a. Comparative Cost Statement (con't)

Budget of 33,000 tons was revised in September to 51,184 tons and the following figures are based on the revised tonnage:

	Budget 1953	Year 1953	Year 1952
Average Daily Output (Agnew Only)		211.23	509.51
Tons Per Man Per Day (Combined)		5.49	7.798
Days Operated		257	257
Costs			
Total Underground Costs	$4.488	$4.768	$2.587
Total Surface Costs	.395	.359	.139
Total General Mine Expense	1.159	1.048	.540
Cost of Production	$6.042	$6.175	$3.266
Depreciation			
Plant and Equipment		.086	.051
Movable Equipment		.005	.004
Taxes			
Ad Valorem		.114	.060
Occupational		.020	- .004
Royalty		.074	.085
Total Depreciation and Taxes		.299	.196
Loading and Shipping Costs		.086	.101
Total Cost at Mine		$6.560	$3.563
Administrative Expense		.050	.050
Miscellaneous Expense and Income		.022	.001
Total Cost of Production		$6.632	$3.614
South Agnew Ore by Contract		2.348	2.555
Total Cost		$4.474	$3.144

b. Cost Comments

Total underground costs were $0.280 higher than the budget.
Total surface costs were $0.036 lower than the budget.
Total general mine expense was $0.111 lower than the budget.
Cost of production was $0.133 higher than the budget.

Low production and high development costs contributed considerably to the higher-than-budget costs. After the $80,000 of the deferred development charges for the lower Agnew ore body was spent, the rest of the development work had to be absorbed with the current mining cost. There were not enough places in which to put mining gangs to increase production in order to offset the low production and high costs of the development gangs. During December, considerable high silica development ore had to be sorted, thus increasing costs.

11. EXPLORATION and FUTURE EXPLORATION

Exploration drifts, raises, and test pits were driven as the development in the lower ore body progressed. An exploration drift was driven a short distance into the blanket formation near the center of the property. Another drift will be driven into the blanket formation near the north property line. Exploration will be conducted in the south half of the mine as development progresses in that area.

12. TAXES

	1953		1952		Increase Decrease	
Agnew Mine	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
Mineral	$46,166	$5,103.65	$72,370	$6,794.82		
Land,Bldg,Mach.	6,532	722.12	6,559	633.83		
Personal Property						
Equipment	3,080	340.48	3,430	322.04		
Stockpile			1,928	181.02		
Total	$55,778	$6,166.25	$84,287	$7,931.71	-$28,509	-$1,765.46
Average Mill Rate		110.55		93.89	/17.74%	

13. ACCIDENTS and PERSONAL INJURY

Name	Date of Injury	Place of Accident	Cause	Nature of Injury	Days Lost	Compensation Paid
Walter Purdy Sampler	4-16-53	Stockpile Loading Track	While climbing Gt.Northern railroad ore car to sample, foot slipped and he fell backward to ground.	Trombosed hemorrhoid Fracture of Coccyx	18	$115.20
Petro Masieniec Pocketman	4-15-53	Old Main Level Pocket	He was standing near pocket while one of the other men was using 10' blowpipe to blow dirt from pocket. Pipe struck him in stomack when pipe was being pulled back out of pocket.	Tenderness and redness over xiphoid process. Redness 3x5 cm.	9	$ 12.80

14. PROPOSED NEW CONSTRUCTION — None

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

a. Equipment Received 1953

1. Thor Sinker and Leg
1. Pomona Deep Well Pump

b. Proposed New Equipment — None

ALWORTH LAND RESERVE

ANNUAL REPORT

YEAR 1953

1. GENERAL

Operations were carried forward from the first of the year on a 2-shift, 5-day-week basis. Ore was placed in stockpile from January 2 to April 1. Loading of direct ore into cars from the pocket started on April 1 and continued until November 9, at which time stockpiling was resumed for the balance of the year. The direct ore stockpile was loaded out as cars were available from April 1 to April 27.

Pickands, Mather & Company did some rock and surface stripping during the first half of January and some rock and lean ore stripping during the first half of December.

The Rhude-Gilbert Company moved equipment into the Alworth on March 5 and started stripping operations on March 12. The area east of the coordinate 1550-E was made an open pit. The Rhude-Gilbert Company have stripped 1,048,667 yards of material to date, of which 39,000 cubic yards have been removed from the property, 151,000 cubic yards have been recast, and 261,895 cubic yards have been moved to the M. A. Hanna Company dump. The material moved to the Hanna dump is to take care of the stripping along the Impro line to free all Alworth ore to the line. A total of 23,000 tons of lean ore has been put in the Scranton lean ore dump, and a total of 122,611 tons of ore has been shipped from the open pit to date. Stripping operations have been discontinued until next spring.

2. PRODUCTION, SHIPMENTS, INVENTORIES

	Production	Shipments	Stockpile
Alworth Underground	119,209	103,291	15,918
Alworth Open Pit	122,611	122,611	____
	241,820	225,902	15,918

3. ANALYSIS

a. Analysis of Production

Alworth	Tons	Iron	Phos	Silica	Mn	Alum	Moist	Iron Natural
Underground	119,209	56.28	.075	9.49	1.14	2.11	17.33	46.527
Open Pit	122,611	55.21	.069	11.71	.90	2.47	16.99	45.830

b. Analysis of Shipments

Underground	114,793	56.22	.073	9.63	1.11	2.10	17.29	46.500
Open Pit	122,611	55.21	.069	11.71	.90	2.47	16.99	45.830

c. Analysis of Ore in Stockpile

Underground	15,918	56.43	.092	8.89	1.22	2.15	17.61	46.493

d. Complete Analysis of Shipments

Alworth	Iron	Phos	Silica	Mn	Alum	Lime	Mag	Sulf	Ign Loss	Moist
Underground	56.22	.073	9.63	1.11	2.10	.07	.07	.012	4.47	17.29

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

	Cubic Feet Per Ton	% Rock Deduction	Per Cent Recovery
Merch	14	0	100
Sil. Merch	14	10	100
Wash Concentrates	14	0	61
Low Grade Wash Concts.	14	0	46
Lean Low Grade Wash Concts.	14	0	60
Lean Wash Concentrates	14	0	50
Retreat Concentrates	14	0	40

Alworth Land Reserve
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b. Estimate of Ore Reserves as of December 31, 1953

Lease	Reserve 12-31-52	Mined	Balance After Mining	Changed by Re-estimate	Reserve 12-31-53
Alworth	1,691,115	241,820	1,449,295	--	1,449,295

c. Estimated Analysis of Ore Reserves

Alworth	Tons	Iron	Phos	Silica	Mang	Alum
Bess Merch Open Pit	64,802	57.18	.030	9.91	.22	.48
Non Bess Merch Open Pit	771,628	56.72	.075	10.15		
Bess Merch Underground	202,876	55.64	.034	12.51	.30	.72
Non Bess Merch Underground	291,970	57.11	.083	8.68		
Bess Wash Concts. Open Pit	8,798	57.29	.034	9.69		
Non Bess Wash Concts. Open Pit	53,690	55.27	.054	13.37		
Bess Wash Concts. Underground	23,551	57.65	.033	9.63		
Non Bess Wash Concts. Underground	9,531	55.27	.054	13.37		
Non Bess Retreat Concts. Open Pit	22,449	58.09	.083	10.46		
Total Alworth	1,449,295	56.78	.067	10.31	.28	.66
Bess Merch	267,678	56.01	.033	11.88	.28	.66
Non Bess Merch	1,063,598	56.82	.077	9.75		
Total Merch	1,331,276	56.66	.069	10.18	.28	.66
Bess Wash Concts.	32,349	57.55	.033	9.65		
Non Bess Wash Concts.	63,221	55.27	.054	13.37		
Total Wash Concts.	95,570	56.04	.047	12.11		
Non Bessemer Retreat Concentrates	22,449	58.09	.083	10.46		
TOTAL Alworth Concentrates	118,019	56.43	.054	11.80		
GRAND TOTAL Alworth	1,449,295	56.64	.068	10.31	.28	.66

Note

Scranton Ore Requirements for 1954	185,041 Tons
Rhude-Gilbert Requirements for 1954	651,389 Tons
Total (from Open Pit Merch)	836,430 Tons

5. LABOR and WAGES

a. Comments

The labor supply was ample throughout the year. The number of gangs employed ranged from eight to ten gangs. Local labor relations continued satisfactorily. A general increase of $0.085 increased the minimum for Job Class 1 from $1.435 to $1.520. A 1-cent increment between job classes was granted on July 1, 1953. The $0.085 per hour general increase and the 1-cent increment between job classes set a new minimum rate for Job Class 14 (Miners) of $2.235. The increment between job classes is now set at $0.055.

b. Production

	1953 Agnew	1953 Alworth	Combined Agnew-Alworth
Direct Ore	54,285	119,209	173,494
Number of Days Operated	257	257	257
Average Daily Production	211.23	466.320	637.840
Average Number of Men Working			137.75
Tons Per Man			
Per Miner			11.484
Total Underground			7.013
Total Mine			5.490
Average Rate Per Day			
Surface			15.70
Underground			20.27
Contract Miners			21.28
Total Mine			19.46
Amount Paid for Labor			614,990.16
Labor Cost Per Ton			3.545

6. SURFACE

a. Buildings and Repairs

The 6-stall garage has been converted into a combination blacksmith and electric shop. The dryhouse was re-arranged to accommodate a new lamp room, and more lockers were installed. An addition was built on the south end of the dry and made into a supply room.

b. Roads and Water Lines

The clear water line has been changed and installed away from the stripping and underground areas. A total of 2600 feet of new 4-inch line was installed. The Oliver Iron Mining Division also changed its clear water line by starting from our lines at the bridge and laying a new line to its mine buildings.

The access road to the mine via the old road on the Hanna property has been discontinued. A new access road over the Alworth property is now being used. The wooden bridge over the Oliver approach has been completed. A new road was made by the Rhude-Gilbert Company to the Scranton lean ore and rock dumps to replace the one made inaccessible by their stripping operation.

c. Miscellaneous General Construction

A new bridge was built over the Oliver approach to make a new access road into the mine.

7. UNDERGROUND MINES

a. Ventilating Shafts

The #2 ventilating shaft was abandoned due to stripping operations.

b. Development

The #1 and #2 north drifts were completed, including the opeing of the side drifts. The south shore line has been explored. A drift was driven east of the #1 north drift to explore the east shore line. This drift was driven far enough east to warrant driving another belt drift to the north.

c. Mining

Mining was carried forward during the year with an average of nine gangs employed--with six slicing, two drifting, and one timbering and moving the conveyor. The height of the slices varied from six to fourteen feet and varied in width from ten to twelve feet.

Mining (Con't)

Conveyor equipment was moved from the stripping area and used in the #3 south and #2 north drifts. Later on in the year, the conveyor was moved from the #3 south to the #1 north drift. Drifts were driven south between 800-E and 1300-E. The south shoreline was then mined in order to tap and drain the water; this did not seem to help the water situation in the north side too much. The working places continued to be extremely wet, slowing up mining and increasing mining costs. Most of the places have to blast twice per cut in order to keep from having trouble with the back. Most of the ore between 1100-E and 1550-E north of the main drift, with the exception of drift pillars, has been mined out during the year. The ore is of such a moist and sticky consistency and fine structure that it is extremely difficult to handle. It is messy on the conveying system, hard to get out of the surge pocket, and hard to work with on the stockpile. There does not seem to be any hope for better conditions in the future. The ore east of 1550-E is being mined by open pit methods.

d. Timber, Explosives, Etc.

The supply of timber was ample and of good quality. Tamarack was used in all of the drifting work, and jackpine was used in all of the slicing work.

Lineal Feet of Timber Used Per Ton of Ore	1.236
Cost Per Ton	
Timber	.222
Lagging, Poles, Boards	.223
Wire	.008
Explosives	.137
Pounds of Explosives Used Per Ton	.717

e. Pumping and Drainage

A small individual pump is used in most working places to improve working conditions and to keep the ore from being slushed through water in the drifts. Water was pumped from the open pit area back through the main drift to the shaft during the first half of the year.

8. BENEFICIATION — None

9. MAINTENANCE and REPAIRS

A continuous program of maintenance and repair was carried forward throughout the year as the need arose. A spill from the surge pocket damaged the shaft and the measuring pocket and caused a 3-day loss in production. The shaft and measuring pocket were repaired and air cylinders were installed on the surge pocket gates.

10. COST of PRODUCTION

a. Comparative Cost Statement

Product	Budget 1953	Year 1953	Year 1952
Direct Ore	100,000	118,845	96,176
Stockpile Overrun		364	110
Total	100,000	119,209	96,286
Average Daily Output		466.32	376.55
Tons Per Man Per Day (Combined)		5.49	7.798
Days Operated		272	308
Costs			
Total Underground Costs	$3.957	$3,807	$3.455
Total Surface Costs	.319	.351	.233
Total General Mine Expense	.696	.577	.463
Cost of Production	$4.972	$4.735	$4.151
Depreciation		—	—
Development		.014	.014
Taxes			
Ad Valorem		.006	.172
Occupational			.006
Royalty		.076	.064
Total Depreciation and Taxes		.096	.256
Loading and Shipping Costs		.085	.057
Total Cost at Mine		$4.916	$4.464
Administrative Expense		—	—
Miscellaneous Income and Expense		.050	.050
Total Cost of Production		$4.966	$4.514

b. Cost Comments

Total underground costs were $0.150 lower than the budget.
Total surface costs were $0.032 higher than the budget.
Total general mine expense was $0.119 lower than the budget.
Cost of production was $0.237 lower than the budget.

The underground costs are still higher than normal even though a figure was obtained which was lower than the budget. In most of the working places two or more blasts per cycle are required making a normal cycle per shift practically impossible. Sand runs are prevalent when a full cut is blasted because the wet gravel back cannot be held back. The extreme wet conditions slow production and hamper the transfer of the ore from the working place to the stockpile or railroad cars. The ore is of such consistency that even stockpiling is very difficult and contributes to slow production.

11. EXPLORATION and FUTURE EXPLORATION

Drifts and raises were driven as needed to outline the ore limits and check the height of the ore. Very little future exploration is necessary in the upper ore body.

12. TAXES

Alworth Mine	1953 Assessed Value	1953 Taxes	1952 Assessed Value	1952 Taxes	Increase Decrease Assessed Value	Increase Decrease Taxes
Mineral	$186,324	$28,736.75	$121,236	$15,965.57		
Land,Bldg,Mach.	10,602	1,635.15	10,296	1,355.88		
Personal Property						
Equipment	934	144.06	934	123.00		
Stockpile			761	100.22		
	$197,860	$30,515.96	$133,227	$17,544.67	$64,633	$12,971.29
Average Mill Rate		154.23		131.69	+17.12%	

12. TAXES (con't)

Tax Commission Reserve
May 1

1953	1,654,322 tons
1952	1,753,755 tons
	- 99,433 tons

Reclassification of underground reserve ore to open pit class rate increased mineral value, plus increase in mill rate of 17.12 per cent, increased the over-all tax 73.93 per cent. Of the above tax, 53.75 per cent was charged to Rhude-Gilbert, 21.37 per cent to Pickands, Mather & Company, and 4.01 per cent to the Oliver Iron Mining Division, leaving a net tax of $6,367.24 chargeable to Alworth underground operations, or a reduction from 1952 of $10,970.71.

13. ACCIDENTS and PERSONAL INJURY

Name	Date of Injury	Place of Accident	Cause	Nature of Injury	Days Lost	Compensation Paid
William Lehto	6-3-53	Contract 17	While lifting cap timber into place, staging gave way. Cap timber came down striking right leg near ankle.	Transverse fracture right fibula. Contusion of foot and ankle.	116	$855.35
Eugene Winkleblack Miner	8-11-53	Contract 6	While picking hitch for post pick struck rock, glanced off, striking right foot.	Laceration 3/4" between 4-5 metatarsals right foot. Deep puncture wound. X-ray negative for fracture.	15	$105.00

13. ACCIDENTS and PERSONAL INJURY (con't)

Name	Date of Injury	Place of Accident	Cause	Nature of Injury	Days Lost	Compensation Paid
Eli Knezovich Timber Trammer	7-22-53	6th Sublevel	Felt pain left side when lifting timber from timber truck.	Pulsating mass thru left inguinal ring.	39	$273.00
Paul Ouke	9-10-53	Contract 6	While miners were getting timber for contract, Ouke, standing in drift, was struck by timber as it was being pulled past him.	Left knee swollen, tender over medial side, injured knee capsule.	11	$ 42.00

14. PROPOSED NEW CONSTRUCTION -- None

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

a. Equipment Received

7 Penberthy Electric Sump Pumps

b. Proposed New Equipment -- None

CANISTEO MINE

ANNUAL REPORT

YEAR 1953

1. GENERAL

Mining conditions were generally good throughout the year. Except for two periods of very extreme rainfall on the 1st and 24th of July, the weather was favorable for both mining and stripping operations.

