ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

3. COST OF OPERATIONS (CONT'D.):

b. Yearly Cost:

| Account | 1958 Amount | 1958 Per Ton/Product | 1957 Amount | 1957 Per Ton/Product |
|---|---|---|---|---|
| Unloading | 26,837.84 | .074 | 73,255.65 | .149 |
| Drying | 69,105.49 | .190 | 45,089.18 | .092 |
| Screening and Crushing | 22,176.95 | .061 | 48,288.18 | .098 |
| Heavy Media | 12,991.86 | .036 | 31,825.45 | .065 |
| Stocking Expense | 381.15 | .001 | 8,664.38 | .018 |
| Other Direct Plant Expense | 49,292.62 | .136 | 93,692.86 | .191 |
| Allocated Expense | 43,875.72 | .121 | 50,434.16 | .102 |
| Screening Tests | 10,787.10 | .030 | - | - |
| Cost of Production | 235,448.73 | .649 | 351,249.86 | .715 |
| Freight - Mines to Plant | 25,019.44 | .069 | 39,770.36 | .081 |
| Advalorem Taxes | 17,030.41 | .047 | 2,777.50 | .006 |
| Depreciation | 6,721.75 | .019 | 182,949.02 | .373 |
| Shipping Expense | 16,933.78 | .047 | 21,743.64 | .044 |
| Total Cost at Plant | 301,154.11 | .831 | 598,490.38 | 1.219 |

4. HOURLY OPERATING RATES - 1958 SEASON:

Because of the very intermittent operating schedule during the 1958 season no intelligent record of delays based on a percentage of operating time could be tabulated and none has therefore been included in this report.

Delays which interfered with production were noted as they occurred and will be referred to and the causes thereof will be eliminated insofar as possible during the winter repair program.

5. LABOR AND WAGES:

a. Comments:

Employees of the Ore Improvement Plant did not affiliate with the AFL - CIO Steelworkers during the 1958 season. The job descriptions and classifications presently in force between Cleveland-Cliffs and the Steelworker's union at all other properties were used as standard at the plant. The same $ .07 per hour general increase; the $ .002 per job increment; and the $ .12 additional per hour cost of living adjustment granted the Steelworker's union in 1958 was extended to plant employees.

There were no grievances submitted as such. Differences were settled in conference between the employee himself, his supervisor, and the mill foreman or the plant superintendent. Relations were basically very friendly and the efforts exerted by all personnel were commendable.

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

5. LABOR AND WAGES (CONT'D.):

b. Report of Vacations Paid:

A total of nineteen employees were eligible for vacation pay in 1958. They were paid a total of $ 3,100.88.

c. Statement of Production and Wages:

| | |
|---|---|
| Product - Concentrates | 362,522 |
| Number of Days Operated | 92 |
| Average Daily Product - Tons | 3,940 |
| Average Number of Men Employed | 30 |
| Product Per Man Per Day | 116.42 |
| Average Wages Per Man Per Day | 22.07 |
| Total Amount Paid for Labor | $ 104,923.38 |
| Labor Cost Per Ton | 0.289 |

d. Annual Statement of Labor:

| Mine Payroll | Stat. Men | Hours | Amount | Avg. Rate |
|---|---|---|---|---|
| Straight Time | 25¼ | 38,359¼ | 100,258.65 | 2.614 |
| Overtime | | 1,043¾ | 1,473.08 | 1.411 |
| Afternoon Differential | | 7,344 | 584.38 | .080 |
| Night Differential | | 3,781¼ | 455.88 | .121 |
| Holiday Allowance | | 1,088 | 2,879.93 | 2.647 |
| Holiday Worked - Premium Time | | 8 | 25.70 | 3.213 |
| Sub Total | 25¼ | 38,359¼ | 105,677.62 | 2.755 |
| Vacation Pay Accrual | | | 3,100.88 | |
| Sunday Premium | | 268 | 172.58 | .644 |
| Total Hourly Employees | 25¼ | 38,359¼ | 108,951.08 | 2.840 |
| Average Job Class | | | | 10.19 |
| Salaried - Mine Payroll - Straight Time | ¼ | 552 | 2,060.00 | 3.732 |
| Total Mine Payroll | 25½ | 38,911¼ | 111,011.08 | 2.853 |
| General Payroll | | | | |
| Salaried - Straight Time | 2¾ | 4,167 | 16,487.00 | 3.957 |
| Labor from Other Mines | 4 | 6,118 | 21,235.90 | 3.471 |
| Total Labor | 32¼ | 49,196¼ | 148,733.98 | 3.023 |
| Distributed as Follows: | | | | |
| Idle Expense | 6 | 9,074½ | 37,970.13 | 4.184 |
| Operating Plant | 16½ | 24,912½ | 66,953.25 | 2.688 |
| Uncompleted Construction | 7½ | 11,283 | 33,207.41 | 2.943 |
| Other Mines | ¾ | 1,397 | 4,181.44 | 2.993 |
| Other Accounts | 1½ | 2,529¼ | 6,421.75 | 2.539 |
| Grand Total as Above | 32¼ | 49,196¼ | 148,733.98 | 3.023 |

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

6. ORE STRUCTURES - PRODUCT:

a. Group I Structure:

The structure listed below is approximate and represents a composite of several studies taken at the dryer screen during the operating season.

| Size | % Wt. | Cuml. % Wt. | % Fe |
|---|---|---|---|
| +3/4" | .20 | .20 | 55.60 |
| +1/2" | 3.30 | 3.50 | 56.50 |
| +1/4" | 26.12 | 29.62 | 59.00 |
| +6 Mesh | 15.00 | 44.62 | 59.50 |
| -6 Mesh | 55.38 | 100.00 | 59.90 |
| Head | 100.00 | | 59.48 |

b. Group II Structure:

The structure listed below represents a composite of samples taken during the 1958 operating season.

| Size | % Wt. | Cuml. % Wt. | % Fe | % Phos. | % $SiO_2$ | % Sul. |
|---|---|---|---|---|---|---|
| +1-1/2" | 7.99 | 7.99 | 60.65 | .076 | 7.48 | .010 |
| +1" | 16.44 | 24.43 | 60.15 | .086 | 8.72 | .102 |
| +3/4" | 15.63 | 40.06 | 60.10 | .190 | 8.42 | .030 |
| +1/2" | 26.82 | 66.88 | 60.05 | .091 | 8.56 | .016 |
| +3/8" | 10.78 | 77.66 | 60.60 | .106 | 8.24 | .016 |
| +3M | 4.66 | 82.32 | 60.10 | .096 | 8.36 | .040 |
| +6M | 3.22 | 85.54 | 59.95 | .102 | 8.82 | .020 |
| +8M | 1.75 | 87.29 | 59.40 | .107 | 9.48 | .020 |
| +10M | 1.55 | 88.84 | 58.35 | .101 | 9.16 | .019 |
| +14M | 1.20 | 90.04 | 58.30 | .103 | 9.22 | .019 |
| +20M | .81 | 90.85 | 58.05 | .098 | 9.30 | .027 |
| +28M | 1.02 | 91.87 | 58.20 | .107 | 9.26 | .017 |
| +35M | .59 | 92.46 | 58.00 | .107 | 9.98 | .017 |
| +48M | 1.25 | 93.71 | 57.90 | .100 | 10.20 | .017 |
| +65M | .73 | 94.44 | 57.80 | .100 | 10.04 | .047 |
| +100M | .95 | 95.39 | 59.70 | .098 | 8.26 | .033 |
| -100M | 4.61 | 100.00 | 61.70 | .085 | 6.46 | .017 |
| Total | 100.00 | | 60.10 | .108 | 8.43 | .034 |

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

7. ACCIDENTS AND PERSONAL INJURY:

a. Accident Statistics:

| | |
|---|---|
| No. of hours of Labor | 38,912 |
| No. of Fatalities | 0 |
| No. of Compensable Injuries | 0 |
| No. of Non-Compensable Injuries | 0 |
| Days Lost -- Compensable Injuries | 0 |
| Days Lost - Non-Compensable Injuries | 0 |
| Frequency Rate | 0 |
| Severity Rate | 0 |
| Average No. of Days Lost Per Injury | 0 |
| Position Rating (Independent Units) | 3 |

b. Compensable Injuries:

There were no compensable injuries at the Ore Improvement Plant during 1958.

8. TAXES:

a. Comparative Statement of Taxes:

| | 1958 | | 1957 | |
|---|---|---|---|---|
| NEGAUNEE TOWNSHIP | Valuation | Taxes | Valuation | Taxes |
| Real Estate | 385,000 | 11,023.90 | - | - |
| Personal Property | 105,000 | 3,006.51 | 110,000 | 2,777.50 |
| Total | 490,000 | 14,030.41 | 110,000 | 2,777.50 |

9. PROPOSED NEW EQUIPMENT AND CONSTRUCTION:

a. Purchase a Model 40 Gaffner Loader.

b. No. 2 Unloading Pocket Replacement.

c. Crusher Section Feeders.

d. New pocket for Classifier Sands.

e. Replace Media Sumps and Raise Screens.

f. Convert and repower No. 2 Conveyor to 36".

g. New Conveyor Scales.

h. Overhead Shop Crane.

i. Electrify Crusher Section Overhead Crane.

j. Move Substation and Provide Power Outlet for Shovel - Stocking Ground.

k. Speed Up and Raise Discharge End of No. 17 Conveyor.

# AGNEW MINE

# ANNUAL REPORT

# YEAR 1958

## 1. GENERAL

Cancellation notices of the lease as of December 31, 1957, were revoked and this lease extended to December 31, 1960. Minimums were waived for this period.

All Cleveland-Cliffs' title and interest in the wooden bridge over and across the Oliver approach tracks and right-of-way were assigned to the South Agnew Mining Company by various documents in April, 1958.

Buildings were dismantled and removed by the Dickovich Construction Company. The shaft was enclosed with a fence.

The South Agnew Mining Company (M. A. Hanna) produced and shipped no trespass ore from the open pit under terms of the Agnew-South Agnew cross mining agreement. The South Agnew Mining Company was granted a license to use a roadway from the bridge south to the South Agnew property.

## 2. ESTIMATE of ORE RESERVES as of DECEMBER 31, 1958

Based on Estimated Production

| Open Pit NE-NE 11-57-21 | Reserves 12-31-58 |
|---|---|
| Merch | 24,423 |
| Wash | 1,908 |
| | 26,331 |

Open Pit Ore
Hanna Trespass on Agnew
Based on Joint Estimate by CCI & Hanna

| NE-NE 11-57-21 | Tons | Iron | Phos | Silica | Mang | Alum |
|---|---|---|---|---|---|---|
| Merch | 24,423 | 55.75 | .050 | 11.00 | .60 | 1.50 |
| Wash | 1,908 | 55.45 | .052 | 11.88 | .33 | 1.48 |
| | 26,331 | 55.73 | .050 | 11.06 | .58 | 1.50 |

3. TAXES

| Real Estate | 1958 Assessed Value | 1958 Taxes | 1957 Assessed Value | 1957 Taxes | Increase-Decrease Assessed Value | Increase-Decrease Taxes |
|---|---|---|---|---|---|---|
| Mineral | $10,691 | $1,980.08 | $10,890 | $1,879.40 | -$ 199 | +$100.68 |
| Lands | 401 | 74.28 | 2,584 | 445.96 | - 2,183 | - 371.68 |
| | $11,092 | $2,054.36 | $13,474 | $2,325.36 | -$2,382 | -$271.00 |
| Average Mill Rate | | 185.21 | | 172.58 | | +7.32 |

Note: Increased mill rate of 7.32 per cent offset some reduction due to removal of buildings and machinery.

# ALWORTH LAND RESERVE

## ANNUAL REPORT

## YEAR 1958

### 1. GENERAL

Cancellation notices of the lease as of December 31, 1957, were revoked and this lease extended to December 31, 1960. Minimums were waived for this period. This extension was executed at the request of Rhude & Fryberger who acquired the interests of Rhude-Gilbert in May, 1958.

All rights to use a vehicular road from the Agnew bridge across the Alworth property and into Hibbing were cancelled to Oliver Iron Mining Division who in turn transferred the same rights to the South Agnew Mining Company.

The Great Northern Railway asked for an extension of their license for access to a gravel stockpile on the Alworth.

### 2. PRODUCTION-SHIPMENTS-INVENTORIES

a. Production & Shipments

No production by Rhude & Fryberger from the Alworth Open Pit in 1958.

b. Tonnage & Analysis of Ore Produced & Shipped

Scranton Trespass-Alworth Open Pit

| Ore | Tons | Iron | Phos | Silica | Mang | Alum | Moist | Iron Natural |
|---|---|---|---|---|---|---|---|---|
| Direct | 2,447 | 54.96 | .037 | 10.61 | .65 | .63 | 10.54 | 49.17 |
| Concts | 59,024 | 56.86 | .043 | 8.00 | .47 | .62 | 11.01 | 50.60 |
| | 61,471 | 56.78 | .043 | 8.10 | .48 | .62 | 10.99 | 50.54 |

Hoyt Mining Company indicates that there will be no production from the Alworth in 1959.

### 3. ESTIMATE of ORE RESERVES as of DECEMBER 31, 1958

| N½-NW¼ 12-57-21 | Reserve 12-31-57 | Mined 1958 | Reserve 12-31-58 |
|---|---|---|---|
| Alworth Lease | 194,750 | 61,471 | 133,279 |

Estimated Analysis of Ore Reserves

| Merch N½-NW¼ 12-57-21 | Tons | Iron | Phos | Silica | Mang | Alum |
|---|---|---|---|---|---|---|
| Bessemer | 54,574 | 55.80 | .037 | 9.70 | 0.31 | 0.56 |
| Non-Bessemer | 78,705 | 57.40 | .101 | 8.10 | 1.15 | 2.53 |
| | 133,279 | 56.70 | .075 | 8.80 | 0.81 | 1.72 |

4. TAXES

| Real Estate | 1958 Assessed Value | 1958 Taxes | 1957 Assessed Value | 1957 Taxes | Increase-Decrease Assessed Value | Increase-Decrease Taxes |
|---|---|---|---|---|---|---|
| Mineral | $ 98,319 | $26,696.56 | $160,411 | $39,918.28 | -$62,092 | -$13,221.72 |
| Land | 2,667 | 724.17 | 2,667 | 663.68 | | ∕ 60.49 |
| Buildings, Mach, Accts Rec. | 5,289 | 1,436.13 | 5,288 | 1,315.92 | ∕ 1 | ∕ 120.21 |
| | $106,275 | $28,856.86 | $168,366 | $41,897.88 | -$62,091 | -$13,041.02 |
| Average Mill Rate | | 271.53 | | 248.85 | | ∕9.11 |

Total distributed as follows:

| | |
|---|---|
| Alworth Underground | $ 4,220.67 |
| Pickands Mather & Company (not reimbursed?) | 9,856.00 |
| Rhude-Gilbert | 13,431.50 |
| Oliver Iron Mining Division U S Steel | 1,348.69 |
| | $28,856.86 |

# CANISTEO MINE

## ANNUAL REPORT

## YEAR 1958

## 1. GENERAL

With the exception of E&A work, the Canisteo mine was on a standby basis from December 27, 1957, until April 7, 1958, when limited crews were recalled for pit and plant equipment repair which continued until the start of ore operations. E&A projects consisted of:

1. Installation of rock pocket at screening plant.
2. Remodeling of concentrate stockpiling system.
3. Installation of additional tailings pumps at fine ore plant.
4. Resheeting of washing plant.
5. Remodeling of pit service garage.

The last two projects (Items 4 and 5) were contracted to Abe Mathews Engineering Company.

Effective January 20, all hourly employees were scheduled on a 4-day-week basis and continued on this schedule for the remainder of the year; effective January 16, all salary (non-exempt) employees were placed on a 36-hour week.

Shipment of ore from stockpile was started April 28 and continued intermittently throughout the season to November 21, depleting the 1957 stockpile on August 7.

Ore operations started May 26 on a 2-shift, 4-day-week schedule which continued until September 29 when a 3-shift, 4-day-week schedule went into effect and continued until shutdown of operations on November 4. In order to meet ore demands, the mine actually operated on a 5-day-week basis during the last month of the operating season.

1,494,083 tons of crude ore (including 101,996 tons of screen rock) were mined. In addition, 17,870 tons of pit rock, lean ore, and cleanup were moved during mining.

Operating the same schedule as the pit, the main concentrating plant received 1,392,087 tons of crude ore and produced 538,604 tons of concentrates. The fine ore plant received 691,938 tons of current tailings to produce 62,149 tons of fine ore concentrates. No basin tails were treated.

At the close of the ore season, pit operations were immediately diverted to truck stripping on a 2-shift-per-week schedule. 465,467 cubic yards of stripping were removed under E&A No. CC-972 by December 10. Crews and pit equipment were then transferred to the Sally mine where stripping operations were continued.

Necessary plant equipment repairs were started after the end of the ore season and continued throughout the remainder of the year.

During January, February, and April of 1958, experimental work was conducted with several makes of rotary and down-the-hole drills for blasthole drilling. All types of material were drilled and records were kept on general operation and operating rates of the drills. With the aid of this information, a Reich Model 750 combination rotary and down-the-hole drill was ordered on November 25, equipped to drill 7-1/2 inch holes. Delivery is expected during the first week of February, 1959.

The Henry Schultz Drilling Company drilled two structure drill holes in the Canisteo pit for a total of 354 feet.

## 2. PRODUCTION-SHIPMENTS-INVENTORIES

### a. Production by Grades

| | Crude | Retreat | Wash | Total |
|---|---|---|---|---|
| Snyder | | 389,093 | | 389,093 |
| Bovey | | 728,666 | 13,231 | 741,897 |
| Hemmens | | 261,097 | | 261,097 |
| | | 1,378,856 | 13,231 | 1,392,087 |

| | Wash | | Retreat | | Overflow | | |
|---|---|---|---|---|---|---|---|
| Concts | Bess | Non-Bess | Bess | Non-Bess | Bess | Non-Bess | Total |
| Snyder | | | 48,403 | 106,346 | | 13,423 | 168,172 |
| Bovey | 3,356 | 1,975 | 29,620 | 256,046 | 1,221 | 38,044 | 330,262 |
| Hemmens | | | 8,975 | 83,883 | | 9,461 | 102,319 |
| | 3,356 | 1,975 | 86,998 | 446,275 | 1,221 | 60,928 | 600,753 |

b. Shipments by Grades

| Ore | Wash | | Retreat | | Overflow | | Stockpiles 1958 | Stockpiles 1957 | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bess | Non-Bess | Bess | Non-Bess | Bess | Non-Bess | Non Bess | Bess | Non-Bess | |
| Snyder | | | 37,761 | 61,741 | | 13,423 | | | | 112,925 |
| Bovey | 3,355 | 1,976 | 22,326 | 179,395 | 1,221 | 38,044 | | | | 246,317 |
| Hemmens | | | 7,891 | 58,729 | | 9,461 | | | | 76,081 |
| Canisteo | | | | | | | 65,303 | 19,020 | 42,837 | |
| | 3,355 | 1,976 | 67,978 | 299,865 | 1,221 | 60,928 | 65,303 | 19,020 | 42,837 | 562,483 |

c. Stockpile Inventories

| Retreat Concentrates | Tons |
|---|---|
| Snyder | 35,893 |
| Bovey | 47,605 |
| Hemmens | 16,055 |
| | 99,553 |

d. Production by Months

Crude

| Month | Wash | Retreat | | | Total |
|---|---|---|---|---|---|
| | Bovey | Snyder | Hemmens | Bovey | |
| May | | | | 44,571 | 44,571 |
| June | | | | 159,975 | 159,975 |
| July | 13,231 | | | 154,361 | 167,592 |
| Aug | | | | 144,945 | 144,945 |
| Sept | | | 177,073 | 77,663 | 254,736 |
| Oct | | 389,093 | 71,188 | 98,516 | 558,797 |
| Nov | | | 12,836 | 48,635 | 61,471 |
| | 13,231 | 389,093 | 261,097 | 728,666 | 1,392,087 |

d. Production by Months

Concentrates

| Month | Bovey Wash | Bovey Retreat | Bovey Overflow | Snyder Retreat | Snyder Overflow | Hemmens Retreat | Hemmens Overflow | Total |
|---|---|---|---|---|---|---|---|---|
| May | | 18,546 | 226 | | | | | 18,772 |
| June | | 58,413 | 7,909 | | | | | 66,322 |
| July | 5,454 | 57,811 | 10,241 | | | | | 73,506 |
| Aug | -123 | 55,879 | 8,996 | 268 | | 44 | | 65,064 |
| Sept | | 33,467 | 3,809 | | | 61,243 | 6,954 | 105,473 |
| Oct | | 37,797 | 5,111 | 153,653 | 13,444 | 26,315 | 1,691 | 238,011 |
| Nov | | 23,753 | 2,973 | 828 | -21 | 5,256 | 816 | 33,605 |
| | 5,331 | 285,666 | 39,265 | 154,749 | 13,423 | 92,858 | 9,461 | 600,753 |

