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c. Tonnage and Analysis of Concentrates Shipped

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulfur</u>	<u>Ign</u>	<u>Loss</u>	<u>Moist.</u>
Holman Bessemer Wash	59,219	57.70	.035	11.35	.23	.43	.25	.16	.010	4.89	6.59	
Holman Non Bessemer Wash	51,579	57.10	.042	11.84	.24	.44	.25	.16	.010	5.22	6.56	
Holman Bessemer Retreat	161,055	57.39	.037	11.51	.24	.43	.26	.16	.011	5.14	6.52	
Holman Non Bess Retreat	118,429	56.94	.046	11.64	.27	.47	.26	.16	.011	5.55	6.80	
Brown Bessemer Wash	3,830	56.68	.036	12.63	.21	.36	.25	.17	.010	5.16	7.43	
Brown Non Bessemer Wash	4,206	56.45	.041	12.72	.21	.36	.25	.17	.010	5.38	6.80	
Brown Bessemer Retreat	175,758	57.10	.033	12.68	.20	.40	.25	.17	.010	4.49	6.87	
Brown Non Bess Retreat	94,800	56.77	.048	12.44	.21	.41	.25	.17	.010	5.14	6.78	
North Star Bessemer Wash	360	58.70	.032	11.70	.14	.48	.27	.17	.011	3.17	8.00	
North Star Non Bess Wash	26,948	57.30	.054	11.62	.21	.41	.26	.17	.010	4.05	7.64	
North Star Bessemer Retreat	29,060	57.29	.035	12.00	.25	.39	.26	.17	.010	4.82	6.93	
North Star Non Bess Retreat	63,320	57.23	.050	11.60	.28	.37	.25	.17	.011	5.26	7.41	
Bingham Bessemer Retreat	3,424	56.18	.039	14.24	.17	.44	.26	.16	.010	4.23	7.19	
Bingham Non Bess Retreat	8,356	56.26	.041	13.32	.23	.44	.26	.16	.010	4.95	7.84	
Holman Lake Bessemer	33,639	54.93	.041	14.84	.24	.45	.26	.18	.009	5.28	7.73	
Holman Lake Non Bessemer	41,871	55.02	.043	14.67	.24	.44	.27	.18	.009	5.32	7.56	
Brown Lake Bessemer	24,023	55.78	.037	14.42	.18	.40	.26	.18	.009	4.63	7.33	
Brown Lake Non Bessemer	<u>21,713</u>	<u>55.67</u>	<u>.042</u>	<u>14.41</u>	<u>.19</u>	<u>.42</u>	<u>.26</u>	<u>.17</u>	<u>.010</u>	<u>4.76</u>	<u>7.36</u>	
Total Concentrates Shipped	921,590	56.90	.040	12.32	.23	.42	.26	.17	.010	5.04	6.91	

d. Mine Analysis of Ore in Stockpile

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Moist</u>
Holman Wash	4,208	56.23	.043	12.63	.20	.49	7.02
Holman Retreat	86,585	57.20	.044	11.59	.21	.39	6.89
Brown Wash	389	55.50	.028	15.95	.18	.36	6.60
Brown Retreat	<u>95,301</u>	<u>57.06</u>	<u>.046</u>	<u>12.41</u>	<u>.20</u>	<u>.40</u>	<u>6.99</u>
Total	186,483	57.10	.045	12.04	.20	.40	6.94

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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>
Merch	14	0	100.00
Wash	14	0	58.00
Lean Wash	14	0	48.00
Low Grade Wash	14	0	58.00
Lean Low Grade Wash	14	0	45.00
Retreat	14	0	40.00

b. Ore Reserves as of December 31, 1953

<u>Lease</u>	<u>Reserve 12-31-52</u>	<u>Mined</u>	<u>Balance After Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-53</u>
North Star	738,451	119,688	618,763		618,763
Bingham	1,545,013	11,780	1,533,233		1,533,233
Brown No. 1	774,112	259,210	514,902		514,902
Holman	1,791,364	351,735	1,439,629		1,439,629
Brown No. 2	<u>2,678,680</u>	<u>107,640</u>	<u>2,571,040</u>		<u>2,571,040</u>
Total	7,527,620	850,053	6,677,567		6,677,567

c. Estimate of 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>North Star</u>						
Bessemer Wash	164,450	58.42	.023	10.50	.17	.40
Non Bessemer Wash	128,028	52.83	.050	11.09	.25	.41
Bessemer Retreat	194,168	55.46	.026	11.35		
Non Bessemer Retreat	<u>132,117</u>	<u>55.49</u>	<u>.046</u>	<u>11.02</u>		
Total North Star	618,763	55.71	.034	11.00	.21	.40

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c. Estimate of Analyses of Reserves (con't)

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>
<u>Bingham</u>						
Non Bessemer Merch	53,259	57.98	.051	11.83		
Bessemer Wash	516,528	58.39	.031	11.34	.16	.49
Non Bessemer Wash	281,237	57.98	.049	11.06	.51	.44
Bessemer Retreat	272,782	57.21	.034	12.03		
Non Bessemer Retreat	<u>409,427</u>	<u>57.83</u>	<u>.047</u>	<u>12.20</u>		
Total Bingham	1,533,233	57.94	.040	11.66	.28	.47
<u>Brown No. 1</u>						
Bessemer Wash	153,921	58.32	.033	11.21	.28	.36
Non Bessemer Wash	50,865	58.97	.046	10.40	.14	.53
Bessemer Retreat	310,116	56.36	.031	12.70		
Non Bessemer Retreat						
Total Brown No. 1	514,902	57.20	.033	12.03	.25	.40
<u>Holman</u>						
Bessemer Wash	760,164	57.87	.029	10.91	.16	.43
Non Bessemer Wash	285,718	56.63	.056	12.06	.17	.48
Bessemer Retreat	320,027	56.70	.026	12.15		
Non Bessemer Retreat	<u>73,720</u>	<u>56.36</u>	<u>.058</u>	<u>11.72</u>		
Total Holman	1,439,629	57.29	.035	11.46	.16	.44
<u>Brown No. 2</u>						
Bessemer Wash	880,958	57.70	.027	11.43	.17	.45
Non Bessemer Wash	401,862	56.56	.061	11.40	.16	.41
Bessemer Retreat	646,915	56.68	.024	12.52		
Non Bessemer Retreat	<u>641,305</u>	<u>56.43</u>	<u>.063</u>	<u>12.20</u>		
Total Brown No. 2	2,571,040	56.95	.041	11.89	.17	.44

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c. Estimate of Analyses of Reserves (Con't)

<u>Concentrates</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>
<u>Total Holman-Cliffs</u>						
Non Bessemer Merch	53,259	57.98	.051	11.83		
Bessemer Wash	2,476,021	57.99	.029	11.17	.17	.44
Non Bessemer Wash	<u>1,147,710</u>	<u>56.62</u>	<u>.055</u>	<u>11.40</u>	<u>.26</u>	<u>.44</u>
Total Wash	3,623,731	57.56	.037	11.24	.20	.44
Bessemer Retreat	1,744,008	56.57	.027	12.28		
Non Bessemer Retreat	<u>1,256,569</u>	<u>56.78</u>	<u>.055</u>	<u>12.05</u>		
Total Retreat	3,000,577	56.66	.039	12.18		
Total Wash	3,623,731	57.56	.037	11.24	.20	.44
Total Retreat	<u>3,000,577</u>	<u>56.66</u>	<u>.039</u>	<u>12.18</u>	—	—
Total Holman-Cliffs Conc.	6,624,308	57.15	.038	11.67	.20	.44
Non Bessemer Merch	53,259	57.98	.051	11.83		
Holman-Cliffs Concts.	<u>6,624,308</u>	<u>57.15</u>	<u>.038</u>	<u>11.67</u>	<u>.20</u>	<u>.44</u>
<u>Total Holman-Cliffs</u>	6,677,567	57.16	.038	11.67	.20	.44

5. LABOR and WAGES

a. Comments

The supply of labor was ample and of average quality. A blanket increase of \$0.085 per hour went into effect on June 12, and an increase of \$0.01 per hour per job class was effective on July 1, 1953.

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b. Comparative Statement of Production and Wages

<u>Product</u>	<u>Pit and Plant</u>	<u>Lake Concentrator</u>	<u>Total</u>
Wash and Retreat Concentrate	850,053	121,246	971,299
Number of Days Mine Operated	104	98	104
Average Number of Men Working	172	39	211
Average Wages Per Day	18.35	16.81	18.07
Production Per Man Per Day	47.39	30.27	44.26
Labor Cost Per Ton	.387	.555	.408
Total Number of Man Days	17,938	4,006	21,944
Amount Paid for Labor	\$329,338.29	\$67,338.29	\$396,566.90

6. GENERAL SURFACE

a. Buildings and Repair

Normal maintenance work was carried on throughout the year on company-owned buildings. In addition to maintenance work on mine buildings, remodeling was completed on the old blacksmith and welding shop for use as a district carpenter shop.

b. Roads, Transmission Lines, Etc.

Minor changes were made in pit transmission lines. Road and transmission line changes were completed on Oliver Iron Mining Division's SE-SE, Section 21 due to development of the Plummer mine.

c. Miscellaneous General Construction

E&A No. MC-214: Addition to test laboratory is completed. Remodeling and strengthening of pit pocket and trestles was completed.

7. OPEN PIT

a. Stripping

Stripping operations were carried forward during the year under E&A No. MC-234. Operations started on August 17 on a 1-shift basis, 5 days per week until the end of the ore season. On September 21, a 3-shift, 5-day schedule was started. This was

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a. Stripping

increased to a 20-shift-per-week basis on September 28. Stripping was completed on December 31.

A total of 1,064,583 cubic yards were moved for a shift average of 3,553 cubic yards and a cost of \$0.298 as compared to a budget estimate of \$0.432. The following tabulation shows the material stripped from the various leases:

<u>Lease</u>	<u>Surface</u>	<u>Taconite</u>	<u>Lean Ore</u>	<u>Total</u>
Brown #2	94,272	515,730	15,071	625,073
North Star	<u>439,510</u>	_____	_____	<u>439,510</u>
Total	533,782	515,730	15,071	1,064,583

b. Open Pit Mining

Mining of crude ore from the pit was started on April 27 on a 5-day, 3-shift basis with two shovels being serviced by six to seven trucks. On August 17 the schedule was reduced to a 2-shift, 5-day operation and continued on this basis until the end of ore season on September 18.

During the season, 1,876,403 tons of gross crude were moved on 284 shifts for an average of 6,607 tons per shift. From the above crude, 204,825 tons of screen rock were removed for a total of 1,671,578 tons net and a shift average of 5,886 tons.

In the course of mining, a total of some 118,582 tons of pit rock, lean, and waste material was moved and placed on their respective dumps for a ratio of .14 tons per ton of shipping ore. The cost of this movement was \$0.003 per ton of shipping ore.

The following tabulation shows the material mined from the various leases:

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b. Open Pit Mining (con't)

<u>Lease</u>	<u>Gross Crude</u>	<u>Screen Plant Rock</u>	<u>Net Crude</u>	<u>Pit Rock Lean and Waste Material</u>
Holman	762,020	80,235	681,785	53,898
Brown	836,473	86,600	749,873	45,416
North Star	249,375	35,765	213,610	19,208
Bingham	<u>28,535</u>	<u>2,225</u>	<u>26,310</u>	<u>60</u>
Total	1,876,403	204,825	1,671,578	118,582

Operations on the Holman lease were mainly from the pit bottom along the south side. Approximately 91 per cent of the ore was retreat and 9 per cent wash.

From the Brown No. 1, ore was mined from the north central portion of the forty and from the retreat stockpile No. 1. Material from this lease was all retreat.

Operations on Brown No. 2 were mostly from the east end from the various benches. A small amount of wash ore was removed from the southeast corner in the pit bottom. As mined, the ore was 98 per cent retreat and 2 per cent wash.

Mining of North Star ore was mainly from the north side of the NE-NE. A small tonnage was removed from the NW-NE in order to establish road grades to the Bingham retreat stockpile No. 10 on this forty. The ratio of ore from this lease was 83 per cent retreat and 17 per cent wash. All ore mined from the Bingham lease was from the retreat stockpile No. 10 located on the North Star NW-NE. This material concentrated to a very high silica, and operations had to be suspended as no low silica material was available for grading purposes.

Of the total ore mined from all leases during the year, 8 per cent was wash ore and 92 per cent retreat ore.

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b. Open Pit Mining (con't)

Operations were carried on with two shovels mixing ores and no trouble was encountered in making the guaranteed grade. Operating conditions during the year were good and no serious delays were experienced. The total cost of producing crude ore was \$0.195 per ton as compared to \$0.202 in 1952.

c. Pumping and Drainage

There were no changes in pumping arrangements and the flow of water remained constant throughout the year. The pumping cost per ton of shipping ore was \$0.016, the same as 1952.

d. General Pit Activities

Power line and road changes to accommodate operations accumulated a cost of \$0.014 per ton of shipping ore.

8. BENEFICIATION

A. Pit Plant

This plant operated on the same schedule as the pit. Ore loading started on April 27 on a 3-shift, 5-day week. On August 17, the schedule was reduced to 2 shifts, 5-days until the end of ore season on September 18. While on a 3-shift basis, repairs were made on Saturdays; and while on a 2-shift basis, the bulk of the repairs were taken care of on the third shift.

A total of 1,676,578 tons of crude was treated to obtain 850,053 tons of concentrates for a net weight recovery of 50.90 per cent and an average rate of production of 2,993 tons of concentrates per shift.

Of the wash ore portion of the feed, 103,145 tons produced 68,744 tons for a weight recovery of 67.00 per cent. The retreat feed of 1,568,432 tons produced 781,309 tons of concentrates for a recovery of 50.00 per cent.

The net over-all weight recovery was 50.80 per cent compared to 51.50 per cent in 1952.

