

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

8. MAINTENANCE, REPAIR AND CHANGES: (Cont'd.)

a. Pit: (Cont'd.)

Euclid Trucks (Cont'd.)

reinforcing of the boxes on two trucks. A broken rear tandem banjo was rebuilt and repaired. The injectors in all units were reconditioned. A new rear left spring and all the torque arms were changed on one unit.

A complete brake job was completed on one unit.

Pickups and Pettibone-Mulliken Loader

The engine on the International pickup was overhauled. The Chevrolet pickup received an engine overhaul and a new transmission. A rebuilt engine was installed in the Pettibone-Mulliken.

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

8. MAINTENANCE, REPAIR AND CHANGES: (Cont'd.)

b. Plant

January

Rebuilt chute under #1 conveyor take-up.
Converted splitter under primary crusher to accommodate
8 x 19 wear plates.
Changed manganese, secondary crusher.
Changed bowl, tertiary crusher.
Revamped steel above tertiary crusher for quick manganese change.
Overhauled primary Aeroturn dust collector.
Installed new bearing and housing, drive side, #1 screen.
Installed new dust seal on tripper.
Tried steam in conditioners #1 unit.
Installed new apex primary cyclone.
Started Krebs cyclone test.
Covered filters.
Installed weir, Denver cells.
Installed new sand strips, both hydroscillators.
Converted from steel to rubber lined parts, 4B pump.

February

Made new oil storage tanks for Olson heater, primary building.
Moved metal detector on #2 conveyor.
Changed mantle, tertiary crusher.
Changed oil pump, #1 screen.
Covered filters.
Installed new belt, 3A, fine ore bin feeder.
Lowered center cleaner overflowlip, Denver cells.
Screened ball charge #1 Ball Mill - started using Ni-Hard balls.
Sprayed cars with Kemcote, cold weather test.

March

Changed manganese, secondary crusher.
Changed manganese, tertiary crusher.
Overhauled secondary Aeroturn dust collector.
Installed new bearing, #1 screen, float side.
Installed apexes, secondary cyclones.
Covered filters.
Installed new drive chains 6A - 6B, fine ore bin feeders.
Checked micarta sleeves on all mills.

April

Installed new buffer belt.
Installed magnet on head pulley, #1 conveyor.
Changed bottom two rows of concaves, primary crusher.
Installed extra pump on Farval system, Pioneer feeder.
Changed manganese, tertiary crusher.
Raised front of tripper to prevent damage to dust seal belt.
Replaced burned motor, #5 conditioner, #2 unit.
Repaired hydroscillator plate #2.
Started to assemble spare hydroscillator bowl.
Overhauled tailing cyclone pump for start-up.

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

8. MAINTENANCE, REPAIR AND CHANGES: (Cont'd.)

b. Plant (Cont'd.)

May

Plugged primary crusher (power failure).
Ripped #2 conveyor belt.
Changed manganese, tertiary crusher.
Replaced rubber corner blocks, #1 screen.
Installed extra conditioners, #2 unit.
Installed new bowl, #2 hydroscillator.
Replaced piece, #2 ball mill scoop.
Overhauled weightometer, #10 conveyor.
Overhauled filtrate pumps.

June

Replace shaft cones on #1 conveyor snub pulley.
Checked Falk reducers for wear, all conveyors.
Changed manganese, secondary crusher.
Changed oil, tertiary crusher.
Burned out motor - #1 screen oil pump.
Installed new oil lines to #1 screen bearings.
Replaced wheel bearing on tripper.
Covered filters.
Hog troughed #3 cell on Denver recleaners.
Burned out motor - #3 rougher East bank Fags.
Drilled extra air holes in Fag. cells.
Changed drive gears, pinion gears, pinion, - #2 hydroscillator
Replaced wear piece - #1 ball mill.
Changed bottom and middle row feed head liners - #2 rod mill.
Moved 2A2 and 2B2 pumps for #7 conditioner installation.
Burned out rubber parts on tailing cyclone plant pump.

July

Installed new bearing, head shaft on buffer belt.
Replaced cones, shaft, - #1 conveyor snub pulley, head end.
Overhauled primary Aeroturn dust collector.
Installed new drive shaft - Pioneer feeder.
Tightened all taper locks on conveyors.
Turned pins and bushings - Pioneer feeder.
Covered filters.
Installed new bearings - filter agitators.
Installed ram roller, ram roller arm shaft, cam arm - #1 hydroscillator.
Installed new micarta sleeve - #2 ball mill.
Honed down rough trunnion - #2 ball mill.
Changed manganese - tertiary crusher.

August

Built new boot jack under secondary crusher.
Revamped rock box above secondary crusher.
Changed manganese - secondary crusher.

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

8. MAINTENANCE, REPAIR AND CHANGES: (Cont'd.)

b. Plant (Cont'd.)

August (Cont'd.)

Plugged secondary crusher.
Installed manganese cast screen deck - #1 screen.
Repaired broken oil lines - #2 screen.
Installed #7 conditioner - #2 unit.
Repaired Reeves drive on #2 filter.
Installed new cam roller, cam drum - #2 hydroscillator.
Overhauled weightometer - secondary bldg.
Changed ball mill lifters from back to front - #2 ball mill.
Extended sides on pulp distributor feed spindle - #2 unit.
Installed overflow weir in front of reuse pump house.

September

Built new dead bed under primary crusher.
Replaced lower mantle - primary crusher.
Added new rock shield around secondary crusher.
Installed new bearing - secondary crusher motor.
Installed new bearing and housing - #1 screen.
Overhauled compressor.
Started split flotation.
Repaired cracked rakes and broken crosshead - hydroscillator #1.
Replaced sand strip - #2 hydroscillator.
Repaired broken rakes - #2 hydroscillator.
Changed lifters - #1 ball mill - front to back.
Changed bottom and middle row feed head liners - #1 rod mill.
Installed new bearing, inboard - #2 rod mill.
Removed one stage - #2 reuse pump.
Adjusted reuse pumps.
Replaced thickener drive shaft, bearing, etc. - #1 thickener.

October

Welded dome on primary crusher.
Overhauled primary Aeroturn dust collector.
Installed new drive shaft, extra bearing - Pioneer Feeder.
Changed manganese - secondary crusher.
Changed manganese - tertiary crusher.
Changed oil - tertiary crusher.
Installed new bags - secondary Aeroturn dust collector.
Installed manganese screen cloth - #2 screen.
Repaired dust seal belt on tripper.
Covered filters.
Installed new fine ore bin feeder belts, SA, SB.
Installed screens between Fag. cells to catch tramp.
Overhauled #2 hydroscillator rake mechanism.
Burned out M. G. set - #1 rod mill.
Lined #1 rod mill motor on its base.
Shimmed top row feed head liners to match other rows.

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

8. MAINTENANCE, REPAIR AND CHANGES: (Cont'd.)

b. Plant (Cont'd.)

October (Cont'd.)

Burned out M. G. set - #2 rod mill.
Installed tugger at pocket.
Overhauled filtrate pumps.

November

Changed all concaves - primary crusher.
Installed rebuilt belt on #2 conveyor.
Changed manganese - tertiary crusher.
Converted tertiary feed distributor for quick manganese change.
Covered filters.
Installed new left hand crank - #2 hydroscillator.
Built up bolt heads - #2 ball mill.
Changed feed trunnion - #2 rod mill.
Repaired #1 river pump - broken discharge bowl and impeller.
Installed new shaft, bushings, bearing - #1 thickener.

December

Plugged primary crusher.
Overhauled primary Aeroturn dust collector.
Changed oil - primary crusher.
Changed manganese - secondary crusher.
Installed floating bowl hopper - secondary crusher.
Installed new dust lines - Roto-Clone dust collector.
Moved oil pump - #1 screen - for gravity flow.
Installed two siphontrol cyclones.
Changed valve head - #1 filter.
Repaired broken rakes - #2 hydroscillator.

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

9. E & A's:a. Construction and Stripping E&A's:

<u>E&A</u> <u>No.</u>	<u>Description</u>	<u>1957</u> <u>Expenditures</u>	<u>1958</u> <u>Expenditures</u>	<u>Total</u> <u>Expenditures</u>
MI-1	Program Covering Moving of 26 Houses	\$ 166.80	\$ -0-	\$ 90547.00
MI-2	Building up Tailings Dam Dikes	-0-	-0-	56537.48
MI-3	Dipper for Marion Shovel	11448.04	-0-	11448.04
MI-4	Trailer Tank for Pit	-0-	-0-	16573.01
MI-5	Pellet Plant - Republic Mine	99593.53	170.56	111162.06
MI-6	Preliminary Design - Republic Mine	47355.86	11359.68	61542.95
MI-7	Oscillator Assembly for Hydrooscillator	5605.29	-0-	5605.29
MI-8	First Addition to Republic Townsite	122010.41	-0-	139826.80
MI-9	Marion Electric Shovel	265688.13	-0-	266870.36
MI-11	Stripping - Republic Mine - 1957	158220.41	-0-	158220.41
MI-13	MOC Testing	158255.96	16640.38	191734.93
MI-14	Dragline Equipment	9934.08	-0-	9934.08
MI-15	One 34-Ton Euclid	56522.01	-0-	56522.01
MI-16	Six 34-Ton Euclids (used)	-0-	-0-	126000.00
MI-17	Empire Mine, Cost of Field Work, etc.	77082.57	12505.29	89587.86
MI-18	House Moving & School Removal	361324.09	-0-	361324.09
MI-19	Pickup Truck	1663.73	-0-	1663.73
MI-20	Service Truck	4094.53	-0-	4094.53
MI-21	Rotary Drill	-0-	-0-	-0-
MI-22	Spare Main Shaft & Mantle for Tert.	30164.83	-0-	30164.83
MI-24	Hardinge Cascade Mill Test	14211.96	-0-	14211.96
MI-27	Tailings Pipeline	24906.12	-0-	24906.12
MI-31	Clamshell Bucket	2487.89	-0-	2487.89
MI-32	Stripping - Republic Mine 1958	-0-	112089.73	112089.73
MI-34	Six Conditioners	-0-	14284.19	14284.19
MI-35	House Moving - 1958	-0-	59375.45	59375.45
MI-36	Storm Sewer First Addition	7462.13	-0-	7462.13
MI-38	Gear Spray for Grinding Mills	-0-	2271.05	2271.05
MI-39	Feed Rate Comp. Jet	-0-	3579.99	3579.99
MI-44	Pickup Truck	-0-	-0-	-0-
MI-46	Stripping - Republic Mine - 1959	-0-	-0-	-0-
MI-47	House Moving - 1959	-0-	-0-	-0-
MI-48	Expansion of Present Facilities	-0-	4846.89	4846.89
Total		1458198.37	237123.21	2034874.86

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

10. COST OF PRODUCTION

a. General

Comparing actual costs with the budget for the year, the cost of production per ton of concentrates was \$3.974 compared to a budgeted figure of \$3.903. In terms of crude ore, the cost of production was \$1.828 per ton compared to a budgeted figure of \$1.952. The affect of the favorable crude ore cost was somewhat offset by the reduced weight recovery, which was 46% compared to the estimated 50%.

Costs were abnormally high during September and October because of a thirty day plant test that was run during this period.

In comparing 1957 costs with 1958, the hourly cost of labor increased from \$2.738 to \$2.979 or 8.8%, while the labor cost per ton of concentrate increased from \$1.07 to \$1.162 or 8.6%. Supply costs again showed an improvement as they did last year from \$2.142 in 1957 to \$2.084 in 1958 for a 2.8% reduction. Power cost increased from \$.546 in 1957 to \$.576 in 1958 for a 5.5% increase.

b. Detail of 1958 Operating Costs:

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>
Pit Expense	1.384	1.354	1.276	1.063	1.138	1.201
Crushing & Screening	.545	.611	.595	.792	.596	.703
Milling Expense	1.802	1.897	1.718	1.505	1.365	1.381
Tailings Disposal	.004	.000	.000	.031	.007	.016
Stocking Expense	.006	.004	.007	.034	.001	.022
General Mine Expense	.502	.557	.484	.503	.407	.500
Telephones & Safety	.012	.017	.009	.007	.007	.007
Holiday	.058	.000	.000	.049	.046	.000
Vacation	.044	.048	.045	.038	.037	.029
Cost of Production	4.357	4.488	4.134	4.022	3.604	3.859
Shipping Expense	.130	.118	.103	.106	.126	.062
Total Cost	4.487	4.606	4.237	4.128	3.730	3.921
	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Pit Expense	1.145	.868	.998	1.043	.846	1.105
Crushing & Screening	.632	.545	.721	.723	.845	.736
Milling Expense	1.551	1.283	2.119	2.598	1.525	1.624
Tailings Disposal	.033	.039	.105	.019	.002	.013
Stocking Expense	.007	.041	.057	.145	.050	.037
General Mine Expense	.498	.352	.441	.593	.460	.405
Telephones & Safety	.005	.005	.008	.009	.005	.006
Holiday	.063	.000	.065	.000	.048	.045
Vacation	.036	.028	.039	.047	.030	.229
Cost of Production	3.970	3.161	4.553	5.177	3.811	4.200
Shipping Expense	.076	.044	.113	.138	.069	.094
Total Cost	4.046	3.205	4.666	5.315	3.880	4.294

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

10. COST OF PRODUCTION: (Cont'd.)

c. Comparison of Cost with Previous Years:

	<u>Total</u> <u>1956</u>	<u>Total</u> <u>1957</u>	<u>Total</u> <u>1958</u>
Pit Expense	1.173	.997	1.075
Crushing & Screening	.497	.517	.664
Milling Expense	1.445	1.761	1.625
Tailings Disposal	.091	.039	.023
Stocking Expense	.073	.083	.033
General Mine Expense	.500	.439	.457
Telephones & Safety	.009	.010	.008
Holiday	.021	.026	.031
Vacation	.022	.028	.058
Cost of Production	3.831	3.900	3.974
Shipping Expense	.026	.069	.092
Total Cost	3.857	3.969	4.066

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

11. TAXES

<u>Description</u>	<u>1958</u>	
	<u>Valuation</u>	<u>Taxes</u>
<u>HUMBOLDT TOWNSHIP</u>		
Parcel in SW $\frac{1}{4}$ of SW $\frac{1}{4}$, Sec. 9, 46-29 20 A.)		
W $\frac{1}{2}$ of NW $\frac{1}{4}$, Sec. 16, 46-29 80 A.)		
SE $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec. 16, 46-29 40 A.)	5,000	138.00
N $\frac{1}{2}$ of SW $\frac{1}{4}$, Sec. 16, 46-29 80 A.)		
(Republic Tailings Basin)		
Total		<u>138.00</u>
Collection Fee		1.38
TOTAL HUMBOLDT TOWNSHIP	<u>5,000</u>	<u>139.38</u>
Tax Rate		27.60
<u>REPUBLIC TOWNSHIP</u>		
<u>REPUBLIC MINE, including stockpile,</u>		
<u>supplies and equipment as placed by</u>		
<u>State Mine Appraiser:</u>		
Real Estate	1,292,000	33,398.20
Personal Property	459,000	<u>11,865.15</u>
Total		45,263.35
Collection Fee		<u>452.63</u>
Total Republic Mine	<u>1,751,000</u>	<u>45,715.98</u>
Parcel in SE $\frac{1}{4}$ of NE $\frac{1}{4}$, Sec. 7, 46-29	1,000	25.85
Part of NE $\frac{1}{4}$, Sec. 7, 46-29	200	5.17
Part of NE $\frac{1}{4}$, Sec. 7, 46-29	200	5.17
Govt. Lot 6, Sec. 8, 46-29	300	7.76
SE $\frac{1}{4}$ of NE $\frac{1}{4}$, Sec. 18, 46-29 40 A.	200	5.17
Part of SE $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec. 19, 46-29 10 A.	500	12.93
NE $\frac{1}{4}$ of SW $\frac{1}{4}$, Sec. 19, 46-29, except Plat of Republic	200	5.17
SE $\frac{1}{4}$ of SW $\frac{1}{4}$, Sec. 19, 46-29 40 A.	300	7.76
Govt. Lot 3 & part of Govt. Lot 4, Sec. 19, 46-29		
except Plat of Republic and Sewage Parcel	200	5.17
SE $\frac{1}{4}$ of NW $\frac{1}{4}$, Sec. 20, 46-29 40 A.	150	3.88
Republic Iron Co. 2nd Addition to Iron City:		
Lot 86	200	5.17
Lot 87	200	5.17
Lot 88	500	12.93
Lot 89	725	18.75
Lot 90	1,000	25.85
Lot 92	200	5.17
Lot 100	700	18.10
Lot 102	200	5.17
Lot 104 and Part of Lot 105	650	16.81
Lot 106	100	2.58
Lot 107	50	1.30
Parcel in NE $\frac{1}{4}$, Sec. 7, 46-29	200	5.17
<u>PLAT OF REPUBLIC:</u>		
Lots 1 thru 11 - 11 lots at \$500	5,500	142.23
Lots 45, 58, 59, 60, 61, 62 at \$100	600	15.48
86 Lots in First Addition to Plat at \$300	25,800	667.36

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

11. TAXES (Cont'd.)

<u>Description</u>	1958	
	<u>Valuation</u>	<u>Taxes</u>
<u>REPUBLIC TOWNSHIP</u> (Cont'd.)		
PERSONAL PROPERTY		
House on Parcel 475, Park City	-	-
House on Parcel 485, Park City	-	-
House on Parcel 450, Park City	-	-
House on Parcel 460, Park City	800	20.68
House on Parcel 461, Park City	500	12.93
House on Parcel 519, Park City	-	-
House on Parcel 520, Park City	800	20.68
Total		1,085.56
Collection Fee		10.85
Total Miscellaneous Lands	41,975	1,096.41
TOTAL REPUBLIC TOWNSHIP	1,792,975	46,812.39
Tax Rate		25.85

12. ACCIDENTS AND PERSONAL INJURY:

<u>Report No.</u>	<u>Name</u>	<u>Date of Injury</u>	<u>Days Lost</u>	<u>Nature of Injury</u>	<u>Compensation Paid</u>
	David Johnson	4-8-58	1	Bruised legs	Non-Compensable
	Leonard Hanninen	5-12-58	1	Kink in back	" "
	Gunnard Kyllonen	5-26-58	2	Dust in right eye	" "
	John Juntila	6-5-58	1	Bruised toe - right foot	" "
	Carl Swahn	10-6-58	1	Strained back	" "
9	Charles Ilves	2-3-58	9	Lumbo-sacral strain	" "
10	Edwin Nevala	3-24-58	9	Dislocated right shoulder	\$ 47.50
11	Carl Swahn	5-26-58	9	Acute lumbo- sacro strain	\$ 30.00
12	Kenneth Burkman	9-30-58	52	Fracture trans- verse processes	589.00

	<u>Year</u> <u>1957</u>	<u>Year</u> <u>1958</u>
Compensable Injuries	4	3
Non-Compensable 1 - 7 Days	3	5
Compensable Days Lost	110	70
Days Lost Non-Compensable	3	6
Frequency	-	21.42
Severity	-	389

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

13. EXPLORATION:

No exploration work was done in 1958.

14. PROPOSED NEW CONSTRUCTION:

Some charges were made to E&A MI-6 relative to preliminary plant expansion planning. In addition, E&A MI-48 was approved for \$220,000.00 to begin planning and studies which will lead to doubling the capacity of the present plant. This E&A will also cover the purchase of several items of equipment for the expanded plant, plus the construction of the wall on the north side of the mill along column line "E". It seems feasible that expansion of present facilities will get under way within the next year which will probably consist of added pit and crushing facilities, additional mill units and a pelletizing plant.

The proposed house moving program for 1959 consists of the removal of the remaining 14 houses in the Park City-West Republic area, 9 houses south of the railroad tracks on the north end of the pit and the Republic Township Hospital west of the school.

In the pit area, some fence construction will be necessary as soon as the section of highway passing through the pit area is condemned. A stripping road will be constructed from the hangingwall side extending northward to a new dump on the northeast end of the ore body. Miscellaneous work will be done on pole lines and oxygen lines.

Dust collection equipment should be added to the primary and secondary-tertiary crusher buildings before next winter.

No. 1 tailing dam dike will be raised and possibly some work will be necessary on No. 2 and No. 9 dikes.

Some additional grading for a future stockpile area will be done east of the tracks in the vicinity of the loading pocket.