3. ANALYSIS

a. Crude Ore Produced

| Crude Ore | Tons | Iron | Silica |
|---|---|---|---|
| Snyder Retreat | 389,093 | 42.32 | 34.94 |
| Bovey Wash | 13,231 | 48.75 | 25.99 |
| Bovey Retreat | 728,666 | 44.73 | 29.73 |
| Hemmens Retreat | 261,097 | 42.25 | 32.49 |
| | 1,392,087 | 43.63 | 31.67 |

b. Concentrates Produced

| Concentrates | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Snyder | | | | | | | |
| Bessemer Retreat | 48,403 | 58.70 | .043 | 10.17 | .26 | .59 | 7.37 |
| Non-Bess Retreat | 106,346 | 57.77 | .053 | 11.25 | .32 | .49 | 7.81 |
| Non-Bess Overflow | 13,423 | 56.71 | .034 | 14.26 | .27 | .53 | 7.92 |

| Concentrates | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Bovey | | | | | | | |
| Bessemer Wash | 3,356 | 59.74 | .040 | 8.46 | .48 | .47 | 6.14 |
| Non-Bess Wash | 1,975 | 59.01 | .048 | 9.25 | .60 | .47 | 6.81 |
| Bessemer Retreat | 29,620 | 57.87 | .045 | 11.43 | .39 | .56 | 6.80 |
| Non-Bess Retreat | 256,046 | 57.47 | .083 | 11.03 | .39 | .59 | 6.44 |
| Bessemer Overflow | 1,221 | 58.37 | .039 | 11.88 | .20 | .61 | 6.65 |
| Non-Bess Overflow | 38,044 | 58.74 | .049 | 11.49 | .28 | .59 | 6.78 |
| Hemmens | | | | | | | |
| Bessemer Retreat | 8,975 | 56.69 | .038 | 12.00 | .47 | .69 | 7.73 |
| Non-Bess Retreat | 83,883 | 55.81 | .056 | 12.31 | .79 | .76 | 7.60 |
| Non-Bess Overflow | 9,461 | 56.52 | .040 | 12.78 | .49 | .84 | 8.26 |
| | 600,753 | 57.47 | .064 | 11.32 | .42 | .60 | 7.04 |

c. Tonnage & Complete Analysis of Concentrates Shipped

| Concentrates | Tons | Iron | Phos | Silica | Mang | Alum | Lime | Mag | Sulf | Ign Loss | Moist |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Snyder | | | | | | | | | | | |
| Bessemer Retreat | 37,761 | 58.93 | .042 | 9.92 | .25 | .56 | .20 | .14 | .014 | 4.45 | 7.56 |
| Non-Bess Retreat | 61,741 | 58.02 | .053 | 10.73 | .34 | .48 | .20 | .14 | .014 | 4.87 | 7.70 |
| Non-Bess Overflow | 13,423 | 56.71 | .034 | 14.26 | .27 | .53 | .20 | .14 | .014 | 3.31 | 7.92 |
| Bovey | | | | | | | | | | | |
| Bessemer Wash | 3,355 | 59.74 | .040 | 8.46 | .48 | .47 | .20 | .14 | .014 | 4.52 | 6.14 |
| Non-Bess Wash | 1,976 | 59.01 | .048 | 9.25 | .60 | .47 | .20 | .14 | .014 | 4.58 | 6.81 |
| Bessemer Retreat | 22,326 | 57.87 | .045 | 11.56 | .42 | .52 | .20 | .14 | .014 | 4.12 | 6.84 |
| Non-Bess Retreat | 179,395 | 57.51 | .085 | 10.92 | .40 | .57 | .20 | .14 | .014 | 5.16 | 6.38 |
| Bessemer Overflow | 1,221 | 58.37 | .039 | 11.88 | .20 | .61 | .20 | .14 | .014 | 3.32 | 6.65 |
| Non-Bess Overflow | 38,044 | 58.74 | .049 | 11.49 | .28 | .59 | .20 | .14 | .014 | 3.07 | 6.78 |
| Hemmens | | | | | | | | | | | |
| Bessemer Retreat | 7,891 | 56.53 | .037 | 12.13 | .49 | .69 | .12 | .18 | .027 | 5.24 | 7.87 |
| Non-Bess Retreat | 58,729 | 55.74 | .054 | 12.15 | .95 | .77 | .12 | .18 | .027 | 5.57 | 7.66 |
| Non-Bess Overflow | 9,461 | 56.52 | .040 | 12.78 | .49 | .84 | .12 | .18 | .027 | 4.45 | 8.26 |
| Canisteo Stockpile | | | | | | | | | | | |
| Bessemer-1957 | 19,020 | 57.87 | .046 | 11.04 | .31 | .68 | .12 | .20 | .014 | 4.65 | 6.69 |
| Non-Bessemer-1957 | 42,837 | 57.34 | .063 | 11.66 | .32 | .75 | .12 | .20 | .014 | 4.67 | 7.02 |
| Non-Bessemer-1958 | 65,303 | 57.24 | .071 | 11.48 | .33 | .61 | .12 | .20 | .014 | 5.05 | 6.85 |
| | 562,483 | 57.51 | .064 | 11.26 | .41 | .61 | .17 | .16 | .016 | 4.81 | 6.99 |

d. Mine Analysis of Ore in Stockpile

| Retreat Ore | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Snyder | 35,893 | 57.46 | .049 | 12.08 | .27 | .47 | 8.22 |
| Bovey | 47,605 | 57.47 | .081 | 11.15 | .38 | .64 | 6.43 |
| Hemmens | 16,055 | 55.29 | .056 | 13.37 | .49 | .82 | 7.78 |
| | 99,553 | 57.12 | .065 | 11.84 | .36 | .61 | 7.29 |

4. ESTIMATE OF ORE RESERVES

a. Developed Ore - Factors Used

| Concentrates | Cubic Feet Per Ton | Per Cent Recovery |
|---|---|---|
| Wash | 14 | 47 |
| Retreat | 14 | 32 |

b. Ore Reserves as of December 31, 1958

| Lease | Reserve 12-31-57 | Mined 1958 | Balance after Mining | Changed by Re-estimate | Reserve 12-31-58 |
|---|---|---|---|---|---|
| Bovey | 1,151,349 | 330,262 | 821,087 | ∕191,097 | 1,012,184 |
| Snyder | 857,069 | 168,172 | 688,897 | ∕ 4,169 | 693,066 |
| Hemmens | 1,193,572 | 102,319 | 1,091,253 | ∕ 45,548 | 1,136,801 |
| | 3,201,990 | 600,753 | 2,601,237 | ∕240,814 | 2,842,051 |

c. Estimated Analysis of Ore Reserves

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| Bovey | | | | |
| Wash | 58,978 | 58.80 | .030 | 8.90 |
| Bessemer Retreat | 216,667 | 58.70 | .100 | 8.30 |
| Bessemer Retreat | 231,205 | 56.50 | .028 | 11.50 |
| Non-Bessemer Retreat | 505,334 | 56.80 | .090 | 10.70 |
| | 1,012,184 | 57.30 | .074 | 10.30 |

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| Snyder | | | | |
| Bessemer Wash | 220,391 | 61.10 | .037 | 8.60 |
| Non-Bessemer Wash | 321,406 | 61.10 | .055 | 8.10 |
| Bessemer Retreat | 61,524 | 57.70 | .033 | 11.60 |
| Non-Bessemer Retreat | 89,745 | 58.20 | .055 | 10.90 |
| | 693,066 | 60.40 | .048 | 8.90 |
| Hemmens | | | | |
| Bessemer Wash | 263,254 | 59.50 | .027 | 9.30 |
| Non-Bessemer Wash | 139,489 | 58.50 | .047 | 9.00 |
| Bessemer Retreat | 396,837 | 56.90 | .030 | 11.70 |
| Non-Bessemer Retreat | 337,221 | 56.90 | .060 | 11.70 |
| | 1,136,801 | 57.70 | .040 | 10.80 |
| Mine Totals | | | | |
| Bessemer Wash | 542,623 | 60.10 | .031 | 9.00 |
| Non-Bessemer Wash | 677,562 | 59.80 | .068 | 8.30 |
| | 1,220,185 | 59.90 | .052 | 8.60 |
| Bessemer Retreat | 689,566 | 56.80 | .030 | 11.60 |
| Non-Bessemer Retreat | 932,300 | 57.00 | .076 | 11.10 |
| | 1,621,866 | 56.90 | .060 | 11.30 |
| Total Bessemer | 1,220,185 | 58.20 | .030 | 10.50 |
| Total Non-Bessemer | 1,621,866 | 58.20 | .072 | 9.90 |
| Total Mine | 2,842,051 | 58.20 | .054 | 10.20 |

5. Labor & Wages

a. Comments

Labor relations during the year were generally quite satisfactory. No grievances were processed at the Canisteo mine in 1958.

Wage and fringe benefits increased at various times throughout the year as follows:

1. Effective January 1, 1958: $0.05 per hour cost-of-living.

2. Effective July 1, 1958: $0.04 per hour cost-of-living.

3. Effective July 1, 1958: $0.07 per job class general increase plus $0.002 per job increment raise.

4. Effective July 1, 1958: Double time and one-quarter (2.25) for holidays worked. Time and one-quarter (1.25) premium pay for Sundays worked.

5. Effective 1958: One-half week extra vacation pay for men with 3 to 5, 10 to 15, and 25 or more years service.

b. Comparative Statement of Production & Wages

| | 1958 | 1957 |
|---|---|---|
| Production-tons | 600,753 | 436,694 |
| Number of Days Operated | 79 | 96 |
| Number of Shifts Operated | 169.5 | 140 |
| Average Product per Shift | 3,544 | 3,196 |
| Average Number of Men Employed | 129 | 142 |
| Tons per Man per Day | 48.77 | 55.70 |
| Average Wages Paid per Day | $25.34 | $24.64 |
| Total Amount of Labor | $279,889.88 | $241,516.57 |
| Labor Cost per Ton | $0.466 | $0.553 |

6. GENERAL SURFACE

a. Buildings & Repairs

No new buildings were constructed in 1958 and repairs were minor.

b. Roads, Transmission Lines, etc. None.

c. Miscellaneous General Construction

E&A No. CC-936: Resheeting of the washing plant contracted to Abe Mathews Engineering Company. Project started November 28, 1957, and completed January 31, 1958. Actual cost: $24,109.

E&A No. CC-937: Remodeling pit service garage; building was raised 2 feet and new doors installed under contract by Abe Mathews Engineering Company. Project started January and completed February, 1958. Actual cost: $4,880.

E&A No. CC-941: Remodeling of concentrate stockpiling system to replace 24-inch equipment with 36-inch equipment on the trailing conveyor. Work done by mine crews. Stripping conveyor equipment used. Project started December, 1957; completed April, 1958. Actual cost: $15,190.

E&A No. CC-952: Installation of screening plant rock pocket. Work done by mine crews. Project started January and completed April, 1958. Actual cost: $23,953.

E&A No. CC-960: Installation of additional tailings pumps at the fine ore plant. Work done by mine crews. Project started March and completed May, 1958. Actual cost: $40,204.

7. OPEN PIT

a. Stripping

Stripping under E&A No. CC-972 started November 4 with 2 shovels and 13 to 14 trucks. A 20-shift-per-week schedule effective November 9 continued until December 10 when crews and equipment were transferred to the Sally. Most of the material moved was surface overburden from the North Bovey forties. All of the material was used to raise and reinforce tailings dykes.

E&A No. CC-972: authorized expenditure of $142,450 for removal of 370,000 cubic yards at $0.385. By December 10, 465,467 cubic yards were moved at a rate of 4,874 yards per shift and a cost of $0.369 a yard, for a total expenditure of $171,867. A supplemental E&A in the amount of $77,000 to cover an additional 200,000 cubic yards justified increased tonnage produced at the Canisteo in 1958 and the anticipated increase in tonnage in 1959.

b. Open Pit Mining

The 1958 ore season started May 26 on a 2-shift, 4-day-week schedule which remained in effect until September 29 when a 3-shift, 4-day-week schedule went into effect and continued until shutdown on November 4. Because of the demand for ore, operations were actually conducted on a 5-day week during October and November.

The pit operated 169.5 shifts to produce 1,494,083 tons of crude ore which included 101,996 tons of screen rock. 17,870 tons of pit rock, cleanup, and lean material were also moved. 1,511,953 tons were removed from the pit at an average rate of 8,920 tons per shift.

Gross crude removed from the various leases is shown below and includes 300,082 tons of crude ore mined from lean ore stockpiles:

| Lease | Tons |
|---|---|
| Bovey | 811,081 |
| Hemmens | 276,411 |
| Snyder | 406,591 |
| | 1,494,083 |

Bovey: Ore was produced from North Bovey forties and from Bovey lean ore stockpiles. Since Sally ore could be mixed with Bovey ore at the Canisteo, a considerable tonnage of low grade Bovey ore was absorbed.

Hemmens: Orewas mined in the upper horizon along the Hemmens-Walker line.

Snyder: Practically all of the ore came from the West Snyder forty. A small amount of ore was also mined in the bottom of the East Snyder forty and from lean ore stockpiles.

c. Pumping & Drainage

Automatic pumping equipment continues to operate satisfactorily. Mine water pumped out of the pit flows north and eventually enters Prairie River. About 2610 gallons a minute were pumped from the pit at a cost of $0.039 per ton of concentrates.

8. BENEFICIATION

a. Plant Operation

Operating on the same schedule as the pit, the concentrating plant received 1,392,087 tons of crude ore and produced 538,604 tons of standard concentrates at an average rate of 3178 tons a shift and a weight recovery of 38.69 per cent of plant crude and 36.01 per

cent of pit crude. The standard concentrates were made up of 5,331 tons of wash and 533,273 tons of retreat.

Operating the same schedule as the washing plant, the Heavy-Media plant received 374,421 tons of feed and produced 244,037 tons of concentrates at a weight recovery of 65.18 per cent. Coarse tailings from the Heavy-Media plant totalled 130,384 tons.

The fine ore plant operated on the same schedule as the main plant. No tailings basin material was treated. 62,149 tons of concentrates were produced from 631,938 tons of current tailings at an average rate of 378 tons per shift. Weight recovery was 8.98 per cent of the current tailings and 4.46 per cent of net crude.

The scrubber unit installed in the main concentrating plant in 1957 was in operation practically 100 per cent of the time during 1958, resulting in a very definite improvement in the grade of concentrates. While some loss in recovery was experienced, a part of this loss was made up by increased production from the fine ore plant.

To eliminate some of the coarse high silica material from the fine ore plant product, a 3x8 Derrick screen was installed to scalp off this material, most of which came from the first two pockets of the sizers. The screen was installed on an experimental basis and was removed at the end of the operating season. Test data is being compiled by the Research Department. Further experimental work with another type of screen is to be conducted during the 1959 operating season.

During the operating season it was necessary to stockpile 164,856 tons of concentrates. Of this amount 65,303 tons were shipped from stockpile, leaving a balance of 99,553 tons in stock on January 1, 1959.

Of the total standard concentrates produced, 45.16 per cent were split coarse and fine. Of the split ore, 61.34 per cent was coarse and 38.66 per cent fine concentrates.

Concentration data for 1958 is as follows:

| Wash Product | Tons | Per Cent Plant | Per Cent Pit | Per Cent Iron | Per Cent Phos | Per Cent Silica | Iron Units |
|---|---|---|---|---|---|---|---|
| Crude to Plant | 13,231 | 100.00 | 94.22 | 48.75 | | 25.99 | |
| Screen Plant Rock | 812 | | 5.78 | 28.43 | | 54.19 | |
| Pit Crude | 14,043 | | 100.00 | 47.90 | | 27.16 | |
| Wash Concentrates Produced | 5,331 | 40.29 | 37.96 | 58.35 | .049 | 10.53 | |
| Total Concentrates Produced & Shipped | 5,331 | 40.29 | 37.96 | 58.35 | .049 | 10.53 | |
| Total Fine Tailings (by difference) | 7,900 | 59.70 | 56.26 | 39.45 | | 40.97 | |
| **Retreat Product** | | | | | | | |
| Crude to Plant | 1,378,856 | 100.00 | 92.43 | 44.88 | | 31.21 | |
| Pit Rock | 11,780 | | .79 | 25.12 | | 58.87 | |
| Screen Plant Rock | 101,184 | | 6.78 | 25.70 | | 58.50 | |
| Pit Crude | 1,491,820 | | 100.00 | 43.51 | | 33.15 | |
| Concentrates Produced | 532,699 | 38.63 | 35.71 | 57.39 | .070 | 11.21 | |
| Stockpile Overrun | 574 | | | | | | |
| Total Concentrates Produced & Shipped | 533,273 | 38.68 | 35.75 | 57.39 | .070 | 11.21 | |
| Heavy-Media Concentrates | 244,037 | 17.69 | 16.36 | 57.49 | | 10.49 | |
| Heavy-Media Rejects | 130,384 | 9.46 | 8.74 | 38.00 | | 37.39 | |
| Heavy-Media Feed | 374,421 | 27.15 | 25.10 | 52.72 | | 17.12 | |
| Total Fine Tailings (by difference) | 715,199 | 51.87 | 47.94 | 36.23 | | 45.82 | |
| **Fine Ore Plant** | | | | | | | |
| Crude to Plant | 691,938 | 100.00 | | 31.41 | | 50.44 | |
| Total Concentrates Produced & Shipped | 62,149 | 8.98 | | 58.33 | .046 | 11.92 | |
| Total Fine Tailings (by difference) | 629,789 | 91.02 | | 28.53 | | 54.56 | |

Following is a brief classification of delay time at the beneficiation plants:

| Source of Delay | Hours | Per Cent of Total Working Hours |
|---|---|---|
| **Washing Plant** | | |
| Out of Ore | .75 | 0.06 |
| Screen Plant Machines | 9.50 | 0.70 |
| Plant Pocket & Rock Chute | 11.00 | 0.81 |
| Electric Power | 6.75 | 0.50 |

| Source of Delay | Hours | Per Cent of Total Working Hours |
|---|---|---|
| Pump & Pipelines | .50 | 0.04 |
| Washing Plant Machines | 7.50 | 0.55 |
| Conveyors | 14.00 | 1.03 |
| | 50.00 | 3.69 |
| **Retreat Plant** | | |
| Electric Power | 1.00 | 0.07 |
| Heavy-Media Plant Machines | 1.75 | 0.13 |
| Pumps & Pipelines | 1.50 | 0.11 |
| | 4.25 | 0.31 |
| **Fine Ore Plant** | | |
| Electric Power | 6.25 | 0.47 |
| Due to Washing Plant | 18.25 | 1.39 |
| Out of Cars | 37.75 | 2.88 |
| Pumps | 66.75 | 5.07 |
| Tailings Line | 4.00 | 0.30 |
| | 133.00 | 10.11 |

## 9. MAINTENANCE & REPAIRS

All pit and plant equipment repair was suspended from December 27, 1957, until April 7, 1958, when a limited crew was recalled to repair both pit and plant equipment prior to the start of the ore season on May 26.

## 10. COST of PRODUCTION

### a. Comparative Mining Costs

| Product | 1957 Actual Cost | 1958 Budget | 1958 Actual Cost |
|---|---|---|---|
| Wash Concentrates | 8 | | 5,331 |
| Retreat Concentrates | 373,981 | 383,000 | 533,273 |
| Fine Ore Concentrates | 60,261 | 42,000 | 62,149 |
| Direct Ore | 2,444 | | |
| | 436,694 | 425,000 | 600,753 |

| Product | 1957 Actual Cost | 1958 Budget | 1958 Actual Cost |
|---|---|---|---|
| Per Cent Gross Crude Recovery | 39.37 | 38.64 | 40.21 |
| Average Product Per Shift | 3,456 | | 3,556 |
| Tons per Man per Day | 44.61 | | 48.77 |
| Days Operated | 96 | | 79 |
| **Costs** | | | |
| Pit Operating | $0.261 | $0.240 | $0.220 |
| Beneficiation | 0.157 | 0.170 | 0.139 |
| Fine Ore Concentrating | 0.924 | 0.850 | 0.713 |
| Loading Stockpile Ore | 0.015 | 0.012 | 0.037 |
| Sampling & Analysis | 0.029 | 0.029 | 0.026 |
| Safety & First Aid Supplies | 0.002 | 0.003 | 0.001 |
| Employees Vacation Pay | 0.040 | 0.052 | 0.051 |
| Personal Injury Expense | 0.002 | 0.002 | 0.010 |
| Social Security Taxes | 0.025 | 0.036 | 0.016 |
| | $1.232 | $1.256 | $1.062 |
| General Mine Expense | 0.199 | 0.254 | 0.150 |
| Winter & Idle | 0.726 | 0.395 | 0.459 |
| Cost of Production | $2.157 | $1.905 | $1.671 |
| **Depreciation** | | | |
| Plant & Equipment | 0.263 | | 0.233 |
| Motorized Equipment | 0.047 | | 0.026 |
| Movable Equipment | 0.012 | | 0.006 |
| **Amortization** | | | |
| Leasehold | 0.126 | | 0.110 |
| Stripping | 0.099 | | |
| **Taxes** | | | |
| Ad Valorem | 0.332 | | 0.202 |
| Occupational | 0.504 | | 0.416 |
| Royalty | 0.048 | | 0.042 |
| Total Depreciation-Amortization-Taxes | $1.431 | | $1.035 |
| Royalty | 0.338 | | 0.330 |
| Total Cost on Cars | $3.926 | | $3.036 |

b. Detailed Cost Comparison

Over-all mining costs of $1.671 were $0.234 under the budget of $1.904--the main reason being increased rate of production. The net crude feed rate was increased from 962 tons per hour in 1957 to 1105 tons in 1958--an increase of about 15 per cent. While a considerable portion of the ore mined was low grade, most of the crude was soft ore containing a comparatively low percentage of rock and this accounted for the increased rate of production. As more of the rockier ores are encountered in the future, it will not be possible to maintain this rate of production. The fact that 600,753 tons of concentrates were produced from the Canisteo mine as compared to the original budget of 425,000 tons also had a favorable effect, particularly on overhead costs.