Repair work on the concentrating plant and pit equipment, started in the fall of 1952, was carried on from the first of the year until the beginning of ore season. Repairs to the stripping conveyor equipment were also underway during this time.

The construction of the Fine Ore Plant, which was started on November 17, 1952, continued until June 22, 1953, at which time the Fine Ore Plant went into operation.

Pit cleanup, in preparation for the 1953 ore season, was started on April 20 on a 3-shift, 5-day-week schedule which continued until the start of the ore season.

Ore operations began on April 27 on a 2-shift, 5-day-week basis, with the third shift continuing on cleanup and lean ore removal. Except for a short period of a 1-shift operation from August 24 to September 15, the 2-shift, 5-day-week schedule remained in effect until the close of the ore season on September 30. A total of 1,498,177 tons of gross crude ore was moved, which included 62,781 tons of screen rock. This ore was produced from three separate leases in the pit at an average rate of 7168 tons per shift.

The concentrating plant operated on the same schedule as the pit, receiving 1,435,396 tons of crude ore which produced 740,912 tons of concentrates for an average of 3545 tons of concentrates per shift.

The Fine Ore Plant which went into operation on June 22 operated on a 3-shift, 5-day-week schedule with two shifts on wash plant classifier overflow and the third shift on tailings basin material. A total of 36,606 tons of fine ore concentrates was produced from this plant for an average of 181 tons per shift.

Repairs to all concentrating plant equipment were started immediately at the end of the ore season.

Conveyor-dragline stripping was started on April 27 on a 20-shift-per week schedule, employing four crews. The schedule was changed to 3 shifts, 5 days per week on May 4. This continued until August 24 when the 20-shift schedule was resumed and remained in effect until the operation was shut down on November 3. 851,621 cubic yards of surface overburden were removed at an average of 1,733 yards per shift.

At the completion of this stripping, work was started immediately on moving of all conveying equipment to the new conveyor stripping site on the West Snyder forty.

At the close of the ore season, pit operations were immediately diverted to truck stripping. A 20-shift-per-week schedule went into effect on October 5 and remained in effect until December 31, when all pit operations were shut down. A total of 813,204 cubic yards of material were moved by truck stripping for an average of 2,833 yards per shift.

The construction of the second Heavy-Media unit was started on June 24 and except for the site preparation and excavation for piers, this work was done by contract. Construction was completed by the end of the year except for some electrical work and belt splicing.

Construction of a new mine entrance road and a new tailings pond dyke was started on October 5 and completed on December 31, 1953.

There was no exploratory drilling done during the year.

2. PRODUCTION, SHIPMENTS & INVENTORIES

a. Production by Grades

Crude	Tons
Snyder Wash	54,843
Snyder Retreat	203,131
Bovey Wash	21,453
Bovey Retreat	327,677
Hemmens Wash	128,987
Hemmens Retreat	699,305
Canisteo Tailings Basin	72,550
Total Crude	1,507,946

Concentrates

Product	Tons Bessemer	Tons Non Bessemer	Tons Total
Snyder Wash	21,371	11,313	32,684
Snyder Retreat	18,020	95,371	113,391
Snyder Classifier	4,041	1,044	5,085
Bovey Wash	4,411	8,580	12,991
Bovey Retreat	59,230	115,955	175,185
Bovey Classifier	4,437	2,358	6,795
Hemmens Wash	42,963	32,467	75,430
Hemmens Retreat	74,034	257,197	331,231
Hemmens Classifier	4,691	4,957	9,648
Total Concentrates Production by Grades	233,198	529,242	762,440

b. Shipments by Grades

Concentrates

Snyder Wash	21,549	12,190	33,739
Snyder Retreat	18,668	97,845	116,513
Snyder Classifier	4,041	1,044	5,085
Bovey Wash	4,514	8,966	13,480
Bovey Retreat	60,023	118,691	178,714
Bovey Classifier	4,437	2,358	6,795
Hemmens Wash	43,126	32,963	76,089
Hemmens Retreat	75,813	265,227	341,040
Hemmens Classifier	4,691	4,957	9,648
Canisteo Tailings Basin	11,355	3,723	15,078
Total Concentrates Shipments by Grades	248,217	547,964	796,181

c. Stockpile Inventories

Concentrates

Snyder Wash	336
Snyder Retreat	1,964
Bovey Wash	318
Bovey Retreat	2,693
Hemmens Wash	620
Hemmens Retreat	4,163
Total Stockpile Inventores	10,094

d. Production by Months

Crude Ore

Month	Snyder Wash	Snyder Retreat	Bovey Wash	Bovey Retreat	Hemmens Wash	Hemmens Retreat	Canisteo Tailings Basin	Total
April						44,447		44,447
May	5,086	41,604			10,899	265,285		322,874
June	2,595	92,344	4,567	94,301	26,584	91,178	1,609	313,178
July			14,705	161,797	27,251	102,067	15,560	321,380
August	27,845	8,988	2,181	71,579	6,316	131,285	23,069	271,263
Sept.	19,317	60,195			57,937	65,043	32,312	234,804
Total	54,843	203,131	21,453	327,677	128,987	699,305	72,550	1,507,946

e. Production Concentrates

April	357	1,263	198	1,546	323	22,604		26,291
May	2,587	22,186			5,161	121,450		151,384
June	1,634	51,773	2,572	50,194	15,044	43,320		164,537
July			9,092	85,697	16,196	48,694		159,679
August	16,015	5,009	1,129	37,748	3,555	59,315		122,771
Sept.	11,936	33,160			35,151	35,812		116,059
Oct.	155					36		191
Total	32,684	113,391	12,991	175,185	75,430	331,231		740,912

e. Production by Months - Concentrates (con't)

Month	Snyder Classifier	Bovey Classifier	Hemmens Classifier	Canisteo Tailings Basin	Total
June			1,010	407	1,417
July		4,905	2,361	2,747	10,013
August	1,432	1,890	2,796	5,118	11,236
Sept.	3,645		3,481	6,799	13,925
Oct.	8			7	15
Total	5,085	6,795	9,648	15,078	36,606

3. Analysis

a. Crude Ore

	Tons	Iron	Phos	Silica
Snyder Wash	54,843	46.76	.046	28.82
Snyder Retreat	203,131	46.14	.042	29.47
Bovey Wash	21,453	45.88	.045	27.47
Bovey Retreat	327,677	44.44	.047	30.43
Hemmens Wash	128,987	42.21	.039	33.26
Hemmens Retreat	699,305	39.99	.049	35.78
Canisteo Tailings Basin	72,550	26.08		58.71
Total	1,507,946	41.64	.046	34.28

b. Tonnage and Analysis of Concentrates Produced

	Tons	Iron	Phos	Silica	Mn	Alum	Moist.
Snyder Bessemer Wash	20,119	59.49	.043	10.20	.31	.37	7.91
Snyder Non Bessemer Wash	6,561	58.64	.056	10.57	.29	.44	7.65
Snyder Bessemer Retreat	10,650	58.36	.046	11.69	.33	.44	8.30
Snyder Non Bessemer Retreat	63,566	57.66	.051	12.64	.38	.48	8.53
Snyder Bessemer Classifier	4,041	58.93	.033	12.36	.27	.36	7.52
Snyder Non Bessemer Classifier	1,044	58.52	.039	13.24	.30	.39	8.67

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b. Tonnage and Analysis of Concentrates Produced (con't)

	Tons	Iron	Phos	Silica	Mn	Alum	Moist.
Bovey Bessemer Wash	3,194	56.32	.033	12.06	.27	.66	5.91
Bovey Non Bessemer Wash	3,296	54.66	.064	13.18	.96	.35	7.98
Bovey Bessemer Retreat	48,943	55.74	.038	13.73	.27	.38	6.91
Bovey Non Bessemer Retreat	66,782	56.41	.055	12.48	.35	.39	7.74
Bovey Bessemer Classifier	4,437	56.47	.036	14.57	.28	.43	8.85
Bovey Non Bessemer Classifier	2,358	57.47	.037	13.49	.27	.43	10.49
Hemmens Bessemer Wash	40,633	56.19	.035	11.95	.39	.36	7.28
Hemmens Non Bessemer Wash	23,530	54.21	.048	13.07	1.17	.41	8.50
Hemmens Bessemer Retreat	58,390	55.72	.036	12.53	.42	.43	8.03
Hemmens Non Bessemer Retreat	189,431	54.00	.054	12.68	1.41	.40	8.87
Hemmens Bessemer Classifier	4,691	54.43	.035	15.79	.52	.45	9.29
Hemmens Non Bessemer Classifier	4,956	53.26	.048	15.95	.84	.42	11.48
Canisteo Bessemer Tailings Basin	11,355	55.87	.036	14.53	.45	.41	8.37
Canisteo Non Bessemer Tailings Basin	3,723	55.14	.041	15.27	.44	.41	8.31
Canisteo Bessemer Stockpile 1953	38,224	56.00	.038	13.08	.29	.41	6.46
Canisteo Non Bessemer Stockpile 1953	167,594	55.99	.053	12.62	.42	.42	7.30
Total Canisteo Mine	777,518	55.73	.048	12.69	.66	.41	7.96

c. Tonnage and Analysis of Concentrates Shipped

	Tons	Iron	Phos	Silica	Mn	Alum	Lime	Mag.	Sulfur	Ign Loss	Moist.
Snyder Bessemer	20,119	59.49	.043	10.20	.31	.37	.26	.18	.011	3.38	7.91
Snyder Non Bessemer	6,225	58.63	.056	10.50	.29	.44	.27	.18	.010	4.23	7.63
Snyder Bessemer Retreat	10,650	58.36	.046	11.69	.33	.44	.26	.17	.010	3.41	8.30
Snyder Non Bessemer Retreat	61,602	57.66	.051	12.65	.38	.48	.26	.17	.010	3.33	8.53
Snyder Bessemer Classifier	4,041	58.93	.033	12.36	.27	.36	.20	.16	.009	2.19	7.52
Snyder Non Bessemer Class.	1,044	58.52	.039	13.24	.30	.39	.19	.16	.009	1.82	8.67
Bovey Bessemer	3,194	56.32	.033	12.06	.27	.66	.27	.18	.010	5.15	5.91
Bovey Non Bessemer	2.978	54.44	.067	13.19	.94	.34	.27	.18	.010	5.29	8.04
Bovey Bessemer Retreat	48,943	55.74	.038	13.73	.27	.38	.26	.17	.011	5.28	6.91
Bovey Bessemer Classifier	4,437	56.47	.036	14.57	.28	.43	.20	.16	.009	3.41	8.85
Bovey Non Bessemer Retreat	64,089	56.42	.055	12.44	.35	.39	.26	.18	.011	5.42	7.74
Bovey Non Bessemer Class.	2,358	57.47	.037	13.49	.27	.43	.19	.16	.009	3.08	10.49

c. Tonnage and Analysis of Concentrates Shipped (con't)

	Tons	Iron	Phos	Silica	Mn	Alum	Lime	Mag.	Sulfur	Ign. Loss	Moist.
Hemmens Bessemer	40,633	56.19	.035	11.95	.39	.36	.26	.18	.011	6.26	7.28
Hemmens Non Bessemer	22,910	54.17	.048	13.10	1.18	.41	.27	.19	.011	6.76	8.49
Hemmens Bessemer Retreat	58,390	55.72	.036	12.53	.42	.43	.26	.18	.010	6.24	8.03
Hemmens Non Bessemer Retreat	185,268	53.98	.054	12.68	1.43	.40	.26	.18	.010	7.11	8.87
Hemmens Bessemer Class.	4,691	54.43	.035	15.79	.52	.45	.20	.16	.009	4.74	9.29
Hemmens Non Bessemer Class.	4,956	53.26	.048	15.95	.84	.42	.19	.16	.009	5.80	11.48
Canisteo Bess. T.B. Fines	11,355	55.87	.036	14.53	.45	.41	.20	.16	.009	4.08	8.37
Canisteo Non Bess T.B.Fines	3,723	55.14	.041	15.27	.44	.41	.19	.16	.009	4.40	8.31
Canisteo Bess. Stockpile 1953	38,224	56.00	.038	13.08	.29	.41	.26	.17	.010	5.50	6.46
Canisteo N.B.Stockpile 1953	167,594	55.99	.053	12.62	.42	.42	.26	.17	.010	5.74	7.30
Canisteo Bess.S.P.1952	3,541	55.59	.038	12.98	.57	.36	.26	.17	.010	5.83	8.50
Canisteo N.B.S.P. 1952	25,216	56.35	.063	11.76	.44	.37	.26	.17	.010	6.08	6.96
Total Canisteo Mine	796,181	55.75	.048	12.66	.65	.41	.26	.17	.010	5.74	7.92

d. Mine Analysis of Ore in Stockpile

	Tons	Iron	Phos	Silica	Mn	Alum	Moist
Canisteo Stockpile Balance	10,093	56.69	.051	12.78	.54	.41	8.53

4. Estimate of Ore Reserves

a. Developed Ore - Factors Used

Concentrates	Cubic Feet Per Ton	Rock Deduction	Per Cent Recovery
Wash	14	0	60.66
Lean Wash	14	0	46.54
Low Grade Wash	14	0	58.62
Lean Low Grade Wash	14	0	48.81
Retreat	14	0	37.50

b. Ore Reserves as of December 31, 1953

Lease	Reserve 12-31-52	Mined	Balance After Mining	Changed by Re-estimate	Reserve 12-31-53
Bovey	1,861,634	194,972	1,666,662		1,666,662
Hemmens	2,841,624	416,310	2,425,314		2,425,314
Snyder	1,460,879	151,158	1,309,721		1,309,721
Total Canisteo	6,164,137	762,440	5,401,697		5,401,697

c. Estimated Analyses of Reserves

Concentrates	Tons	Iron	Phos	Silica	Mang	Alum
Bovey						
Bessemer Wash	415,572	57.67	.030	10.83	.42	.43
Non Bessemer Wash	866,814	57.41	.081	10.81	.77	.51
Bessemer Retreat	93,506	55.42	.030	13.21		
Non Bessemer Retreat	290,770	54.54	.085	13.12		
Total Bovey	1,666,662	56.86	.066	11.35	.66	.48
Hemmens						
Bessemer Wash	1,086,630	57.98	.032	10.71	.29	.50
Non Bessemer Wash	1,042,554	57.22	.073	10.70	.38	.51
Bessemer Retreat	138,641	55.75	.027	11.98		
Non Bessemer Retreat	157,489	58.58	.073	11.34		
Total Hemmens	2,425,314	57.56	.052	10.82	.33	.50
Snyder						
Bessemer Wash	666,375	59.51	.038	11.05	.17	.32
Non Bessemer Wash	620,414	57.82	.061	12.10	.20	.35
Bessemer Retreat	22,932	55.52	.030	11.14		
Non Bessemer Retreat						
Total Snyder	1,309,721	58.64	.049	11.55	.18	.33

c. Estimated Analyses of Reserves (con't)

Concentrates	Tons	Iron	Phos	Silica	Mang	Alum
Snyder						
Bessemer Wash	2,168,577	58.39	.033	10.84	.28	.43
Non Bessemer Wash	2,529,782	57.43	.073	11.08	.47	.47
Total Wash	4,698,359	57.87	.055	10.97	.38	.45
Bessemer Retreat	255,079	55.61	.028	12.35		
Non Bessemer Retreat	448,259	55.95	.080	12.50		
Total Retreat	703,338	55.83	.061	12.45		
Total Wash	4,698,359	57.87	.055	10.97	.38	.45
Total Retreat	703,338	55.83	.061	12.45		
Total Canisteo	5,401,697	57.61	.056	11.16	.38	.45

5. Labor and Wages

a. Comments

Labor relations during the year were generally good and labor supply was adequate. A general across-the-board increase of 8-1/2 cents per hour plus a 1-cent increase in the job class increment went into effect on July 1, 1953.

b. Comparative Statement of Production and Wages

Production	777,518
Number of Days Operated	112
Number of Shifts Operated	209
Average Daily Product	7,005
Average Product Per Shift	3,720
Average Number of Men Employed	164
Product Per Man Per Day	42.99
Average Wages Per Day	$ 18.23
Total Amount Paid Per Labor	$331,403.71
Labor Cost Per Ton	$ 0.426

6. General Surface

a. Buildings and Repairs

The remodeling of the shop building, started in 1952, was completed in February 1953. The major part of this job was the remodeling of the old round house which now serves as a machine shop.

b. Roads, Transmission Lines, Etc.