15. EQUIPMENT RECEIVED AND PROPOSED NEW EQUIPMENT:

a. Equipment Received:

- 6 - Conditioners w/drives, etc.
- 1 - Automatic feed rate compensator for jet.
- 1 - Mill gear lubricating system
- 1 - Used single drum hoist (car puller)
- 1 - 6" SRL pump

REPUBLIC MINE
ANNUAL REPORT
YEAR - 1958

15. EQUIPMENT RECEIVED AND PROPOSED NEW EQUIPMENT: (Cont'd.)

b. Proposed New Equipment:

2 - Pickup Trucks	1959
Addition of Tertiary Crusher	1959 & 1960
Auxiliary Rotary Drill	1959
Secondary Crusher Main Shaft Assembly	1959
Track Links for Marion Shovel	1959
Dipper Sticks for Marion Shovel	1959
Siphontrols for Mill	1959
Primary Dust Collection	1959
Secondary Dust Collection	1959
D-8 Tractor	1959
1 - High Intensity Conditioner	1959
24 - 4" Cyclones	1959
1 - 8" x 10" SRL Pump	1959

Any major expansion program would require equipment which is in addition to the above items.



FIG. 1. View looking north, showing secondary-tertiary crusher building on left, shop-office-dry building in foreground and concentrator in background on the right.



FIG. 2. View of pit looking north. One shovel is shown working on the 1600' bench and the other shovel on the 1640' bench.

WESTON BOND

WESTON BOND



FIG. 3. View looking south, showing shovel at left working on 1640' bench. Road ramping down to 1600' bench is shown just below primary crusher building. Road system on right shows access to proposed 1560' and 1520' benches.



TILDEN MINE
ANNUAL REPORT
YEAR 1958

1. INTRODUCTION

The Tilden Mine was idle until mid-September, although small tonnages were shipped from stockpile in the period from April through early September. Repairs to the crushing plant were started on September 4th and completed in time to begin production on September 12th. Operations continued on a one shift per day, 5 days per week basis through October 29, 1958. The total production for this period amounted to 75,105 tons of Tilden Silica.

Since most of the shipping was completed before the mine opened for production, the Tilden Silica stockpile was almost exhausted for the first time in several years. This loading made it possible to realize 27,457 tons of overrun.

The job of preparing the mine equipment for the winter idle period was completed during the first week in November.

2. PRODUCTION, SHIPMENTS & INVENTORIES

<u>a. Ore Statement</u>	<u>Tilden Silica</u>	<u>Tilden Low Phos.</u>	<u>Total</u>
On hand Jan.1,1958	48,920	17,580	66,500
Output for Year	75,105	-	75,105
Stockpile Overrun	27,457	-	27,457
Total	151,482	17,580	169,062
Shipments	81,079	-	81,079
Balance on Hand 12-31-58	70,403	17,580	87,983

<u>b. Shipments (Gross Tons)</u>	<u>Pocket</u>	<u>Stockpile</u>	<u>Total</u>
Tilden Silica	100	80,979	81,079
Tilden Low Phos.	-	-	-
Total	100	80,979	81,079

c. Comparison of Shipments - 10 Year Period 1949-1958

<u>Year</u>	<u>Tons Silica</u>	<u>Tons Low Phos.</u>	<u>Total</u>
1949	69,446	9,373	78,819
1950	91,510	23,926	115,436
1951	78,627	9,959	88,586
1952	64,590	15,859	80,449
1953	83,896	19,497	103,393
1954	77,781	-	77,781
1955	101,437	-	101,437
1956	140,401	25,027	165,428
1957	189,371	3,156	192,527
1958	81,079	-	81,079

TILDEN MINE
ANNUAL REPORT
YEAR 1958

2. PRODUCTION, SHIPMENTS & INVENTORIES (Cont.)

d. Production Data

	<u>Days Operated</u>	<u>Shifts Operated</u>	<u>Avg. Tonnage per 8-hour shift</u>	<u>Total Tons</u>
Total Year	33	32-3/4	2,293	75,105

e. Production by Pits

<u>West Pit Lower Bench</u>	<u>West Pit Upper Bench</u>	<u>East Pit Upper Bench</u>	<u>Summit Pit</u>	<u>Total</u>
59,905	-	15,200	-	75,105

3. ANALYSIS

a. Grading Dept. Analyses - (Dried)

<u>Grade</u>	<u>From</u>	<u>To</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Moist</u>
Stockpile			75,005	39.95	.052	40.44	.007	-
Tilden Silica	Stockpile	Presque Isle	74,040	40.37	.038	40.67	.005	3.10
"	"	Edison Ind. Inc	170	39.10	.030	42.60	.006	3.00
"	"	Inland Steel	114	48.00	.019	30.07	.005	2.10
"	"	Portland Cement	1,333	40.30	.030	40.51	.005	2.80
		Midwest Ins. Co	100	41.61	.035	39.64	.005	2.60

b. Composite Analysis of Shipments

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Al.</u>	<u>Lime</u>	<u>Mg.</u>	<u>Sul.</u>	<u>Ig. Loss</u>	<u>Moist</u>
Tilden Silica Dried	81,079	40.36	.037	40.67	.06	.71	.15	.17	.005	.20	3.09

c. Analysis of Ore Remaining in Stockpile (Estimated)

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>
Tilden Silica (dried)	70,403	39.95	.052	40.44	.007
Tilden Low Phos "	17,580	35.45	.014	47.82	.005

4. LABOR AND WAGES

a. Comments

An average of 15 hourly rate men and one full time salaried foreman made up the regular crew at the Tilden Mine. A Superintendent and Clerk on a part time basis completed the organization.

TILDEN MINE
ANNUAL REPORT
YEAR 1958

4. LABOR AND WAGES (Cont.)

a. Comments (Cont.)

No grievances were filed during the short operating period.

b. Statement of Product

	<u>1958</u>
Production	75,105
Number of Days Operated	33
Number of Shifts Operated	32-3/4
Average Daily Product (tons)	2,276
Average Product per Shift (tons)	2,293
Average Number of Men Employed	16
Product per Man per Day	106.99

5. OPEN PIT OPERATIONS

a. Stripping

There was no development work at the Tilden Mine during 1958.

b. Open Pit Mining

Most of the mining was conducted on the lower bench of the West Pit which accounted for 59,905 tons of the total ore produced. The remaining 15,200 tons were mined from the top bench of the East Pit.

Only one field blast was fired, breaking 31,000 tons along the north-east corner of the West Pit. These drill holes were 6" in size and were made by an Ingersoll-Rand Drillmaster. This unit was rented in order to try out a "Down-the-hole" machine at the Tilden Mine.

The remaining ore produced was loaded from old piles and shattered faces that needed cleaning before large drilling programs could be started again in the future. Although this work involved a slower loading operation than would be expected from utilizing a new ore pile, a daily average of 2,293 tons was maintained throughout the operating period.

Three 34-ton Euclids from the Humboldt Mine were moved to the Tilden Mine as production units and two 24-ton International-Harvester Payhaulers were moved in for use as stocking trucks. Only two Euclids and one Payhauler had to be used during an operating shift.

TILDEN MINE
ANNUAL REPORT
YEAR 1958

5. OPEN PIT OPERATIONS (Cont.)

c. Crushing Plant

Work completed before the opening of the operating season included the installation of a mantle on the east secondary crusher, the turning of the bowl liner on the same crusher, the changing of oil in all the crushers, and the splicing of the conveyor belt.

During the first month of operation, repairs to the conveyor were necessary and most of the wood walkways and railings throughout the plant had to be reinforced or replaced.

During the second month of operation, the bowl on the west secondary crusher was reversed, the eccentric on this crusher was inspected and cleaned, and a new pulley was installed on the head end of the pocket conveyor.

In general, the mechanical difficulties experienced were very limited and the operating time amounted to 97.5% of the scheduled crushing operation.

d. Stocking Data

<u>Location</u>	<u>Material</u>	<u>Loads</u>	<u>Shifts</u>	<u>Loads Per Shift</u>	<u>Type Truck</u>
Plant to Stockpile	Tilden Silica	2,989	32-3/4	91.3	24 ton

Truck factor used - 25 tons per load.

6. ESTIMATE OF ORE RESERVES

a. Summary of Estimate of Ore Reserves

	<u>Proven</u>	<u>Prospective</u>	<u>Total Tons</u>
Ore Reserves as of 1-1-58	3,930,239	2,735,500	6,665,739
Less 1958 Production	102,562	-	102,562
Ore Reserves as of 12-31-58	3,827,677	2,735,500	6,563,177

TILDEN MINE
ANNUAL REPORT
YEAR 1958

6. ESTIMATE OF ORE RESERVES (Cont.)

b. Expected Average Analysis of Ore Reserves

	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Sul.</u>	<u>Moist</u>
Tilden Proven	3,827,677	39.74	0.028	43.51	0.090	0.009	2.50
Tilden Prospective	2,735,500	36.90	0.026	42.90	0.090	0.009	2.50

c. Proven Ore (Developed)

1. West Pit - Above Floor 1430 Feet
(13 cu.ft. equals one ton)

	<u>Tons</u>
Proven - Jan. 1, 1958	806,310
Mined, 1958, incl. overrun adjustment	81,870
Remaining 12-31-58	<u>724,440</u>

2. East Pit - Above Floor 1440 Feet
(14 cu.ft. equals one ton)

Proven - Jan. 1, 1958	2,831,054
Mined 1958, incl. overrun adjustment	20,692
Remaining 12-31-58	<u>2,810,362</u>

3. Summit Pit - Above Floor 1620 Feet
(14 cu.ft. equals one ton)

Proven - Jan. 1, 1958	292,875
Mined 1958	-
Remaining 12-31-58	<u>292,875</u>

4. Total Proven Ore - Dec. 31, 1958

West Pit	724,440
East Pit	2,810,362
Summit Pit	292,875
Total Proven Ore 12-31-58	<u>3,827,677</u>

d. Total Prospective Ore

West Pit	500,000
East & Summit Pits	2,235,500
Total Prospective Ore 12-31-58	<u>2,735,500</u>

TILDEN MINE
ANNUAL REPORT
YEAR 1958

6. ESTIMATE OF ORE RESERVES (Cont.)

e. Guaranteed Grade - 1958

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist</u>
Tilden Silica										
Dried	39.00	0.040	42.30	0.07	0.69	0.25	0.20	0.01	0.35	-
Natural	38.30	0.040	41.54	0.07	0.68	0.25	0.20	0.01	0.34	1.80
Tilden Low Phos.										
Dried	36.00	0.015	46.94	0.07	0.66	0.20	0.20	0.01	0.30	-
Natural	35.50	0.015	46.24	0.07	0.65	0.20	0.20	0.01	0.30	1.40

7. TAXES

	<u>1958</u>		<u>1957</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Tilden Mine-N $\frac{1}{2}$, Sec. 26, 47-27				
Real Estate	\$ 125,000	4,012.50	\$ 105,000	2,740.50
Personal Property, stockpile, supplies, etc.	220,000	7,062.00	180,000	4,698.00
Total		\$ 11,074.50		\$ 7,438.50
Collection Fee		110.75		74.39
TOTAL TILDEN MINE	\$ 345,000	11,185.25	\$ 285,000	7,512.89

8. PERSONAL INJURY

There were no compensable or lost-time accidents at the Tilden Mine during 1958.

9. PROPOSED NEW CONSTRUCTION

None.

10. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

None.

TILDEN MINE
ANNUAL REPORT
YEAR 1958

11. GENERAL SURFACE

a. Buildings and Repairs

All windows and doors to the office, shop and dry building were painted during 1958. Extensive repairs to crushing plant walkways and railings were also completed.

b. Roads and Transmission Lines

A program involving the brushing of all mine transmission lines had to be carried out in 1958 due to the heavy growth of the underbrush.

The shovel outlets for the East Pit area were revised to permit a more efficient shovel operation on the top bench.

c. General

To accommodate the inventory of heavy crusher and shovel parts which have been stored outside for many years at the Tilden Mine, a platform was constructed east of the office and all new and partly used items were tagged, covered, and conveniently stored on this platform.

12. COST OF OPERATIONS

a. Cost of Production - 1958

Production	75,105 tons	
<u>Pit Operating</u>	<u>Amount</u>	<u>Rate</u>
Primary Drilling	\$ 3,674.53	.035
Primary Blasting	2,889.98	.028
Power Shovels	2,257.38	.022
Haulage Trucks	4,374.22	.043
Haulage Truck Rental	5,383.79	.052
Tractors	1,408.61	.014
Pit Roads & Ramps	105.98	.001
Supervision	1,325.54	.014
General Pit Expense	1,299.37	.012
Total Pit Expense	\$ 22,719.40	.221

TILDEN MINE
ANNUAL REPORT
YEAR 1958

12. COST OF OPERATIONS (Cont.)

a. Cost of Production-1958 (Cont.)

<u>Crushing</u>	<u>Amount</u>	<u>Rate</u>
Primary Crusher	\$ 2,081.22	.020
Primary (General)	565.99	.006
Secondary Crusher	2,024.70	.020
Conveyors	440.21	.004
Secondary (General)	321.66	.003
Total Crushing Expense	\$ 5,433.78	.053
Stocking Expense	2,852.75	.028
General Mine Expense	4,311.83	.042
Winter & Idle Expense	20,693.90	.202
Holiday Pay	308.53	.003
Rental of Equipment	1,144.83	.011
Cost of Production	\$ 57,465.02	.560
Taxes	\$ 18,185.25	.177
Depletion & Depreciation	21,027.53	.205
Shipping Expense	7,360.29	.072
Total Cost at Mine	\$104,038.09	1.014

b. Comparison of 1958 and 1957 Costs

	<u>Cost per Ton</u>	
	<u>1958</u>	<u>1957</u>
Pit Expense	\$.221	.402
Crushing & Screening	.053	.118
Stocking Expense	.028	.020
General Mine Expense	.042	.099
Winter & Idle Expense	.202	.276
Holiday Pay & Miscellaneous	.014	.010
Cost of Production	.560	.925
Taxes	.177	.041
Depletion	.088	.005
Depreciation	.064	.097
Amortization of Stripping	.053	.053
Shipping Expense	.072	.079
Total Cost at Mine	\$ 1.014	1.200

TILDEN MINE
ANNUAL REPORT
YEAR 1958

12. COST OF OPERATIONS (Cont.)

a. Analysis of Costs

The cost of production at the Tilden Mine for 1958 was \$0.56 with the total cost amounting to \$1.014.

Influencing factors, such as overrun and small drilling and blasting costs, on the positive side, and rental trucks, high depletion charges and high taxes on the negative side, makes a detailed cost comparison with past years very difficult to follow. Also, the need for the extensive repairing of tractors that had been given heavy use in past years at the Tilden added greatly to the 1958 idle costs. However, the final accounting indicated that total controllable mine costs remained comparatively low for the year, being \$0.372 per ton under the 1957 controllable cost.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

1. GENERAL

Production from the Bunker Hill Group in 1958 totaled 323,287 tons. This is a decrease of 67.5% from the 996,329 tons produced in 1957. The decrease was the result of a reduction in the working force and in the number of operating days. The production for the year came from the 2nd, 10th, and 12th levels.

The total shipments for the year were 406,423 tons, which is a decrease of 398,486 tons from the 804,909 tons shipped in 1957.

The mine operated on a 4-day, 2-shift schedule through February. From March 1st through September the schedule consisted of working 4-days, 2-shifts, for three weeks and idle the fourth week, and on October 1st the schedule reverted back to a straight 4-day, 2-shift schedule. The hoisting schedule was on a 2-shift basis for January and a 1-shift basis for the balance of the year.

The average natural iron analysis of the ore as hoisted during the year was 52.16%. Past experience has indicated that when Bunker Hill Group ore is placed on stockpile there is a reduction in the moisture content of from 1% to 1½%. Since practically all the ore produced at this mine is placed on stock, it is safe to assume that there will be at least a 1% reduction in the moisture content of the ore when it is shipped. This means that the Bunker Hill Group product for the year will ship out at 52.76% natural iron rather than the 52.16% natural iron as hoisted. The average natural iron content of the ore as hoisted in 1957 was 50.41%.

The average natural iron analysis of the ore shipped in 1958 was 51.65%. This tonnage was a mixture of ores produced in 1958 and years prior to 1958.

The proven ore reserves, as submitted to the State Tax Commission, showed a marked reduction of the tax figures submitted in 1957. The decrease of 1,477,850 tons is the result of a 25% rock and mining loss rather than the 10% previously used in the Bunker Hill-Athens; and a decrease in the estimated recovery of retaining pillars in the Maas-Pioneer & Arctic from 50% used in 1957 to 33% used in 1958.

Labor relations between management and employees throughout the year were excellent. There were no formal grievances submitted during 1958.

The wage increases during the year totaled 7.0%. This increase includes the cost of living adjustments.

The surface operations were routine for the year except for the construction of a new timber yard to the west of the shops building.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

1. GENERAL (Cont'd.)

The underground operations were drastically reduced in 1958 as compared to the 1957 operation. In spite of this cutback in production, the efficiency of the operation was maintained. The tons per man per day was 8.00 compared to 8.12 in 1957. The only major change in the underground operations, outside of refinements and improvements in the existing mining methods, was the installation of 130 cubic foot capacity roll-over tram cars replacing the Maas Mine 65 cubic foot rocker dump cars. These cars were placed in service at mid-year. The tramming cost per ton at the Maas Mine for the last half of the year was 35% lower than it was for the first half of the year. This reduction in cost was primarily due to the use of the new roll-over cars. The continued use of yieldable arch steel supports and drag chain conveyors proved highly satisfactory in 1958. Approximately 90% of the years production came from block caving and long hole stoping.

Exploration at the Bunker Hill Group was limited to a small amount of development drilling in the Bunker Hill and Pioneer & Arctic properties.

Pumping of Bunker Hill Group water continued on an automatic basis with very satisfactory results.

There were 13 active E & A's during 1958, and a total of \$159,683.67 was expended as compared with \$1,669,169.24 in 1957.

The total valuation for the Athens showed a decrease from 1957 of \$223,000.00, the Bunker Hill a decrease of \$335,000.00, and the Maas \$481,360.00.

There was a sharp decrease in the number of days lost due to personnel injury. The frequency and severity ratings were 22.01 and 1,129 in 1958, compared to 54.22 and 7,060 in 1957.

The cost of electric power per kilowatt hour increased from .00642 in 1957 to .00827 in 1958.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

2. PRODUCTION:

a. Production by Grades and Months:

<u>Month</u>	<u>Athens</u>	<u>Bunker Hill</u>	<u>Maas</u>	<u>Pioneer-Arctic</u>	<u>Mulvey</u>	<u>Race Course</u>	<u>Total</u>	<u>Rock</u>
January	12,588	25,680	9,165	3,861	8,827	2,327	62,448	2,468
February	6,360	7,524	4,790	2,063	4,462	675	25,874	1,050
March	3,648	6,300	4,500	588	3,096	2,460	20,592	912
April	3,612	5,328	3,336	4,176	3,756	1,776	21,984	1,176
May	2,460	7,812	1,788	4,536	3,216	1,752	21,564	900
June	4,980	5,892	1,860	4,548	2,508	1,920	21,708	1,344
July	3,156	3,852	1,008	3,900	2,160		14,076	828
August	1,572	6,565	4,014	5,028	5,107		22,286	1,284
September	751	7,287	5,515	6,838	3,645		24,036	2,736
October	2,998	11,101	9,892	3,649	4,737		32,377	3,436
November	2,096	7,831	1,704	5,238	3,415		20,284	3,914
December	1,654	14,946	4,280	7,940	5,265		34,085	4,490
Total	45,875	110,118	51,852	52,365	50,194	10,910	321,314	24,538

<u>Stockpile</u>								
Overrun	-----	-----	-----	-----	-----	1,973	1,973	-----
Total 1958	45,875	110,118	51,852	52,365	50,194	12,883	323,287	24,538
Total 1957	178,059	324,545	328,754	53,450	82,962	27,559	996,329	108,352
Decrease	132,184	215,427	276,902	1,085	32,768	14,676	673,042	83,814

b. Shipments:

<u>Grade of Ore:</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total 1958</u>	<u>Total 1957</u>
Athens	139	72,130	72,269	161,594
Mitchell Lease	-----	-----	-----	13,101
Bunker Hill	3,700	117,930	121,630	266,331
Maas	3,416	105,796	109,212	272,045
Pioneer-Arctic	4,186	23,861	28,047	32,775
Mulvey	2,164	54,804	56,968	36,890
Race Course	-----	18,297	18,297	22,173
Total	13,605	392,818	406,423	804,909
Total Last Year	43,318	761,591	804,909	-----
Decrease in Shipments	29,713	368,773	398,486	-----

c. Ore Statement:

	<u>Athens</u>	<u>Bunker Hill</u>	<u>Maas</u>	<u>Pioneer-Arctic</u>	<u>Mulvey</u>	<u>Race Course</u>	<u>Total</u>	<u>Rock</u>
On Hand 1-1-58	78,662	135,220	102,213	20,675	46,072	5,414	388,256	196,836
Product 1958	45,875	110,118	51,852	52,365	50,194	10,910	321,314	991,439
Stockpile Overrun	---	-----	-----	-----	-----	1,973	1,973	4,890
Total	124,537	245,338	154,065	73,040	96,266	18,297	711,543	1,193,165
Shipments	72,271	121,630	109,212	28,047	56,968	18,297	406,425	804,909
Balance on Hand	52,266	123,708	44,853	44,993	39,298	-----	305,118	388,256
Increased Output								162,692
Decreased Output	132,184	215,427	276,902	1,085	32,768	14,676	673,042	
Increased ore on hand				24,318				
Decreased Ore on Hand	26,396	11,512	57,360		6,774	5,414	83,138	

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

2. PRODUCTION: (Cont'd.)

c. Ore Statement: (Cont'd.)