Pit Operating Costs: $0.020 below the budget of $0.240.

Beneficiation Costs: $0.031 below the budget of $0.170.

Fine Ore Concentration Costs: $0.137 below the budget of $0.850. An increased rate of production, accounted for in part by an increase in recovery, was the main reason for decreased costs.

Miscellaneous Pit & Beneficiation Costs: $0.024 under the budget of $0.134.

General Mine Expense: $0.104 under the budget of $0.254 mainly because tonnage produced was about 40 per cent more than original estimate.

Winter & Idle: $0.100 higher than budget of $0.359. The combined Canisteo-Sally expenditure for Winter & Idle expense was $363,477 as compared to the combined budget of $255,050--an overexpenditure of $108,427. Some of the factors contributing to increased Winter & Idle are: late start of ore season; an overexpenditure for month of May in amount of $55,000 was not anticipated; increase in electric power rates raised costs by $12,000; increased tonnage necessitated more plant equipment repairs than originally anticipated under a minimum repair program; and charging cost of repair parts, screen cloth, etc., required for the concentrating plant for the start of the 1959 ore season, under the 1958 Winter & Idle allowance.

11. EXPLORATION & FUTURE EXPLORATION

During 1958, the Henry Schultz Drilling Company drilled two holes in the Canisteo pit for a total of 354 feet. These two holes were drilled along the west side of the North Bovey forty to check the extent of the ore in this area. No appreciable change in ore reserves resulted from this drilling.

Additional drilling will be required along the east and south side of the pit on the Hemmens and South Bovey forties, and on the north side of the pit on the North Bovey forties before ultimate pit limits and actual reserves can be determined.

12. TAXES

| | 1958 | | 1957 | | Increase-Decrease | |
|---|---|---|---|---|---|---|
| Real Estate | Assessed Value | Taxes | Assessed Value | Taxes | Assessed Value | Taxes |
| Mineral | $410,537 | $ 88,233.31 | $561,406 | $114,789.38 | -$150,869 | -$26,556.07 |
| Land,Buildings,Machinery | 85,625 | 18,680.55 | 80,269 | 16,660.05 | ∕ 5,356 | ∕ 2,020.50 |
| Personal Property | | | | | | |
| Equipment | 108,736 | 23,274.95 | 117,998 | 24,049.17 | - 9,262 | - 774.22 |
| Stockpile | 4,982 | 1,066.40 | 5,314 | 1,083.05 | - 332 | - 16.65 |
| Tailings Basin Stockpile | 18,748 | 4,013.01 | 32,197 | 6,562.07 | - 13,449 | - 2,549.06 |
| | $628,628 | $135,268.22 | $797,184 | $163,143.72 | -$168,556 | -$27,875.50 |
| Average Mill Rate | | 215.17 | | 204.65 | ∕10.52 mills or 5.14% | |

Note: Tax on mineral reduced by mining and rate per ton reduced to 42.5% of full and true value from 47% in 1957 under recovery law. Lands, building, and machinery valuation increased by addition of scrubber plant to beneficiating plant. Personal property equipment valuation decreased by depreciation. Tailings basin value by mining in 1957.

Of above taxes, $13,149.09 were charged to Sally mine for their proportionate amount for use of Canisteo facilities.

13. ACCIDENTS & PERSONAL INJURY

On October 28, 1958, Gerald Aiton parked truck at a shovel in the pit. While waiting for truck to be loaded, leaned against truck door, fell out, landed on ground head first, sustained neck injury. Time lost: 1 week and 1 day. Compensation paid: $45.

14. PROPOSED NEW CONSTRUCTION None

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

a. Equipment Received

540 feet of 24-inch conveyor belt for fines concentrate conveyor. Plant to loading bin.

b. Proposed New Equipment

One 40-ton haulage truck.
Three pickup trucks.
One service truck.
One Blasthole drill (On order under E&A No. CC-977)

# CUSHING MINE

## ANNUAL REPORT

## YEAR 1958

1. GENERAL

There was no stripping, ore production, or drilling on the Cushing Reserve proper in 1958.

Great Northern Railway continued its engineering work on the relocation of tracks which are on Cushing land.

4. ESTIMATE OF ORE RESERVES AS OF May 1, 1958

| | Bessemer | | | | Non-Bessemer | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Concentrates | Tons | Iron | Phos | Silica | Tons | Iron | Phos | Silica | Total |
| NE-SW 36-56-25 | | | | | | | | | |
| Wash | | | | | 105,255 | 57.50 | .045 | 8.10 | 105,255 |
| Retreat | 74,661 | 56.50 | .035 | 11.00 | 157,414 | 56.50 | .045 | 11.00 | 232,075 |
| | 74,661 | 56.50 | .035 | 11.00 | 262,669 | 56.90 | .045 | 9.84 | 337,330 |
| NW-SW 36-56-25 | | | | | | | | | |
| Wash | | | | | 560,628 | 58.90 | .045 | 8.80 | 560,628 |
| Retreat | 395,112 | 56.50 | .035 | 11.00 | 853,227 | 56.50 | .045 | 11.00 | 1,248,339 |
| | 395,112 | 56.50 | .035 | 11.00 | 1,413,855 | 57.45 | .045 | 10.13 | 1,808,967 |
| SW-SW 36-56-25 | | | | | | | | | |
| Wash | | | | | 392,152 | 58.90 | .045 | 8.80 | 392,152 |
| Retreat | 126,141 | 56.50 | .035 | 11.00 | 69,860 | 56.50 | .045 | 11.00 | 196,001 |
| | 126,141 | 56.50 | .035 | 11.00 | 462,012 | 58.54 | .045 | 9.26 | 588,153 |
| Total Cushing Reserve | | | | | | | | | 2,734,450 |
| Total Breakdown | | | | | | | | | |
| Wash | | | | | 1,058,035 | 58.76 | .045 | 8.73 | 1,058,035 |
| Retreat | 595,914 | 56.50 | .035 | 11.00 | 1,080,501 | 56.50 | .045 | 11.00 | 1,676,415 |
| | 595,914 | 56.50 | .035 | 11.00 | 2,138,536 | 57.63 | .045 | 9.86 | 2,734,450 |
| Grand Total | | | | | | 57.38 | .043 | 10.08 | |

Cushing Reserve
Annual Report
Year 1958
Page 2

12. TAXES

| Real Estate | 1958 Assessed Value | 1958 Taxes | 1957 Assessed Value | 1957 Taxes | Increase-Decrease Assessed Value | Increase-Decrease Taxes |
|---|---|---|---|---|---|---|
| Mineral | $183,989 | $51,066.15 | $188,051 | $47,202.68 | -$4,062 | +$3,863.47 |
| Land | 4,556 | 1,264.52 | 4,281 | 1,074.58 | + 275 | + 189.94 |
| | $188,545 | $52,330.67 | $192,332 | $48,277.26 | -$3,787 | +$4,053.41 |
| Average Mill Rate | | 277.55 | | 251.01 | | |

Note: Increase mill rate 10.57 per cent increased mineral tax.

# HAWKINS MINE

## ANNUAL REPORT

## YEAR 1958

### 1. GENERAL

Stripping operations in progress at the turn of the year were carried forward on a 3-shift, 5-day-week schedule until January 23 when curtailment to a 4-day-week schedule was effected to the completion of the stripping program on February 6. Practically all surface material was used to complete dykes around the new clear water basin and tailings pond extensions. With the close of pre-season stripping, the mine was placed on a standby basis with only one hourly employee retained for janitor service and snow removal.

Outside of relocating the pumphouse and pipelines entailed by the dyke changes, no plant and equipment repairs were scheduled until April 28 when a limited crew was recalled to complete unfinished projects and equipment repairs preparatory to the start of the ore season.

Ore operations were started May 26 on a 2-shift, 4-day-week schedule until the close of the season on October 15. Despite heavy rock burden which was further aggravated in excavating a rock channel to facilitate lower pit drainage for the exploitation of bottom ores, the pit crude production averaged 8219 tons a shift, reflecting a big improvement over the 1957 movement of 7749 tons.

At the end of 1957, 23,443 tons of ore remained in stockpile. 125,094 tons were placed in stockpile during the season and 116,390 tons removed, leaving a balance of 32,147 tons in stockpile at the end of 1958. Stockpile bedding of highly fluctuating manganese concentrates proved very successful as indicated by the uniformity of cargoes reloaded from stockpile to meet special high manganese ore requirements.

At the Harvester fines plant, production was started with transfer of equipment in Basin "B". The plant went into production May 19 on a 2-shift, 4-day-week schedule. With the release of the necessary crew upon completion of the rock channel excavation in the Hawkins pit, plant production was stepped up to a 3-shift operation on July 7. Upon fulfillment of the season's production of fine concentrates, the plant was shut down on October 16, leaving a slight tonnage in Basin "B" for next year before transferring operations to Basin "C".

Post-season stripping operations in the flint-hard taconite area along the east side of the pit were started on October 16 on a 3-shift, 4-day-week schedule which continued until December 18 when all operations were shut down for the remainder of the year--except drilling and blasting to catch up on rock breakage.

Winter & Idle repairs were started immediately after the 1958 ore season but were temporarily discontinued December 18 to be resumed with stripping operations after the first of the year.

Encouraged by the success of ammonium nitrate blasting in dry holes, experimentation was carried forward with varying degrees of success trying various containers and suggestions for water-proofing. However, although experiments still continue, no positive solution of fertilizer blasting in wet holes was discovered by the end of the year.

A Failing horizontal drill was put into operation on a trial basis in October to determine the merit of horizontal drilling versus vertical rotary drilling. Although limited to 8 holes, the drilling looked promising. Further experimenting with horizontal holes will be conducted during next year's ore season.

## 2. PRODUCTION-SHIPMENTS-INVENTORIES

### a. Production by Grades

| Hawkins | Wash | Retreat | Total |
|---|---|---|---|
| Crude | | 1,176,982 | 1,176,982 |
| Concentrates | | | |
| Non-Bessemer | 155 | 294,953 | 295,108 |
| Bessemer | | 117,876 | 117,876 |
| | 155 | 412,829 | 412,984 |
| IHC Fines | | | |
| Crude | | | 183,585 |
| Concentrates | | | 50,541 |

b. Shipments by Grades

| Ore | Bessemer Retreat | Non-Bessemer Wash | Non-Bessemer Retreat | Total |
|---|---|---|---|---|
| Hawkins | 124,242 | 8,475 | 271,562 | 404,279 |
| IHC Fines | | | | 50,541 |

c. Stockpile Inventories

| | |
|---|---|
| Hawkins Retreat Concentrates | 32,147 |

d. Production by Months

Crude Ore

| Month | Hawkins Retreat | IHC Fines |
|---|---|---|
| May | 47,852 | 7,152 |
| June | 249,371 | 21,396 |
| July | 263,161 | 41,964 |
| Aug | 223,172 | 35,214 |
| Sept | 270,654 | 51,495 |
| Oct | 122,772 | 26,364 |
| | 1,176,982 | 183,585 |

Concentrates

| Month | Wash | Retreat | Total | IHC Fines |
|---|---|---|---|---|
| May | | 14,131 | 14,131 | 2,504 |
| June | | 87,399 | 87,399 | 5,605 |
| July | | 85,833 | 85,833 | 14,670 |
| Aug | 155 | 74,915 | 75,070 | 8,281 |
| Sept | | 103,333 | 103,333 | 14,000 |
| Oct | | 47,218 | 47,218 | 5,481 |
| | 155 | 412,829 | 412,984 | 50,541 |

3. ANALYSIS

a. Tonnage & Analysis of Crude Ore Produced

| Hawkins | Tons | Iron | Silica |
|---|---|---|---|
| Retreat Crude | 1,176,982 | 40.59 | 36.80 |
| Fine Ore Crude | 183,585 | 38.59 | 41.68 |

b. Tonnage & Analysis of Concentrates Produced

| Hawkins | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Non-Bessemer Wash | 155 | 55.70 | .055 | 12.07 | .87 | .50 | 5.43 |
| Bessemer Retreat | 117,876 | 57.12 | .038 | 11.97 | .37 | .48 | 6.44 |
| Non-Bessemer Retreat | 294,953 | 56.24 | .044 | 12.29 | .98 | .50 | 6.56 |
| | 412,984 | 56.49 | .042 | 12.20 | .81 | .49 | 6.52 |
| IHC Fines | 50,541 | 57.97 | .032 | 13.02 | .32 | .54 | 7.95 |

c. Tonnage & Complete Analysis of Concentrates Produced & Shipped

| Hawkins | Tons | Iron | Phos | Silica | Mang | Alum | Lime | Mag | Sulf | Ign Loss | Moist |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-Bessemer Wash | 8,475 | 56.47 | .050 | 10.40 | 1.56 | .48 | .10 | .20 | .007 | 5.72 | 5.45 |
| Bessemer Retreat | 124,242 | 57.10 | .038 | 11.99 | .37 | .48 | .10 | .20 | .007 | 4.96 | 6.34 |
| Non-Bessemer Retreat | 271,562 | 56.24 | .044 | 12.26 | .99 | .50 | .10 | .20 | .007 | 5.00 | 6.50 |
| | 404,279 | 56.51 | .042 | 12.14 | .81 | .49 | .10 | .20 | .007 | 5.00 | 6.43 |
| IHC Fines | 50,541 | 57.97 | .032 | 13.02 | .32 | .54 | .08 | .22 | .007 | 2.71 | 7.95 |

d. Tonnage & Analysis of Ore in Inventory

| Hawkins | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Retreat | 32,147 | 56.45 | .045 | 11.97 | .97 | .46 | 6.64 |

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

| Concentrates | Cubic Feet per Ton | Per Cent Recovery |
|---|---|---|
| Wash | 14 | 50 |
| Retreat | 14 | 30 |

b. Ore Reserves as of December 31, 1958

| Lease | Reserves 12-31-57 | Mined 1958 | Balance After Mining | Changed by Re-estimate | Reserves 12-31-58 |
|---|---|---|---|---|---|
| SE-NE 31,57-22 | | | | | |
| Open Pit Wash | 111,204 | | 111,204 | | 111,204 |
| Open Pit Retreat | 389,139 | 24,760 | 364,379 | | 364,379 |
| | 500,343 | 24,760 | 475,583 | | 475,583 |
| NE-SE 31, 57-22 | | | | | |
| Open Pit Wash | 182,178 | | 182,178 | | 182,178 |
| Open Pit Retreat | 855,541 | 181,236 | 674,305 | | 674,305 |
| | 1,037,719 | 181,236 | 856,483 | | 856,483 |
| SW-NW 32, 57-22 | | | | | |
| Open Pit Wash | 31,043 | | 31,043 | | 31,043 |
| Open Pit Retreat | 345,882 | 138,177 | 207,705 | | 207,705 |
| | 376,925 | 138,177 | 238,748 | | 238,748 |
| NW-SW 32, 57-22 | | | | | |
| Open Pit Wash | 277,610 | 155 | 277,455 | -50,000 | 227,455 |
| Open Pit Retreat | 94,585 | 68,656 | 25,929 | +50,000 | 75,929 |
| Underground Wash | 127,319 | | 127,319 | | 127,319 |
| | 499,514 | 68,811 | 430,703 | | 430,703 |
| Total Hawkins | | | | | |
| Open Pit Wash | 602,035 | 155 | 601,880 | | 601,880 |
| Open Pit Retreat | 1,685,147 | 412,829 | 1,272,318 | | 1,272,318 |
| Underground Wash | 127,319 | | 127,319 | | 127,319 |
| | 2,414,501 | 412,984 | 2,001,517 | | 2,001,517 |

c. Estimated Analysis of Ore Reserves

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| SE-NE 31-57-22 | | | | |
| Bessemer Wash Open Pit | 72,117 | 61.13 | .026 | 8.72 |
| Non-Bessemer Wash Open Pit | 39,087 | 61.20 | .047 | 7.38 |
| Bessemer Retreat Open Pit | 187,333 | 59.38 | .028 | 10.66 |
| Non-Bessemer Retreat Open Pit | 177,046 | 59.38 | .050 | 10.66 |
| | 475,583 | 59.79 | .038 | 10.10 |
| NE-SE 31-57-22 | | | | |
| Bessemer Wash Open Pit | 127,205 | 59.95 | .029 | 8.72 |
| Non-Bessemer Wash Open Pit | 54,973 | 60.58 | .058 | 8.37 |
| Bessemer Retreat Open Pit | 665,974 | 57.65 | .030 | 11.81 |
| Non-Bessemer Retreat Open Pit | 8,331 | 57.65 | .052 | 11.81 |
| | 856,483 | 58.18 | .032 | 11.13 |
| SW-NW 32-57-22 | | | | |
| Bessemer Wash Open Pit | 21,370 | 56.60 | .012 | 9.87 |
| Non-Bessemer Wash Open Pit | 9,673 | 56.76 | .063 | 10.15 |
| Bessemer Retreat Open Pit | 159,948 | 57.50 | .028 | 10.90 |
| Non-Bessemer Retreat Open Pit | 47,757 | 57.50 | .056 | 10.90 |
| | 238,748 | 57.39 | .034 | 10.78 |
| NW-SW 32-57-22 | | | | |
| Bessemer Wash Open Pit | 71,774 | 59.08 | .029 | 7.63 |
| Non-Bessemer Wash Open Pit | 155,681 | 56.85 | .062 | 9.78 |
| Bessemer Retreat Open Pit | 25,929 | 57.50 | .028 | 10.90 |
| Non-Bessemer Retreat Open Pit | 50,000 | 57.50 | .056 | 10.90 |
| Bessemer Wash Underground | 62,974 | 58.00 | .030 | 9.00 |
| Non-Bessemer Wash Underground | 64,345 | 57.00 | .060 | 9.50 |
| | 430,703 | 57.53 | .047 | 9.46 |
| Total-Open Pit Wash | | | | |
| Bessemer | 292,466 | 59.78 | .027 | 8.54 |
| Non-Bessemer | 259,414 | 58.26 | .060 | 9.15 |
| | 551,880 | 59.07 | .043 | 8.83 |
| Total-Open Pit Retreat | | | | |
| Bessemer | 1,039,184 | 57.94 | .029 | 11.44 |
| Non-Bessemer | 283,134 | 58.68 | .053 | 10.78 |
| | 1,322,318 | 58.10 | .034 | 11.30 |
| Underground Wash | | | | |
| Bessemer | 62,974 | 58.00 | .030 | 9.00 |
| Non-Bessemer | 64,345 | 57.00 | .060 | 9.50 |
| | 127,319 | 57.49 | .045 | 9.25 |
| GRAND TOTAL HAWKINS MINE | 2,001,517 | 58.33 | .038 | 10.49 |

## 5. LABOR & WAGES

### a. Comments

An ample labor supply existed during the year and very little turnover was experienced. Eleven men retired after reaching age 65.

Wage and fringe benefits increased at various times during the year as follows:

| | |
|---|---|
| Effective January 1, 1958: | $0.05 per hour cost-of-living. |
| Effective July 1, 1958: | $0.04 per hour cost-of-living. |
| Effective July 1, 1958: | $0.07 per job class general increase plus $0.002 per job increment raise. |
| Effective July 1, 1958: | Double time and one-quarter (2.25) for holidays worked. Time and one-quarter (1.25) premium pay for Sundays worked. |
| Effective 1958: | One-half week extra vacation pay for men with 3 to 5, 10 to 15, and 25 or more years of service. |

### b. Comparative Statement of Production

| | 1958 | 1957 |
|---|---|---|
| Concentrate Tonnage | 412,984 | 629,442 |
| Number of Shifts | 167 | 251 |
| Number of Hours | 92,694 | 141,033 |
| Average Number of Men Working | 112 | 140 |
| Average Wages per Hour | $3.175 | $2.810 |
| Product per Man per Day | 35.64 | 35.70 |
| Labor Cost per Man per Ton | $0.7408 | $0.6538 |
| Total Number of Days | 84 | 126 |
| Total Amount Paid for Labor | $305,950.51 | $411,556.44 |

6. GENERAL SURFACE

a. Buildings & Repairs

Only necessary repairs were made to mine buildings.

b. Roads, Transmission Lines, etc. - Only operation changes.

c. Miscellaneous General Construction - None

7. OPEN PIT

a. Stripping

Surface stripping along the east side of the Hawkins pit was completed February 6. 65,158 cubic yards of surface material moved in 1958 were hauled to the tailings area for dyke extension and construction of a new clear water basin.

After the close of the 1958 ore season, stripping operations were started under E&A No. CC-974 in rock in the east pit extension using 2 shovels and 10 trucks. Stripping was conducted on a 3-shift, 4-day-week basis which continued until December 18 when operations were suspended over the holiday period. Due to the flinty nature of the taconite, however, drilling and blasting crews were retained during this period to catch up on rock breakage.

The following table shows Hawkins stripping. Cost includes two weeks of drilling and blasting completed during the holiday shutdown:

| Cubic Yards | Shifts | Yards/Shift | Man Hours | Cost/Yard |
|---|---|---|---|---|
| 577,802 | 186 | 3,106 | 55,050 | $0.717 |

b. Open Pit Mining

Ore operations began on May 26 on a 2-shift, 4-day-week schedule using 2 shovels and 8 trucks. Production from the pit was high, averaging 8,219 tons per shift, for a total of 1,389,042 tons for the season. Pit production for the season came from the pit bottom and the upper ore in the east pit extension.