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a. Pit Plant (con't)

The gross weight recovery was 45.30 per cent compared to 48.00 per cent in 1952.

These differences in recovery are due to the greater percentage of retreat ore processed in 1953 than in 1952. There were no changes in the flowsheet.

There were no serious delays during the year and a satisfactory operation was maintained.

Tests were made intermittently during the year in the pilot plant treating fine sizes by Heavy-Media in cyclone and Hardinge circuits. However, lack of skilled personnel and the transfer of some equipment from this plant to the Hill-Trumbull and Hawkins cyclone plants hampered this test work and very few results were obtained.

Owing to the shortage of railroad cars, 713 hours were spent in stockpiling concentrates, and a total of 259,878 tons were placed in stock which, with the balance from 1952, made a total of 396,652 tons. Concentrates were loaded out intermittently during the year and a total of 210,170 tons was shipped, leaving a balance of 186,482 tons as of December 31.

The following shows time lost on production due to delays:

<u>Source of Delay</u>	<u>Washing Plant</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of Working Hours</u>
Out of Ore - Pit Delays		5.58	6.64	0.24
Out of Ore - Pit Screening Plant & Conveyor		13.17	37.07	1.36
Primary Screens		1.00	1.19	0.04
Crushers		1.42	1.69	0.06
Secondary Screens		0.33	0.39	0.01
Akins Classifiers		1.67	1.99	0.07
Concentrate Conveyor		0.75	0.89	0.03
Stockpile Conveyor		1.74	2.07	0.08
Railroad Cars and Tracks		3.17	3.77	0.14
Clear Water Pump		0.84	1.00	0.04
Air Compressor		1.00	1.19	0.04
Electric Power		23.64	28.12	1.03
Electric Power Heavy-Media Plant Delays		<u>11.76</u>	<u>13.99</u>	<u>0.52</u>
Total		<u>84.07</u>	<u>100.00</u>	<u>3.66</u>

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a. Pit Plant (con't)

Heavy-Media Plant

<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of Working Hours</u>
Washing Plant Delays	48.30	63.22	2.24
Coarse Feed Conveyor	3.00	3.93	0.14
Coarse Concentrate Drain Screen	0.33	0.43	0.02
Coarse Concentrate Wash Screen	0.42	0.55	0.02
Coarse Reject Drain Screen	2.42	3.17	0.11
Magnetic Separator	0.50	0.65	0.02
Reject Truck	0.67	0.88	0.03
Coarse Circ. Media Pumps	1.00	1.31	0.05
Spray Water Pump	1.17	1.53	0.05
Miscellaneous Chutes and Launderers	3.00	3.93	0.14
Electric Power	<u>15.59</u>	<u>20.40</u>	<u>0.73</u>
Total	76.40	100.00	3.55

b. Lake Concentrator

This plant was started on April 27 and operated on a 2-shift 5-day basis until the end of ore season on September 11, 1953.

A total of 357,756 tons of crude was mined, 75,870 tons of rock scalped, and 121,246 tons of concentrates produced for a net recovery of 43.00 per cent and a gross recovery of 33.90 per cent. One shovel, serviced by two trucks on ore and one truck hauling rock and rejects, operated a total of 191 shifts for an average of 1,873 tons of gross crude per shift, producing an average of 635 tons of concentrates per shift.

Operations were very satisfactory during the year with the only serious delays caused by shortage of railroad cars and shovel repairs.

The following table shows delays incidental to plant operation:

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b. Lake Concentrator (con't)

<u>Lake Concentrator</u>			
<u>Source of Delay</u>	<u>Hours</u>	<u>Per Cent</u>	<u>Per Cent of Working Hours</u>
Out of Ore - Shovel Repairs	73.31	33.22	4.68
Screening Plant	9.66	4.38	0.61
Crude Conveyor	2.25	1.02	0.14
Crusher	2.00	0.91	0.13
Wash Screens	0.50	0.23	0.03
Circ. Media Pumps	0.83	0.38	0.05
Magnetic Separators	0.67	0.30	0.04
Reject Pocket	2.41	1.09	0.15
Rock Truck	0.50	0.23	0.03
Railroad Cars and Tracks	76.17	34.52	4.87
Spiral Feed Pumps	4.50	2.04	0.29
Charging Plant	16.00	7.25	1.02
Adjust Gravity	3.17	1.44	0.20
Freezing Weather	0.50	0.23	0.03
Electric Power Failure	<u>28.17</u>	<u>12.76</u>	<u>1.80</u>
Total	220.64	100.00	14.07

The following tabulation shows tonnages and analyses of various mill rejects and products:

<u>Product</u>	<u>Tonnage</u>	<u>Per Cent</u>		<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
		<u>Total Mined</u>	<u>Iron Dried</u>		
Crude Ore and Rock Mined	118,309	100.00	43.75		
Less: Rock Removed in Mining	5,049	4.27	29.72		
Crude Ore Trans. to Screening Plant	113,260	95.73	44.38		
Less: Rock Rejects in Screening Pl.	10,115	8.55	29.48		
Crude Ore Entering Mill	103,145	87.18	45.84		
Concentrates Produced	68,744	58.11	57.20		
Tailings (by Deduction)	34,401	29.07	23.88	66.65	83.16

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Total Holman-Cliffs Retreat Plant

<u>Product</u>	<u>Tonnage</u>	Per Cent		<u>Tonnage Recovery</u>	<u>Iron Unit Recovery</u>
		<u>Total Mined</u>	<u>Iron Dried</u>		
Crude Ore and Rock Mined	1,814,145	100.00	40.21		
Less: Rock Removed in Mining	51,002	2.81	27.48		
Crude Ore Trans. to Screening Plant	1,763,143	97.19	40.58		
Less: Rock Rejects in Screening Pl.	194,710	10.73	27.11		
Crude Ore Entering Mill	1,568,433	86.46	42.25		
Concentrates Produced	781,309	43.07	57.10	49.81	67.32
Tailings (by Deduction)	579,322	31.93	22.82		
Heavy Density Reject	207,802	11.46	40.61		

Total Lake Concentrates

Crude Ore and Rock Mined	384,853	100.00	38.28		
Less: Rock Removed in Mining	25,362	6.59	27.21		
Crude Ore Trans. to Screening Plant	359,491	93.41	39.06		
Less: Rock Rejects in Screening Pl.	76,605	19.91	26.97		
Crude Ore Entering Mill	282,886	73.50	42.33		
Concentrates Produced	121,246	31.50	55.26	42.86	55.95
Heavy Density Rejects	49,205	12.78	42.07		
Tailings (by Deduction)	112,435	29.22	28.50		

9. MAINTENANCE AND REPAIRS

The usual maintenance work on all mine and plant equipment was carried on throughout the year. Plant and mine equipment was given a thorough check and complete repair during the shutdown period.

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10. COST of OPERATION

a. Comparative Cost of Operation

Product	Pit			Lake Concentrator			Total		
	Budget	1953*	1952	Budget	1953*	1952	Budget	1953*	1952
Concts.(tons)	900,000	850,053	841,377	200,000	121,246	42,789	1,100,000	971,299	884,166
Recovery	47%	45.3%	48.02%	25%	33.9%	30.12%	43%	43.47%	46.7%
Average Shift Output		2993	3236		635	372		3420	3401
Tons/Man/Day		47.39	52.41		30.27	16.93		44.26	47.59
Shifts Operated		284	260		191	115		284	260
<u>Costs</u>									
Pit Operating	.445	.431	.420	.404	.442	.510	.438	.433	.424
Concentrating	.268	.319	.227	1.346	.685	1.787	.464	.365	.303
Loading S.P. Ore	.004	.008	.009				.003	.007	.009
General Mine Expense	.188	.181	.169	.188	.181	.241	.188	.181	.172
Winter & Idle	.520	.443	.474	.360	.262	.195	.491	.420	.460
Cost of Production	1.425	1.383	1.299	2.298	1.571	2.733	1.584	1.406	1.368
<u>Depreciation</u>									
Plant & Equipment								.258	.185
Motorized								.058	.058
Movable								.003	.004
<u>Amortization</u>									
Defense Facilities								.039	.042
Leasehold								.206	.222
Stripping								.339	.395
<u>Taxes</u>									
Ad Valorem								.188	.306
Occupational								.297	.300
Royalty								.153	.139
Total: Depreciation, Amortization and Taxes								1.541	1.651

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a. Comparative Cost of Operatinn (con't)

	<u>1953*</u>	<u>1952</u>
Administrative	.100	.100
Miscellaneous Expense and Income	<u>.003</u>	<u>.005</u>
Total Cost at Mine	3.050	3.125

*Mine figures taken from November 1953 cost sheet.

b. Comments - Pit

The cost of production was \$0.042 per ton lower than the budget and \$0.084 higher than 1952 costs. The increase over 1952 was practically all in concentrating and was due to operating the retreat plant approximately 92 per cent of the time as compared to 63 per cent in 1952.

Comments - Lake Concentrator

The cost of production for this operation was \$0.72 lower than the budget and \$1.162 lower than 1952 costs. Inasmuch as this operation was started in 1952 and the plant developed numerous "bugs" which were rectified during the winter of 1952-53, a comparison is meaningless.

Comments - Pit and Lake Concentrator Combined

The cost of production was \$0.178 lower than the budget and \$0.038 higher than 1952 costs. The large decrease from the budget was due almost entirely to the Lake plant operation which was set too high. The increase over 1952 costs was all in pit operation costs and was due to lower recovery from the increased production of retreat ores.

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11. EXPLORATION and FUTURE EXPLORATION

The Henry Schultze & Company started structure drilling on December 5 on the Brown #2 SE-NW in approximately the center of this forty. This is a dump area to the east of the pit, and the fee owners have requested further proof of barrenness before continued use of this area for dump purposes. Drilling on Hole No. H-419 was completed to a depth of 301'6" at the end of the year with no ore apparent. Upon completion of this hole, drilling will continue on the North Star lease to further outline the ore body to the north and prove up an area for a rock dump.

12. TAXES

	<u>1953</u>		<u>1952</u>		<u>Increase or Decrease</u>	
	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>
Mineral	\$1,079,355	\$166,328.61	\$1,226,601	\$150,970.05		
Land, Bldgs, Machinery	110,648	17,326.28	110,695	13,864.24		
<u>Personal Property</u>						
Equipment	77,936	12,084.51	71,874	8,846.25		
Stockpile	101	15.56				
Lake Conct. Stockpile	<u>22,859</u>	<u>3,761.40</u>	<u>24,604</u>	<u>3,252.36</u>		
Total	\$1,290,899	\$199,516.36	\$1,433,744	\$176,932.90	\$142,875	\$22,583.46
Average Mill Rate		154.56		123.40	25.25%	

Tax Commission Reserve

	<u>Tons</u> <u>1953</u>	<u>Tons</u> <u>1952</u>	<u>Increase</u> <u>Decrease</u>
May 1	7,487,378	8,368,997	-881,619
Lake Concentrator	496,948	534,866	- 37,918

Over-all reduction in taxable value of 11.11 per cent. Increase of 25.25 per cent in mill rate for taxing district increased taxes by 12.76 per cent.

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13. ACCIDENTS & PERSONAL INJURIES

There was one compensable accident at this property in 1953:

1. Name:	Urho Toivonen
Date of Injury:	January 6, 1953 at 12:45 pm
Cause of Injury:	Toivonen was helping unload a car of timber. The timber was icy and he slipped and fell approximately 10 feet to the ground.
Nature of Injury:	Fracture of left arm.
Time Lost:	38 days
Compensation Paid:	\$595.20

14. NEW CONSTRUCTION

a. Completed in 1953

Test Laboratory Addition
Remodeling of Old Blacksmith Shop
Remodeling of Pit Screening Plant Pocket and Trestles

b. To Be Completed in 1954

None

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

a. Major Equipment Received in 1953

2	34-ton Euclid Trucks (Rental)
1	Automatic 600-amp Electric Welder
1	60-ton Shop Press
3	Magnetic Controllers - Lake Concentrator Separators
1	60 hp Motor for Stacker
1	4 x 6" Jaw Crusher
1	10" Diamond Alloy Slurry Pump-Lake Concentrator
1	36" x 8' - 5" Springfield Lathe
2	Spare GMD Engines - Central Warehouse

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b. Equipment Ordered for or Proposed for 1954

E&A MC-254: 10x8 AC Pump and 450 hp Motor - Pit Pumping
261: Automatic Controls for Stacker
262: 3/4-ton Pickup - Test Laboratory
264: 3/4-yard Pettibone Mulliken Swing Loader

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1. GENERAL

The only activity at this property was the digging of a test pit at 4000E-6655N, approximately 100 feet south of Drill Hole No. 1. The pit was started on December 7, 1953, and on December 31, 1953, had marked a depth of 43 feet. Work continued into January of 1954.

