by difference)	406,121	48.86	44.93	33.87		48.01	
<u>Fine Ore Plant</u>							
Crude to Plant	384,309	100.00		31.34		51.62	
Total Concentrates Produced	33,467	8.71		58.89	.035	11.77	
Total Fine Tailings (by difference)	350,842	91.29		28.71		55.42	

Following is a brief classification of delay time:

Source of Delay	Hours	Per Cent of Total Working Hours
Heavy-Media Plant Pumps	.50	.07

<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent of Total Working Hours</u>
<u>Wash Plant</u>		
Screening plant	14.75	2.17
Plant conveyors	1.25	.19
Plant machines	1.50	.22
Electric power	.50	.07
	<u>18.00</u>	<u>2.65</u>
<u>Fine Ore Plant</u>		
Out of cars	8.75	1.16
Pumps	9.50	1.26
Due to mill	12.50	1.66
	<u>30.75</u>	<u>4.08</u>

9. REPAIRS & MAINTENANCE

Plant repairs started on February 1, continued until startup of ore operations on April 22, and were resumed on September 11 after ore operations. All plant equipment repairs required for the startup of the 1961 ore season were completed by December 30. Repairs were conducted on a 1-shift, 5-day-week basis.

10. COST OF PRODUCTION

a. Comparative Mining Costs

<u>Product</u>	<u>1960</u>		<u>1959</u>
	<u>Budget</u>	<u>Actual</u>	<u>Actual</u>
Wash concentrates			3,465
Retreat concentrates	380,000	359,031	144,198
Fine ore concentrates	<u>45,000</u>	<u>33,467</u>	
	425,000	392,498	<u>147,663</u>
Per cent gross crude recovery	42.49	43.42	44.04
Average product per shift		4,046	3,991
Tons per man per day		69.63	63.85
Days operated		48.50	18.50

Sally Mine
Annual Report
Year 1960
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<u>Costs</u>	<u>1960</u>		<u>1959</u>
	<u>Budget</u>	<u>Actual</u>	<u>Actual</u>
Pit operating	\$0.406	\$0.367	\$0.412
Beneficiation	0.160	0.157	0.150
Fine ore concentrating	0.710	0.724	
Loading Stockpile ore	0.010	0.016	0.058
Sampling and analysis	0.034	0.030	0.037
Safety and first aid supplies	0.001	0.001	0.001
Employees vacation pay	0.059	0.021	0.074
Personal injury expense	0.005	0.005	0.002
Social security taxes	0.018	0.020	0.023
Total pit and beneficiation	<u>\$1.507</u>	<u>\$1.348</u>	<u>\$1.426</u>
General mine expense	0.164	0.186	0.147
Winter & Idle	0.350	0.438	0.248
Total production cost	<u>\$2.021</u>	<u>\$1.972</u>	<u>\$1.821</u>
<u>Depreciation</u>			
Plant and equipment		0.276	0.276
Motorized equipment		0.008	0.021
Movable equipment			0.005
<u>Taxes</u>			
Ad Valorem		0.236	0.184
Occupational		0.335	1.170
Royalty		0.039	0.045
Deferred mining costs	0.011	0.026	0.026
Total depreciation, amortization, taxes		<u>\$0.920</u>	<u>\$1.727</u>
Royalty		0.300	0.300
Total cost on cars		<u>\$3.193</u>	<u>\$3.848</u>

b. Detailed Cost Comparison

Cost of Production: \$0.049 under the budget and \$0.151 over 1959 costs. A sustained high rate of production was main reason for decrease.

Pit Operating: \$0.039 under the budget of \$0.406 and \$0.045 under 1959.

Beneficiation: \$0.003 under the budget of \$0.160 and \$0.007 over 1959.

Fine Ore Concentration: \$0.014 over the budget of \$0.710 because of cost allocation between Canisteo and Sally. Canisteo costs were under the budget.

Miscellaneous Pit & Beneficiation: \$0.030 under the budget of \$0.138.

General Mine Expense: \$0.022 over the budget of \$0.164 and \$0.039 over 1959. Increase matter of cost allocation between Canisteo and Sally.

Winter & Idle: \$0.088 over the budget of \$0.350 and \$0.190 over 1959. A decrease in over-all tonnage and an early shutdown is main reason. Also, major repairs to plant equipment required for the 1961 operating season were completed before January 1, 1961.

11. EXPLORATION & FUTURE EXPLORATION

The Henry Schultze Company put down three structure drill holes to a total depth of 626 feet on the northwest side of the Sally pit. While some additional retreat ore was revealed, indications are that the bottom is coming up quite rapidly on the north side of the formation. Additional drilling is necessary to determine actual pit limits.