For grading requirements, a high manganese ore was produced which lowered somewhat the natural iron of the concentrates produced. Nevertheless, the final grade for the season--averaging 52.66 per cent iron and 11.55 per cent silica--compared satisfactorily with the guaranteed 52.55 and 11.02 per cent respectively.

Crude production from the pit was as follows:

| | Wash Plant | | | | Pit | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Material | Shifts | -2" Rejects | Crude | Tons per Shift | Shifts | Screen Rock | Rock | Crude | Tons per Shift | Cost per Ton |
| Retreat | 167 | 348 | 1,177,330 | 7,050 | 169 | 177,744 | 33,968 | 1,389,042 | 8,219 | $0.295 |

c. Pumping & Drainage

Pumping from the pit averaged approximately 1200 gallons per minute, and the water elevation was lowered 10 feet to develop additional bottom ore.

d. General Pit Activity

During the 1958 season, pit activity was confined to mining of ore and removal of pit rock. In the development of some bottom ore, it was necessary to excavate a channel through a horse of rock to facilitate drainage from the lower elevation.

8. BENEFICIATION

a. Washing Plant

The plant operated on the same shift schedule as the pit except for a small maintenance crew on the third shift. Production rate through the plant was good with no major delays. No additions or changes are contemplated for this unit in 1959.

Delay time is shown as follows. Delays shown do not necessarily mean an interruption in plant production as in most instances by-passing of these units was possible:

| Source of Delay | Hours | Per Cent | Per Cent of 1344.00 Working Hours |
|---|---|---|---|
| Out of Ore | 12.16 | 20.76 | 0.91 |
| Pit Screening Plant | 5.42 | 9.25 | 0.40 |
| Rock Pocket Truck | 0.92 | 1.57 | 0.07 |
| Crude Ore Conveyor | 15.18 | 25.91 | 1.13 |
| Primary Screens | 1.25 | 2.13 | 0.10 |
| Crushers and Feed Conveyor | 1.91 | 3.26 | 0.14 |
| Crusher Product Conveyor | 3.08 | 5.26 | 0.23 |
| Secondary Screens | 2.16 | 3.69 | 0.16 |
| Surge Pile Conveyor | 0.50 | 0.85 | 0.04 |
| Classifiers | 0.25 | 0.43 | 0.02 |
| Stockpile Conveyor & Stacker | 0.25 | 0.43 | 0.02 |
| Cleanup Pump | 0.58 | 0.99 | 0.04 |
| Miscellaneous Chutes & Launders | 1.25 | 2.13 | 0.09 |
| Tailings Pump | 1.51 | 2.58 | 0.11 |
| Tailings Line | 8.00 | 13.65 | 0.59 |
| Fresh Water | 0.33 | 0.56 | 0.02 |
| Electric Power | 3.84 | 6.55 | 0.29 |
| | 58.59 | 100.00 | 4.36 |
| Recapitulation | | | |
| Crude Ore to Head of Mill | 33.68 | 57.49 | 2.51 |
| Ore Processing Delays | 24.91 | 42.51 | 1.85 |
| | 58.59 | 100.00 | 4.36 |

b. Heavy-Media Plant

The Heavy-Media plant operated satisfactorily with a minimum of downtime. Rate of crude through the plant was increased from 315 tons per hour in 1957 to over 350 tons per hour in 1958. Media losses for the season were well below 1957. No changes in the flowsheet are contemplated for 1959.

Delays were as follows:

| Source of Delay | Hours | Per Cent | Per Cent of 1481.67 Working Hours |
|---|---|---|---|
| Out of Ore | 35.79 | 42.39 | 2.42 |
| Surge Pile Feeder | 3.88 | 4.60 | 0.26 |
| Heavy-Media Feed Conveyor | 0.75 | 0.89 | 0.05 |

| Source of Delay | Hours | Per Cent | Per Cent of 1481.67 Working Hours |
|---|---|---|---|
| Feed Preparation Screen | 6.90 | 8.17 | 0.46 |
| Akins Separator | 0.42 | 0.50 | 0.03 |
| Hardinge Separator | 0.25 | 0.30 | 0.02 |
| Coarse Concentrate Screen | 1.00 | 1.18 | 0.07 |
| Coarse Reject Screen | 1.50 | 1.78 | 0.10 |
| Coarse Concentrate Conveyor | 0.75 | 0.89 | 0.05 |
| Reject Conveyor | 0.75 | 0.89 | 0.05 |
| Dirty Media Pump | 4.00 | 4.74 | 0.27 |
| Magnetic Separator-Fine Side | 0.25 | 0.30 | 0.02 |
| Magnetic Separtor-Coarse Side | 2.03 | 2.40 | 0.14 |
| Magnetic Circulating Load | 0.50 | 0.59 | 0.03 |
| Dirty Media | 3.30 | 3.91 | 0.22 |
| Reject Truck | 8.40 | 9.95 | 0.57 |
| Miscellaneous Chutes & Launders | 0.25 | 0.30 | 0.02 |
| Tailings Line-Washing Plant | 8.00 | 9.47 | 0.54 |
| Charging Plant | 1.95 | 2.31 | 0.13 |
| Electric Power | 3.75 | 4.44 | 0.25 |
| | 84.42 | 100.00 | 5.70 |
| Recapitulation | | | |
| Crude Ore to Head of Mill | 40.42 | 47.88 | 2.73 |
| Ore Processing Delays | 44.00 | 52.12 | 2.97 |
| | 84.42 | 100.00 | 5.70 |

c. Cyclone Plant

Although somewhat improved over 1957, the operation of this plant is not entirely satisfactory. Excess water in the feed made it hard to hold a high gravity. At times the feed rate to the plant had to be cut in order to do a satisfactory job of separating. A third dewatering screen is being added to the flowsheet to improve dewatering of feed to the plant.

Delays were as follows:

| Source of Delay | Hours | Per Cent | Per Cent of 1318.75 Working Hours |
|---|---|---|---|
| Out of Ore | 1.50 | 0.46 | 0.11 |
| Feed Dewatering Screens | 8.76 | 2.66 | 0.66 |
| Dewatering Screen Undersize Pump | 2.75 | 0.84 | 0.21 |
| Cyclone Feed Pumps | 24.62 | 7.48 | 1.87 |
| Media Feed Pump | 25.75 | 7.82 | 1.95 |
| Charging Pump | 1.00 | 0.30 | 0.07 |
| Cyclones | 0.50 | 0.15 | 0.04 |
| Cyclone Float Screens | 9.33 | 2.83 | 0.71 |
| Cyclone Sink Screens | 9.45 | 2.87 | 0.72 |
| Dings Primary Drums | 2.36 | 0.72 | 0.18 |
| Dings Secondary Drums | 1.88 | 0.57 | 0.14 |
| Jeffrey Secondary Drums | 3.01 | 0.91 | 0.23 |
| Sink-Float Tramp Screens | 35.50 | 10.78 | 2.69 |
| Triplex Pumps | 7.50 | 2.28 | 0.57 |
| Float Magnetic Return Pump | 1.50 | 0.46 | 0.11 |
| Tailings Pump | 5.75 | 1.75 | 0.44 |
| Concentrate Dewatering Classifier | 4.75 | 1.44 | 0.36 |
| Magnetic Ore | 48.87 | 14.84 | 3.71 |
| Loaded Product Screens | 106.21 | 32.26 | 8.05 |
| High Grade Feed | 5.24 | 1.59 | 0.40 |
| Reclaim Water Pump | 3.25 | 0.99 | 0.25 |
| Wash Plant Tailings Line | 8.00 | 2.43 | 0.61 |
| Charging Plant | 5.25 | 1.60 | 0.40 |
| Miscellaneous | 4.00 | 1.21 | 0.30 |
| Electric Power | 2.50 | 0.76 | 0.19 |
| | 329.23 | 100.00 | 24.97 |
| **Recapitulation** | | | |
| Crude Ore to Head of Mill | 13.01 | 3.96 | 0.98 |
| Ore Processing Delays | 316.22 | 96.04 | 23.99 |
| | 329.23 | 100.00 | 24.97 |

d. International Harvester Tailings Basin Plant

Operations of the International Harvester tailings basin plant were started May 19 on a 2-shift, 4-day-week basis and increased to 3-shifts, 4-days on July 7. Mining operations were conducted in Pond "B" west and adjacent to O'Brien Lake.

Although lower in recovery, the concentrates were higher in natural iron than the Pond "A" product. Some difficulty in balancing the new 2-stage pumping system encountered the first part of the season increased delay time over 1957. After the plant feed pumps were synchronized, operations proceeded on a normal basis.

1958 plant production statistics are as follows:

| Product | 1958 Estimate | 1958 Production | 1957 Production |
|---|---|---|---|
| Concentrates | 50,000 | 50,541 | 43,806 |
| Per Cent Recovery | 32.00 | 27.53 | 30.93 |
| Average Daily Output | 549 | 568 | 429 |
| Tons per Man per Day | | 24.63 | 21.72 |
| Days Operated | 91 | 89 | 102 |

Delay time is as follows:

| Source of Delay | Hours | Per Cent | Per Cent of 1800.00 Working Hours |
|---|---|---|---|
| Dragline | 25.51 | 11.23 | 1.42 |
| Screen Repairs | 6.83 | 3.01 | 0.38 |
| Move Screening Plant | 21.50 | 9.46 | 1.19 |
| Screening Plant Feeder | 5.25 | 2.31 | 0.29 |
| Trash Screen | 2.25 | 0.99 | 0.12 |
| Trash Conveyor | 7.00 | 3.08 | 0.39 |
| Screen Plant Feed Pump | 41.50 | 18.27 | 2.31 |
| Screen Plant-General | 6.25 | 2.75 | 0.35 |
| Plant Feed Pipeline | 48.75 | 21.46 | 2.71 |
| Booster Feed Pump | 22.42 | 9.87 | 1.25 |
| Sizers | 0.75 | 0.33 | 0.04 |
| Concentrate Pump | 5.07 | 2.23 | 0.28 |
| Dewatering Classifier | 4.50 | 1.98 | 0.25 |
| Startup & Tieup | 2.75 | 1.21 | 0.15 |
| Clear Water Pump | 3.42 | 1.51 | 0.19 |
| Clear Water Line | 12.25 | 5.39 | 0.68 |
| Miscellaneous | 3.50 | 1.54 | 0.19 |
| Railroad Tracks & Cars | 3.17 | 1.40 | 0.18 |
| Electric Power | 4.50 | 1.98 | 0.25 |
| | 227.17 | 100.00 | 12.62 |

Recapitulation

| | | | |
|---|---|---|---|
| Crude Ore to Head of Mill | 187.26 | 82.43 | 10.40 |
| Ore Processing Delays | 39.91 | 17.57 | 2.22 |
| | 227.17 | 100.00 | 12.62 |

e. Complete Concentration Data

| Hawkins Wash Plant Product | Tons | Per Cent Weight Plant | Per Cent Weight Pit | Per Cent Iron | Per Cent Phos | Per Cent Silica | Per Cent Iron Units |
|---|---|---|---|---|---|---|---|
| 1957 Stockpile Overrun | 155 | | | | | | |
| **Hawkins Retreat Plant Product** | | | | | | | |
| Crude to Plant | 1,177,330 | 100.00 | 84.76 | 40.59 | | 36.80 | |
| Pit Rock | 33,968 | | 2.44 | 21.53 | | 64.55 | |
| Screen Plant Rock | 177,744 | | 12.80 | 25.03 | | 61.18 | |
| Pit Crude | 1,389,042 | | 100.00 | 38.13 | | 40.60 | |
| Total Concentrates Produced | 412,829 | 35.06 | 29.72 | 56.48 | .043 | 12.30 | 48.79 |
| Unsized Concentrates Produced | 370,401 | 31.31 | 26.53 | 56.42 | .044 | 12.32 | |
| Coarse Concentrates Produced | 29,241 | 2.65 | 2.25 | 57.60 | .045 | 10.82 | |
| Fine Concentrates Produced | 13,187 | 1.10 | 0.94 | 55.42 | .037 | 14.99 | |
| Total Concentrates Produced & Shipped | 412,829 | 35.06 | 29.72 | 56.48 | .043 | 12.30 | 48.79 |
| Heavy-Media Concentrates | 285,286 | 24.23 | 20.54 | 57.43 | | 10.57 | |
| Heavy-Media Rejects | 219,044 | 18.61 | 15.77 | 41.43 | | 34.76 | |
| Heavy-Media Feed | 504,330 | 42.84 | 36.31 | 50.45 | | 21.13 | |
| -2" Wash Plant Rejects | 348 | 0.03 | 0.03 | 24.25 | | 60.20 | |
| Total Fine Tailings (by difference) | 545,109 | 46.30 | 39.24 | 28.23 | | 56.15 | |
| **Tailings Basin Plant** | | | | | | | |
| Crude to Plant | 183,585 | 100.00 | | 38.59 | | 41.68 | 100.00 |
| Total Concentrates | 50,541 | 27.53 | | 57.97 | .032 | 13.08 | 41.31 |
| Total Fine Tailings (by difference) | 133,044 | 72.47 | | 31.23 | | 52.54 | |

9. MAINTENANCE & REPAIRS

Upon completion of stripping on February 6, the Hawkins mine was placed on a standby basis until April 28 when limited crews were recalled for necessary pit and plant equipment repairs. Plant equipment repairs were started immediately after the close of the 1958 ore season and continued to the end of the year. Pit equipment repairs were carried on throughout the operating season to minimize Winter & Idle repairs.

10. COST of OPERATIONS

a. Comparative Mining Costs

| Product | 1958 Estimate | 1958 Production | 1957 Production |
|---|---|---|---|
| Wash Concentrates | | 155 | 19,131 |
| Per Cent Recovery | | | 45.29 |
| Retreat Concentrates | 400,000 | 412,829 | 610,311 |
| Per Cent Recovery | 30.00 | 30.47 | 32.74 |
| Total Production | 400,000 | 412,984 | 629,442 |
| Per Cent Recovery | 30.00 | 30.48 | 33.02 |
| Average Daily Output | 4,395 | 4,976 | 4,996 |
| Tons per Man per Day | | 35.64 | 35.71 |
| Days Operated | 91 | 84 | 126 |
| **Costs** | | | |
| Total Pit Operating | $0.273 | $0.295 | $0.274 |
| Total Concentrating | 0.220 | 0.195 | 0.206 |
| Loading Stockpile Ore | 0.015 | 0.008 | 0.014 |
| Miscellaneous Pit & Beneficiation | 0.174 | 0.184 | 0.110 |
| Total Pit & Beneficiation | $1.762 | $1.742 | $1.521 |
| General Mine Expense | 0.328 | 0.218 | 0.213 |
| Winter & Idle | 0.600 | 0.573 | 0.653 |
| Cost of Production | $2.690 | $2.533 | $2.387 |
| Depreciation | | | |
| Plant & Equipment | | 0.298 | 0.267 |
| Motorized & Other Equipment | | 0.062 | 0.067 |
| Movable Equipment | | 0.019 | 0.013 |

| Costs | 1958 Production | 1957 Production |
|---|---|---|
| Taxes | | |
| Ad Valorem | $0.487 | $0.346 |
| Occupational | 0.051 | 0.021 |
| Royalty | 0.210 | 0.184 |
| Total Depreciation & Taxes | $1.127 | $0.898 |
| Administrative Expense | 0.050 | 0.050 |
| Miscellaneous Expense & Income | 0.022 | 0.020 |
| Royalty | 1.425 | 1.344 |
| Total Cost on Cars | $5.157 | $4.699 |

b. Detailed Cost Comparison

Pit Costs: $0.021 over 1957 and $0.022 over the estimate. Include major repairs to 2 shovels to minimize Winter & Idle. Drilling and blasting costs high because impossible to use ammonium nitrate in pit bottom due to wet holes.

Concentrating: $0.025 under budget and $0.011 under 1957. Saving due partly to lower media loss and elimination of repairs on an overtime basis.

Loading Stockpile Ore: $0.007 under budget and $0.006 under 1957. Loading done mostly on Fridays on a straight time basis, whereas, in the past, loading on weekends required overtime.

Miscellaneous Pit & Beneficiation: $0.010 over budget and $0.074 over 1957 due to reduction in concentrate tonnage produced from 1957.

Total Pit & Beneficiation: $0.020 under budget and $0.221 over 1957 costs due to larger tonnage produced in 1957 and a 3 per cent drop in recovery.

General Mine Expense: $0.110 under budget and $0.005 over 1957 due to reduction in salaried work week.

Winter & Idle: $0.027 under budget and $0.080 under 1957. Pit equipment repairs completed during operating season to minimize Winter & Idle charges.

Cost of Production: $0.157 under budget and $0.146 over 1957.

11. EXPLORATION & FUTURE EXPLORATION - None

12. TAXES

| | 1958 | | 1957 | | Increase-Decrease | |
|---|---|---|---|---|---|---|
| Real Estate | Assessed Value | Taxes | Assessed Value | Taxes | Assessed Value | Taxes |
| Mineral | $182,206 | $ 86,977.86 | $250,047 | $109,048.00 | -$67,841 | -$22,070.14 |
| Land,Building,Machinery | 131,034 | 61,413.69 | 130,327 | 55,780.29 | ∕ 707 | ∕ 5,633.40 |
| IHC Basin Lands, Plant | 12,015 | 4,349.68 | 11,772 | 3,774.21 | ∕ 243 | ∕ 575.47 |
| Personal Property | | | | | | |
| Equipment | 107,000 | 51,077.52 | 119,288 | 52,022.69 | - 12,288 | - 945.17 |
| Stockpile | 2,598 | 1,240.18 | 2,731 | 1,191.02 | - 133 | ∕ 49.16 |
| | $434,853 | $205,058.93 | $514,165 | $221,816.21 | -$79,312 | -$16,757.28 |
| Average Mill Rate | | 471.56 | | 431.41 | | 40.15 |

Note: Average mill rate increase 9.31%.
Mineral valuation and taxes decreased by reserve depletion mining in 1957.
Land, Building, and Machinery valuation increased by 10% across-the-board increase on lands and buildings in Lone Pine Township.
Personal property decreased by depreciation and retirement of equipment.

13. ACCIDENTS & PERSONAL INJURY

Garvin Johnson
On January 9 fractured left elbow, left knee, and received cut above eye when he fell 18 feet while removing left side of broken stick from shovel with mobil crane. While up on ladder, broken stick shifted, fell off shipper shaft, and knocked Johnson and ladder to ground.
Lost days: 68 Compensation paid: $780

Laurence Smothers
On July 14, fractured and bruised ribs when he fell 5 feet to ground while climbing down outside ladder of railroad car.
Lost days: 53 Compensation paid: $533

Ronald Metzer
On October 16, dislocated left shoulder and fractured greater trochanter falling out of truck on fast turn. Days lost: 7
Compensation paid: $68

14. PROPOSED NEW CONSTRUCTION - None

15. EQUIPMENT & PROPOSED NEW EQUIPMENT

a. Equipment Received - None

b. Proposed New Equipment

3 3/4-ton Pickups
1 TD-20 Tractor
1 Derrick Screen

# HILL-TRUMBULL MINE

## ANNUAL REPORT

## YEAR 1958

1. GENERAL

General winter repairs at the Hill-Trumbull were suspended in December of 1957. After completion on January 17 of construction of a dyke and a new clear water basin, the Hill-Trumbull was placed on standby until spring with foremen scheduled as watchmen on a 3-shift, 7-day-week basis and one tractor operator scheduled on a 4-day-week basis to maintain roads.

Blasthole drilling was started April 7 in the Gross-Marble lease with one crew on a 1-shift, 4-day-week basis. A limited repair program was started April 14 on:

Pit Screening Plant
Pit Conveying System
Production Trucks
30-yard Dump Cars
General Plant Repairs
E&A Projects

The 1958 season reflected an anticipated reduction in Mesaba-Cliffs shipments and production estimates were submitted showing complete shutdown of the Hill-Trumbull in 1958. At the Annual Meeting on May 13, 1958, the Board of Directors confirmed this anticipation by deciding that the Hill-Trumbull would remain closed in 1958 and the entire production of 800,000 tons was to be obtained from the Holman-Cliffs mine.

The following E&A projects were active in the spring of 1958:

| E&A No. | Project | Cost |
|---|---|---|
| MC-344 | Revised Pit Power Line | $12,000 |
| MC-346 | 30" Pit Conveyor Belt | 31,980 |
| MC-350 | Pit Voltage Change | 4,951 |
| MC-354 | Cyclone Plant Coils | 6,600 |

33,282 tons of stockpiled ore were loaded out in 11 shifts of intermittent loading during the early part of May. 18,243 tons of regular ore remained in stock when the mine was placed on standby on May 23.

Subsequent to stockpile activities, the Hill-Trumbull was placed on a standby basis for the remainder of 1958. Hourly employees were transferred to the Canisteo and Holman mines. Electric power was discontinued except for office lighting and the Minnesota Power & Light service was reduced to the minimum L3 contract.