Operating Schedule:

<u>Year</u>	<u>Days per Week Mine Operated</u>
1958	4 days per week through February -- March 1st through September mine operated four days per week, three weeks on then off one week -- 4 days October through December.
1957	5 days through November 1st -- 4 days balance of year.
1956	5 days entire year.
1955	4 days through April 17th -- 5 days balance of year.
1954	5 days through April 4th -- 4 days balance of year.

d. Division of Product by Levels:

	<u>1958</u>		<u>1957</u>	
	<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>
2nd Level Maas	167,294	51.8	492,725	49.5
10th Level Bunker Hill	65,091	20.1	226,269	22.7
12th Level Bunker Hill	90,902	28.1	277,335	27.8
Total	323,387	100.0	996,329	100.0

c. Production Delays:

The Mine was idle from November 7th until day shift November 19th due to burned out skip hoist motor.

3. ANALYSIS:

a. Average Mine analysis on Output:

<u>Grade:</u>	<u>1958</u>					<u>1957</u>				
	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>
Athens-Bunker Hill	155,993	59.34		6.70		503,604	57.86	.112	9.19	.014
Maas	154,411	60.88		6.24	.208	465,166	57.74	.087	8.64	.312
Race Course	12,883	60.96		6.08	.211	27,559	57.48	.083	8.63	.323

b. Average Analysis of Shipments:

<u>Grade:</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Athens-Bunker Hill:											
Dried	193,901	58.27	.113	8.51	.70	3.35	.55	1.20	.012	1.72	
Natural		51.10	.099	7.46	.61	2.94	.48	1.05	.011	1.51	12.30
Maas:											
Dried	194,227	59.44	.093	7.69	.25	3.04	1.00	.32	.228	2.29	
Natural		52.18	.082	6.75	.22	2.67	.88	.28	.200	2.01	12.22
Race Course:											
Dried	18,297	59.07	.087	7.95	.24	3.27	1.04	.35	.232	2.25	
Natural		51.93	.076	6.99	.21	2.87	.91	.31	.204	1.98	12.08

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

3. ANALYSIS: (Cont'd.)

c. Average Analysis of Ore in Stock:

<u>Grade:</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
<u>Athens-Bunker Hill:</u>											
Dried	175,974	58.72	.113	7.70	.70	3.35	.55	1.20	.012	1.72	
Natural		51.82	.100	6.80	.62	2.96	.49	1.06	.011	1.52	11.75
<u>Maas:</u>											
Dried	129,144	59.66	.093	7.33	.25	3.05	1.00	.32	.235	2.29	
Natural		52.50	.082	6.45	.22	2.68	.88	.28	.207	2.02	12.00

d. Straight Cargo Shipments:

<u>Grade:</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Sul.</u>	<u>Moist.</u>
Maas:	3,243	58.53	.104	8.53	.28	.253	12.03

4. ESTIMATE AND ANALYSIS OF ORE RESERVES:

Developed Ore:

Athens:

The total ore reserve based on the figures submitted to the Michigan State Tax Commission is considered to be developed ore.

Bunker Hill:

All of the ore reserves above 10th and 12th levels, with exception of any ore north of the 3000-S coordinate, are considered developed. All remaining ore is considered undeveloped.

Maas-Mulvey:

The total ore reserve based on the figures submitted to the Michigan State Tax Commission is considered to be developed ore.

Pioneer & Arctic:

All of the reserves above 2nd level are considered to be developed.

BUNKER HILL GROUP
ANNUAL REOPRT
YEAR 1958

4. ESTIMATE AND ANALYSIS OF ORE RESERVES: (Cont'd.)

The ore reserves in the following table are based on figures submitted to the Michigan State Tax Commission.

	<u>Athens</u>	<u>Bunker Hill</u>	<u>Maas-Mulvey</u>	<u>Race Course</u>	<u>Pioneer & Arctic</u>	<u>Total</u>
Ore Reserves - Dec. 31, 1957	333,141	5,265,269	1,992,687		1,406,413	8,997,510
Ore Production - 1958	45,875	110,118	102,046	12,883	52,365	323,287
Ore Reserves - Dec. 31, 1958	244,258	4,179,110	1,505,412		1,267,593	7,196,373
Tonnage Proven in 1958	43,008	976,041	385,229	12,883	86,455	1,477,850
Above 2nd Level (Formerly Maas 7th)			2,660,015		2,115,296	4,775,311
6th Level to 8th Level		367,549				367,549
8th Level to 10th Level		1,738,242				1,738,242
10th Level to 12th Level	118,152	1,808,949				1,927,101
12th Level to 14th Level	219,620	1,721,047				1,940,667
Total Gross July 31, 1958	337,772	5,635,787	2,660,015		2,115,296	10,748,870
*Expected Recovery						
Net Total July 31, 1958	253,329	4,226,840	1,552,986		1,296,286	7,307,155
Less Production July 31 to December 31, 1958	9,071	47,730	47,574		28,693	110,782
Net Total Dec. 31, 1958	244,258	4,179,110	1,505,412		1,267,593	7,196,373

*Ore which is expected to be recovered. Athens-Bunker Hill 75%. Maas, Mulvey, and Pioneer-Arctic -- Recovery Estimate.

Expected Average Natural Analysis of Ore Reserves:

Athens-Bunker Hill:

<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
51.50	.100	6.65	.58	2.75	.45	1.00	.011	1.70	14.00

Maas-Mulvey-Pioneer & Arctic:

<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
51.50	.075	6.75	.21	3.40	.95	.30	.31	2.50	13.00

The remaining Athens reserves are confined to the North Orebody between 10th and 14th Levels. The decrease in reserves is entirely due to a 25% rock and mining deduction rather than the previously used 10%. This increase in mining loss results from an increase in the natural iron analysis to 51.50%, which was required during 1958. The 75% recovery of gross ore was arrived at by determining the amount of ore which is expected to be recovered by maintaining this average analysis.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

4. ESTIMATE AND ANALYSIS OF ORE RESERVES: (Cont'd.)

The decrease in the Bunker Hill reserves is also entirely due to the 25% rock and mining deduction described above. These reserves occur in the North and South Orebodies, the upper 10th Level Orebody and the Boundary Orebody.

The reduction in the ore reserves for the Maas, Mulvey, and Pioneer-Arctic Properties is largely due to a 33% pillar recovery factor rather than the 50% used in 1957.

A significant tonnage of ore which occurs in the Pioneer & Arctic portion of the Boundary Orebody is not included in the State Tax Commission Estimate. This is because there is no mining agreement outside the Phase I portion of this property.

Since the State Tax Commission Estimate was prepared three diamond drill holes, which were drilled for development purposes, have indicated a significant reduction in the Pioneer & Arctic reserves west of the 2400-W coordinate.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

5. LABOR & WAGES:

Labor Relations:

The labor relations between management and employees were excellent during the year. There were no formal grievances submitted in spite of the drastic cutbacks in personnel and the large number of transfers between mines that transpired during the year.

Employment:

The average number of statistical employees in 1958 was 249 $\frac{1}{2}$ as compared with 522 $\frac{1}{2}$ in 1957.

There were 245 separations during 1958 -- 3 quit, 8 retired, 2 died, 2 terminations, 224 transferred, and 6 laid off.

Number of Men Beginning of Year	426
Added During Year	29
Separations	<u>245</u>
Total End of Year	210

The following tables give data pertinent to paid vacations and holidays.

	<u>Vacations - 1958</u>		<u>Amount</u>	<u>Rate Per Hour</u>
	<u>Number of Men</u>	<u>Number of Hours</u>		
1 Week	4	160	\$ 549.64	\$3.435
1 $\frac{1}{2}$ Weeks	1	60	175.88	2.931
2 Weeks	19	1,520	3,848.29	2.532
2 $\frac{1}{2}$ Weeks	15	1,500	4,587.47	3.058
3 Weeks	91	10,920	32,973.74	3.020
3 $\frac{1}{2}$ Weeks	97	13,580	38,711.94	2.851
*Adjustment 1957			<u>1,151.01</u>	
Total	<u>227</u>	<u>27,740</u>	<u>\$81,997.97</u>	<u>2.956</u>

*Adjusted 1957 vacations by .04 per hour to reflect wage increase of July 1, 1957.

	<u>Paid Holidays - 1958</u>		<u>Amount</u>	<u>Rate Per Hour</u>
	<u>Number of Men</u>	<u>Number of Hours</u>		
New Years Day	370	2,964	\$ 8,320.32	\$2.807
Good Friday	186	1,488	4,178.28	2.808
Memorial Day	187	1,496	4,200.37	2.808
4th of July	185	1,484	4,271.89	2.879
Labor Day	192	1,536	4,570.89	2.976
Thanksgiving	179	1,432	4,393.15	3.068
Christmas Day	<u>182</u>	<u>1,456</u>	<u>4,437.25</u>	<u>3.048</u>
Total	212	11,856	<u>\$34,372.15</u>	<u>2.899</u>

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

5. LABOR AND WAGES: (Cont'd.)

Statement of Wages:

	<u>1958</u>	<u>1957</u>	<u>Increase</u>	<u>Decrease</u>
<u>Average Wages Per Day</u>				
Surface	\$ 25.53	\$ 22.90	\$ 2.63	
Underground	30.52	24.38	6.14	
Total	\$ 29.26	\$ 24.06	\$ 5.20	

Average Wages Per Month

Surface	\$344.66	\$437.84		\$ 93.18
Underground	412.02	466.15		54.13
Total	\$395.01	\$460.03		\$ 65.02

Average Days Worked Per Month

1958 -	13.50
1957 -	19.12

Tons Per Man Per Day

Surface	31.60	38.98		7.38
Underground	10.71	10.26	.45	
Total	8.00	8.12		.12

Labor Cost Per Ton

Surface	.808	.588	.220	
Underground	2.850	2.375	.475	
Total	3.658	2.963	.695	

6. SURFACE

Athens Shaft

The Athens Shaft was inspected periodically during the year and continues to show slight movement in the upper portion of the shaft. This shaft is presently being used as a second outlet and for exhaust ventilation for the Athens and Bunker Hill sections of the mine.

Maas Shaft

The Maas Shaft is presently being maintained as a second outlet and an exhaust ventilation shaft for the Maas section of the mine.

Purchase and Disposal of Dwellings:

Maas House 225, Lot 9, Block 32, Pioneer Flat,
Purchased from Annie Auvinen, August 22, 1958. \$11,000.00

Maas House 226, Lot 1-2-3-4, Block 2, Kirkwood
and Kellan Addition, Purchased from Kellan Est.,
December 4, 1958. \$35,000.00

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

6. SURFACE: (Cont'd.)

Purchase and Disposal of Dwellings (Cont'd.)

Houses Sold

Maas House 128, Lot 41, C.C.I. Co. 4th Addition
 Maas House 12, Lot 10, Block 6, Corbits 2nd Addition
 Maas House 5, Lot 7, Block 4, Corbits 2nd Addition
 Maas House 13, Lot 12, Block 4, Corbits 2nd Addition
 Maas House 117, Lot 1, Block 5, Corbits 2nd Addition
 Maas House 114, Lot 3, Block 5, Corbits 2nd Addition
 Maas House 115, Lot 4, Block 5, Corbits 2nd Addition
 Maas House 116, Lot 6, Block 5, Corbits 2nd Addition
 Maas House 120, Lot 12, Block 6, Corbits 2nd Addition
 Maas House 118, Lot 15, Block 6, Corbits 2nd Addition
 Maas House 119, Lot 16, Block 6, Corbits 2nd Addition

Construction

In order to establish a more efficient means of handling materials on surface, it was necessary to increase the size of the timber yard. For this reason the area to the west of the shops building was leveled off and the timber tunnel track extended through this area.

Equipment

On November 7th the skip hoist motor generator set drive motor burned out because of faulty construction by the manufacturer. The motor was sent to Westinghouse in Milwaukee to be repaired and was operating again on November 19th. The breakdown resulted in a loss of four days production.

The six sections of the cage hoist drum were rebolted. The existing bolt holes were reamed out and body fit bolts installed.

A new 30" belt was installed on the upper headframe conveyor and a rebuilt 30" belt was installed on the lower headframe conveyor.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

7. UNDERGROUND

Underground mining operations during 1958 were conducted on the 2nd, 10th, 12th, and 14th levels. The operations on the 14th level were confined to the cutting of two top timber cutouts in January, after which operations on this level were suspended for the balance of the year. The size of the operation was greatly reduced as the production in 1958 was 67.5% less than in 1957. In spite of this reduction, the tons per man per day was 8.00 compared to 8.12 in 1957. In order to maintain an efficient operation, while producing a small tonnage from mining areas which are widely spread out, changes and refinements in the existing operation were necessary. On the 2nd level, new 130 cubic foot roll-over tram cars were installed in place of the 65 cubic foot rocker dump cars. These new cars made it possible to reduce the number of tramping crews and also made it possible to tram at higher speeds than could previously be attained while using rocker dump cars. The increased use of yieldable arch steel supports in heavy ground greatly reduced the amount of repair time previously required when rigid types of support were used. Bulk mining methods accounted for 92% of the 1958 production, with block caving being the predominant mining method employed.

Mining operations in the Athens Lease were confined to block caving in the eastern portion of the 12th level North Orebody. There were four block areas producing during the year. These blocks were located in the extreme east end and along the north footwall of the North Orebody.

The mining in the Bunker Hill was split between the 10th and 12th levels, with 59.1% of the production being produced on the 10th level. All the Bunker Hill production was mined by block caving. Since a higher grade product had to be produced it was necessary to mine the upper 10th level orebody with a much greater degree of selectivity. This area contains somewhat massive jasper lenses within the ore, and since the ore itself is not excessively high in iron content to begin with, it was necessary to stop production in the blocks in this area as soon as there was the slightest amount of jasper dilution. Consequently the recovery factor was reduced from that previously experienced in the area. During the latter part of the year all the production on the 10th level was trammed strictly by drag chain and belt conveyors, which entirely eliminated the use of tram cars. The bulk of the 12th level production came from a grizzly block located in the south orebody west of the 2400 X-Cut.

All the production from the Maas, Pioneer-Arctic, Mulvey and Race Course was from the 2nd level. Mining operations in the Race Course lease were terminated in June as the last of the ore reserves remaining in this lease were mined to completion. Long-hole stoping accounted for 73.5% of the Maas Mine production, as the long-hole stoping method of mining has proven to be far superior to block caving in the harder type of Maas Ore. Since the hanging wall jasper is highly friable and readily infiltrates the more massive chunks of ore, it is desirable to keep the hanging wall jasper intact as long as possible. By long-hole

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

7. UNDERGROUND: (Cont'd.)

drilling and blasting the ore while maintaining an ore pillar adjacent to the hanging, a much larger percent of the ore can be recovered before any dilution from the jasper occurs. The use of drag chain conveyors as the prime mover of ore in the long-hole stope transfer drifts proved to be very efficient when compared to the use of scrapers. At mid-year new 130 cubic foot roll-over cars were installed on the 2nd level replacing the 65 cubic foot rocker dump cars, which speeded up the main level haulage considerably. The cost per ton tramping for the second half of the year was 35% lower than the cost for the first half of the year. The bulk of this saving is attributable to the use of the new cars.

The following is a resume of main level drifting done in 1958:

<u>Level</u>	<u>Ore Drift</u>	<u>Rock Drift</u>	<u>Total</u>
2nd Level	--	---	---
10th Level	--	6	6
12th Level	59	168	227
14th Level	--	---	---
Total	<u>59</u>	<u>174</u>	<u>233</u>

Exploration:

Athens:

Geological mapping incidental with development was the extent of exploration in the Athens Property during the year. No significant changes in the expected structural outline were indicated as a result of this mapping.

Bunker Hill:

There was no diamond drill program conducted at the Bunker Hill Mine during the year. Three short holes, totaling 230 feet, were drilled for development purposes, and one water drain hole was drilled from 10th to 12th levels. Geological mapping revealed only minor changes in the expected structural outline.

Maas-Mulvey:

Geological mapping of the mining development was the extent of exploration in the Maas and Mulvey properties during the year.

Pioneer & Arctic:

Three diamond drill holes, for development purposes, were drilled in the Pioneer & Arctic Property during the latter part of 1958. This drilling and geological mapping incidental with development indicates a large irregular shaped mass of iron formation which occurs within the previously outlined ore section west of the 2400-W coordinate.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

7. UNDERGROUND: (Cont'd.)

Exploration: (Cont'd.)

The following table gives the amount of ore cut and the total footage drilled during 1958:

	<u>1958 Holes</u>	<u>First Class Ore</u>	<u>Footage Drilled</u>
Bunker Hill:	90	25'	75'
" "	91	60'	95'
" "	92	0	60'
" "	93	Water Drain	198'*
Maas:	114	15'	70'
" "	115	70'	75'
" "	116	45'	110'
		<u>215'</u>	485' Footage for Ore Exploration
			<u>198'</u> Hole #93
			<u>683</u> Total Footage Drilled

*Not included in footage drilled for ore exploration.

The following is a summary by properties and levels of the 1958 drilling:

Bunker Hill:

10th Level:

U.H. Numbers 90,91, and 92 were drilled along the 2325-W coordinate to outline a small section of ore occurring near the north end of the 10th level conveyor drift for development purposes.

Pioneer & Arctic:

2nd Level:

During the development of the 710 and 712E block areas, iron formation was intersected. U. H. Numbers 114, 115, and 116 were drilled to outline this material. From this drilling it was learned that a large irregular shaped mass of iron formation occurs in the previously outlined ore section west of 2400-W and south of 1000-S.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

7. UNDERGROUND: (Cont'd.)

Statement of Timber Used:

	<u>Amount - 1958</u>	<u>Amount - 1957</u>
Cribbing	\$ 2,021.37	\$ 3,388.81
Stulls	6,746.83	31,879.43
Lagging	7,774.94	19,256.59
Poles	8,242.49	7,039.67
Steel Beams	47,144.20	95,592.12
Steel Sets	42,827.15	82,648.32
Total	<u>\$114,756.98</u>	<u>\$239,804.94</u>

Total Cost of Timber, Lagging, Poles, etc.:

<u>Year</u>	<u>Amount</u>	<u>Per Ton</u>
1958	\$114,756.98	.3550
1957	239,804.94	.2407
1956	184,283.60	.2212
1955	196,013.82	.2340
1954	184,238.54	.2190
1953	238,470.33	.1975
1952	181,991.85	.1828
1951	159,351.37	.1186
1950	142,517.38	.1144
1949	150,879.95	.1308

Explosives:

Statement of Explosives Used During 1958:

	<u>1958</u>		<u>1957</u>	
	<u>Quantity</u>	<u>Amount</u>	<u>Quantity</u>	<u>Amount</u>
Total Powder Used	139,900#	\$28,221.12	412,589#	\$84,651.58
Total Caps, Fuse, etc.		<u>13,336.75</u>		<u>44,598.02</u>
Total		<u>\$41,557.87</u>		<u>\$129,249.60</u>
<u>Product:</u>	323,287		996,329	
Pounds Powder per ton of ore		.4327		.4141
Tons of ore per pound of powder		2.311		2.415
Cost per ton for powder		.0873		.0850
Cost per ton for fuse, Caps, etc.:		.0413		.0448
Cost per ton for all explosives		<u>.1286</u>		<u>.1298</u>

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

7. UNDERGROUND (Cont'd.)

Pumping:

The following table shows the average number of gallons pumped per minute for the last five years.