2. PRODUCTION, SHIPMENTS, INVENTORIES --- None

3. ANALYSIS --- None

4. ESTIMATE of ORE RESERVES

a. Factors used

	<u>Cubic Feet</u> <u>Per Ton</u>	<u>Rock</u> <u>Deduction</u>	<u>Per Cent</u> <u>Recovery</u>
Merch	14		100.00
Wash	14		56.76
Low Wash	14		45.85
Low Grade Wash	14		58.38
Lean, Low Grade Wash	14		50.50
Retreat	14		40.00

b. Estimate of Ore Reserves

<u>Property</u>	<u>Reserves</u> <u>12-31-52</u>	<u>Mined</u>	<u>Balance</u> <u>Mining</u>	<u>Changed by</u> <u>Re-estimate</u>	<u>Reserves</u> <u>12-31-53</u>
Bovey #1	1,751,579		1,751,579		1,751,579

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c. Estimated Analysis of Ore Reserves

<u>Product</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Bessemer Merch	88,457	64.01	.020	5.50
Non Bessemer Merch	63,657	62.22	.078	5.59
Bess Wash Concentrates	755,429	60.92	.026	7.85
Non Bess Wash Concts.	450,438	58.89	.067	8.65
Bess Retreat Concts.	229,073	58.33	.031	11.73
Non Bess Retreat Concts.	<u>164,525</u>	<u>57.73</u>	<u>.061</u>	<u>10.03</u>
Total	1,751,579	59.96	.042	8.57
Total Bessemer	1,072,959	60.62	.027	8.48
Total Non Bessemer	678,620	58.91	.067	8.70

5. LABOR and Wages --- None
 6. GENERAL SURFACE --- None
 7. OPEN PIT --- None
 8. BENEFICIATION --- None
 9. MAINTENANCE & REPAIRS None
 10. COST of PRODUCTION None
 11. EXPLORATION and FUTURE EXPLORATION --- None
 12. TAXES

	<u>1953</u>		<u>1952</u>		<u>Increase</u>
	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>	<u>Taxes</u>
Mineral	\$231,247	\$35,284.27	\$231,247	\$28,526.63	
Land	666	78.11	666	85.79	
Total	\$231,913	\$35,362.38	\$231,913	\$28,612.42	\$6,749.96
Average Mill Rate		152.48		123.38	23.59

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12. TAXES (con't)

Tons
Tax Commission Reserve
May 1

1953	1,751,579
1952	1,751,579

13. ACCIDENTS and PERSONAL INJURIES --- None
14. PROPOSED NEW CONSTRUCTION --- None
15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT --- None

SARGENT UNDERGROUND MINE

ANNUAL REPORT

YEAR 1953

1. GENERAL

Operations in 1953 were carried forward on a 2-shift, 5-day-week basis. Crude ore was placed in stockpile from January 2 to April 27. Seepage into the underground from the continual heavy rains throughout the summer months hampered operations somewhat. After one of the heavy rains, the mine was shut down completely for a few days and cleanup and repair work was carried on for a week afterwards. On October 9, production from the underground was halted completely; and on October 12, preparation began for abandoning the underground. The salvageable equipment and material were completely removed from the underground by November 13. All of the men were transferred to the Sargent Open Pit, the Hawkins, or the Agnew mines. Equipment and material that could be used at the Agnew mine were transferred as needed. All of the surface structure, buildings, and equipment have been left as they were until a decision is reached as to how to dispose of them.

2. PRODUCTION, SHIPMENT, and INVENTORIES

a. Production by Grades

	<u>Tons</u>
Crude	167,579
Concentrates	128,486

b. Shipments Concentrates 128,486

c. Stockpile Inventories None

d. Production by Months - Crude Underground

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d. Production by Months - Crude Underground (con't)

<u>Month</u>	<u>Tons</u>
January	14,361
February	14,490
March	13,227
April	12,036
May	13,323
June	13,275
July	30,258
August	31,413
September	19,440
October	5,756
Total	167,579

e. Production by Months - Concentrates Underground

April	2,948
May	27,563
June	29,886
July	27,350
August	22,096
September	13,849
October	4,794
Total	128,486

3. ANALYSIS

a. Tonnage and Analysis of Crude Ore - Underground

<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
167,579	51.84	.059	17.31

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b. Tonnage and Complete Analysis of
Underground Concentrates Produced and Shipped

<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulfur</u>	<u>Ign. Loss</u>	<u>Moist.</u>
128,486	56.35	.060	11.58	.87	1.56	.33	.20	.012	4.36	12.81

4. ESTIMATE of ORE RESERVES - None

5. LABOR and WAGES

A. Comments

The labor supply was ample throughout the year. Local labor relations continued satisfactorily. The number of gangs producing ranged from 8 to 4 gangs during the year. After the mine ceased operations, the men were transferred to the Sargent Open Pit, the Hawkins, and the Agnew mines.

A general increase of 8-1/2 cents per hour was granted which set the new rate for Job Class I at \$1.52 per hour. A 1-cent increment between job classes was granted on July 1, which together with the 8-1/2 cent raise, increased the miner's minimum rate to \$2.235 (Job Class 14). The increment between job classes is now \$0.055.

B. Comparative Statement of Production and Wages

<u>Production</u>	
Crude Ore	167,579
Concentrates	128,486
Number of Days Operated	223
Average Daily Production	751
Average Number of Men Working	80
Tons Per Man Per Miner	31.42
Tons Per Man Total Underground	15.85

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b. Comparative Statement of Production and Wages (con't)

Tons Per Man Total Mine	9.85
Average Rate Per Day-Surface	15.48
Average Rate Per Day-Underground	19.81
Average Rate Per Day-Contract Miners	20.61
Average Rate Per Day-Total Mine	18.37
Amount Paid for Labor	\$315,017.20
Labor Cost Per Ton	1.880

6. SURFACE

a. Building and Repairs

Minor maintenance repairs to buildings were carried on throughout the year.

b. Timber Shafts

After stripping operations began in the open pit, the #2 timber shaft was filled with surface material. The #1 timber shaft was abandoned during the summer, and all timber and supplies were taken underground through the hoisting shaft. Mining began around the timber shaft pillar so the #1 timber shaft was caved as the ore was removed.

c. Roads and Water Lines

The road into the mine was resurfaced with gravel from the open pit and from the St. Paul pit. A 3-inch water line was laid from the M. A. Hanna Company clear water line to obtain water for the balance of the year for the mine and the location. The use of this water began on May 25.

d. Dykes

It was necessary to raise the east side of the tailings dyke along the Great Northern tracks. The contract was awarded to

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d. Dykes (con't)

Dickovich Brothers. There should be enough room in the tailings pond to take care of the tailings from the wash ore encountered in the milling pit next year.

e. Washing Plant Repairs

Minor maintenance repairs were carried on throughout the year.

7. UNDERGROUND MINING

a. Main Shaft

Minor repairs were carried on as needed to keep the shaft in shape for the short period remaining before the mine was shut down. A temporary cover was put over the shaft opening after the underground was abandoned. The shaft was in need of repairs when the mine was shut down.

b. Development

Very little development work was done during the year. Drifts and raises were driven as needed to retreat in an orderly manner.

c. Mining

Mining was carried forward during the year with an average of six and one half gangs employed, with four mining on sublevel caving, one and one half on drifting, and one on repairing and developing. Blocks approximately 28 feet high and 25 feet wide were caved. Pillars were caved back in an orderly manner. The main level drift was propped near the milling pit in order to maintain drainage after the underground was abandoned. A pillar of ore was left in the milling pit area. It would not have been economical to mine this pillar because of the high overhead and low production with only one gang mining. This

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c. Mining (con't)

pillar will be mined by open pit methods. Heavy rains hampered operations somewhat. Minor floods and sand runs happened quite frequently during the summer. During the last two months of operation, there were only four gangs producing ore.

d. Timber, Explosives, Etc.

The supply of timber was ample and of good quality. Elm has been used in all caving places. The timber inventory was kept to a minimum. All timber left after the mine was shut down was hauled to the Agnew mine.

Lineal feet of timber used per ton of ore	.293
Cost per ton for timber	.062
Cost per ton for lagging, poles, and boards	.052
Cost per ton for wire	.0016
Pounds of explosives per ton	.321
Cost of explosives per ton of ore	.073

e. Pumping and Drainage

There has been no change in the pumping arrangements. Minor repairs were done on the pumps as needed. All of the pumps were dismantled and brought to the surface after the mine was shut down. The main pumping problem was during heavy rainstorms. Production has to be stopped during heavy rains, the dams closed, and the water released slowly so that the pumps could handle the excess gallonage.

8. BENEFICIATION

The washing plant started operating on April 27 on a 3-shift, 5-day-week basis for most of the season. The plant was shut down for a few days during one of the heavy rainstorms. During the latter part of the season, the plant operated on a

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8. Beneficiation (con't)

2-shift, 5-day-week basis. The plant was shut down on October 9 for the remainder of the year.

During the season, the plant operated 118 shifts, treating 197,419 tons of crude ore and producing 131,880 tons of concentrates for an average weight recovery of 66.80 per cent. An average of 1673 tons per shift of crude ore was maintained with a resulting product of 1118 tons per shift of concentrates. Of the 197,419 tons of crude ore treated, 167,569 tons were produced during the year, 23,314 tons were in stockpile at the beginning of the year, and 6,536 tons were from the open pit. Of the 131,880 tons of concentrates produced, 128,486 tons were underground concentrates and 3,394 tons were open pit concentrates.

In general, the plant worked satisfactorily. Some open pit wash ore was also treated during the season. This ore was of such a painty structure that it had to be mixed with underground ore in order to put it through the plant.

9. MAINTENANCE and REPAIR

A continuous program of maintenance and repair was carried on during the year. Repairs were not too extensive because of the mine being abandoned at the end of the shipping season. The first fifty feet of the shaft below surface was in very bad shape before the mine was abandoned.

10. COST of OPERATION

a. Comparative Cost Statement

<u>Product</u>	<u>1953 Budget</u>	<u>1953 Cost Per Ton</u>	<u>1952 Cost Per Ton</u>
Direct Ore			14,377
Crude Ore	128,000	167,579	188,718
Total Direct and Crude	128,000	167,579	203,095
Concentrates	83,200	128,486	125,285
Total Concentrates and Direct Ore	83,200	128,486	139,662
Recovery		66.80	66.80
Average Daily Product		783	812
Tons Per Man Per Day		9.99	8.74
Days Operated		223	251

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a. Comparative Cost Statement (con't)

<u>Costs</u>	1953 <u>Budget</u>	1953 <u>Cost Per Ton</u>	1952 <u>Cost Per Ton</u>
Total Underground Costs	\$3.177	\$1.563	\$2.068
Total Surface Costs	0.349	0.245	0.246
General Mine Expense	0.606	0.506	0.499
Cost of Production	<u>\$4.132</u>	<u>\$2.314</u>	<u>\$2.813</u>
Concentrating Costs	0.494	0.344	0.373
Total Cost—Merch Ore Production	<u>\$6.851</u>	<u>\$3.876</u>	<u>\$4.422</u>
<u>Depreciation</u>			
Plant and Equipment		0.591	0.182
Motorized Equipment			0.002
Movable Equipment		0.002	0.005
<u>Taxes</u>			
Ad Valorem		0.147	0.101
Occupational		0.007	0.009
Royalty		<u>0.060</u>	<u>0.061</u>
Total Depreciation and Taxes		\$0.807	\$0.360
Loading and Shipping			<u>0.023</u>
Total Cost at Mine		<u>\$4.683</u>	<u>\$4.805</u>
Administrative Expense		0.050	0.050
Miscellaneous Income and Expense		<u>0.080</u>	<u>0.044</u>
Grand Total Underground		\$4.813	\$4.899

b. Comments

Total underground cost of \$1.563 was \$1.614 below the budget and \$0.505 below 1952 costs. Total surface cost of \$0.245 was \$0.104 below the budget and \$0.001 below 1952 costs. Total general mine expense was \$0.100 below the budget and \$0.007 higher than 1952 costs. Cost of production of \$2.314 was \$1.818 below the budget

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b. Comments (con't)

estimate of \$4.132 and \$0.499 below the 1952 costs. Concentrating costs of \$0.344 were \$0.150 lower than the budget of \$0.494 and \$0.029 lower than 1952 costs. The total cost of producing merch ore was \$2.975 lower than the budget estimate of \$6.851 and \$0.546 below the cost secured in 1952.

11. EXPLORATION and FUTURE EXPLORATION

No extensive program of exploration was carried out in 1953.

12. TAXES

	<u>1953</u>		<u>1952</u>		<u>Increase or Decrease</u>	
	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>	<u>Assessed Value</u>	<u>Taxes</u>
Mineral	\$ 80,424	\$21,166.31	\$ 98,244	\$18,682.00		
Land, Bldg, Machinery	19,301	4,929.60	19,360	3,559.70		
<u>Personal Prop.</u>						
Equipment	4,241	1,122.85	4,733	904.76		
Stockpile	872	230.87	2,618	500.46		
Total	\$104,838	\$27,449.63	\$124,955	\$23,646.92	-\$20,117	\$3,802.71
Average Mill Rate		261.82		189.24		738.35%

Tax Commission Reserve

<u>Tons</u>	<u>Tons</u>
<u>May 1</u>	<u>May 1</u>
<u>1953</u>	<u>1952</u>
946,110	1,162,997

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13. ACCIDENTS and PERSONAL INJURY

Lost-time accidents at the Sargent underground during 1953 are as follows:

<u>Name</u>	<u>Date of Injury</u>	<u>Place of Accident</u>	<u>Cause</u>	<u>Nature of Injury</u>	<u>Days Lost</u>	<u>Compensation Paid</u>
Joe Sametz	1-6-53	Contract #6	He was drilling when chunk of ore fell from pillar side striking him on the right knee and right foot.	Fractured bone in right foot & strained right knee.	64	\$312.93
Lauri Seppa	1-26-53	Contract #14	While drilling, dirt from side of working place came down and struck left leg.	Severe contusion of left foot, dorsum.	34	\$217.60
Jerry Rachunek	2-17-53	Contract #11	He was putting up an open set post and turned post to fit. Felt pain in right side.	Right Inguinal Hernia	38	\$243.20
S. Grcevich	5-21-53	By Hoisting Shaft	He was loading timber into skip to be taken down into the mine. Felt pain in back.	Pain right side of back, tender over sacroiliac joint on right.	6	\$ 6.40
Ernest Miller	6-11-53	Fire Hydrant at Sargent Loc.	He was shoveling dirt around fire hydrant; blister formed on base of right index finger and became infected.	Blister right index finger Finger Swollen and lanced.	6	\$ 6.40

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13. ACCIDENTS and PERSONAL INJURY (con't)

<u>Name</u>	<u>Date of Injury</u>	<u>Place of Accident</u>	<u>Cause</u>	<u>Nature of Injury</u>	<u>Days Lost</u>	<u>Compensation Paid</u>
Urho Kesti	8-25-53	Contract #6	He was scraping dirt into chute with the tigger. The upright sprag pole in front of trugger broke, causing tigger to shift over against left foot, bruising ankle.	Severe bruise and contusion of lateral side of ankle.	33	\$231.00

14. PROPOSED NEW CONSTRUCTION - None

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

a. Equipment Received

1 Chicago Pneumatic Air Sump Pump

b. Proposed New Equipment

None

SARGENT OPEN PITANNUAL REPORTYear 1953

1. GENERAL

During January, February, and almost all of March, there was no work at the mine. On March 30, repairing of trucks was started with a crew of one foreman and two automotive mechanics. The District carpenter crew started work on the rock reject feeder at the screening plant, which was completed in April. The company structural drill started drilling in an area north of the underground caves and along the Missabi-Chief line where stripping had revealed some ore.