2. PRODUCTION-SHIPMENTS-INVENTORIES

a. Production by Grades - None

b. Shipments

| Stockpile | Bessemer | Non-Bessemer | Total |
|---|---|---|---|
| Trumbull Retreat | | 13,143 | 13,143 |
| Gross-Marble Retreat | 18,104 | 2,035 | 20,139 |
| | 18,104 | 15,178 | 33,282 |

c. Stockpile Inventories

| Non-Bessemer | Tons |
|---|---|
| Hill Retreat | 3,550 |
| Trumbull Wash | 548 |
| Trumbull Retreat | 11,047 |
| Gross-Marble Retreat | 3,098 |
| | 18,243 |

d. Production by Months - None

3. ANALYSIS

a. Crude Ore - None

b. Concentrates - None

c. Tonnage & Complete Analysis of Concentrates Shipped

| Stockpile Retreat Product | Tons | Iron | Phos | Silica | Mang | Alum | Lime | Mag | Sulf | Loss | Moist |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trumbull Non-Bessemer | 13,143 | 57.76 | .049 | 11.01 | .14 | .86 | .10 | .15 | .007 | 4.97 | 7.00 |
| Gross-Marble Bessemer | 18,104 | 57.99 | .044 | 9.98 | .17 | .54 | .20 | .15 | .007 | 5.86 | 5.53 |
| Gross-Marble Non-Bessemer | 2,035 | 57.74 | .048 | 10.46 | .13 | .84 | .20 | .15 | .007 | 5.49 | 5.90 |
| | 33,282 | 57.89 | .046 | 10.42 | .16 | .69 | .16 | .15 | .007 | 5.49 | 6.13 |

d. Mine Analysis of Ore in Stockpile

| Concentrates | Tons | Iron | Phos | Silica | Mang | Alum | Moist |
|---|---|---|---|---|---|---|---|
| Hill Retreat | 3,550 | 57.59 | .042 | 11.73 | .17 | .58 | 7.82 |
| Trumbull Wash | 548 | 56.50 | .045 | 11.60 | .13 | .42 | 8.45 |
| Trumbull Retreat | 11,047 | 56.91 | .048 | 11.79 | .16 | .63 | 6.85 |
| Gross-Marble Retreat | 3,098 | 57.47 | .043 | 10.70 | .14 | .47 | 6.61 |
| | 18,243 | 57.13 | .046 | 11.59 | .16 | .59 | 7.05 |

4. ESTIMATE OF ORE RESERVES

a. Developed Ore - Factors Used

| Material | Cubic Feet Per Ton | Rock Deduction | Per Cent Recovery |
|---|---|---|---|
| Hill-Trumbull & Hill-Walker | | | |
| Merch | 14 | 0 | 100 |
| Wash | 14 | 0 | 54 |
| Retreat | 14 | 0 | 30 |
| Gross-Marble & Potter | | | |
| Wash | 14 | 0 | 54 |
| Retreat | 14 | 0 | 25 |

b. Ore Reserves Estimated as of December 31, 1958

| Lease | Reserve |
|---|---|
| Trumbull | 1,269,186 |
| Hill | 802,373 |
| Hill-Walker | 601,257 |
| Potter | 74,100 |
| Gross-Marble | 644,271 |
| | 3,391,187 |

c. Estimated Analyses of Ore Reserves

| Material | Tons | Iron | Phos | Silica | Mang | Alum |
|---|---|---|---|---|---|---|
| Trumbull Concentrates | | | | | | |
| Bessemer Wash | 17,093 | 57.61 | .037 | 9.63 | .10 | .39 |
| Non-Bessemer Wash | 139,207 | 58.23 | .053 | 9.70 | .11 | .54 |
| Bessemer Retreat | 170,495 | 57.69 | .037 | 10.75 | | |
| Non-Bessemer Retreat | 942,391 | 57.66 | .056 | 10.72 | | |
| | 1,269,186 | 57.72 | .053 | 10.58 | .11 | .53 |
| Hill | | | | | | |
| Non-Bessemer Direct | 63,317 | 60.05 | .063 | 8.82 | | |
| Bessemer Wash Concentrates | 264,011 | 62.38 | .028 | 9.24 | .11 | .48 |
| Non-Bessemer Wash Concentrates | 75,258 | 60.12 | .053 | 10.76 | .12 | .36 |
| Bessemer Retreat Concentrates | 321,858 | 60.42 | .033 | 10.54 | | |
| Non-Bessemer Retreat Concentrates | 77,929 | 60.01 | .049 | 10.37 | | |
| | 802,373 | 60.97 | .038 | 9.98 | .11 | .45 |
| Hill-Walker Concentrates | | | | | | |
| Non-Bessemer Retreat | 601,257 | 60.36 | .050 | 8.75 | | |
| Potter Concentrates | | | | | | |
| Non-Bessemer Retreat | 74,100 | 58.00 | .045 | 11.50 | | |
| Gross-Marble Concentrates | | | | | | |
| Non-Bessemer Wash | 160,915 | 58.25 | .054 | 9.35 | | |
| Bessemer Retreat | 93,985 | 57.67 | .035 | 10.52 | | |
| Non-Bessemer Retreat | 389,371 | 58.16 | .049 | 9.62 | | |
| | 644,271 | 58.08 | .049 | 9.66 | | |

| Material | Tons | Iron | Phos | Silica | Mang | Alum |
|---|---|---|---|---|---|---|
| Total Direct | 63,317 | 60.05 | .063 | 8.82 | | |
| Total Wash Concentrates | | | | | | |
| Bessemer | 281,104 | 62.09 | .036 | 9.26 | .10 | .40 |
| Non-Bessemer | 375,380 | 58.62 | .053 | 9.76 | .11 | .45 |
| | 656,484 | 60.10 | .046 | 9.55 | .11 | .43 |
| Total Retreat Concentrates | | | | | | |
| Bessemer Retreat | 586,338 | 59.19 | .034 | 10.60 | | |
| Non-Bessemer Retreat | 2,085,048 | 58.63 | .052 | 9.96 | | |
| | 2,671,386 | 58.75 | .049 | 10.10 | | |
| Total Concentrates | | | | | | |
| Bessemer | 867,442 | 60.13 | .035 | 10.17 | .10 | .40 |
| Non-Bessemer | 2,523,745 | 58.63 | .052 | 9.93 | .11 | .45 |
| | 3,391,187 | 59.01 | .048 | 9.99 | .11 | .44 |

5. LABOR & WAGES

a. Comments

All hourly labor was transferred to the Canisteo and Holman-Cliffs mines on May 23 in order of seniority. Repair work was conducted on a 4-shift-per-week basis prior to suspension of work at the Hill-Trumbull mine. Salaried employees were placed on a 4-day-week starting March 1.

b. Comparative Statement of Production & Wages - None

6. GENERAL SURFACE

a. Building & Repairs

Only minor repairs were made to houses and other buildings.

b. Roads-Transmission Lines-Tracks-Construction

No major road changes were made during the year.

The Oliver Iron Mining Division maintained a road through the Hill and Trumbull leases which was used to haul Delaware No. 1 ore from the mine to the screening plant located on the Gross-Marble lease.

Power line changes were made over the Delaware No. 1 lease to allow the Oliver Iron Mining Division to strip and mine ore. During the last half of September, work under E&A No. MC-350 was started to convert pit power voltage from 2400 to 4160. This work was conducted intermittently as limited crews were available from the Holman operations.

7. OPEN PIT

a. Stripping - None

b. Open Pit Mining - None

c. Pumping & Drainage

The Oliver Iron Mining Division pumped steady throughout the year from the Gross-Marble lease. In August, Oliver started an intermittent pumping program from the bottom of the Trumbull pit to prevent the water from flooding their haul road over the Trumbull lease.

d. General Pit Activity - None

8. BENEFICIATION

a. Washing Plant - None

b. Heavy-Media Plant - None

c. Cyclone Plant - None

9. MAINTENANCE & REPAIRS

A limited repair program in the plant and shop was started on April 14 and continued until May 23 when the mine was placed on a standby basis. During the summer, minor repairs were made to 34-ton production trucks and by the start of stripping all trucks were transferred to the Hawkins, Canisteo, and Holman-Cliffs.

10. COST OF OPERATIONS

Comparative Mining Costs - None

Detailed Cost Comparison - None

11. EXPLORATION & FUTURE EXPLORATION

Hill-Walker
Mining limits have been fairly well established with the 1957 drilling program and no drilling is required for several years.

Gross-Marble
Additional drilling will be required on the south side and in the pit bottom.

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

Hill
Some additional holes will be needed to further prove or disprove ore beneath the present pit bottom in the Hill. 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.

Potter
With only the eastern half of the Potter forty drilled to any extent, this lease will require more exploration.

12. TAXES

| Real Estate | 1958 Assessed Value | 1958 Taxes | 1957 Assessed Value | 1957 Taxes | Increase-Decrease Assessed Value | Increase-Decrease Taxes |
|---|---|---|---|---|---|---|
| Mineral | $203,383 | $47,211.30 | $222,224 | $ 49,867.06 | -$18,841 | -$2,655.76 |
| Land,Building,Machinery | 146,569 | 40,757.71 | 146,079 | 40,295.15 | + 490 | + 462.56 |
| Accounts Receivable | 27,734 | 6,437.90 | 27,734 | 6,223.51 | | + 214.39 |
| Personal Property | | | | | | |
| Equipment | 151,904 | 35,292.90 | 171,586 | 38,539.09 | - 19,682 | - 3,246.19 |
| Stockpile | 1,967 | 456.60 | 3,188 | 715.39 | - 1,221 | 258.79 |
| | $531,557 | $130,156.41 | $570,811 | $135,640.20 | -$39,254 | -$5,483.79 |
| Average Mill Rate | | 244.86 | | 237.63 | | +7.23 |

Average mill rate increase of 3.04 per cent was offset by decrease in mineral reserve valuation by 1957 mining and smaller stockpile on hand May 1. Greenway Township had across-the-board increase on lands, buildings, and machinery of 10 per cent. Personal property equipment valuation reduced by depreciation.

13. ACCIDENTS & PERSONAL INJURY - None

14. PROPOSED NEW CONSTRUCTION

Extend rock reject belt at the mill.
Construct conveyor system to new rock reject area at the mill.

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

a. New Equipment Received

One 10 KVA Transformer
One 25 amp, 96 ohm Ground Resistor
Two 600 A, 416 V. Oil Circuit Breakers
One 166 KVA Transformer
One 249 KVA Transformer

Two 4200/7274Y-120/240 V Potential Transformers
Four Demagnetizing Coils
Two 10-inch Cleanup Cyclones
70 feet 13-inch Elevator Belt
One Davis Pulverizer

b. Proposed New Equipment

One Plant Service Truck
One Rock Reject Stacker
Cyclone Plant Screens

# HOLMAN-CLIFFS MINE

## ANNUAL REPORT

## YEAR 1958

### 1. GENERAL

The 1957 stripping program at the Holman was completed January 11, 1958. Winter & Idle repairs to pit and plant equipment were also suspended on January 11 and the mine placed on a standby basis through February and March with one hourly employee retained for snow plowing and salaried personnel acting as property watchmen.

Late in April, loading of concentrates from stockpile was started and carried forward intermittently until the start of ore operations on May 25. When the Hill-Trumbull was shut down, Holman-Cliffs production was set at 800,000 tons for the season and operations in the pit and plant were placed on a 16-shift-per-week basis with 4 crews working 4 shifts a week. Maintenance crews in the shops and offices were staggered to cover 6 days a week with employees receiving 4 shifts a week. This schedule was maintained until October 1 at which time one crew was transferred to the Canisteo and the Holman completed the season with 3 crews on a 4 and 5-day week as required.

Operating conditions during the season were normal. Although a sharp drop in recovery was experienced, costs were within the budget and a better grade of ore was produced than estimated. Ore production was completed on November 1, and the stripping program was started by pit crews on November 3. 490,972 cubic yards of stripping material were moved from the Bingham, North Star, and Brown leases by December 27. The stripping program will be continued in the spring and during the summer of 1959 to complete cleanup on top of ore in the stripping areas.

Intermittent loading of concentrates was carried forward during November and completed November 11 with a balance left in stock of 90,306 tons.

Under E&A No. MC-340, in conjunction with ore operations during May and June, pit crews completed cleanup on top of ore in the stripping areas. Under E&A No. MC-349, dyke work at the tailings pond was completed early in the season. Two structure drill holes were put down the latter part of the season in the Bingham lease to outline the ore body on the east side. An E&A in the amount of $842,024 was approved late in the year for the construction of a

scrubber plant with auxiliaries. Work of detailing plans and ordering equipment was immediately started and by January 1, 1959, 85 per cent of the footing and pier work was completed.

Normal repair work was conducted in the washing, heavy density, and cyclone plants from the end of ore season to the end of the year.

## 2. PRODUCTION-INVENTORIES-SHIPMENTS

### a. Production by Grades

| Crude | Wash | Retreat | Total |
|---|---|---|---|
| Holman | | 44,193 | 44,193 |
| Brown | | 964,213 | 964,213 |
| Bingham | 8,812 | 671,628 | 680,440 |
| North Star | 48,299 | 271,254 | 319,553 |
| | 57,111 | 1,951,288 | 2,008,399 |

| | Bessemer | | Non-Bessemer | | |
|---|---|---|---|---|---|
| Concentrates | Wash | Retreat | Wash | Retreat | Total |
| Holman | | 12,783 | | 2,396 | 15,179 |
| Brown | | 113,342 | | 244,022 | 357,364 |
| Bingham | 1,988 | 73,247 | 3,060 | 181,722 | 260,017 |
| North Star | 32,455 | 108,850 | 2,297 | 40,857 | 184,459 |
| | 34,443 | 308,222 | 5,357 | 468,997 | 817,019 |

### b. Shipments

| | | | | | |
|---|---|---|---|---|---|
| Holman | | 12,783 | | 2,396 | 15,179 |
| Brown | | 114,072 | | 220,296 | 334,368 |
| Bingham | 1,988 | 70,405 | 3,060 | 145,407 | 220,860 |
| North Star | 32,455 | 166,386 | 2,297 | 38,100 | 239,238 |
| | 34,443 | 363,646 | 5,357 | 406,199 | 809,645 |

c. Inventories

| Retreat | Tons |
|---|---|
| Brown | 46,150 |
| Bingham | 39,943 |
| North Star | 4,213 |
| | 90,306 |

d. Production by Months

Crude Ore

| | Retreat | | | | Wash | | |
|---|---|---|---|---|---|---|---|
| Month | Holman | Brown | Bingham | North Star | Bingham | North Star | Total |
| May | | 23,497 | 9,004 | 15,664 | | | 48,165 |
| June | | 138,382 | 81,021 | 139,943 | | 13,819 | 373,165 |
| July | | 273,391 | 34,148 | 66,988 | | 2,613 | 377,140 |
| Aug | | 173,517 | 138,317 | 48,659 | | 31,867 | 392,360 |
| Sept | | 129,859 | 277,718 | | 4,036 | | 411,613 |
| Oct | 44,193 | 221,608 | 131,420 | | 4,776 | | 401,997 |
| Nov | | 3,959 | | | | | 3,959 |
| | 44,193 | 964,213 | 671,628 | 271,254 | 8,812 | 48,299 | 2,008,399 |

Concentrates

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| May | | 9,396 | 1,925 | 7,660 | | | 18,981 |
| June | | 48,607 | 27,561 | 82,518 | | 10,344 | 169,030 |
| July | | 107,307 | 13,990 | 32,134 | | 2,034 | 155,465 |
| Aug | | 70,484 | 51,204 | 27,395 | | 22,374 | 171,457 |
| Sept | | 45,616 | 112,052 | | 2,232 | | 159,900 |
| Oct | 15,068 | 74,102 | 48,185 | | 2,816 | | 140,171 |
| Nov | 111 | 1,852 | 52 | | | | 2,015 |
| | 15,179 | 357,364 | 254,969 | 149,707 | 5,048 | 34,752 | 817,019 |

3. ANALYSIS

a. Tonnage & Analysis of Crude Ore Produced

| Crude Ore | Tons | Iron | Silica |
|---|---|---|---|
| Holman Retreat | 44,193 | 39.04 | 37.92 |
| Brown Retreat | 964,213 | 39.16 | 39.30 |
| Bingham Wash | 8,812 | 40.95 | 36.53 |
| Bingham Retreat | 671,628 | 39.02 | 39.79 |
| North Star Wash | 48,299 | 49.58 | 24.70 |
| North Star Retreat | 271,254 | 47.50 | 27.41 |
| | 2,008,399 | 40.50 | 37.46 |

b. Tonnage & Analysis of Concentrates Produced

| Product | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Holman | | | | | | | |
| Bessemer Retreat | 12,783 | 56.14 | .040 | 13.28 | .20 | .47 | 7.78 |
| Non-Bessemer Retreat | 2,396 | 56.03 | .060 | 12.95 | .17 | .45 | 7.52 |
| Brown | | | | | | | |
| Bessemer Retreat | 113,342 | 57.52 | .035 | 12.64 | .15 | .46 | 7.11 |
| Non-Bessemer Retreat | 244,022 | 57.48 | .048 | 12.16 | .16 | .56 | 6.77 |
| Bingham | | | | | | | |
| Bessemer Wash | 1,988 | 57.21 | .043 | 14.10 | .13 | .56 | 7.82 |
| Non-Bessemer Wash | 3,060 | 57.92 | .047 | 12.25 | .13 | .53 | 7.81 |
| Bessemer Retreat | 73,247 | 57.69 | .038 | 12.81 | .17 | .65 | 7.35 |
| Non-Bessemer Retreat | 181,722 | 57.77 | .041 | 12.54 | .18 | .75 | 7.65 |
| North Star | | | | | | | |
| Bessemer Wash | 32,455 | 58.22 | .031 | 11.64 | .22 | .45 | 7.44 |
| Non-Bessemer Wash | 2,297 | 58.94 | .042 | 10.80 | .31 | .42 | 8.20 |
| Bessemer Retreat | 108,850 | 58.98 | .033 | 10.70 | .24 | .46 | 6.99 |
| Non-Bessemer Retreat | 40,857 | 59.58 | .037 | 9.96 | .25 | .46 | 6.64 |
| | 817,019 | 57.81 | .041 | 12.07 | .18 | .44 | 7.14 |

c. Tonnage & Complete Analysis of Concentrates Produced & Shipped

| Product | Tons | Iron | Phos | Silica | Mang | Alum | Lime | Mag | Sulf | Ign Loss | Moist |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Holman | | | | | | | | | | | |
| Bessemer Retreat | 12,783 | 56.14 | .040 | 13.28 | .20 | .47 | .12 | .22 | .027 | 5.24 | 7.78 |
| Non-Bessemer Retreat | 2,396 | 56.03 | .060 | 12.95 | .17 | .45 | .12 | .22 | .027 | 5.74 | 7.52 |
| Brown | | | | | | | | | | | |
| Bessemer Retreat | 114,072 | 57.51 | .035 | 12.65 | .16 | .46 | .20 | .24 | .027 | 3.89 | 7.10 |
| Non-Bessemer Retreat | 220,296 | 57.30 | .050 | 12.34 | .16 | .59 | .20 | .24 | .027 | 4.33 | 6.54 |
| Bingham | | | | | | | | | | | |
| Bessemer Wash | 1,988 | 57.21 | .043 | 14.10 | .13 | .56 | .10 | .15 | .007 | 3.00 | 7.82 |
| Non-Bessemer Wash | 3,060 | 57.92 | .047 | 12.25 | .13 | .53 | .10 | .15 | .007 | 3.86 | 7.81 |
| Bessemer Retreat | 70,405 | 57.67 | .038 | 12.83 | .17 | .65 | .11 | .15 | .007 | 3.47 | 7.35 |
| Non-Bessemer Retreat | 145,407 | 57.65 | .042 | 12.59 | .18 | .77 | .11 | .15 | .007 | 3.59 | 7.73 |
| North Star | | | | | | | | | | | |
| Bessemer Wash | 32,455 | 58.22 | .031 | 11.64 | .22 | .45 | .24 | .20 | .014 | 3.83 | 7.44 |
| Non-Bessemer Wash | 2,297 | 58.94 | .042 | 10.80 | .31 | .42 | .24 | .20 | .014 | 3.51 | 8.20 |
| Bessemer Retreat | 166,386 | 58.88 | .033 | 10.75 | .24 | .50 | .24 | .20 | .014 | 3.69 | 6.87 |
| Non-Bessemer Retreat | 38,100 | 59.58 | .038 | 9.94 | .25 | .48 | .24 | .20 | .014 | 3.49 | 6.56 |
| | 809,645 | 57.88 | .040 | 12.02 | .19 | .58 | .19 | .20 | .018 | 3.88 | 7.04 |

d. Mine Analysis of Ore in Stockpile

| Retreat Concentrates | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Brown | 46,150 | 58.06 | .047 | 11.24 | .17 | .50 | 7.43 |
| Bingham | 39,943 | 58.27 | .039 | 12.36 | .18 | .65 | 7.33 |
| North Star | 4,213 | 59.38 | .033 | 10.45 | .23 | .56 | 7.07 |
| | 90,306 | 58.21 | .043 | 11.70 | .18 | .57 | 7.37 |

## 4. ESTIMATE OF ORE RESERVES

### a. Developed Ore - Factors Used

| Concentrates | Cubic Feet Per Ton | Per Cent Recovery |
|---|---|---|
| Wash | 14 | 52 |
| Retreat | 14 | 40 |