12. TAXES

<u>Real Estate</u>	<u>1960</u>		<u>1959</u>		<u>Increase-Decrease</u>	
	<u>Assessed</u>		<u>Assessed</u>		<u>Assessed</u>	
	<u>Value</u>	<u>Taxes</u>	<u>Value</u>	<u>Taxes</u>	<u>Value</u>	<u>Taxes</u>
Mineral	\$239,849	\$46,653.08	\$ 97,108	\$24,013.84	\$142,741	\$22,639.24
Lands, Buildings, Machinery	933	185.12	933	235.81	-	50.69
<u>Personal Property</u>						
Stockpile Concentrates	4,581	891.05	2,078	513.86	+ 2,503	+ 377.19
Crude Stockpile	156,089	30,360.87	74,514	18,426.57	+ 81,575	+ 11,934.30
	<u>\$401,452</u>	<u>\$78,090.12</u>	<u>\$174,633</u>	<u>\$43,190.08</u>	+ \$226,819	+ \$34,900.04
Average mill rate		194.52		247.32		-52.80

Note: Mineral valuation increased by use of present worth method of valuation for 1960, boosting the average rate per ton to \$0.3880 as compared to the average rate per ton on fixed class rate in 1959 of \$0.1063. The 1960 crude ore stockpile rate was \$0.3880 per ton as compared to the 1959 average rate per ton of \$0.2516. Additional charges for taxes in the amount of \$14,622 covered Sally share of taxes on Canisteo facilities jointly used, such as shops, office buildings, mining machinery, beneficiating plant, lands, etc. The mill rate was reduced because of greater valuation in Itasca County.

Tax Commission Reserve as of May 1, 1960

<u>Year</u>	<u>Tons</u>	<u>plus Crude Stockpile</u>	<u>Total</u>
1959	913,167	296,165	1,209,332
1960	<u>618,167</u>	<u>402,292</u>	<u>1,020,459</u>
	-295,000	<u>106,027</u>	-188,973

- 13. ACCIDENTS & PERSONAL INJURY - None
- 14. PROPOSED NEW CONSTRUCTION - None
- 15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT - None

50% COTTON FIBER

WESTON BOND

100
100
100

WANLESS MINE

ANNUAL REPORT

YEAR 1960

1. GENERAL

The Wanless mine continued on an idle basis during 1960. The only activity was intermittent pumping by the Snyder Mining Company from the Wanless mine pit sump to supplement drainage in their Whiteside and Kosmerl mines.

2. PRODUCTION-SHIPMENTS-INVENTORIES

c. Stockpile Inventories

Wanless	98
Woodbridge	<u>341</u>
	439

3. ANALYSIS

d. Concentrates in Stockpile

Iron	52.215
Phos	.167
Silica	9.46
Mang	.88
Alum	5.13
Moisture	17.36

4. ESTIMATE OF ORE RESERVES AS OF DECEMBER 31, 1960

<u>Woodbridge</u>	
Open Pit	59,889
Underground	<u>11,426</u>
	71,315

<u>Wanless</u>	
Open Pit	621,623
Underground	<u>103,662</u>
	725,285

<u>Total</u>	<u>796,600</u>
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c. Estimated Analyses of Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moist</u>
Woodbridge <u>SE$\frac{1}{4}$-NE$\frac{1}{4}$ 16-58-19</u>							
Open Pit	59,889	56.04	.079	6.22	.93	1.20	18.50*
Underground	11,426						
Wanless <u>NE$\frac{1}{4}$-SE$\frac{1}{4}$ 16-58-19</u>							
Open Pit	621,623	55.51	.103	8.77	1.42	1.94	18.50*
Underground	103,662	55.51	.093	9.28	.71	.92	18.50*
<u>Total Wanless Mine</u>	796,600	54.68	.098	8.52	1.27	1.72	18.50*

*Moisture assumed

12. TAXES

<u>Real Estate</u>	<u>1960</u>		<u>1959</u>		<u>Increase-Decrease</u>	
	<u>Assumed Value</u>	<u>Taxes</u>	<u>Assumed Value</u>	<u>Taxes</u>	<u>Value</u>	<u>Taxes</u>
Mineral	\$186,318	\$24,418.84	\$172,210	\$22,049.77	\$14,108	\$2,369.07
Lands, Bldgs, Machinery	1,867	245.78	1,867	240.40		5.38
<u>Personal Property</u>						
Equipment	1,936	253.72	2,484	318.05	- 548	- 64.33
Stockpile Concts-Direct	208	27.26	211	27.02	- 3	.24
	<u>\$190,329</u>	<u>\$24,945.60</u>	<u>\$176,772</u>	<u>\$22,635.24</u>	\$13,557	\$2,310.36
Average Mill Rate		131.07		128.05		3.02

Note: Mineral valuation was increased by new present worth valuation. Personal property valuation was decreased by removal of some odd equipment from property. Mill rate was increased by general decrease of valuation in taxing district.

Tax Commission Reserve as of May 1, 1960

1959	796,600
1960	796,000

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1911

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ME

