

Hill-Trumbull
Annual Report
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<u>Costs</u>	<u>1959</u>		<u>1957</u>
	<u>Budget</u>	<u>Year</u>	
<u>Taxes</u>			
Ad Valorem	\$0.224		\$0.195
Occupational	0.147		0.281
Royalty	<u>0.201</u>		<u>0.223</u>
Total Depreciation, Amortization, Taxes	\$0.817		\$1.042
Administrative Expense	0.100		0.100
Miscellaneous Expense & Income	0.016		0.006
Royalty	<u>1.761</u>		<u>1.645</u>
Total Cost at Mine	\$5.393		\$5.679

Note: 1959 costs do not include Cleveland office revisions.

b. Detailed Cost Comparison

Pit Operating: \$0.009 a ton above the budget. Purchase of a shovel cable and a deferred drilling and blasting charge from 1958 were two items not anticipated in the 1959 budget. A Joy drill which has not been overhauled since it was purchased also showed high maintenance costs.

Beneficiation: \$0.052 above the budget. Concentrating-Maintenance and media were two higher-than-budget items. In 1958, when the Hill-Trumbull was idle, supplies were used at other mines. Media on hand after the 1957 ore season was used at the Holman during the 1958 ore season. An entirely new supply of media had to be purchased to charge up the Hill-Trumbull plant in 1959. These situations were not anticipated when making out the budget. Another factor contributing to high media loss was a defective crockett, a media pump, and power failures.

Total Pit & Beneficiation Plants: \$0.012 a ton under the budget. Loading stockpile and social security taxes were two items higher than the budget. Even though the pit and beneficiation items were higher than the budget, the total is lower on a cost-per-ton basis because it is a cost per ton on concentrates and the recovery is much higher than was used for budget purposes.

General Mine Expense: \$0.036 higher than the budget because of a Hibbing Office charge which is \$0.035 higher than the budget.

Winter & Idle: \$0.148 a ton lower than the budget. The repair program planned for November and December was cancelled because of the steel strike.

Cost of Production: \$0.124 a ton lower than the budget because high recovery offset all higher-than-budget costs--especially due to lower-than-budget Winter & Idle costs.

11. EXPLORATION & FUTURE EXPLORATION

No exploratory drilling was done during the year.

Areas requiring exploratory drilling in the future are:

- | | |
|--------------------------|--------------|
| a. Bottom and south side | Gross-Marble |
| b. North bank | Trumbull |
| c. Bottom and north bank | Hill |
| d. Western half | Potter |

12. TAXES

<u>Real Estate</u>	<u>1959</u>		<u>1958</u>		<u>Increase-Decrease</u>	
	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>
Mineral	\$202,809	\$ 52,841.88	\$203,383	\$ 47,211.30	-\$ 574	/\$5,630.58
Lands, Bldgs, Machinery	146,138	46,152.73	146,569	40,757.71	- 431	/ 5,395.02
Accts Receivable	28,995	7,554.66	27,734	6,437.90	/ 1,261	/ 1,116.76
<u>Personal Property</u>						
Equipment	111,188	28,970.03	151,904	35,292.90	- 40,716	- 6,322.87
Stockpile Concts	151	39.34	1,967	456.60	- 1,816	- 417.26
	<u>\$489,281</u>	<u>\$135,558.64</u>	<u>\$531,557</u>	<u>\$130,156.41</u>	<u>-\$42,276</u>	<u>/5,402.23</u>
Average Mill Rate		277.06		244.86		/ 32.20

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Note: Mineral valuation reduced by small tonnage produced in April, 1959, prior to May 1. Personal property reduced by more favorable assessment. Average tax increased by 13.15 per cent increase in mill rate.

13. ACCIDENTS & PERSONAL INJURIES

On December 2, 1959, while attempting to carry cutting edge from machine shop to truck shop with partner, Anderson bruised instep of right foot when cutting edge slipped from partner's hand. Two days time lost. No compensation paid.

14. PROPOSED NEW CONSTRUCTION

Cyclone Plant Revisions: approved and project to be completed prior to 1960 ore season.

Double-Deck Screen: to be installed in pit screening plant prior to 1960 ore season. Will allow 2-inch scalping in pit.

Rock Reject System: being planned for coarse rejects at the plant.

15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

a. Equipment Received

3	18" Link Belt Backstops
1	1/2-ton International Pickup
1	9" Carbide Drill Bit
4	24" Troughing Idlers
20	36" Troughing Idlers
23	30" Troughing Idlers
12	pieces 34x24 Stainless Steel Screens
50	#3 Ni Hard Chute Liners
1	6-1/2 yard Dipper Front
6	Railroad Locomotive Axels
1	3x7' Single-Deck Hewitt-Robins Screen
1	3 hp Westinghouse Motor

- 250 #12 Wear Shoes
- 350 Railroad Ties
- 1500' 5000-V #4 Shovel Cable
- 1000' 1-1/4" Preformed Wire Rope
- 388' 24" Conveyor Belting
- 250' 5000-V Oil Resistant Wire
- 1150' 1000 MCM Bare Copper Trolley Wire
- 150' 1-1/2" Fire Hose

b. Proposed New Equipment

- 1 600 amp Cutler Hammer Starter
- 1 100 amp Cutler Hammer Starter
- 2 8" Wilfley Model K Pumps
- 1 Perless Fluidyne Pump
- 2 5x5 Denver Solids Pumps
- 1 60 hp Electric Motor
- 2 7 1/2 hp Westinghouse Motors
- 1 3 hp Westinghouse Electric Motor
- 12 5 hp Allis-Chalmers Motors
- 1 8 1/2 x 14' Double-Deck Screen
- 1 36" x 84" Hewitt-Robins Single-Deck Screen
- 12 3' x 7' Single-Deck Allis-Chalmers Screens
- 6 4' Dorr Oliver DSM Floor Screens
- 6 4' Dorr Oliver DSM Tramp Screens
- 1 1/2-ton Pickup Truck
- 2 Euclids
- 1 Robins & Myers Electric Hoist
- 3 1 KVA Transformers
- 2 Welding Machines
- 1 Pipe Threading Machine
- 1000' 600-V Anaconda Control Cable

HOLMAN-CLIFFS MINE

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I. GENERAL

Mine activity at the start of the year consisted of limited shop and plant repairs under the Winter & Idle program and construction of a scrubber plant and a 2-inch scalping unit under E&A programs. All operations were conducted on a 4-day-week, single-shift basis.

On April 6, dyke construction under E&A MC-359 and pit cleanup under E&A MC-358 were started on a 5-day-week, single-shift basis. Repair and construction crews were increased to a 5-day schedule. Except for the scrubber construction, all programs were completed by the start of ore production on April 27. Loading of concentrates from stockpile was started on April 20 and carried forward intermittently until the start of ore operations. The ore schedule was carried forward on a 3-shift, 5-day-week basis until May 10 when the work schedule was increased to a 6-day week.

Operating conditions during the season were normal. Although recovery remained low, costs were within the budget and a better grade was produced than estimated. Ore production was suspended at 11 p.m. on July 14 when a general strike was called by the union. Beginning November 7, when the 80-day Taft-Hartley law was invoked, stockpile concentrates were loaded on an intermittent basis--because of cold weather--until December 1, leaving a stockpile balance of 20,432 tons.

On November 15, a stripping program was started under E&A MC-358 and continued under E&A MC-367 to December 13 when the program was completed for the year. 432,393 cubic yards of material were moved from the Bingham, North Star, and Brown leases after November 15.

The Reich 750 drill was moved into the Holman lease and one experimental hole drilled in semi-taconite. Additional experimental work on semi-taconite drilling will be conducted in 1960.

A limited repair program was conducted in the shops after the stripping programs and carried through to the end of the 1959 season.

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2. PRODUCTION-INVENTORIES-SHIPMENTS

a. Production by Grades

	<u>Crude</u>	<u>Wash</u>	<u>Retreat</u>	<u>Total</u>
Brown			336,219	336,219
Bingham		14,775	335,039	349,814
North Star		<u>25,230</u>	<u>306,988</u>	<u>332,218</u>
		40,005	968,246	1,018,251

<u>Concentrates</u>	<u>Bessemer</u>		<u>Non-Bessemer</u>		<u>Total</u>
	<u>Wash</u>	<u>Retreat</u>	<u>Wash</u>	<u>Retreat</u>	
Brown		22,833		79,056	101,889
Bingham	944	53,582	7,035	66,424	127,985
North Star	<u>2,471</u>	<u>50,724</u>	<u>16,643</u>	<u>98,062</u>	<u>167,900</u>
	3,415	127,139	23,678	243,542	397,774

b. Shipments

Brown		22,833		74,688	97,521
Bingham	944	53,582	7,035	66,424	127,985
North Star	<u>2,471</u>	<u>50,724</u>	<u>16,643</u>	<u>81,998</u>	<u>151,836</u>
	3,415	127,139	23,678	223,110	377,342

c. Inventories

	<u>Retreat</u>	<u>Tons</u>
Brown		4,368
North Star		<u>16,064</u>
		20,432

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d. Production by Months

Month	<u>Crude Ore</u>					Total
	Retreat			Wash		
	Brown	Bingham	North Star	Bingham	North Star	
April			49,342			49,342
May	83,274		221,211		25,230	329,715
June	178,357	245,595	14,308	14,775		453,035
July	74,588	89,444	22,127			186,159
	<u>336,219</u>	<u>335,039</u>	<u>306,988</u>	<u>14,775</u>	<u>25,230</u>	<u>1,018,251</u>

	<u>Concentrates</u>					Total
April			29,311			29,311
May	26,876		104,498		19,114	150,488
June	52,004	92,452	4,661	7,979		157,096
July	23,009	24,910	10,316			58,235
Nov		2,644				2,644
	<u>101,889</u>	<u>120,006</u>	<u>148,786</u>	<u>7,979</u>	<u>19,114</u>	<u>397,774</u>

3. ANALYSIS

a. Tonnage & Analysis of Crude Ore Produced

<u>Crude Ore</u>	<u>Tons</u>	<u>Iron</u>	<u>Silica</u>
Brown Retreat	336,219	37.70	41.29
Bingham Wash	14,775	39.19	41.51
Bingham Retreat	335,039	36.38	41.55
North Star Wash	25,230	52.97	18.44
North Star Retreat	<u>306,988</u>	<u>46.90</u>	<u>27.59</u>
	<u>1,018,251</u>	<u>40.44</u>	<u>36.68</u>

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b. Tonnage & Analysis of Concentrates Produced

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moisture</u>
<u>Brown</u>							
Bessemer Retreat	22,833	56.76	.036	12.71	.15	.62	7.18
Non-Bessemer Retreat	79,056	57.15	.059	11.54	.18	.67	7.09
<u>Bingham</u>							
Bessemer Wash	944	57.03	.035	15.01	.10	.88	7.80
Non-Bessemer Wash	7,035	57.25	.042	13.63	.14	.54	7.44
Bessemer Retreat	53,582	57.84	.037	12.23	.15	.71	7.15
Non-Bessemer Retreat	66,424	58.08	.043	11.87	.16	.86	7.54
<u>North Star</u>							
Bessemer Wash	2,471	56.46	.039	13.94	.28	.59	8.23
Non-Bessemer Wash	16,643	57.86	.043	11.37	.25	.61	8.34
Bessemer Retreat	50,724	58.55	.037	10.73	.27	.56	6.82
Non-Bessemer Retreat	98,062	58.09	.047	10.71	.29	.58	6.93
	<u>397,774</u>	<u>57.81</u>	<u>.045</u>	<u>11.50</u>	<u>.21</u>	<u>.61</u>	<u>7.17</u>

c. Tonnage & Complete Analysis of Concentrates Shipped

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulf</u>	<u>Ign Loss</u>	<u>Moist</u>
<u>Brown</u>											
Bessemer Retreat	34,358	56.99	.037	12.89	.16	.59	.20	.24	.027	4.25	6.87
Non-Bessemer Retreat	109,313	57.27	.057	11.59	.17	.62	.20	.24	.027	5.06	6.82
<u>Bingham</u>											
Bessemer Wash	944	57.03	.035	15.01	.10	.88	.10	.16	.008	2.08	7.80
Non-Bessemer Wash	7,035	57.25	.042	13.63	.14	.54	.10	.16	.008	3.41	7.44
Bessemer Retreat	89,844	58.18	.038	11.95	.17	.71	.11	.16	.008	3.55	6.87
Non-Bessemer Retreat	70,105	58.11	.043	11.86	.16	.85	.11	.16	.008	3.60	7.58
<u>North Star</u>											
Bessemer Wash	2,471	56.46	.039	13.94	.28	.59	.22	.20	.015	3.82	8.23
Non-Bessemer Wash	16,643	57.86	.043	11.37	.25	.61	.22	.20	.015	4.40	8.34
Bessemer Retreat	50,724	58.55	.037	10.73	.27	.56	.22	.20	.015	4.09	6.82
Non-Bessemer Retreat	86,211	58.18	.045	10.63	.30	.57	.22	.20	.015	4.65	6.89
	<u>467,648</u>	<u>57.87</u>	<u>.044</u>	<u>11.57</u>	<u>.21</u>	<u>.65</u>	<u>.17</u>	<u>.20</u>	<u>.016</u>	<u>4.25</u>	<u>7.03</u>

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d. Mine Analysis of Ore in Stockpile

<u>Retreat Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moisture</u>
North Star	16,064	57.75	.053	11.39	.25	.60	7.04
Brown	<u>4,368</u>	<u>57.75</u>	<u>.053</u>	<u>11.39</u>	<u>.25</u>	<u>.60</u>	<u>7.04</u>
	20,432	57.75	.053	11.39	.25	.60	7.04

4. ESTIMATE OF ORE RESERVES

a. Developed Ore - Factors Used

	<u>Concentrates</u>	<u>Cubic Feet Per Ton</u>	<u>Rock Deduction</u>	<u>Per Cent Recovery</u>
Wash		14	0	52
Retreat		14	0	30

b. Ore Reserves as of December 31, 1959*

*These figures based on new tax estimate as of May 1, 1959

<u>Lease</u>	<u>Reserve 12-31-58</u>	<u>Mined 1959</u>	<u>Balance after Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-59</u>
<u>North Star</u> N $\frac{1}{2}$ -NE $\frac{1}{4}$ 21, 56-24	422,317	167,900	254,417		254,417
<u>Bingham</u> NW $\frac{1}{4}$ -SE $\frac{1}{4}$ 21, 56-24	1,149,429	127,985	1,021,444		1,021,444
<u>Holman</u> SE $\frac{1}{4}$ -NE $\frac{1}{4}$ 21, 56-24	999,260		999,260		999,260
<u>Brown No. 1</u> SW $\frac{1}{4}$ -NE $\frac{1}{4}$ 21, 56-24	509,856	31,867	477,989		477,989
<u>Brown No. 2</u> SW $\frac{1}{4}$ -NW $\frac{1}{4}$ 22, 56-24	1,350,494	70,022	1,280,472		1,280,472
	<u>4,431,356</u>	<u>397,774</u>	<u>4,033,582</u>		<u>4,033,582</u>

c. Estimated Analysis of Ore Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
<u>North Star</u>				
Non-Bessemer Wash	11,492	60.13	.063	6.90
Bessemer Retreat	225,492	55.91	.028	11.92
Non-Bessemer Retreat	<u>17,433</u>	<u>46.55</u>	<u>.072</u>	<u>18.05</u>
	254,417	55.46	.033	12.11
<u>Bingham</u>				
Bessemer Wash	189,528	60.42	.030	9.17
Non-Bessemer Wash	117,114	60.48	.050	8.09
Bessemer Retreat	411,788	58.36	.029	11.97
Non-Bessemer Retreat	<u>303,014</u>	<u>58.35</u>	<u>.052</u>	<u>12.03</u>
	1,021,444	58.98	.038	11.02
<u>Holman</u>				
Bessemer Wash	204,380	59.70	.030	9.30
Non-Bessemer Wash	92,592	59.30	.050	8.90
Bessemer Retreat	454,923	57.80	.030	11.10
Non-Bessemer Retreat	<u>247,365</u>	<u>57.80</u>	<u>.050</u>	<u>11.10</u>
	999,260	58.33	.037	10.53
<u>Brown No. 1</u>				
Non-Bessemer Wash	30,250	59.00	.050	9.10
Bessemer Retreat	379,134	57.63	.030	12.49
Non-Bessemer Retreat	<u>68,605</u>	<u>57.74</u>	<u>.047</u>	<u>12.77</u>
	477,989	57.73	.034	12.31
<u>Brown No. 2</u>				
Bessemer Wash	225,418	59.20	.030	9.30
Non-Bessemer Wash	59,311	58.40	.050	9.00
Bessemer Retreat	646,714	57.82	.030	11.07
Non-Bessemer Retreat	<u>349,029</u>	<u>57.92</u>	<u>.048</u>	<u>11.02</u>
	1,280,472	58.12	.036	10.65
<u>North Star & Bingham</u>				
Bessemer Wash	189,528	60.42	.030	9.17
Non-Bessemer Wash	128,606	60.45	.051	7.98
Bessemer Retreat	637,280	57.49	.029	11.95
Non-Bessemer Retreat	<u>320,447</u>	<u>57.71</u>	<u>.053</u>	<u>12.36</u>
	1,275,861	58.28	.037	11.24