### b. Ore Reserves as of December 31, 1958

| Lease | Reserve 12-31-57 | Mined 1958 | Balance After Mining | Changed by Re-estimate | Reserve 12-31-58 |
|---|---|---|---|---|---|
| North Star<br>N½-NE¼ 21-56-24 | 132,517 | 184,459 | | ⁄100,000 | 48,058 |
| Bingham<br>NW¼-SE¼ 21-56-24 | 1,396,319 | 260,017 | 1,136,302 | -100,000 | 1,036,302 |
| Holman<br>SE¼-NE¼ 21-56-24 | 1,138,220 | 15,179 | 1,123,041 | | 1,123,041 |
| Brown No. 1<br>SW¼-NE¼ 21-56-24 | 527,506 | 217,001 | 310,505 | | 310,505 |
| Brown No. 2<br>SW¼-NW¼ 22-56-24 | 1,605,732 | 140,363 | 1,465,369 | | 1,465,369 |
| | 4,800,294 | 817,019 | 4,035,217 | | 3,983,275 |

### c. Estimated Analysis of Ore Reserves

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| North Star<br>Non-Bessemer Retreat | 48,058 | 55.15 | .051 | 10.70 |

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| Bingham | | | | |
| Bessemer Wash | 227,729 | 60.14 | .033 | 9.27 |
| Non-Bessemer Wash | 187,222 | 60.36 | .053 | 8.53 |
| Bessemer Retreat | 297,359 | 58.00 | .032 | 11.43 |
| Non-Bessemer Retreat | 323,992 | 58.00 | .051 | 11.43 |
| | 1,036,302 | 58.90 | .042 | 10.43 |
| Holman | | | | |
| Bessemer Wash | 205,078 | 59.61 | .031 | 9.29 |
| Non-Bessemer Wash | 105,726 | 59.35 | .054 | 8.93 |
| Bessemer Retreat | 554,212 | 57.24 | .030 | 10.64 |
| Non-Bessemer Retreat | 258,025 | 57.24 | .057 | 10.64 |
| | 1,123,041 | 57.87 | .039 | 10.23 |
| Brown No. 1 | | | | |
| Bessemer Wash | 61,333 | 60.51 | .035 | 9.14 |
| Non-Bessemer Wash | 42,611 | 60.29 | .039 | 9.50 |
| Bessemer Retreat | 206,561 | 56.93 | .029 | 12.32 |
| Non-Bessemer Retreat | | | | |
| | 310,505 | 58.10 | .032 | 11.30 |
| Brown No. 2 | | | | |
| Bessemer Wash | 303,577 | 59.36 | .028 | 9.31 |
| Non-Bessemer Wash | 68,345 | 58.34 | .059 | 9.04 |
| Bessemer Retreat | 784,154 | 57.21 | .027 | 10.76 |
| Non-Bessemer Retreat | 309,293 | 51.21 | .066 | 10.76 |
| | 1,465,369 | 57.71 | .037 | 10.38 |
| North Star & Bingham | | | | |
| Bessemer Wash | 227,729 | 60.14 | .033 | 9.27 |
| Non-Bessemer Wash | 187,222 | 60.36 | .053 | 8.53 |
| Bessemer Retreat | 297,359 | 58.00 | .032 | 11.43 |
| Non-Bessemer Retreat | 372,050 | 57.63 | .051 | 11.34 |
| | 1,084,360 | 58.73 | .042 | 10.44 |
| Holman & Brown | | | | |
| Bessemer Wash | 569,988 | 59.57 | .030 | 9.30 |
| Non-Bessemer Wash | 216,682 | 59.22 | .053 | 9.08 |
| Bessemer Retreat | 1,544,927 | 57.18 | .028 | 10.93 |
| Non-Bessemer Retreat | 567,318 | 57.22 | .062 | 10.71 |
| | 2,898,915 | 57.81 | .036 | 10.43 |

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| Total Wash | | | | |
| Bessemer | 797,717 | 59.73 | .031 | 9.29 |
| Non-Bessemer | 403,904 | 59.75 | .053 | 8.83 |
| | 1,201,621 | 59.73 | .043 | 9.14 |
| Total Retreat | | | | |
| Bessemer | 1,842,286 | 57.31 | .028 | 11.01 |
| Non-Bessemer | 939,368 | 57.38 | .058 | 10.96 |
| | 2,781,654 | 57.33 | .038 | 10.99 |
| Total Holman-Cliffs | | | | |
| Bessemer | 2,640,003 | 58.04 | .029 | 10.49 |
| Non-Bessemer | 1,343,272 | 58.09 | .056 | 10.32 |
| | 3,983,275 | 58.06 | .040 | 10.43 |

5. LABOR & WAGES

a. Comments

There was practically no labor turnover during the year and labor relations were satisfactory. With the Hill-Trumbull mine on a standby basis, all men in the bargaining unit were not called back to work and the labor supply was ample.

Wage and fringe benefits increased at various times throughout the year as follows:

1. Effective January 1, 1958: $0.05 per hour cost-of-living.

2. Effective July 1, 1958: $0.04 per hour cost-of-living.

3. Effective July 1, 1958: $0.07 per job class general increase plus $0.002 per job increment raise.

4. Effective July 1, 1958: Double time and one-quarter (2.25) for holidays worked. Time and one-quarter (1.25) premium pay for Sundays worked.

5. Effective 1958: One-half week extra vacation pay for men with 3 to 5, 10 to 15, and 25 or more years service.

b. Comparative Statement of Production & Wages

| | 1958 | 1957 |
|---|---|---|
| Wash & Retreat Concentrates | 817,019 | 859,204 |
| Number of Days Operated | 133 | 134 |
| Average Number of Men Working | 157 | 152 |
| Average Wage Per Day | $26.11 | $23.51 |
| Production Per Man Per Day | 39.22 | 42.28 |
| Labor Cost Per Ton | 0.666 | 0.556 |
| Total Number of Man Days | 20,830 | 20,330 |
| Amount Paid for Labor | $543,957.59 | $478,008.79 |

6. GENERAL SURFACE

a. Building & Repairs

Normal maintenance work was carried on throughout the year on mine buildings and company-owned houses.

b. Roads, Transmission Lines, Etc.

No major changes made during the year.

c. Miscellaneous General Construction

The following construction projects were completed in 1958:

| E&A No. | Amount | Description |
|---|---|---|
| MC-349 | $13,325.62 | Dyke and ditch for retreat water. |
| MC-355 | 25,553.00 | DSM screens and coils. |

Construction of a scrubber plant under E&A No. MC-356 was started after the ore season. By January 1, 1959, the following work was completed:

| | Per Cent Completed |
|---|---|
| 1. Pier & Footing Excavation | 95 |
| 2. Pile Driving | 100 |
| 3. Concrete | 75 |
| 4. Equipment on Order | 75 |

7. OPEN PIT

a. Stripping

The following table shows material moved from various leases and actual and estimated costs in 1958:

| Lease | E&A No. | Cubic Yards Surface | Cost Estimated | Cost Actual |
|---|---|---|---|---|
| North Star | MC-340 | 132,677 | $0.450 | $0.341 |
| Brown No. 1 | MC-340 | 12,910 | 0.450 | 0.341 |
| Bingham | MC-340 | 35,989 | 0.450 | 0.341 |
| North Star | MC-358 | 247,377 | 0.420 | 0.436 |
| Brown | MC-358 | 94,601 | 0.420 | 0.436 |
| Bingham | MC-358 | 148,994 | 0.420 | 0.436 |
| | | 672,548 | | |

Surface stripping under E&A No. MC-340 continued from 1957 until January 11, 1958, when the program was discontinued until the ore season. Intermittent cleanup on top of ore was carried out in conjunction with ore operations until September.

Upon completion of the ore season, surface stripping under E&A No. MC-358 on a 3-shift, 4-day schedule was started on November 3 with 2 shovels loading and serviced by 9 to 10 trucks. In December one crew was shifted from the Canisteo mine to the Holman-Cliffs mine and the schedule was increased to 4 crews working 4 days a week. The stripping program was discontinued December 27 and will be resumed in the spring on cleanup. Surface was removed from the east side of the Bingham and Brown No. 1 leases and from the north side of the North Star lease. For this program to date an average of 5010 cubic yards per shift was maintained. Extreme weather conditions during December hampered stripping operations.

b. Open Pit Mining

The 1958 ore season started 11 p.m., May 25, on a 16-shift-a-week basis with 4 crews. Two shovels and 5 to 6 trucks hauling ore were used per shift during the first half of the season. One truck was required for disposal of screen rock and 1 to 2 trucks for heavy density reject haul. As the amount of rock increased later in the season, another truck was added to the rock haul and to screen rock disposal. On October 1, one crew was shifted to the Canisteo, and the Holman-Cliffs worked on a 12-shift-a-week schedule until the end of the season on November 1.

2,472,379 tons of gross crude were produced in 345 shifts at an average rate of 6984 tons per shift. 463,980 tons of screen rock were removed, leaving a total net crude of 2,008,399 tons for a shift average of 5673 tons.

The following table shows material mined from the various leases:

| Lease Mined | Gross Crude | Screen Rock | Net Crude | Pit Rock Screen Waste | Total |
|---|---|---|---|---|---|
| Holman* | 51,093 | 6,900 | 44,193 | 991 | 52,084 |
| Brown No. 1* | 690,880 | 146,019 | 544,861 | 29,977 | 720,857 |
| Brown No. 2* | 513,813 | 94,461 | 419,352 | 19,984 | 533,797 |
| North Star | 435,863 | 116,310 | 319,553 | 40,104 | 475,967 |
| Bingham | 780,730 | 100,290 | 680,440 | 20,885 | 801,615 |
| | 2,472,379 | 463,980 | 2,008,399 | 111,941 | 2,584,320 |

*Includes 160,141 tons mined from lean ore dumps #6 and #12.

The following leases and areas were mined:

Holman Lease
All crude mined was the retreat from the west end of the forty adjacent to the screening plant. 21,300 tons were mined from lean ore dump #12 and absorbed in pit production.

Brown No. 1 Lease
Mining was from central bottom to the north end of the lease. All ore mined was retreat ore.

Brown No. 2 Lease
All crude mined was from the northeast corner of the forty. 138,841 tons were mined from lean ore dumps #6 and #12 and absorbed in production of both Brown leases.

North Star Lease
All crude ore was mined from the northwest corner of the NW¼-NE¼ forty. A small amount of wash ore crude was mined from the same area.

Bingham Lease
Most of the crude ore was mined from the east side of the forty with a small amount of wash ore encountered in the pit bottom. Operating conditions were generally satisfactory and normal and no serious delays were encountered. Cost of producing crude ore in 1958 on a crude basis was $0.218 a ton as compared to $0.226 in 1957.

c. Pumping & Drainage

There was no change in pumping facilities and the flow of water remained constant. Pumping cost per ton of concentrates was $0.025 as compared to $0.037 in 1957.

d. General Pit Activities

Only minor road and transmission line changes were necessary during the year. Cost was $0.017 per ton of concentrates as compared to $0.014 in 1957.

8. BENEFICIATION

a. Pit Plant

Operating on the same schedule as the pit, the pit plant treated wash and retreat ores as required. Repairs were conducted on the Saturday day shift.

2,008,399 tons of crude ore treated produced 817,019 tons of concentrates at an average rate of 2308 tons a shft and a net weight recovery of 40.68 per cent.

Of the wash portion of the feed, 57,111 tons produced 39,800 tons of concentrates at a weight recovery of 69.69 per cent. The crude retreat feed of 1,951,288 tons produced 777,219 tons at a weight recovery of 39.83 per cent.

The total net weight recovery of 40.68 per cent is down 6.04 from the 46.72 per cent in 1957. Average crude feed was 5673 per shift as compared to 5833 tons in 1957. Concentrates were produced at the rate of 2308 tons a shift as compared to 2725 tons in 1957.

460,993 tons of ore were split intermittently during the season with 65.17 per cent being coarse and 34.83 per cent fines.

Operations were normal throughout the season and there were no serious delays. The 817,019 tons of concentrates produced averaged 53.76 per cent natural iron and 11.19 natural silica as compared to an estimated 800,000 tons at 53.50 natural iron and 11.20 natural silica.

During the season it was necessary to stockpile 127,824 tons of concentrates which, added to a balance of 82,932 tons carried over from 1957, made a total of 210,758 tons in stock. 120,450 tons were loaded and shipped intermittently from April 24 to November 11, leaving a balance of 90,306 tons in stock as of December 31, 1958.

Following is a tabulation of lost time:

Washing Plant

| Source of Delay | Hours | Per Cent | Per Cent of Total Working Hours |
|---|---|---|---|
| Out of Ore | 2.05 | 3.54 | 0.07 |
| Rock Pocket | 0.50 | 0.86 | 0.02 |
| Crude Ore Pocket | 1.75 | 3.03 | 0.06 |
| Pit Screen Plant | 0.42 | 0.73 | 0.01 |
| 8' Pan Conveyor | 9.16 | 15.83 | 0.32 |
| Crude Ore Conveyor | 1.75 | 3.03 | 0.06 |
| Primary Screens | 2.00 | 3.46 | 0.07 |

## Washing Plant

| Source of Delay | Hours | Per Cent | Per Cent of Total Working Hours |
|---|---|---|---|
| Crushers | 5.29 | 9.15 | 0.19 |
| Secondary Screens | 2.17 | 3.75 | 0.08 |
| Stockpile Conveyor | 0.50 | 0.86 | 0.02 |
| Tailings Tank | 0.83 | 1.43 | 0.03 |
| Tailings Pump | 3.67 | 6.34 | 0.13 |
| Generator Converter | 2.33 | 4.03 | 0.08 |
| Air Compressor | 4.50 | 7.78 | 0.16 |
| | 57.85 | 100.00 | 2.04 |

### Recapitulation

| | | | |
|---|---|---|---|
| Crude Ore to Head of Mill | 15.63 | 27.02 | 0.54 |
| Ore Processing Delays | 42.22 | 72.98 | 1.50 |
| | 57.85 | 100.00 | 2.04 |

## Heavy-Media Plant

| | | | |
|---|---|---|---|
| Wash Plant Delays | 45.38 | 82.67 | 1.64 |
| Heavy-Media Feed Conveyor | 0.42 | 0.76 | 0.02 |
| Circulating Media Pump | 0.75 | 1.37 | 0.03 |
| Coarse Reject Drain Screen | 3.84 | 7.00 | 0.14 |
| Reject Conveyor | 0.33 | 0.60 | 0.01 |
| Start & Stop | 1.50 | 2.73 | 0.05 |
| Repair Screen Cloth | 0.25 | 0.46 | 0.01 |
| Surge Pump | 1.42 | 2.59 | 0.05 |
| Electrical Power | 1.00 | 1.82 | 0.04 |
| | 54.89 | 100.00 | 1.99 |

### Recapitulation

| | | | |
|---|---|---|---|
| Crude Ore to Head of Mill | 45.80 | 83.43 | 1.66 |
| Ore Processing Delays | 9.09 | 16.57 | 0.33 |
| | 54.89 | 100.00 | 1.99 |

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

| Wash Product | Tons | Per Cent Weight Plant | Per Cent Weight Pit | Per Cent Iron | Per Cent Phos | Per Cent Silica | Per Cent Iron Units |
|---|---|---|---|---|---|---|---|
| Crude to Plant | 57,111 | 100.00 | 82.89 | 48.24 | | 26.52 | |
| Pit Rock | 1,260 | | 1.83 | 28.10 | | 54.70 | |
| Screen Plant Rock | 10,528 | | 15.28 | 27.31 | | 55.66 | |
| Pit Crude | 68,899 | | 100.00 | 44.67 | | 31.49 | |
| Total Concentrates | 39,800 | 69.69 | 57.77 | 58.14 | .034 | 11.80 | 83.99 |
| Unsized Concentrates | 34,451 | 60.32 | 50.00 | 58.14 | .033 | 11.81 | |
| Coarse Concentrates | 4,181 | 7.32 | 6.07 | 57.16 | .041 | 12.89 | |
| Fine Concentrates | 1,168 | 2.05 | 1.70 | 61.72 | .035 | 7.93 | |
| Total Concts Produced & Shipped | 39,800 | 69.69 | 57.77 | 58.14 | .034 | 11.80 | 83.99 |
| Total Fine Tailings (by difference) | 17,311 | 30.31 | | 25.48 | | 60.36 | |
| **Retreat Product** | | | | | | | |
| Crude to Plant | 1,951,288 | 100.00 | 78.49 | 40.27 | | 37.78 | |
| Pit Rock | 81,210 | | 3.27 | 24.04 | | 60.80 | |
| Screen Plant Rock | 453,452 | | 18.24 | 24.51 | | 60.21 | |
| Pit Crude | 2,485,950 | | 100.00 | 36.86 | | 42.62 | |
| Total Concentrates | 777,219 | 39.83 | 31.26 | 57.85 | | 12.09 | 57.22 |
| Unsized Concentrates | 316,226 | 16.20 | 12.72 | 57.88 | | 11.96 | |
| Coarse Concentrates | 300,432 | 15.40 | 12.08 | 57.57 | | 12.31 | |
| Fine Concentrates | 160,561 | 8.23 | 6.46 | 58.30 | | 11.94 | |
| Total Concts Produced & Shipped | 777,219 | 39.83 | | 57.85 | | 12.09 | 57.22 |
| Heavy-Media Concentrates | 501,645 | 25.71 | 20.18 | 57.26 | | 12.61 | |
| Heavy-Media Rejects | 527,595 | 27.04 | 21.22 | 33.56 | | 47.63 | |
| Heavy-Media Feed | 1,029,240 | 52.75 | 41.40 | 44.86 | | 30.90 | |
| Total Fine Tailings (by difference) | 646,474 | 33.13 | 26.01 | 24.61 | | 60.63 | |

9. MAINTENANCE & REPAIRS

Upon suspension of stripping on January 11, the mine was placed on a standby basis until April 17. Limited crews were recalled for necessary plant and shop repairs--this work continued until the start of ore season on May 23.

Heavy repair work was conducted in the concentrating and pit screening plants during November and December to complete necessary repairs before shifting crews to the new scrubber plant construction to be conducted early in 1959.

10. COST OF OPERATIONS

a. Comparative Cost

| Pit Product | 1957 Actual Cost | 1958 Budget | 1958 Actual Cost |
|---|---|---|---|
| Crude Ore Net Tonnage | 1,796,696 | 1,904,762 | 2,008,399 |
| Concentrate Tonnage | 839,435 | 800,000 | 817,019 |
| Per Cent Recovery | 46.7 | 42.0 | 40.7 |
| Average Shift Product | 2,725 | 2,500 | 2,308 |
| Tons per Man per Day | 42.28 | | 39.22 |
| Shifts Operated | 308 | 320 | 345 |
| **Costs** | | | |
| Pit Operating | $0.224 | $0.235 | $0.218 |
| Beneficiating | 0.260 | 0.264 | 0.266 |
| Loading Stockpile | 0.010 | 0.014 | 0.005 |
| Sampling & Analysis | 0.032 | 0.034 | 0.035 |
| Safety & First Aid | 0.002 | 0.002 | 0.001 |
| Employee Vacation | 0.054 | 0.058 | 0.092 |
| Personal Injury | 0.015 | 0.014 | 0.003 |
| Social Security | 0.022 | 0.018 | 0.027 |
| Total Pit & Beneficiating | $1.266 | $1.460 | $1.506 |
| General Mine Expense | 0.170 | 0.258 | 0.186 |
| Winter & Idle | 0.523 | 0.375 | 0.398 |
| Cost of Production | $1.959 | $2.093 | $2.090 |
| **Depreciation** | | | |
| Plant & Equipment | 0.269 | | 0.279 |
| Motorized Equipment | 0.073 | | 0.080 |
| Movable Equipment | 0.002 | | 0.002 |

| Taxes | 1957 Actual Cost | 1958 Budget | 1958 Actual Cost |
|---|---|---|---|
| Ad Valorem | $0.201 | | $0.212 |
| Occupational | 0.435 | | 0.449 |
| Royalty | 0.223 | | 0.235 |
| Total Depreciation & Taxes | $1.203 | | $1.257 |
| Miscellaneous Expense & Income | 0.010 | | 0.016 |
| Administrative Expense | 0.100 | | 0.100 |
| Royalty | 1.633 | | 1.541 |
| Total Cost on Cars | $4.905 | | $5.004 |

b. Cost Comments

Pit Operating
was $0.017 below the budget and $0.006 below 1957. Trucks operating and maintenance combined was $0.010 above the budget because of increased amount of rock and longer haul than anticipated. All other items under this caption were slightly below the budget.

Beneficiation
was $0.002 above the budget and $0.006 above 1957. An increase of $0.024 above the estimated media costs was due to painty material handled from the Bingham lease.

Employees Vacation Pay
was $0.034 above the budget because this cost was corrected to carry 1959 vacations for the Hill-Trumbull employees.

General Mine Expense
An SUB provision of $0.054 to provide for back payments was never used, thus lowering this item $0.045 under the budget. Total General Mine Expense was $0.072 lower than the budget but $0.017 higher than 1957.

Winter & Idle
remained below the estimated budget until December when an accelerated program in the plants to prepare for the scrubber plant construction increased costs $0.023 over the budget but remained $0.125 below 1957.

Cost of Production
A drop in recovery of 6.04 per cent from 1957 raised costs $0.131 above 1957 but remained $0.003 below the estimate.

11. EXPLORATION & FUTURE EXPLORATION

A limited exploration drilling program--two deep holes on the east side of the Bingham--was conducted to determine mining limits. Several holes will be required on the east bank of the Brown No. 1 lease to definitely outline the ore in this area for future stripping and mining. Future drilling will be necessary in the southeast corner of the Bingham lease to outline ore below the paint rock layer.