During April, repairs on trucks were completed and work was started on the #5 tractor from the underground. Pumping was started in the pit.

Stripping started on May 5; ore operations started on May 11. Work was scheduled on a 1-shift, 5-day-week basis, using the 85-B 3-1/4 yard shovel and three and four 20-ton Euclid trucks. Stripping was conducted concurrently with ore operations, with only enough stripping done to uncover ore as indicated in the ore banks. Wet weather hindered both operations--trucks mired in the pit and on the dumps, which had to be surfaced with rock, and many truckloads of overburden and rock were hauled to improve the dykes at the tailings pond.

During June, July and August, exploratory operations continued and considerable rock was necessarily removed to remodel approaches to some narrow, lower ore channels. A small amount of ore was obtained along the Missabi-Chief line. Some wash ore was encountered throughout the operations; this was screened at the underground wash plant and beneficiated. To screen and haul this ore to the washing plant, a fill was completed and the tracks planked in so that trucks could be loaded at the loading bin of the screening

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1. GENERAL (con't)

plant. An agreement was made with the fee representatives to concentrate the open pit wash ore with the underground ore, since the open pit wash would not concentrate satisfactorily by itself because of paint rock which plugged the screens.

On September 17, all operations ceased in the north pit with the depletion of ore from the deep channel areas. The shovel was moved out of the pit for repairs.

On September 21, stripping was started on an approach to the old milling pit area, where the removal of 218,148 cubic yards of surface, old caves, taconite, etc., would reveal 71,188 tons of merchantable ore. This stripping continued until the end of the year. Rain hampered stripping operations the first part of the month, but the balance of the stripping project was carried on under favorable weather conditions until November, when snow and cold made the 11.3 per cent approach road slippery. Getting through the caved ground and old dump in the approach was hazardous as both trucks and shovels mired, and the banks and the road in the approach would not stabilize immediately. Some of the taconite digging was hard as the bottom underground caving had not broken it entirely. Five trucks were used in the lower stripping.

2. PRODUCTION, SHIPMENTS, and INVENTORIES

a. Production by Grades

<u>Product</u>	<u>Tons</u>
Direct Ore	53,568
Concentrates	<u>3,394</u>
Total	56,962

b. Shipments

Direct Ore	53,568
Concentrates	<u>3,394</u>
Total	56,962

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- c. Stockpile Inventories - No stockpile balance.
d. Production by Months - Crude

<u>Month</u>	<u>Open Pit</u>
May	1,424
June	1,824
July	2,573
August	—
September	<u>715</u>
Total	6,536

- e. Production by Months - Concentrates and Direct

<u>Month</u>	<u>Open Pit Concentrates</u>	<u>Open Pit Direct</u>
May		14,722
June	340	13,723
July	684	12,942
August	1,990	8,809
September	<u>371</u>	<u>3,372</u>
Total	3,394	53,568

3. ANALYSIS

- a. Tonnage and Analysis of Concentrates - Open Pit Crude

<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
6,536	51.61	.074	17.89

- b. Tonnage and Complete Analyses of Concentrates and Open Pit Direct as produced and shipped.

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sulfur</u>	<u>Ign Loss</u>	<u>Moist.</u>
Concentrates	3,394	54.32	.068	14.28	1.08	1.47	.32	.20	.010	4.35	13.71
Direct	53,568	53.67	.072	13.66	1.53	1.77	.33	.21	.011	4.92	16.55

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4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

<u>Product</u>	<u>Cubic Feet Per Ton</u>	<u>Rock Reduction</u>	<u>Per Cent Recovery</u>
Merch Ore	14	0	100
Wash Concentrates	14	0	60

b. Ore Reserves as of December 31, 1953

<u>Lease</u>	<u>Reserve 12-31-52</u>	<u>Mined</u>	<u>Balance After Mining</u>	<u>Changed by Re-estimate</u>	<u>Reserve 12-31-53</u>
SW-SE-23, 57-22				71,188	71,188

c. Estimate of Analyses of Reserves - Open Pit (Milling Pit Area)

<u>Non-Bessemer Material</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Moist</u>	<u>Natural Iron</u>	<u>Natural Silica</u>
Merch	33,244	56.50	.047	11.92	1.28	2.50	13.00	49.16	10.37
Wash Concts.	37,944	56.00	.045	12.10	.96	2.30	12.00	49.28	10.65
Total	71,188	56.23	.046	12.01	1.11	2.39	12.45	49.23	10.53

Note: The estimate of 71,188 tons is all the ore in the Sargent Open Pit mine that is considered to be economically available. It is possible that additional ore might be found on the borderline and the old caves, and that some of the ore might be of Bessemer grade.

d. Prospective Reserves

<u>Material</u>	<u>Tons</u>	<u>Iron</u>	<u>Moisture</u>	<u>Natural Iron</u>
Merch	40,000	55.00	15.00	46.75
Wash Concentrates	430,000	56.00	13.00	48.72
Retreat Concentrates	390,000	56.00	13.00	48.72
Total	860,000	55.95	13.09	48.63

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5. LABOR and WAGES

a. Comments

During 1953, there was no real scarcity of labor. Attracted by the good wages, men came in from the outlying communities. The labor attitude in 1953 was somewhat better than in other years.

b. Comparative Statement of Wages and Product

Tons	56,962
Number of Days Operated	54.75
Number of Shifts Operated	54.75
Average Daily Product	1097.8
Average Product Per Shift	1097.8
Average Production Per Man Per Day	41.64
Average Wages Per Hour (Ore Season)	2.286
Amount Paid for Labor (Ore Season)	\$25012.44
Labor Cost Per Ton	0.472

6. GENERAL SURFACE

a. Building and Repair

No work was done in 1953, and none is contemplated.

b. Roads, Transmission Lines, Etc.

No new work is proposed at the present time. Both the new power line to the old milling pit and the new approach road were completed in the fall. Work of stabilizing the lower part of the approach road is proposed for the spring by putting in a layer of rock from the north pit. A road fill to the screening plant loading bin was completed during the summer and the track planked in so that trucks could load from the bin.

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c. Miscellaneous General Construction

The rock reject feeder and screen were completed before the ore season opened. No new work is contemplated for 1954.

7. OPEN PIT

a. Stripping

Stripping under E&A No. CC-563 started on May 5 and was conducted concurrently with ore operations until September. Part of this stripping was carried over into the approach stripping of the old milling pit. E&A No. CC-598 was authorized for stripping of the old milling pit and was scheduled on a 3-shift, 5-day-week basis until the end of the year.

Following is a summary of stripping and costs for E&A's No. CC-563 and CC-598 for the year 1953:

<u>E&A No.</u>	<u>Cubic Yards Stripped in 1953</u>	<u>Estimated Cost</u>	<u>Actual Cost</u>	<u>Over or Under</u>
563	79,835	\$0.417	\$0.498	/\$0.081
<u>598</u>	<u>205,765</u>	<u>\$0.491</u>	<u>\$0.431</u>	<u>-\$0.060</u>
Total	285,600	\$0.470	\$0.450	-\$0.020

Costs were high under E&A No. CC-563 because stripping proceeded only as ore was developed, the ore body not being uniform.

b. Open Pit Mining

For the season, a total of 56,962 tons were shipped; this total included 53,568 tons of direct ore and 3,394 tons of wash concentrates. Ore operations were discontinued on September 17.

SARGENT & Lundy
BOSTON
MILWAUKEE
SARGENT & Lundy
BOSTON
MILWAUKEE

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b. Open Pit Mining

Average production per shift for the year was 1098 as compared to 1809 in 1952. The reduced production was due to scrambling the spotty pockets of ore remaining in 1953, as against mining the newly developed ore body in 1952 when, in the month of November alone, over 45,000 tons were shipped.

Ore shipped in 1953 came from the deep channels and along the Missabi-Chief line. In addition, wash ore was mined in the north pit and along the Missabi-Chief line; this was screened and stocked at the underground washing plant where it was beneficiated after an agreement with the fee representatives to mix the underground and pit wash ores to obtain better washing results.

For each 5.1 tons of ore shipped, one ton of lean ore, waste, and rock was removed. This compares with 8.2 tons to one in 1952.

c. Pumping and Drainage

After the spring thaw, a Carver self-priming pump was used, but heavier rains necessitated the use of a larger pump.

8. BENEFICIATION

a. Plant Operation

Before the opening of the season, the rock reject pan feeder was installed and a reversible bar screen with 4-1/2 inch openings was placed between the chain grizzly and crusher. This bar screen could readily be converted for oversize to the crusher or rock reject feeder. Very little oversize was sent to the crusher in 1953; however, it is intended to use this installation with the ore from the old milling pit.

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a. Plant Operation (con't)

The plant operated 438 hours and lost about 60 hours, or about 11.1 per cent for delays in waiting for empties, chutes and bins plugging due to sticky ore, and other miscellaneous delays.

9. MAINTENANCE and REPAIRS

There were no major repairs during 1953.

10. COST of OPERATIONS

a. Comparative Cost Statement

<u>Product</u>	1953 Budget Revised 7-1-53	Cost Per Ton 1953	Cost Per Ton 1952
Direct Ore	67,000	53,568	96,792
Concentrates	8,000	3,394	
Average Daily Output		1097.8	1809.2
Tons Per Man Per Day		41.64	76.09
Days Operated		54.75	53.50
<u>Costs</u>			
Total Pit Operating	\$0.809	0.641	0.334
Total Concentrating	0.069	0.073	
Total General Mine Expense	0.299	0.299	0.394
Total Winter & Idle	0.361	0.634	
Cost of Production	\$1.538	\$1.647	\$0.728
<u>Depreciation</u>			
Plant and Equipment		0.591	0.188
Motorized Equipment and Other		0.040	0.002
Movable Equipment		0.002	0.001
<u>Taxes</u>			
Ad Valorem		0.146	0.097
Occupational		0.037	0.155
Royalty		0.082	0.078

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a. Comparative Cost Statement (con't)

	<u>Cost Per Ton</u> 1953	<u>Cost Per Ton</u> 1952
Total Depreciation and Taxes	\$0.898	\$0.521
Administrative Expense and Income	0.050	0.050
Miscellaneous Expense and Income	<u>0.093</u>	<u>0.043</u>
Total Cost at Mine	<u>\$2.688</u>	<u>\$1.342</u>

11. EXPLORATION and FUTURE EXPLORATION

Eight holes were put down in 1953 totalling approximately 606 feet. This structural drilling was carried on to investigate possibilities of top ore north of the caves and to develop probable extensions of ore exposed by stripping along the Missabi-Chief line by the M. A. Hanna Company. The cave area proved barren; however, a very small amount of merch ore was developed by this drilling in the property line, which was moved during the season's production.

12. TAXES (Refer to Sargent Underground Annual Report for 1953)

13. ACCIDENTS and PERSONAL INJURY - None

14. PROPOSED NEW CONSTRUCTION - None

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

No new equipment was received in 1953 and none is proposed for 1954.

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1. GENERAL

Stripping at the Wanless mine was carried on from January 1, 1953, to March 13, 1953, when operations were suspended in order to repair equipment. Operations were again resumed on April 20 and continued until November 20. During the year, stripping was carried on in conjunction with mining.

Loading out of Kosmerl stockpile was carried on in April. Mining of pit ore started on April 28, 1953.

At the end of the operating season, four trucks and a grader were sent to the Sargent mine; the Lima shovel was sent to the Hill-Trumbull mine. Crews were then reduced to four pumpmen, two foremen, one master mechanic, and two clerks.

In March the Wanless shaft, which contained a deep well pump, caved in; the bowls and rods were lost, but the motor and electrical equipment were salvaged.

A well was drilled and completed in 1953 to furnish fresh water for the employees.

An Allis-Chalmers pump was installed to pump water from the pit into the settling basin.

A variable speed control was installed on the pan feeder in order to speed up production.