<u>Month</u>	<u>1958</u>	<u>1957</u>	<u>1956</u>	<u>1955</u>	<u>1954</u>
January	2028	2125	911	1124	1115
February	1999	2130	811	1057	1083
March	2035	2113	923	1023	1060
April	2045	2166	901	1002	1150
May	2142	2229	937	1014	1150
June	2073	2252	914	1053	1234
July	2051	2067	981	1053	1191
August	1956	2118	1020	1011	1238
September	1978	2326	944	999	1091
October	2095	2007	1030	961	1164
November	2145	2046	1020	963	1142
December	2169	2068	1017	880	1129
Average	2060	2137	956	1012	1146

The following statement shows the average number of gallons pumped for the past ten years:

<u>Year</u>	<u>Gallons Per Minute</u>
1958	2060
1957*	2137
1956	956
1955	1012
1954	1146
1953	1495
1952	1493
1951	1539
1950	1593
1949	1214

*Beginning with 1957, the figures include Maas water as well as Bunker Hill since both are pumped through the Bunker Hill Shaft.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING:

There were 13 active E & As at the Bunker Hill Group during 1958:

	<u>Prior Year's</u> <u>Expenditures</u>	<u>1958</u> <u>Expenditure</u>	<u>Total</u>
E&A CC-870 Underground Development	\$ 263,112.50	\$ 2,565.26	\$ 265,677.76
CC-869 Underground Development	522,552.84	16,800.68	539,353.52
CC-871 Drill Machine	19,260.00	665.00	19,925.00
CC-925 Underground Cars		52,315.00	52,315.00
CC-873 Scraper Hoists	12,838.00	2,838.06	15,676.06
CC-910 Chain Conveyors	112,870.04	7,550.00	120,420.04
CC-876 Communication System	3,745.99	1,200.00	4,945.99
CC-717 Install Shaft Sets	19,348.00	10,528.05	29,876.05
753-662 Maas Consolidation	1,887,115.49	5,500.00	1,892,615.49
753-980 Underground Development (Maas)		14,746.57	14,746.57
753-980 P & A Development		8,100.19	8,100.19
753-979 Undg. Development (B-Hill)		31,871.22	31,871.22
753-945 Automatic Sampler		5,003.64	5,003.64

Comparative Mining Costs:

	<u>1958</u>	<u>1957</u>	<u>Increase</u>	<u>Decrease</u>
Product	323,287	996,329		673,042
Underground Cost	4.032	3.460	.572	
Surface Cost	.676	.536	.140	
General Mine Expense	1.061	.768	.293	
Power Adjustment	.006			.006
Cost of Production	5.763	4.764	.999	
Depreciation	.511	.348	.163	
Taxes	.762	.162	.600	
Loading & Shipping	.151	.093	.058	
Administration, Cleveland Office, etc.	.132	.068	.064	
Total Cost at Mine	7.319	5.435	1.884	
Budget: Estimated Cost at Mine	6.418	5.255	1.163	
Number of Shifts & Hours	2-1/8 Hr. 161-2/8 "	1-1/8 Hr. 228-2/8 "	1-1/8 Hr.	67-2/8 Hr.
Number of Days Operated	163	229		66
Average Daily Product	1996	4350		2354

Proportion of Labor & Supplies:

<u>Cost of Production</u>	<u>1958</u>	<u>Percent</u>	<u>1957</u>	<u>Percent</u>	<u>Increase</u>	<u>Decrease</u>
Labor	3.737	64.78	3.215	67.49	.522	
Supplies	2.032	35.22	1.549	32.51	.483	
Total	5.769	100.00	4.764	100.00	1.005	

8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING (Cont'd.)

	Cost of Production		1957	
	Amount	Per Ton	Amount	Per Ton
Underground Costs:				
Development	\$ 219,639.72	\$.679	\$ 546,062.92	.548
Mining	370,254.64	1.145	1,195,494.00	1.200
Tramming	220,805.63	.683	669,648.37	.672
Auxiliary Hoisting			8,774.80	.009
Ventilation	28,876.65	.089	51,018.01	.051
Pumping	77,662.40	.240	91,024.79	.092
Compressors and Air Lines	37,802.89	.117	88,614.35	.089
Crushing and Screening - UG	16,221.49	.050	43,537.67	.044
Underground Superintendence	84,616.66	.262	220,331.78	.221
Maint: Pockets and Chutes	4,327.25	.013	11,401.24	.011
" Mining Equipment	46,725.85	.145	139,679.29	.140
" Levels and X-Cuts	65,273.49	.202	104,257.18	.105
" Shaft	9,993.49	.031	32,335.09	.032
Telephones & Safety Devices	20,597.59	.064	45,008.78	.045
Holiday Pay	28,756.67	.089	60,393.97	.061
Vacation Pay	72,023.37	.223	139,632.46	.140
Wage Adjustment			217.89	
Total Underground Cost	\$1,303,577.79	\$4.032	\$3,446,996.81	\$3.460
Surface Costs:				
Hoisting	\$ 61,923.45	\$.192	\$ 142,695.64	\$.143
Crushing and Screening - Surf	6,098.29	.019	11,973.74	.012
Stocking	47,532.42	.147	146,020.69	.147
Timber Yard	25,599.63	.079	58,266.73	.058
Dry House	27,558.09	.085	27,235.71	.027
Policing	13,571.28	.042	21,954.41	.022
General Surface	13,657.86	.042	41,033.06	.041
Maint: Headframe Bldg. & Equip.	773.36	.002	10,914.21	.011
" Other Mine Buildings	3,734.10	.012	23,680.62	.024
Telephones & Safety Devices	611.80	.002	2,725.14	.003
Holiday Pay	6,945.78	.021	10,521.09	.011
Vacation Pay	10,540.00	.033	37,224.00	.037
Total Surface Cost	\$ 218,546.06	\$.676	\$ 534,245.04	\$.536
General Mine Expenses:				
Electrical Engineering	\$ 2,820.10	\$.009	\$ 9,910.01	\$.010
Geological Department	14,939.50	.046	14,629.57	.015
Mining Engineering Department	30,117.54	.093	53,124.81	.053
Mechanical Engineering Department	4,801.46	.015	9,302.34	.009
Safety Department	4,983.38	.015	10,213.76	.010
Research Laboratory	10,478.39	.032	5,745.14	.006
Analysis & Grading - Laboratory	15,448.46	.048	51,305.14	.051
" " - Shipping	4,305.93	.013	5,014.43	.005
Research Department	4,779.43	.015	16,786.03	.017
Design Department			251.00	
Special Expense - Pensions			136.99	
" " - Retirements	4,038.48	.012	6,102.23	.006
" " - Hygiene Clinic	3,514.23	.011	8,050.01	.008
" " - Employment Office	28.00		1,970.51	.002
Ishpeming Office	60,273.51	.187	127,978.50	.129
Mine Office - Supt. & Clerks	47,996.98	.148	81,067.87	.082
Central Warehouse Overhead	9,317.86	.029	30,034.69	.030
Insurance - Property	5,274.64	.016	5,130.38	.005
" - Group, Health & Life	28,304.18	.088	68,233.24	.069
" - Group Annuity	6,733.39	.021	19,678.67	.020
" - Catastrophe	6,146.50	.019	7,172.79	.007
Personal Injury - Comp. & Doctors	18,728.86	.058	60,240.27	.060
MSESC RENTAL -	75.00			
General Storehouse Obsolete Supplies			3,931.54	.004
Mine Obsolete Supplies			10,192.83	.010
Sale of Scrap	300.00	.001		
Taxes - Unemployment Insurance	12,146.64	.038	38,537.47	.039
" - Old Age Benefit	23,064.43	.071	58,288.42	.059
Employees Insurance & Comp.	3,755.78	.012	9,947.50	.010
Supplemental Unemployment Benefits	18,057.65	.056	50,626.86	.051
Supply Inventory Adj.	485.91	.002	1,328.77	.001
Michigan Sales & Use Tax	2,738.77	.008		
Total General Mine Expenses	\$ 342,849.00	\$1.061	\$ 764,931.77	\$.768
Power Adjustment	1,882.46	.006		
COST OF PRODUCTION	\$1,863,090.43	\$5.763	\$4,746,173.62	\$4.764

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

9. TAXES:

DESCRIPTION	1958		1957	
	Valuation	Taxes	Valuation	Taxes
<u>ATHENS MINE</u>				
Including Stockpile as placed by State				
Tax Commission - Real Estate			\$295,000	\$12,390.00
Personal Property	\$655,000	\$29,704.25	585,000	24,570.00
Collection Fee		297.04		369.60
TOTAL ATHENS MINE	\$655,000	\$30,001.29	\$880,000	\$37,329.60
Total Rented Buildings	3,540	162.15	1,540	65.33
TOTAL ATHENS IRON MINING COMPANY	\$658,540	\$30,163.44	\$881,540	\$37,394.93
<u>BUNKER HILL MINE</u>				
Realty as described and assessed by				
Michigan State Tax Commission	\$1,065,000	\$48,297.75	\$1,870,000	\$ 78,540.00
Personal - Stockpile, Supplies &				
Equipment	1,530,000	69,385.50	1,060,000	44,520.00
Personal Property - Furnace Houses	5,050	229.02	5,050	212.10
Collection Fee		1,179.13		1,232.72
TOTAL BUNKER HILL MINE	\$2,600,050	\$119,091.40	\$2,935,050	\$124,504.82
<u>MAAS MINE</u>				
Maas-Mulvey	\$ 194,000	\$ 8,797.90	\$1,820,000	\$ 76,440.00
Race Course	1,000	45.35	25,000	1,050.00
Pioneer & Arctic	940,000	42,629.00	885,000	37,170.00
Stockpile and Equipment	1,450,000	65,757.50	345,000	14,490.00
Miscellaneous Parcels	20,570	932.85	11,930	501.06
TOTAL MAAS MINE	\$2,605,570	\$118,162.60	\$3,086,930	\$129,651.06
Collection Fee		1,181.62		1,296.51
TOTAL	\$2,605,570	\$119,344.22	\$3,086,930	\$130,947.57
Maas Mine Rented Houses	\$ 108,110	\$4,902.79	\$ 138,805	\$ 5,829.81
Mineral Lands	22,380	1,014.93	22,380	939.96
Total Houses & Lands	\$ 130,490	\$5,917.72	\$ 161,185	\$ 6,769.77
Collection Fee		59.23		67.69
Total	\$ 130,490	\$5,976.95	\$ 161,185	\$ 6,837.46
Tax Rate		45.35		42.00

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

10. ACCIDENTS AND PERSONAL INJURY:

There were a total of six lost time accidents in 1958 as compared with twenty in 1957.

Fatal	None
Time lost over 4 Months	1
Time Lost 1 to 4 Months	3
Time Lost Less than 1 Month	2
Total	6

<u>Date of Accident</u>	<u>Name</u>	<u>Injury</u>	<u>Days Lost</u>
1/23/58	Raymond Cheverette	Sprain right shoulder.	60
5/14/58	Nestor Rivers	Lost thumb nail on right hand.	14
6/25/58	John Guizzetti	Two broken ribs, contusions chest, hand, and eye.	38
11/ 4/58	Edwin Anderson	Severe laceration right index finger.	200
11/ 6/58	Waino Hahka	Fracture left foot	29
12/ 1/58	Norman Gervae	Cuts and bruises on face back and chest	<u>14</u>
	TOTAL DAYS LOST		355

11. POWER:

The Cleveland-Cliffs Iron Company Electric Power Department generates the power and the U. P. Power Company distributes it over their transmission lines. The average cost per kilowatt hour in 1958 was .00827, as compared to .00642 in 1957.

The rate per kilowatt hour is determined by dividing the total operating cost of The Cleveland-Cliffs Iron Company Electric Power Department by the total kilowatt hours sold and charging each consumer proportionately. To this is added a wheeling charge by the U. P. Power Company for distributing the power to the Mine.

BUNKER HILL GROUP
ANNUAL REPORT
YEAR 1958

11. POWER: (Cont'd.)

The following table lists the costs of power for 1958:

Hoisting	\$ 13,365.12
Dry House	1,425.69
Shops	499.30
Crush & Screen U.G.	1,240.43
Tram Conveyors	1,977.73
Electric Haulage	6,618.95
Ventilation	8,192.96
Heating Plant	930.19
Compressors	18,817.32
Stocking	2,054.58
Pumping	64,041.06
Chain Conveyors	495.36
Maas Operating Research	124.22
Maas Haulage	3,594.70
Maas Ventilation	2,160.57
Maas Safety Department	39.14
Electric Shovels	528.01
Mine Office	55.53
Skip Tending	630.51
Crush & Screen Surf.	<u>194.56</u>
 TOTAL	 \$ 126,985.93

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

1. GENERAL:

A reduction in labor and operating days at the Mather Mine "B" Shaft resulted in a curtailment of production. The tonnage for the year was 34.3% less than that of 1957.

The 1958 production was 851,382 tons. The division of this tonnage by levels was 65,036 tons from the 6th Level, 177,030 tons from the 7th Level, 452,195 tons from the 8th Level, and 157,121 tons from the 9th Level.

The production analysis improved in 1958.

Average Mine Analysis on Output (Including Stockpile)

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>
Mather Standard	59.03	-	8.22	.042
Mather Special	57.35	-	8.12	.847

The shipping season started on April 15th and ended on November 22nd. Shipments from the stockpile and pocket amounted to 585,345 tons.

Average Analysis on Shipments (Total Average)

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>
Mather Standard	59.47	.096	7.68	.055
Mather Special	57.99	.095	7.20	.848

The cost of production was \$0.35 per ton above that of the previous year. The higher cost was a result of an increase in wages, cost of living, and supplementary unemployment benefits combined with a rise in supply costs. This increase amounted to \$0.245 per ton for labor and \$0.105 per ton for supplies.

During the year, the labor relations were good. Only one grievance, concerning vacation pay, was initiated by the Union. The two grievants received a pay adjustment by the Company.

In the Partridge Creek area, the dewatering of the overburden continued during the year. This area is located over the underground workings. The electric motors on three of the four pumps burned out; therefore, the water table rose from a low of 19'-9" to 10'-0".

The progress of the vertical extent and the East limit of the underground cave above the mining blocks was recorded. Daily microseismic counts were recorded in three surface holes, while monthly seismic time interval shots were performed in two holes. The information showed that the progress of the cave was slow and that the cave was 1000' from surface.

A water vug was encountered in the 10700 Cross-cut. Because of the rapid inrush of water, the 10th Level main line was dammed for one day. The flow of water reached a high of approximately 2000 G.P.M.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

1. GENERAL: (Cont'd.)

When the operation of the Cambria-Jackson Mine ceases, the drainage water from this Mine will be piped to the Mather "B" Shaft's 5th Level. A dam was not constructed to check the water. An accumulation of water head possibly could destroy the dam. A rapid surge of water into the Mather "B" Mine would be disastrous.

West of the Cambria-Jackson Fault, the 9th Level south extension of the main line was advanced 431' to completion. In addition, the 9500, 9800, 9900, and 9910 Cross-cuts were driven 846'. The total main-level drifting for the 9th Level amounted to 1277'. All of this development required the use of steel supports.

The 10th Level main line progressed 1320' during the year. This heading is located 2515' west of the "A" and "B" Shaft boundary. Approximately 1000' of drifting remains until a connection is made with the Mather "A" heading. With the exception of 78', the entire main line was supported with steel sets during the year. Also on the "A" Shaft property, the winze cross-cut was driven 188'. The 10100, 10200, 10400, and 10500 Cross-cuts were advanced 1154' with steel sets as supports. The 10th Level main line and cross-cut footage totaled 2662'.

The 10th Level crusher box equipment was installed. The work on the 1897' conveyor belt on the 10th Level has been completed. During the early part of 1959, the steel work in the 9th to 10th Level ore pass raise will be finished -- as a result, the crusher-conveyor system will be in full operation. The ore from the 9th and 10th Levels will be crushed to a -5" and then conveyed to the 10th Level storage trenches at the Shaft.

Between the 8th and 9th Levels, a ventilation raise was driven by a cage-raising method. When the cage-raising method is compared to the conventional rock-raising method, the former method costs 43% less, and 64% less time is consumed in completing a raise. Cage raising is safer because the miners are hoisted to the working face in a cage and are not exposed to falling rock.

Test-hole drilling with a percussion machine was introduced this year. The holes varied from 48' to 64'. By combining the diamond drill data with that of the percussion drilling data, a closer control was achieved in outlining the ore body. This operation enhanced the accuracy of ore development layout.

The 7th Level East-West conveyor belt was extended 285'. The total length is 1100'. The costlier track haulage was eliminated in tramping the ore between the 7300 and the 7500 Cross-cuts.

The 9th Level West conveyor belt was installed for a distance of 1125'. All of the ore between the 9200 and the 9700 Cross-cuts will be conveyed by this belt, while the 9th Level East belt conveys the ore from the 9000 to the 9200 Cross-cuts. The 9th Level North conveyor belt gathers the ore from both of these conveyor belts and discharges the product to the 10th Level crusher-conveyor system. At the head end of the 9th Level North conveyor belt, an industrial television set was installed, thus enabling one conveyor belt attendant to take care of the three conveyor belts.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

1. GENERAL: (Cont'd.)

The trend in the utilization of the yielding steel sets in the block caving areas has increased. Extensive experimentation with steel set spacing, arch curvature radius, and mill-size openings has resulted in less repair work in the caving drifts. In 1959, better results should be attained when a new yielding steel clamp arrangement is placed into use.

A sound preventative maintenance program on the chain conveyors increased their efficiency and life. Their permanence as standard mining equipment was assured. The chain conveyors were employed primarily in transfer drifts. This method eliminated long, costly cross-hauls with scrapers.

Contrary to the former method of estimating ore reserves for taxation, a lower recovery factor was applied to the mining pillars. Compared to last year, the 1958 ore reserves were decreased by approximately 2,000,000 tons.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

2. PRODUCTION,
SHIPMENTS &
INVENTORIES:

a. Production by Grade and Months:

	<u>Standard</u>	<u>Special</u>	<u>Total Tons</u>	<u>Rock</u>
January	52,791	39,214	92,005	15,384
February	63,935	18,137	82,072	11,688
March	59,004	10,528	69,532	9,204
April	52,959	24,519	77,478	8,028
May	54,378	16,724	71,102	8,112
June	58,835	9,173	68,008	6,564
July	35,765	1,051	36,816	3,612
August	59,530		59,530	7,608
September	72,415		72,415	7,284
October	83,885		83,885	8,436
November	65,519		65,519	6,828
December	<u>73,020</u>		<u>73,020</u>	<u>6,324</u>
Total	<u>732,036</u>	<u>119,346</u>	<u>851,382</u>	<u>99,072</u>
Transfers	<u>19,205</u>	<u>19,205</u>	-	-
Grand Total	<u>751,241</u>	<u>100,141</u>	<u>851,382</u>	<u>99,072</u>

b. Shipments:

	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total 1957</u>	<u>Increase or Decrease</u>
Mather Standard	26,911	492,672	519,583	1,033,567	513,984
Mather Special	-	65,762	65,762	214,744	148,982
Total	<u>26,911</u>	<u>558,434</u>	<u>585,345</u>	<u>1,248,311</u>	<u>662,966</u>

c. Ore Statement:

	<u>1958</u>	<u>1957</u>
On Hand January 1, 1958	260,602	212,414
Output for Year	851,382	1,296,499
Total	<u>1,111,984</u>	<u>1,508,913</u>
Shipments	<u>585,345</u>	<u>1,248,311</u>
Balance On Hand	526,639	260,602
Increase or Decrease in Output	445,117	8,455
Increase in Ore on Hand	266,037	48,188

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

2. PRODUCTION,
SHIPMENTS &
INVENTORIES: (Cont'd.)

Working Schedules:

1958 - Four 3-8 hr. shifts from January 1, 1958 to October 4, 1958. Four 2-8 hr. shifts from October 5, 1958 to December 31, 1958, with a tramming crew on the third shift.

Commencing in March, the Mine operated on a reduced schedule of four days per week for three weeks, with the fourth week idle. This schedule prevailed throughout the month of September.