Conveyor stripping in the West Snyder forty during 1954 will cut off the existing mine entrance road. It was necessary, therefore, to construct a 1-1/2 mile strip of new road which connects with a county road to the west of the mine. Construction consisted of hauling 97,962 cubic yards of surface overburden from the truck stripping operation. This road is complete except for surfacing which will be done next spring.

Construction of 1,310 feet of 22,000 volt power line and a sub-station and 1,510 feet of 2,200 volt line to serve the Fine Ore plant was started in November, 1952, and completed in April, 1953. The construction of 2,800 feet of 2,200 volt power line to serve the stripping conveyor equipment in its new location was begun in October, 1953. This will be completed in 1954.

c. Miscellaneous General Construction

The construction of the Fine Ore plant, started November 17, 1952, continued until June 22, 1953, when this plant went into operation. The construction of this plant, scheduled to go into operation May 1, was held up because of the necessity of working the construction and electrical crews on projects of more importance at other mines. The concentrating machinery in the plant consists of five 24-inch DorrClones, five 8-pocket Dorrco sizers, and three stages of Humphrey spirals: thirty-six 5-turn spirals in the first stage, twenty-four 3-turn spirals in the second stage, and sixteen 3-turn spirals in the third stage.

Construction included a portable pumping and screening plant which is required in connection with mining the basin tailings.

Construction of the second Heavy-Media unit was started on June 24, and except for the site preparation and excavation for piers, this work was done by contract. Construction was completed by the end

c. Miscellaneous General Construction (con't)

of the year except for some electrical work and belt splicing which will be completed in April, 1954. This plant, a duplicate of the existing unit, will make it possible to treat all the ore by Heavy-Media down to plus 1/8 inch. The only important difference between the new unit and the existing plant is the use of an Akins screw-type separator in place of the Hardinge drum separator, and the use of Jeffrey drum magnetic separators in place of Dings belt-type magnetic separators. This plant will go into operation at the beginning of the 1954 season.

A new tailings pond dyke, approximately 7,700 feet long, was constructed to surround an area of approximately 110 acres. This area lies directly north of the existing tailings pond. The dyke was constructed by casting 160,000 cubic yards with a 54-B dragline and by hauling 218,638 cubic yards of material from the truck stripping operation, for a total of 378,638 cubic yards.

This construction is complete except for the installation of overflow pipes and the construction of an off-take ditch which will be completed in January, 1954.

The movement to and erection of all stripping conveyor equipment at the new site of the West Snyder forty was started November 3. It is estimated that this work will be completed in March, 1954.

Revision of the concentrate stockpiling system, which includes widening of the track guage for more stability, and installation of machinery for automatic travel was started in October, 1953, and completion is estimated about April, 1954.

7. Open Pit

a. Stripping

Truck stripping was started on October 1, 1953. A 20-shift-per-week schedule was put into effect on October 5 and continued until December 31, when all pit operations were shut down. Truck stripping during 1953 was covered by two separate E&A's: E&A No. 576 went into effect at the start of the stripping season and continued until October 16, 1953; it called for the removal of 234,500 cubic

a. Stripping (Con't)

yards of surface and lean ore material at an estimated cost of $0.416 per cubic yard. A total of 234,480 cubic yards were removed at a cost of $0.40 per cubic yard. When E&A No. 576 was expended, a new E&A, No. 601, was set up for the removal of 400,000 cubic yards at a cost of $0.3933 per cubic yard. Under this program, 578,724 cubic yards were removed at a cost of $0.287. The total yardage moved under the two E&A's was 813,204 cubic yards at a cost of $0.3196 per cubic yard and at the rate of 2,833 cubic yards per shift.

Forty-six per cent of the material removed by truck stripping during the year came from the east side of the pit. This material consisted mostly of lean formation and paint rock from the Hemmens lease. The remaining 54 per cent of the material moved was surface overburden from the North Bovey forty.

Conveyor-dragline stripping was started on April 27 on a 20-shift-per-week schedule employing 4 crews. On May 4, the schedule was changed to 3 shifts, 5 days per week. On August 24, the 20-shift-per-week schedule was again put into effect and remained so until the operation was shut down on November 3.

Conveyor-dragline stripping during 1953 was covered by two separate E&A's: E&A No. 492 was a carry-over from the previous season and was completed in July, 1953; it was set up for the removal of 800,000 yards at a cost of $0.250 per cubic yard. 657,113 yards were moved in 1952 and 357,747 yards in 1953 for a total of 1,014,860 cubic yards at a cost of $0.198 per cubic yard. E&A No. 577, effective July 1953, was set up for the removal of 480,000 cubic yards at $0.220 per cubic yard. 493,874 cubic yards were removed at a cost of $0.2264 per cubic yard. The total yardage moved under the two E&A's during 1953 was 851,621 cubic yards at a cost of $0.2145 per cubic yard and an average of 1,733 cubic yards per shift.

Following is a tabulation by leases of all stripping moved during 1953:

Leases	Surface	Cretaceous	Paint Rock	Lean Formation	Lean Ore	Total
Bovey	440,287			9,716		450,003
Snyder			33,676	8,188	2,212	44,076
Hemmens	851,621	7,556	34,431	155,016	122,122	1,170,746
Total	1,291,908	7,556	68,107	172,920	124,334	1,664,825

b. Open Pit Mining

The 1953 ore season started on April 27 on a 2-shift, 5-day-week schedule. Except for a short period of 1-shift operation from August 24 to September 15, this schedule remained in effect until the close of all ore operations on September 30.

The pit operated 209 shifts producing a total of 1,498,177 tons of gross crude which included 62,781 tons of screen rock. 7,168 tons of gross crude ore were mined per shift at a cost of $0.239 per ton.

849,313 tons of gross crude ore were produced from the Hemmens lease; 274,300 tons from the Snyder lease; and 374,564 tons from the Bovey lease.

72,272 tons of gross crude ore mined from the various lean ore stockpiles in the pit are included in the above tonnages.

Most of the Hemmens ore came from the upper horizon and consisted of a very lean low grade retreat ore that required mixing with wash ore in order to make a satisfactory concentrate. Ore from the Snyder lease came from the East and West Snyder forties. The ore from the East Snyder forty is in the same upper horizon as the Hemmens ore and is approximately of the same quality. The West Snyder ore continues to be high grade. The Bovey ore was mined from the upper horizon in the South Bovey forty and from the lower ore in the West Bovey. As in the case of the East Snyder, the upper ore in the South Bovey was similar to the upper ore in the Hemmens. The ore from the West Bovey is near the bottom taconite and is a fair retreat ore. This ore should improve with the use of the second Heavy-Media unit this coming season.

In addition to the crude ore, a total of 438,372 tons of pit rock, cleanup, and other lean materials were moved in mining. Most of this material was moved on the night shift and amounted to six tenths of a ton of lean material to a ton of concentrates. The cost of removal was $0.039 per ton of concentrates.

c. Pumping and Drainage

There were no changes in the pumping installation from the previous year. The mine water is pumped out of the pit in two stages. The water not used in concentrating plants overflows to the north and eventually enters Prairie River. Approximately 2,715 gallons per minute were pumped from the pit at a cost of $0.027 per ton of concentrates.

8. Beneficiation

a. Plant Operation

The concentrating plant operated the same schedule as the pit, starting on April 27 and shutting down on September 30. Crude ore feed to the plant totalled 1,435,396 tons which produced 740,912 tons of concentrates. Of this amount, 121,105 tons were wash concentrates and 619,807 tons were retreat concentrates.

The average output of concentrates was 3,545 tons per shift at a weight recovery of 51.62 per cent.

Except for periods when only wash concentrates were being produced, the Heavy-Media plant operated the same schedule as the washing plant. Operating 176-1/2 shifts, the Heavy-Media plant received 232,380 tons of feed and produced 202,761 tons of Heavy-Media concentrates, the remaining 29,619 tons being rejected as coarse tailings.

While 619,807 tons of retreat concentrates were produced, Heavy-Media concentrates accounted for only 202,761 tons, or 32.71 per cent of this total. This was due to the fact that only the plus 1/2 inch material could be treated in the one-unit plant. With the second Heavy-Media unit going into operation this coming season, making it possible to treat all the ore down to plus 1/8 inch, the grade of the concentrates should show a definite improvement, assuming that the same grade of crude ore can be mined.

The Fine Ore plant started operating on June 22 on a 3-shift basis with 2 shifts on wash plant classifier overflow and the third shift on basin tailings. A total of 339,934 tons of classifier overflow were treated producing 21,528 tons of concentrates at a recovery of 6.33 per cent of the material treated. 72,550 tons of tailings basin material were mined producing 15,078 tons of concentrates at a recovery of 20.78 per cent. A total of 36,606 tons of fine ore concentrates were produced from both sources at an average of 181 tons per shift.

Neither the recovery nor the grade of concentrates was up to expectations; however, difficulties inherent with the operation of any new plant were one of the major reasons for this, and it is anticipated that the grade of concentrates as well as production per shift should show considerable improvement in 1954.

a. Plant Operation (con't)

During the operating season it was necessary to stockpile 208,876 tons of concentrates of which 198,782 tons were removed, leaving a total of 10,094 tons in stockpile on January 1, 1954.

Following is a brief classification of the delays to the washing plant and Heavy-Media plant, showing time lost and percentage of delay time as compared to the total time worked.

Washing Plant

Source of Delay	Delay Hours	Per Cent of Total Hours Worked
Out of Ore	10.00*	0.60
Screening Plant Machines	9.26	0.55
Washing Plant Machines	11.33	0.68
Electric Power	12.34	0.74
Pumps and Pipe Lines	17.75	1.06
Conveyors	13.83	0.83
Concentrate Stacker	5.50	0.33
Railroad Cars and Tracks	1.00	0.06
Tailings Dyke	12.25	0.73
Total	93.26	5.58

Heavy-Media Plant

Out of Surge	15.50	1.10
Media Circuit	14.75	1.04
Conveyors	1.42	0.10
Electric Power	3.25	0.23
Heavy-Media Plant Machines	6.42	0.45
Concentrate Stacker	2.33	0.17
Pumps and Pipelines	1.83	0.13
Freezing	1.00	0.07
Total	46.50	3.29

* 2-1/2 hours due to storm on July 1.

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a. Plant Operation (con't)

Washing Plant	Tonnage	Per Cent of Total Mined	Per Cent Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined	211,456	100.00	43.43		
Less Rock Removed in Mining	1,475	.70	30.37		
Crude Ore Trans. to Screening Plant	209,981	99.30	43.52		
Less Rock Rejects in Screening Plant	4,698	2.22	31.06		
Crude Ore Entering Mill	205,283	97.08	43.81		
Concentrates Produced	121,105	57.27	56.53	58.99	76.12
Tailings (by Deduction)	84,178	39.81	25.51		
Retreat Plant					
Crude Ore and Rock Mined	1,318,354	100.00	41.53		
Less Rock Removed in Mining	30,158	2.29	31.39		
Crude Ore Trans. to Screening Plant	1,288,196	97.71	41.76		
Less Rock Rejects in Screening Plant	58,083	4.41	32.77		
Crude Ore Entering Mill	1,230,113	93.30	42.19		
Concentrates Produced	619,807	47.01	55.56	50.39	66.35
Tailings (by Deduction)	580,687	44.04	27.94		
Heavy Density Rejects	29,619	2.25	41.87		
Total Fine Ore Concentrates					
Crude Ore Through Plant	408,493	100.00	18.49		
Total Concentrates	36,606	8.96	55.85		
Total Fine Tailings (by Difference)	371,887	91.04	14.81		

9. Maintenance and Repairs

Winter repairs to the concentrating plant equipment were carried on from the first of the year to the beginning of ore season. The usual repairs to plant equipment took place with no major changes being made.

Repairs to plant equipment were again resumed at the end of the ore season. In addition, work was started on the installation of an additional secondary screen in the washing plant so that a more efficient screening job can be done. Work was also started on the remodeling of the concentrate stockpiling system, including the widening of the travelling conveyor gauge and the installation of controls for automatic travel, to aid in the proper bedding of concentrates in stockpile.

Overhauling of all pit equipment, including shovels, trucks, tractors, etc., underway at the end of the 1952 season, continued into 1953 until the beginning of ore season.

At the stripping conveyor, repairs to the conveying equipment, underway at the first of the year, were completed on March 15. After completion of conveyor stripping on November 3, the movement to and erection of all conveying equipment at the new site on the West Snyder forty was started and this work continues into 1954. Repairs to the equipment were also started as soon as it was moved into place. There are no major changes contemplated for the stripping conveyor equipment.

10. Cost of Production

a. Comparative Mining Costs

Product	1953	1952
Wash Concentrates	121,105	102,093
Retreat Concentrates	619,807	640,931
Classifier Product	21,528	
Tailings Basin Fines	15,078	
Total Product	777,518	743,024

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a. Comparative Mining Costs (Con't)

Product	1953	1952
Per Cent Recovery	49.45*	49.18
Average Product Per Shift	3,545*	3,231
Tons Per Man Per Day	42.99	45.95
Days Operated	112	101

*Excludes Fine Ore Plant Product

Cost	Budget 1953	Cost Per Ton 1953	Cost Per Ton 1952
Pit Operating	$ .289	$ .239	$ .261
Concentrating	.231	.104	.206
Rewashing Tailings	.760	1.321	
Loading Stockpile Ore	.007	.418	.012
General Mine Expense	.200	.189	.185
Winter & Idle Expense	.500	.595	.498
Cost of Production	$1.557	$1.520	$1.432
Depreciation - Plant & Equipment		.146	.083
Motorized Equipment		.072	.064
Movable Equipment		.006	.006
Amortization - Leasehold		.126	.134
Stripping			.372
Taxes - Ad Valorem		.240	.209
Occupational		.375	.256
Royalty		.043	.027
Total - Depreciation, Amortization, Taxes		$1.008	$1.151
Miscellaneous Expense and Income		.000	.001
Total Cost at Mine		$2.528	$2.584

b. Detailed Cost Comparison

Crude ore mining was $0.050 under the budget estimate of $0.289 and $0.022 under the 1952 costs.

The difference that was shown between the budget estimate and the 1953 costs can be accounted for by the decrease in maintenance costs on operating equipment such as shovels, trucks, and tractors. Increased daily production is the principal reason for decreased costs as compared to 1952.

Concentrating costs were $0.127 below the budget estimate and $0.102 lower than 1952 costs. The decrease of $0.127 can be accounted for almost wholly by increased production and recovery.

Cost of rewashing tailings, as noted, is the cost per ton of fine ore concentrates. Usual difficulties encountered in the operation of a new plant, plus the fact that recoveries on both tailings basin fines and classifier overflow were lower than anticipated, accounts for the increase in cost of $0.561 over the budget estimate.

General mine expense was $0.011 below the budget, and winter and idle was $0.095 above the budget.

11. Exploration and Future Exploration

No exploratory drilling was done at the Canisteo mine during the past year.

There are two areas of interest where additional drilling will have to be done before possible pit extensions can be definitely established. One is along the east side of the pit on the Hemmens and South Bovey forties; the other is the possible pit extension on the North Bovey forties. In both cases a very lean low grade concentrate is indicated.