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2. PRODUCTION, SHIPMENTS, and INVENTORIES

a. Production

<u>Product</u>	<u>Tons</u>
Wanless	87,679
Woodbridge	<u>44,328</u>
Total	132,007
Whiteside	11,721
Kosmerl	<u>159,153</u>
Total	170,874

b. Shipments

Wanless shipped exactly what it produced.

c. Stockpile Inventories - No Balance.

d. Shipments by Months

<u>Months</u>	<u>Wanless</u>	<u>Woodbridge</u>	<u>Total</u>	<u>Whiteside</u>	<u>Kosmerl</u>
March					53,051
April	4,333	550	4,883		3,135
May	3,818	3,160	6,978		31,154
June	22,473		22,473		20,432
July	23,868		23,868	7,422	8,740
August	16,514	3,373	19,887	2,200	35,835
Sept.	12,579	27,448	40,027	2,099	6,519
October	<u>4,094</u>	<u>9,797</u>	<u>13,891</u>		<u>287</u>
Total	87,679	44,328	132,007	11,721	159,153

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3. ANALYSIS

a. Tonnage and Analysis of Production

	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mn</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sulfur</u>	<u>Ign Loss</u>	<u>Moist.</u>
Wanless	87,679	51.45	.096	10.84	.92	5.92	.05	.07	.010	8.01	18.89
Woodbridge	<u>44,328</u>	<u>54.35</u>	<u>.089</u>	<u>10.06</u>	<u>.95</u>	<u>4.08</u>	<u>.08</u>	<u>.11</u>	<u>.012</u>	<u>6.38</u>	<u>16.48</u>
Total	132,007	52.42	.093	10.58	.93	5.30	.06	.08	.011	7.47	18.08
Whiteside	11,721	51.31	.096	11.05	.39	8.18	.06	.10	.012	6.46	
Kosmerl	No Analysis										

b. Tonnage and Analysis of Shipments

Same as for Production above

4. ESTIMATE of ORE RESERVES

a. Developed Ore - Factors Used

	<u>Cubic Feet Per Ton</u>	<u>Rock Reduction</u>	<u>Per Cent Recovery</u>
Merch	14	0	100

b. Ore Reserves as of December 31, 1953

<u>Lease</u>	<u>Reserve 12-31-52</u>	<u>Mined</u>	<u>Balance After Mining</u>	<u>Changed Re-estimate</u>	<u>Reserve 12-31-53</u>
Wanless	1,205,179	87,679	1,117,500		1,117,500
Woodbridge	<u>351,227</u>	<u>44,328</u>	<u>306,899</u>		<u>306,899</u>
Total Wanless	1,556,406	132,007	1,424,399		1,424,399

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c. Estimated Analyses of Reserves

<u>Lease</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>	<u>Mang</u>	<u>Alum</u>
<u>Wanless</u>						
No. 1 Merch Open Pit	801,140	55.02	.120	7.17	1.64	3.47
No. 2 Merch Open Pit	224,588	48.47	.100	12.90	1.32	7.67
No. 1 Merch Underground	38,743	54.50	.151	8.22	.90	2.65
No. 2 Merch Underground	<u>53,029</u>	<u>50.05</u>	<u>.092</u>	<u>13.03</u>	<u>1.78</u>	<u>3.81</u>
Total Wanless	1,117,500	53.45	.116	8.64	1.56	4.30
<u>Woodbridge</u>						
No. 1 Merch Open Pit	208,145	55.26	.098	8.01	1.21	2.65
No. 2 Merch Open Pit	98,754	48.89	.105	10.59	2.41	6.15
No. 1 Merch Underground						
No. 2 Merch Underground						
Total Woodbridge	306,899	53.21	.100	8.84	1.60	3.78
<u>Total Wanless</u>						
Total No. 1 Merch	1,048,028	55.05	.117	7.38	1.53	3.28
Total No. 2 Merch	<u>376,371</u>	<u>48.80</u>	<u>.100</u>	<u>12.31</u>	<u>1.67</u>	<u>6.73</u>
	1,424,399	53.40	.112	8.68	1.57	4.19

5. LABOR and WAGES

a. Comments

The labor supply was adequate throughout the year and this was the first year where the majority of the employees took their vacation during the operating season. The mine was scheduled on a 2-shift, 5-day-week basis for ore and stripping operations.

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b. Comparative Statement of Production and Wages

Direct Ore	249,830
Number of Days Operated	101
Average Number of Men Working	46
Average Wage Per Man	17.98
Production Per Man Per Day	64.60
Labor Cost Per Man Per Day	18.48
Total Number of Man Days	3867
Amount Paid for Labor	\$71,158.22

3867
8
30936

6. GENERAL SURFACE

a. Building and Repairs

Outside of housing built for the pit pump and the fresh water well pump, no major building projects were undertaken during 1953.

- b. Roads were surfaced with rock occasionally to build up soft spots and replace sections washed out by rains and spring thaws, as general maintenance. In addition, the main pit approach was excavated and shifted west and north in the Woodbridge area and, under a trespass agreement, was constructed on the Whiteside-Kosmerl side of the property line to gain depth and release additional Wanless and Woodbridge ore.

7. OPEN PIT

a. Stripping

The stripping program at the Wanless was carried forward from 1952 under E&A No. CC-495 until March 13, 1953, when this stripping program was completed with a total of 184,444 cubic yards stripping during 1953 at a cost of \$0.6203 and a total of 590,913 cubic yards stripped to date at a cost of \$0.503.

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a. Stripping (Con't)

E&A No. CC-568 was started in April and continued until November when this stripping program was completed. A total of 269,043 cubic yards was stripped under this E&A at a cost per yard of \$0.537. The total yardage stripped under this E&A during the year included:

<u>Lease</u>	<u>Cubic Yards</u>
Wanless	181,956
Kosmerl	47,091
Whiteside	<u>39,996</u>
Total	269,043

Total stripping at the Wanless mine during the year 1953 amounted to 453,487 cubic yards at a cost of \$0.5665 per cubic yard.

Yardage stripped under E&A No. CC-495 was distributed as follows:

<u>Lease</u>	<u>Cubic Yards</u>
Wanless-Woodbridge	437,094
Whiteside	58,116
O.I.M.Div. Kosmerl Line	69,920
O.I.M.Div. Merch Ore	<u>25,783</u>
Total	590,913

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a. Stripping (con't)

Stripping operations involved the use of the following:

- 8 Trucks
- 1 Tractor (13 years old)
- 1 Tractor (5 years old)
- 1 85-B Electric Shovel
- 1 1201 Lima Diesel Shovel
(4 years old)

Stripping was done in 341 shifts with an average of 1328 yards moved per shift. The haul at times was over two miles long with an average 190-foot lift, and occasionally the various materials were sorted and hauled to five different dumps on a single shift.

b. Open Pit Mining

During 1953, a total of 302,881 tons of ore was shipped, although only 249,830 tons were produced. The difference between ore shipped and ore produced, amounting to 53,051 tons, represents stockpiled Kosmerl ore encountered in stripping. Production by leases is as follows:

<u>Lease</u>	<u>Tons</u>
Wanless-Woodbridge	132,007
Kosmerl	106,102
Whiteside	<u>11,721</u>
Total	<u>249,830</u>

Approximately 14,000 tons of ore from the lean ore stockpile were shipped; this ore was mixed with ore from the pit when pit ore was of decent grade. A total of 132,007 tons of ore were produced in 1953, which fell short of the 150,000 ton budget by 17,993 tons because of late season cutbacks.

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b. Open Pit Mining (con't)

Stockpile loading started on April 6, 1953. All of the stockpile was put through the crusher before it was loaded in cars. No ore was in stock as of December 31, 1953.

Ore operations were started in the pit on April 28, 1953. Shipping continued intermittently until October 30, 1953.

c. Pumping and Drainage

A deep well pump was operated in the Woodbridge caved area again this year. The deep well pump in the Wanless was lost in March due to caving of the shaft.

A new sump was built this year and the Allis-Chalmers pump was installed to handle dirty water from the pit. The water pumped from the pit enters a settling basin before it is discharged into the creek.

After stripping operations were suspended, a ditching program was carried on to try to lower the water table and drain the gob.

9. MAINTENANCE and REPAIRS

During the shut-down period from March 13 to April 20, 1953, trucks, tractors, and shovel were given a general overhauling; in addition, other repairs to equipment were carried on from November 13 to December 23. Equipment loaned out to other mines will be repaired in the spring.

10. COST of OPERATIONS

a. Comparative Mining Costs

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<u>Direct Ore</u>	1953 <u>Budget</u>	1953 <u>Cost-Per-Ton</u>	1952 <u>Cost-Per-Ton</u>
Wanless	150,000	132,007	
Kosmerl	156,000	106,102	
Whiteside	<u>22,000</u>	<u>11,721</u>	
Total	328,000	249,830	<u>207,289</u>
Average Daily Output		2455.33	2329.09
Tons Per Man Per Day		64.60	62.43
Days Operated		101	89
<u>Costs</u>			
Total Pit Operating	\$0.575	\$0.531	\$0.530
Loading Stockpile	0.019	0.008	0.024
Total General Mine Expense	- 0.254	0.166	0.227
Winter & Idle Expense	0.330	0.381	0.414
Cost of Production	<u>\$1.218</u>	<u>\$1.086</u>	<u>\$1.195</u>
<u>Depreciation</u>			
Plant and Equipment	(2)	0.073	0.071
Motorized & Other Equipment	(2)	0.101	0.012
Equipment Loaned	(2)	0.018	0.011
Amortization Stripping	(1)	0.281	0.596
<u>Taxes</u>			
Ad Valorem	(1)	0.074	0.090
Occupational	(1)	0.027	0.024
Royalty	(1)	0.001	0.003
Miscellaneous Expense & Income			0.004
Total Cost at Mine		<u>\$1.661</u>	<u>\$0.811</u>
<u>Less Credit</u>			
Mining Kosmerl & Whiteside Ore		- 1.402	
Cost of Wanless Ore		<u>\$1.893*</u>	<u>\$2.006</u>

*Cost is based on Wanless production of 132,007 tons.

(1) Amounts are based on Wanless-Woodbridge ore only,
based on the following rates per ton:

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a. Comparative Mining Costs (con't)

Stripping	\$0.5313
Ad Valorem	0.136
Occupational	0.072
Royalty Taxes	0.027

(2) Amounts include all ore mined, including trespass ore.

b. Comments

Total pit operating for 1953 amounted to \$0.531 which was \$0.044 lower than the budget of \$0.575 and \$0.001 above the 1952 costs. Winter & Idle expense was \$0.381, or \$0.051 above the budget of \$0.330 and \$0.033 below the 1952 costs.

The total cost of production for the year amounted to \$1.086 which was \$0.132 lower than the budget of \$1.218 and \$0.109 below the 1952 costs.

11. EXPLORATION and FUTURE EXPLORATION

None being anticipated.

12. TAXES

	1953		1952		Increase Decrease	
	Assessed Value	Taxes	Assessed Value	Taxes	Assessed Value	Taxes
Mineral	\$186,790	\$16,796.16	\$213,398	\$17,131.59		
Land, Bldg. Machine	1,870	168.15	1,070	85.90		
Personal Property						
Equipment	14,294	1,285.32	14,574	1,170.00		
Stockpile	2,357	211.94	2,371	190.34		
Total	\$205,311	\$18,461.57	\$231,413	\$18,577.83	-\$26,102	-\$116.26
Average Mill Rate		89.92		80.28	✓ 12.01%	

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12. TAXES (con't)

Tax Commission Reserve

	1953 <u>Tons</u>	1952 <u>Tons</u>
May 1	1,551,523	1,763,695

Reduction in mineral value was partially offset by a 12.01 per cent increase in mill rate, giving a slight decrease in total tax.

13. ACCIDENTS and PERSONAL INJURY

There were seven minor accidents at the Wanless mine during 1953; and for the first time in almost three years, there was one lost time accident of two days.

14. PROPOSED NEW CONSTRUCTION - None

15. EQUIPMENT RECEIVED and PROPOSED NEW EQUIPMENT

a. Equipment Received in 1953

2 - 22-Ton Euclids from the Hawkins mine.
2 - 22-Ton Euclids from the Canisteco mine.
2 - 22-Ton Euclids from the Holman-Cliffs mine.
1 - 22-Ton Euclid from the Hill-Trumbull mine.
1 - 60' Dragline Boom for Lima Shovel.
1 - 3-1/2 Yard Dragline Bucket.

b. Proposed New Equipment

1 - Pickup truck for Pit Foreman's use; to replace the 1-1/2 ton truck over 3 years old.
1 - New tractor to replace one 5 years old.

Safety Department

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11. ACCIDENTS
AND
PERSONAL
INJURYa. Fatal Accidents

Two fatal accidents occurred at our Mines during the year of 1953. One of these occurred at the Negaunee Shaft on the Marquette Range and one at the Hill-Trumbull Mine on the Mesaba Range.

With an average employment of 4952 and two fatal accidents it gives us a fatality rate of .40. Only in five previous years has our fatality rate been better. In 1932 and 1946 we had no fatal injuries. In 1945 the rate was .32 and in 1949 it was .24. In 1937 we had a rate of .36 and in 1951 it was .40.

The fatality rate from 1898 through 1910 was 4.99, from 1911 through 1953 it is 1.88 including the 55 fatal accidents which occurred in 1926. Fifty-one of these fatalities occurred in the Barnes-Hecker disaster.

Brief summary of fatal accidents for the past year follows:

NEGAUNEE SHAFT - OTTERINO CATTO

Catto was fatally injured in a fall of ground accident on the 14th level plat while in the act of trying to make the place safe. The accident occurred on August 20th at 2:30 P.M.

Catto, who was underground foreman in charge of development work, was making his rounds with his shift boss, John Juidici. On approaching the skip-pit raise, about 90' from the shaft, these men noticed some loose rock on the side of the drift close to the raise. Recognizing the hazardous condition, Catto and Juidici began to bar the loose rock to make the place safe. Apparently Catto barred a small "key" chunk of rock from under a large piece which could not be detected as loose either by barring or sounding and this large rock fell on Catto causing instant death. This accident was classified as I, Trade Risk.

HILL-TRUMBULL MINE - MIKE TRTICA

In a sort of mysterious manner, Trtica was struck and run over by a locomotive and train causing instant death.

Trtica was employed as a general laborer at the crude ore loading pocket. Because of his advanced age he had been placed on a job which required but little effort. This consisted of heating sand in a small sand house, spreading the sand on oily places along the railroad tracks near the track switches and greasing the inside of the ball of the rail. At no time was he required to place himself in a hazardous position because all his work could be done while the trains were either standing idle or on a trip to the washing plant which was some distance away.

Just previous to the accident, Trtica had been seen by two other employees, first with a shovel full of sand and immediately afterwards leaning on his shovel. A few minutes later his body was seen

(Continued)

Safety Department

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INJURYa. Fatal AccidentsHILL-TRUMBULL MINE - MIKE TRTICA (Cont'd)

lying alongside the tracks just after one of the trains had pulled out from the loading pocket. It seems Trtica must have either walked across the tracks in front of the approaching train or was standing too close to the tracks and was struck.