1957 - Five 3-8 hr. shifts from January 1, 1957 to November 3, 1957. Four 3-8 hr. shifts from November 4, 1957 to December 31, 1957.

1956 - Five 2-8 hr. shifts from January 1, 1956 to September 9, 1956. Five 3-8 hr. shifts from September 10, 1956 to December 31, 1956.

1955 - Four 2-8 hr. shifts from January 1, 1955 to April 14, 1955. Five 2-8 hr. shifts from April 15, 1955 to December 31, 1955.

1954 - Five 3-8 hr. shifts from January 1, 1954 to March 31, 1954. Four 3-8 hr. shifts from April 1, 1954 to May 14, 1954. Four 2-8 hr. shifts from May 15, 1954 to December 31, 1954.

d. Division of Product by Levels and by Months:

	6th Level	7th Level	7th Level	8th Level	9th Level	Total Tons	
	<u>Special</u>	<u>Special</u>	<u>Standard</u>	<u>Standard</u>	<u>Standard</u>	<u>Standard</u>	<u>Special</u>
January	14,546	24,668		50,206	2,585	52,791	39,214
February	6,666	11,471	5,905	54,940	3,090	63,935	18,137
March	8,400	2,128	4,290	42,954	11,760	59,004	10,528
April	13,800	10,719		39,159	13,800	52,959	24,519
May	11,400	5,324	12,076	29,702	12,600	54,378	16,724
June	9,173		15,684	29,261	13,890	58,835	9,173
July	1,051		8,225	20,065	7,475	35,765	1,051
August			15,478	31,551	12,501	59,530	
September			19,552	38,380	14,483	72,415	
October			13,299	49,038	20,779	83,116	
November			9,956	34,810	20,753	65,519	
December			18,255	32,129	22,636	73,020	
Total	<u>65,036</u>	<u>54,310</u>	<u>122,720</u>	<u>452,195</u>	<u>156,352</u>	<u>731,267</u>	<u>119,346</u>
Stockpile Overrun Transfers						769	
	<u>65,036</u>	<u>54,310</u>	<u>122,720</u>	<u>452,195</u>	<u>156,352</u>	<u>19,205</u>	<u>19,205</u>
						<u>751,241</u>	<u>100,141</u>

e. Production Delays:

There were no major production delays during the year.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

3. ANALYSIS:

a. Average Mine Analysis on Output: (Incl. Stockpile)

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>
Mather Standard	59.03	-	8.22	.042
Mather Special	57.35	-	8.12	.847

b. Average Analysis of Shipments: (Total Average)

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>	<u>Moist.</u>	<u>Iron Nat'l.</u>
Mather Standard	59.47	.096	7.68	.055	10.18	53.42
Mather Special	57.99	.095	7.20	.848	9.59	52.43

c. Average Analysis of Ore in Stock:

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>	<u>Moist.</u>
Mather Standard	400,139	58.85	.097	8.46	.33	2.85	.50	.73	.041	1.86	9.80
Mather Special	126,500	57.27	.095	8.02	.29	2.24	1.64	.46	.868	2.78	9.40

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

4. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING:

a. Comparative Mining Costs:

	<u>1958</u>	<u>1957</u>
Product	851,382	1,296,499
Underground Costs	\$3.230	\$3.164
Surface Costs	.467	.348
General Mine Expense	<u>.776</u>	<u>.611</u>
Cost of Production	\$4.473	\$4.123
Amortization of Defense Facilities	.095	.121
Depreciation:		
Plant & Equipment	.256	.214
Development after 12/31/44	.104	.104
Pre-Production Development	.016	.013
Movable Equipment	.012	.011
Taxes	.721	.317
Administration	.053	.050
Loading & Shipping	<u>.055</u>	<u>.057</u>
Total Cost at Mine	\$5.690	\$5.010
Budget-Estimated Cost at Mine	5.728*	4.897
Number of Shifts and Hours		
	29 1-8 Hr.	49 1-8 Hr.
	75 2-8 Hr.	48 2-8 Hr.
	90 3-8 Hr.	187 3-8 Hr.
Total 8 Hr. Operating Shifts	447	706
Number of Operating Days	165-2/3	235-1/3

*Does Not Include \$0.095 Amortization of Defense Facilities

Proportion of Labor and Supplies

	<u>Amount</u>	<u>Per Ton</u>	<u>Per Cent</u>
Labor	\$2,492,866.66	\$2.928	51%
Supplies	2,351,750.29	2.762	49%
Total Cost at Mine	<u>\$4,844,616.95</u>	<u>\$5.690</u>	<u>100%</u>

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

4. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd.)

b. Detailed Cost Comparison:

	1958		1957	
	Amount	Per Ton	Amount	Per Ton
Development	\$ 466,495.83	\$.548		
Mining	1,170,405.19	1.375		
Tramming	371,220.37	.436		
Power Adjustment				
Ventilation	21,678.62	.025		
Pumping	28,439.55	.034		
Compressors and Air Lines	51,254.86	.060		
Crushing and Screening - Underground	22,953.51	.027		
Underground Superintendence	186,458.28	.219		
Maint: Pockets and Chutes	3,152.93	.004		
Mining Equipment	101,360.22	.119		
Levels and Cross-cuts	43,056.49	.051		
Shaft	8,381.21	.009		
Telephones and Safety Devices	53,040.57	.062		
Vacation Pay	155,535.65	.183		
Holiday Allowance	66,402.63	.078		
Wage Adjustment				
Total Underground Cost	<u>\$2,749,835.91</u>	<u>\$3.230</u>	<u>\$4,102,306.30</u>	<u>\$3.164</u>
Hoisting	145,272.24	.171		
Crushing and Screening - Surface	36,286.26	.043		
Stocking	62,090.06	.073		
Timber Yard	36,292.22	.043		
Dry House	40,145.44	.047		
Policing	11,865.08	.014		
General Surface	27,787.10	.033		
Maint: Headframe Bldg. and Equipment	917.56	.001		
Other Mine Buildings	2,179.45	.002		
Telephones & Safety Devices	1,262.08	.001		
Vacation Pay	23,241.71	.027		
Holiday Allowance	9,975.12	.012		
Total Surface Cost	<u>\$ 397,314.32</u>	<u>\$.467</u>	<u>\$ 451,370.25</u>	<u>\$.348</u>
Geological Department	10,881.56	.013		
Mining Engineering Department	44,760.91	.052		
Mechanical Engineering Department	7,693.72	.009		
Safety Department	11,203.34	.013		
Research Laboratory	22,601.68	.027		
Analysis and Grading - Laboratory	47,896.53	.057		
Analysis and Grading - Shipping	6,201.47	.007		
Special Expense - Retirements	9,059.18	.010		
Special Expense - Hygiene Clinic	9,014.57	.011		
Ishpeming Office	134,110.76	.158		
Mine Office - Superintendent and Clerks	65,536.81	.077		
Central Warehouse Overhead	16,096.08	.019		
Insurance	91,301.86	.106		
Personal Injury - Comp. and Doctors	39,242.12	.046		
Project Engineering	10,668.25	.012		
Taxes - Unemployment Insurance	36,474.60	.043		
" - Old Age Benefit	51,179.73	.060		
Electrical Engineering Department	3,149.68	.004		
Employees' Insurance and Compensation	8,424.95	.010		
Supplemental Unemployment Benefits	35,717.40	.042		
Total General Mine Expense	<u>\$ 661,215.20</u>	<u>\$.776</u>	<u>\$ 791,633.66</u>	<u>\$.611</u>
COST OF PRODUCTION	<u>\$3,808,365.43</u>	<u>\$4.473</u>	<u>\$5,345,310.21</u>	<u>\$4.123</u>

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

4. COST OF OPENING, EQUIPPING,
DEVELOPING AND OPERATING: (Cont'd.)

Capital account expenditures for the year amounted to \$779,260.35, which brings the cumulative expenditures in E&A to \$17,922,686.60.

Capital Expenditures for Year:

E&A NM-111	\$ 1,442.71
E&A NM-115	115,138.12
E&A NM-127	76,718.25
E&A NM-140	45,492.37
E&A NM-142	9,349.17
E&A NM-143	108,536.86
E&A NM-144	97,462.60
E&A NM-145	322,668.86
E&A NM-151	<u>2,451.41</u>
	\$779,260.35

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

5. ESTIMATE AND
ANALYSIS OF
ORE RESERVES:

The net ore reserves reported to the Tax Commission on December 31, 1958, were 10,902,542 tons. This is a decrease of 2,059,038 tons from the previous year.

	<u>Mather Standard</u>	<u>Sulphurous</u>	<u>Total Tons</u>
Above 5th Level		1,449,789	1,449,789
Between 5th & 6th Levels		345,509	345,509
Between 6th & 7th Levels	796,672		796,672
Between 7th & 8th Levels	1,512,045		1,512,045
Between 8th & 9th Levels	3,821,069		3,821,069
Between 9th & 10th Levels	3,355,321		3,355,321
Below 10th Level	977,709		977,709
Sec. 1 Diamond Drill Hole Estimate	248,710		248,710
Total Gross as of July 31, 1958	<u>10,711,526</u>	<u>1,795,298</u>	<u>12,506,824</u>
Less 10% for Mining Loss & Rock	<u>1,071,153</u>	<u>179,529</u>	<u>1,250,682</u>
Net Total as of July 31, 1958	9,640,373	1,615,769	11,256,142
Less Production July 31 - Dec. 31, 1958	<u>353,600</u>		<u>353,600</u>
Net Total as of December 31, 1958	<u>9,286,773</u>	<u>1,615,769</u>	<u>10,902,542</u>

Expected Average Natural Analysis of Ore Reserves as of December 31, 1958:

<u>Grade</u>	<u>Total Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulph.</u>	<u>Loss</u>	<u>Moist.</u>
By Surface Diamond Drilling	223,839	54.40	.081	5.08	.10	2.62	.58	.60	.017	2.20	11.50
By Underground Development	<u>10,678,703</u>	51.50	.090	8.85	.45	2.62	2.50	.50	.300	2.00	10.50
	10,902,542										

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

6. LABOR AND WAGES:

a. Comments:

The turnover in skilled miners lowered the efficiency of the mining contracts. When the miners were established finally in the contracts, their output rose to the normal efficient standard.

Only one grievance was filed during the year. There were no "hold-over" grievances from the year 1957. The single grievance concerned the computation of vacation pay. The grievants received an adjustment in vacation pay.

b. Employment Record:

At the end of the year, 451 men were employed at the Mine. This represents a net decrease of 184 employees for the year.

Number of Men 1/1/58	635	
Losses - Deceased	3	
Disability	4	
Quit	5	
Retired	5	
Transferred to other		
properties	25	
Laid Off	318	
Discharged	<u>1</u>	
		<u>361</u>
		274
Gains - Transferred from other		
properties	175	
Recalls	<u>2</u>	
		<u>177</u>
Total on Payroll 12/31/58	451	

c. Vacations and Holidays:

The Mine was shut down from the 14th through the 25th of July, which was the regular vacation period.

The men were paid for seven holidays--New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas. This was in accordance with the provisions of the labor contract.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

6. LABOR AND WAGES: (Cont'd)

d. Comparative Statement of Wages and Product:
(Operating Only - Not Including E&A Work)

<u>Average Wages Per Day:</u>	<u>1958</u>	<u>1957</u>	<u>Increase or Decrease</u>
Surface	\$ 23.38	\$ 21.83	\$ 1.550
Underground	<u>27.34</u>	<u>25.06</u>	<u>2.280</u>
Total	\$ 26.55	\$ 24.43	\$ 2.120
 <u>Average Wages Contract Miner:</u>	 \$ 30.48	 \$ 27.22	 \$ 3.260
 <u>Wages Per Month of 13$\frac{3}{4}$ Days: (1957 Based on 19$\frac{1}{2}$ Days)</u>			
Surface	\$322.78	\$425.69	\$102.91
Underground	<u>377.45</u>	<u>488.67</u>	<u>111.22</u>
Total	\$366.54	\$476.39	\$109.85
 <u>Tons Per Man Per Day:</u>			
Surface	50.16	51.07	.91
Underground	<u>12.52</u>	<u>11.31</u>	<u>1.21</u>
Total	10.02	9.89	.13
 <u>Labor Cost Per Ton:</u>			
Surface	\$.466	\$.427	\$.039
Underground	<u>2.184</u>	<u>2.043</u>	<u>.141</u>
Total	\$ 2.650	\$ 2.470	\$.180

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

7. SURFACE:

Buildings:

Few minor repairs were required to keep the buildings in excellent condition.

New Installations and New Equipment:

A Kling Punch Press was installed in the steel set fabricating shop. This removed the necessity of one punch operator while still maintaining the same steel set output.

Engine House:

During the vacation period in July, the motor-generator equipment was cleaned.

Headframe and Stocking:

A mechanical sampler was installed on the North Stocking Conveyor Belt. This sampler insures a more accurate analysis of stockpile and pocket ore.

In February and June, the lower pan feeder in the headframe required shaft replacement and pad repair. Both the top pan feeder and the shaker screen had to be repaired in November. No production losses resulted from these changes.

Pumping:

Pumping of the North Jackson Mine underground workings continued throughout 1958. The average rate of pumping was 239 G.P.M., which is the same rate as last year. The purpose of this pumping is to dewater the old workings which lie over the present mining areas.

Three out of the four pumps at Partridge Creek burned out during the year. Pumping was continued with one pump operating at 300 G.P.M., but the water table rose from a low of 19' 9" to 10' 0". Additional pumps will be added early in 1959.

Subsidence:

Microseismic counts were recorded daily in Holes #153, #167, and #168. Seismic time interval shots were also made monthly between Holes #167 and #153. Evidence indicates very slow advance of the cave. The fact that water remains in Hole #167 indicates that the cave is still 1,000' from surface.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND:

a. General:

Total ore production was 851,382 tons. The tonnage distribution by levels was 8% or 65,036 tons from the 6th Level, 21% or 177,030 tons from the 7th Level, 53% or 452,195 tons from the 8th Level, and 18% or 157,121 tons from the 9th Level.

The utilization of yielding steel sets in the block caving areas has increased. Because of this steel support, less repair work was required in the caving drifts. Experimentation with yielding steel set spacing, arch curvature radius, and mill-size opening has increased the support life of the caving drifts. Better results should be realized in 1959 with the introduction of a new yielding steel clamp arrangement.

A sound preventative maintenance program on the chain conveyors increased their efficiency and life. The performance of the chain conveyors assured their permanence as standard mining equipment. The chain conveyors were employed primarily in transfer drifts. This arrangement eliminated the long, costly cross-hauls with scrapers.

5th Level:

The drainage water from the inactive Cambria-Jackson Mine will be piped to the Mather "B" Shaft's 5th Level. This arrangement eliminates the necessity of a dam. Over a period of years, a large accumulation of water head in the Cambria-Jackson Mine could rupture the dam. The Mather "B" Mine would be endangered by an inrush of water.

6th Level:

During the year, 65,036 tons of hi-sulphur ore were mined from this level. The sub-level system was used in mining the ore because of its extreme hardness. Due to a curtailed production schedule, mining was stopped during June and will not be resumed until next year.

Area Above 6200 Cross-cut:

Block 63-B: Production for the year totaled 65,036 tons from this hi-sulphur block located 50' above the level and along the footwall. The ore from this area was conveyed with a chain conveyor to a crusher above the main line. The cost savings showed this system to be the best mining combination tried in the hi-sulphur ore body.

7th Level:

All of the 177,030 tons produced from the 7th Level was conveyed by the 1225' mining conveyor. The ore was dropped to the 8th Level crusher trench by means of an ore pass and then crushed. The ore was conveyed from the crusher station to the shaft by a 483' conveyor. The block-cave system of mining was used in all the standard ore blocks on the 7th Level. During the latter part of the year, the East-West Belt was extended 285' to mine the area above the 7400 Cross-cut.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

7th Level: (Cont'd.)

Area Between 7000 and 7100 Cross-cuts:

Block 71-C North: During the year, 6,000 tons were mined from this timbered slusher drift located at the -775 sub elevation. The drift is along the footwall and below the 6th Level.

Block 71-C Pillar: A yielding arch slusher drift was driven. In this drift, a chain conveyor was installed during the early part of the year. A total of 10,640 tons was recovered from this area.

Area Between 7100 and 7200 Cross-cuts:

Block 72-C: Development of three slusher drifts on the -850 and -825 subs was completed in February. Block-cave mining produced 106,316 tons during 1958. This ore body is situated on the north side of #22 Dike and along the footwall.

Area Between 7200 and 7300 Cross-cuts:

Block 73-C: Block caving was completed in February after 34,200 tons were mined.

Area Between 7300 and 7400 Cross-cuts:

Block 74-C: Development work began in February. This 101,000 ton standard ore body lies along the footwall and on the north side of Dike #22. The block will consist of three slusher drifts driven at the -825 and -850 sub elevations. The block is in the process of being undercut. A total of 18,726 tons has been mined.

8th Level:

All of the standard ore was adaptable to the block-cave system of mining. Production for the year totaled 452,195 tons from this level.

Area Above 8000 Cross-cut:

Block 80-A: Block caving produced 69,834 tons from this area below the 7000 Cross-cut pillar.

Area Between 8400 and 8500 Cross-cuts:

Block 84-C Pillar: A single timbered slusher drift was undercut in May. The production was 5,360 tons.

Block 85-B North: Mining was completed in May. This standard ore body is located 50' below the 7th Level and north of Dike #22. The production was 10,800 tons for the year.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

8th Level: (Cont'd.)

Block 85-C: Development of two slusher drifts and a drilling sub was completed in June. The slot was cut in July. At the end of December, 36,442 tons have been removed.

Area Between 8600 and 8700 Cross-cuts:

Block 87-B: Production began in January. This 150,000 ton standard ore body is at the top timber elevation and along the south side of Dike #22. To date, 123,040 tons have been mined.

Area Between 8700 and 8800 Cross-cuts:

Block 87-D: Production totaled 63,626 tons this year. This area is located at the south end of the 8700 Cross-cut.

Block 88-E: Two slusher drifts were driven. In this area, 45,978 tons were block caved. This standard ore body is located at top timber elevation and south of Dike #22.

Block 89-C: Two slusher drifts at the -1050 sub elevation were completed in September. The standard ore body lies along the east side of the Cambria-Jackson Fault zone. To date, 6,840 tons have been mined.

Area West of 8900 Cross-cut:

Block 89-A: Block caving from this area amounted to 99,716 tons during the year.

9th Level:

Mining on the 9th Level was started in the month of January. A total of 157,121 tons was block caved from two areas on the east end of the level. All of the ore is conveyed by the 694' mining conveyor and discharged through an ore-pass raise to the 10th Level.

The 9th Level south extension of the main line was driven 431' to completion. This drift is located west of the Cambria-Jackson Fault. The total advance of the 9500, 9800, 9900, and 9910 Cross-cuts amounted to 846'. The total main-level development work of 1,277' required the use of steel support.

Area Between 9000 and 9100 Cross-cuts:

Block 90-A: Block caving yielded 126,070 tons from the area located along the south side of the Negaunee Fault zone and at the -1225 sub elevation. The block consists of three slusher drifts. The ore is caved directly onto the chain conveyors.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

9th Level: (Cont'd.)

Area Between 9100 and 9200 Cross-cuts:

Block 91-A: Development of eight short slusher drifts that scrape onto two chain conveyors was completed in August. At the end of the year, 30,248 tons have been removed from this standard ore body which is located at the top-timber elevation and south of the Negaunee Fault zone. All of the production from this block is conveyed by the 9th Level East Conveyor Belt.

Block 91-B: The main transfer drift was completed in this 80,000 ton standard ore body. The ore body is 100' above the 9200 Cross-cut.

Area Between 9500 and 9600 Cross-cuts:

Block 95-A: Development of the main transfer drift was completed during the fall of this year. Additional drill-hole information is required before development work can be resumed.

All of the ore from the 9000 to the 9200 Cross-cuts is trammed by the 9th Level East Conveyor Belt, while the ore between the 9200 and the 9700 Cross-cuts will be conveyed by the 9th Level West Conveyor Belt. During the year, the West Conveyor Belt was installed for a distance of 1125'. The ore from the East and West Belts is gathered by the short 9th Level North Conveyor Belt, which in turn discharges the ore to the 10th Level crusher-conveyor system. At the head end of the North Conveyor Belt, an industrial television set was installed. This will enable one conveyor belt attendant to take care of the three conveyor belts.