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c. Estimated Analyses of Ore Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
<u>Holman & Brown</u>				
Bessemer Wash	429,798	59.44	.030	9.30
Non-Bessemer Wash	182,153	58.96	.050	8.97
Bessemer Retreat	1,480,771	57.77	.030	11.44
Non-Bessemer Retreat	664,999	57.86	.049	11.23
	<u>2,757,721</u>	<u>58.13</u>	<u>.036</u>	<u>10.89</u>
 <u>Total Wash</u>				
Bessemer	619,326	59.74	.030	9.26
Non-Bessemer	<u>310,759</u>	<u>59.58</u>	<u>.050</u>	<u>8.56</u>
	930,085	59.69	.037	9.03
 <u>Total Retreat</u>				
Bessemer	2,118,051	57.69	.030	11.59
Non-Bessemer	<u>985,446</u>	<u>57.81</u>	<u>.050</u>	<u>11.60</u>
	3,103,497	57.73	.036	11.59
 <u>Total Holman-Cliffs</u>				
Bessemer	2,737,377	58.15	.030	11.06
Non-Bessemer	<u>1,296,205</u>	<u>58.23</u>	<u>.050</u>	<u>10.87</u>
	4,033,582	58.18	.036	11.00

5. LABOR & WAGES

a. Comments

There was practically no labor turnover during the year and labor relations were satisfactory up to the strike period. Necessary replacements and additional labor were placed from the Hawkins and Wanless mines on a preferential hiring basis until both lists were exhausted. After the close of the spring college semester, some students were hired to fill vacancies.

A \$0.01 an hour cost-of-living increase was granted effective January 1, 1959.

b. Comparative Statement of Production & Wages

	<u>1959</u>	<u>1958</u>
Wash & Retreat Concentrates	397,774	817,019
Number of Days Operated	66	133
Average Number of Men Working	173	157
Average Wages Per Day	27.39	26.11
Production Per Man Per Day	34.89	39.22
Labor Cost Per Ton	0.785	0.666
Total Number of Man Days	11,399	20,830
Amount Paid for Labor	\$312,248.39	\$546,957.59

6. GENERAL SURFACE

a. Building & Repairs

Normal maintenance work was carried on throughout the year on mine buildings and company-owned houses, five of which were sold during the year.

b. Roads, Transmission Lines, Etc.

No major changes made during 1959.

c. Miscellaneous General Construction

The following construction projects were completed in 1959:

<u>E&A No.</u>	<u>Amount</u>	<u>Description</u>
MC-356	\$769,151	Scrubber Plant
MC-357	79,999	Tailings Disposal Facilities Alterations
MC-359	11,195	Dike Construction
MC-361	18,994	2-inch Scalping Unit

7. OPEN PIT

a. Stripping

The following table shows material moved from various leases and the actual and estimated costs during 1959:

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<u>Lease</u>	<u>E&A No.</u>	<u>Cubic Yards Surface</u>	<u>Cost</u>	
			<u>Estimated</u>	<u>Actual</u>
North Star	MC-358	41,585*	\$0.420	\$0.458
Brown #1	MC-358	3,860	0.420	0.458
Bingham	MC-358	11,822	0.420	0.458
North Star	MC-367	81,740	0.496	0.396
Brown	MC-367	233,799	0.496	0.396
Bingham	MC-367	98,970	0.496	0.396
		<u>471,776</u>		

*Includes 7,543 cubic yards rock.

On April 6, a pit cleanup program under E&A No. MC-358 was started on a 1-shift basis and continued until the start of ore season on April 27. After the Taft-Hartley law was invoked, a regular stripping program was started on November 15 under E&A No. MC-358 and was continued under E&A No. MC-367 until December 13 when the program was discontinued for the year. Stripping was conducted on a 20-shift-a-week basis using four crews five days a week. Ten trucks serviced by two to three shovels were used per shift. The program will be continued in the spring on cleanup. Surface and cleanup were removed from:

<u>Lease</u>	<u>Area</u>
Brown #1	West and north side of tail tracks
Bingham	Bottom
North Star	Along north pit approach

An average of 5,527 cubic yards per shift was maintained for this program.

E&A No. MC-363 in the amount of \$40,000 was authorized May 20, 1959, for the purchase of additional stripping dump land for the Holman-Cliffs mine. Purchase of one 40-acre tract for \$20,000 has thus far been completed.

b. Open Pit Mining

The 1959 ore season started at 7 a.m. on April 27 on a 15-shift schedule with three crews. Two to three shovels and six to eight trucks were used per shift hauling ore and pit rock. One truck

was required for disposal of screen rock and two trucks for heavy-density reject haul. On May 10, the work schedule was increased to 18 shifts a week and maintained on this basis until the start of the steel strike at 11 p.m. on July 14. Because of the strike which lasted until November 7, all pit operations were discontinued for the year. Plants were washed down from October 30 to November 4.

1,296,982 tons of gross crude were produced in 192 shifts at an average rate of 6,755 tons a shift. From this crude, 255,540 tons of screen rock and 23,191 tons of pit rock were removed in the pit and the balance of 1,018,251 tons delivered to the plant for a shift average rate of 5,303 tons. Screen rock made up 19.70 per cent of the total crude mined in 1959.

The following table shows material mined from various leases:

<u>Lease</u>	<u>Gross Crude</u>	<u>Screen Rock</u>	<u>Net Crude</u>	<u>Pit Rock & Waste</u>	<u>Total Tons</u>
Brown #1*	135,555	30,400	105,155	20,210	155,765
Brown #2*	273,525	40,461	231,064	2,413	275,938
North Star	478,842	146,624	332,218	19,518	498,360
Bingham	<u>388,779</u>	<u>38,965</u>	<u>349,814</u>	<u>18,228</u>	<u>407,007</u>
	1,276,701	258,450	1,018,251	60,369	1,337,070

*Includes 140,106 tons mined from Lean Ore Dump #12

The following leases and areas were mined:

Brown #1 Lease

Mining was from central bottom to north end of lease. Minor amount mined along south approach road leading into pit.

Brown #2 Lease

All crude from east corner of forty. 140,106 tons mined from lean ore dump #12 and absorbed in production of both Brown leases. All ore mined in both Brown leases was retreat ore.

North Star Lease

All crude ore mined along north side of lease. Majority of crude was rocky and banks low as mining consisted of cleanup to bottom rock. Small amount of crude wash ore mined from northwest corner of NW $\frac{1}{4}$ -NE $\frac{1}{4}$ forty.

Bingham Lease

Most of crude ore mined from east side of forty with small amount wash ore encountered in pit bottom. Operating conditions generally satisfactory and normal with no serious delays. Cost of crude production in 1959 was \$0.243 a ton as compared to \$0.218 in 1958.

c. Pumping & Drainage

During the spring thaw, rocks rolling down pit banks collapsed the 12-inch pit discharge pipe from the pit bottom to the surface and a new line had to be installed. Otherwise, there was no change in pumping facilities and the flow of water remained constant. Pumping cost per ton of concentrates was \$0.029 as compared to \$0.025 in 1958.

d. General Pit Activities

Only minor road and transmission line changes were necessary during the year. Cost was \$0.022 a ton compared to \$0.017 in 1958.

8. BENEFICIATION

a. Pit Plant

Operating the same schedule as the pit, the plant treated wash and retreat ores as required. Repairs were conducted on the Saturday shift when operating on a 5-day-week schedule and on the Sunday shift when operating on a 6-day-week schedule.

1,018,251 tons of crude treated produced 397,774 tons of concentrates at an average shift rate of 2,072 tons and a net weight recovery of 39.06 per cent. Of the wash portion of the feed, 40,005 tons produced 27,093 tons of concentrates at a weight recovery of 67.72 per cent. The crude retreat feed of 978,256 tons produced 370,681 tons of concentrates at a weight recovery of 37.89 per cent.

Total weight recovery of 39.06 per cent is down 1.62 per cent from the 40.68 per cent in 1958. Average crude feed was 5,303 tons a shift as compared to 5,673 tons in 1958. Concentrates were produced at the rate of 2,072 tons a shift as compared to 2,308 tons in 1958.

311,291 tons of ore were split intermittently during the season--66.03 per cent coarse and 33.97 per cent fines.

Operations were normal throughout the season and there were no serious delays. 397,774 tons of concentrates produced averaged 53.57 per cent natural iron and 10.62 per cent natural silica as compared to an estimated 53.50 natural iron and 11.20 natural silica.

During the season, it was necessary to stockpile 62,367 tons of concentrates which added to a balance of 90,306 tons carried over from 1958 made a total of 152,673 tons in stock. 132,241 tons were loaded and shipped intermittently from April 20 to December 1 leaving a balance of 20,432 tons in stock as of December 31, 1959.

Following is a tabulation of lost time:

<u>Washing Plant</u> <u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent</u> <u>of Total</u> <u>Working Hours</u>
Pit Screen	1.91	4.83	0.12
8' Pan	3.25	8.22	0.21
Crude Ore Conveyor	4.91	12.42	0.32
Crude Ore Pocket	1.00	2.53	0.07
Storage Bin Feeder	1.75	4.43	0.12
Primary Screens	1.25	3.16	0.08
Scalping Chute	0.42	1.06	0.03
Crushers	0.83	2.10	0.05
Secondary Screens	1.17	2.96	0.08
Classifiers	0.50	1.27	0.03
Coarse Concentrate Conveyor	0.33	0.83	0.02
Miscellaneous	1.25	3.16	0.08
Tailings Pump	0.50	1.27	0.03
Miscellaneous Heavy-Density Plant	18.21	46.07	1.19
Miscellaneous Cyclone Plant	0.42	1.06	0.03
Electric Power	<u>1.83</u>	<u>4.63</u>	<u>0.12</u>
	<u>39.53</u>	<u>100.00</u>	<u>2.58</u>
<u>Recapitulation</u>			
Crude Ore to Head of Mill	12.82	32.43	0.84
Ore Processing	<u>26.71</u>	<u>67.57</u>	<u>1.74</u>
	<u>39.53</u>	<u>100.00</u>	<u>2.58</u>

<u>Heavy-Media Plant</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of Total Working Hours</u>
Miscellaneous Wash Plant	20.90	52.87	1.47
Miscellaneous Cyclone Plant	0.42	1.06	0.03
Fine Circulating Media Pump	0.33	0.84	0.02
Magnetic Separator Feed Pump	0.83	2.10	0.06
50' Thickener	0.25	0.63	0.02
Coarse Heavy Density Hopper	1.00	2.53	0.07
Concentrate Conveyor	0.42	1.06	0.03
Reject Conveyor	5.67	14.34	0.40
Miscellaneous Chutes & Launderers	0.55	1.39	0.04
Rock Truck	2.41	6.10	0.17
Heavy Density Generator Set	<u>6.75</u>	<u>17.08</u>	<u>0.47</u>
	39.53	100.00	2.78

Recapitulation

Crude Ore to Head of Mill	21.32	53.93	1.50
Ore Processing	<u>18.21</u>	<u>46.07</u>	<u>1.28</u>
	39.53	100.00	2.78

Cyclone Plant

Miscellaneous Wash Plant	20.90	45.90	1.48
Miscellaneous Heavy-Media Plant	18.21	40.00	1.29
Dewatering Screens	2.50	5.49	0.18
Magnetic Ore	1.50	3.29	0.11
Tramp Screen Feed Pump	2.00	4.39	0.14
Fine Concentrate Conveyor	<u>0.42</u>	<u>0.93</u>	<u>0.03</u>
	45.53	100.00	3.23

Recapitulation

Crude Ore to Head of Mill	39.11	85.90	2.77
Ore Processing	<u>6.42</u>	<u>14.10</u>	<u>0.46</u>
	45.53	100.00	3.23

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

<u>Wash Product</u>	<u>Tons</u>	<u>Per Cent Weight</u>		<u>Per Cent</u>			<u>Iron Units</u>
		<u>Plant</u>	<u>Pit</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	
Crude to Pit	40,005	100.00	77.40	47.88		26.96	
Pit Rock	300		0.58	27.60		55.60	
Screen Plant Rock	11,385		22.02	28.89		53.53	
Pit Crude	51,690		100.00	43.58		32.98	
Total Concentrates Produced	27,093	67.73	52.42	57.41	.042	12.39	81.20
Unsized Concentrates Produced	3,987	9.97	7.71	58.14	.039	11.09	
Coarse Concentrates Produced	16,285	40.71	31.51	56.70	.046	12.89	
Fine Concentrates Produced	6,821	17.05	13.20	58.70	.035	11.95	
Total Concentrates Produced & Shipped	27,093	67.73	52.42	57.41	.042	12.39	81.20
Total Fine Tailings (by Difference)	12,912	32.27	24.98	27.88		57.54	
 <u>Retreat Product</u>							
Crude to Plant	978,246	100.00	78.55	40.14		37.08	
Pit Rock	22,891		1.84	25.25		58.94	
Screen Plant Rock	244,155		19.61	25.22		59.15	
Pit Crude	1,245,292		100.00	36.94		41.81	
Total Concentrates Produced	366,207	37.43	29.41	57.81	.045	11.40	53.91
Unsized Concentrates Produced	78,022	7.98	6.27	58.17	.046	11.16	
Coarse Concentrates Produced	189,260	19.35	15.20	57.58	.049	11.31	
Fine Concentrates Produced	98,925	10.11	7.94	57.99	.040	11.75	
1958 Stockpile Overrun	4,474	0.46	0.36				
1959 Stockpile Overrun	2,644						
Total Concentrates Produced & Shipped	370,681	37.89	29.77	57.81	.045	11.39	54.56
Heavy-Media Concentrates	231,856	23.70	18.62	57.58		11.15	
Heavy-Media Rejects	238,780	24.41	19.17	37.83		40.44	
Heavy-Media Feed	470,636	48.11	37.79	46.98		26.66	
Cyclone Concentrates	83,956	8.58	6.74	58.74		10.76	
Cyclone Rejects	34,015	3.48	2.73	41.61		32.64	
Cyclone Feed	118,011	12.06	9.48	53.79		17.06	
2" Wash Plant Rejects	32,146	3.29	2.58	32.61		49.66	
Total Fine Tailings (by Difference)	302,624	30.93	24.30	20.94		65.06	

1959 Stockpile Overrun Included in 1959 Concentrate Figures.

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9. MAINTENANCE & REPAIR

Winter & Idle repair work was conducted in the plant in January and February. Crews were transferred to E&A scrubber construction in March and April. A limited repair program was also conducted in the shops on pit equipment during the same period. Usual maintenance of mine and plant equipment was carried on throughout the operating season.