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12. Taxes

	1953		1952		Increase or Decrease	
	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
Mineral	1,031,033	$157,191.29	1,126,475	$138,961.96		
Land, Bldgs, Machinery	60,768	9,484.66	60,591	7,654.54		
Personal Property						
Equipment	102,068	15,858.89	101,480	12,761.77		
Stockpile			1,721	212.30		
Tailings Basin Stockpile	26,720	4,073.73				
Total	1,220,589	$186,608.57	1,290,267	$159,590.57	-69,678	$27,018.00
Average Mill Rate		152.88		123.69	↑23.60%	

Tax Commission Reserve

	Tons 1953	Tons 1952	Increase or Decrease
May 1	6,137,845	6,907,161	-769,316
Tailings Basin	160,000	None	↑160,000

Production from tailings basin Fine Ore plant placed taxable value on tailings pond for the first time. Normal depletion by mining reducing mineral reserve value was offset by increase of 23.6 per cent in mill rate for taxing districts, or 16.92 per cent increase in over-all taxes.

13. Accident and Personal Injury

There were 77 slight accidents at the Canisteo mine during 1953. Four lost time accidents during the year are described as follows:

Name	Date of Injury	Cause	Nature	Days Lost
Kenneth Nelson	11-22-53	Shovel was backing up and Nelson was pulling chain attached to cable boat when he felt a pain in his back.	Tenderness - Librosis right upper gluteal muscles.	27
Arne Hepola	2-13-53	Hepola and partner were were carrying 2" round bar for repairing 5x12' screen when he felt a pain in his right side.	Right inguinal hernia.	10
Eero Eklin	6-25-53	While Eklin was grading on dump, grader blade struck rock and impact threw his right knew against gear case with control levers which are directly in front of the operator. Felt pain in right hip.	Right hip Dislocation of right sacroiliac joint.	6
Rolland Mellen	7-29-53	Mellen was standing near rock truck which was under the chute. A rock rolled from the truck striking him on his right leg.	Contusion of right leg.	19

14. Proposed New Construction

There is no major construction planned for 1954.

15. Equipment Received During 1953

2	34-ton Euclid Trucks on Rental
2	Pickup Trucks

16. Proposed New Equipment

2	Pickup Trucks
1	Service Truck
1	Tractor
1	Swing-Type Loader
4	34-ton Euclid Trucks on Rental
2400'	18-inch Pipeline
525'	36-inch Belting for #3 Crude Ore Conveyor

HAWKINS MINE

ANNUAL REPORT

YEAR 1953

1. GENERAL

Stripping operations at the MacKillican mine and construction of the second Heavy-Media unit and cyclone plant, in progress at the close of 1952, continued into 1953. A new screening plant was built near the MacKillican mine to serve both the MacKillican and upper Hawkins area. Stripping operations continued in the MacKillican mine until February 21, when operations were suspended and repair work on mobile and movable equipment was started and continued until spring ore operations.

Ore and stripping operations began on April 27 with the ore being worked alternately between the Hawkins and the MacKillican, and the stripping confined to the MacKillican. Both operations continued on a 3-shift, 5-day-week basis until the close of the ore season.

The International Harvester Company fine ore plant went into operation on June 8 on the same shift schedule as the pit and continued until September 22 when production requirements were completed.

Ore production from the pit was halted on October 15 after completion of ore requirements. Pit crews were then shifted to the MacKillican stripping program on the west side of the pit and plant crews began the winter repair program.

MacKillican stripping was completed on December 16 and Hawkins rock stripping was begun and continued into 1954.

2. PRODUCTION, SHIPMENTS and INVENTORIES

a. Production by Grades

Crude	Tons
Hawkins Wash	24,634
Hawkins Retreat	977,501
MacKillican Wash	340,862
MacKillican Retreat	539,981
Total	1,882,978
Hawkins Tailings Basin	150,133

Concentrates	Tons		
	Bessemer	Non Bessemer	Total
Hawkins Wash		14,219	14,219
Hawkins Retreat	110,654	268,556	379,210
Hawkins B Stockpile Overrun	12,351	16,846	29,197
Total	123,005	299,621	422,626
Hawkins Tailings Basin			78,164
MacKillican Wash			189,938
MacKillican Fines			12,566
MacKillican Retreat			208,900
Total			411,304

b. Shipments by Grades

Hawkins Wash		11,953	11,953
Hawkins Retreat	112,432	241,968	354,400
Hawkins B Stockpile	39,160	44,696	83,856
Total	151,592	298,617	450,209
Hawkins Tailings Basin Fines			78,164

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b. Shipments by Grades (con't)

Concentrates	Tons		
	Bessemer	Non Bessemer	Total
MacKillican Wash			189,938
MacKillican Fines			12,566
MacKillican Retreat			208,900
Total			411,304

c. Stockpile Inventories

Concentrates	Tons	Iron	Phos	Silica	Mn	Alum	Moisture
Hawkins Wash	6,088	56.42	.043	13.15	.48	.49	7.26
Hawkins Retreat	27,466	56.74	.043	13.03	.73	.44	7.38

d. Production by Months - Crude Ore

Month	Hawkins Wash	Hawkins Retreat	MacKillican Wash	MacKillican Retreat	Total	Hawkins Tailings Basin
April		40,656			40,656	
May	13,958	173,366	127,108		314,432	9,655
June	653	205,624	112,923	22,575	341,775	40,721
July		105,398	65,657	158,128	329,183	38,405
Aug.	10,023	275,703	29,659	38,614	353,999	40,915
Sept.		142,127		206,545	348,672	20,437
Oct.		34,627	5,515	114,119	154,261	
Total	24,634	977,501	340,862	539,981	1,882,978	150,133

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d. Production by Months - Concentrates

Month	Hawkins Wash	Hawkins Retreat	MacKillican Wash	MacKillican Fines	MacKillican Retreat	Total	Hawkins Tailings Basin
Apr.	139	14,981				15,120	
May	8,386	59,436	71,363			139,185	5,419
June	691	80,104	55,888	8,753	6,393	151,829	18,294
July		45,136	39,486	3,149	57,305	145,076	18,758
Aug.	5,003	107,076	19,239	664	16,159	148,141	26,311
Sept.		85,240	16		78,928	164,184	9,382
Oct.		16,434	3,846		50,115	70,395	
Total	14,219	408,407	189,838	12,566	208,900	833,930	78,164

3. ANALYSIS

a. Tonnage and Analysis of Crude Ore Produced

	Tons	Iron	Phos	Silica	Mang	Alum	Moist.
Hawkins Wash	24,634	46.66	.044	28.01			
Hawkins Retreat	977,501	41.07	.033	36.25			
MacKillican Wash	340,862	43.49	.047	31.00			
MacKillican Retreat	539,981	39.21	.039	38.09			
Total	1,882,978	41.04	.037	35.72			
Hawkins Tailings Basin	150,133	46.28	.029	29.39			

b. Tonnage and Analysis of Concentrates Produced

Hawkins Non Bessemer Wash	14,219	57.44	.050	11.68	.42	.63	7.14
Hawkins Bessemer Retreat	110,654	56.40	.038	12.94	.57	.46	6.91
Hawkins Non Bessemer Retreat	268,556	56.30	.042	13.25	.68	.42	6.96
Hawkins "B" Stockpile Bessemer Overrun	12,351	54.68	.029	17.08	.37	.37	7.63
Hawkins "B" Stockpile Non Bess Overrun	16,846	54.49	.030	17.27	.36	.38	7.77
Total	422,626	56.25	.040	13.39	.62	.43	7.00
Hawkins Tailings Basin	78,164	57.71	.034	12.74	.30	.49	8.71

b. Tonnage and Analysis of Concentrates Produced (Con't)

	Tons	Iron	Phos	Silica	Mang	Alum	Moist.
MacKillican Wash	189,838	57.24	.060	10.49	.32	.65	8.34
MacKillican Fines	12,566	52.70	.050	17.55	.39	.80	9.43
MacKillican Retreat	208,900	56.23	.056	12.22	.36	.52	7.58
Total	411,304	56.59	.058	11.58	.34	.59	7.99

c. Tonnage and Complete Analysis of Concentrates Shipped

Hawkins	Tons	Iron	Phos	Silica	Mn	Alum	Lime	Mag	Sulfur	Ign Loss	Moist
Non Bessemer Wash	11,953	57.09	.048	11.82	.40	.61	.28	.19	.010	4.78	6.78
Bessemer Retreat	112,432	56.37	.038	12.96	.57	.46	.28	.19	.010	4.60	6.88
Non Bessemer Retreat	241,968	56.25	.042	13.27	.67	.42	.27	.20	.011	4.34	6.91
"B" Stockpile Bessemer	39,160	53.91	.029	17.84	.37	.40	.27	.20	.011	3.60	7.81
"B" Stockpile Non Bessemer	44,696	53.63	.029	18.15	.41	.39	.28	.21	.010	3.61	7.83
Total	450,209	55.87	.039	14.04	.59	.43	.28	.20	.010	4.22	7.07
Tailings Basin	78,164	57.71	.034	12.74	.30	.49	.28	.21	.010	3.25	8.71
MacKillican											
Wash	189,838	57.21	.059	10.58	.32	.67					8.30
Fines	12,566	52.72	.051	17.52	.38	.82					9.54
Retreat	208,900	56.21	.057	12.17	.34	.53					7.62
Total	411,304	56.56	.058	11.60	.33	.60					7.99

d. Tonnage and Analysis of Ore in Stockpile

	Tons	Iron	Phos	Silica	Mn	Alum	Moisture
Hawkins Wash	6,088	56.42	.046	13.15	.48	.49	7.26
Hawkins Retreat	27,466	56.74	.046	13.03	.73	.44	7.38
Total	33,554	56.68	.046	13.05	.68	.45	7.36

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

Concentrates	Cubic Feet Per Ton	Rock Deduction	Per Cent Recovery
Wash	14	0	60
Lean Wash	14	0	40
Low Grade Wash	14	0	55
Lean Low Grade Wash	14	0	40
Retreat	14	0	40

b. Estimated Reserves

Hawkins Concentrates	Reserve 12-31-52	Mined	Balance After Mining	Changed by Re-estimate	Reserve 12-31-53
SW-NW 32, 57-22					
Open Pit Wash	237,106	21,606	215,500		215,500
Open Pit Retreat	1,056,918	125,100	931,818		931,818
Underground Wash	150,819		150,819		150,819
Underground Retreat	265,513		265,513		265,513
Total	1,710,356	146,706	1,563,650		1,563,650
NW-SW 32, 57-22					
Open Pit Wash	73,999	2,091	71,908		71,908
Open Pit Retreat	640		640		640
Underground Wash	687,053		687,053		687,053
Underground Retreat	56,138		56,138		56,138
Total	817,830	2,091	815,739		815,739
NE-SW 31, 57-22					
Open Pit Wash	911,015	13,296	897,719		897,719
Open Pit Retreat	1,170,487	175,180	995,307		995,307
Underground Wash	81,074		81,074		81,074
Underground Retreat	364,806		364,806		364,806
Total	2,527,382	188,476	2,338,906		2,338,906

b. Estimated Reserves (con't)

Hawkins Concentrates	Reserve 12-31-52	Mined	Balance After Mining	Changed by Re-estimate	Reserve 12-31-53
SE-NE 31, 57-22					
Open Pit Wash	538,965	6,423	532,542		532,542
Open Pit Retreat	707,486	78,930	628,556		628,556
Total	1,246,451	85,353	1,161,098		1,161,098
Total Hawkins	6,302,019	422,626	5,879,393		5,879,393

c. Estimated Analysis of Ore Reserves

Hawkins Concentrates	Tons	Iron	Phos	Silica
SW-NW 32, 57-22				
Bessemer Wash Open Pit	191,061	56.65	.031	10.53
Non Bessemer Wash Open Pit	24,439	57.27	.059	11.72
Bessemer Retreat Open Pit	598,443	56.26	.028	12.21
Non Bessemer Retreat Open Pit	333,375	56.05	.063	11.75
Bessemer Wash Underground	92,877	57.23	.030	11.16
Non Bessemer Wash Underground	57,942	57.48	.056	11.27
Bessemer Retreat Underground	213,398	56.39	.029	12.16
Non Bessemer Retreat Underground	52,115	56.39	.056	12.16
Total	1,563,650	56.40	.039	11.79
NW-SW 32, 57-22				
Bessemer Wash Open Pit	38,948	57.55	.035	10.56
Non Bessemer Wash Open Pit	32,960	57.62	.058	10.98
Bessemer Retreat Open Pit				
Non Bessemer Retreat Open Pit	640	55.56	.070	11.96
Bessemer Wash Underground	308,557	57.25	.031	10.48
Non Bessemer Wash Underground	378,496	55.75	.060	11.39
Bessemer Retreat Underground				
Non Bessemer Retreat Underground	56,138	55.56	.070	11.96
Total	815,739	56.47	.048	11.03

c. Estimated Analysis of Ore Reserves (con't)

Hawkins Concentrates	Tons	Iron	Phos	Silica
NE-SE 31, 57-22				
Bessemer Wash Open Pit	666,121	56.90	.029	11.57
Non Bessemer Wash Open Pit	231,598	58.02	.056	11.29
Bessemer Retreat Open Pit	789,404	56.01	.027	13.43
Non Bessemer Retreat Open Pit	205,903	56.21	.056	13.61
Bessemer Wash Underground	75,588	56.60	.028	11.60
Non Bessemer Wash Underground	5,486	57.05	.067	11.12
Bessemer Retreat Underground	326,588	55.97	.029	13.44
Non Bessemer Retreat Underground	38,218	55.97	.053	13.44
Total	2,338,906	56.50	.034	12.64
SE-NE 31, 57-22				
Bessemer Wash Open Pit	336,906	59.66	.033	10.64
Non Bessemer Wash Open Pit	195,636	57.05	.055	11.41
Bessemer Retreat Open Pit	318,366	59.09	.032	11.49
Non Bessemer Retreat Open Pit	310,190	59.32	.055	11.44
Total	1,161,098	58.97	.042	11.22
Total Bessemer Wash Open Pit	1,233,036	57.64	.031	11.12
Total Non Bessemer Wash Open Pit	484,633	57.56	.056	11.34
Total Wash Open Pit	1,717,669	57.62	.038	11.18
Total Bessemer Retreat Open Pit	1,706,213	56.67	.028	12.64
Total Non Bess Retreat Open Pit	850,108	57.28	.058	12.09
Total Retreat Open Pit	2,556,321	56.87	.038	12.46
Total Bessemer Wash Underground	477,022	57.14	.030	10.79
Total Non Bess Wash Underground	441,924	55.99	.060	11.37
Total Wash Underground	918,946	56.59	.044	11.07
Total Bessemer Retreat Underground	539,986	56.14	.029	12.93
Total Non Bess Retreat Underground	146,471	55.96	.061	12.42
Total Retreat Underground	686,457	56.10	.036	12.82
Total Hawkins Concentrates	5,879,393	56.96	.039	11.91

5. LABOR and WAGES

a. Comments

Labor was plentiful during the entire year with very little turnover. On July 1, an automatic raise of 8-1/2 cents across the board plus a 1-cent increment was put into effect, in accord with the Union contract.

b. Comparative Statement of Production

Product	833,930 Tons Concentrates
Number of shifts and hours	3 shifts, 8 hours
Average Number of Men working	254
Average wages per hour	2.20
Product per man per day	33.06
Labor cost per man per ton	.535
Total number of days	123
Amount paid for labor	$446,397.01

6. GENERAL SURFACE

a. Buildings and Repairs

The enlargement of the present warehouse was completed by moving in another vacated warehouse and annexing it to the present building.

Several truck doors were replaced in order to admit the larger trucks. Other than this, only minor and necessary repairs were made to mine buildings.

Twenty-one cars of scrap and rail accumulated over past years were loaded and sold.

b. Roads

Dump and surface roads were topped with Heavy-Media rejects to facilitate year-around operations.

c. Power Transmission

Two shovel power lines were installed--one in the Hawkins mine and one in the MacKillican mine.

7. OPEN PIT

a. Stripping

MacKillican stripping in 1953 continued on a 20-shift-per-week basis until February 21 when operations were suspended for winter repair. It was necessary to place a wall of rock along the toe of the south and east banks to hold the banks from sluffing. Stripping operations began again on April 27 concurrently with ore operations and continued on a 2 and 3-shift basis throughout the ore season.