A 200' ventilation raise was driven between the 9th and the 8th Levels by the cage-raising method. A 4" pilot hole was drilled between the levels. An electric hoist located at the top of the hole dropped the hoisting rope through the pilot hole. When the wire rope reached the 9th Level, the cage was attached to the wire rope. The miners were hoisted to the working face for barring loose rock, drilling, and charging the holes. The miners were lowered to the level when blasting was to be performed. All blasting was done electrically. When the cage-raising method is compared to the conventional rock-raising method, the former method costs 43% less, and 64% less time is consumed in completing a 200' raise. Cage raising is safer because the miners are hoisted to the working face in a cage and are not exposed to falling rock.

10th Level:

The main-level development drifting comprised of advancing the 10th Level footwall drift 1320', driving the 10100, 10200, 10400 and 10500 Cross-cuts 1154', and extending the Mather "A" Shaft winze drift 188'. With the exception of 78', the total main level development footage of 2662' was driven with steel sets as supports.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

10th Level: (Cont'd.)

Approximately 1000' remains until the footwall drift is connected to the Mather "A" Shaft heading. The footwall drift is 2515' west of the "A" and "B" Shaft boundary.

Installation of the 10th Level crusher box equipment and the 1897' conveyor belt on 10th Level has been completed. Once the remaining steel work in the 9th to 10th Level ore pass raise is finished, the crusher-conveyor system will be in full operation. All of the ore from the 9th and the 10th Levels will be crushed to a -5" and then conveyed to the 10th Level storage trenches at the Shaft.

Diamond drill stations were cut out south of the 10700 Cross-cut and west of the 10900 Cross-cut. Another station was started east of the 10400 Cross-cut.

At the Shaft, the 9½ Level shuttle belt drift was driven 157' and completed. This work is part of the proposed incline conveyor system that will handle the ore below the 10th Level.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

b. Diamond Drilling:

The diamond drilling program comprised of drilling 36 holes for a total footage of 8984'. Of this footage, 1640' were drilled for the Mather "A" Shaft but contracted to the Mather "B" Shaft. The division of holes by levels was as follows: 4 holes each on the 7th and 8th Levels, 19 holes on the 9th Level, and 9 holes on the 10th Level. The main objectives in the drilling program were:

1. Detailing ore in the 73-B, 74-C, and 89-A Blocks.
2. Outlining most of the ore on the 9th Level.
3. Outlining some of the 10th Level ore.
4. Outlining ore and structure below the 10th Level for development layout on the 11th and 12th Levels.

7th Level:

Four holes were drilled to outline the 73-B and 74-C Blocks prior to development. A hanging wall encroachment was found which lowered the tonnage estimate for the two blocks. Also some lean areas were found within the ore in the 73-B Block. This will necessitate very careful mining and possibly eliminate development in some sections of the block.

8th Level:

Three holes were drilled to outline the south end of the 89-A Block. In this area, large horizontal encroachments of I-fm. were found coming in from the hanging wall. Therefore, no additional development was planned for this area. One hole was drilled on the 10050-W section to determine the mining ore height directly below the 8th Level.

9th Level:

Two holes were drilled up to the 8th Level for ventilation raises. Seventeen holes were drilled to outline the 9th Level ore. These holes nearly completed the outlining of the 9th Level ore. Only the west end remains to be outlined. Several encroachments of lean material were found in the 9th Level ore. The largest of these encroachments comes from the hanging wall and cuts into the ore body at 8800-W. It continues westward to the Cambria Fault at 9100-W. A second large encroachment extends from 8750-W to 9050-W and is located between the Jackson Fault and the ore body. It is about 200' high and averages about 50' in thickness. These encroachments slightly lowered the ore estimate and caused some changes in development plans. The general size and shape of the 9th Level ore body from the shaft pillar to the Cambria Fault remained about the same as last year's interpretation.

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

b. Diamond Drilling: (Cont'd.)

10th Level:

The 10th Level drilling was divided into two phases. The first phase was the drilling of three holes on the 10600-W coordinate to outline ore and structure for Mather "A". This drilling was financed by Mather "A". The results of this drilling will be in the Mather "A" Annual Report.

The second phase was the outlining of ore and structure below the 10th Level. On the 8550-W section, the footwall leaves the Jackson Fault just above the 10th Level elevation and dips southward at approximately -20° . At Dike 27, the footwall is displaced downward about 70' and continues to the Cambria Fault. There is a considerable amount of ore lying on the footwall between the Jackson and Dike 27 Faults. In the trough formed by the junction of Dike 27 and the Cambria Fault, another body of ore was found. On the west side of the Cambria Fault, the footwall is displaced upward about 80'. There appears to be a body of ore where the footwall is intersected by an E-W dike at 3400-S. On the 9300-W section, the footwall leaves the Jackson Fault slightly above the 10th Level elevation and dips southward at about -28° . It is displaced downward 100' by Dike-Fault 28 and continues to another large E-W dike at 3520-S. Between these latter two dikes, an ore body of considerable size has been indicated. To date, a close correlation between these sections has not been possible because they are separated and displaced by the Cambria Fault.

Ore Reserves:

The net ore reserves reported to the Tax Commission on December 31, 1958, were 10,902,542 tons, a decrease of 2,059,038 tons from the previous year. The reserves were decreased due to a recognition in the estimate that some ore is unrecoverable as the result of higher grade requirements and a reduction in diamond drilling.

The following table shows the drilling for the year:

<u>Holes Drilled From 7th Level</u>	<u>Ore Drilled</u>	<u>Depth</u>
Hole Number: 465	79	185
467	33	125
469	85	150
474	94	137
<u>Holes Drilled From 8th Level</u>		
Hole Number: 471	94	102
473	42	140
480	78	82
481	63	110

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)

b. Diamond Drilling: (Cont'd.)

<u>Holes Drilled From 9th Level</u>	<u>Ore Drilled</u>	<u>Depth</u>
Hole Number: 454	88	180
456	101	150
457	128	193
458	30	245
459	147	190
461	188	304
463	29	199
464	60	200
466	25	178
468	0	150
476	177	270
478	89	270
482	94	210
484	79	240
486	120	256
488	62	294
491	115	250

Holes Drilled From 10th Level

Hole Number: 462*	252	653
470*	85	452
472	109	358
475*	151	535
477	137	405
483	210	560
487	135	290
489	186	525
<u>490</u>	<u>92</u>	<u>396</u>
36	3,457'	8,984'

*Holes drilled for Mather "A" by Mather "B".

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd.)c. Timbering:

Statement of Ground Support Material Used Under Develop-
ment and Mining Accounts

<u>Item</u>	<u>Amount</u>	<u>Cost Per Ton</u>
Cribbing	\$ 8,434.49	\$.00991
Stull Timber	1,962.61	.00231
Lagging	14,727.32	.01729
Poles	5,989.58	.00704
Steel	<u>156,344.29</u>	<u>.18363</u>
Total 1958	\$187,458.29	\$.22018
Total 1957	\$299,980.23	\$.23135
Total 1956	\$231,672.76	\$.17984
Total 1955	\$142,941.88	\$.11591
Total 1954	\$239,016.55	\$.26281

d. Explosives:

Explosives Used In Breaking 851,382 Tons Of Ore In
Development And Mining Accounts

		<u>Cost Per Ton</u>
Gelamite (1 $\frac{1}{4}$ x 8)	\$ 28,325.63	\$.03327
Gelatin 60%	32,405.77	.03806
Hercomite	<u>30,087.88</u>	<u>.03534</u>
Total Powder	\$ 90,819.28	\$.10667
Blasting Supplies	<u>66,877.86</u>	<u>.07855</u>
Grand Total Powder & Blasting Supplies	\$157,697.14	\$.18522
Pounds of Powder Per Ton of Ore		.48567
Tons of Ore Per Pound of Powder		2.05951
Cost Per Ton For Powder		\$.10667
Cost Per Ton For Fuse, Caps, etc.		\$.07855
Cost Per Ton For All Explosives		\$.18522

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

8. UNDERGROUND: (Cont'd)

e. Pumping:

On January 20th, a water vug was encountered in the 10700 Cross-cut on the 10th Level. A rapid inrush of water demanded that the 10th Level main line be dammed for one day. The peak flow of water was approximately 2000 G.P.M.

The quantity of water decreased on the 6th, 7th, and 9th Levels, while the flow increased on the 8th and the 10th Levels. The total gallonage increased 62.3 G.P.M. during 1958.

<u>Level</u>	<u>1958</u> <u>G.P.M.</u>	<u>1957</u> <u>G.P.M.</u>
6th	40.7	47.0
7th	20.9	36.6
8th	30.3	20.0
9th	16.4	31.5
10th	<u>131.6</u>	<u>42.5</u>
Total	239.9	177.6

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

9. TAXES:

Mather Mine "B" Shaft, including stockpile, supplies and equipment as placed by the State Tax Commission:

	1958			1957		
	<u>Valuation</u>	<u>Rate</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Rate</u>	<u>Taxes</u>
Section 1, 47-27						
Real	\$ 7,665,000		\$347,607.75	\$7,540,000		\$316,680.00
Personal	2,680,000		121,538.00	2,155,000		90,510.00
Total	<u>\$10,345,000</u>	45.3500	<u>\$469,145.75</u>	<u>\$9,695,000</u>	42.0000	<u>\$407,190.00</u>
Collection Fee		.4535	4,691.46		.4200	4,071.90
Total Mather Mine "B" Shaft (Sec. 1 City of Negaunee)	\$10,345,000	45.8035	\$473,837.21	\$9,695,000	42.4200	\$411,261.90

	1958		
	<u>Taxes</u>	<u>Per Ton Produced</u>	<u>Per Ton Shipped</u>
Operating	\$473,837.21	\$0.557	\$0.810
Idle Expense	-	-	-
Total	<u>\$473,837.21</u>	<u>\$0.557</u>	<u>\$0.810</u>

	1957		
	<u>Taxes</u>	<u>Per Ton Produced</u>	<u>Per Ton Shipped</u>
Operating	\$411,261.90	\$0.317	\$0.329
Idle Expense	-	-	-
Total	<u>\$411,261.90</u>	<u>\$0.317</u>	<u>\$0.329</u>

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

10. ACCIDENTS AND PERSONAL INJURY:

During the year, a total of twenty-three compensable accidents occurred, which resulted in a time loss of 7100 days. There was one fatal accident during 1958. Also 20 days were lost because of five non-compensable accidents. Therefore the number of days lost, including compensable and non-compensable injuries, and one fatality, amounted to 7120 days.

<u>Year</u>	<u>Total Hours Worked</u>	<u>Days Lost</u>	<u>Severity</u>	<u>Frequency</u>
			(<u>Days Lost x 1 Million</u>) (<u>Man Hrs. Worked</u>)	(<u>Injuries</u>) (<u>Million Man Hrs. Worked</u>)
1958	747,280	7,120	9,528	37.47
1957	1,241,170	6,982	5,625	54.79

<u>Date</u>	<u>Name</u>	<u>Nature of Injury</u>	<u>Days Lost</u>
1- 3-58	Leslie Wills	Contusion left and right index fingers.	11
1- 9-58	Angelo Rubatt	Contusion back.	250
1-10-58	Charles Niemi	Strain left arm.	30
1-21-58	William Olgren	Laceration right index finger.	14
1-30-58	Emil Saari	Traumatic amputation right ring finger.	60
3- 6-58	Eino Mustamaa	Strained back.	8
3-11-58	Elvin Velin	Laceration scalp, contusion left shoulder, fracture right fibula.	59
3-11-58	Clarence Prudom	Fatality.	6,000
3-12-58	Waino Kuivinen	Contusion back and right ankle.	34
3-18-58	Elmer Reikki	Fracture right little finger.	15
4- 1-58	August Barbieri	Laceration left middle finger	150
4-30-58	Raymond Barney	Fracture two left ribs.	27
5- 6-58	Arthur Moore	Contusion shoulder and neck.	50
5-12-58	Richard Toms	Fracture left leg.	160
5-15-58	Rudolph Peterson	Contusion left great toe.	28
6- 3-58	William Johnson	Contusion face, mouth, and nose.	44
8- 6-58	Werner Manninen	Strained back, sprained left wrist and ankle.	30
9- 8-58	Gust Anderson	Contusion left ankle.	10
9-29-58	Donald Ombrello	Contusion sacrum coccyx.	75
10-31-58	William Sivula	Contusion right foot.	7
11-10-58	John Basola	Strained right foot.	9
12- 4-58	Laurie Martonen	Fracture right ring finger.	21
12-10-58	Gunnard Anderson	Contusion left hand.	8
			7,100

MATHER MINE "B" SHAFT
ANNUAL REPORT
YEAR 1958

11. POWER:

	<u>CONSUMPTION K.W. HOURS</u>	<u>AVERAGE MAX. DEMAND</u>	<u>AVERAGE DEM. FACTOR</u>	<u>COST OF CURRENT</u>	<u>AVERAGE PRICE PER K.W. HOUR</u>
1958 -	15,584,943	4,248 K.W.	42.3%	\$205,552.04	\$.01319
1957 -	19,263,481	4,219 K.W.	53.1%	\$214,657.24	\$.01114
1956 -	17,699,459	3,532 K.W.	57.8%	\$157,953.08	\$.00892
1955 -	15,193,755	3,300 K.W.	53.1%	\$140,408.83	\$.00924
1954 -	12,486,451	3,020 K.W.	47.6%	\$116,430.27	\$.00932

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

General

In reviewing the statistics or performance record for the year 1958 the need for additional improvements are revealed in order to close the gap between the actual and desired results. However, the improvement made in 1958 substantiates managements contention that the process can be made to show a profit.

A marked improvement was made in the annual production tonnage, cost per ton of pellets and the quality of the pellets. The years production of 524,516 tons approximates the designed annual production of 600,000 tons. The \$5.48 cost per ton for 1958, as compared to \$7.48 for 1957, is favorable on a comparison basis. However, the mine - pelletizing plant combination operating at a loss necessitates increased reductions in cost plus increased production. The quality of the pellets produced in 1958 was considerably better than that of 1957. The quality of the 1959 pellets should show further improvement over the 1958 product.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

I. PRODUCTION, SHIPMENT, AND INVENTORIES

A. Operating Schedule

The plant operated on a 3 shift per day, 7 day per week schedule through the first 5 months of the year. Starting with June and continuing through November the plant was on a reduced operating schedule of 3 shifts per day, 6 days per week. In December the plant returned to the 7 day per week schedule. One or more shifts were scheduled each week for repairs. From July 27th to August 7th the plant was shut down for major repairs. The operating schedule, by months, is shown in Table No. 1 below.

TABLE NO. 1

<u>Month</u>	<u>Days Operated</u>	<u>Days/Week</u>	<u>Total Shifts</u>	<u>Total Hours</u>
January	28.5	7	85.6	684.5
February	26.3	7	78.8	630.6
March	28.9	7	86.7	693.9
April	27.6	7	82.7	661.3
May	27.5	7	82.5	660.3
June	22.9	6	68.5	548.4
July	20.4	6	61.3	490.2
August	19.5	6	58.5	467.7
September	22.5	6	67.6	540.5
October	25.3	6	75.8	606.4
November	22.5	6	67.5	540.9
December	27.1	7	81.4	650.8
Totals	299.0		896.9	7175.5

B. Production and Production Rates

The production and production rates for 1958 were as shown in Table No. 2 below.

TABLE NO. 2

<u>Month</u>	<u>Concentrate Regrinding Section</u>			<u>Pellet Firing Section</u>		
	<u>Tonnage</u>	<u>LTPH</u>		<u>Tonnage</u>	<u>LTPH</u>	
		<u>Gross</u>	<u>Net</u>		<u>Gross</u>	<u>Net</u>
January	56,786	88.7	89.3	37,393	54.6	64.4
February	53,955	91.0	91.7	35,327	56.0	66.6
March	65,895	102.3	102.5	41,749	60.2	70.5
April	66,421	109.4	109.5	46,913	70.9	82.1
May	67,509	110.2	110.8	50,488	76.5	89.5
June	59,038	111.7	112.3	43,866	79.8	89.5
July	50,403	110.1	112.5	39,657	80.9	96.9
August	47,470	104.7	105.5	36,949	79.0	87.7
September	58,832	109.6	110.3	46,363	85.8	94.8
October	58,315	100.5	102.2	41,161	67.9	80.6
November	53,332	101.8	101.9	36,722	67.9	74.7
December	63,315	100.5	101.0	42,262	64.9	72.2
Overrun				25,666		
Totals	701,271			524,516		

A more detailed description of production rates of the various sections may be found in Table Nos. 19 to 21.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

C. Production Costs

The cost of producing the 524,516 long tons of pellets averaged 5.419 dollars per ton. A brief description of the operating costs is shown below:

TABLE NO. 3

Raw Materials - Unloading and Storage	0.201
Material Preparation	2.675
Pellet Firing	1.383
Product Screening and Loading	.426
Water Supply	.025
Control and Analysis	.063
Other Direct Plant Expense	.416
Allocated Expense	.230
Total Processing Costs	5.419

A detailed monthly cost analysis may be found in Table No. 15.

D. Tonnage and Analysis of Pellets Produced and Shipped

During the shipping season, 518,361 long tons of pellets were shipped. The chemical analysis of the pellets produced and shipped is presented below.

TABLE NO. 4

Pellets Produced:

	<u>Fe.</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>	<u>Moisture</u>	<u>I.N.</u>
January	63.21		9.55		1.50	62.76
February	63.28		9.44		1.50	62.33
March	63.29		9.44		1.52	62.33
April	63.58	.035	9.07	.005	1.89	62.38
May	63.68	.033	9.23	.005	2.64	62.00
June	63.71	.036	9.03	.005	3.49	61.49
July	63.38	.040	8.83	.006	3.49	61.17
August	63.14	.034	9.21	.006	3.49	60.94
September	63.30	.035	9.22	.005	3.49	61.09
October	63.65	.036	8.98	.006	3.36	61.51
November	64.11	.033	8.13	.007	3.12	62.11
December	63.23		8.77		2.50	61.65
Yearly Average	63.46		9.09		2.68	61.76

TABLE NO. 5

Pellets Shipped:

Pocket	63.57	.036	8.98	.005	3.31
Stockpile	63.30	.032	9.32	.006	2.76

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

E. Estimated Production and Analysis

The estimated tonnage and chemical analysis of pellets for 1959 is as follows:

TABLE NO. 6

Estimated Tonnage	600,000 Long Tons				
Estimated Analysis	<u>Fe.</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>	<u>Moisture</u>
Dry	63.38	.030	8.19	.005	
Natural	62.42	.030	8.07	.005	1.50

The pellet analysis is based on Republic's 1958 analysis.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

II. LABOR AND WAGES

A. Report of Men Hired, Transferred, and Separated

TABLE NO. 7

	First of Month	Hires	Trans. From Other Mines	Separations	End of Month
January	99		2		101
February	101			2	99
March	99		4		103
April	103		1	2	102
May	102				102
June	102				102
July	102		1		103
August	103		1		104
September	104				104
October	104				104
November	104		4	1	107
December	107		6		113

B. Annual Statement of Labor

TABLE NO. 8

	Stat.			Average
	Men	Hours	Amount	Rate
<u>Hourly Employees</u>				
Straight Time - Classified	101½	208,915	536,870.78	2.570
Overtime - Classified		(19,453½)	25,120.29	1.291
Shift Differential - Aftn		(48,063½)	3,489.39	.073
- Night		(41,124½)	4,536.02	.110
Holiday Allowance		(3,582)	9,234.50	2.578
Holiday Worked - Prem. Time Only		(1,983)	5,780.41	2.915
Sunday Premium Pay		(16,998)	9,520.09	.560
Jury Pay		(8)	12.28	1.535
Sub Total	101½	208,915	594,563.76	2.846
Vacation Pay			11,961.89	
Other			29.20	
Total Hourly Employees	101½	208,915	606,554.85	2.903
Average Job Class				9.517
<u>Salaried Employees</u>				
Mine Payroll - Straight Time	5	10,421	37,906.00	3.637
Total Mine Payroll	106½	219,336	644,460.85	2.938
<u>General Payroll</u>				
Salaries - Straight Time	4¼	8,501	24,794.69	2.916
- Overtime		24	32.59	1.358
Labor From Other Mines	19½	39,959½	140,469.20	3.515
Total Labor	130¼	267,796¼	809,757.33	3.024
<u>Distributed As Follows:</u>				
Operating Mine	123	252,371¼	755,749.22	2.995
Uncompleted Construction	5½	11,475½	40,521.16	3.531
Other Mines	-	221	727.46	3.292
Other Accounts	1¾	3,728½	12,759.49	3.422
Total As Above	130¼	267,796¼	809,757.33	3.024

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

C. Labor Breakdown

At the end of 1958 the crew was 107 hourly rate and 6 salaried.