The accident occurred on September 14th at about 9:45 A.M. Accident classified as III-A-4, Improper Act Or Selection Of Improper Method Of Doing Work (By Injured Workman).

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TABLE I

FATAL ACCIDENT RECORD
THE CLEVELAND-CLIFFS IRON CO. AND CLIFFS POWER & LIGHT CO.
1898-1953, INCLUSIVE

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NO. OF FATALITIES</u>	<u>FATALITY RATE</u>
1898	1065	6	5.63
1899	1174	4	3.41
1900	1427	4	2.80
	3,666	14	3.79
1901	1317	9	6.83
1902	1485	8	5.38
1903	1551	8	5.15
1904	1338	4	2.97
1905	2038	12	6.54
	7,729	41	5.30
1906	2418	10	4.13
1907	2843	17	6.00
1908	2340	6	2.52
1909	2520	13	5.15
1910	2907	20	6.88
	13,028	66	5.06
1898 - 1910		121	4.99
1911	2633	5	1.90
1912	2335	4	1.71
1913	2521	11	4.19
1914	2435	10	4.10
1915	3308	5	1.51
	13,332	35	2.70
1916	3063	8	2.61
1917	3457	6	1.73
1918	3765	13	3.45
1919	3938	11	2.79
1920	4125	5	1.21
	18,348	43	2.36
1921	2309	6	2.60
1922	2301	1	.43
1923	2728	6	2.20
1924	2472	5	2.02
1925	2472	2	.81
	12,282	20	1.61

(Continued)

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TABLE I (Cont'd)

<u>YEAR</u>	<u>NO. MEN EMPLOYED</u>	<u>NO. OF FATALITIES</u>	<u>FATALITY RATE</u>
1926	2119	55	25.96
1927	1969	4	2.03
1928	1784	4	2.25
1929	2000	4	2.00
1930	2566	5	1.95
	10,438	72	6.90
1931	1651	3	1.82
1932	630	0	0.00
1933	631	2	3.17
1934	1073	4	3.74
1935	1313	2	1.53
	5,298	11	2.05
1936	2125	2	.94
1937	2763	1	.36
1938	2590	3	1.17
1939	2457	1	.41
1940	2756	5	1.88
	12,691	12	.94
1941	3570	5	1.40
1942	3562	2	.56
1943	3609	4	1.11
1944	3584	3	.84
1945	3078	1	.32
	17,403	15	.86
1946	2791	0	0.00
1947	3942	7	1.78
1948	4003	3	.75
1949	4191	1	.24
1950	4344	5	1.15
	19,271	16	.83
1951	4975	2	.40
1952	4906	5	1.02
1953	4952	2	.40
1911 - 1953	123,896	233	1.88

BASED ON PER THOUSAND
EMPLOYEES

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TABLE II

CLASSIFICATION OF CAUSES OF FATAL ACCIDENTS
FROM DECEMBER 1, 1898 TO DECEMBER 31, 1953

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	3	
	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	56
C.	<u>Use Of Explosives:</u>		
	Explosion Of Powder	16	
	Premature Blast	3	
	Fall Of Ground Or Timber Due To A Blast	4	
	Overcome By Gas	3	
	Miscellaneous Causes	2	28
D.	<u>Mine And Railroad Cars:</u>		
	Caught By Haulage Cars	16	
	Riding Or Attempting To Ride Cars	6	
	Falling With Car From Trestle	4	
	Run Over By Railroad Car	8	
	Struck By Locomotive	3	
	Miscellaneous Causes	1	38
E.	<u>Miscellaneous Causes:</u>		
	Falling In Raise, Stope Or Pocket	10	
	Electric Shock	12	
	Falling From Ladder, Trestle, Etc.	8	
	By Moving Machinery	8	
	Mine Fires	3	
	Stockpile Slide	3	
	Slipping And Falling	1	
	Miscellaneous Causes	5	50
	TOTALS		354

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a. Fatal Accidents (Continued)

TABLE III

CLASSIFICATION OF FATAL ACCIDENTS - 1911 TO 1953, INCLUSIVE
BY THE CENTRAL SAFETY COMMITTEE

I.	<u>Trade Risk</u>		125
II.	<u>Negligence Of The Company</u>		
	Violation Of Rules	6	
	Failure To Provide Safety Devices	7	
	Improper Method Of Doing Work	12	
	Failure To Provide Tools Or Safe Places To Work ..	5	
	Failure To Instruct Men	5	
	Improper Act Or Selection Of Improper Method Of Doing Work (By Foreman)	<u>1</u>	36
III.	<u>Negligence Of Workmen</u>		
A.	<u>Injured Men:</u>		
	Improper Act Or Improper Method Of Work	28	
	Violation Of Rules	10	
	Failure To Use Tools Or Appliances Provided	4	
	Failure To Use Safety Devices	<u>4</u>	46
B.	<u>Other Workmen:</u>		
	Improper Act Or Improper Method Of Work	14	
	Violation Of Rules	4	
	Failure To Use Tools Or Appliances Provided	<u>1</u>	19
A-B.	<u>Injured Men And Other Workmen:</u>		
	Improper Act Or Improper Method Of Work	<u>3</u>	3
II-5 & III-A-3	Failure To Instruct Men By Foreman And Violation Of Rules By Injured Man And Partner	<u>1</u>	1
III-B-3			
II-5 & III-A-4 III-B-4	Failure To Instruct Men As To Method Of Work And Improper Act Or Selection Of Improper Method Of Doing Work By Injured Workman And Other Workman ..	<u>2</u>	2
II-2 & III-A-2 III-B-2	Failure To Use Proper Tools Or Appliances Provided (By The Foreman, Injured Workman And Other Workman	<u>1</u>	1
	TOTALS		<u>233</u>

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INJURYb. All InjuriesINTERPRETATION 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 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.

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(Continued)

Our accident frequency dropped favorably during the year from 33.72 in 1952 to 23.39 in 1953. There were 77 non-compensable injuries which caused 241 days lost time and 154 compensable injuries which caused 20,587 days lost time for a total of 231 injuries and 20,828 days lost time. Of this lost time, 12,000 days are time charges for two fatal accidents.

Only five active properties out of 26 listed had severity rates over 1.00. Exclusive of the fatals and permanent partial disabilities, all properties, with the exception of the Sargent Underground, would have been under 1.00 severity. The Ohio Mine had only one injury which was a loss of a foot with time charges of 2400 days. The Storehouse and Shops had five injuries with 658 days lost time of which 450 days were charged to loss of fingers. At the Negaunee Shaft, of a total of 6,121 days lost, 6,000 days were charged to the fatal accident. On the Mesaba Range, the Hill-Trumbull Mine had a total of 6,110 days lost, of which 6,000 days were charged to the fatal accident. All other properties had very favorable records.

Following we have put together accident statistics which have been broken down to Michigan Mines, Minnesota Mines, Open Pit, Underground and Miscellaneous.

TABLE IV

CLASSIFICATION OF COMPENSABLE INJURIES

11. ACCIDENTS AND PERSONAL INJURY

b. All Injuries

(Continued)

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CLASSIFICATION	AGNEW	ATHENS	CAMBRIA-JACKSON	CANISTEO	C. P. & L. CO.	CLIFFS SHAFT	HAWKINS	HILL-TRUMBULL	HOIMAN-CLIFFS	HUMBOLDT	LLOYD	MAAS	MATHER MINE "A" SHAFT	MATHER MINE "B" SHAFT	MISCELLANEOUS	NEGAUNEE SHAFT	OHIO	SARGENT	SPIES-VIRGIL	STHSE & SHOPS	TILDEN	TOTAL
I. Trade Risk, Incidental and Non-Preventable	2	4	2	2		5	4	1				5	4	6		1	1	2	1			40
II. Negligence Of Company:																						
1. Failure To Use Safety Devices Provided																						0
2. Failure To Use Proper Tools Provided																						0
3. Violation Of Rules																						0
4. Improper Act Or Selection Of Method Of Doing Work(By Foreman)		1							1													2
5. Failure To Instruct Men As To Hazards, Method, Etc.																						0
6. Failure To Provide Safety Devices																						0
7. Failure To Provide Tools, Appliances Or Places To Work						2								1								3
III. Negligence Of Workman:																						
A. Injured Workman																						
1. Failure To Use Safety Devices Provided								1										1				2
2. Failure To Use Proper Tools, Etc. Provided	1						1			1	1	1	1	1						1		5
3. Violation Of Rules						1				1	6	1	1	1						1		10
4. Improper Act Or Method Of Doing Work	2	9	5	2		4	3	3				10	7	9		2		3		3		62
B. Other Workman																						
1. Failure To Use Safety Devices Provided		1																				1
2. Failure To Use Proper Tools, Etc. Provided																						0
3. Violation Of Rules												1										1
4. Improper Act Or Method Of Doing Work	2					1	1						1			1						6

TABLE IV (Continued From Previous Page)

CLASSIFICATION OF COMPENSABLE INJURIES

COMBINED CLASSIFICATIONS	ACNEW	ATHENS	CAMBRIA-JACKSON	CANISTEO	C. P. & I. CO.	CLIFFS SHAFT	HAWKINS	HILL-TRUMBULL	HOLMAN-CLIFFS	HUMBOLDT	LLOYD	MAAS	MATHER MINE "A" SHAFT	MATHER MINE "B" SHAFT	MISCELLANEOUS	NEGAUNEE SHAFT	OHIO	SARGENT	SPIES-VIRGIL	STHSE & SHOPS	TILDEN	TOTAL
III-A-4 and III-B-4	1	2			2					1	1		5	2								14
II-2, III-A-2 and III-B-2		1											2									3
III-A-4, III-B-4 and II-7													2									2
III-A-1 and III-B-1													1									1
III-A-2 and III-B-2														1								1
III-A-2 and III-A-4														1								1
TOTALS*	6	20	7	4	0	14	9	6	1	0	2	18	29	22	0	4	1	6	1	4	0	154

* Totals Are For This Page And Preceding Page.

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b. All Injuries

(Continued)

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AND
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(Continued)

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>
1934	4	80,477	451,046
1935	2	196,883	1,136,215
1936	2	283,945	1,850,898
1937	1	765,702	5,216,879
1938	3	163,434	385,954
1939	1	564,433	3,713,389
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
TOTALS	58	16,210,105	118,786,183
20 Year Average	- 2.90	279,485	2,048,038

* Man-Days Worked During Year Without Fatality

** Amount Of Ore Mined During Year Without Fatality

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INJURYb. All Injuries

(Continued)

TABLE VI

RESUME OF ALL LOST TIME INJURIES & FATALITIES

<u>Mine Or Plant</u>	<u>Less Than 7 Days</u>	<u>7 Days Or More</u>	<u>Fatal- ities</u>	<u>TOTAL</u>
AGNEW	2	6		8
ATHENS	8	20		28
CAMBRIA-JACKSON	3	7		10
CANISTEO	3	4		7
C. P. & L. CO.	0	0		0
CLIFFS SHAFT	6	14		20
HAWKINS	7	9		16
HILL-TRUMBULL	1	5	1	7
HOLMAN-CLIFFS	2	1		3
HUMBOLDT	1	0		1
LLOYD	3	2		5
MAAS	6	18		24
MATHER MINE "A" SHAFT	9	29		38
MATHER MINE "B" SHAFT	15	22		37
MISCELLANEOUS	0	0		0
MISCELLANEOUS-HIBBING	0	0		0
NEGAUNEE SHAFT	3	3	1	7
OHIO	0	1		1
REPUBLIC	0	0		0
RESEARCH LABORATORY	0	0		0
SARGENT	2	6		8
SARGENT OPEN PIT	1	0		1
SPIES-VIRGIL	3	1		4
STHSE AND SHOPS	1	4		5
TILDEN	0	0		0
WANLESS	1	0		1
TOTALS	77	152	2	231

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(Continued)

TABLE VII

CAUSES OF COMPENSABLE INJURIES - UNDERGROUND (INCLUDING FATALITIES)

CAUSE	AGNEW	ATHENS	CAMBRIA-JACKSON	CLIFFS SHAFT	LLOYD	MAAS	MATHER MINE "A" SHAFT	MATHER MINE "B" SHAFT	NEGAUNEE SHAFT	SARGENT	SPIES-VIRGIL	TOTAL
Fall Of Ground		4	2	1	1	1	4	2	1	2		18
Falling Chunks (Shafts, Chutes, Raises)		1	1	2		1	4	6				15
Rolling Chunks			1			1		2				4
Persons Falling (Raises, Shafts, Scaffolds)				2		1	1					4
Persons Falling (Slipping & Stumbling)						2	1	1			1	5
Haulage		3		1		2		1	1			8
Drilling Equipment				1			3	2				6
Loading Equipment							1	1				2
Machinery (Moving)		1	1	1			1	2		1		7
Hand Tools	2	2			1	2	2	1				10
Flying Objects		1				1	1	1	1			5
Handling Materials			2			2	3	1		1		9
Lifting Or Pulling	1	1		1		3						6
From Nails Or Sharp Objects				1								1
Falling Or Moving Material	2	1		1			6	1				11
Explosives		1					1					2
Miscellaneous				1								1
TOTALS	5	15	7	12	2	16	28	21	3	4	1	114

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(Continued)

TABLE VII (Cont'd)

CAUSE	<u>OPEN PITS</u>					TOTAL
	CANISTEO	HAWKINS	HILL- TRUMBULL	HOLMAN- CLIFFS	OHIO	
Lifting Or Pulling	2	2				4
Haulage	1	1	1			3
Falling Material	1	1	1			3
Flying Objects		1				1
Persons Falling (Slipping And Stumbling)		1				1
Movement Of Rail- road Cars		1	1			2
Falling From Ladder, Car, Scaffold, Etc.		1		1		2
Machinery (Moving)			1			1
Hand Tools			1			1
Welding Equipment			1			1
Loading Equipment					1	1
Miscellaneous		1				1
TOTALS	4	9	6	1	1	21

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(Continued)

TABLE VII (Cont'd)

SURFACE (Underground Mines)

CAUSE	AGNEW	ATHENS	CLIFFS SHAFT	MAAS	MATHER "A"	MATHER "B"	NEGA- UNEE	SAR- GENT	TOTAL
Falling Or Moving Material		4					1		5
Persons Falling (Slipping Or Stumbling)				2					2
Machinery (Moving)			1						1
Flying Objects			1						1
Persons Falling (Scaffolds, R.R. Cars, Pockets, Etc.)	1				1				2
Welding Equipment		1							1
Hand Tools						1		1	2
Lifting Or Pulling								1	1
TOTALS	1	5	2	2	1	1	1	2	15

OTHER OPERATIONS

CAUSE	C. P. & L. CO.	GARAGE STHSE & SHOPS	MISCELLANEOUS	TOTAL
Falling Material		2		2
Flying Objects		1		1
Machinery (Moving)		1		1
TOTALS		4		4

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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>	
1939	564,542	44	1	9.96
1940	714,391	59	5	11.19
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 $\frac{3}{4}$	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	1,359,479 $\frac{3}{4}$	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

* Based On One Million Man-Hours Of Labor.