After the close of the ore season on October 15, stripping operations were shifted from the East MacKillican to the West MacKillican on a 20-shift-per-week basis. A portion of the Hawkins conveyor was removed for a roadway. The material encountered in the West MacKillican, although wet, was much better than the clay and water that plagued us all through the East operation. Good progress was made and costs improved considerably.

On December 17, MacKillican stripping was completed and operations were shifted to the Hawkins rock stripping project under E&A No. 599. Except for 80,000 cubic yards of surface under the entrance road, MacKillican stripping is complete. Rock stripping under E&A No. 599 continued into 1954.

The following tabulation shows the stripping removed, man hours, and cost per yard for the year from the Hawkins and MacKillican mines:

a. Stripping (con't)

Hawkins Stripping

	Yards	Yards Per Shift	Man Hours	Cost Per Yard
E&A No. 493	140,618	1653	6,537	$0.363
E&A No. 574	425,415	3073	19,779	$0.346
E&A No. 599	173,210	2585	8,052	$0.763
	739,243	2689	34,368	$0.447

MacKillican Stripping

	1,649,880	3318	126,293	$0.340
Grand Total	2,389,123	3123	160,661	$0.373

b. Open Pit Mining

The 1953 ore season began on April 27 working alternately between the Hawkins and MacKillican mines. Hawkins production for the year came mostly from ore which had been placed in stockpile when the conveyor was moved in 1951. This, of course, made it difficult to maintain an even grade of concentrates as the ore came from areas that varied from a near wash to a poor retreat. A constant change in treating practice slowed production considerably. The ore coming from the pit bottom was used to upgrade the stockpiles. All possible ore was cleaned from the pit bottom area to establish a rock dump for screen rejects.

MacKillican production came entirely from the east side. Although concentrates were not in accord with drill hole results, a good grade of ore was realized. Here, again,

b. Open Pit Mining (con't)

the ore was cleaned to rock bottom in an attempt to secure permission to backfill with screen rock and relocate the pit entrance road, thereby releasing the ore under the present road.

Production in the pit was as follows:

		Main Plant Crude			Pit Crude		
Hawkins	Shifts	Plant Crude	Pit Rock	Tons Screen Rejects	Pit Crude	Tons Per Shift	Cost Per Ton
Wash	6	24,634	3,890	2,389	30,913	5152	$0.268
Retreat	178	977,501	15,780	105,617	1,098,898	6174	$0.268
Total	184	1,002,135	19,670	108,006	1,129,811	6140	$0.268
MacKillican							
Wash	63	340,862	349	23,610	364,821	5791	$0.284
Retreat	118	539,981	982	94,065	635,028	5382	$0.284
Total	181	880,843	1,331	117,675	999,849	5524	$0.284
Total Wash	69	365,496	4,239	25,999	395,734	5735	$0.276
Total Retreat	269	1,517,482	16,762	199,682	1,733,926	5858	$0.276
Grand Total	365	1,882,978	21,001	225,681	2,129,660	5835	$0.284

c. Pumping and Drainage

A 500-gallon-per-minute pump was installed in the MacKillican pit and intermittent pumping was carried on to keep the surface water at a minimum. Regular pumping in the Hawkins pit amounted to approximately 1500 gallons per minute.

d. General Pit Activities

Pit activities in the Hawkins mine were confined to the mining of iron ore and the removal of pit rock. There was no lean ore or waste movement of any consequence.

8. BENEFICIATION

a. Washing Plant

Operations at the washing plant began on April 12 and followed the same schedule as the pit. During the early part of the season, production was limited because of under-powered motors on the No. 1, No. 2, and No. 2-A conveyors; however, production increased when these motors were replaced by larger ones.

Although plant operations were fairly satisfactory, a great deal of time and money was spent during the entire season on sumps, chutes, pumps, etc., to improve spillage conditions. This work will be completed this winter and should greatly improve plant operations next year.

Plant and research results showed that a good deal of the ½ inch material in the Hawkins pit is of such low iron unit value that it could be scalped off at the primary screens, thereby saving the cost of retreating. This would result in a more desirable product and would increase the output of the Heavy-Media plant by not handling material which is finally a reject. During the past season whenever this type of ore was encountered, the Heavy-Media plant had to be slowed down in order to maintain grade.

A brief statement showing lost time and percentage of total operations is shown as follows:

a. Washing Plant (con't)

Washing Plant Delays

Source of Delays	Hours	Per Cent	Per Cent of 2939.25 Working Hours
Out of Ore	186.44	38.06	6.34
Crude Ore Pocket	1.33	0.27	0.05
Pit Screening Plant	39.28	8.02	1.34
Crude Ore Conveyors	58.15	11.87	1.98
Primary Screens	8.95	1.83	0.30
Crusher Feed Conveyor	2.08	0.42	0.07
Crushers	5.18	1.06	0.18
Crusher Discharge Screen	11.00	2.25	0.37
Crusher Product Conveyor	4.25	0.87	0.14
Crusher Discharge Screen Undersize Pump	0.80	0.16	0.03
Secondary Screens	17.16	3.50	0.59
Surge Pile Conveyor	9.54	1.94	0.32
Surge Pile Full	83.75	17.10	2.85
Classifiers	2.80	0.57	0.10
Coarse Concentrate Conveyor	16.12	3.29	0.56
Fine Concentrate Conveyor	2.96	0.60	0.10
Stockpile Conveyor	0.70	0.14	0.02
Stockpile Stacker	0.42	0.09	0.01
Railroad Cars and Tracks	0.42	0.09	0.01
Tailings Pumps	18.62	3.80	0.63
Clear Water Line	0.75	0.15	0.03
Miscellaneous Chutes and Launders	9.65	1.97	0.33
Miscellaneous Conveyors	1.27	0.26	0.04
Electric Power	8.26	1.69	0.28
Total	489.88	100.00	16.67

Recapitulation

Crude Ore Delays (Ore to Head of Mill)	282.20	58.22	9.70
Ore Processing Delays	204.68	41.78	6.97
Total	489.88	100.00	16.67

b. Retreat Plant

The second unit of the Heavy-Media plant went into operation with the beginning of the ore season. As the cyclone plant was not able to handle the entire feed, gravity had to be carried at maximum in order to grade the fine ore. It was also necessary a good deal of the time to slow the plant down in order to meet grade requirements because of oversize rock being trapped in the concentrator. With 2-inch scalping next year to improve the feed and with improvements to the cyclone plant to handle the fine ore, a very satisfactory operation is anticipated for this plant.

Heavy-Media plant delays were as follows:

Source of Delays	Hours	Per Cent	Per Cent of 2415.50 Working Hours
Out of Ore	150.83	53.08	6.24
Surge Pile Feeder	2.38	0.84	0.10
Feed Conveyor	6.75	2.38	0.28
Feed Preparation Screen	6.41	2.26	0.27
Akins Separator	1.42	0.50	0.06
Hardinge Separator	4.42	1.56	0.18
Coarse Concentrate Screen	5.67	2.00	0.23
Coarse Float Screen	3.00	1.06	0.12
Repair Float Screen Buggy	3.25	1.14	0.13
Circulating Media Pumps	10.17	3.58	0.42
Circulating Media Lines	8.75	3.08	0.36
Magnetic Separators	3.83	1.35	0.16
Densifiers	0.83	0.29	0.03
Crockett Sands Pump	10.57	3.72	0.44
Concentrate Conveyor	6.08	2.14	0.25
Stockpile Conveyor	2.00	0.70	0.08
Concentrate Stacker	1.50	0.53	0.06
Reject Conveyor	7.01	2.47	0.29
Reject Pocket	2.58	0.91	0.11
Rock Truck	2.00	0.70	0.08
Miscellaneous Chutes and Launders	1.42	0.50	0.06
Bucket Elevator	2.00	0.70	0.08
Demagnetizing Coil	1.50	0.53	0.06
Adjust Gravity	12.25	4.31	0.52

b. Retreat Plant (con't)

Source of Delays	Hours	Per Cent	Per Cent of 2415.50 Working Hours
Charging Plant	11.00	3.86	0.46
Clear Water	0.33	0.12	0.01
Electric Power	16.16	5.69	0.68
Total	284.11	100.00	11.76

Recapitulation

Crude Ore Delays (Ore to Head of Mill)	159.96	56.30	6.62
Ore Processing Delays	124.15	43.70	5.14
Total	284.11	100.00	11.76

c. Cyclone Plant

The cyclone plant went into operation in May with more than its share of the usual "bugs." There were more fines than had been anticipated in the areas mined and the plant was not able to handle the entire fines product. Natural magnetite in the ore presented another source of trouble. These, along with elevator and separator troubles, plagued us during the entire year. To better the operation next year, the feed will be 2 mm. which will reduce the feed from the 1/8 inch used last year. Wash sections on the sink-float screens will be installed to further reduce the size and quantity of the feed to the separators, where the natural magnetite gave us the trouble. With less feed, the elevator should be able to handle the total fines product; and this, along with the other improvements, should correct most of last year's troubles. Grade-wise, the plant did a fairly good job on the product treated.

d. International Harvester Tailings Basin Plant

d. International Harvester Company Tailings Basin Plant (con't)

The tailings basin plant went into operation on May 18 on a 2-shift basis and increased to 3 shifts in June. This plant operated very satisfactorily both as to grade and production. A total of 150,133 tons of crude ore was processed which produced 78,164 tons of concentrates in 247 shifts at an average recovery of 52 per cent--and varying from 65 per cent in the upper end of the pond to 7 per cent in the lower end.

A summary of the delays is shown as follows:

Source of Delays	Hours	Per Cent	Per Cent of 1952 Working Hours
Crude Ore	4.75	1.00	0.24
Dragline	59.65	12.60	3.06
Oiling Dragline	76.75	16.22	3.93
Move Screening Plant	38.50	8.13	1.97
Screening Plant	90.41	19.09	4.63
Feeder - Screen Plant	36.13	7.63	1.85
Trash Screen - Screen Plant	19.67	4.15	1.01
Pump - Screening Plant	52.33	11.05	2.68
Trash Screen - Plant	5.75	1.21	0.29
Trash Conveyor	2.75	0.58	0.14
Hydroseparator	31.00	6.55	1.59
Sizers	3.00	0.63	0.15
Concentrate Pumps	7.58	1.60	0.39
Railroad Cars and Tracks	18.08	3.82	0.93
Tailing Pump	1.00	0.21	0.05
Miscellaneous Chutes and Launders	0.50	0.11	0.03
Clear Water Pumps	7.58	1.60	0.39
Electric Power	18.08	3.82	0.93
Total	473.51	100.00	24.26

Recapitulation

Crude Ore Delays (Ore to Head of Mill)	383.94	81.08	19.67
Ore Processing Delays	89.57	18.92	4.59
Total	473.51	100.00	24.26

e. Complete Concentration Data for 1953

Hawkins Washing Plant Product	Tonnage	Per Cent of Total Mined	Per Cent Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined	30,913	100.00	42.59		
Less Pit Rock	3,890	12.58	26.70		
Crude Ore Trans. to Screen Plant	27,023	87.42	44.88		
Less Rock Rejects in Screen Plant	2,389	7.73	26.48		
Crude Ore Entering the Mill	24,634	79.69	46.66		
Coarse Concentrates Produced	14,219	46.00	57.44	57.72	71.06
Tailings by Deduction	10,415	33.69	31.94		
Hawkins Retreat Plant					
Crude Ore and Rock Mined	1,098,898	100.00	39.38		
Less Rock Removed in Mining	15,780	1.44	25.54		
Crude Ore Transferred to Screen Plant	1,083,118	98.56	39.58		
Less Rock Rejects in Screen Plant	105,617	9.61	25.77		
Crude Ore Entering the Mill	977,501	88.95	41.07		
Concentrates Produced	379,210	34.51	56.33	38.79	53.21
Heavy Density Rejects	125,933	11.46	40.15		
Tailings by Deduction	472,358	42.98	29.06		
MacKillican Mine Washing Plant					
Crude Ore and Rock Mined	364,821	100.00	42.44		
Less Pit Rock	349	.10	29.39		
Crude Ore Trans. To Screen Plant	364,472	99.90	42.45		
Less Rock Rejects in Screen Plant	23,610	6.47	27.43		
Crude Ore Entering the Mill	340,862	93.43	43.49		
Coarse and fine concentrates produced	202,404	55.48	56.96	59.38	77.77
Tailings by Deduction	138,458	37.95	23.80		

e. Complete Concentration Data for 1953 (con't)

MacKillican Retreat Plant	Tonnage	Per Cent of Total Mined	Per Cent Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined	635,028	100.00	37.06		
Less Rock Removed in Mining	982	.15	25.57		
Crude Ore Trans. to Screen Pl.	634,046	99.85	37.08		
Less Rock Rejects in Screen Pl.	94,065	14.81	24.82		
Crude Ore Entering Mill	539,981	85.04	39.21		
Concentrates Produced	208,900	32.90	56.23	38.69	55.48
Heavy Density Rejects	77,764	12.25	41.57		
Tailings (by Deduction)	253,317	39.89	24.45		

9. MAINTENANCE and REPAIRS

a. Comments

After completion of the stripping program in February, all mobile and movable equipment was given a thorough overhaul. As this property had been in operation continuously for two seasons, except for a short period during spring breakup, equipment was in rough shape and a good deal of repairs had to be made.

Plant equipment was repaired and ready for spring operation.

10. COST of OPERATIONS

a. Comparative Mining Costs - Hawkins and MacKillican Combined

Product	1953 Estimate	1953 Production	1952 Production
Wash Concentrates			
Coarse	400,000	214,979	321,829
Per Cent Recovery	60.00	54.32	49.86

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a. Comparative Mining Costs - Hawkins and MacKillican Combined

Product	1953 Estimate	1953 Production	1952 Production
Retreat Concentrates	400,000	589,615	184,699
Per Cent Recovery	43.96	34.00	45.79
Grand Total Production	800,000	833,791*	557,425**
Overrun Stockpile			139
Average Daily Output		6,780	6,716
Tons Per Man Per Day		33.06	34.94
Days Operated		123	83

*Includes 29,197 tons of 1951 stockpile overrun.
**Includes 50,897 tons of 1951 stockpile overrun.

Fine Ore Plant			
Concentrates	85,000	78,164	5,454
Per Cent Recovery	40.00	52.06	41.64
Average Daily Output		878	287
Tons Per Man Per Day		26.25	8.10
Days Operated		89	19
Costs			
Total Pit Operating	.274	.276	.572
Total Concentrating	.175	.187	.262
Loading Stockpile Ore	.015	.023	.035
General Mine Expense	.212	.227	.276
Winter & Idle	.658	.601	.605
Cost of Production	$2.099	$2.022	$2.287
Depreciation			
Plant and Equipment	[illegible]	.233	.182
Motorized Equipment		.041	.064
Movable Equipment		.010	.013

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a. Comparative Mining Costs - Hawkins and MacKillican Combined

Costs	1953 Estimate	1953 Production	1952 Production
Amortization - Stripping		.204	.619
Taxes			
Ad Valorem		.275	.364
Occupational		.028	.060
Royalty		.072	.110
Total Depreciation, Amortization, Taxes		$0.863	$1.412
Administrative Expense		.025	.050
Miscellaneous Expense and Income		- .010	.013
Grand Total Cost at Mine		$3.824	$3.762

b. Detailed Cost Comparison

The pit operating cost compares favorably with the budget and shows a decrease of $0.296 per ton from the 1952 costs. This was due to a higher rate of crude production per shift.

Concentration costs were increased $0.012 over the budget and decreased $0.075 from last year. An increase of $0.009 in operating the retreat plant was due primarily to changes in the cyclone plant in an endeavor to increase production. The decrease from 1952 costs, which included the cost of operating an additional second Heavy-Media unit and a cyclone plant, was due to stepped-up production.

The cost of loading stockpile increased $0.008 over the budget. Most of this ore was loaded out on week ends during the operating season, which meant paying labor on an overtime basis.

The differential in general mine expense charges was minor and tended to balance out fairly well.

11. EXPLORATION and FUTURE EXPLORATION

Hawkins drilling showed drill holes to a depth of 280 feet on churn drilling and 468 feet on structural drilling. MacKillican drilling showed drill holes to a depth of 210 feet on churn drilling and 100.5 feet on structural drilling. The total for the year was 1058.5 feet.

Holes in both the Hawkins and MacKillican were drilled to try to establish a rock dump area for screen rock. Future drilling will depend on the depletion of known ore reserves.