TABLE NO. 9

	<u>Number of Men</u>
<u>Pelletizing Plant</u>	
Operating - Metallurgical Engineer	1
Mechanical - Maintenance Engineer	1
Plant Foremen	2
Maintenance Foremen	2
Shift Leaders	4
Raw Materials Unloading & Storage	
Car Dumpmen	2
Car Dumpmen Helpers	4
Material Preparation	
Pulverizer Operators	3
Ball Mill Operators	4
Disc Operators	8
Feeder men	4
Ball Mill - Pulverizer Helpers	4
Pellet Firing	
Hardening Furnace Operators	4
Hardening Furnace Assistants	4
Product Screening & Loading	
Pocketmen	4
Plant Laboratory & Sampling	
Plant Analyst	1
Plant Sampler	1
Truck & Tractor	
Service Truck	1
Tractor	1
Janitors	2
Plant Laborers	21*
<u>Plant Maintenance</u>	
Electrician Leader	1
Electricians	6
Assistant Mill Foreman	1
Mechanical Leaders	2
Plant Repairmen	7
Plant Repairmen Helpers	5
Welder Standard	9
Welder Starter	1
Plant Oilers	2
Automotive Mechanic	<u>1</u>

113

*Includes 8 Temporary Cleanup Employees

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

III. PLANT OPERATION

A. Introduction

The Pelletizing Plant operated continuously in 1958 with the exception of a 10-day shut-down in July and August for major repairs and revisions. Pellet production reached a monthly high of 50,488 LT in May. The production rate reached a high of 96.9 LTPH in July and the yearly average was 84.1 LTPH. Operating time increased to a high of 90.5% in September and remained around 90% for the rest of the year. Total pellet production for the year was 524,516 long tons.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

B. Concentrate Balance with Pellet Production

TABLE NO. 10

Republic Concentrates Shipped		543,502 LT (nat'l)
Eagle Mills Pellets Produced		<u>524,516</u>
		18,986 LT (nat'l)
Plus: Material Recovered from Tailings Pond		32,518
Ore Improvement Plant Fines		<u>980</u>
Material Unaccounted For		52,484 LT (nat'l)

Unaccounted For Material

Moisture Difference		
Concentrate Moisture	36,242	
Tailings Moisture	4,552	
Ore Improvement Plant Fines Moisture	69	
	<u>40,863</u>	
Product Moisture	<u>12,975</u>	
		27,888

Concentrate In Transit		1,633
Concentrate in Storage at Eagle Mills		7,200
In Transit Losses - Republic to Eagle Mills		2,172
Rotoclone Dust Losses - To Atmosphere		681
Oxygen Loss - Reduction of Hematite to Magnetite		3,206
Balling Study Losses		256
Other Losses (including loss in thickener overflow, spillage, etc)		<u>9,448</u>
Total		52,484 LT

Actual Lost Material

In transit Losses - Republic to Eagle Mills		2,172
Rotoclone Dust Losses - To Atmosphere		681
Balling Study Losses		256
Other Losses (including loss in thickener overflow, spillage, etc)		<u>9448</u>
Total		12,557 LT

Possible Recoverable Material

Other Losses (including loss in thickener overflow, spillage, etc)		9,448 LT
--	--	----------

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

C. Monthly Hourly Operating Rates

The operating rates of major pieces of equipment is presented below. This data is on a net time basis.

TABLE NO. 11

	Ball Mills & Filters <u>LTPH</u>	Pulverizer Process <u>Coal</u>	Average No. Discs <u>Operating</u>	Grate Machine <u>LTPH</u>
January	89.3	7.71	3.86	64.4
February	91.7	4.41	3.90	66.6
March	102.5	6.86	3.94	70.5
April	109.5	6.32	3.95	82.1
May	110.8	6.73	3.94	89.5
June	112.3	6.74	3.96	89.5
July	112.5	7.54	3.94	96.9
August	105.5	6.56	3.93	87.7
September	110.3	6.77	3.94	94.8
October	102.2	8.91	3.89	80.6
November	101.9	7.82	3.93	74.7
December	101.0	7.91	3.97	72.2

A complete description of the operating rates of these pieces of equipment may be found in Tables 19 through 21.

D. Major Delay Time

The operating time varied from a low of 83.5% to a high of 90.9%. A specific piece of equipment was not charged with delay time unless the production of the plant was halted because of the piece of equipment. Some of the major delays are listed below.

TABLE NO. 12

Piece of Equipment

Grate Machine Sump Pumps - sanded, plugged, or repairs.
Simplicity Vibrating Conveyor
No. 26 Conveyor
Grate Machine Pallet Cars - replace, caught in machine,
or repairs.
Unloading Pocket Collapse & No. 2 Conveyor Repairs
No. 24 Conveyor
No. 12 Conveyor
Grate Discharge Grizzly - plugged or repairs
Simplicity Vibrating Screen

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

E. Fuel and Raw Materials Consumption

The raw materials consumption during 1958 is presented below. These are divided into total consumption and consumption per ton of pellets produced.

TABLE NO. 13

<u>Raw Material</u>	<u>Amount Used</u>	<u>Amount/Ton of Pellets</u>
Concentrate	549,114 LT	1.047 LT
Bentonite	3,036 LT	12.97 lbs
Limestone	1,620 LT	-
Process Coal	32,545 LT	138.98 lbs
Ignition Coal	10,810 LT	46.17 lbs
Propane	1,003,425 Gals	1.913 Gal.
Grinding Balls	1,197 NT	-

A monthly distribution of the heat required for pelletizing is presented below.

TABLE NO. 14

	<u>Consumption - Million BTU/LT</u>			
	<u>Propane</u>	<u>Ignition Coal</u>	<u>Process Coal</u>	<u>Total</u>
January	0.175	0.704	2.813	3.692
February	.155	.688	1.790	2.633
March	.106	.890	2.472	3.468
April	.092	.684	1.733	2.509
May	.085	.648	1.836	2.569
June	.078	.688	1.535	2.301
July	.074	.640	1.426	2.140
August	.081	.747	1.353	2.181
September	.063	.546	1.324	1.933
October	.090	.743	2.257	3.090
November	.107	.466	2.174	2.747
December	.105	.442	2.169	2.716

PELLETTIZING PLANT
ANNUAL REPORT
YEAR 1958

IV. REPAIRS AND CHANGES

A. Raw Material Unloading And Storage

The unloading pocket bin was re-installed following its collapse. Temporary feeding equipment was installed to maintain plant operation during the repair period. A new shaker conveyor was installed in conjunction with the above pocket repair.

B. Material Preparation

The 6' x 10' Allis Chalmers ball mill on the returns circuit was converted from a grate type of overflow to a straight overflow type of mill with a subsequent 15% increase in H.P.

Testing of an air operated pump to pump solids of a consistent flow and density to the filters was unsuccessful.

The "Gamma Gauge", originally used at the Humboldt Mine, was installed on the A-C ball mill discharge line with little success.

Two screw conveyors were installed to replace the conveyor belts carrying bentonite and limestone from the silos to the filtered concentrate for balling feed. The installation eliminated a hazardous dust condition.

A third disc type filter, a Dorr-Oliver, was added to the filtering section. The added filtering capacity did much towards increased production.

New pinion shaft bearings, pinion shaft and pinion, were installed on the Hardinge ball mill. This represents the second repair of this type on the Hardinge ball mill.

The 6' x 10' Allis Chalmers regrind ball mill required extensive repairs following the failure of one of the bearings.

A new roll and a complete new wear plate was installed on the Hardinge coal and limestone pulverizer.

The 10½' x 14' Allis Chalmers ball mill motor was equipped with an individual fresh air source. Ducts were installed to bring air from outside directly to the motor to minimize the possibilities of a major breakdown.

C. Pellet Firing

A new type grate feeder was installed on "B" line but was unsuccessful due to early bearing failure.

An auxiliary fan of 20,000 cfm capacity was installed to withdraw a portion of recoup air and exhaust to atmosphere. A 40,000 cfm fan was also installed as an auxiliary to take over a portion of the dust collection requirements in case of rotoclone failure.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

IV. REPAIRS AND CHANGES (CONT'D)

C. Pellet Firing (Contd)

The addition of limestone to the disc feed increased the quality of the finished product considerably.

A smaller sized ignition coal was tested with considerable success. The 1959 coal purchases should reflect the results of this test work.

A screen was installed for the re-screening of hearth layer material just over the hearth layer bin.

A newly designed grizzly bar arrangement was installed in the discharge end of the grate machine to expedite repairs and maintenance.

Air cooling was added to the Simplicity shaker conveyor to cool the product and effect longer life in the pan liners.

A pressure type librication system was installed for lubrication of the four flying saucers.

A new fan wheel and shaft were installed on the No. 2 process air fan. The fan wheel is equipped with bolt fastened wear plate for easier maintenance.

New seal bars, moving and stationary, were installed the full length of the grate machine.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

V. GENERAL SURFACE

A. New Equipment Received

None.

B. Water Supply

A six inch pipe line was installed for supplying process water to the Pilot Plant. The line was tapped into the river water supply line to the Pelletizing Plant.

C. Roads

Normal road maintenance and improvement was carried on during the year.

D. Buildings

The foundations were completed for a 320 foot extension on the present 250 foot railroad car thawing shed.

A gallery covering Number 26 conveyor, between the plant proper and the loading pocket, was erected for winter operations.

E. Outside Lighting

No change.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

VI. COST OF PRODUCTION

TABLE NO. 15

	<u>Monthly Operating Costs</u>												<u>Total Year</u>
	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>	
<u>Processing Cost</u>													
Raw Mat'l Unload & Storage	.088	.086	.077	.067	.061	.043	.043	.054	.048	.072	.041	.062	.058
Power	.012	.014	.011	.012	.010	.012	.013	.010	.013	.014	.014	.012	.012
Operating Supplies	.017	.053	.033	.040	.033	.013	.004	.006	.014	.023	.016	.260	.034
Maintenance Labor	.045	.086	.075	.043	.039	.048	.044	.042	.023	.044	.019	.037	.043
Maintenance Supplies	.028	.045	.019	.025	.012	.024	.473	.016	.008	.009	.013	.034	.054
Total Month	.190	.284	.215	.107	.155	.140	.577	.128	.106	.162	.103	.405	.201
<u>Material Preparation</u>													
Operating Labor	.386	.387	.359	.296	.266	.255	.271	.320	.248	.321	.311	.382	.297
Power	.287	.323	.317	.321	.273	.327	.348	.259	.301	.364	.386	.333	.303
Operating Supplies	2.038	1.708	1.812	1.410	1.596	1.504	1.354	1.477	1.288	1.921	1.725	2.055	1.568
Maintenance Labor	.227	.208	.269	.136	.184	.179	.205	.242	.168	.212	.249	.234	.197
Maintenance Supplies	.306	.443	.323	.171	.233	.250	.226	.339	.337	.477	.405	.461	.310
Total Month	3.244	3.069	3.080	2.334	2.552	2.515	2.404	2.637	2.342	3.295	3.076	3.465	2.675
<u>Pellet Firing</u>													
Operating Labor	.143	.141	.133	.109	.103	.099	.110	.121	.095	.128	.181	.217	.125
Power	.270	.305	.250	.262	.223	.263	.279	.212	.275	.297	.310	.276	.254
Operating Supplies	.681	.688	.679	.776	.550	.516	.525	.591	.466	.616	.416	.509	.554
Maintenance Labor	.151	.114	.190	.193	.220	.208	.463	.632	.199	.224	.170	.210	.233
Maintenance Supplies	.181	.142	.105	.164	.143	.126	.507	.549	.166	.263	.153	.306	.217
Total Month	1.426	1.390	1.357	1.504	1.239	1.212	1.884	2.105	1.201	1.528	1.230	1.518	1.383
<u>Product Screening & Loading</u>													
Operating Labor	.107	.135	.128	.097	.055	.055	.070	.071	.053	.084	.080	.111	.082
Power	.009	.010	.008	.009	.007	.009	.009	.007	.009	.010	.010	.009	.008
Operating Supplies	.061	.061	.054	.036	.005	.022	.030	.007	.009	.022	.031	.065	.031
Maintenance Labor	.165	.198	.133	.107	.113	.105	.130	.120	.088	.090	.143	.091	.115
Maintenance Supplies	.456	.216	.230	.082	.160	.156	.260	.268	.104	.189	.172	.171	.190
Total Month	.798	.620	.553	.331	.340	.347	.499	.473	.263	.395	.436	.447	.426
<u>Water Supply</u>													
Operating Labor	--	--	--	--	--	--	--	--	--	--	--	--	--
Power	.008	.008	.008	.008	.007	.008	.008	.006	.008	.009	.002	--	.007
Operating Supplies	.002	.002	--	--	--	--	--	--	--	--	--	--	--
Maintenance Labor	.012	.009	.010	.013	.016	.017	.018	.028	.009	.010	.001	--	.011
Maintenance Supplies	.003	.036	.003	.007	.004	.004	.007	.020	.003	.003	--	.002	.007
Total Month	.025	.055	.021	.028	.207	.029	.033	.054	.020	.022	.003	.002	.025

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

TABLE NO. 15 (Contd)

Processing Cost	Monthly Operating Costs												Total Year
	January	February	March	April	May	June	July	August	September	October	November	December	
Control and Analysis													
Operating Labor	.060	.055	.043	.060	.043	.055	.054	.054	.044	.051	.049	.038	.048
Power	.001	.001	.001	.000	.001	.000	.000	.000	.000	.001	.001	.001	.000
Operating Supplies	.021	.026	.006	.013	.012	.017	.016	.012	.013	.011	.009	.026	.015
Maintenance Labor	--	--	--	--	--	--	--	--	--	--	--	--	--
Maintenance Supplies	--	--	--	--	--	--	.001	--	--	--	.004	--	--
Total Month	<u>.082</u>	<u>.082</u>	<u>.050</u>	<u>.073</u>	<u>.056</u>	<u>.073</u>	<u>.071</u>	<u>.066</u>	<u>.057</u>	<u>.063</u>	<u>.063</u>	<u>.065</u>	<u>.063</u>
Other Direct Plant Expense													
Operating Labor	.212	.176	.146	.184	.178	.164	.239	.233	.222	.194	.295	.353	.197
Power	.010	.011	.009	.010	.008	.010	.010	.008	.010	.010	.011	.010	.009
Operating Supplies	.228	.258	.203	.193	.116	.192	.070	.133	.085	.110	.149	.113	.152
Maintenance Labor	.045	.035	.028	.029	.025	.027	.032	.031	.017	.026	.035	.061	.031
Maintenance Supplies	<u>.044</u>	<u>.036</u>	<u>.005</u>	<u>.028</u>	<u>.039</u>	<u>.004</u>	<u>.038</u>	<u>.002</u>	<u>.023</u>	<u>.033</u>	<u>.033</u>	<u>.057</u>	<u>.027</u>
Total Month	<u>.539</u>	<u>.516</u>	<u>.391</u>	<u>.444</u>	<u>.366</u>	<u>.397</u>	<u>.389</u>	<u>.407</u>	<u>.357</u>	<u>.373</u>	<u>.523</u>	<u>.594</u>	<u>.416</u>
Allocated Expense													
Operating Labor	.129	.148	.090	.039	.085	.250	.122	.125	.079	.095	.106	.161	.112
Operating Supplies	<u>.101</u>	<u>.108</u>	<u>.086</u>	<u>.093</u>	<u>.089</u>	<u>.185</u>	<u>.114</u>	<u>.108</u>	<u>.107</u>	<u>.132</u>	<u>.172</u>	<u>.205</u>	<u>.118</u>
Total Month	<u>.230</u>	<u>.256</u>	<u>.176</u>	<u>.132</u>	<u>.174</u>	<u>.435</u>	<u>.236</u>	<u>.233</u>	<u>.186</u>	<u>.227</u>	<u>.278</u>	<u>.366</u>	<u>.230</u>
Total Processing Cost													
Operating Labor	1.125	1.128	.976	.852	.791	.921	.909	.978	.789	.945	1.063	1.324	.919
Power	.597	.672	.604	.622	.529	.629	.667	.502	.616	.705	.734	.641	.593
Operating Supplies	3.149	2.904	2.873	2.481	2.401	2.449	2.113	2.334	1.982	2.835	2.518	3.233	2.472
Maintenance Labor	.645	.650	.705	.521	.597	.585	.892	1.095	.504	.606	.617	.633	.630
Maintenance Supplies	<u>1.018</u>	<u>.918</u>	<u>.685</u>	<u>.477</u>	<u>.591</u>	<u>.564</u>	<u>1.512</u>	<u>1.194</u>	<u>.641</u>	<u>.974</u>	<u>.780</u>	<u>1.031</u>	<u>.805</u>
Total Month	<u>6.534</u>	<u>6.272</u>	<u>5.843</u>	<u>4.953</u>	<u>4.909</u>	<u>5.148</u>	<u>6.093</u>	<u>6.103</u>	<u>4.532</u>	<u>6.065</u>	<u>5.712</u>	<u>6.862</u>	<u>5.419</u>

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

VII. STATEMENT OF TAXESTABLE NO. 16

<u>Negaunee Township</u>	<u>Valuation</u>	<u>Taxes</u>
S $\frac{1}{2}$ of NW $\frac{1}{4}$ & NE $\frac{1}{4}$ of SW $\frac{1}{4}$ Sec 36, 48-26 Eagle Mills Pelletizing Plant	1,330,000.00	38,082.57
Tax Rates		28.35

Eo A EXPENDITURES

THE FOLLOWING EXPENDITURES WERE MADE IN
1958 AGAINST Eo A AUTHORIZATIONS.

Eo ANo

MI 654 PELLETIZING PLANT AND EQUIPMENT	131,500.05
5 PRELIMINARY DESIGN - SECOND UNIT	170.56
26 WATER TANK	3,245.54
30 RELINE ROTOCLOVES	7,600.00
33 PELLET PLANT CHANGES	121,840.09
40 DISC FILTER	7,096.94
42 CONVEYOR GALLERIES	26,527.81
43 ADDITIONAL THAWING CAPACITY	20,680.40
45 40,000 CFM FAN	7,424.31

TOTAL 326,085.70

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

VIII. ACCIDENTS AND PERSONAL INJURY

Following is the statistics completed by the Safety Department for the Pelletizing Plant during 1958.

TABLE NO. 17

1. Number of Man Hours Worked	219,336
2. Position Rating - Miscellaneous Group	6
3. Accidents	
Compensable Injuries (218 Compensable Days)	3
Non Compensable Injuries (10 Days)	<u>3</u>
Total (228 Days)	6
Average Days Lost Per Injury	38
4. Frequency (Number of accidents per million man hours worked)	27.36
5. Severity (Number of days lost permillion man hours worked)	1,040

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

IX. PROPOSED NEW EQUIPMENT AND CONSTRUCTION

A. Equipment

1. Type N-40 Rotoclone.
2. 22 Ton Pocket-stocking Truck.
3. Hydro-crane equipped with magnet.
4. Stationary air compressor.
5. Rubber tired dozer for stockpile.
6. Dust collection equipment to recover coal exhaust dust losses.
7. Steffensen Cones.
8. Balling Drums.
9. Green ball screens.
10. Conveyor to carry ignition coal across the top of the building to eliminate truck haulage.
11. Individual bentonite feeders for each piece of balling equipment.
12. Reduction of pallet car weights with particular reference to pallet car sides.
13. Pallet car retarder.

B. Construction

1. Gallery for man walkway from plant to outside thickener.
2. Cold storage warehouse space.
3. Increased sump capacity at discharge end of grate machine.
4. Grinding ball storage and handling facilities inside plant building.
5. Pour additional concrete on top of present floors to produce floor slopes for cleaning purposes.
6. Building for mobile equipment.
7. Change windbox design to facilitate daily cleaning problems.
8. Arrangement for dewatering the pulp going to the derrick screens.