During the stripping program in November and December, a limited maintenance program was conducted on stripping equipment. No repairs were done in the beneficiating plants.

10. COST OF OPERATIONS

a. Comparative Cost

<u>Pit Product</u>	1958	1959	
	<u>Actual Cost</u>	<u>Budget</u>	<u>Actual Cost</u>
Crude Ore Net Tonnage	2,008,399	1,961,050	1,018,251
Concentrate Tonnage	817,019	725,000	397,774
Per Cent Recovery	40.7	37.0	39.1
Average Shift Product	2,308	2,080	2,072
Tons per Man per Shift	39.22		34.90
Shifts Operated	345	348	192
 <u>Costs</u>			
Pit Operating	\$0.218	\$0.238	\$0.243
Beneficiating	0.266	0.277	0.247
Loading Stockpile	0.005	0.010	0.019
Sampling & Analysis	0.035	0.037	0.045
Safety & First Aid	0.001	0.001	0.003
Employee Vacation	0.092	0.088	0.082
Personal Injury	0.003	0.005	0.006
Social Security	0.027	0.027	0.049
Total Pit & Beneficiating	<u>\$1.506</u>	<u>\$1.745</u>	<u>\$1.654</u>
General Mine Expense	0.186	0.204	0.231
Winter & Idle	0.450	0.450	0.383
Cost of Production	<u>\$2.090</u>	<u>\$2.399</u>	<u>\$2.268</u>

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10. COST OF OPERATIONS (con't)

a. Comparative Costs

<u>Costs</u>	1958	1959	
	<u>Actual Cost</u>	<u>Budget</u>	<u>Actual Cost</u>
<u>Depreciation</u>			
Plant & Equipment	\$0.279		\$0.334
Motorized Equipment	0.080		0.088
Movable Equipment	0.002		0.001
<u>Taxes</u>			
Ad Valorem	0.212		0.218
Occupational	0.449		0.158
Royalty	0.235		0.318
<u>Total Depreciation & Taxes</u>	\$1.257		\$1.117
Miscellaneous Expense & Income	0.016		0.014
Administrative Expense	0.100		0.100
Royalty	<u>1.541</u>		<u>1.614</u>
<u>Total Cost on Cars</u>	\$5.004		\$5.113

b. Cost Comments

Pit Operating: \$0.005 above budget and \$0.025 above 1958 costs. Shovel operating costs \$0.005 above budget due to working third shovel on more shifts than anticipated. Third shovel used to sort pit rock and wash lean ore dumps.

Beneficiation: \$0.030 below budget and \$0.019 below 1958 costs. Electric power costs below budget and 1958 costs because budget increased to run scrubber. Scrubber not run as anticipated due to steel strike.

Sampling & Analysis: \$0.008 above budget and \$0.010 above 1958 costs. Costs would have decreased to the budget figure if season had been normal.

Social Security: \$0.022 above both budget and 1958 costs. Short ore season due to strike--most employees did not earn over \$4800 when payment would have ceased. In full ore season, costs would have decreased to budget figure.

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General Mine Expense: \$0.027 above budget and \$0.045 above 1958 costs. Special expense--Hibbing & Ishpeming office--was above estimated budget.

Winter & Idle: \$0.067 below both budget and 1958 costs because short season necessitated only limited repair program.

Cost of Production: Drop in net recovery of 1.62 per cent and 1.86 in gross recovery from 1958 increased costs \$0.126 over 1958 but remained \$0.131 below the estimated budget.

11. EXPLORATION & FUTURE EXPLORATION

For experimental purposes, the Reich #750 drilled one hole in semi-taconite in the Holman lease. After test work on the samples, additional experimental drilling may be done on semi-taconite.

Several holes will be required on the east bank of the Brown #1 lease to definitely outline the ore in this area for future mining. Future drilling will be necessary in the southeast corner of the Bingham lease to outline ore below the paint rock layer.

12. TAXES

	<u>1959</u>		<u>1958</u>		<u>Increase-Decrease</u>	
	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>
<u>Real Estate</u>						
Mineral	\$329,946	\$ 85,139.27	\$544,118	\$120,837.73	-\$214,172	-\$35,698.46
Lands,Bldgs,Mach	135,569	34,994.95	146,824	32,754.03	- 11,255	/ 2,240.92
<u>Personal Property</u>						
Equipment	80,871	20,867.95	99,958	22,198.67	- 19,087	- 1,330.72
Stockpile Concts	4,028	1,039.39	5,880	1,305.83	- 1,852	- 266.44
	<u>\$550,414</u>	<u>\$142,041.56</u>	<u>\$796,780</u>	<u>\$177,096.26</u>	<u>-\$246,366</u>	<u>-\$35,054.70</u>
Average Mill Rate		258.06		222.26		/ 35.80

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Note: Mineral reserve reestimated by State. Increase in tonnage offset by 1958 mining for decrease of 368,938 tons. Under recovery law valuation per ton decreased from 44 per cent to 35 per cent of full and true value, or decrease of 20.5 per cent in valuation of per ton rates.

Building valuation decreased by sale and removal of Lake Concentrator from property.

Equipment valuation reduced by disposal of three Mack trucks, two 20-ton Euclids, and Western railroad car plus nominal depreciation.

13. ACCIDENTS & PERSONAL INJURIES

Albert Estlick, Churn Drill Helper, Age 65

Cut tips of second and fourth toes, fractured third toe on left foot by bouncing the bailer onto feet. Compensation Paid: \$360

Earl Luoma, Drill Helper

stated back injured while moving shovel cable. Compensation Paid: \$150

14. PROPOSED NEW CONSTRUCTION

2-inch Screening in Pit Screening Plant.
Raise & Widen Dyke on North and West Sides.

14. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

a. Received in 1959

1 High-Capacity Truck Fuel Pump & Meter
3 12" Hazleton Pumps for Tailings System
3 350 hp Western Electric Motors for Tailings System
1 Blackhawk 100,000# Electric Jack
1 P&H Zip Lift Hoist
2 40-ton Mack Production Trucks
1500' #4 Power Cable

Scrubber, Screens, Pumps--for Scrubber & Spiral Plants
Crawler Pads with Pins for #57 Shovel

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15. EQUIPMENT RECEIVED & PROPOSED NEW EQUIPMENT

b. Proposed New Equipment for 1960

- 1 3/4-ton Pickup
- 1 1/2-ton Pickup
- 1 Combination Rotary Down-the-Hole Drill
- 1 8' x 16' Pit Screen for 2-inch Screening

SALLY MINEANNUAL REPORTYear 19591. GENERAL

Sally stripping--under way in the fall of 1958--continued until January 10 when stripping was temporarily suspended because of shovel breakdowns. Stripping was resumed on February 15 and completed on March 15. The ore haul to the Canisteo was carried on from February 20 to March 28. Both operations were conducted on a 20-shift-a-week schedule with all hourly employees working a 4-day schedule. From January 1 to March 15, 385,755 cubic yards of stripping were removed. From February 20 to March 28, 701,870 tons of crude ore were hauled to the Canisteo. Stripping was resumed on December 13 and continued into 1960 on a 20-shift-a-week schedule. From December 13 to January 1, 1960, 272,754 cubic yards of surface were removed.

During the operating season which started on April 27, 335,894 tons of crude ore--which included 35,731 tons of screen rock and 624 tons of pit rock--were mined from the Sally stockpile. Because of the steel strike all operations were suspended from July 14 to November 7. Since ore operations were not resumed, a balance of 365,976 tons remained in the Sally crude ore stockpile.

The Canisteo plant received 299,539 tons of crude ore and produced 147,663 tons of Sally concentrates.

During 1959, 658,509 cubic yards of surface overburden were removed from the Sally.

2. PRODUCTION-SHIPMENTS-INVENTORIESa. Production by Grades

<u>Crude</u>	<u>Tons</u>
Wash	6,997
Retreat	<u>292,542</u>
	299,539

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a. Production by Grades (con't)

	<u>Concentrates</u>	<u>Bessemer</u>	<u>Non-Bessemer</u>	<u>Total</u>
Wash		312	3,153	3,465
Retreat		<u>12,325</u>	<u>131,873</u>	<u>144,198</u>
		12,637	135,026	147,663

b. Shipments by Grades

Wash	312	3,284	3,596
Retreat	<u>12,325</u>	<u>160,831</u>	<u>173,156</u>
	12,637	164,115	176,752

c. Inventories

	<u>Ore</u>	<u>Tons</u>
Retreat		5,766

d. Production by Months

	<u>Crude</u>		
<u>Month</u>	<u>Wash</u>	<u>Retreat</u>	<u>Total</u>
April		7,619	7,619
May	6,430	205,976	212,406
June		50,845	50,845
July	<u>567</u>	<u>28,102</u>	<u>28,669</u>
	6,997	292,542	299,539

	<u>Concentrates</u>		
April		3,835	3,835
May	3,170	106,680	109,850
June		21,991	21,991
July	295	10,912	11,207
Nov		<u>780</u>	<u>780</u>
	3,465	144,198	147,663

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3. ANALYSIS

a. Crude Ore Produced

<u>Crude Ore</u>	<u>Tons</u>	<u>Iron</u>	<u>Silica</u>
Wash	6,997	36.00	43.80
Retreat	<u>292,542</u>	<u>45.28</u>	<u>29.73</u>
	299,539	45.06	30.06

b. Concentrates Produced

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moist</u>
Bessemer Wash	312	58.80	.027	9.90	.22	.42	6.40
Non-Bessemer Wash	3,153	57.78	.036	11.27	.31	.46	6.47
Bessemer Retreat	12,325	58.94	.042	10.05	.29	.65	6.21
Non-Bessemer Retreat	<u>131,873</u>	<u>58.30</u>	<u>.049</u>	<u>10.66</u>	<u>.30</u>	<u>.59</u>	<u>6.06</u>
	147,663	58.34	.048	10.62	.30	.59	6.08

c. Tonnage & Complete Analysis of Concentrates Shipped

<u>Product</u> <u>Sally</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulf</u>	<u>Ign</u> <u>Loss</u>	<u>Moist</u>
Bessemer Wash	312	58.80	.027	9.90	.22	.42	.30	.20	.008	4.72	6.40
Non-Bessemer Wash	3,284	57.77	.037	11.29	.31	.47	.30	.20	.008	4.60	6.46
Bessemer Retreat	12,325	58.94	.042	10.05	.29	.65	.30	.20	.008	4.01	6.21
Non-Bessemer Retreat	<u>160,831</u>	<u>58.13</u>	<u>.053</u>	<u>10.91</u>	<u>.32</u>	<u>.62</u>	<u>.30</u>	<u>.20</u>	<u>.008</u>	<u>4.27</u>	<u>6.06</u>
	176,752	58.17	.052	10.87	.32	.62	.30	.20	.008	4.25	6.08

d. Mine Analysis of Ore in Stockpile

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moist</u>
Retreat	5,766	57.92	.053	11.09	.34	.57	6.70

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4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

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

b. Ore Reserves as of December 31, 1959

<u>Lease</u>	<u>Reserve 12-31-58</u>	<u>Mined 1959</u>	<u>Balance after Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-59</u>
Bovey No. 1 NW $\frac{1}{4}$ -SW $\frac{1}{4}$ 21-56-24	1,213,168	147,663	1,065,505		1,065,505

c. Estimated Analyses of Ore Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Bessemer Wash	459,312	61.52	.029	7.47
Bessemer Retreat	329,752	58.59	.026	11.45
Non-Bessemer Retreat	<u>276,441</u>	<u>57.12</u>	<u>.053</u>	<u>10.42</u>
	1,065,505	59.47	.034	9.46
<u>Wash</u>				
Bessemer	459,312	61.52	.029	7.47
<u>Retreat</u>				
Bessemer	329,752	58.59	.026	11.45
Non-Bessemer	<u>276,441</u>	<u>57.12</u>	<u>.053</u>	<u>10.42</u>
	606,193	57.92	.038	10.98
<u>Totals</u>				
Bessemer	789,064	60.30	.028	9.13
Non-Bessemer	<u>276,441</u>	<u>57.12</u>	<u>.053</u>	<u>10.42</u>
	1,065,505	59.47	.034	9.46

5. LABOR & WAGES

a. Comments

The nationwide steel strike shut down operations from July 14 to November 7. Labor relations during the period the mine operated were generally satisfactory.

b. Comparative Statement of Production & Wages

	<u>1959</u>	<u>1958</u>
Production-Tons	147,663	263,963
Number of Days Operated	18.5	36
Number of Shifts Operated	37	59.5
Average Product per Shift	3,991	4,436
Average Number of Men Employed	130	129
Tons per Man per Day	63.85	70.55
Average Wages Paid per Day	\$23.22	\$25.43
Total Amount of Labor	\$122,297.32	\$146,806.13*
Labor Cost per Ton	\$0.8282	\$0.556

*includes cost of hauling Sally ore to the Canisteo

6. GENERAL SURFACE

- a. Buildings & Repairs None
- b. Roads, Transmission Lines, Etc. None
- c. Miscellaneous General Construction None

7. OPEN PIT

a. Stripping

Surface stripping authorized under E&A CC-973 and started in the fall of 1958 continued from January 1 to January 10 and was then suspended until February 15 because of shovel breakdowns. Stripping resumed on February 15 and was completed on March 15. Operations were conducted on a 20-shift-a-week

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basis with all hourly employees working a 4-day-week schedule. Two shovels and twelve trucks were in operation. 385,755 cubic yards were moved at an average rate of 5,550 cubic yards per shift and a cost of \$0.381 per cubic yard, for a total of \$146,980.

Surface stripping was resumed on December 13 and continued into 1960. E&A CC-32 authorized removal of 600,000 cubic yards of surface stripping at a cost of \$0.390 a yard, for a total of \$234,000. From December 13, 1959, to January 1, 1960, 272,754 cubic yards were moved at an average rate of 5,566 yards per shift and a cost of \$0.338 per cubic yard. Stripping operations were conducted on a 20-shift-week schedule with all hourly employees working a 5-day week.

658,509 cubic yards of surface overburden were moved in 1959 at an average rate of 5,557 cubic yards a shift and a cost of \$0.363 a cubic yard, for a total expenditure of \$254,910.

b. Open Pit Mining

Hauling of ore to the Canisteo on a 20-shift-per-week schedule started on February 20 and continued to completion on March 28. Two shovels and fourteen trucks were in operation. Hourly employees worked a 4-day week. 701,870 tons were stockpiled in the Canisteo pit.

Ore operations started April 27 on a 2-shift, 5-day-week schedule which continued until May 10 when a 2-shift, 6-day-week schedule went into effect and continued until all operations were suspended by the steel strike on July 14. Ore operations were not resumed after the end of the strike on November 7.

335,270 tons of crude were mined from the Sally stockpile in 37 shifts at an average rate per shift of 9,061 tons. The balance in the Sally crude stockpile as of January 1, 1960, was 365,976 tons.

c. Pumping & Drainage

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

8. BENEFICIATION

a. Plant Operation

The concentrating plant at the Canisteo received 299,539 tons of crude ore and produced 147,663 tons of concentrates at an average rate of 3,991 tons a shift. Weight recovery on pit and plant crude was 44.04 and 49.30 per cent respectively. Of the standard concentrates, 3,465 tons were wash and 144,198 tons retreat concentrates.

The Heavy-Media plant received 87,236 tons of feed and produced 63,274 tons of concentrates at a weight recovery of 72.53 per cent. Coarse tailings amounted to 23,962 tons.

The fine ore plant did not operate.

During the operating season it was necessary to stockpile 59,631 tons of concentrates. Of this amount, 53,865 tons were shipped from stockpile, leaving a balance of 5,766 tons in stock as of January 1, 1960.