12. TAXES

| | 1958 | | 1957 | | Increase-Decrease | |
|---|---|---|---|---|---|---|
| Real Estate | Assessed Value | Taxes | Assessed Value | Taxes | Assessed Value | Taxes |
| Mineral | $544,118 | $120,837.73 | $596,461 | $120,372.67 | -$52,343 | +$ 465.06 |
| Lands,Bldg,Machinery | 145,824 | 32,754.03 | 154,437 | 38,514.14 | - 7,613 | - 5,760.11 |
| Personal Property | | | | | | |
| Equipment | 99,958 | 22,198.67 | 83,033 | 17,582.68 | + 16,925 | + 4,615.99 |
| Stockpile Concentrates | 5,880 | 1,305.83 | 7,138 | 1,508.83 | - 1,258 | - 203.00 |
| Lake Conct Stockpile Only | | | 5,148 | 1,106.67 | - 5,148 | - 1,106.67 |
| | $796,780 | $177,096.26 | $846,217 | $179,084.99 | -$49,436 | -$1,988.73 |
| Average Mill Rate | | 222.26 | | 210.27 | | +11.99 |

Mill rate increase of 5.06 per cent in Village of Taconite offset reduction of $52,343 in mined valuation. Reduced assessed valuation on Lake Concentrator gave a reduction on Land, Building & Machinery tax. Personal property-equipment tax increased by mill rate and revaluation. Lake Concentrator stockpile eliminated by concentration in 1957.

13. ACCIDENTS & PERSONAL INJURY

Carl Eggebraaten, plant repairman helper, age 59, fell off ladder 15 feet into bottom of pocket. Fractured left foot. Compensation paid: $885.

14. PROPOSED NEW CONSTRUCTION

Construction of scrubber plant & auxiliary facilities.
2-inch scalping unit.
Construct dyke northwest corner of tailings basin.

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

a. Received in 1958

Four Dorr Oliver DSM Screens
New Type Feedbox for DSM Screens
Two demagnetizing Coils
2252 feet 30-inch 4-ply conveyor Belting

b. Proposed Equipment for 1959

Two 1/2-ton Pickups
One 1-1/2 ton Service Truck
Two 34-ton Production Trucks
Crawler Pads for Marion Shovel
Rotary Drill
Scrubber Plant & Revised Tailings System Equipment
2-inch Scalping Unit Equipment

# SALLY MINE

## ANNUAL REPORT

## YEAR 1958

### 1. GENERAL

Stripping at the Sally, underway in the fall of 1957, was completed on January 21. 190,388 cubic yards of surface were moved from January 1 to January 21. The ore haul to the Canisteo was started January 14 and completed February 8. Both operations were conducted on a 3-shift, 5-day-week basis until January 20 when a 4-day week went into effect. A 16-shift-per-week schedule was started on January 27 and continued until shutdown on February 8. 450,209 tons of crude were hauled to the Canisteo pit, making a total in stockpile of 548,458 tons which included the ore remaining in stockpile from the previous year's operation.

During the operating season, which started May 26, 548,458 tons of ore, including 29,596 tons of screen rock and 1,274 tons of pit rock, were mined from the Sally crude ore stockpile. On October 10, the stockpile was depleted, which completed mining of Sally ore in 1958.

The Canisteo plant received 517,588 tons of crude ore which produced 234,130 tons of Sally concentrates. In addition, 29,833 tons of Sally fine ore concentrates were produced from current tailings at the Canisteo fine ore plant.

On December 10, stripping operations were resumed on a 16-shift-per-week schedule. From December 10 to January 1, 1959, 239,778 cubic yards of surface were moved. This operation continued into 1959.

During 1958, a total of 430,166 cubic yards of surface overburden were removed from the Sally.

### 2. PRODUCTION-SHIPMENTS-INVENTORIES

a. Production by Grades

Crude

| | |
|---|---|
| Wash | 35,283 |
| Retreat | 482,305 |
| | 517,588 |

| Concentrates | Bessemer | Non-Bessemer | Total |
|---|---|---|---|
| Wash | 11,690 | 6,854 | 18,544 |
| Retreat | 38,519 | 177,067 | 215,586 |
| Overflow | | 29,833 | 29,833 |
| | 50,209 | 213,754 | 263,963 |

b. Shipments by Grades

| | | | |
|---|---|---|---|
| Wash | 11,690 | 6,723 | 18,413 |
| Retreat | 38,519 | 192,094 | 230,613 |
| Overflow | | 29,833 | 29,833 |
| | 50,209 | 228,650 | 278,859 |

c. Inventories

| Material | Tons |
|---|---|
| Wash | 131 |
| Retreat | 34,724 |
| | 34,855 |

d. Production by Months

| | Crude | | |
|---|---|---|---|
| Month | Wash | Retreat | Total |
| May | | 4,354 | 4,354 |
| June | 17,397 | 97,667 | 115,064 |
| July | 10,980 | 155,472 | 166,452 |
| Aug | 6,906 | 118,588 | 125,494 |
| Sept | | 77,984 | 77,984 |
| Oct | | 28,240 | 28,240 |
| | 35,283 | 482,305 | 517,588 |

Concentrates

| Month | Wash | Retreat | Overflow | Total |
|---|---|---|---|---|
| May | | 1,860 | | 1,860 |
| June | 8,932 | 42,100 | 6,476 | 57,508 |
| July | 5,873 | 65,479 | 9,999 | 81,351 |
| Aug | 3,739 | 57,379 | 7,573 | 68,691 |
| Sept | | 36,034 | 4,733 | 40,767 |
| Oct | | 12,734 | 1,052 | 13,786 |
| | 18,544 | 215,586 | 29,833 | 263,963 |

3. ANALYSIS

a. Crude Ore Produced

| Crude Ore | Tons | Iron | Silica |
|---|---|---|---|
| Wash | 35,283 | 48.75 | 25.99 |
| Retreat | 482,305 | 44.73 | 29.73 |
| | 517,588 | 45.00 | 29.48 |

b. Concentrates Produced

| Product | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Bessemer Wash | 11,690 | 58.14 | .045 | 10.97 | .51 | .52 | 7.19 |
| Non-Bessemer Wash | 6,854 | 57.84 | .060 | 11.22 | .48 | .54 | 7.49 |
| Bessemer Retreat | 38,519 | 57.67 | .045 | 11.42 | .36 | .59 | 6.69 |
| Non-Bessemer Retreat | 177,067 | 57.43 | .081 | 11.01 | .45 | .60 | 6.60 |
| Non-Bessemer O'flow | 29,833 | 59.21 | .047 | 10.98 | .29 | .57 | 6.52 |
| | 263,963 | 57.71 | .070 | 11.07 | .42 | .59 | 6.65 |

c. Concentrates Shipped

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bessemer Wash | 11,690 | 58.14 | .045 | 10.97 | .51 | .52 | 7.19 |
| Non-Bessemer Wash | 6,723 | 57.84 | .060 | 11.21 | .49 | .54 | 7.50 |
| Bessemer Retreat | 38,519 | 57.67 | .045 | 11.42 | .36 | .59 | 6.69 |
| Non-Bessemer Retreat | 192,094 | 57.44 | .076 | 11.09 | .43 | .63 | 6.69 |
| Non-Bessemer O'flow | 29,833 | 59.21 | .047 | 10.98 | .29 | .57 | 6.52 |
| | 278,859 | 57.70 | .067 | 11.12 | .41 | .61 | 6.71 |

d. Mine Analysis of Ore in Stockpile

| Concentrates | Tons | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|---|
| Wash | 131 | 57.60 | .057 | 11.55 | .26 | .46 | 7.00 |
| Retreat | 34,724 | 57.54 | .075 | 11.10 | .40 | .57 | 6.48 |
| | 34,855 | 57.54 | .075 | 11.01 | .40 | .57 | 6.48 |

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

| Material | Cubic Feet per Ton | Per Cent Recovery |
|---|---|---|
| Wash | 14 | 50 |
| Retreat | 14 | 40 |

b. Ore Reserves as of December 31, 1958

| Lease | Reserve 12-31-57 | Mined 1958 | Balance after Mining | Changed by Re-estimate | Reserve 12-31-58 |
|---|---|---|---|---|---|
| Bovey No. 1 NW-SW 21-56-24 | 1,397,868 | 263,962 | 1,133,906 | -79,262 | 1,213,168 |

c. Estimated Analysis of Ore Reserves

| Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| Bessemer Wash | 462,777 | 61.50 | .029 | 7.50 |
| Bessemer Retreat | 342,077 | 58.60 | .027 | 11.40 |
| Non-Bessemer Retreat | 408,314 | 57.50 | .052 | 10.50 |
| | 1,213,168 | 59.40 | .036 | 9.60 |
| Wash Concentrates | | | | |
| Bessemer | 462,777 | 61.50 | .029 | 7.50 |

| Retreat Concentrates | Tons | Iron | Phos | Silica |
|---|---|---|---|---|
| Bessemer Retreat | 342,077 | 58.60 | .027 | 11.40 |
| Non-Bessemer Retreat | 408,314 | 57.50 | .052 | 10.50 |
| | 750,391 | 58.00 | .040 | 10.90 |
| Totals | | | | |
| Bessemer | 804,854 | 60.30 | .028 | 9.20 |
| Non-Bessemer | 408,314 | 57.50 | .052 | 10.50 |
| | 1,213,168 | 59.40 | .036 | 9.60 |

5. LABOR & WAGES

a. Comments

Labor relations during the year were satisfactory. No grievances were processed in 1958.

| b. Comparative Statement of Production & Wages | 1958 | 1957 |
|---|---|---|
| Production-Tons | 263,963 | 353,711 |
| Number of Days Operated | 36 | 76 |
| Number of Shifts Operated | 59.5 | 98 |
| Average Product per Shift | 4436 | 3351 |
| Average Number of Men Employed | 129 | 142 |
| Product per Man per Day | 70.55 | 57.47 |
| Average Wages Paid per Day | $25.43 | $21.87 |
| *Total Amount Paid for Labor | $146,806.13 | $168,230.13 |
| Cost per Ton for Labor | $0.556 | $0.476 |

*Includes cost of hauling Sally ore to the Canisteo.

6. GENERAL SURFACE

a. Buildings & Repairs - None

b. Roads, Transmission Lines, etc. - None

c. Miscellaneous General Construction - None

## 7. OPEN PIT

### a. Stripping

Surface stripping authorized under E&A No. CC-933 in the fall of 1957 was completed January 21, 1958. Operations were conducted on a 3-shift, 5-day-week schedule using 2 shovels and 12 to 14 trucks. 586,482 cubic yards were moved at an average rate of 5,924 cubic yards per shift and a cost of $0.330 per cubic yard, for a total of $193,796.

Surface stripping was resumed December 10 on a 16-shift-per-week schedule under E&A No. CC-973 which authorized removal of 400,000 cubic yards of surface stripping at an estimated cost of $0.360 totalling an estimated $144,000. 239,778 cubic yards were moved in December at an average rate of 4,944 cubic yards a shift and a cost of $0.370 per cubic yard. This stripping program continued into 1959.

430,166 cubic yards of surface overburden were moved in 1958 at an average rate of 4,861 cubic yards per shift and a cost of $0.367 a cubic yard, for a total expenditure of $158,033.

### b. Open Pit Mining

Hauling of ore to the Canisteo started January 14 on a 3-shift, 5-day-week schedule using 2 shovels and 14 trucks. On January 20, operations were scheduled on a 4-day-week basis; and on January 27, a 16-shift-per-week schedule went into effect and continued until shutdown on February 8. 450,209 tons of crude ore were stockpiled in the Canisteo pit in 1958. Total crude ore in stock--including ore remaining from the previous year's operation--was 548,458 tons.

Ore operations were started at the Canisteo plant (where Sally ore was processed) on May 26 on a 2-shift, 4-day-week schedule. On September 29, a 3-shift, 4-day-week schedule went into effect and continued until shutdown on November 4.

547,184 tons of crude ore were mined from the Sally stockpile in 59.5 shifts at an average rate of 9,196 tons per shift. 29,596 tons of screen rock were included in this tonnage. 1,274 tons of pit rock were also removed from the Sally stockpile. The Sally crude ore stockpile was depleted October 10.

c. Pumping & Drainage

No pit pumping was necessary. Surface drainage was directed into the natural flowage to the west.

8. BENEFICIATION

Operating the same schedule as the pit, the concentrating plant received 517,588 tons of crude ore to produce 234,130 tons of standard concentrates at an average rate of 3,935 tons per shift and a weight recovery of 45.23 per cent of plant crude and 42.79 per cent of pit crude. Of these standard concentrates, 18,544 tons were wash and 215,586 tons retreat concentrates.

The Heavy-Media plant received 125,053 tons of feed and produced 97,631 tons of concentrates at a weight recovery of 78.07 per cent. Coarse tailings amounted to 27,422 tons.

The fine ore plant produced 29,833 tons of fine ore concentrates from 259,500 tons of current tailings at a weight recovery of 11.50 per cent. Plant crude recovery was 5.76 per cent.

For grading purposes most of the Sally crude ore was mined simultaneously with Bovey crudes and dumped into the crude ore pocket in varying proportions to attain the blend required for the resultant grade of concentrate.

During the operating season it was necessary to stockpile 66,762 tons of concentrates. Of this amount, 31,907 tons were shipped from stockpile, leaving a balance of 34,855 tons in stock on January 1, 1959.

Of the total standard concentrates produced, 37.85 per cent were split coarse and fine. Of the split ore, 66.69 per cent was coarse and 33.31 per cent fine concentrates.

Concentration data for the year is as follows:

| Wash Product | Tons | Per Cent Weight Plant | Per Cent Weight Pit | Per Cent Iron | Per Cent Phos | Per Cent Silica | Per Cent Iron Units |
|---|---|---|---|---|---|---|---|
| Crude to Plant | 35,283 | 100.00 | 96.44 | 48.75 | | 25.99 | |
| Screen Plant Rock | 1,303 | | 3.56 | 28.43 | | 54.19 | |
| Pit Crude | 36,586 | | 100.00 | 47.90 | | 27.16 | |
| Concentrates Produced | 18,544 | 52.56 | 50.69 | 58.35 | .049 | 10.53 | |
| Total Concentrates Produced & Shipped | 18,544 | 52.56 | 50.69 | 58.35 | .049 | 10.53 | |
| Total Fine Tailings (by difference) | 16,739 | 47.44 | 45.75 | 39.45 | | 40.97 | |
| **Retreat Product** | | | | | | | |
| Crude to Plant | 482,305 | 100.00 | 94.22 | 44.73 | | 29.73 | |
| Pit Rock | 1,274 | | .25 | 25.31 | | 58.52 | |
| Screen Plant Rock | 28,293 | | 5.53 | 26.06 | | 58.01 | |
| Pit Crude | 511,872 | | 100.00 | 43.18 | | 32.09 | |
| Concentrates Produced | 215,060 | 44.59 | 42.01 | 57.52 | .079 | 11.01 | |
| Stockpile Overrun | 526 | | | | | | |
| Total Concentrates Produced & Shipped | 215,586 | 44.70 | 42.12 | 57.52 | .079 | 11.01 | |
| Heavy-Media Concentrates | 97,631 | 20.24 | 19.07 | 57.79 | | 9.99 | |
| Heavy-Media Rejects | 27,422 | 5.69 | 5.36 | 38.76 | | 36.11 | |
| Heavy-Media Feed | 125,053 | 25.93 | 24.43 | 53.56 | | 15.82 | |
| Total Fine Tailings (by difference) | 239,823 | 49.72 | 46.85 | 35.29 | | 43.87 | |
| **Fine Ore Plant** | | | | | | | |
| Crude to Plant | 259,500 | 100.00 | | 33.69 | | 46.90 | |
| Total Concentrates Produced & Shipped | 29,833 | 11.50 | | 58.92 | .048 | 11.32 | |
| Total Fine Tailings (by difference) | 229,667 | 88.50 | | 30.60 | | 51.26 | |

Following is a brief classification of delay time at the beneficiation plants:

| Washing Plant | Hours | % of Working Hours |
|---|---|---|
| Plant Pocket | 2.00 | 0.42 |
| Screening Plant Machines | 2.00 | 0.42 |
| Plant Conveyor | 5.00 | 1.05 |
| Plant Machines | 15.25 | 3.20 |
| Tailings Line | 2.00 | 0.42 |
| | 26.25 | 5.51 |

| Fine Ore Plant | Hours | Per Cent of Total Working Hours |
|---|---|---|
| Due to Washing Plant | 5.00 | 1.05 |
| Out of Cars | 15.50 | 3.26 |
| Pumps | 17.50 | 3.67 |
| Fine Ore Plant Machines | 4.00 | 0.84 |
| | 42.00 | 8.82 |

9. MAINTENANCE & REPAIRS

All Canisteo equipment repair work was suspended from December 27, 1957, until April 7, 1958. Starting April 7, a limited crew was recalled for pit and plant equipment repair prior to the start of the ore season.

10. COST OF PRODUCTION

a. Comparative Mining Costs

| Product | Budget 1958 | Actual 1958 | Actual 1957 |
|---|---|---|---|
| Wash Concentrates | | 18,544 | 8,862 |
| Retreat Concentrates | 247,000 | 215,586 | 302,789 |
| Fine Ore Concentrates | 28,000 | 29,833 | 22,950 |
| Direct Ore | | | 19,110 |
| | 275,000 | 263,963 | 353,711 |
| Per Cent Gross Crude Recovery | 48.24 | 49.11 | 49.32 |
| Average Product Per Shift | | 4,436 | 3,351 |
| Tons per Man per Day | | 70.55 | 57.47 |
| Days Operated | | 36 | 76 |
| **Costs** | | | |
| Pit Operating | $0.391 | $0.371 | $0.373 |
| Beneficiating | 0.170 | 0.131 | 0.149 |
| Fine Ore Concentrating | 0.850 | 0.604 | 0.807 |
| Loading Stockpile Ore | 0.012 | 0.036 | 0.005 |
| Sampling & Analysis | 0.029 | 0.026 | 0.028 |
| Safety & First Aid Supplies | 0.003 | 0.001 | 0.003 |
| Employees Vacation Pay | 0.052 | 0.047 | 0.049 |

| Costs | Budget 1958 | Actual 1958 | Actual 1957 |
|---|---|---|---|
| Personal Injury Expense | $0.002 | $0.008 | $0.001 |
| Social Security Taxes | 0.036 | 0.017 | 0.036 |
| Total Pit & Beneficiation | $1.327 | $1.212 | $1.117 |
| General Mine Expense | 0.237 | 0.173 | 0.134 |
| Winter & Idle Expense | 0.317 | 0.331 | 0.156 |
| Cost of Production | $1.881 | $1.716 | $1.407 |
| Depreciation | | | |
| Plant & Equipment | | 0.292 | 0.264 |
| Motorized Equipment | | 0.019 | 0.017 |
| Movable Equipment | | 0.006 | |
| Amortization - None | | | |
| Taxes | | | |
| Ad Valorem | | 0.202 | 0.210 |
| Occupational | | 0.620 | 0.664 |
| Royalty | | 0.043 | 0.016 |
| Deferred Mining Costs | | 0.028 | 0.018 |
| Total Depreciation-Amortization-Taxes | | $1.210 | $1.189 |
| Royalty | | 0.300 | 0.300 |
| Total Cost on Cars | | $3.226 | $2.896 |

b. Detailed Cost Comparison

Over-all Mining Costs: of $1.716 were $0.165 under the budget of $1.881. The main reason for the favorable cost picture was the increased rate of production...made possible because of the high grade, soft, sand and ore mixed Sally ore. It will not be possible to maintain this high rate of production as more of the rockier ores are encountered.

Pit Operating Costs: $0.020 below budget of $0.391.

Beneficiation Costs: $0.039 below budget of $0.170.

Fine Ore Concentration: $0.246 below budget of $0.850.
High rate of production accounted for in part by an increase in recovery was main reason for decreased costs.

Miscellaneous Pit & Beneficiation: $0.024 below budgeted $0.140.

General Mine Expense: $0.064 below budget of $0.140.
Increased production of Canisteo ore reduced overhead costs at the Sally as well as at the Canisteo.

Winter & Idle: $0.014 over budget of $0.317.
Combined Canisteo-Sally Winter & Idle expense was $363,477 compared to budget of $255,050--an overexpenditure of $108,427. Since these costs were divided on a tonnage basis, most of the increase was allocated to the Canisteo. (See Canisteo annual report for details)

## II. EXPLORATION & FUTURE EXPLORATION

No exploratory drilling was done at the Sally in 1958. Additional drilling will be required to determine extent of minable ore, particularly in the northwest portion of the forty. Minimum requirement of 2000 feet for future exploratory drilling estimated.

## 12. TAXES

| | 1958 | | 1957 | | Increase-Decrease | |
|---|---|---|---|---|---|---|
| Real Estate | Assessed Value | Taxes | Assessed Value | Taxes | Assessed Value | Taxes |
| Mineral | $158,440 | $33,914.08 | $278,403 | $56,741.32 | -$119,963 | -$22,827.24 |
| Land,Building,Machinery | 933 | 206.48 | 933 | 195.68 | | / 10.80 |
| Personal Property | | | | | | |
| Concentrate Stockpile | 2,857 | 611.54 | | | / 2,857 | / 611.54 |
| Crude Stockpile | 28,784 | 6,161.22 | | | / 28,784 | / 6,161.22 |
| | $191,014 | $40,893.32 | $279,336 | $56,937.00 | -$ 88,322 | -$16,043.68 |
| Average Mill Rate | | 214.09 | | 203,83 | /10.26 or 5.03% | |

Note: Decrease in mineral valuation by new revised estimate reclassifying part of reserve to lower value ores. Also, in 1957, crude ore stockpile was included as part of mineral reserve tonnage. Personal property-- no concentrate stockpile on hand May 1, 1957.