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

X. MONTHLY OPERATING TABLES

TABLE NO. 18 - Raw Materials Consumption - Monthly Operating Data

<u>Month</u>	<u>Concentrates</u>	<u>Process Coal</u>	<u>Tonnages</u>			<u>Gallons Propane</u>	<u>Net Tons Grinding Balls</u>
			<u>Ignition Coal</u>	<u>Limestone</u>	<u>Bentonite</u>		
January	45,611	3,656	878	-	173	126,743	108
February	47,338	2,200	812	-	293	121,435	116
March	52,649	3,590	1,235	-	236	106,208	114
April	48,516	2,816	1,067	-	255	82,250	99
May	53,803	3,186	1,079	-	283	79,898	127
June	43,958	2,315	996	46	237	69,429	95
July	37,985	1,928	830	109	265	52,860	77
August	35,589	1,703	903	282	208	53,124	86
September	46,549	2,093	828	233	280	57,473	77
October	40,993	3,169	1,002	157	233	71,691	105
November	44,696	2,732	562	251	267	77,236	80
December	51,427	3,157	618	542	306	105,078	113
Totals	549,114	32,545	10,810	1,620	3,036	1,003,425	1,197

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

TABLE NO. 19

Material Preparation
Regrind Section - Monthly Operating Data

	<u>Ball Mills and Filters</u>			<u>Percent Operation</u>	<u>Regrinding Rate LTPH</u>	
	<u>Tonnage Processed</u>	<u>Hours Operating</u>	<u>Delays</u>		<u>Gross Time Basis</u>	<u>Net Time Basis</u>
January	56,786	636.0	4.4	99.3	88.7	89.3
February	53,955	588.6	4.3	99.3	91.0	91.7
March	65,895	642.7	1.3	99.8	102.3	102.5
April	66,421	606.5	.9	99.9	109.4	109.5
May	67,509	609.1	3.7	99.4	110.2	110.8
June	59,038	525.7	3.0	99.4	111.7	112.3
July	50,403	447.8	10.1	97.8	110.1	112.5
August	47,470	449.9	3.3	99.3	104.7	105.5
September	58,832	533.6	2.9	99.4	109.6	110.3
October	58,315	570.6	9.6	98.3	100.5	102.2
November	53,332	523.3	.7	99.9	101.8	101.9
December	63,315	626.9	3.4	99.5	100.5	101.0
Total & Avgs	701,271				103.4	104.1

	<u>Power Consumption</u>				<u>Steel Consumption Lbs/LT</u>		<u>Structure - % -325 m</u>			
	<u>KWH/LT</u>		<u>KWH/LT % -325 m</u>		<u>Consumption Lbs/LT</u>		<u>Mill Feed</u>		<u>Mill Discharge</u>	
	<u>#1 Ball Mill</u>	<u>#2 Ball Mill</u>	<u>#1 Ball Mill</u>	<u>#2 Ball Mill</u>	<u>#1 Ball Mill</u>	<u>#2 Ball Mill</u>	<u>Concentrate</u>	<u>Returns</u>	<u>#1 Ball Mill</u>	<u>#2 Ball Mill</u>
January	11.70	12.7	60.4	55.1	4.52	4.13	53.61	54.9	72.8	76.8
February	12.60	13.30	65.6	57.7	3.67	4.13	51.62	62.0	72.6	74.7
March	9.61	12.26	56.9	56.1	3.41	3.60	50.78	65.2	72.6	72.6
April	9.20	12.71	53.5	58.5	2.72	3.94	49.53	65.6	71.8	71.2
May	10.27	10.69	54.7	47.2	3.45	3.91	50.87	64.6	73.0	73.5
June	10.28	10.27	54.1	43.0	2.86	3.85	53.90	63.1	75.5	77.8
July	10.82	10.13	51.3	41.4	3.80	4.02	52.01	20.9 & 67.5	73.8	76.5
August	10.73	10.51	43.0	46.1	2.88	3.04	53.45	20.4	70.5	76.2
September	9.59	9.10	37.8	38.4	2.78	3.26	47.81	15.0	66.0	70.8
October	10.36	12.35	35.6	43.6	3.48	5.16	#1 44.70 #2 16.9		65.1	73.0
November	11.90	11.10	38.7	40.0	4.41	3.07	47.53 52.04	16.1	70.9	76.1
December	9.79	12.97	32.6	54.2	3.16	4.74	51.61	20.7	72.3	75.5

	<u>Pulverizer</u>		<u>Pulverizing Rate - LTPH</u>	<u>Structure % -200 m Discharge</u>	<u>Power Consumption</u>		<u>Heat Consumption BTU/LT</u>
	<u>Tonnage Processed, LT</u>	<u>Process Coal</u>			<u>KWH/LT</u>	<u>KWH/LT % -200 m</u>	
January	3,180		7.71	60.4	16.4	30.5	319,000
February	1,888		4.41	59.6	33.6	63.3	687,224
March	3,062		6.86	61.6	21.0	38.1	520,650
April	2,458		6.32	66.9	23.3	38.5	509,904
May	2,762		6.73	62.0	20.9	37.6	513,448
June	2,016		6.74	57.0	21.5	42.6	560,625
July	1,683		7.54	57.7	20.3	39.7	486,415
August	1,520		6.56	64.7	22.0	37.8	682,919
September	1,862		6.77	58.7	24.4	46.7	522,053
October	2,840		8.91	53.5	18.0	38.3	387,199
November	2,397		7.82	54.4	20.5	42.9	503,290
December	2,765		7.91	54.6	23.0	47.7	971,906

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

TABLE NO. 20

Material Preparation
Balling Section - Monthly Operating Data

	<u>Tonnage Processed LT (Dry)</u>	<u>Processing Rate LT/Disc-Hour</u>	<u>Average No. of Disc Optg. - Net Time Basis</u>	<u>A Disc</u>	<u>Percent Operating Hours - Net Time Basis</u>			
					<u>B Disc</u>	<u>C Disc</u>	<u>D Disc</u>	
January	51,221	22.83	3.86	100.00	99.61	99.44	96.86	
February	49,153	23.76	3.90	100.00	99.68	99.47	98.12	
March	60,689	25.98	3.94	100.00	99.71	99.42	99.47	
April	60,403	26.75	3.95	100.00	99.30	99.73	99.42	
May	61,474	27.68	3.94	100.00	99.55	99.57	99.58	
June	53,666	27.62	3.96	100.00	99.78	99.76	99.59	
July	45,942	28.50	3.94	100.00	99.66	99.54	99.12	
August	43,122	26.07	3.93	100.00	99.40	99.45	98.62	
September	53,631	27.83	3.94	100.00	99.82	99.45	99.06	
October	53,224	26.79	3.89	100.00	99.32	99.03	98.88	
November	48,836	25.29	3.93	100.00	99.40	99.28	99.38	
December	57,610	24.78	3.97	100.00	99.78	99.66	99.67	

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

TABLE NO. 21

Pellet Firing - Monthly

	<u>Pellets Produced</u>	<u>Hours Operating</u>	<u>Delays</u>	<u>Percent Operating</u>	<u>Pelletizing Rate - Net Time Basis</u>			<u>Fuel Consumption MBTU/LT</u>
					<u>LTPH</u>	<u>LT/Sq Ft/Day</u>		
					<u>Over Firing Zone</u>	<u>Over Up Draft</u>		
January	37,393	581.0	103.5	84.9	64.4	3.07	1.65	3.692
February	35,327	530.5	100.1	84.1	66.6	3.17	1.71	2.633
March	41,749	592.0	101.8	85.3	70.5	3.36	1.81	3.468
April	46,913	571.7	89.7	86.4	82.1	3.91	2.10	2.5089
May	50,488	563.8	96.5	85.4	89.5	4.26	2.30	2.569
June	43,866	490.1	58.3	89.4	89.5	4.26	2.30	2.301
July	39,657	409.4	80.7	83.5	96.9	4.61	2.48	2.140
August	36,949	421.2	46.5	90.1	87.7	4.18	2.25	2.181
September	46,363	489.2	51.5	90.5	94.8	4.51	2.43	1.933
October	41,161	510.7	95.6	84.2	80.6	3.84	2.07	3.090
November	36,722	491.5	49.3	90.9	74.7	3.56	1.92	2.748
December	42,262	585.7	65.1	90.0	72.2	3.44	1.85	2.716

PELLETIZING PLANT
ANNUAL REPORT
YEAR 1958

TABLE NO. 22PELLET QUALITY REPORT

Tonnage	524,516
---------	---------

% Delays	13.20
----------	-------

Screen Analysis, %

	+ 1"	9.81
- 1"	+ 3/4"	6.07
-3/4"	+ 1/2"	21.69
-1/2"	+ 3/8"	32.16
-3/8"	+ 3M	18.35
-3M	+ 4M	3.84
-4M	+ 6M	1.90
-6M	+ 8M	1.16
-8M	+10M	.44
-10M	+14M	.27
-14M	+20M	.19
-20M	+28M	.17
-28M		3.95

Cumulative -8M	5.02
----------------	------

Tumble Test

% - 8M	20.80*
% -28M	15.13

Chemical Analysis, %

Fe	63.46
SiO ₂	9.09
P	
S	
H ₂ O	2.68

Bulk Density

#/Ft ³	113.10
-------------------	--------

*From August Month

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

1. INTRODUCTION:

Production for the 1958 season began on a two shift per day, four day per week basis in June and continued on this schedule until mid-September. At that time the Bethlehem Steel Co. requested that approximately 150,000 tons of their ore from the Mather Shafts be processed through complete treatment on a custom milling basis. This increased demand together with one special cargo for McLouth Steel and the Cliffs Group requirements resulted in an increased operating schedule of three shifts per day, five days per week through November 13th when the season ended. A winterization program was initiated at that time with a skeleton crew.

During the idle period prior to the beginning of operations a centrifugal type wet scrubber was purchased from the Ducon Co. and installed in the exhaust system of the rotary dryer. At the same time the dryer was repowered with a 400 h.p. direct current motor together with necessary motor generator set and controls. This drive made possible variation in rotation speed as well as providing sufficient power to rotate the dryer under full load, a condition which was impossible in 1957 with the 200 h.p. The combination of sufficient power to operate and efficient removal of the very fine dust particles resulted in the complete elimination of dust loss in 1958 as compared to a 4% dust loss in 1957. Tests of the Ducon equipment by the Ducon Co. and the Michigan State Board of Health under operating conditions showed a collection efficiency of 98.3% by weight under the most extreme operating conditions.

A new product designated Group No. 3 was introduced during the 1958 operating season. This product was the result of the drying only of very wet but high grade ores from the Bunker Hill Group to approximately 8% moisture. Since this material was sufficiently high in quality to require no heavy density concentration the resultant product was a free flowing material containing a high natural iron and acceptable natural silica, and the ore structure contains the full particle size range of from $-1/8"$ to $+4"$ cubes.

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

2. PLANT PROCESSES:

a. Distribution and Analyses of Feed:

	<u>Tons</u>	<u>%age</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Sul.</u>	<u>Moist.</u>
Athens Pocket	3,840	1.00	59.93	.122	5.08	.008	12.74
Athens Stockpile	116,745	30.31	57.97	.110	8.99	.013	12.43
Maas Pocket	9,652	2.51	61.64	.098	5.71	.201	13.01
Maas Stockpile	15,267	3.96	58.80	.090	8.44	.223	11.89
C. J. Pocket	2,137	.55	59.91	.075	7.28	.058	12.32
C. J. Stockpile	14,797	3.84	59.13	.085	8.51	.053	12.16
Mather "A" Pocket	72,274	18.77	58.90	.101	7.67	.012	10.63
Mather "A" Stock.	83,219	21.61	59.13	.095	7.75	.018	10.03
Mather "B" Pocket	26,610	6.91	60.82	.089	6.91	.014	9.88
Mather "B" Stock.	39,011	10.13	59.38	.105	7.63	.033	10.56
Mather "B" Special	1,267	.33	58.10	.111	7.24	1.077	9.60
Dryer Cleanup	<u>332</u>	<u>.08</u>	—	—	—	—	—
Total	385,151	100.00	58.93	.101	8.02	.034	11.18
Natural Mine Analysis			52.34	.090	7.12	.030	
Natural Plant Analysis			52.31	.090	7.12	.030	

b. Dryer Balance:

Average Moisture - Feed - 11.20

Average Moisture - Product - 8.19

	<u>Natural Tons</u>	<u>Percent Recovery</u>	<u>Percent Moisture</u>	<u>Dry Tons</u>
Product	367,288	96.72	8.19	337,227
Moisture Loss	12,472		100.00	
Dust Loss	—	<u>Negligible</u>	—	—
Total	379,760		11.20	337,227

Heavy Media Section

	<u>Tons</u>
Total +1/2"	31,591
Less Proportion of Moisture Loss	<u>1,035</u>
Heavy Media Feed	30,556

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

2. PLANT PROCESSES (CONT'D.):c. Primary Section (Unloading Pockets 1 and 2):

	<u>Tons</u>	<u>Split</u>
Tons Unloaded	385,151	100.00%
Tons Group III (Includes Moisture Loss)	208,262	54.07%
Tons -1/2" (Includes Moisture Loss)	145,298	37.73%
Tons +1/2" (Includes Moisture Loss)	31,591	8.20%

d. Production Figures:

<u>Type</u>	<u>Tons</u>	<u>Iron</u>	<u>Sil.</u>	<u>Phos.</u>	<u>Sul.</u>	<u>Moist.</u>
Group I Bethlehem	Dry	60.05	6.90	.097	.028	-
	Nat. 122,746	55.43	6.37	.090	.026	7.70
Group I C. C. I.	Dry	59.48	7.37	.097	.029	-
	Nat. <u>22,622</u>	<u>54.88</u>	<u>6.80</u>	<u>.090</u>	<u>.027</u>	<u>7.64</u>
Total Group I	Dry	59.95	6.98	.097	.028	-
	Nat.* 145,368	55.34	6.44	.090	.026	7.69
Group II Bethlehem	Dry	59.59	8.50	.104	.042	-
	Nat. 21,412	55.06	7.85	.096	.039	7.61
Group II C. C. I.	Dry	57.92	9.84	.121	.038	-
	Nat. <u>3,513</u>	<u>53.58</u>	<u>9.10</u>	<u>.112</u>	<u>.035</u>	<u>7.49</u>
Total Group II	Dry	59.35	8.67	.106	.041	-
	Nat. 24,925	54.85	8.03	.098	.038	7.59
Group III C. C. I.	Dry	58.65	8.38	.105	.047	-
	Nat. <u>200,915</u>	<u>53.65</u>	<u>7.66</u>	<u>.096</u>	<u>.043</u>	<u>8.53</u>
Total Product	Dry	59.21	7.85	.102	.039	-
	Nat. 371,208	54.39	7.21	.094	.036	8.14

* Includes 8,686 tons Group I overrun from 1957 stockpile.

Average Improvement FE Nat'l. - 2.05 Units.

e. Metallurgical Balances:

<u>Product - Natural</u>	<u>Tons</u>	<u>% Wt. Crude</u>	<u>Cuml. % Wt. Crude</u>	<u>% Fe</u>	<u>% SiO₂</u>	<u>% Moist.</u>
Group I	136,682	35.49	35.49	55.34	6.44	7.69
Group II	24,925	6.47	41.96	54.85	8.03	7.59
Group III	200,915	52.17	94.13	53.65	7.66	8.53
Tailings	10,157	2.64	96.77			
Moisture Loss	<u>12,472</u>	<u>3.23</u>	<u>100.00</u>			<u>100.00</u>
Total Feed	385,151	100.00	-	52.34	7.12	11.18

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

2. PLANT PROCESSES (CONT'D.):e. Metallurgical Balances (Cont'd.):

<u>Product - Dry</u>	<u>Tons</u>	<u>% Wt. Crude</u>	<u>Cuml. % Wt. Crude</u>	<u>% Fe</u>	<u>% SiO₂</u>	<u>% Moist.</u>
Group I	126,171	36.88	36.88	59.95	6.98	-
Group II	23,033	6.73	43.61	59.35	8.67	-
Group III	183,777	53.72	97.33	58.65	8.38	-
Tailings	<u>9,110</u>	<u>2.67</u>	<u>100.00</u>	<u>42.90</u>		
Total Feed (Shipping Dept. Analysis)	342,091	100.00	-	58.93	8.02	-
Total Feed (Met. Balance Calculation)	342,091			58.76		

f. Metallurgical Balance, Heavy Media Section:

<u>Product</u>	<u>Tons</u>	<u>% Wt.</u>	<u>% Wt. H. M. Feed</u>	<u>% Fe</u>	<u>% SiO₂</u>
Feed	35,082		100.00	55.53	
Sink	21,756	71.20	62.02	59.30	8.72
Float	8,800	28.80	25.08	42.90	
H. M. Drum Feed	30,556	100.00	87.10	54.58	
Class. Sands	3,168	70.00	9.03	59.69	8.33
Class. Overflow	1,358	30.00	3.87	58.06	
Class. Feed	4,526	100.00	12.90	59.20	
Total	35,082		100.00	55.53	
Sink	21,757	87.29	62.02	59.30	8.72
Class. Sands	3,168	12.71	9.03	59.69	8.33
Total Concentrate	24,925	100.00	71.05	59.35	8.67

g. Ferrosilicon Consumption

	<u>Tons H.M. Feed</u>	<u>Lbs. FeSi Dumped</u>	<u>FeSi Loss Lbs/Ton H.M. Feed</u>	<u>Tons H.M. Concentrate</u>	<u>FeSi Lbs/Ton of H.M. Concentrate</u>	<u>% Recovery</u>
1958 Totals	30,556	54,171	1.77	21,757	2.49	71.20
1957 Totals	117,201	121,585	1.04	64,602	1.88	57.53

A series of natural screening tests were run during the latter part of the 1958 operating season and the excessive percentage of fines carried over into the heavy media feed together with the inadequate wash prep equipment ahead of the heavy media drum resulting in a viscous media circuit with resultant high ferrosilicon losses. Under normal conditions the 1957 ferrosilicon loss would be more nearly average with present wash prep equipment.

ORE IMPROVEMENT PLANT
ANNUAL REPORT
YEAR 1958

2. PLANT PROCESSES (CONT'D.):

h. Process Oil Consumption:

	<u>Tons Dryer Feed</u>	<u>Process Oil Used</u>	<u>Gals. Oil/ Ton Feed</u>	<u>Tons Dryer Product</u>	<u>Gals. Oil/ Ton Product</u>	<u>Cost/Ton Product for Oil</u>
1958 Totals	379,760	445,673	1.17	367,288	1.21	.098
1957 Totals	177,165	292,185	1.65	160,368	1.82	.173

With the repowering of the rotary dryer wherein adequate power was available to turn the drum under maximum load conditions and with variation in rotary speed being available to speed up or slow down the passage of ore through the rotary dryer, maximum efficiency in the consumption of heat available per gallon of fuel oil was realized per ton of material handled. In addition, with the drastic reduction in the number of vessels in service on the Great Lakes during the 1958 season, the Bunker "C" type fuel oil used in both ship boilers and the dryer combustion equipment was in excess supply and the price of fuel oil in 1958 dropped 1.65¢ per gallon under 1957.

i. Final Distribution of Ores to the Plant:

	<u>Beth. Mather A</u>	<u>CCI Mather A</u>	<u>Beth. Mather B</u>	<u>CCI Mather B</u>	<u>C. Jackson</u>	<u>Athens</u>	<u>Bunker H.</u>	<u>Maas</u>	<u>Total</u>
Tons Unloaded	96,921	58,572	62,015	5,204	16,934	16,194	104,392	24,919	385,151
Tons Recovered	88,651	56,950	55,507	5,059	16,203	15,492	100,692	23,968	362,522
Loss	8,270	1,622	6,508	145	731	702	3,700	951	22,629
Percent Rec.	91.47	97.23	89.51	97.21	95.68	95.67	96.46	96.18	94.12
Tons Shipped	88,651	56,950	55,507	5,059	16,203	15,492	100,692	23,968	362,522

3. COST OF OPERATIONS:

a. Comments:

Because of the extremely small tonnage processed during 1958 (385,151 tons); because the operating schedule was most inefficient in that the plant was idle eight hours out of every twenty-four hours and three days of each operating week until mid-September; and because it was necessary to maintain equipment on a standby basis during this idle period, the cost per ton of product as shown in the following table for the 1958 season cannot be considered representative of a fair operating cost for the Ore Improvement Plant. Production data gained from the 1959 operating season will be much more representative of actual concentrating costs since present indications are that the 1959 season will demand capacity production of the plant with resultant more average operating costs.