Of the total standard concentrates produced, 33 per cent was split coarse and fines. Of the split ore, 50 per cent was coarse and 50 per cent fines.

Concentration data for the year follows:

<u>Wash Product</u>	<u>Tons</u>	<u>%Recovery</u>		<u>Per Cent</u>		
		<u>Plant</u>	<u>Pit</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Crude to Plant	6,997	100.00	96.42	36.00		43.80
Screen Plant Reject	260		3.58	27.70		57.90
Pit Crude	7,257		100.00	35.70		44.30
Concentrates Produced	3,465	49.52	47.75	57.80	.035	11.24
Total Concts Produced & Shipped	3,465	49.52	47.75	57.80	.035	11.24
Total Fine Tailings (by difference)	3,532	50.48	48.67	14.60		75.75
<u>Retreat Product</u>						
Crude to Plant	292,542	100.00	89.02	45.28		29.73
Pit Rock	624		.19	25.30		61.53
Screen Rock	35,471		10.79	26.97		59.17
Pit Crude	328,637		100.00	43.26		32.97

<u>Retreat Product</u>	<u>Tons</u>	<u>%Recovery</u>		<u>Per Cent</u>		
		<u>Plant</u>	<u>Pit</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Concentrates Produced	140,951	48.18	42.89	58.04	.053	10.94
Stockpile Overrun	3,247					
Total Concts Produced & Shipped	144,198	49.29	43.88	58.04	.053	10.94
Heavy-Media Concentrates	63,274	21.63	19.25	58.36		9.83
Heavy-Media Rejects	23,962	8.19	7.29	39.46		37.00
Heavy-Media Feed	87,236	29.82	26.54	52.44		18.49
Total Fine Tailings (by difference)	124,382	42.52	37.85	31.61		50.11

Following is a brief classification of delay time:

<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent of Total Working Hours</u>
<u>Washing Plant</u>		
Screen Plant	4.00	1.35
Plant Conveyor	2.00	.68
Plant Machines	1.00	.33
Windstorm	2.00	.68
	9.00	3.04
<u>Heavy-Media Plant</u>		
Electrical	4.00	1.40

9. MAINTENANCE & REPAIR

Plant repairs under way at the Canisteo in the fall of 1958 continued until January 10 when all repair work except shovel repair was suspended. Pit and plant equipment repairs were resumed February 15 and continued until the start of ore operations on April 27. There was no repair program in the fall of 1959 except running repairs necessary to pit equipment to conduct stripping operations in the Sally.

10. COST of PRODUCTION

a. Comparative Mining Costs

<u>Product</u>	<u>Budget</u>	<u>Actual</u>	
	<u>1959</u>	<u>1959</u>	<u>1958</u>
Wash Concentrates	20,000	3,465	18,544
Retreat Concentrates	280,000	144,198	215,586
Fine Ore Concentrates			<u>29,833</u>
	<u>300,000</u>	<u>147,663</u>	<u>263,963</u>
Per Cent Recovery	42.86	44.04	49.11
Average Product per Shift		3,991	4,436
Tons per Man per Day		63.85	70.55
Days Operated		18.5	36
<u>Costs</u>			
Pit Operating	\$0.385	\$0.412	\$0.371
Beneficiation	0.152	0.150	0.131
Fine Ore Concentration			0.604
Loading Stockpile Ore	0.010	0.058	0.036
Sampling & Analysis	0.029	0.037	0.026
Safety & First Aid Supplies	0.001	0.001	0.001
Employees Vacation Pay	0.064	0.074	0.047
Personal Injury Expense	0.008	0.002	0.008
Social Security Taxes	0.024	0.023	0.017
	<u>\$1.382</u>	<u>\$1.426</u>	<u>\$1.212</u>
General Mine Expense	0.197	0.147	0.173
Winter & Idle	0.373	0.248	0.331
Cost of Production	<u>\$1.952</u>	<u>\$1.821</u>	<u>\$1.716</u>
<u>Depreciation</u>			
Plant & Equipment		0.276	0.292
Motorized Equipment		0.021	0.019
Movable Equipment		0.005	0.006
<u>Taxes</u>			
Ad Valorem		0.184	0.202
Occupational		1.170	0.620
Royalty		0.045	0.043
Deferred Mining Costs		<u>0.026</u>	<u>0.028</u>
Total Depreciation & Taxes		<u>\$1.727</u>	<u>\$1.210</u>
Royalty		<u>0.300</u>	<u>0.300</u>
Total Cost on Cars		<u>\$3.848</u>	<u>\$3.226</u>

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b. Detailed Cost Comparison

Over-all Mining: \$0.131 under budget of \$1.952.
Main reason due to decrease in Winter & Idle expense as adjusted by Cleveland office because of strike.

Pit Operating: \$0.027 over budget of \$0.385.
Some reduction in crude ore consumption experienced which was main reason for increase. Because Sally ore was mixed with a rocky and in some cases painty Bovey ore, the over-all rate of crude consumption decreased.

Beneficiation: \$0.002 below budget of \$0.152.

Miscellaneous Pit & Beneficiation: \$0.040 over budget of \$0.143. Large tonnage of ore loaded out of stockpile as compared to total tonnage was main reason for increase. Also noted were increases in personal injury and social security taxes.

General Mine: \$0.050 below budget of \$0.197.
Part of decrease due to allocation of costs between Canisteo and Sally. Canisteo costs were \$0.015 over budget.

Winter & Idle: \$0.125 below budget of \$0.373.
Adjustment by Cleveland because of strike accounted for decrease.

II. EXPLORATION & FUTURE EXPLORATION

No exploratory drilling was done at the Sally in 1959. Additional drilling will be required to determine extent of mineable ore, particularly in the northwest portion of the forty. A minimum requirement of 2000 feet for future exploratory drilling is estimated.

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12. TAXES

	1959		1958		Increase-Decrease	
	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
<u>Real Estate</u>						
Mineral	\$ 97,108	\$24,013.84	\$158,440	\$33,914.08	-\$61,332	-\$9,900.24
Lands, Bldgs, Mach.	933	235.81	933	206.48		29.33
<u>Personal Property</u>						
Stockpile Concts	2,078	513.86	2,857	611.54	- 779	- 97.68
Crude Stockpile	74,514	18,426.57	28,784	6,161.22	45,730	12,265.35
	<u>\$174,633</u>	<u>\$43,190.08</u>	<u>\$191,014</u>	<u>\$40,893.32</u>	<u>-\$16,381</u>	<u>/\$2,296.76</u>
Average Mill Rate		247.32		214.09		33.23

Note: Increased mill rate of 15.5 per cent offset decrease in valuation by 1958 production.

In addition to above taxes, \$15,720.92 charged to Sally cost for proportionate share of Canisteo taxes on equipment used by Sally.

Tax Commission Reserve
as of May 1, 1959

1959	913,167*
1958	<u>1,213,168</u>
	<u>-300,001</u>
*plus crude stockpile of	296,165

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

WANLESS MINE
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1. GENERAL

The Wanless mine was shut down and no mining or stripping was conducted in the pit in 1959. The only activity was intermittent pumping by the Snyder Mining Company from the Wanless mine pit sump to supplement drainage in their Whiteside and Kosmerl mines.

2. PRODUCTION-SHIPMENTS-INVENTORIES

- a. Production - None
- b. Shipments - None
- c. Stockpile Inventories

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

3. ANALYSIS

d. Concentrates in Stockpile

Iron	52.215
Phos	.167
Silica	9.46
Mang	.88
Alum	5.13
Moisture	17.360

4. ESTIMATE OF ORE RESERVES

b. Reserves Estimated as of December 31, 1959

<u>Ore</u>	<u>Tons</u>
Woodbridge	
Pit (Open)	59,889
Underground	<u>11,426</u>
	71,315

Wanless Mine
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4. ESTIMATED ORE RESERVES (con't)

b. Reserves Estimated as of December 31, 1959

<u>Ore</u>	<u>Tons</u>
<u>Wanless</u>	
Open Pit	621,623
Underground	<u>103,662</u>
	725,285
Total Wanless-Woodbridge	796,600

c. Estimated Analyses of Reserves

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>	<u>Moisture</u>
Woodbridge							
<u>SE$\frac{1}{4}$-NE$\frac{1}{4}$ 16-58-19</u>							
Open Pit	59,889	56.04	.079	6.22	0.93	1.20	18.50*
Underground	11,426						
Wanless							
<u>NE$\frac{1}{4}$-SE$\frac{1}{4}$ 16-58-19</u>							
Open Pit	621,623	55.51	.103	8.77	1.42	1.94	18.50*
Underground	103,662	55.51	.093	9.28	0.71	0.92	18.50*
<u>Total Mine</u>	796,600	54.68	.098	8.52	1.27	1.72	18.50*

*Moisture Assumed

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12. TAXES

	1959		1958		Increase-Decrease	
	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
<u>Real Estate</u>						
Mineral	\$172,210	\$22,049.77	\$181,299	\$19,076.28	-\$ 9,089	/\$2,973.49
Lands, Bldg, Machinery	1,867	240.40	1,867	198.46		41.94
<u>Personal Property</u>						
Equipment	2,484	318.05	2,593	272.82	- 109	45.23
Stockpile Concts-Direct	211	27.02	10,100	1,062.72	- 9,889	- 1,035.70
Total	\$176,772	\$22,635.24	\$195,859	\$20,610.28	-\$19,087	/\$2,024.96
Average Mill Rate		128.05		105.23		22.82

Note: Revised mineral estimate filed and valuation redetermined by State on present worth basis--reduction of 428,749 tons, \$9,089 in valuation. Stockpile shipped in 1958 left balance of 439 tons on hand May 1. Mill rate increase of 21.69 per cent offset the valuation decrease for an over-all tax increase of \$2,025.

Tax Commission Reserve

as of	Tons
Total reported December 31, 1958	1,225,349
Total reported December 31, 1959	<u>796,600</u>
Decrease by re-estimate May 1, 1959	428,749

SAFETY DEPARTMENTANNUAL REPORTYEAR 1959

11. ACCIDENTS
AND
PERSONAL
INJURY

a. Fatal Accidents

We probably should open this annual report with a prayer of thanks because there were no fatal accidents for the year. This is the fifth no-fatality year since fatal accident records have been kept, starting in 1898. A breakdown of the fatal accidents shows that from 1898 through 1931 there were fatal accidents each year. During 1932, with an average of 630 men employed, there were no fatal accidents. The next fatal accident free year was 1946 with an average of 2,791 employees. During the six year period (1954-1959) three of the years, 1954, 1956 and 1959, were free of fatal injuries. The average number of employees for those three years was 3,381. In the following tables, it is interesting to note that the five year fatality rates have been going down gradually. The highest fatality rate for a five year period was 6.90 per thousand employees. The first time it was below 1.00 was the period 1936 to 1940 when it was .94. The following five year period it was .86, then .83 and at the end of 1955 it was .58. For the last four years (1956 through 1959) the rate is .41. This at least shows some improvement over the years.

TABLE I
FATAL ACCIDENT RECORD
THE CLEVELAND CLIFFS IRON CO.
MINING & ELECTRIC POWER DEPARTMENTS
1898-1959 INCLUSIVE

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NO. OF FATALITIES</u>	<u>FATALITY RATE</u>
1898	1,065	6	5.63
1899	1,174	4	3.41
1900	1,427	4	2.80
	<hr/> 3,666	<hr/> 14	<hr/> 3.79
1901	1,317	9	6.83
1902	1,485	8	5.38
1903	1,551	8	5.15
1904	1,338	4	2.97
1905	2,038	12	6.54
	<hr/> 7,729	<hr/> 41	<hr/> 5.30

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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

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

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NO. OF FATALITIES</u>	<u>FATALITY RATE</u>
1906	2,418	10	4.13
1907	2,843	17	6.00
1908	2,340	6	2.52
1909	2,520	13	5.15
1910	2,907	20	6.88
	<hr/> 13,028	66	5.06
1898-1910		121	4.99
1911	2,633	5	1.90
1912	2,335	4	1.71
1913	2,521	11	4.19
1914	2,435	10	4.10
1915	3,308	5	1.51
	<hr/> 13,332	35	2.70
1916	3,063	8	2.61
1917	3,457	6	1.73
1918	3,765	13	3.45
1919	3,938	11	2.79
1920	4,125	5	1.21
	<hr/> 18,348	43	2.36
1921	2,309	6	2.60
1922	2,301	1	.43
1923	2,728	6	2.20
1924	2,472	5	2.02
1925	2,472	2	.81
	<hr/> 12,282	20	1.61
1926	2,119	55	25.96
1927	1,969	4	2.03
1928	1,784	4	2.25
1929	2,000	4	2.00
1930	2,566	5	1.95
	<hr/> 10,438	72	6.90
1931	1,651	3	1.82
1932	630	0	0.00
1933	631	2	3.17
1934	1,073	4	3.74
1935	1,313	2	1.53
	<hr/> 5,298	11	2.05

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

a. Fatal Accidents (Cont.)

TABLE I (Cont.)

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NO. OF FATALITIES</u>	<u>FATALITY RATE</u>
1936	2,125	2	.94
1937	2,763	1	.36
1938	2,590	3	1.17
1939	2,457	1	.41
1940	2,756	5	1.88
	<u>12,691</u>	<u>12</u>	<u>.94</u>
1941	3,570	5	1.40
1942	3,562	2	.56
1943	3,609	4	1.11
1944	3,584	3	.84
1945	3,078	1	.32
	<u>17,403</u>	<u>15</u>	<u>.86</u>
1946	2,791	0	0.00
1947	3,942	7	1.78
1948	4,003	3	.75
1949	4,191	1	.24
1950	4,344	5	1.15
	<u>19,271</u>	<u>16</u>	<u>.83</u>
1951	4,975	2	.40
1952	4,906	5	1.02
1953	4,952	2	.40
1954	3,946	0	0.00
1955	3,742	4	1.07
	<u>22,521</u>	<u>13</u>	<u>.58</u>
1956	3,878	0	0.00
1957	3,200	2	.62
1958	2,654	3	1.13
1959	2,320	0	0.00
1911-1959	143,636	242	1.68

BASED ON PER THOUSAND EMPLOYEES

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

a. Fatal Accidents (Cont.) TABLE II

CLASSIFICATION OF CAUSES OF FATAL ACCIDENTS
FROM DECEMBER 1, 1898 TO DECEMBER 31, 1959

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

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries

Causes of Compensable Injuries - Underground

It is a coincidence that we had the same number of compensable injuries underground in 1958 and 1959. The total number was 58. Of these injuries, there is a total of 5,569 lost time days charged; included is one injury (loss of foot) with a time charge of 2,400 days or close to half of the time charges. Falls of ground caused only eleven injuries, none of which were very serious and main causes of these injuries were failure to properly block the back and sides of the drift or failure of rotted blocking and lagging.

Falling material caused seven injuries. Falling material, chunks and tools down raises, mills and shafts caused five injuries, as did falling persons from stumbling and tripping and five from drilling equipment.

Chunks falling and rolling from mill raises are a real threat as no method has been devised to properly block and open the mills. A questionnaire was sent out to mining companies of the district on their methods but according to the answers, they are in trouble also.

The other 26 injuries were from 13 different causes as shown on Table VII.

Surface at Underground Mines

There were only four compensable injuries on surface at underground mines, and came from four different causes.

Open Pits

There were ten injuries at open pits and five of them occurred at one of the pits. None of the injuries were serious and I feel sure that all were avoidable.

Other Operations

Four compensable injuries occurred at these operations, with at least one of a serious nature, causing loss of about five months. The others were of a minor nature.