To above tax cost, $13,149.09 was added from Canisteo for proportionate share of taxes on Canisteo facilities used by Sally.

Tax Commission Reserve
as of
May 1, 1958

| | |
|---|---|
| 1958 | 1,213,168 tons (plus crude stockpile of 262,949) |
| 1957 | 1,727,324 |
| | -514,156 |

13. ACCIDENTS & PERSONAL INJURY - None

14. PROPOSED NEW CONSTRUCTION - None

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT - None

# SARGENT OPEN PIT MINE

## ANNUAL REPORT

## YEAR 1958

1. GENERAL

The sublease between The Cleveland-Cliffs Iron Company and the International Harvester Company was cancelled on December 31, 1958. The International Harvester Company cancelled its lease with the Sargent Land Company as of the same date.

The estimated 15,450 tons of gross crude, or estimated 9,857 tons of net crude trespass ore stacked by M. A. Hanna in the Bray pit is expected to be treated in the Mesabi Chief plant in 1959. Royalties have been paid on 9,000 tons net crude.

A small tax on the buildings left on the property will be billed to us by the fee owners.

# WANLESS MINE

# ANNUAL REPORT

# YEAR 1958

## 1. GENERAL

The Wanless mine was shut down and no mining or stripping was conducted in the pit in 1958--the only pit activity being intermittent pumping by the Snyder Mining Company and the Wanless pit sump to supplement drainage in Snyder's Whiteside mine. During the latter part of March, the Snyder Mining Company removed the Wanless pump and installed its own pumping equipment hooked up to its own power lines.

A few Wanless men were recalled on June 16 for a 4-day period to block up trucks, cover conveyor belting, and return borrowed equipment.

About the first of September, during a period of heavy cargo requirements, it was necessary to supplement production with stockpile loading from the concentrating plants. Stockpile concentrate grade was excellent and purchased ore was running high grade--so it was considered an opportune time to absorb the low grade Wanless ore to eliminate future exposure to stockpile taxes. On 5 intermittent shifts of loading, 7203 tons of Wanless and 8807 tons of Woodbridge, or a total of 16,010 tons were shipped of the previously recorded 16,449 tons in stockpile, leaving a book balance of 439 tons in the Wanless stockpile.

Two grievances were processed during the year: one carried over from the previous year in which the arbitrator ruled against the company for compensation of a shift not worked by the grievant when the company neglected to recall him from his home at the time he was completing a justified layoff penalty; the other protesting the use of Holman crews to load out the Holman shovel on rent to the Wanless was carried to the third step and dropped by the Union.

Colorado Fuel & Iron cancelled its partnership in the Wanless as of April 1, 1958.

## 2. PRODUCTION-SHIPMENTS-INVENTORIES

a. Production - None

b. Shipments

| Direct Stockpile | Tons |
|---|---|
| Wanless | 7,203 |
| Woodbridge | 8,807 |
| | 16,010 |

c. Stockpile Inventories

| | |
|---|---|
| Wanless | 98 |
| Woodbridge | 341 |
| | 439 |

3. ANALYSIS

Analysis of Concentrates Shipped & Concentrates in Stockpile

| Ore | Iron | Phos | Silica | Mang | Alum | Moisture |
|---|---|---|---|---|---|---|
| Wanless | 52.415 | .130 | 9.72 | .76 | 5.46 | 17.552 |
| Woodbridge | 52.157 | .178 | 9.38 | .91 | 5.03 | 17.305 |
| | 52.215 | .167 | 9.46 | .88 | 5.13 | 17.360 |

4. ESTIMATE of ORE RESERVES as of DECEMBER 31, 1958

| Ore | Tons |
|---|---|
| Woodbridge | 184,800 |
| Wanless | |
| Open Pit | 899,521 |
| Underground | 141,028 |
| | 1,040,549 |
| Total Wanless-Woodbridge | 1,225,349 |

Estimated Analysis of Reserves

| Concentrates | Tons | Iron | Phos | Silica | Mang | Alum |
|---|---|---|---|---|---|---|
| Woodbridge | | | | | | |
| SE-NE 16-58-19 | | | | | | |
| Open Pit No. 1 | 109,741 | 54.37 | .086 | 7.30 | 1.11 | 1.11 |
| Open Pit No. 2 | 75,059 | 50.67 | .106 | 11.80 | 1.63 | 3.99 |
| | 184,800 | 52.87 | .094 | 9.13 | 1.32 | 2.28 |
| Wanless | | | | | | |
| NE-SE 16-58-19 | | | | | | |
| Open Pit No. 1 | 722,588 | 54.03 | .115 | 9.22 | 1.43 | 2.93 |
| Open Pit No. 2 | 176,933 | 48.59 | .114 | 14.24 | 1.44 | 5.88 |
| Underground No. 1 | 41,600 | 53.50 | .151 | 9.52 | .90 | 2.65 |
| Underground No. 2 | 99,428 | 49.05 | .092 | 14.33 | 1.78 | 3.81 |
| | 1,040,549 | 52.61 | .114 | 10.57 | 1.44 | 3.50 |
| Total Mine | | | | | | |
| No. 1 | 873,929 | 54.05 | .113 | 8.99 | 1.36 | 2.69 |
| No. 2 | 351,420 | 49.16 | .106 | 13.74 | 1.58 | 4.89 |
| | 1,225,349 | 52.65 | .111 | 10.35 | 1.41 | 3.32 |

12. TAXES

| | 1958 | | 1957 | | Increase-Decrease | |
|---|---|---|---|---|---|---|
| Real Estate | Assessed Value | Taxes | Assessed Value | Taxes | Assessed Value | Taxes |
| Mineral | $181,299 | $19,076.28 | $194,143 | $20,130.69 | -$12,844 | -$1,054.41 |
| Land,Building,Machinery | 1,867 | 198.46 | 2,032 | 214.37 | - 165 | - 15.91 |
| Personal Property | | | | | | |
| Equipment | 2,593 | 272.82 | 9,294 | 963.69 | - 6,701 | - 690.87 |
| Direct Ore Stockpile | 10,100 | 1,062.72 | | | + 10,100 | + 1,062.72 |
| Lean Ore Stockpile | | | 2,493 | 258.51 | - 2,493 | - 258.51 |
| | $195,859 | $20,610.28 | $207,962 | $21,567.26 | -$12,103 | -$ 956.98 |
| Average Mill Rate | | 105.23 | | 103.71 | | +1.52 |

Note: Reduction in mineral valuation by mining in 1957. Personal property part of equipment moved from property reduced valuation. Lean ore stockpile removed from tax rolls presently have no economic value. Direct ore stockpile of 16,449 tons added to tax rolls.

TAX COMMISSION RESERVE

| as of | tons |
|---|---|
| May 1, 1957 | 1,402,423 |
| May 1, 1958 | 1,225,349 |
| | -177,074 |

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY

a. Fatal Accidents

Three fatal accidents occurred at our properties during the year, one at Mather Mine "B" Shaft, one at Mather Mine "A" Shaft and one at the Cliffs Shaft Mine. All three accidents involved equipment used to move iron ore. Although each was investigated thoroughly, there was at least one link in the chain of events which could not be uncovered.

Our fatality rate was 1.13 (based on per thousand employees) compared to 1.71 average since 1911.

A brief description of the three fatal accidents follows:

Mather Mine "B" Shaft - Clarence Prudom

Mr. Clarence Prudom was fatally injured at approximately 2:40 P.M. on March 11, 1958 at Mather Mine "B" Shaft. He had been struck by a scraper in a transfer on the -675 sublevel above 6200 crosscut. How he got into the transfer will never be known. Prudom's job was to keep watch on a chain conveyor belt which was hauling ore from two mining contracts on the -650 sublevel, and through use of a television set could watch the scraper and crusher on the -675 sub. Electrical controls for all this equipment were located at his operating position and were provided with a lockout in case it was necessary to go to the -675 sub. For some reason Prudom had stopped the chain conveyor but not the rest of the equipment. The safety rules required that equipment be stopped at any time it was necessary to go to the -675 sub and he had had a number of days training by another employee and had instructions from the supervisor.

It would seem that Prudom either slipped and fell through the ore pass from the -650 to the -675 or he may have fainted and fallen into the raise. Prudom had recently undergone major surgery to his stomach and still was not in the best of health and had told fellow employees that he had suffered weak spells.

Mather Mine "A" Shaft - Glenn Veale

Glenn Veale, contract miner at Mather Mine "A" Shaft, was fatally injured at 2:50 P.M. on August 18, 1958 when he either fell or jumped from the locomotive of a haulage train. Veale and another miner had got on the locomotive, in violation of safety rules, near the end of the shift to save

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

a. Fatal Accidents (Cont.)

himself the long walk to the shaft. As the train approached the 7700 crosscut, Veale was missing. He was found by other employees who were on their way to the shaft. Apparently he was dead at the time, having been dragged some distance by the fifth or dumping wheel of the Granby type haulage car.

Cliffs Shaft Mine - Waino Kangas

Waino Kangas, Supervisor at the Cliffs Shaft Mine, was fatally injured at approximately 10:50 A.M. on December 13, 1958. The accident occurred about 400 feet west and south of "B" Shaft, where Kangas was using an Eimco #40 loader. He was alone at the time of the accident so there were no witnesses. Previous to the accident another shift supervisor had been working with Kangas but he had stayed at the rock dump 1100 feet away to scrape rock and level it off in the stope which was being filled. When found by the other supervisor, Kangas was caught between the side of the drift and the dipper of the loader. He apparently had slipped and fallen from the operator's platform of the loader and was crushed between it and the rib.

The above is the first fatality at the Cliffs Shaft Mine since 1947, during which time there has been 10,041,040 hours of exposure and 6,643,918 tons of ore mined.

TABLE I
FATAL ACCIDENT RECORD
THE CLEVELAND CLIFFS IRON CO.
MINING & ELECTRIC POWER DEPARTMENTS
1898-1958 INCLUSIVE

| YEAR | NO. MEN EMPLOYED | NO. OF FATALITIES | FATALITY RATE |
|---|---|---|---|
| 1898 | 1065 | 6 | 5.63 |
| 1899 | 1174 | 4 | 3.41 |
| 1900 | 1427 | 4 | 2.80 |
| | 3,666 | 14 | 3.79 |
| 1901 | 1317 | 9 | 6.83 |
| 1902 | 1485 | 8 | 5.38 |
| 1903 | 1551 | 8 | 5.15 |
| 1904 | 1338 | 4 | 2.97 |
| 1905 | 2038 | 12 | 6.54 |
| | 7,729 | 41 | 5.30 |

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

a. Fatal Accidents (Cont.)

TABLE I (Cont.)

| YEAR | NO. MEN EMPLOYED | NO. OF FATALITIES | FATALITY RATE |
|---|---|---|---|
| 1906 | 2418 | 10 | 4.13 |
| 1907 | 2843 | 17 | 6.00 |
| 1908 | 2340 | 6 | 2.52 |
| 1909 | 2520 | 13 | 5.15 |
| 1910 | 2907 | 20 | 6.88 |
| | 13,028 | 66 | 5.06 |
| 1898 - 1910 | | 121 | 4.99 |
| 1911 | 2633 | 5 | 1.90 |
| 1912 | 2335 | 4 | 1.71 |
| 1913 | 2521 | 11 | 4.19 |
| 1914 | 2435 | 10 | 4.10 |
| 1915 | 3308 | 5 | 1.51 |
| | 13,332 | 35 | 2.70 |
| 1916 | 3063 | 8 | 2.61 |
| 1917 | 3457 | 6 | 1.73 |
| 1918 | 3765 | 13 | 3.45 |
| 1919 | 3938 | 11 | 2.79 |
| 1920 | 4125 | 5 | 1.21 |
| | 18,348 | 43 | 2.36 |
| 1921 | 2309 | 6 | 2.60 |
| 1922 | 2301 | 1 | .43 |
| 1923 | 2728 | 6 | 2.20 |
| 1924 | 2472 | 5 | 2.02 |
| 1925 | 2472 | 2 | .81 |
| | 12,282 | 20 | 1.61 |
| 1926 | 2119 | 55 | 25.96 |
| 1927 | 1969 | 4 | 2.03 |
| 1928 | 1784 | 4 | 2.25 |
| 1929 | 2000 | 4 | 2.00 |
| 1930 | 2566 | 5 | 1.95 |
| | 10,438 | 72 | 6.90 |

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

a. Fatal Accidents (Cont.) TABLE I (Cont.)

| YEAR | NO. MEN EMPLOYED | NO. OF FATALITIES | FATALITY RATE |
|---|---|---|---|
| 1931 | 1651 | 3 | 1.82 |
| 1932 | 630 | 0 | 0.00 |
| 1933 | 631 | 2 | 3.17 |
| 1934 | 1073 | 4 | 3.74 |
| 1935 | 1313 | 2 | 1.53 |
| | 5,298 | 11 | 2.05 |
| 1936 | 2125 | 2 | .94 |
| 1937 | 2763 | 1 | .36 |
| 1938 | 2590 | 3 | 1.17 |
| 1939 | 2457 | 1 | .41 |
| 1940 | 2756 | 5 | 1.88 |
| | 12,691 | 12 | .94 |
| 1941 | 3570 | 5 | 1.40 |
| 1942 | 3562 | 2 | .56 |
| 1943 | 3609 | 4 | 1.11 |
| 1944 | 3584 | 3 | .84 |
| 1945 | 3078 | 1 | .32 |
| | 17,403 | 15 | .86 |
| 1946 | 2791 | 0 | 0.00 |
| 1947 | 3942 | 7 | 1.78 |
| 1948 | 4003 | 3 | .75 |
| 1949 | 4191 | 1 | .24 |
| 1950 | 4344 | 5 | 1.15 |
| | 19,271 | 16 | .83 |
| 1951 | 4975 | 2 | .40 |
| 1952 | 4906 | 5 | 1.02 |
| 1953 | 4952 | 2 | .40 |
| 1954 | 3946 | 0 | 0.00 |
| 1955 | 3742 | 4 | 1.07 |
| | 22,521 | 13 | .58 |
| 1956 | 3878 | 0 | 0.00 |
| 1957 | 3200 | 2 | .62 |
| 1958 | 2654 | 3 | 1.13 |
| 1911-1958 | 141,316 | 242 | 1.71 |

BASED ON PER THOUSAND EMPLOYEES

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

a. Fatal Accidents (Cont.) TABLE II

CLASSIFICATION OF CAUSES OF FATAL ACCIDENTS
FROM DECEMBER 1, 1898 TO DECEMBER 31, 1958

| | | |
|---|---|---|
| A. Fall of Ground | 115 | |
| Run of Mud or sand | 60 | |
| Fall of Chunk of Ore from Chute | 3 | |
| Stray Chunk or Stick Down Raise or Stope | 4 | 182 |
| B. Shaft Accidents: | | |
| Falling Down Shaft | 16 | |
| Rock or Timber Falling Down Shaft | 4 | |
| Struck or Caught by Cage, Skip, Bucket, Tool | 8 | |
| Falling from Cage, Skip or Bucket | 11 | |
| Falling from Ladder in Shaft | 5 | |
| Carried or Pushed Into Shaft by Car | 3 | |
| Jumping on or off Cage, Skip or Bucket | 3 | |
| Struck by Crosshead | 5 | |
| Struck by Falling Material | 2 | 57 |
| C. Use of Explosives | | |
| Explosion of Powder | 20 | |
| Premature Blast | 3 | |
| Fall of Ground or Timber Due to a Blast | 4 | |
| Overcome by Gas | 3 | |
| Miscellaneous Causes | 2 | 32 |
| D. Mine, Railroad Cars, Trucks, Etc. | | |
| Caught by Haulage Cars | 16 | |
| Riding or Attempting to Ride Cars | 7 | |
| Falling with Car from Trestle | 4 | |
| Run Over by Railroad Car | 8 | |
| Struck by Locomotive | 3 | |
| Truck Haulage | 1 | |
| Miscellaneous Causes | 1 | 40 |
| E. Miscellaneous Causes: | | |
| Falling in Raise, Stope or Pocket | 10 | |
| Electric Shock | 12 | |
| Falling from Ladder, Trestle, etc | 8 | |
| By Moving Machinery | 10 | |
| Mine Fires | 3 | |
| Stockpile Slide | 3 | |
| Slipping & Falling | 1 | |
| Miscellaneous Causes | 5 | 52 |
| TOTALS | | 363 |

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

a. Fatal Accidents (Cont.)

TABLE III

CLASSIFICATION OF FATAL ACCIDENTS - 1911 TO 1958, INCLUSIVE BY THE CENTRAL SAFETY COMMITTEE

| | | | |
|---|---|---|---|
| I. | Trade Risk | | 129 |
| II. | Negligence of Company | | |
| | Violation of Rules | 6 | |
| | Failure to Provide Safety Devices | 7 | |
| | Improper Method of Doing Work | 12 | |
| | Failure to Provide Tools or Safe Places to Work | 6 | |
| | Failure to Instruct Men | 5 | |
| | Improper Act or Selection of Improper Method of Doing Work (By Foreman) | 1 | 37 |
| III. | Negligence of Workmen | | |
| | A. Injured Men: | | |
| | Improper Act or Improper Method of Work | 29 | |
| | Violation of Rules | 11 | |
| | Failure to Use Tools or Appliances Provided | 4 | |
| | Failure to Use Safety Devices | 4 | 48 |
| | B. Other Men: | | |
| | Improper Act or Improper Method of Work | 14 | |
| | Violation of Rules | 5 | |
| | Failure to Use Tools or Appliances Provided | 1 | 20 |
| | A.B. Injured Men & Other Men; | | |
| | Improper Act or Improper Method of Work | 4 | 4 |
| II-5 IIIA3 IIIB3 | Failure to Instruct Men by Foreman and Violation of Rules by Injured Man and Partner | 1 | 1 |
| II-5 IIIA4 IIIB4 | Failure to Instruct Men as to Method of Work and Improper Method of Doing Work by Injured Workman and Other Workmen | 2 | 2 |
| II-2 IIIA2 IIIB2 | Failure to Use Proper Tools or Appliances Provided (By the Foreman, Injured Workman and Other Workmen) | 1 | 1 |
| | TOTALS | | 242 |

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY

b. All Injuries

Causes of Compensable Injuries - Underground

Total compensable injuries amounted to 58 which is almost half the number which occurred in 1957 but the number of manhours worked in 1958 is considerably less. Again falls of ground caused the greatest number of injuries but the severity of injuries was low. Falling chunks down raises, shafts and chutes caused eight injuries and has for many years been an injury hazard. These two hazards usually cause about 30% of all underground injuries and has been of serious concern to everyone.

Much has been done to prevent falls of ground accidents through use of proper forepoles, side support and blocking over the poles and behind the side support. There is no question as to the value of this support before timbering and statistics show that there has been a great decrease in falls of ground accidents. As for injuries caused by falling chunks from raises, mills, etc., we have had an increase in number. This category also includes barring of mills and chutes and many of the injuries are caused when loosened chunks roll down the piles and strike the chute man and at other times the bar is struck by a chunk and in turn the bar strikes the man. The Safety Department and supervisory personnel at the mines have concentrated on prevention of this type of accident but although some improvement has been noticed, we still have a real problem, especially protecting the man barring mills.

Slipping and falling injuries continue but most of them are of minor nature. Housekeeping,of course, is the main problem but the careful man can usually avoid this type of accident.

Surface at Underground Mines

There were only two compensable injuries on surface at underground mines. Again we had a slipping and falling injury and one from handling material.

Open Pits

At open pits there were eight compensable injuries and of these, with one exception, were caused by falls of persons. One listed as jumping from one railroad car to another probably should be listed as falling, because the man fell on top of the loaded railroad car after jumping and this caused the injury. The eighth injury was caused by falling material.

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

b. All Injuries (Cont.)

Other Operations

Five injuries are listed under this category and they were the cause of much lost time. Falling from a broken stage caused a badly fractured ankle. Caught in a V-belt drive the loss of a finger,and caught in a conveyor belt a fractured arm. This last one could have been fatal had a larger motor powered the small conveyor belt. Violation of safety rules were responsible for the three serious injuries.

SAFETY DEPARTMENT

ANNUAL REPORT

YEAR 1958

11. ACCIDENTS AND PERSONAL INJURY (Cont.)

b. All Injuries (Cont.)

## INTERPRETATION OF INJURY RATES

That injury frequency rates are much more significant than sets of abstract figures punctuated with decimal points is forcefully recognized when they are interpreted in terms of employees.

Using an average of 2,000 hours per employee per year, 1,000,000 hours represents the yearly exposure of about 500 employees. An injury frequency rate of 10.0 per 1,000,000 man-hours, then, indicates 10 disabling injuries per year among each 500 employees, or 1 injury among 50. In a plant with a frequency rate of 20.0, approximately one employee out of every 25 is suffering a disabling injury each year.

The severity rate is the number of days lost and charged per each 1,000,000 hours worked. Because of the inclusion of time charges, which generally are in excess of the actual number of days lost, it is incorrect to say that the rate represents days lost in relation to a given number of employees.

The severity rate actually is a single rate which measures both the frequency and severity of injuries. Whereas the frequency rate is determined by counting each injury as 1, regardless of the seriousness of the case,the severity rate is determined by counting each injury the number of times indicated by its time charge - i.e., according to its relative severity.