12. TAXES

	1953		1952		Increase Decrease	
Hawkins	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
Mineral	$642,705	$168,536.53	$675,206	$145,013.99		
Land,Bldg,Machinery	98,961	25,372.94	101,064	20,984.05		
Personal Property						
Equipment	120,284	31,422.53	138,088	29,638.77		
Stockpile	15,953	4,183.30	35,094	7,537.13		
I.H.C.Plant Basin Land	11,103	2,247.91				
Total	$889,006	$231,763.21	$949,452	$203,173.94	-$60,446	$28,589.27
Average Mill Rate		260.70		209.46	/ 24.46%	
I.H.C.Tailings Basin						
Personal Property S.P.	$ 50,517	$ 10,227.67	$ 51,466	$ 7,897.97	-$ 949	$ 2,329.70
Mill Rate		202.46		153.46	/ 31.93%	

Tax Commission Reserve

May 1	Tons-1953	Tons-1952	Increase Decrease
Hawkins	6,286,900	6,859,445	- 572,545
I.H.C.Tailings Basin	290,328	295,782	- 5,454

12. TAXES (con't)

An increase in mineral valuation by mining and decrease in equipment value by normal depreciation and reduction of stockpile decreased tax value by 6.79 per cent but mill rate increase of 24.46 per cent increased the over-all tax 14.07 per cent.

13. ACCIDENTS and PERSONAL INJURY

Name	Date of Injury	Cause	Nature of Injury	Days Lost	Compensation Paid
Lee Kraushaar	11-15-53	Kraushaar was getting out of truck; foot slipped; he came down stiff-legged to the ground. Felt back snap as feet struck ground.	No back pain on straight leg raising. No back tenderness. Had ruptured disc removed in 1947 at University Hospital. First recurrence of back pain.	11	$ 38.40
Albert Mottonen	8-9-53	Mottonen started down steel ladder after working on screen; slipped and fell about 12' landing on back.	Localized tenderness over spine of first left vertebrae. X-ray shows fracture of first lumbar vertebrae.	65	$490.20
Clarence W. Borg	7-15-53	Borg was helping load 30" pulley on to service truck. Pulley was being pulled by cable from truck wench. Slack cable slipped and pulley dropped back on ground striking Borg's left foot.	Swelling and discoloration dorsum left foot. X-ray negative for fracture.	7	$ 14.00

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13. ACCIDENTS and PERSONAL INJURY (con't)

Name	Date of Injury	Cause	Nature of Injury	Days Lost	Compensation Paid
Raymond Crane	5-13-53	Crane was tightening brakes on centercar of 3-car spot at loading pocket. Faulty brakes on 4 cars being dropped about 500' to the pocket got out of control,striking 3 cars under pocket. Crane thrown from platform against car; hung up in safety belt momentarily, then climbed up; stopped car 100' down track.Left leg sore. Couldn't walk on it.	Simple cominution	150	$971.60
John Colton	4-30-53	Backed up while washing floor with hose; stumble fell backwards feeling pain in right groin.	Right inguinal hernia.	31	$198.40
Richard Johnson	12-12-53	Lifted mole board on on grader;felt pain in right side.	Soft swelling adjacent to internal ring.	21	$128.00
Paul Vik	1-11-53	Felt pain in back as he was getting out of truck.	Back pain and tenderness.	6	$ 32.00
Edward Matsdorf	12-30-52	Rock flew up from a tire when truck was backing up to edge of dump striking him on left leg. Severe pain and swelling.	Bruised area tender and discolored. Cleansed with alcohol phisodex.	9	$ 53.33

14. PROPOSED NEW CONSTRUCTION

The installation of a 2-inch scalping unit in the Hawkins plant will be completed this winter. No additional construction is anticipated at this time.

15. EQUIPMENT and PROPOSED NEW EQUIPMENT

a. During the year the following equipment was received at the mine:

6 FFD Euclid Trucks
1 3/4 ton Pickup
2 150 hp Electric Motors for Conveyors

b. Proposed new equipment for 1954:

1 End Loader to replace present Lull loader.
3 FFD 34-ton Euclid Trucks.

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A stripping project started in the fall of 1952 was carried over into 1953 and involved the removal of surface material from the Hill-Walker lease under E&A No. 238. A 40-hour, 7-day-week schedule was maintained with four crews operating. This E&A was completed in October with a total of 1,254,169 cubic yards stripped during the program. Stripping was started in November on E&A No. 250 and completed early in December with a total of 584,433 cubic yards stripped to the end of the year. A further stripping program was initiated under E&A No. 263 and at the end of the year a total of 344,045 cubic yards was stripped. A total of 2,182,647 cubic yards was stripped under the above projects.

In addition to stripping, an extensive repair and maintenance program was conducted. Repairs to the pit conveyor and the screen plant were discontinued on January 12 but were resumed in the spring during milder weather. The mine shops were engaged in repairs to shovels, drills, haulage cars, and miscellaneous equipment; the truck shop was engaged in repairs to trucks, tractors, and graders. Three locomotives were bought from the Hill-Annex mine. Remodelling of the electric locomotives was completed. Removal of old converters, transformers, and switch panels was completed. The construction of an extension to the converter house was completed.

General repairs in the washing and retreat plants began in the fall of 1952 and continued through the winter and spring. Construction of the cyclone plant was about 80 per cent complete by January 1, 1953. The remaining work, which consisted of electrical installations, piping, and chute work, was completed by ore season.

Longer ore trains could be handled with the new Hill-Annex locomotives; this necessitated an extension of 150 feet to the tail track at the plant crude pocket. The pocket capacity at the plant was enlarged from 300 tons to 500 tons.

The clearing of the new tailings pond area was about 50 per cent complete by the end of the year 1952. This area was cleared and the new dyke was started. About one third of the length of the new dyke was completed to the full width, the remaining distance was narrowed so that the dyke could be completed for the 1953 season.

Stockpile loading was begun on April 1 and continued until ore season with 113,985 tons loaded out.

The ore season began on April 27 on a 3-shift, 5-day-week basis. Mining continued on the same schedule throughout the entire season until ore loading ceased on September 28.

Two shovels in ore, serviced by 7 to 10 trucks, produced 1,917,763 tons of crude wash and retreat ore from which was obtained 651,878 tons of concentrates. This figure includes 1952 and 1953 stockpile overrun. Shift production of crude averaged 6,147 tons with a recovery of 32.93 per cent. The recovery is based on actual 1953 production. No direct ore was produced.

Wash ore was mined from the Trumbull-Delaware #2 trespass area and from the Hill lease. From 79,708 tons of crude, 54,501 tons of concentrates were produced, including the 1952 and 1953 stockpile overrun. Shift production of washed concentrates averaged 2,564 tons with a recovery of 65.13 per cent based on actual 1953 production.

Retreat crude, totalling 1,838,055 tons, was mined from the middle and southeast areas of the Trumbull, from the north side of the Hill, with a small tonnage produced from the Hill scram area, and the center of the Hill-Walker. Trumbull retreat crude totalled 581,945 tons from which 188,324 tons of concentrates were obtained. Hill retreat crude, including that from the scram area, totalled 467,828 tons and produced 135,113 tons of concentrates. Hill-Walker retreat crude totalled 788,282 tons from which 245,997 tons of concentrates were produced. Shift production of retreat concentrates averaged 1,987 tons with a net recovery averaging 31.52 per cent.

Due to the shortage of railroad cars, 187,493 tons of concentrates were stockpiled during the season.

Following the close of mining operations, plant and conveyor systems were cleaned out and crews immediately shifted to stripping and repair work. The original fall stripping program involved the removal of surface from the east and west sides of the Hill-Walker and an approach into the Potter lease with stripping of an area large enough to mine sufficient crude to produce 50,000 tons of concentrates. Further stripping of the first lift from the north side of the Trumbull would eventually release Hill-Walker ore to the south property line.

Normal plant repairs were conducted after the ore season. The lower end of the surge tunnel was concreted, and the two dewatering classifiers were moved into the basement of the cyclone plant.

Stockpile loading was begun after the shutdown of mining operations and continued intermittently as cars were available until October 21 with 38,089 tons loaded out during this period. The stockpile was completely loaded out at year's end. A total of 334,473 tons of concentrates was loaded out during the calendar year of 1953.

During the latter half of June, a contract drill in the southeast Trumbull explored an area now mined below previous drilling. In September, a second drill was put into exploration work in the Hill pit bottom. After this work was completed, the drills were moved to the north side of the Trumbull to determine the final south limits of the Hill-Walker. This completed the drilling for the year.

2. PRODUCTION, SHIPMENTS, and INVENTORIES

a. Production by Grades

Crude	Tons
Hill Wash	58,521
Hill Retreat	417,038
Trumbull Wash	20,347
Trumbull Retreat	516,225
Hill-Walker Retreat	694,592
Total Crude	1,706,723

a. Production by Grades (con't)

Concentrates	Bessemer	Non Bessemer	Total
Hill Wash	16,710	22,461	39,171
Hill Retreat	55,126	85,489	140,615
Trumbull Wash	11,152	4,178	15,330
Trumbull Retreat	68,123	137,472	205,595
Hill-Walker Retreat	14,472	236,695	251,167
Total Concentrates	165,583	486,295	651,878

b. Shipments

Concentrates			
Hill Wash	16,710	22,461	39,171
Hill Retreat	62,325	128,177	190,502
Trumbull Wash	23,675	25,777	49,452
Trumbull Retreat	77,709	157,862	235,571
Hill-Walker Retreat	14,472	236,695	251,167
Total Concentrates	194,891	570,972	765,863

c. Stockpile Inventories

No balance in stockpile at end of year.

d. Production by Months - Crude Ore

Month	Hill Wash	Hill Retreat	Trumbull Wash	Trumbull Retreat	Hill Walker Retreat	Total
April				51,570		51,570
May				311,323		311,323
June	18,117	177,526	20,347	153,332		369,322
July	40,404	239,512			69,762	349,678
Aug.					368,476	368,476
Sept.					256,354	256,354
Total	58,521	417,038	20,347	516,225	694,592	1,706,723

e. Production by Months - Concentrates

April		3,261	2,584	31,599		37,444
May				108,683		108,683
June	11,104	61,356	12,348	62,473		147,281
July	26,000	73,757			19,265	119,022
Aug.					132,911	132,911
Sept.					93,821	93,821
Oct.	2,067	2,241	398	2,840	5,170	12,716
Total	39,171	140,615	15,330	205,595	251,167	651,878

3. ANALYSIS

a. Crude Ore

Product	Tons	Iron	Phos	Silica
Hill Wash	58,521	44.33	.032	32.71
Hill Retreat	417,038	36.66	.026	43.41
Trumbull Wash	20,347	41.82	.033	33.06
Trumbull Retreat	516,225	36.50	.037	42.48
Hill-Walker Retreat	694,592	40.80	.042	36.59
Total Crude	1,706,723	38.62	.036	39.86

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b. Tonnage and Analysis of Concentrates Produced

Product	Tons	Iron	Phos	Silica	Mn	Alum	Moisture
Hill Bessemer Wash	16,710	59.06	.037	11.50	.22	.40	6.52
Hill Non Bessemer Wash	22,461	58.68	.039	11.79	.19	.41	6.74
Hill Bessemer Retreat	55,126	57.48	.036	12.79	.15	.39	6.20
Hill Non Bessemer Retreat	85,489	57.53	.037	12.48	.18	.39	6.64
Trumbull Bessemer Wash	11,152	56.16	.043	12.91	.16	.35	6.16
Trumbull Non Bessemer Wash	4,178	56.12	.045	12.70	.18	.37	5.89
Trumbull Bessemer Retreat	68,123	56.91	.046	11.51	.14	.40	6.38
Trumbull Non Bessemer Retreat	137,472	56.67	.051	11.95	.15	.43	6.31
Hill-Walker Bessemer Retreat	14,472	57.25	.050	13.95	.21	.80	7.36
Hill-Walker Non Bessemer Retreat	236,695	58.56	.056	11.13	.18	.82	7.71
Total Concentrates Produced	651,878	57.69	.048	11.79	.17	.56	6.90

N.B. 8555 486,795 165,083

c. Tonnage and Complete Analysis of Concentrates Shipped

Product	Tons	Iron	Phos	Silica	Mn	Alum	Lime	Mag	Sulf	Ign. Loss	Moist.
Hill Bessemer Wash	16,710	59.06	.037	11.50	.22	.40	.26	.16	.010	2.83	6.52
Hill Non Bessemer Wash	22,461	58.68	.039	11.79	.19	.41	.26	.16	.010	3.11	6.74
Hill Bessemer Retreat	62,325	57.14	.037	13.03	.15	.39	.27	.17	.011	4.13	6.17
Hill Non Bessemer Retreat	128,177	56.68	.040	13.08	.18	.41	.27	.17	.011	4.67	6.44
Trumbull Bessemer Wash	23,675	55.59	.043	13.75	.15	.37	.25	.17	.011	5.65	5.85
Trumbull Non Bess Wash	25,777	55.74	.047	13.40	.15	.39	.26	.16	.011	5.76	5.48
Trumbull Bessemer Retreat	77,709	56.57	.045	12.06	.14	.40	.26	.17	.010	5.91	6.23
Trumbull Non Bess Retreat	157,862	56.57	.050	12.13	.15	.42	.24	.16	.010	5.83	6.15
Hill-Walker Bessemer Retreat	14,472	57.25	.050	13.95	.21	.80	.25	.17	.011	2.55	7.36
Hill-Walker Non Bess Retreat	236,695	58.56	.056	11.13	.18	.82	.25	.17	.011	3.50	7.71
Total Concentrates	765,863	57.32	.048	12.15	.17	.54	.26	.17	.011	4.56	6.71

d. Mine Analysis of Ore in Stockpile

No ore in stockpiles.

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

Concentrates	Cubic Feet Per Ton	Rock Reduction	Per Cent Recovery
Wash	14	0	60
Lean Wash	14	0	48
Low Grade Wash	14	0	57
Lean Low Grade Wash	14	0	45
Retreat	14	0	36

b. Ore Reserves Estimated as of December 31, 1953

Lease	12-31-52 Reserve	Mined	Balance After Mining	Changed by Re-estimate	Reserve 12-31-53
Hill	1,300,859	179,786	1,121,073		1,121,073
Trumbull	1,486,605	220,925	1,265,680	87,984	1,353,664
Walker	1,157,905	251,167	906,738		906,738
Total Hill-Trumbull	3,945,369	651,878	3,293,491	87,984	3,381,475

c. Estimated Analyses of Ore Reserves

Hill	Tons	Iron	Phos	Silica	Mang	Alum
Non Bessemer Merch	120,805	59.27	.064	10.50		
Bessemer Wash Concts.	440,352	61.51	.027	10.77	.10	.48
Non Bessemer Wash Concts.	144,091	60.39	.055	11.02	.12	.48
Bessemer Retreat Concts.	301,119	58.67	.030	12.28		
Non Bessemer Retreat Concts.	114,706	58.32	.049	12.20		
Total Hill	1,121,073	60.04	.038	11.32	.10	.48

c. Estimated Analyses of Ore Reserves (con't)

Trumbull	Tons	Iron	Phos	Silica	Mang	Alum
Bessemer Wash Concts.	58,708	58.16	.035	9.19	.14	.42
Non Bessemer Wash Concts.	266,348	57.85	.056	11.67	.11	.51
Bessemer Retreat Concts.	51,276	56.65	.029	12.35		
Non Bessemer Retreat Concts.	977,332	56.39	.057	12.50		
Total Trumbull	1,353,664	56.76	.055	12.19	.12	.49
Walker						
Bessemer Wash Concts.						
Non Bessemer Wash Concts.	60,053	59.50	.045	11.30		
Bessemer Retreat Concts.						
Non Bessemer Retreat Concts.	846,685	56.14	.051	13.19		
Total Hill-Walker	906,738	56.36	.051	13.06		
Non Bess Merch	120,805	59.27	.064	10.50		
Bessemer Wash Concts.	499,060	61.12	.028	10.58	.10	.47
Non Bessemer Wash Concts.	470,492	58.84	.054	11.42	.11	.50
Total Wash Concts.	969,552	60.01	.041	10.99	.11	.48
Bessemer Retreat Concts.	352,395	58.38	.030	12.29		
Non Bessemer Retreat Concts.	1,938,723	56.40	.054	12.78		
Total Retreat Concts.	2,291,118	56.70	.050	12.70		
Total Wash Concts.	969,552	60.01	.041	10.99	.11	.48
Total Retreat Concts.	2,291,118	56.70	.050	12.70		
Total Hill-Trumbull Concts.	3,260,670	57.68	.047	12.19	.11	.48
Total Hill-Trumbull	3,381,475	57.74	.048	12.13	.11	.48

5. LABOR and WAGES

a. Comments

The labor supply was ample during 1953, although most new men were inexperienced.

a. Labor Comments (con't)

A 1-cent increment in job classes was effective on July 1, 1953, as agreed in the labor contract of September 15, 1952.