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

INTERPRETATION OF INJURY RATES

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

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

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

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

CLASSIFICATION OF COMPENSABLE ACCIDENTS

11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

(COMBINED) CLASSIFICATION	BUNKER HILL	CAMBRIA JACKSON	CANISTEO	CLIFFS SHAFT	DIAMOND DRILLS	ELEC. POWER DIV.	HAWKINS	HILL TRUMBULL	HOLMAN CLIFFS	HUMBOLDT	MISCELLANEOUS	MATHER MINE "A" SHAFT	MATHER MINE "B" SHAFT	ORE IMPROV. PLT	OHIO	PELLET PLANT	REPUBLIC	RES. PILOT PLT	STRHSE & SHOPS	TILDEN	WANLESS	TOTAL	
III-A-4 & III-B-4												1	3				1						5
III-A-4 & III-A-3													1			1							2
III-A-4 & II-6																	1						1
TOTALS*	14	0	2	10	0	0	2	0	1	0	0	18	20	1	0	2	5	0	1	0	0		76

*Totals are for this page and preceding page.

TABLE IV (Cont.)

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.) TABLE V

NUMBER OF MAN-SHIFTS WORKED
AND TONS OF ORE PRODUCED PER FATALITY

<u>YEAR</u>	<u>NUMBER OF FATALITIES</u>	<u>NUMBER OF MAN-DAYS WORKED PER FATALITY</u>	<u>NUMBER OF TONS OF ORE MINED PER FATALITY</u>
1940	5	142,878	1,156,387
1941	5	182,340	1,456,528
1942	2	512,356	3,808,258
1943	4	269,351	1,624,315
1944	3	331,090	1,995,787
1945	1	915,666	5,970,577
1946	0	747,079*	4,416,253**
1947	7	153,031	1,130,679
1948	3	386,965	2,869,090
1949	1	1,013,442	7,162,324
1950	5	233,060	1,647,066
1951	2	679,740	4,507,045
1952	5	239,483	1,493,841
1953	2	617,377	4,482,063
1954	0	884,848*	6,280,483**
1955	4	223,940	2,147,324
1956	0	911,240*	8,908,456**
1957	2	463,167	4,367,207
1958	3	175,078	1,748,612
1959	0	462,219*	4,087,895**
TOTALS	54	19,192,359	142,766,021
20 Year Average	2.70	355,414	2,643,815

* Man-Days Worked During Year without Fatality

** Amount of Ore Mined During Year without Fatality

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE VI

<u>Mine or Plant</u>	<u>Less Than</u> <u>7 Days</u>	<u>7 Days</u> <u>or More</u>	<u>Fatalities</u>	<u>Total</u>
Bunker Hill Group	5	14		19
Cambria Jackson	0	0		0
Canisteo	2	2		4
Cliffs Shaft	7	10		17
Diamond Drills	0	0		0
Electric Power Div.	0	0		0
Hawkins	3	2		5
Holman Cliffs	0	1		1
Hill Trumbull	2	0		2
Humboldt	0	0		0
Mather Mine "A" Shaft	5	18		23
Mather Mine "B" Shaft	13	20		33
Miscellaneous-Michigan	0	0		0
Miscellaneous-Minnesota	0	0		0
Ohio	0	0		0
Ore Improvement Plant	0	1		1
Pelletizing Plant	1	2		3
Republic	0	5		5
Research Pilot Plant	1	0		1
Research Laboratory	1	0		1
Storehouse & Shops	0	1		1
Tilden	0	0		0
Wanless	0	0		0
TOTALS	40	76	0	116

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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE VII

CAUSES OF COMPENSABLE INJURIES - UNDERGROUND

CAUSE	BUNKER HILL GROUP	CAMBRIA JACKSON	CLIFFS SHAFT	MATHER MINE "A" SHAFT	MATHER MINE "B" SHAFT	TOTAL
Fall of Ground	1		1	3	6	11
Falling Chunks, etc. (Shafts, Chutes, Raises, Mills)	3			1	1	5
Persons Falling (Slipping and Stumbling)			2	3		5
Haulage	2		2			4
Flying Objects					2	2
Drilling Equipment			1	1	3	5
Lifting or Pulling					1	1
Handling Material				3	1	4
Falling Material	2		2	1	2	7
Loading Equipment					1	1
Bumping Against Objects	1					1
Scraping Operations	2			1		3
Hand Tools	1			1		2
Jumping from Slide to Level			1			1
Rolling Chunks			1		1	2
Caught by Chain Conveyor				1		1
Falling Down Raise				1		1
Stepping Off Stage					2	2
TOTALS	12	0	10	16	20	58

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE VII (Cont.)

CAUSES OF COMPENSABLE INJURIES-OPEN PITS

CAUSE	CANISTEO	HAWKINS	HILL TRUMBULL	HOLMAN CLIFFS	HUMBOLDT	OHIO	REPUBLIC	TILDEN	WANLESS	TOTAL
Haulage	1									1
Hand Tools	1									1
Rolling Chunks		1								1
Falling from Stage		1								1
Drilling Equipment				1						1
Caught by Band Saw							1			1
Handling Material							1			1
Slipping and Stumbling							3			3
TOTALS	2	2	0	1	0	0	5	0	0	10

SAFETY DEPARTMENT
ANNUAL REPORT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE VII (Cont.)

CAUSES OF COMPENSABLE INJURIES - SURFACE (Underground Mines)

CAUSE	Bunker Hill Group	Cambria Jackson	Cliffs Shaft	Mather Mine "A" Shaft	Mather Mine "B" Shaft	TOTAL
Struck by Snow Bucket of Shovel	1					1
Caught by Brake Wheel	1					1
Handling Material				1		1
Lifting or Pulling				1		1
TOTALS	2	0	0	2		4

CAUSE	<u>OTHER OPERATIONS</u>								Total
	Elec. Power Div.	Diamond Drill Dept.	Ore Improv. Plant	Pellet Plant	Res. Pilot Plant	Strhse Shops Garage	Misc. Mich	Misc. Minn	
Handling Material			1						1
Slipping or Falling					1				1
Moving Machinery					1				1
Falling Material						1			1
TOTALS	0	0	1	2	0	1	0	0	4

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SAFETY DEPARTMENT
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YEAR 1959

11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE VIII

FREQUENCY RATES, ALL COMPENSABLE INJURIES

<u>Year</u>	<u>Total Man Days Worked</u>	<u>Number of Compensable Injuries</u>		<u>Frequency* Rate</u>
		<u>Non-Fatal</u>	<u>Fatal</u>	
1941	918,300	79	5	11.43
1942	1,024,713	75	2	9.39
1943	1,077,402 $\frac{1}{4}$	171	4	20.30
1944	993,272 $\frac{1}{2}$	121	3	15.61
1945	915,665-3/4	107	1	14.74
1946	747,079	101	0	16.89
1947	1,071,219	149	7	18.20
1948	1,160,896 $\frac{1}{4}$	145	3	15.94
1949	1,013,442	126	1	15.66
1950	1,165,301 $\frac{1}{2}$	145	5	16.09
1951	1,359,478-3/4	136	2	12.69
1952	1,197,416 $\frac{1}{2}$	152	5	15.87
1953	1,234,755 $\frac{1}{4}$	152	2	15.39
1954	884,848	99	0	13.99
1955	895,762	121	4	17.44
1956	911,240 $\frac{1}{4}$	139	0	19.07
1957	926,334	140	2	19.16
1958	525,236	70	3	17.37
1959	462,194	76	0	20.55

* Based on 1,000,000 Man-Hours of Labor.

TABLE VIII-A
SEVERITY RATES, ALL COMPENSABLE INJURIES

<u>Year</u>	<u>Non-Fatal</u>		<u>Fatal</u>		<u>Days Lost</u>		<u>Severity* Rate</u>
	<u>Days Lost</u>	<u>Rate</u>	<u>Days Lost</u>	<u>Rate</u>	<u>All Injuries</u>		
1941	5,403	.735	30,000		35,403		4.819
1942	5,851	.500	12,000		17,851		2.177
1943	10,355	1.201	24,000		34,355		3.986
1944	7,759	.976	18,000		25,759		3.242
1945	7,624	1.041	6,000		13,624		1.860
1946	7,994	1.337	0		7,994		1.337
1947	9,946	1.161	42,000		51,946		6.062
1948	14,526	1.564	18,000		32,526		3.502
1949	5,833	.719	6,000		11,833		1.390
1950	7,063	.757	30,000		37,063		3.976
1951	10,657	.979	12,000		22,657		2.083
1952	17,716	1.849	30,000		47,716		4.981
1953	8,587	.869	12,000		20,587		2.084
1954	6,502	.919	0		6,502		.919
1955	7,392	1.832	24,000		31,392		4.381
1956	5,560	.763	0		5,560		.763
1957	6,302	.850	12,000		18,302		2.470
1958	3,337	.794	18,000		21,337		5.078
1959	5,569	1.506	0		5,569		1.506

* Based on Days Lost by Injuries per 1,000 Man-Hours of Labor except for Years 1955, 1956, 1957, 1958 and 1959 which are based on new rate - 1,000,000 Man-Hours of Labor.

SAFETY DEPARTMENT
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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE IX
COMPARISON OF COMPENSABLE ACCIDENTS, INCLUDING FATALITIES
BY MINES

<u>Mine or Plant</u>	<u>FREQUENCY</u>		<u>SEVERITY</u>	
	<u>1958</u>	<u>1959</u>	<u>1958</u>	<u>1959</u>
Bunker Hill	18.87	38.38	1,116	8,181
Cambria Jackson	0.00	0.00	0	0
Canisteo	4.84	13.44	39	726
Cliffs Shaft	32.10	29.34	15,715	1,396
Diamond Drill Dept.	0.00	0.00	0	0
Elec. Power Div.	0.00	0.00	0	0
General Roll	0.00	0.00	0	0
Hawkins	16.67	13.01	745	624
Hill Trumbull	0.00	0.00	0	0
Holman Cliffs	4.11	5.49	398	220
Humboldt	0.00	0.00	0	0
Mather Mine "A" Shaft	25.42	32.38	9,627	1,482
Mather Mine "B" Shaft	30.78	34.42	9,501	1,294
Miscellaneous-Michigan	0.00	0.00	0	0
Ohio	0.00	0.00	0	0
Ore Improvement Plant	0.00	13.98	0	182
Pelletizing Plant	13.68	12.23	994	281
Republic	16.22	30.74	378	609
Storehouse & Shops	15.72	10.39	1,360	1,361
Tilden	0.00	0.00	0	0
Wanless	0.00	0.00	0	0
All Properties	17.37	20.55	5,078	1,506

Note: Severity rating based on 1,000,000 Man-Hours of Labor.

11. ACCIDENTS
AND

PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

TABLE X

COMPENSABLE INJURIES INCLUDING FATALITIES

MINE OR PLANT	TONS OF ORE PRODUCED	HOURS OF LABOR	NO. OF FATALITIES	NO. OF COMP. INJ.	DAYS LOST FATALITIES	COMPENSABLE DAYS LOST	TOTAL DAYS LOST FATALITIES & COMPENS.	FREQUENCY	SEVERITY
Bunker Hill Group	415,955	364,742		14		2,984	2,984	38.38	8,181
Cambria Jackson	708	8,012		0		0	0	0.00	0
Cliffs Shaft	362,434	340,862		10		476	476	29.34	1,396
Mather Mine "A" Shaft	516,966	555,859		18		824	824	32.38	1,482
Mather Mine "B" Shaft	654,574	581,087		20		752	752	34.42	1,294
TOTALS	1,950,637	1,850,562	0	62	0	5,036	5,036	33.50	2,721
Canisteo	406,376	148,762		2		108	108	13.44	726
Hawkins	345,527*	153,744		2		96	96	13.01	624
Hill Trumbull	291,948	133,143		0		0	0	0.00	0
Holman Cliffs	397,774	182,083		1		40	40	5.49	220
Humboldt	-	11,885		0		0	0	0.00	0
Ohio	-	18,012		0		0	0	0.00	0
Republic	475,458	162,665		5		99	99	30.74	609
Tilden	220,175	16,497		0		0	0	0.00	0
Wanless	-	-							
TOTALS	2,137,258*	826,791	0	10	0	343	343	12.09	415
General Roll		556,302						0.00	0
Elec. Power Div.		48,007						0.00	0
Diamond Drill Div.		20,859						0.00	0
Research Pilot Plant		46,934						0.00	0
Miscellaneous		16,923						0.00	0
Ore Improvement Plant		71,508		1		13	13	13.98	182
Pelletizing Plant		163,590		2		46	46	12.23	281
Strhse & Shops		96,279		1		131	131	10.39	1,361
TOTALS		1,020,402	0	4	0	190	190	3.92	186
GRAND TOTALS	4,087,895	3,697,755	0	76	0	5,569	5,569	20.55	1,506

* Hawkins total includes 27,406 tons International Harvester Co. Fine Ore Concentrate.

THE CLEVELAND CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS - YEAR- 1959

Mine or Plant	Position Rating	Hrs. Labor	No. of Fatals	Compens. Injuries	Non-Comp. 1-7 Days	Compens. Days Lost	Days Lost Non-Comp. 1-7 Days	Lost-Time Injur. Incl. Fatals	Days Lost All Injur. & Fatals	Frequency	Severity	Avg. Days Lost per Injury	Type of Operation
Cambria Jackson	1	8,012	0	0	0	0	0	0	0	0.00	0	0	Under-Ground
Mather Mine "B" Shaft	2	581,087	20	13	752	35	33	787	56.79	1,354	24		
Cliffs Shaft	3	340,862	10	7	476	22	17	498	49.87	1,461	29		
Mather Mine "A" Shaft	4	555,859	18	5	824	11	23	835	41.38	1,502	36		
Bunker Hill Group	5	364,742	14	5	2,984	13	19	2,997	52.09	8,217	158		
TOTALS		1,850,562	62	30	5,036	81	92	5,117	49.71	2,765	56		
Ohio	1	18,012	0	0	0	0	0	0	0.00	0	0	Open Pit	
Tilden	2	16,497	0	0	0	0	0	0	0.00	0	0		
Humboldt	3	11,885	0	0	0	0	0	0	0.00	0	0		
Hill Trumbull	4	133,143	0	2	0	4	2	4	15.02	30	2		
Holman Cliffs	5	182,083	1	0	40	0	1	40	5.49	220	40		
Republic	6	162,665	5	0	99	0	5	99	30.74	609	20		
Hawkins	7	153,744	2	3	96	9	5	105	32.52	683	21		
Canisteo	8	148,762	2	2	108	7	4	115	26.89	773	29		
TOTALS		826,791	10	7	343	20	17	363	20.56	439	21		
Miscellaneous	1	16,923	0	1	0	3	1	3	59.09	177	3	Independent Unit	
Research Pilot Plant	2	46,934	0	1	0	3	1	3	21.31	64	3		
Electric Power Div.	3	48,007	0	0	0	0	0	0	0.00	0	0		
General Roll Div.	4	556,302	0	0	0	0	0	0	0.00	0	0		
Diamond Drill Div.	5	20,859	0	0	0	0	0	0	0.00	0	0		
Ore Improvement Plant	6	71,508	1	0	13	0	1	13	13.98	182	13		
Pelletizing Plant	7	163,590	2	1	46	2	3	48	18.34	293	16		
Storehouse & Shops	8	96,279	1	0	131	0	1	131	10.39	1,361	131		
TOTALS		1,020,402	4	3	190	8	7	198	6.86	194	28		
GRAND TOTALS		3,697,755	0	76	40	5,569	109	116	5,678	31.37	1,536	49	

TABLE XI (1)

THE CLEVELAND CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS - YEAR 1959