TABLE VIII-A

SEVERITY RATES, ALL COMPENSABLE INJURIES

<u>YEAR</u>	<u>NON-FATAL</u>		<u>FATAL DAYS LOST</u>	<u>DAYS LOST ALL INJURIES</u>	<u>SEVERITY * RATE</u>
	<u>DAYS LOST</u>	<u>RATE</u>			
1939	3,264	.723	6,000	9,264	2.051
1940	3,442	.602	30,000	33,442	5.852
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

* Based On Days Lost By Injuries Per 1,000 Man-Hours Of Labor.

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(Continued)

TABLE IX

COMPARISON OF COMPENSABLE ACCIDENTS, INCLUDING FATALITIES
BY MINES

<u>Mine Or Plant</u>	<u>FREQUENCY</u>		<u>SEVERITY</u>	
	<u>1952</u>	<u>1953</u>	<u>1952</u>	<u>1953</u>
AGNEW	16.02	22.62	.941	.893
ATHENS	27.50	31.16	10.275	.941
CAMBRIA--JACKSON	6.63	15.56	.762	.747
CANISTEO	8.94	11.01	.629	.198
C. P. & L. CO.	15.99	0.00	.474	.000
CLIFFS SHAFT	11.88	14.78	.363	.577
GENERAL ROLL	0.00	0.00	.000	.000
HAWKINS	12.57	17.70	11.623	.793
HILL TRUMBULL	8.10	14.84	.538	15.109
HOLMAN CLIFFS	13.07	2.76	.405	.124
HUMBOLDT	0.00	0.00	.000	.000
LLOYD	12.33	7.64	.871	.168
MAAS	22.30	23.87	8.480	.707
MATHER MINE "A" SHAFT	26.43	21.17	10.887	.887
MATHER MINE "B" SHAFT	21.63	18.21	1.140	.875
MISCELLANEOUS	15.03	0.00	45.092	.000
MISCELLANEOUS--HIBBING	0.00	0.00	.000	.000
NEGAUNEE SHAFT	30.28	15.74	2.270	24.043
OHIO	0.00	8.60	.000	20.641
REPUBLIC	0.00	0.00	.000	.000
SARGENT (UNDERGROUND)	21.69	45.52	33.986	1.373
SARGENT (OPEN PIT)	0.00	0.00	.000	.000
SPIES--VIRGIL	21.92	4.78	2.516	.177
STHSE AND SHOPS	4.19	10.54	.054	1.728
TILDEN	0.00	0.00	.000	.000
WANLESS	0.00	0.00	.000	.000
All Properties	15.87	15.39	4.981	2.084

TABLE X

COMPENSABLE INJURIES INCLUDING FATALITIES

Mine Or Plant	Tons Of Ore Produced	Hours Of Labor	No. Of Fatals	No. Of Comp. Inj.	Days Lost, Fatals	Compens. Days Lost	Total Days Lost, Fatals & Compens.	Frequency	Severity
AGNEW	173,494	265,264		6		237	237	22.62	.893
ATHENS	620,080	641,814		20		604	604	31.16	.941
CAMBRIA-JACKSON	350,700	449,954		7		336	336	15.56	.747
CLIFFS SHAFT	551,261	946,959		14		546	546	14.78	.577
LLOYD	138,900	261,721		2		44	44	7.64	.168
MAAS	587,016	753,981		18		533	533	23.87	.707
MATHER MINE "A" SHAFT	1,159,749	1,370,147		29		1216	1216	21.17	.887
MATHER MINE "B" SHAFT	1,080,150	1,207,945		22		1057	1057	18.21	.875
NEGAUNEE SHAFT	---	254,209	1	3	6,000	112	6112	15.74	24.043
SARGENT	167,579	131,818		6		181	181	45.52	1.373
SPIES-VIRGIL	212,344	209,104		1		37	37	4.78	.177
TOTALS	5,041,273	6,492,916	1	128	6,000	4,903	10,903	19.71	1.679
CANISTEO	777,518	363,311		4		72	72	11.01	.198
HAWKINS	912,094	508,472		9		403	403	17.70	.793
HILL TRUMBULL	651,878	404,267	1	5	6,000	108	6108	14.84	15.109
HOLMAN CLIFFS	971,299	361,920		1		45	45	2.76	.124
HUMBOLDT	---	82,568		0		0	0	0.00	.000
OHIO	124,615	116,273		1		2400	2400	8.60	20.641
REPUBLIC	---	2,510		0		0	0	0.00	.000
SARGENT	56,962	36,466		0		0	0	0.00	.000
TILDEN	178,658	42,859		0		0	0	0.00	.000
WANLESS	249,830	98,069		0		0	0	0.00	.000
TOTALS	3,922,854	2,016,715	1	20	6,000	3,028	9,028	9.92	4.478
GENERAL ROLL	---	658,358		0		0	0	0.00	.000
C. P. & L. CO.	---	161,263		0		0	0	0.00	.000
MISCELLANEOUS-HIBBING	---	86,333		0		0	0	0.00	.000
MISCELLANEOUS	---	82,925		0		0	0	0.00	.000
STHSE AND SHOPS	---	379,532		4		656	656	10.54	1.728
TOTALS	---	1,368,411		4		656	656	2.92	.479
GRAND TOTALS	8,964,127	9,878,042	2	152	12,000	8,587	20,587	15.39	2.084

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TABLE XI

THE CLEVELAND-CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS, YEAR 1953

Mine Or Plant	Position Rating	Tons Of Ore Produced	Hours Of Labor	No. Of Fatalities	No. Of Compens. Injuries	No. Of Non-Comp 1 - 7 Days	Days Lost - Fatalities	Compensable Days Lost	Days Lost, Non-Compens., 1 - 7 Days	Total No. Lost-Time Injuries Incl. Fatals	Total Days Lost, All Inj. & Fatalities	Frequency	Severity	Average No. Days Lost Per Accident
LLOYD	1	138,900	261,721	2	3			44	9	5	53	19.10	.202	11
SPIES-VIRGIL	2	212,344	209,104	1	3			37	10	4	47	19.13	.225	12
CLIFFS SHAFT	3	551,261	946,959	14	6			546	22½	20	568½	21.12	.600	28
MAAS	4	587,016	753,981	18	6			533	18	24	551	31.83	.731	23
CAMBRIA-JACKSON	5	350,700	449,954	7	3			336	9	10	345	22.22	.767	34½
MATHER MINE, "A" SHAFT	6	1,159,749	1,370,147	29	9			1,216	30	38	1,246	27.73	.909	33
MATHER MINE, "B" SHAFT	7	1,080,150	1,207,945	22	15			1,057	41	37	1,098	30.63	.909	30
AGNEW	8	173,494	265,264	6	2			237	7	8	244	30.16	.920	30½
ATHENS	9	620,080	641,814	20	8			604	22	28	626	43.63	.975	22
SARGENT	10	167,579	131,818	6	2			181	8	8	189	60.69	1.434	24
NEGAUNEE SHAFT	11		254,209	1	3	3	6,000	112	9	7	6,121	27.54	24.079	874
TOTALS		5,041,273	6,492,916	1	128	60	6,000	4,903	185½	189	11,088½	29.11	1.708	59
TILDEN	1	178,658	42,859	0	0			0	0	0	0	0.00	.000	0
REPUBLIC	2		2,510	0	0			0	0	0	0	0.00	.000	0
WANLESS	3	249,830	98,069	0	1			0	2	1	2	10.20	.020	2
HUMBOLDT	4		82,568	0	1			0	3½	1	3½	12.11	.042	3½
SARGENT	5	56,962	36,466	0	1			0	3	1	3	27.42	.082	3
HOLMAN-CLIFFS	6	971,299	361,920	1	2			45	6	3	51	8.29	.141	17
CANISTEO	7	777,518	363,311	4	3			72	11	7	83	19.24	.228	12
HAWKINS	8	912,094	508,472	9	7			403	26	16	429	31.47	.844	27
HILL-TRUMBULL	9	651,878	404,267	1	5	1	6,000	108	2	7	6,110	17.32	15.114	873
OHIO	10	124,615	116,273	1	0			2,400	0	1	2,400	8.60	20.641	2400
TOTALS		3,922,854	2,016,715	1	20	16	6,000	3,028	53½	37	9,081½	18.35	4.503	245
GENERAL ROLL	1		658,358	0	0			0	0	0	0	0.00	.000	0
C. P. & L. CO.	2		161,263	0	0			0	0	0	0	0.00	.000	0
MISCELLANEOUS-HIBBING	3		86,333	0	0			0	0	0	0	0.00	.000	0
MISCELLANEOUS	4		82,925	0	0			0	0	0	0	0.00	.000	0
STHSE AND SHOPS	5		379,532	4	1			656	2	5	658	13.17	1.734	132
TOTALS			1,368,411	4	1			656	2	5	658	3.65	.481	132
GRAND TOTALS		8,964,127	9,878,042	2	152	77	12,000	8,587	241	231	20,828	23.39	2.109	90

FREQUENCY - $\frac{\text{No. Of Lost-Time Accidents} \times 1,000,000}{\text{Man Hours Worked}}$

SEVERITY - $\frac{\text{No. Of Days Lost} \times 1,000}{\text{Man Hours Worked}}$

TABLE XI-A (Continued)

THE CLEVELAND-CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS, YEAR 1953

UNDERGROUND MINES

Mine Or Plant	Position Rating	Tons Of Ore Produced	Hours Of Labor	No. Of Fatalities	No. Of Compens. Injuries	No. Of Non-Comp. 1 - 7 Days	Days Lost-Fatalities	Compensable Days Lost	Days Lost Non-Compens., 1 - 7 Days	Total No. Lost-Time Injuries, Incl. Fatals	Total Days Lost, All Inj. & Fatalities	Frequency	Severity	Average No. Days Lost Per Accident
LLOYD	1	138,900	261,721	2	3			44	9	5	53	19.10	.202	11
SPIES-VIRGIL	2	212,344	209,104	1	3			37	10	4	47	19.13	.225	12
CLIFFS SHAFT	3	551,261	946,959	14	6			546	22½	20	568½	21.12	.600	28
MAAS	4	587,016	753,981	18	6			533	18	24	551	31.83	.731	23
CAMBRIA-JACKSON	5	350,700	449,954	7	3			336	9	10	345	22.22	.767	34½
MATHER MINE, "A" SHAFT	6	1,159,749	1,370,147	29	9			1,216	30	38	1,246	27.73	.909	33
MATHER MINE, "B" SHAFT	7	1,080,150	1,207,945	22	15			1,057	41	37	1,098	30.63	.909	30
AGNEW	8	173,494	265,264	6	2			237	7	8	244	30.16	.920	30½
ATHENS	9	620,080	641,814	20	8			604	22	28	626	43.63	.975	22
SARGENT	10	167,579	131,818	6	2			181	8	8	189	60.69	1.434	24
NEGAUNEE SHAFT	11		254,209	1	3	3	6,000	112	9	7	6,121	27.54	24.079	874
TOTALS		5,041,273	6,492,916	1	128	60	6,000	4,903	185½	189	11,088½	29.11	1.708	59

FREQUENCY - $\frac{\text{No. Of Lost-Time Accidents} \times 1,000,000}{\text{Man Hours Worked}}$

SEVERITY - $\frac{\text{No. Of Days Lost} \times 1,000}{\text{Man Hours Worked}}$

TABLE XI-B (Continued)

THE CLEVELAND-CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS, YEAR 1953
OPEN PITS

Mine Or Plant	Position Rating	Tons Of Ore Produced	Hours Of Labor	No. Of Fatalities	No. Of Compens. Injuries	No. Of Non-Comp 1 - 7 Days	Days Lost - Fatalities	Compensable Days Lost	Days Lost, Non-Compens., 1 - 7 Days	Total No. Lost-Time Injuries, Incl. Fatals	Total Days Lost, All Inj. & Fatalities	Frequency	Severity	Average No. Days Lost Per Accident
TILDEN	1	178,658	42,859	0	0		0	0	0	0	0	0.00	.000	0
REPUBLIC	2		2,510	0	0		0	0	0	0	0	0.00	.000	0
WANLESS	3	249,830	98,069	0	1		0	2	1	2	10.20	.020	.020	2
HUMBOLDT	4		82,568	0	1		0	3½	1	3½	12.11	.042	.042	3½
SARGENT	5	56,962	36,466	0	1		0	3	1	3	27.42	.082	.082	3
HOLMAN-CLIFFS	6	971,299	361,920	1	2		45	6	3	51	8.29	.141	.141	17
CANISTEO	7	777,518	363,311	4	3		72	11	7	83	19.24	.228	.228	12
HAWKINS *	8	912,094	508,472	9	7		403	26	16	429	31.47	.844	.844	27
HILL-TRUMBULL	9	651,878	404,267	1	5	6,000	108	2	7	6,110	17.32	15.114	15.114	873
OHIO	10	124,615	116,273	1	0		2,400	0	1	2,400	8.60	20.641	20.641	2400
TOTALS		3,922,854	2,016,715	1	20	16	6,000	3,028	53½	37	9,081½	18.35	4.503	245

* Hawkins production includes 411,304 tons mined for the M. A. Hanna Company from the MacKillican and also 78,164 tons of "fines" held over from mining of previous years.