Labor relations were normal.

b. Comparative Statement of Production and Wages

Product	651,878
Number of Shifts (8-Hour)	3
Average Number of Men Working	204
Average Wages Per Day	18.08
Production Per Man Per Day	24.93
Labor Cost Per Ton	0.725
Total Number of Days Worked	104
Amount Paid for Labor	$472,731.43

6. GENERAL SURFACE

A. Buildings and Repairs

Houses and other buildings were repaired and painted as required. The east wall of the present converter house was removed and an extension was constructed to accommodate the larger generators and switch panels needed for the locomotives bought from the Hill-Annex.

B. Roads, Transmission Lines, Tracks, and Construction

A revised power line to the plant was installed; this line was necessary because of the plotting of "Starvation Hill."

Normal track repair was carried on throughout the year, with bridge repair done on week ends. After the ore season, a complete repair job was started on the bridge near the washing plant.

Construction of the second Heavy-Media unit, underway in 1952, was completed for the 1953 ore season.

7. OPEN PIT

a. Stripping

At the start of the year, a stripping project in the Hill-Walker lease was in progress. This program was a continuation of the 1952 project opening up the Hill-Walker for the initial shipment of ore for the 1953 ore season. Three shovels and a standby shovel, serviced by 17 to 20 trucks, were used on this stripping. The work was completed on January 10 with 230,767 cubic yards moved in January. On April 20, cleanup of a small amount of surface from the north bank of the Trumbull was begun. This work was completed on April 24 with a total of 28,498 cubic yards moved for the period.

Shift production on the January project averaged 9,507 cubic yards. On the cleanup work in April, shift production was reduced to an average of 2,036 cubic yards. Cost on this project in 1953, excluding depreciation, averaged $0.222 per yard.

Following the close of mining operations in September, one shovel was moved to the Potter and two shovels to the Hill-Walker, with one of these to be used as a standby. The original stripping program called for stripping from the Potter, Trumbull and Hill-Walker leases. This work consisted of making an approach to the Potter, stripping an area large enough to produce 50,000 tons of concentrates from the Potter, stripping enough Trumbull to get into the Potter, and widening out the Hill-Walker pit to produce 225,000 tons of concentrates. Later it was decided to strip until January 1, 1954; this program called for stripping of the first lift from the west and northeast sides of the Hill-Walker and stripping the first lift on the north side of the Trumbull dumps to eventually expose the Hill-Walker ore to the south property line. A 40-hour, 20-shift-per-week schedule was maintained using four crews. Stripping was dumped on lands immediately north of the Hill-Walker pit area. Two shovels and 10 to 13 trucks were used; a third shovel was used when needed to improve operations, start new cuts, etc.

a. Stripping (con't)

The stripping project was completed on December 31 with a total of 1,921,716 cubic yards stripped since the start of this program. Of this total, 174,866 cubic yards were from the Potter, 289,236 cubic yards from the Trumbull, and 1,457,614 cubic yards from the Hill-Walker. Shift production on this project averaged 6,988 cubic yards. Stripping costs averaged $0.194 per yard, about $0.049 under the budget.

Following completion of stripping, all shovels were moved to the stripping garage where general shovel repairs will be done after the first of the year. All other equipment was brought to the shop for inspection and repair.

The following tabulation shows the stripping material moved in 1953:

Lease	Surface Cubic Yards	Waste Cubic Yards	Total Cubic Yards
Hill	378		378
Trumbull	317,356	1,666	319,022
Hill-Walker	1,688,381		1,688,381
Potter	174,866		174,866
Total	2,180,981	1,666	2,182,647

b. Open Pit Mining

The 1953 ore season began on April 27 on a 3-shift, 5-day-week schedule which was maintained until the end of ore season on September 28.

Operating two shovels and 7 to 10 trucks in normal mining operations, the mine produced 1,917,763 tons of crude ore in 104 days at an average shift production of 6,147 tons. From the above crude tonnage, 211,040 tons of ∠ 4" waste rock was screened out in the pit. The balance of 1,706,723 tons was sent to the plants at an average rate of 5,470 tons per shift.

b. Open Pit Mining (con't)

Screen rock constituted 12.37 per cent of the total crude ore, 1.07 per cent of the wash crude, and 12.91 per cent of the retreat. Rock percentage in the wash ore doubled over the previous year; rock percentage in the retreat increased .74 per cent over last year; the combined total increased 1.83 per cent over the 1952 season. When the Hill-Walker operation was first started, the percentage was high but tapered to a normal average after the pit was enlarged.

As in the past several years, retreat ore constituted the major portion of the pit production, totalling 1,838,085 tons as compared with 79,708 tons of wash ore crude. The Trumbull lease produced 581,945 tons of retreat crude from the middle and southeast areas; the Hill produced 467,828 tons from the north side; and the Hill-Walker produced 788,282 tons from the center.

One shovel and two trucks worked most of the season in the Hill scram area sorting retreat ore from rocky areas. This ore, approximately 84,898 tons, was stocked and reloaded with other Hill ores. Rock sorted out was hauled to the rock dump.

Wash ore was produced from the Trumbull-Delaware #2 trespass and from the north side of the Hill lease.

During mining operations, rock too large to pass through the screening plant was sorted and loaded out at the shovel. This pit rock amounted to 42,195 tons which, combined with 25,042 yards, or 43,824 tons, of sand and waste cleanup, gave a total of 86,019 tons of waste material removed from the mine during the operating season. Removing this material cost approximately $0.005 per ton of crude ore moved.

Mining conditions during the 1953 operating season were generally satisfactory. There were few heavy rains, equipment breakdowns were average, and the whole operation could be termed normal.

c. Pumping and Drainage

Pit pumping was no problem during the year. The Oliver Iron Mining Division lowered the Gross-Marble pit bottom and dug a sump so that they had to do the pumping for the 1953 season. The Oliver installed the pumping equipment, but used our discharge line.

The drainage ditch on the north side of the Hill lease was widened and lowered. A temporary drainage ditch was dug around the proposed Potter mining area.

Water was still pumped from the lower ditch to the upper ditch in the Hill-Walker pit area.

Pumping and drainage cost was $0.001 per ton of crude ore.

d. General Pit Activity

Pit activity during the year consisted of surface stripping, mining, scramming, and minor exploratory drilling. Except for pit rock and sand cleanup, there was no movement of waste or lean ore.

8. BENEFICIATION

a. Washing Plant

Operation of the washing plant began on April 27 and continued until September 21 on a 3-shift, 5-day-week basis with general repair and maintenance work conducted on Saturdays. During the year, the plant operated 312 shifts treating 1,706,723 tons of crude ore; of this total, 78,868 tons were wash and 1,627,855 tons were retreat crude ore. The plant produced 49,452 tons of washed concentrates and 779,001 tons of Heavy-Media feed. Plant production during 1953 averaged 775.78 net tons per hour of crude to the plant. Recovery of washed concentrates was approximately 62.70 per cent and Heavy-Media feed approximately 47.85 per cent. This is in contrast to a recovery of 50.08 per cent for Heavy-Media feed in 1952, which, in a large measure, reflects the increased amount of scalped ½" material amounting to 9.63 per cent of the retreat crude.

a. Washing Plant (con't)

Finer crushing through use of the secondary crushing circuit in conjunction with the scalping program proved highly valuable in helping to produce a much better liberated retreat feed, as well as ore, which was somewhat higher in grade. This circuit was used a great deal more than in the preceding season inasmuch as mechanical bugs were eliminated.

Washing plant delays totalled 11.86 per cent of the available operating time. As in years past, by far the major portion of this total was caused by lack of crude ore to the mill. It was hoped that this figure would be reduced this season because of the increased capacity of the haulage system. There seems to be little doubt that the new haulage system and the enlargement of the crude ore pocket did materially reduce this source of delay. The greatest portion by far of the crude ore delay was sustained in a relatively short period of time when the Hill-Walker pit was first opened up. A painty merch structure of ore at first encountered, along with excessive moisture, made conveying and screening extremely difficult, and a limited operational area in the pit at the outset greatly hindered production of crude ore, causing the sizable delay noted.

Following is a brief summary of delay time:

Source of Delay	Hours	Per Cent	Per Cent of 2496 Working Hours
Out of Ore	183.83	62.11	7.36
Crude Ore Pocket	1.00	.34	.04
8-Foot Pan Conveyor	2.42	.82	.10
Crude Conveyor	.25	.08	.01
Primary Screens	3.66	1.24	.15
Crushers	.67	.23	.03
Scalp Rock Belt	1.17	.40	.05
Rock Pocket	.67	.23	.03
Rock Truck	1.58	.53	.06
Secondary Screens	5.25	1.77	.21

a. Washing Plant (con't)

Source of Delay	Hours	Per Cent	Per Cent of 2496 Working Hours
Surge Pile Feed Belt	22.82	7.71	.91
Surge Pile Full	15.50	5.24	.62
66-Inch Classifiers	1.50	.51	.06
Ball Mill	.75	.25	.03
Cyclone Feed Bins Full	3.50	1.18	.14
Dewatering Classifier	4.75	1.60	.19
Main Tailings Pump	2.50	.84	.10
Miscellaneous Chutes and Launders	1.16	.39	.05
Electric Power	17.00	5.74	.68
Changing Ore	.75	.25	.03
Plant Tie-up for Weekend	25.25	8.54	1.01
Total	295.98	100.00	11.86
Crude Ore Delays (Ore to Head of Mill)	187.50	63.35	7.51
Ore Processing Delays	108.48	36.65	4.35
Total	295.98	100.00	11.86

b. Retreat Plant

Retreat plant operation began on April 27 and followed the same work schedule as the pit and wash plant. During periods when the wash plant was down for repairs or operating on wash ore, the retreat plant operated on feed from the surge pile. From 779,001 tons of Heavy-Media feed, 421,493 tons of Heavy-Media concentrates were produced at a weight recovery of 54.11 per cent. Total retreat crude delivered to the washing plant was 1,627,855 tons from which 569,434 tons of total retreat concentrates were produced at a weight recovery of 34.98 per cent.

The over-all grade of Heavy-Media concentrates was slightly better than that which were produced during the previous season. This was in large measure due to the higher grade of crude and concentrates

b. Retreat Plant (con't)

produced from the Hill-Walker pit, as well as a reflection of the finer crushing and scalping of lean /2" material along with cyclone treatment of the fines.

Retreat plant delays were not considered to be excessive, although they were double those of the previous year. Out of ore caused the largest delay time while the washing plant was processing wash ore. Following is a brief resume of retreat plant delays:

Source of Delay	Hours	Per Cent	Per Cent of 2488 Working Hours
Out of Ore	24.70	17.92	1.39
Out of Ore-Processing Wash Ore	88.99	45.93	3.58
Emergency Wash Plant Delays	.50	.26	.02
Surge Pile Feeder	1.00	.52	.04
Heavy-Media Feed Conveyor	3.25	1.68	.13
Feed Preparation Screen	5.00	2.58	.20
Coarse Concentrate Wash Screen	3.00	1.55	.12
Coarse Reject Wash Screen	4.08	2.11	.16
Circulating Media Pumps	4.50	2.32	.18
Magnetic Separators	.50	.26	.02
35-Foot Thickener	1.00	.52	.04
Rock Pocket	3.50	1.81	.14
Rock Truck	.33	.17	.01
Railroad Cars and Tracks	2.50	1.29	.10
Miscellaneous Chutes and Launders	.59	.30	.02
Adjusting Gravity	2.25	1.16	.09
Tie-up for Weekend	29.50	15.23	1.20
Electric Power	8.50	4.39	.34
Total	193.69	100.00	7.78
Crude Ore Delays (Ore to Head of Mill)	128.44	66.31	5.16
Ore Processing Delays	65.25	33.69	2.62
Total	193.69	100.00	7.78

b. Retreat Plant (con't)

Concentration Data
Washing Plant

Product	Tonnage	Per Cent Total Mined	Per Cent Iron Dried	Tonnage Recovery	Iron Unit Recovery
Crude Ore and Rock Mined	79,708	100.00	43.50		
Less Rock Removed in Mining					
Crude Ore Transfer to Screen Plant	79,708	100.00	43.50		
Less Rock Rejects in Screen Plant	840	1.05	25.91		
Crude Ore Entering Mill	78,868	98.95	43.68		
Concentrates Produced	54,501	68.38	58.08	69.10	87.53*
Tailings (by Deduction)	24,367	30.57	15.24		

*Iron Unit Recovery does not include overrun.

Retreat Plant

Crude Ore and Rock Mined	1,880,430	100.00	36.37		
Less Rock Removed in Mining	42,375	2.25	23.24		
Crude Ore Transfer to Screen Plant	1,838,055	97.75	36.67		
Less Rock Rejects in Screen Plant	210,200	11.18	23.47		
Crude Ore Entering Mill	1,627,855	86.57	38.38		
Concentrates Produced	597,377	31.77	57.66		
Heavy Density Rejects	357,508	19.01	25.80		
-2" Wash Product Rejects Scalped	156,754	8.34	27.57	36.70	55.13
Tailings (by Deductinn)	516,216	27.45	28.06		

c. Cyclone Plant

The cyclone plant began operations on May 1 using the same work schedule as the washing and Heavy-Media plants. The usual mechanical bugs in the flowsheet were encountered at the outset and corrected as they occurred; consequently, it was not until June 1

c. Cyclone Plant (con't)

that daily sampling schedules were set up and tonnage records of feed to the plant and concentrates produced were recorded. These figures are subject to some speculation inasmuch as no scale readings of either cyclone feed or concentrates are available. On a calculated basis, however, 98,027 tons of cyclone feed were sent to the plant from which 74,339 tons of cyclone concentrates were produced at a weight recovery of 75.84 per cent. This is a definite improvement in recovery of fine concentrates over the abrasion milling and spiral circuit of the previous season. Gradewise, cyclone concentrates were also considerably improved over the spiral product.

Midway in the season, it became apparent that there were times when the cyclone plant could not handle the entire tonnage of classifier sands being produced by the washing plant, and it was necessary to send a portion of this material directly to either cars or stockpile. This, of course, was highly undesirable from a grade standpoint. Difficulty in pumping the cyclone concentrates and rejects away from the plant to the respective dewatering classifiers made this bypassing of cyclone feed necessary. Changes and improvements in the plant flowsheet are being made this winter, however, which it is anticipated will greatly relieve this condition and should act to improve the over-all operation of the plant.

9. MAINTENANCE and REPAIRS

The usual winter repair program in progress at the start of the year was continued until ore season. Following completion of stripping, all shovels were moved up to the stripping garage which served as headquarters for general shovel repair. All other equipment was brought to the shop for inspection and repair. Normal repairs were conducted at the pit screen plant and conveyor system. The normal winter repair program continued until shipping season.

Following the close of the 1953 ore season, all plants were cleaned out in preparation for the winter repair program. The lower end of the surge tunnel, which was constructed from timber,

9. MAINTENANCE and REPAIR

was dismantled and replaced with a concrete tunnel. The alterations to the cyclone plant, which consisted of moving the dewatering classifiers to the basement and the necessary conveying systems, were started. These alterations will eliminate pumping to the classifiers which has proved to be a very costly operation. At the shops, locomotives, cars, and miscellaneous plant equipment were brought in for repair.