MINE OR PLANT-MICHIGAN	Position Rating	Hours Labor	No. of Fatals	Compens. Injuries	Non-Comp. 1-7 Days	Compens. Days Lost	Days Lost Non-Comp. 1-7 Days	Lost Time Injur. Incl. Fatals	Days Lost All Injur. & Fatals	Frequency	Severity	Avg. Days Lost per Injury
General Roll	1	404,462		0	0	0	0	0	0	0.00	0	0
Elec. Power Div.	2	48,007		0	0	0	0	0	0	0.00	0	0
Diamond Drill Div.	3	20,859		0	0	0	0	0	0	0.00	0	0
Ohio	4	18,012		0	0	0	0	0	0	0.00	0	0
Tilden	5	16,497		0	0	0	0	0	0	0.00	0	0
Humboldt	6	11,885		0	0	0	0	0	0	0.00	0	0
Cambria Jackson	7	8,012		0	0	0	0	0	0	0.00	0	0
Research Pilot Plant	8	46,934		0	1	0	3	1	3	21.31	64	3
Miscellaneous	9	16,923		0	1	0	3	1	3	59.09	177	3
Ore Improvement Plant	10	71,508		1	0	13	0	1	13	13.98	182	13
Pelletizing Plant	11	163,590		2	1	46	2	3	48	18.34	293	16
Republic	12	162,665		5	0	99	0	3	99	30.74	609	20
Mather Mine "B" Shaft	13	581,087		20	13	752	35	33	787	56.79	1,354	24
Strhse & Shops	14	96,279		1	0	131	0	1	131	10.39	1,361	131
Cliffs Shaft	15	340,862		10	7	476	22	17	498	49.87	1,461	29
Mather Mine "A" Shaft	16	555,859		18	5	824	11	23	835	41.38	1,502	36
Bunker Hill Group	17	364,742		14	5	2,984	13	19	2,997	52.09	8,217	158
TOTAL		2,928,183	0	71	33	5,325	89	104	5,414	35.52	1,849	52
MICHIGAN MINES		2,928,183	0	71	33	5,325	89	104	5,414	35.52	1,849	52
MINNESOTA MINES		769,572	0	5	7	244	20	12	264	15.59	343	22
GRAND TOTAL		3,697,755	0	76	40	5,569	109	116	5,678	31.37	1,536	49

THE CLEVELAND CLIFFS IRON COMPANY

SAFETY DEPARTMENT, ACCIDENT STATISTICS - YEAR 1959

Mine or Plant-Minnesota	Position Rating	Hours Labor	No. of Fatals	Compens. Injuries	Non-Comp. 1-7 Days	Compen. Days Lost	Days Lost Non-Comp. 1-7 Days	Lost-Time Injur. Incl. Fatals	Days Lost All Injur. & Fatals	Frequency	Severity	AVG. Days Lost Per Injury
General Roll	1	151,840		0	0	0	0	0	0	0.00	0	0
Hill Trumbull	2	133,143		0	2	0	4	2	4	15.02	30	2
Holman Cliffs	3	182,083		1	0	40	0	1	40	5.49	220	40
Hawkins	4	153,744		2	3	96	9	5	105	32.52	683	21
Canisteo	5	148,762		2	2	108	7	4	115	26.89	773	29
Wanless		0										
TOTAL		769,572	0	5	7	244	20	12	264	15.59	343	22

THE CLEVELAND CLIFFS IRON COMPANY

CAUSES OF LOST TIME ACCIDENTS, JANUARY 1, 1959 TO JANUARY 1, 1960 - MARQUETTE RANGE

A - No. of Accidents
DL - Days Lost

TYPE OF ACCIDENT	Bunker Hill		Res. Pilot		Cliffs Shaft		Surf. Dia. Drills		Humboldt		Mather "A"		Mather "B"		Miscel.		Ohio		Ore Imp. Plt.		Pellet Plant		Rep. ublic		Strhse Shqps		Til-Den		Total	
	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL
Falls-Slides of Ground	1	10	.	.	1	33	3	176	7	363	12	582	
Falling chunks, materials (shafts, chutes, mills, raises)	5	147	1	7	2	12	8	166	
Falling Material	4	203	.	.	3	35	.	.	.	.	1	13	3	55	.	.	.	.	.	.	.	.	1	131	.	.	12	437
Haulage (underground)	2	27	.	.	1	155	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	4	184
Persons falling (slipping, & stumbling)	1	3	1	3	4	215	.	.	.	.	4	149	3	32	1	3	.	.	1	13	2	11	3	47	.	.	20	476
Drilling Equipment	.	.	.	.	1	10	.	.	.	.	2	38	5	139	.	.	.	.	.	.	.	.	.	.	.	.	8	187
Handling Material	.	.	.	.	.	.	.	.	.	.	5	136	3	40	.	.	.	.	.	.	.	.	1	37	.	.	9	213
Flying Particles	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
Rolling Chunks	.	.	.	.	1	28	.	.	.	.	.	.	1	25	.	.	.	.	.	.	.	.	.	.	.	.	2	53
Flying Objects	.	.	.	.	1	2	.	.	.	.	.	.	2	89	.	.	.	.	.	.	.	.	.	.	.	.	3	91
Hand Tools	1	22	.	.	1	3	.	.	.	.	1	25	3	8	.	.	.	.	.	.	.	.	.	.	.	.	6	58
Lifting or Pulling	.	.	.	.	2	5	.	.	.	.	1	2	2	14	.	.	.	.	.	.	.	.	.	.	.	.	5	21
Burns, Flashes, etc.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
Electricity	
Falling Down Raise	.	.	.	.	.	.	.	.	.	.	1	160	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	160
Loading Equipment	1	43	.	.	.	.	.	.	.	.	.	.	1	8	.	.	.	.	.	.	.	.	.	.	.	.	2	51
Bumping Coupling pin	1	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	12
Jumped from Slide to Level	.	.	.	.	1	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	10
Caught by conveyor (chain)	.	.	.	.	.	.	.	.	.	.	1	32	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	32
Railroad Cars	1	70	.	.	.	.	.	.	.	.	1	31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	101
Scraping Eqript	2	2460	.	.	.	.	.	.	.	.	1	64	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2524
Conveyor Belt	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	37	.	.	.	.	.	1	37
Band Saw	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	15	.	.	1	15
TOTALS	19	2997	1	3	17	498	0	0	0	0	23	835	33	787	1	3	0	0	1	13	3	48	5	99	1	131	0	0	104	5414

THE CLEVELAND CLIFFS IRON COMPANY

A - No. of Accidents

DL - Days Lost

CAUSES OF LOST TIME ACCIDENTS, JANUARY 1, 1959 - JANUARY 1, 1960 - MESABA RANGE

TYPE OF ACCIDENT	Canisteeo		Hawkins		Hill Trumbull		Holman Cliffs		Wanless		General Roll		Total	
	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL	A	DL
Chunk from Bank			2	27									2	27
Hand Tools	1	25	1	3									2	28
Lifting or Pulling	1	3											1	3
Falling Material					2	4							2	4
Drilling Equipment							1	40					1	40
Falling from Truck cab	1	83											1	83
Shovel boom striking shovel cab	1	4											1	4
Collapse of Staging			2	75									2	75
TOTALS	4	115	5	105	2	4	1	40	0	0	0	0	12	264

TABLE XI (3)

THE CLEVELAND CLIFFS IRON COMPANY
SAFETY DEPARTMENT - ACCIDENT STATISTICS
EYE INJURIES - YEAR 1959

<u>MICHIGAN</u>				
Mine or Plant	Slights	Compensables	Total Injuries	Days Lost
Bunker Hill Group	1	0	1	0
Cambria Jackson	0	0	0	0
Cliffs Shaft	3	0	3	2
Diamond Drills	0	0	0	0
Electric Power Div.	0	0	0	0
Engrg-Geol.Depts.	3	0	3	1
General Storehouse	3	0	3	0
Humboldt	1	0	1	1
Mather Mine "A" Shaft	8	0	8	3
Mather Mine "B" Shaft	5	0	5	0
Ohio	0	0	0	0
Ore Improvement Plant	3	0	3	0
Pelletizing Plant	5	0	5	0
Republic	3	0	3	0
Research Laboratory	0	0	0	0
Research Pilot Plant	1	0	1	0
Tilden	0	0	0	0
TOTALS	36	0	36	7

<u>MINNESOTA</u>				
Mine or Plant	Slights	Compensables	Total Injuries	Days Lost
Canisteo	4	0	4	0
Hawkins	5	0	5	0
Hill Trumbull	0	0	0	0
Holman Cliffs	7	0	7	1
Wanless	0	0	0	0
Hibbing Office	0	0	0	0
TOTALS	16	0	16	1
GRAND TOTAL	52	0	52	8

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11. ACCIDENTS
AND
PERSONAL
INJURY (Cont.)

b. All Injuries (Cont.)

Eye Injuries

It is interesting to note that at all Michigan operations there were 36 eye injuries with a total of 7 days lost time and at Minnesota operations there were 16 eye injuries with only one day lost time. Total eye injuries was 52 and total lost time 8 days. This compares with 55 eye injuries during 1958 and 37 days lost time .

How many eye injuries the safety glasses have prevented we do not know because all accidents are not reported. We can only surmise that when a lense is badly chipped or broken that we have prevented injury. A great majority of the eye injuries reported for the year were caused by dust, dirt or water getting behind the glasses.

All in all, it is gratifying to know that there were no permanent eye injuries and our eye protection program is paying off.

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11. ACCIDENTS
AND
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INJURY (Cont.)

b. All Injuries (Cont.)

TABLE XII

SHOWING TIME PERIODS
WHEN COMPENSABLE INJURIES OCCURRED

<u>Time</u>	<u>Number</u>	<u>Working Period</u>
8:00 A.M. to 12:00 Noon.....	28	.....First Half of Day Shift
12:00 Noon to 4:00 P.M.....	21	.....Second Half of Day Shift
4:00 P.M. to 8:00 P.M.....	10	.....First Half of Afternoon Shift
8:00 P.M. to 12:00 Midnight.....	8	.....Second Half of Afternoon Shift
12:00 Midnight to 4:00 A.M.....	6First Half of Night Shift
4:00 A.M. to 8:00 A.M.....	3Second Half of Night Shift
Total.....	76	

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b. All Injuries (Cont.)

TABLE XIII

SHOWING OCCUPATION OF INJURED WORKERS
(Compensable Injuries)

<u>UNDERGROUND</u>	<u>SURFACE</u>	<u>OPEN PIT</u>
Stope Scraperman.....13	Tunnel Motorman.....1	Truck Driver.....1
Miner.....32	Lander.....1	Surface Crew Leader.....1
Track Foreman..... 1	Carpenter.....1	Shovel Oiler.....1
Block Leader..... 1	Surface Laborer.....1	Master Mechanic.....1
Timber Foreman..... 1		Drill Helper .....1
Underground Foreman..... 1		Welder Leader.....1
Brakeman..... 1		Plant Repair Helper.....1
Conveyor Belt Attendant.... 2		Electrician Helper.....1
Underground Repairman..... 1		Pan Feeder Attendant.....1
Electrician..... 1		Pocket Man.....1
Underground Supervisor..... 1		
Timberman..... 1		
Welder..... 1		
Pipeman..... 1		
Total	58	Total 10
<u>ORE IMPROVEMENT PLANT</u>	<u>PELLET PLANT</u>	<u>GENERAL STRHSE & SHOPS</u>
Welder Starter..... 1	Surface Laborer..... 1	Steel Erector..... 1
	Plant Repairman Helper1	
Total	1	2
		1

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c. Safety Inspection

Routine safety inspections are made by members of the department in company of the Safety Foreman at the active properties. A Union Safety Committee man accompanies these men once a month. If a second or more safety inspections are made of the property during the same month, no Union representative is present.

During these inspections, the Safety Department personnel reports in writing only those hazards or violations which the safety foreman misses. In a separate report he writes down those hazards and violations which the safety foreman notes. The Union representative makes out his own report which is sent to the Safety Department and placed on file. A copy of his report is attached to the reports sent out by the Safety Department.

If the Safety Department recommendations are approved by the Superintendent, he signs and dates the report and returns it to the Safety Department which, in turn, sends the signed reports to the Manager. Any recommendations not approved by the Superintendent are taken up with the Central Safety Committee or the Manager.

Very fine cooperation is received by the Department from all supervisory personnel and this is very much appreciated.

Idle Property

All idle property is checked at least twice a year, usually early spring before leaves of the trees grow up and in the fall when the leaves are gone. This gives us a better chance to see our fencing and pits which very often are hidden by brush and leaves. Last summer and fall during the labor union strike, we brushed all idle and operating property fence lines and most of the prospect pits.

During the late summer we filled two small subsidences in the Negaunee residential area on Jackson Street and Cherry Street. Cause of the subsidence is not known but it seemed to be from old filled areas in former swamp land. An old shaft on Lincoln Street, Negaunee, was also filled.

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c. Safety Inspections (Cont.)

Old Number 1 shaft of the Michigamme Mine, which had been filled, caved again, so a concrete cap was placed over it on solid ledge so it should not give us trouble again.

At the Cambria Jackson Mine the shaft was prepared for filling if necessary by placing rails at ledge.

Fire Patrols and Inspections

Regular fire patrols are made of all underground mines when the mines are idle. Surface operations are patrolled by watchmen and police. There were no serious fires at our properties during the year.

Goody!

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11. ACCIDENTS
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c. Safety Inspection (Cont.) TABLE XIV
1959

MINE OR PLANT	Violations of Standards	Safety Suggestions	Recommendations	Fire Hazard	Total
Bunker Hill Group	11	23	20	5	59
Cambria Jackson	0	0	0	0	0
Cliffs Shaft	2	28	15	3	48
Diamond Drills	0	0	0	0	0
Humboldt	0	0	0	0	0
Mather Mine "A" Shaft	3	29	12	0	44
Mather Mine "B" Shaft	6	16	8	0	30
Ohio	0	0	0	0	0
Ore Improvement Plant	1	7	6	4	18
Pelletizing Plant	2	26	15	4	47
Republic	1	4	3	3	11
Research Laboratory	0	0	0	0	0
Research Pilot Plant	1	2	2	0	5
Storehouse & Shops	0	11	2	3	16
Tilden	0	2	4	1	7
TOTAL	27	148	87	23	285

TABLE XV
YEAR 1958

MINE OR PLANT	Violations of Standards	Safety Suggestions	Recommendations	Fire Hazard	Total
Bunker Hill Group	15	25	22	4	66
Cambria Jackson		6	2		8
Cliffs Shaft	3	14	13		30
Diamond Drills	0	0	0		0
Humboldt		4	2	1	7
Mather Mine "A" Shaft	19	34	16	4	73
Mather Mine "B" Shaft	16	40	16	1	73
Ohio	0	0	0		0
Ore Improvement Plant	8	9	4	2	23
Pelletizing Plant	12	30	22	3	67
Strhse & Shops	0	0	0		0
Research Laboratory		1	2		3
Republic	4	2	8	1	15
Tilden		2	2		4
Metallurgical Pilot Plant		1	10		11
TOTAL	77	168	119	16	380

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11. ACCIDENTS
AND
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INJURY (Cont.)

c. Safety Inspections (Cont.)

Blasting Inspections

There were 589 blasting inspections at underground operations with 55 violations and these were mainly because of lack of use of stemming. Only 62 inspections were for fuse blasting compared to 527 for electric blasting, which shows the trend.

Supervisors are required by our safety rules to inspect blasting procedure in underground mining contracts at least once every two months and the main purpose is to insure safety in the use of explosives. Reports indicate that this rule is not being followed as well as it should be.

Nearly all blasting on surface and in open pits is under the supervision of a foreman so reports are not required.

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11. ACCIDENTS
AND
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INJURY (Cont.)

c. Safety Inspections (Cont.)

TABLE XVI

NUMBER OF INSPECTIONS MADE DURING THE BLASTING
PROCEDURE IN VARIOUS MINING CONTRACTS

<u>Mine</u>	<u>Fuse</u> <u>Blasting</u>	<u>Electric</u> <u>Blasting</u>	<u>Number of</u> <u>Violations</u>	<u>Number of</u> <u>Inspections</u>
Bunker Hill	12	26	7	38
Cambria Jackson	0	0	0	0
Cliffs Shaft	0	206	0	206
Mather Mine "A" Shaft	50	45	24	95
Mather Mine "B" Shaft	0	250	24	250
TOTAL	62	527	55	589

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11. ACCIDENTS
AND
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c. Safety Inspections (Cont.)

Safety Rules and Regulations

The distribution of rule books to employees engaged in various occupations at our properties was limited in 1959. Due to the strike, the resulting reduction in employee personnel etc. and the fact that all employees had recently received new rule books, no complete coverage was undertaken.

Men who were transferred from one job to another during the year were given a new set of rules covering the hazards of their new employment. Also, all contractors' employees gainfully employed on our properties were furnished a set of rules.

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11. ACCIDENTS
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INJURY (Cont.)

c. Safety Inspections (Cont.)

Central Safety Committee

This Committee meets once a month to discuss all safety problems and classify accidents and is composed of Superintendents and Heads of Departments.

Supervisors Safety Meetings

These meetings are similar to the Central Safety meeting but subjects are discussed more in detail because these men are in direct contact with employees and the work being done. They are interesting and informative along with a fine exchange of ideas.

Lake Superior Mines Safety Council

Twenty-six companies are represented in this Council. Sectional meetings are held on each of the mining ranges of Upper Michigan, including Wisconsin on the Gogebic Range, and the three ranges in Minnesota. The annual meeting is held at Duluth, Minnesota and has attracted up to 815 mining men.

The Cleveland-Cliffs Iron Company has been active in the organization since it was founded in 1919. Directly connected with the Council is the Accident Exchange, in which 14 of the companies participate. Any of these companies can send out questionnaires on safety problems to the other 13 companies, which is a great saving in time and effort in many cases.

National Safety Council

This Council is the leader in all safety and the service we get from it cannot be estimated in dollars and cents. Because of its size, we are able to buy our safety material at a price which cannot be matched by any other organization. I believe our Company can be proud of being a charter member and helped in its organization, which actually started in 1912 under a different name but became the National Safety Council in 1913.

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INJURY (Cont.)

c. Safety Inspections (Cont.)

Inspection Reports from Mines and Plants

The following inspection reports are made by Mine or Department Supervisors or employees appointed by the Superintendent and are checked by the Safety Department:

- Hoisting Ropes (Daily)
- Skip & Cage Roads (Twice a Week)
- Safety Catches on Cages (Monthly)
- Ladder Roads (Weekly)
- Slack Rope Alarm (Monthly)
- Hoisting Engines (Monthly)
- ✓ Fire Extinguishers (Twice a Year)
- ✓ Fire Equipment (Four Times a Year)
- ✓ Fire Prevention (Once a Year)
- Blasting Inspection (Six Times a Year-Each Contract)
- Old Stope Inspection (Cliffs Shaft Mine)
- ✓ Fire Patrol Inspection (Idle Periods)

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INJURY (Cont.)

c. Safety Inspections (Cont.)

Following are tables showing the kind and number of safety inspections reports made by the mine and plant foremen which were received and checked by this Department:

TABLE XVII

Type of Inspection	Bunker Hill	Cambria Jackson	Cliffs Shaft	Maas	Mather "A"	Mather "B"	Total
Hoisting Ropes	162		160		142	164	628
Skip & Cage Roads	23				30	35	88
Ladder Roads	25				24	35	84
Cage Safety Catches	9				7	12	28
Slack Rope Alarm					4	4	8
Hoist Inspection	21	2	42	12	21	21	119
Skip, Cage & Ladder			31				31
Fire Extinguishers	1		1		1	2	5
Fire Equipment						1	1
Fire Prevention			12			9	21
TOTALS	241	2	246	12	229	283	1013

Mine or Plant	Fire Extinguishers	Fire Prevention	Total
Canisteo		17	17
Diamond Drills			0
Electric Power Dept.	16	8	24
General Office	1		1
General Shops	1	8	9
Hawkins		37	37
Hibbing Office		1	1
Hill Trumbull		17	17
Holman Cliffs		22	22
Humboldt			0
Mather Inn	1		1
Ohio			0
Ore Improvement Plant	1		1
Pelletizing Plant	2		2
Rented Buildings	1		1
Republic	1		1
Research Lab.	1		1
Research Pilot Plant			0
Sally			0
Sargent			0
Tilden			0
Wanless		8	8
TOTAL	25	118	143

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c. Safety Inspections (Cont.)

Fire Extinguisher Reports

These first aid extinguishers are serviced at least two times a year, during July and January. It is our first line of defense against fires and has paid off many times over. We have in service 1,322 first aid extinguishers, most of which are the dry chemical type for oil and electric type. On the Marquette Range we have eliminated the vaporizing type of extinguisher because of the toxic effects of the carbon tetrachloride liquid used in them. Also in time we will eliminate the soda acid type and replace it with the Karbaloy. The reason for this is that the soda acid will freeze and is hard to maintain while the Karbaloy will stand -40° and is very effective on both oil and rubber fires, as well as fires in wood, debris, etc. It also is fire retardent and prevents back flash.

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11. ACCIDENTS
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INJURY (Cont.)

c. Safety Inspection (Cont.)TABLE XVIIITYPES AND TOTALS OF FIRE EXTINGUISHERS INSTALLED AT VARIOUS PROPERTIES

MINE OR PLANT	2½ - 3 Gal. Soda - Acid	1 - 5 Gal. Non-Freeze	2½ - Gal. Foam Type	4 lb. Dry Powder	5-10-15 lb. Dry Powder	20 - 30 lb. Dry Powder	1 - 1½ Quart Vaporizing	1 - 3½ Gal. Vaporizing	Automatic Carbon Dioxide	5-10-15-30 lb. Carbon Dioxide	150 lb. Dry Powder & Nitrogen Engines	TOTAL
Bunker Hill Group	11	7		8	5	49						80
Cambria Jackson	10	8		2		16						36
Canisteo	3		1		4	11	30	5				54
Cliffs Shaft	12	3		14		52		1				82
Diamond Drills		3		13		9						25
Genl Strhse & Shops	19	20	1	45		16	2					103
Hawkins	8	2		1	3	25	26	9			1	75
Hill Trumbull	5				16	21	31	4				77
Holman Cliffs	11			1	6	27	50	6				101
Humboldt	3	6				30						39
Mather Inn	14			4		1	1					20
Mather Mine "A" Shaft	9	13		21	2	78						123
Mather Mine "B" Shaft	29	16		1		123						169
Ohio	6	2		10		11						29
Ore Improvement Plant		8				18						26
Pelletizing Plant		5				16					2	23
Republic		20		1	2	67					2	92
Tilden		2		1	3	10		1				17
Wanless						9	5	1			1	16
Sargent		1			2	3	4	2			1	13
McClure Plant				2		2				2		6
Carp Plant				1		2				2	1	6
Hoist Plant						2				2		4
Republic Plant						1				1		2
Escanaba Plant						1				1		2
Au Train Plant						1				1		2
Diesel Plant			5							2	1	8
Steam Plant				5		1		5	10			21
Hibbing Office	4		1				3	1				9
Ishpening Genl Office	7	3	1			2						13
Rented Houses	4	6		17	1	1	1					30
Research Lab.	4					13						17
Sally					1	1						2
TOTAL	159	125	9	147	45	619	153	30	5	21	9	1,322

Someone has forgotten the 20th installation
in the Hill drum bore tunnel.

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c. Safety Inspections
(Cont.)

TABLE XIX
SUMMARY OF DISCIPLINARY ACTION REPORTS

MINE OR PLANT	SMOKING UNDERGROUND	INFLUENCE OF LIQUOR	VIOLATION OF SAFETY RULE	SLEEPING ON JOB	LOSS OF TIME		INSUBORDINATION	CARELESSNESS	MISCELLANEOUS	NO. CONVERTED TO DISCHARGE	TOTAL						
					No.	Days					No.	Days	No.	Days			
Bunker Hill Group	0	0	0	0	1	1	0	0	0	0	1	1					
Cambria Jackson	0	0	0	0	0	0	0	0	0	0	0	0					
Canisteo	0	0	0	0	0	0	0	0	0	0	0	0					
Diamond Drills	0	0	0	0	0	0	0	0	0	0	0	0					
District Lab.	0	0	0	0	0	0	0	0	0	0	0	0					
Elec. Power Div.	0	0	0	0	0	0	0	0	0	0	0	0					
General Shops	0	0	0	0	0	0	0	0	0	0	0	0					
General Strhse	0	0	0	0	0	0	0	0	0	0	0	0					
Hawkins	0	0	0	0	0	0	0	0	0	0	0	0					
Hill Trumbull	0	4	20	0	2	10	0	0	0	2	6	30					
Holman	0	0	0	0	0	0	0	0	0	0	0	0					
Humboldt	0	0	0	0	0	0	0	0	0	0	0	0					
Mather Mine "A" Shaft	0	0	0	2	4	0	2	4	0	0	4	8					
Mather Mine "B" Shaft	0	1	4	6	18	1	3½	0	1	5	9	30½					
Ohio	0	0	0	0	0	0	0	0	0	0	0	0					
Ore Improvement Plant	0	1	5	0	0	0	0	1	5	0	2	10					
Pelletizing Plant	0	0	0	1	1	0	3	7	0	0	4	8					
Republic	0	0	0	0	0	0	0	0	1	3	1	3					
Research Lab.	0	0	0	0	0	0	0	0	0	0	0	0					
Research Pilot Plant	0	0	0	0	0	0	0	0	0	0	0	0					
Tilden	0	0	0	0	0	0	0	0	0	0	0	0					
Wanless	0	0	0	0	0	0	0	0	0	0	0	0					
TOTALS	0	6	29	7	3	7½	6	18	2	4	3	13	0	0	2	27	90½

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d. Ventilation

Good ventilation of our mines and plants is not only necessary because of the health of employees but for efficient operation. It has been so well recognized during the past 16 or 17 years, that all properties have increased the amount of air used. As examples of the change over the years, the Cliffs Shaft Mine had only natural ventilation amounting to 55,000 c.f.m. Blasting was done mostly at lunch time and when going off shift. Now 235,000 c.f.m. is forced into the mine and blasting can be done at any time. All underground mines have main mine fans plus booster and auxiliary fans to force air into the different mining areas and to ventilate drift and mining contracts. When the system is installed correctly, a mining contract can blast and return to its work place in from 20 minutes to a half hour.

Fans at the Mather Mine handle 138,000 c.f.m., and at the Bunker Hill Group it is 150,000 c.f.m.

The long idle period in 1959, created by a strike in the steel industry, afforded our Department an opportunity to conduct both natural and forced ventilation surveys at our underground mines. Results were tabulated and forwarded to personnel concerned, in order that our underground fire maps could be posted to date.

Considerable work was done at the Bunker Hill Group to reduce air recirculation, and related ventilation surveys were conducted by the Safety Department. A number of ventilation surveys were also made at the Mather Mine "A" and "B" Shafts, and the ventilation system improved to better existing conditions. Because of the "holing through" of the 10th level between "A" and "B" Shafts, and the future development of lower levels, continuous changes are being made in the ventilation system. This work is being continued in 1960 and ventilation surveys will be made as further changes develop.

Dust Sampling and Analysis

Much has been done over the years to dilute, allay and collect dust in the various occupations and in my opinion has been greatly responsible for lack of new silicosis cases among employees. Dust respirators also have helped a lot but cannot take the place of ventilation and dust collectors because the human element is too much involved. Nearly every place of work where there is a dust hazard, there is also a means of eliminating that hazard. Education of the employee by making him dust

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d. Ventilation (Cont.)

Dust Sampling and Analysis (Cont.)

conscious has also helped. Because of a lack of personnel in the Department, we have not been able to follow up this work as completely as we would like but the supervisory force and employees have helped a lot. Most of our dust sampling during the year has been in those places where we knew there was a real problem.

During 1959, dust sampling and analysis were confined to the crushing and pelletizing of ore and related operations. Although silica content of the ores processed are considerably lower than those encountered in underground rock operations, total dust counts have been higher and therefore, have warranted closer attention.

Improvements in dust collection systems, introduction of water sprays where practical and the elimination and confinement of dust producing operations are some of the steps taken to reduce total dust counts.

Considerable progress has been made towards reducing the total dust count at the Pelletizing plant, Republic and Cliffs Shaft Mines. Also, work is nearing completion on the revamping of the dust collection system at the Republic Mine; this should result in a considerable improvement in the dust count.

It will be noted in Table XXII that the dust count (year's average) has been reduced at both the Pelletizing Plant and Republic Mine. The dust counts at the Cliffs Shaft Mine have been confined to the Underground Crushing Plant and related operations, and appear to be high when compared to the previous year's dust counts. However, previous year's samples do not include an operation of this nature. Again, at the Bunker Hill Group, sampling was confined to the underground crushing of ore and related operations.

Dust sampling will be continued at operations creating the greatest hazard. Also, continuous safety inspection trips, by Company safety inspectors, include observations of auxiliary ventilation at underground rock and ore headings and checks for strict compliance with Company rock-work procedures and safe practices.

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d. Ventilation (Cont.)

The tables on this and following pages give location and various occupations where dust counts were taken; also, total averages of counts since 1933 when the first counts were taken.

TABLE XX

DUST SAMPLES COLLECTED - ROCK AND ORE WORK

Mine or Plant	1959	1959		1959	1933-1959
	Misc.	In Ore	In Rock	Total	Total
Athens*	0	0	0	0	843
Bunker Hill	0	5	0	5	35
Cambria Jackson**	0	0	0	0	394
Cliffs Shaft	0	21	0	21	1,977
Humboldt	0	0	0	0	85
Lloyd**	0	0	0	0	775
Maas*	0	0	0	0	878
Mather Mine "A" Shaft	0	0	0	0	911
Mather Mine "B" Shaft	0	0	0	0	574
Negaunee **	0	0	0	0	830
Pelletizing Plant	20	0	0	20	158
Princeton**	0	0	0	0	85
Republic	0	12	0	12	69
Research Laboratory	0	0	0	0	48
Spies Virgil**	0	0	0	0	203
Tilden	0	0	0	0	103
Miscellaneous (Test samples)	8	0	0	8	302
Mesaba Range	0	0	0	0	20
TOTAL	28	38	0	66	8,290

* Now a part of Bunker Hill Group

** No longer in operation

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d. Ventilation (Cont.)

TABLE XXI

VARIOUS OCCUPATIONS WHERE DUST SAMPLES WERE COLLECTED

<u>OPERATION</u>	<u>BUNKER HILL</u>	<u>CLIFFS SHAFT</u>	<u>PELLETIZING PLANT</u>	<u>REPUBLIC</u>	<u>TOTAL</u>
<u>Crushing Ore</u>	5	15		9	29
<u>Dumping & Conveying Ore</u>		6			6
<u>Pelletizing Ore</u>			20		20
<u>Refining Ore</u>				3	3
<u>TOTAL</u>	5	21	20	12	58

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d. Ventilation (Cont.)

TABLE XXII

<u>Mine or Plant</u>	<u>1951</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>
Athens*	4.15	2.71	2.37						
Bunker Hill				1.19	2.33	3.00			6.34
Cambria Jackson**	8.32	4.54	6.80	1.38	4.56	2.17			
Cliffs Shaft	4.90	2.76	4.45	2.79	2.31	***	1.95	***	13.14
Humboldt			1.59	27.57	6.34	10.04	3.15	40.97	
Lloyd**	6.28	4.72	5.17	4.58	5.09				
Maas*	4.84	4.93	7.06	5.25	4.14	1.73			
Mather Mine A Shaft	8.75	5.86	5.15	3.77	1.38	5.29	7.50		
Mather Mine B Shaft	5.04	5.40	5.56	6.41	4.81	2.36		3.96	
Mesaba Range				20.28					
Negaunee*	2.27	1.70	2.60						
Pellet Plant						17.65	9.77	25.40	9.12
Princeton**									
Republic						4.67	3.65	24.39	19.05
Research Lab.						5.29			
Spies Virgil**	6.05	5.29	4.75	4.14					
Tilden	6.34		3.05		2.36	1.68	1.82		

* Now a part of Bunker Hill Mine

** No longer in operation

*** All test samples

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e. Mine Safety, First Aid and Mine Rescue Courses

First Aid Training

All first aid training during the year was done at the various properties, mostly for supervisors, and covered specific subjects such as resuscitation, control of bleeding and transportation. Classes in first aid which were planned for September were cancelled because of the steelworkers strike.