10. COST of OPERATION

a. Comparative Mining Costs

Product	1953 Budget	1953 Year	1952 Year
Direct Shipping Ore	—	—	—
Washing Plant Concentrates	36,000	54,501	34,894
Retreat Concentrates	680,000	597,377	572,787
Total Production	700,000	651,878	607,681
Recovery	32.39	33.33	31.68
Average Daily Output		6,146	6,017
Tons Per Man Per Day		24.93	27.75
Days Operated		104	101
Cost			
Pit Operating	$ .249	$ .280	$ .266
Concentrating	.176	.247	.163
Loading Stockpile Ore	.010	.028	.030
General Mine Expense	.257	.257	.254
Winter & Idle	.500	.707	.571
Cost of Production	$2.068	$2.542	$2.210
Depreciation			
Plant and Equipment		.097	.053
Motorized Equipment		.086	.090
Movable Equipment		.005	.005

a. Comparative Costs (con't)

	Year 1953	Year 1952
Amortization		
Defense Facilities	.153	.089
Stripping		.105
Taxes		
Ad Valorem	.143	.126
Occupational	.113	.079
Royalty	.142	.188
Total Depreciation, Amortization, Taxes	.739	.735
Administrative Expense	.100	.100
Miscellaneous Expense and Income	.003	.007
Total Cost at Mine	$3.384	$3.052

b. Detailed Cost Comparison

The pit operating cost was $0.031 over the budget and $0.014 over the 1952 cost. Cost of drilling went up $0.014 over the budget and $0.014 over the 1952 budget due to the increased powder costs, labor costs, and increased amount of drilling and blasting. Leased trucks, not in the budget or in the 1952 costs, increased the pit operating costs $0.031 over the budget and $0.014 over 1952 costs. In truck maintenance, a reduction of $0.007 over the budget and $0.008 over 1952 costs was due to the new 34-ton Euclids. With the increase in labor wages, the 1953 costs compare favorably with the 1952 costs.

Concentrating costs were $0.071 over the budget and $0.084 over 1952 costs. The cost of transportation increased $0.01 over the budget due to the extra amount of repair needed to keep both bridges in shape to complete the season. A new item--deferred dykes--which was not included in the estimated budget, increased the costs $0.023. Operating the retreat plant was $0.045 above the budget; starting up of the new cyclone plant increased this item.

b. Detailed Cost Comparison (con't)

Because more ore was loaded out than anticipated, the cost of loading stockpile ore was $0.018 over the budget and $0.002 under 1952 costs.

General mine expense was $0.003 above 1952 costs; the item most out of line was social security tax which was $0.020 above the budget.

Winter and Idle expense was $0.207 over the budget and $0.136 above 1952 costs due to an early closing of the ore season and to placing of labor charges from E&A requests into Winter and Idle.

Cost of production was $0.474 over the budget and $0.332 over 1952 costs. Increased labor and supplies and a decrease in production during the opening of the Hill-Walker had a marked effect on increasing costs. Excessive amounts of rock and the wet painty seams slowed production from the pit through the plant for a period of about three weeks. Production returned to normal as a larger area was opened up.

11. EXPLORATION and FUTURE EXPLORATION

Drilling was started on June 22 in the southeast Trumbull to explore an area now mined below previous drilling. A second drill was started in September to check the occurrence of deep ore in the east end of the Hill lease. The drills were then moved to the north side of the Trumbull to determine the final south limits of the Hill-Walker.

Drilling to a depth of 556 feet in the Hill and 1,360 feet in the Trumbull made a total of 1,916 feet for the year.

Further drilling will be needed each year as mining progresses. Some additional drilling will be needed to further explore the bottom of the present Trumbull pit. Two holes were completed in the bottom of the Hill pit, but additional holes will be needed to further prove or disprove ore beneath the present bottom.

11. EXPLORATION and FUTURE EXPLORATION (con't)

Further exploration is required on the north bank of the Hill lease between the Hill pit and the Barbara. Most of this area has been drilled on 300-foot centers and does indicate some ore. The exploratory work on this area should be done in the near future so that drainage work can be done. With the demand for better ores, this area should be proven or disproven as an aid to the Hill lease.

A few more holes are required along the north bank of the Trumbull to determine actual mining limits.

With only the eastern half of the forty having been drilled to any extent, the Potter lease requires more exploration.

Hill-Walker drilling is fairly complete, although some additional holes should be drilled along the south line to determine final limits.

12. TAXES

	1953		1952		Increase Decrease	
Hill-Trumbull	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
Mineral	$294,409	$47,876.79	$318,456	$40,963.00		
Land,Bldg,Machinery	129,871	27,389.50	114,471	19,733.17		
Personal Property						
Equipment	140,376	22,860.31	108,518	13,990.62		
Stockpile	4,881	793.75	20,411	2,625.47		
Total	$569,537	$98,920.35	$561,856	$77,312.26	$7,681	$21,608.09
Average Mill Rate		173.69		137.65	26.23%	

Tax Commission Reserve
May 1

Tons 1953	Tons 1952	Increase Decrease
3,907,925	4,553,050	-645,125

13. ACCIDENTS and PERSONAL INJURY

Name	Date of Injury	Cause	Nature of Injury	Days Lost	Compensation
E. C. Danielson	6-13-53	Danielson and partner went up pioneer stacker to oil motor. Workmen finishing repair of belt pushed button starting belt--apparently forgetting about Danielson and partner. Danielson was thrown off belt about 30' to ground, landing on left side.	Strain left shoulder muscles, left hip joint, contusion left hip, strain posterior neck muscles.	42	$248.52
Dean Ellis	6-11-53	Ellis was disconnecting power for pit when locking pin stuck in hole and as he was about to take it out, switch handle snapped back striking right forefinger.	Amputated terminal third of terminal phalenx of right forefinger.	2	$140.80
Carl Torkelson	7-31-53	Twisted right shoulder while shoveling spillage in pit tunnel.	Right shoulder sore. X-ray for fracture negative.	6	Not Settled
Mike Trtica	9-14-53	Struck by locomotive #204 while sanding oily ties.	Fatality		$450.00
Nick Georgiff	8-27-53	While entering pickup #94 door slammed striking right elbow.	Bruistis and hemo arthritis of right elbow.	10	$ 32.00
Andrew Columbo	8-17-53	Wrenched back driving wedges out of dipper teeth with sledge hammer.	Lumbo-sacral-iliac strain with sciatica.	19	$133.00
H. L. Bundy, Sr.	9-9-53	Received flash in both eyes from arc welder while welding	Flash burns in eye from electric welder.	19	$112.00
Morten Jensen	11-5-53	While welding, dipper tooth fell off table striking his left foot.	Bruised left foot. X-ray negative.	11	$ 42.00

14. PROPOSED NEW CONSTRUCTION

A truck service garage has been proposed for the pit. Extension of the rock reject belt at the mill will be made as needed.

It is proposed to raise and widen the new dyke and the dyke between the old and new tailings ponds. The first year's work is to be done with a shovel, trucks, and a bulldozer. Later, when the dykes must be raised, the work will be done with a dragline, and the fill will be spread and compacted with a bulldozer.

The State Highway Department has proposed widening Highway 169 under the present locomotive bridge to the plant. This would necessitate the widening and raising of the main bridge span and would be paid by the State. If the State does not do this work for the 1954 ore season, temporary repairs will be carried on to both ends of the bridge to get through the 1954 season.

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

a. New Equipment Received

1	5½ yard Anchor bucket (Prop Chrgs)
2	Sets of D-8 tracks.
3	Cutlets #9F2K6
1	Allis Chalmers Pump 8 x 6
1	Lincoln Grease Pump with fittings #82205
2	G. E. Syrchonic Converters
1	Artcraft Industrial Furnace, Model 500-A
1	Kleer Flo Machine, Model #30
1	Kerrick Cleaner #55745
3	85-ton Electric locomotives
1	1/2-ton Ford Pickup, Model F100
1	3/4-ton Ford Pickup, Model F250
1	Welding Machine #WD44, 400 amp

Drills

1	Black & Decker 3/4"
1	Black & Decker 3/8"

a. New Equipment Received (con't)

Cable, Wire, Conduit

30,435#	Used copper cable
350'	2/0 cable (electric locomotives)
350'	3-conductor cable #2
764'	2/0 wire #6002
3000'	7-strand copper wire #2
190'	500,000 c.m. stranded Neprene wire
250'	3" conduit
525#	3/16" to 1/4" copper bar (tracks and trolleys)

Hoists

2	2-ton chain hoists #9A-130-05
1	1-ton Chisholm-Moore hoist

Pipe

1060'	Spiral Weld 8"
760'	Spiral Weld 6"
30'	Pilot Flexible

Belting

110'	13" conveyor
1565'	24" conveyor
360'	30" conveyor
60'	36" conveyor
35'	48" conveyor

Switches, Starters

2	Ensign centrifugal switches (pit conveyor)
1	Air Breaker Switch (type TA1)
1	Switchboard assembled (cyclone plant)
2	Magnetic starters (cyclone plant)
1	Starter #9589 H1443

Motors

1	Used 200 hp (cyclone Plant)
1	Used 50 hp

a. New Equipment Received (con't)

Transformers

1	H DF 9104 (let. cat.)
1	10 KVA (used) pit power lines
3	250 KVA
1	15 KVA
1	300 KVA Uptegreff

b. Proposed New Equipment

2	Pickup trucks
1	Caterpillar patrol
145'	30" conveyor belting
791'	24" conveyor belting
30	30" troughing idlers
1 set	4 wheels with axel for locomotives
1	Jeffrey Magnetic separator drum
1	Switch panel complete
1	Cyclone Ni-Hard feed ring
6	Remote reading dials

HOLMAN-CLIFFS MINE

ANNUAL REPORT

YEAR 1953

1. GENERAL

The usual Winter & Idle repairs to pit and plant equipment were carried forward from the first of the year to April 27. Loading of concentrates from stockpile was started on April 1 and completed on April 23. Ore operations at both the Pit and Lake Concentrator were started on April 27 with the Pit on a 3-shift, 5-day schedule and the Lake Concentrator on a 2-shift, 5-day schedule. The Lake Concentrator remained on this schedule until the end of ore season on September 11. The Pit was cut back to a 2-shift, 5-day operation on August 17 and remained on this basis until the close of ore season on September 18.

Stripping under E&A No. MC-234 was started on the third shift in the Pit on August 17 and carried through on this basis until the end of ore season on September 18. Work was then continued on a 3-shift, 5-day basis until September 28, at which time a 20-shift-per-week schedule was started and stripping continued on this basis until completion on December 31.

The addition to the test laboratory was completed the early part of the year. Remodeling and strengthening of the pit pocket and approach trestles was completed in March. Power line and road changes were made during the summer due to the Oliver Iron Mining Division's development of the Plummer mine.

Operating conditions throughout the year were good and no serious delays were encountered.

2. PRODUCTION - INVENTORIES - SHIPMENTS

a. Production by Grades

Crude	Tons
Holman Wash	64,517
Holman Retreat	617,268
Brown Wash	3,240
Brown Retreat	746,633
North Star Wash	35,388
North Star Retreat	178,222
Bingham Retreat	26,310
Holman Lake	160,927
Brown Lake	120,959
Total Crude	1,953,464

Concentrates	Bessemer	Non Bessemer	Total Tons
Holman Wash	28,510	10,183	38,693
Holman Retreat	131,330	181,712	313,042
Brown Wash	1,312	1,431	2,743
Brown Retreat	175,602	188,505	364,107
North Star Wash	360	26,948	27,308
North Star Retreat	29,060	63,320	92,380
Bingham Retreat	3,424	8,356	11,780
Holman Lake	33,639	41,871	75,510
Brown Lake	24,023	21,713	45,736
	57,562		121,276
Total	427,260	544,039	971,299

b. Shipments

Concentrates	Bessemer	Non Bessemer	Total Tons
Holman Wash	59,219	51,579	110,798
Holman Retreat	161,055	118,429	279,484
Brown Wash	3,830	4,206	8,036
Brown Retreat	175,758	94,800	270,558
North Star Wash	360	26,948	27,308
North Star Retreat	29,060	63,320	92,380
Bingham Retreat	3,424	8,356	11,780
Holman Lake	33,639	41,871	75,510
Brown Lake	24,023	21,713	45,736
Total	490,368	431,222	921,590

c. Inventories

Concentrates	Tons
Holman Wash	4,208
Holman Retreat	86,585
Brown Wash	389
Brown Retreat	95,301
Total	186,483

d. Production by Months

Crude Ore

Month	Holman Wash	Holman Retreat	Brown Wash	Brown Retreat	North Star Wash	North Star Retreat	Bingham Retreat	Holman Lake Conct.	Brown Lake	Total
Apr.	5,070	2,570		47,715	1,541	7,892		6,761		71,549
May	25,891	99,813	1,220	204,666	27,402	20,684		28,156	31,624	439,456
June	17,484	49,552	2,020	159,082		131,802	19,974	29,595	32,602	442,111
July	13,964	189,357		176,517		14,019		25,984	41,099	460,940
Aug.	2,108	210,810		98,165				47,598	15,634	374,315
Sept.		65,166		60,488	6,445	3,825	6,336	22,833		165,093
Total	64,517	617,268	3,240	746,633	35,388	178,222	26,310	160,927	120,959	1,953,464

Concentrates

Apr.	4,895	4,819	1,015	24,344	1,087	4,082		1,864		42,106
May	14,083	45,430	632	101,507	20,708	10,025		14,817	12,898	220,100
June	10,585	21,820	1,096	72,025		67,719	8,356	15,599	12,146	209,346
July	7,752	91,522		85,276		8,032		10,125	15,676	218,383
Aug.	1,378	110,798		47,111				22,007	5,016	186,310
Sept.		38,652		33,845	5,513	2,522	3,424	11,098		95,054
Total	38,693	313,041	2,743	364,108	27,308	92,380	11,780	75,510	45,736	971,299

3. ANALYSIS

a. Tonnage and Analysis of Crude Ore Produced

Product	Tons	Iron	Phos	Silica
Holman Wash	64,517	42.89	.029	34.08
Holman Retreat	617,268	42.20	.037	34.43
Brown Wash	3,240	44.23	.033	31.39
Brown Retreat	746,633	41.92	.034	35.28

a. Tonnage and Analysis of Crude Ore Produced (con't)

Product	Tons	Iron	Phos	Silica
North Star Wash	35,388	51.36	.050	21.43
North Star Retreat	178,222	44.36	.044	30.66
Bingham Retreat	26,310	38.53	.031	39.92
Holman Lake	160,927	44.17	.038	30.86
Brown Lake	120,959	39.90	.034	38.14
Total Crude	1,953,464	42.45	.036	34.17

b. Tonnage and Analysis of Concentrates Produced

Product	Tons	Iron	Phos	Silica	Mn	Alum	Moist.
Holman Bessemer Wash	28,510	57.55	.032	11.70	.23	.47	7.27
Holman Non Bessemer Wash	10,183	56.24	.043	12.70	.22	.54	7.09
Holman Bessemer Retreat	131,330	57.31	.037	11.68	.23	.44	6.63
Holman Non Bessemer Retreat	181,712	57.09	.045	11.58	.24	.43	6.90
Brown Bessemer Wash	1,312	55.89	.039	13.74	.22	.37	7.39
Brown Non Bessemer Wash	1,431	55.43	.037	15.15	.19	.35	6.62
Brown Bessemer Retreat	175,602	57.10	.033	12.68	.20	.40	6.87
Brown Bessemer-Non Retreat	188,505	56.92	.047	12.43	.20	.40	6.89
North Star Bessemer Wash	360	58.70	.032	11.70	.14	.48	8.00
North Star Non Bessemer Wash	26,948	57.31	.054	11.62	.21	.41	7.64
North Star Bessemer Retreat	29,060	57.29	.035	12.00	.25	.39	6.93
North Star Non Bessemer Retreat	63,320	57.23	.050	11.60	.28	.37	7.41
Bingham Bessemer Retreat	3,424	56.18	.039	14.24	.17	.44	7.19
Bingham Non Bessemer Retreat	8,356	56.26	.041	13.32	.23	.44	7.84
Holman Lake Bessemer	33,639	54.93	.041	14.84	.24	.45	7.73
Holman Lake Non Bessemer	41,871	55.02	.043	14.67	.24	.44	7.56
Brown Lake Bessemer	24,023	55.78	.037	14.42	.18	.40	7.33
Brown Lake Non Bessemer	21,713	55.67	.042	14.41	.19	.42	7.36
Total Concentrates Produced	971,299	56.87	.041	12.40	.23	.41	7.01

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Bess 427,260