Mine Rescue Training

There was no mine rescue training during the year. The offices of the Safety Department were moved into the mine rescue room which prevented training during the early part of the year and the steel strike prevented training in the last half of the year.

Other Classes

A number of classes were held for supervisors on use and charging of first aid fire extinguishers.

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11. ACCIDENTS
AND
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INJURY (Cont.)

e. Mine Safety, First Aid and Mine Rescue Courses (Cont.)

TABLE XXIII

<u>Material</u>	<u>Number Distributed</u>
1" Compresses (Band Aids)-----	43,160
Cotton-Tipped Merthiolate Applicators-----	1,892
Knuckle Bandages-----	1,456
Plain Gauze Pads (3"x3")-----	375
Oz. of Spirits of Ammonia-----	321
Rolls of Adhesive Tape ($\frac{1}{2}$ ")-----	181
Oz. of Tincture of Merthiolate-----	122
2" Compress Bandages-----	194
Picric Acid Gauze Pads (for burns)-----	169
5/8 oz. tubes of Foille (for burns & abrasions)--	168
1" Roll Bandages-----	110
3" Compress Bandages-----	92
Leather Finger Cots-----	72
2" Roll Bandages-----	85
Triangular Bandages (40" Cravat)-----	51
3" Roll Bandages-----	69
2 oz. Bottles (For Tincture of Merthiolate)-----	16
Oz. of Absorbent Cotton-----	16
Scissors-----	4
10 oz. Cans Foille Spray (for burns)-----	4
TOTAL-----	48,557

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f. Miscellaneous

Checked use of ear plugs and ear muffs as handled by a number of other companies in the district. Dr. Moore is now fitting ear plugs for employees who are subjected to noise and is using the audiometer to check values.

Attended monthly meetings of the Negaunee Business & Professional Men's Association.

Checked on use of safety dogs under skip or man cars in incline shaft at Sherwood Mine. This was in connection with plans for Mather "B".

Checked on 40 year employees for possible recognition for injury-free service and received The Joseph A. Holmes Safety Association "Certificates of Honor" for five employees. Also received "Certificates of Honor" for the Cliffs Shaft Mine and the Cambria Jackson Mine. For an injury free year (1958) the Cambria Jackson Mine also received a "Certificate of Commendation" from the National Safety Council.

In cooperation with the Lake Superior Mines Safety Council, conducted a special campaign on "Falls of Persons". This was very successful in the entire district.

Attended several meetings on Civil Defense.

Safety Department officers were moved from the Central Office to the Mine Rescue Room at Mather Mine "B" Shaft.

Attended meetings on Pellet Plant grievance which involved men leaving job when number six dust collector was broken down.

Attended several meetings of the Suggestion Committee and Mather Mine Subsidence Committee.

Several movies on safety were shown at Supervisors' meetings at the various properties; also, use of the Inhalator and first aid fire fighting equipment was demonstrated.

In cooperation with the Negaunee, Palmer, Gwinn and the Sawyer Air Force Base fire departments conducted classes in use of gas masks and Chemox self-contained oxygen apparatus.

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f. Miscellaneous (Cont.)

Made arrangements with the Smith Welding Equipment Corporation to demonstrate "Safety Aspects of Oxygen and Welding & Cutting" at our properties. About 250 employees attended these demonstrations.

On request have taken many photographs at the various properties.

TABLE XXIV

COMPARISON OF FREQUENCY, SEVERITY RATING

				<u>Frequency</u>	<u>Severity</u>		
1956-1958	National Rating,	Coal Mining (Underground)	-----	23.11	6,766	1958	
1956-1958	"	" Other Mining	" -----	25.40	5,491	Lake Superior	
1956-1958	"	" Metal Mining	" -----	27.23	6,168	District	
1958	The Lake Superior District Mines (23 Companies reporting)		--	11.79	2,560	<u>Frequency</u>	<u>Severity</u>
1959	The Cleveland Cliffs Iron Co.	Compensable Injuries	-----	20.55	1,506		
1959	"	" All Injuries	-----	31.37	1,536	11.79	2,560
1959	"	" Open Cut Mining	-----	23.29	568	5.00	397
1959	"	" Concentrating Plants	-----	16.35	200	6.46	799
1959	"	" Stopping	-----	49.87	1,461	25.54	7,447
1959	"	" Block Caving	-----	49.68	3,060	31.58	8,065
1959	"	" General Shops	-----	10.39	1,361	4.45	303
1959	"	" Elec. Power Div.	-----	0.00	0		
1959	"	" General Roll	-----	0.00	0		
1959	"	" Miscellaneous	-----	1.61	5		

11. ACCIDENTS
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PERSONAL
INJURY (Cont.)
f. Miscellaneous (Cont.)

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SUMMARY OF MINING ENGINEERING DEPARTMENT ACTIVITIES - 1959

1. The very close association of the Mining Engineering Department and the Recording, Ad Valorem & Fire Insurance Department continued throughout 1959.
2. There were very few changes in personnel during the year. Harley E. Clickner was transferred from general underground engineering to Engineer at the Humboldt Mine. After March 1, Einer D. Lindquist devoted all of his time to methods study.
3. With sorrow we must record the death of Ernest A. Oja, Surveyor on June 9, 1959. Mr. Oja entered the Mining Engineering Department on March 22, 1943, as a Helper and consistently performed in a very satisfactory manner. As of the end of the year no replacement had been made.
4. The underground properties continued mining and development work which necessitated engineering assistance in the surveying and mapping of this work. Stockpiles were surveyed, estimates of the ore in stock were calculated, ore reserves were estimated for valuation purposes and all shafts were gauged during the year.
5. The open pit properties called for engineering assistance in the surveying and mapping, drilling and blasting control, checking of tailings basins and the estimates of ore in stockpile.
6. The Field Engineering Crew carried on with the necessary subsidence surveys, property line control, drill hole control; assisted in the construction of the Humboldt Mine Expansion with the establishment and maintenance of lines and grades for building and machinery installation; and assisted at the open pits, when necessary, on pit surveys and stockpile estimating.
7. Throughout the year, Mr. Magnuson continued to provide the Cleveland Tax Department with assistance in compiling data for the Federal Income Tax Returns. During the year, Schedules of Estimated Expenditures for 1959 were prepared for both the Michigan and Minnesota properties, based on the Capital Expenditures Forecasts. A review of the Pelletizing Plant's depreciation schedule was made and a new depreciation schedule was set up for the Pilot Plant. As time permitted throughout the year, the Mineral Land Account Review was continued. New aggregation elections and maps to accompany the elections were made in accordance with the 1958 law.
8. Foreign visitors during the year were:

Mr. Min Chun Sik of Korea, whose interest is basically shaft sinking, visited Ishpeming during the week of May 18. He was taken on a tour of the underground properties.

Mr. Masao Kaneko, Chief Mining Engineer for the Mitsui Mining & Smelting Co., Ltd., Tokyo, Japan, visited in Ishpeming during the week of June 15. He was taken to Mather Mine, "B" Shaft, Bunker Hill Mine and Cliffs Shaft "C" Shaft.

A. MINING ENGINEERING DEPARTMENT STAFF

During the year 1959, the personnel and assignments of personnel remained as reported for the end of 1958. Harley E. Clickner, who had been assigned to general underground engineering, was assigned to the Humboldt Mine as of April 1, 1959. Until March 1, 1959, Einer D. Lindquist, in the time that he was available to the Mining Engineering Department, worked on special engineering studies, and after March 1, his time was completely devoted to the study of mining methods.

On June 9, 1959, Ernest A. Oja died of pulmonary edema caused by liver disease and an old brain injury. Mr. Oja was a conscientious and capable member of the Mining Engineering Department. His death was received with sorrow by all members of the Department. The loss was not only of a fellow worker but of a friend as well.

Assignments of the Mining Engineering Department's personnel throughout the year were as follows:

Daniel P. Isaacson continued with the responsibilities for all underground surveying and related work. Following Mr. Clickner's assignment to Humboldt, Mr. Isaacson, in addition to his other duties, assumed the responsibility for reserve estimates, stockpile surveys and shaft gaugings.

Maxwell H. Madsen, in the time he was available to the Mining Engineering Department, was assigned the responsibility of triangulation calculations and the application of IBM equipment to engineering calculations.

Edward C. Rosar was assigned to the engineering and planning for underground development and installation of equipment.

LeRoy Hosking and Frank A. Koski were assigned the responsibility for subsidence surveys, engineering control for construction work and surface surveys.

The Recording, Ad Valorem and Fire Insurance Department's responsibilities were handled by Robert G. Fountain and Donald W. Carlson. Mr. Fountain, as Recorder, was responsible for the recording of all land transactions concerning Mining Department lands, the preparation of the annual tax list, Negaunee house acquisitions, etc. Mr. Carlson was responsible for the various reports, requests, etc., necessary in connection with the payment of Michigan Ad Valorem Taxes, Republic house moving and fire insurance.

The following table shows the personnel of the Mining Engineering Department, their position and their 1959 employment.

TABLE I

<u>Name</u>	<u>Position</u>	<u>1959 Employment</u>
Ralph E. Magnuson, Jr.	Chief Mining Engineer	12 months
Harley E. Clickner	Engineer	12 months

TABLE I (continued)

<u>Name</u>	<u>Position</u>	<u>1959 Employment</u>
Robert J. Flynn	Engineer	12 months
Oiva W. Hakala	Technical Foreman	12 months
LeRoy Hosking	Engineer	12 months
Daniel P. Isaacson	Engineer	12 months
R. Charles Kincaid	Engineer	12 months
Carl A. Koski	Engineer	12 months
Frank A. Koski	Engineer	12 months
Einer D. Lindquist	Engineer	12 months
Maxwell H. Madsen	Engineer	12 months
James P. Meyers	Engineer	12 months
Bernhardt H. Petersen	Technical Foreman	12 months
Edward C. Rosar	Engineer	12 months
William H. Stannard	Chief Draftsman	12 months
Gideon S. Johnson	Draftsman & Printer	12 months
Jean C. Jensen	Stenographer	12 months
Clifford H. Amel	Surveyor	12 months
Clarence P. Ayotte, Jr.	Surveyor	12 months
Alfred B. Nault	Surveyor	12 months
John R. Sleeman	Surveyor	12 months

The following table shows the personnel of the Recording, Ad Valorem and Fire Insurance Department, their position and their 1959 employment:

TABLE II

<u>Name</u>	<u>Position</u>	<u>1959 Employment</u>
Robert G. Fountain	Recorder	12 months
Donald W. Carlson	Insurance Examiner	12 months

The following table shows the length of service in the Company and in the Mining Engineering Department of those employed at the end of the year:

TABLE III

Name	Date Started Company Service	Length of Service in Company	Date Entered		Length of Service
			Mining	Engineering Department	
Ralph E. Magnuson, Jr.	June, 1946	13 years, 7 months	February, 1957		2 years, 11 months
Jean C. Jensen	July, 1951	8 years, 5½ months	July, 1951		8 years, 5½ months
William H. Stannard	November, 1940	19 years, 2 months	November, 1940		19 years, 2 months
Gideon S. Johnson	June, 1948	11 years, 7 months	August, 1958		1 year, 4½ months
Harley E. Clickner	June, 1952	5 years, 5 months	June, 1952		5 years, 5 months
Robert J. Flynn	April, 1953	6 years, 8 months	April, 1953		6 years, 8 months
Oiva W. Hakala	July, 1951	8 years, 6 months	July, 1951		8 years, 6 months
LeRoy Hosking	June, 1950	9 years, 7 months	March, 1954		5 years, 10 months
Daniel P. Isaacson	November, 1940	14 years, 4½ months	November, 1940		14 years, 4½ months
R. Charles Kincaid	July, 1951	8 years, 6 months	July, 1951		8 years, 6 months
Carl A. Koski	June, 1941	15 years, 1 month	June, 1941		15 years, 1 month
Frank A. Koski	February, 1927	28 years, 8 months	January, 1936		19 years, 9 months
Einer D. Lindquist	July, 1951	8 years, 6 months	August, 1958		1 year, 4½ months
Maxwell H. Madsen	September, 1943	16 years, 3½ months	August, 1958		1 year, 4½ months
James P. Meyers	June, 1952	7 years, 6½ months	January, 1958		2 years
Bernhardt H. Petersen	June, 1949	10 years, 6½ months	June, 1949		10 years, 6½ months
Edward C. Rosar	November, 1952	5 years, 2 months	August, 1958		1 year, 4½ months
Clifford H. Amel	May, 1944	15 years, 7½ months	May, 1944		15 years, 7½ months
Clarence P. Ayotte, Jr.	April, 1948	11 years, 8½ months	April, 1948		11 years, 8½ months
Alfred B. Nault	September, 1941	18 years, 4 months	September, 1946		13 years, 3½ months
John R. Sleeman	February, 1947	12 years, 11 months	February, 1947		12 years, 6 months

Time spent in the Armed Forces is not included in this table.

The following table shows the length of service in the Company and in the Recording, Ad Valorem and Fire Insurance Department of those employed at the end of the year:

TABLE IV

<u>Name</u>	<u>Date Started Company Service</u>	<u>Length of Service in Company</u>
Robert G. Fountain	August, 1951	8 years, 4 months
Donald W. Carlson	August, 1936	20 years, 1 month

<u>Name</u>	<u>Date Entered Recording, Ad Valorem and Fire Insurance Department</u>	<u>Length of Service Recording, Ad Valorem and Fire Insurance Department</u>
Robert G. Fountain	August, 1951	8 years, 4 months
Donald W. Carlson	August, 1936	20 years, 1 month

Time spent in the Armed Forces is not included in this table.

The following sheets show in tabular form (Tables V and VI) the personnel of the Mining Engineering Department and the Recording, Ad Valorem and Fire Insurance Department and the mines to which they were assigned during 1959:

TABLE V

THE CLEVELAND-CLIFFS IRON COMPANY
MINING ENGINEERING DEPARTMENT

Personnel Assignments

Chief Mining Engineer Ralph E. Magnuson, Jr.
 Department Secretary & Stenographer Jean C. Jensen
 Chief Draftsman William H. Stannard
 Draftsman & Printer Gideon S. Johnson

General Engineering
& Office

*Industrial Engineer Maxwell H. Madsen
 *Industrial Engineer Einer D. Lindquist

Bunker Hill—Maas Mine

Technical Foreman Bernhardt H. Petersen
 Surveyor John R. Sleeman

Mather Mine, "B" Shaft

Mining Engineer R. Charles Kincaid
 Surveyor Alfred B. Nault

General Field &
Surface Engineering

Mining Engineer LeRoy Hosking
 Mining Engineer Frank A. Koski

Cliffs Shaft Mine

Mining Engineer James P. Meyers

Humboldt, Ohio & Tilden Mines

Mining Engineer Harley E. Clickner

General Underground
Engineering

Mining Engineer Daniel P. Isaacson
 Mining Engineer Edward C. Rosar
 Mining Engineer Carl A. Koski

Mather Mine, "A" Shaft

Technical Foreman Oiva W. Hakala
 Surveyor Clarence P. Ayotte, Jr.

Republic Mine

Mining Engineer Robert J. Flynn
 Surveyor Clifford H. Amel

* Shared with Industrial Engineering Department

WESTON BOND

WESTON BOND

TABLE VI

RECORDING, AD VALOREM AND FIRE INSURANCE DEPARTMENT

Recorder - Robert G. Fountain
Taxes and Fire Insurance - Donald W. Carlson