INDEPENDENT UNITS

GENERAL ROLL	1		658,358	0	0		0	0	0	0	0	0.00	.000	0
C. P. & L. CO.	2		161,263	0	0		0	0	0	0	0	0.00	.000	0
MISCELLANEOUS-HIBBING	3		86,333	0	0		0	0	0	0	0	0.00	.000	0
MISCELLANEOUS	4		82,925	0	0		0	0	0	0	0	0.00	.000	0
STHSE AND SHOPS	5		379,532	4	1		656	2	5	658	13.17	1.734	1.734	132
TOTALS			1,368,411	4	1		656	2	5	658	3.65	.481	.481	132

FREQUENCY - $\frac{\text{No. Of Lost-Time Accidents} \times 1,000,000}{\text{Man Hours Worked}}$

SEVERITY - $\frac{\text{No. Of Days Lost} \times 1,000}{\text{Man Hours Worked}}$

TABLE XI-C (Continued)

THE CLEVELAND-CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS, YEAR 1953

M I C H I G A N

Mine Or Plant	Position Rating	Hours Labor	No. Of Fatal	Compens. Injuries	Non-Comp. 1-7 Days	Compens. Days Lost	Days Lost Non-Comp. 1-7 Days	Lost-Time Injur, Incl. Fatal	Days Lost, All Injur. & Fatal	Frequency	Severity	Avg. Days Lost Per Injury
GENERAL ROLL	1	658,358	0	0	0	0	0	0	0	0.00	.000	0
C. P. & L. CO.	2	161,263	0	0	0	0	0	0	0	0.00	.000	0
MISCELLANEOUS	3	82,925	0	0	0	0	0	0	0	0.00	.000	0
TILDEN	4	42,859	0	0	0	0	0	0	0	0.00	.000	0
REPUBLIC	5	2,510	0	0	0	0	0	0	0	0.00	.000	0
HUMBOLDT	6	82,568	0	1	0	3½	1	3½	12.11	.042	3½	
LLOYD	7	261,721	2	3	44	9	5	53	19.10	.202	11	
SPIES-VIRGIL	8	209,104	1	3	37	10	4	47	19.13	.225	12	
CLIFFS SHAFT	9	946,959	14	6	546	22½	20	568½	21.12	.600	28	
MAAS	10	753,981	18	6	533	18	24	551	31.83	.731	23	
CAMBRIA-JACKSON	11	449,954	7	3	336	9	10	345	22.22	.767	34½	
MATHER MINE, "A" SHAFT	12	1,370,147	29	9	1,216	30	38	1,246	27.73	.909	33	
MATHER MINE, "B" SHAFT	13	1,207,945	22	15	1,057	41	37	1,098	30.63	.909	30	
ATHENS	14	641,814	20	8	604	22	28	626	43.63	.975	22	
STHSE AND SHOPS	15	379,532	4	1	656	2	5	658	13.17	1.734	132	
OHIO	16	116,273	1	0	2,400	0	1	2,400	8.60	20.641	2400	
NEGAUNEE SHAFT	17	254,209	1	3	6,112	9	7	6,121	27.54	24.079	874	
TOTALS		7,622,122	1	121	58	13,541	176	180	13,717	23.62	1.800	76

FREQUENCY - $\frac{\text{No. Of Lost-Time Accidents} \times 1,000,000}{\text{Man Hours Worked}}$

SEVERITY - $\frac{\text{No. Of Days Lost} \times 1,000}{\text{Man Hours Worked}}$

TABLE XI-D (Continued)

THE CLEVELAND-CLIFFS IRON COMPANY
SAFETY DEPARTMENT, ACCIDENT STATISTICS, YEAR 1953

MINNESOTA

Mine Or Plant	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
MISCELLANEOUS-HIBBING	1	86,333	0	0	0	0	0	0	0	0.00	.000	0
WANLESS	2	98,069	0	1	0	2	1	2	10.20	.020	.020	2
SARGENT OPEN PIT	3	36,466	0	1	0	3	1	3	27.42	.082	.082	3
HOLMAN-CLIFFS	4	361,920	1	2	45	6	3	51	8.29	.141	.141	17
CANISTEO	5	363,311	4	3	72	11	7	83	19.24	.228	.228	12
HAWKINS	6	508,472	9	7	403	26	16	429	31.47	.844	.844	27
AGNEW	7	265,264	6	2	237	7	8	244	30.16	.920	.920	30
SARGENT UNDERGROUND	8	131,818	6	2	181	8	8	189	60.69	1.434	1.434	24
HILL-TRUMBULL	9	404,267	1	5	1	6,108	2	7	6,110	17.32	15.114	873
TOTALS		2,255,920	1	31	19	7,046	65	51	7,111	22.61	3.152	139

FREQUENCY - $\frac{\text{No. Of Lost-Time Accidents} \times 1,000,000}{\text{Man Hours Worked}}$

SEVERITY - $\frac{\text{No. Of Days Lost} \times 1,000}{\text{Man Hours Worked}}$

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11. ACCIDENTS
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(Continued)

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 -----	49 -----	FIRST HALF OF DAY SHIFT
12:00 NOON To 4:00 P.M. -----	38 -----	SECOND HALF OF DAY SHIFT
4:00 P.M. To 8:00 P.M. -----	22 -----	FIRST HALF OF AFTERNOON SHIFT
8:00 P.M. To 12:00 MIDNIGHT --	21 -----	SECOND HALF OF AFTERNOON SHIFT
12:00 MIDNIGHT To 4:00 A.M. --	17 -----	FIRST HALF OF NIGHT SHIFT
4:00 A.M. To 8:00 A.M. -----	7 -----	SECOND HALF OF NIGHT SHIFT
TOTALS	154	

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INJURYb. All Injuries

(Continued)

TABLE XIII

SHOWING OCCUPATION OF INJURED WORKERSCOMPENSABLE INJURIES

<u>UNDERGROUND</u>	<u>SURFACE</u>	<u>OPEN-PIT</u>
Miner _____ 54	Laborer _____ 5	Wash Plant Repairman _____ 3
Timberman _____ 13	Blacksmith's Helper _____ 2	Shovel Oiler _____ 2
Scraper Operator _____ 8	Carpenter _____ 2	Truck Operator _____ 2
Motorman _____ 7	Truck Operator _____ 2	Laborer _____ 2
Motor Brakeman _____ 6	Sampler _____ 1	Welder "A" _____ 2
Timber Hoister _____ 5	Picking Belt Attendant _____ 1	Grader Operator _____ 1
Repairman _____ 4	Hoisting Engineer _____ 1	Conveyor Attendant _____ 1
Skiptender _____ 3	Conveyor Attendant _____ 1	Dumpman _____ 1
Chuteman _____ 2	Timber Lander _____ 1	Steel Worker _____ 1
Laborer _____ 2		Mechanic _____ 1
Shift Boss _____ 2		Car Dropper _____ 1
Pocket Man _____ 1		Screen Plant Operator _____ 1
Timber Trammer _____ 1		Wash Plant Oiler _____ 1
Conveyor Operator _____ 1		Shovel Operator _____ 1
Car Repairer _____ 1		Serviceman "A" _____ 1
Machinery Foreman _____ 1		
Stemmer _____ 1		
Foreman _____ 1		
TOTALS _____ 113	_____ 16	_____ 21

TABLE XIII-A

GENERAL STOREHOUSE

Machine Operator _____	2
Mechanic's Helper _____	1
Carpenter's Helper _____	1
TOTALS _____	4

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INJURYc. Safety Inspection

The personnel of the Safety Department has tried to cooperate with all of the mines, department heads and supervisory force to promote safety. All inspections, with a few exceptions, are made with supervisors and once a month at each property, a labor union representative accompanies the inspector. The company policy has been to allow the supervisor time to correct hazards he notices but a report is also made of all corrections, orders, suggestions or recommendations he makes. The safety inspector will call the attention of the supervisor to any hazard he may miss and this is made up in another report. The labor union representative is always asked if he has any suggestions or recommendations. After the finish of each inspection trip, conditions are discussed with the mine captain or superintendent or both if it is a mine inspection. At other plants, shops and drills, etc., conditions are discussed with whoever is in charge. Reports are sent in as soon as possible, usually the day following the inspection. The original copy of the report is signed by the department head or superintendent and returned to the Safety Department if it is agreeable with that person. If he disagrees, he must take the matter up with either the Central Safety Committee or the manager for discussion.

Each of the larger mines appoint a underground foreman to make safety inspections at the mine. This job is rotated so that each foreman makes inspections for a period of either three or four months and returns to his former position. In my opinion this arrangement should pay dividends in the future.

During the year, Mr. M. A. Swanson, who was safety inspector for the Safety Department, was transferred to the Lloyd Mine as Underground Foreman in charge as acting mining captain.

Mr. E. G. Bengry, who was formerly Underground Foreman at Mather Mine, "A" Shaft, was transferred to the Safety Department on September 1, 1953.

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INJURYc. Safety Inspection (Continued)Idle Property

There was a change during the year on idle property inspection and repairs. The personnel of the Safety Department will be responsible only for those properties not located on the active mining properties. This is as it should be because it has taken too much of the time of the Safety Department and the Landscape Department.

Inspection of idle property is made during early spring and fall. Reports are sent to Peter DeRoche and his crew takes care of the job. On completing the job, Mr. DeRoche signs the original report and returns it to this office.

Each year there is considerable fencing to repair which has been broken by falling trees, weight of snow and destroyed by people who short-cut through the property or cut trees and pick berries.

At the present time most of the old test pits and shafts have been either filled or covered and it is our intention to do away with these hazards during the coming year. Many of the old pits and shafts are not on our maps so we have had to travel many miles to locate them. Many new caves occur each year as a result of rotting timber and water movement in the old mines. Also many of the properties taken over by the company in its expansion program must be inspected and in some cases considerable fencing and filling must be done because former owners did not do this work.

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c. Safety Inspection (Continued)

Fire Patrol Inspections

These inspections are important because most fires are found in the incipient stage and usually extinguished before serious damage has been done. During the day shift on surface there are enough men working on the various parts of the properties so that few fires gain any headway. On the afternoon and midnight shifts the inspections are made by the mine watchman and police. These men have been instructed to call the City Fire Department immediately if they cannot immediately put out the fire.

The underground workings are protected as well as the surface and there are many more hazards. After the last shift preceding each idle period and once every twenty-four hours there after a fire patrol examines entire mine. The men make sure all electric current has been cut off except where necessary such as pump-houses. They check every dead end and contract and report to their superintendent. There is no doubt but these patrols have prevented many major fires.

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INJURYc. Safety Inspection

(Continued)

TABLE XIV

1953

Mine Or Plant	Violations Of Standards	Safety Suggestions	Recommendations	Fire Hazard	Total
ATHENS	6	15	21	2	44
CAMBRIA-JACKSON	8	13	13	3	37
CLIFFS SHAFT	21	48	16	5	90
DIAMOND DRILLS	0	0	0	0	0
GEN. STHSE. & SHOPS	0	0	0	0	0
HUMBOLDT	0	0	1	1	2
LLOYD	9	7	5	4	25
MAAS	43	42	19	8	112
MATHER MINE "A" SHAFT	3	21	5	6	35
MATHER MINE "B" SHAFT	2	24	8	3	37
NEGAUNEE SHAFT	12	21	6	8	47
OHIO	0	0	1	0	1
REPUBLIC	0	0	0	0	0
RESEARCH LAB.& PELLET.PLANT	0	0	0	0	0
SPIES-VIRGIL	3	2	3	1	9
TILDEN	0	0	0	2	2
TOTALS	107	193	98	43	441

TABLE XV

1952

Mine Or Plant	Violations Of Standards	Safety Suggestions	Recommendations	Fire Hazard	Total
ATHENS	25	22	9	19	75
CAMBRIA-JACKSON	20	18	6	12	56
CLIFFS SHAFT	22	23	14	17	76
DIAMOND DRILLS	0	0	2	1	3
GEN. STHSE. & SHOPS	0	0	2	0	2
HUMBOLDT	0	14	1	5	20
LLOYD	7	8	10	15	40
MAAS	30	14	5	11	60
MATHER MINE "A" SHAFT	22	19	9	8	58
MATHER MINE "B" SHAFT	23	20	9	10	62
NEGAUNEE SHAFT	7	8	4	17	36
OHIO	0	1	3	0	4
REPUBLIC	0	0	0	0	0
RESEARCH LAB.& PELLET.PLANT	0	0	0	0	0
SPIES-VIRGIL	5	5	1	22	33
TILDEN	0	0	0	0	0
TOTALS	161	152	75	137	525

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In order to promote as much safety as possible in all blasting operations we have a rule which requires each shift boss to check blasting procedures in each of his mining contracts at least six times a year. If the blasting is under the supervision of leader, such as in rock development and shaft sinking, this is not required. A blank form is filled out by the shift boss for each inspection and these forms are sent to the Safety Department for checking. These inspections are of real value because the boss usually has a fine opportunity to instruct in the blasting procedure if the men are making mistakes.

At all of our properties we have had the foreman electrician instruct all supervisors in proper electrical blasting and hazards involved.

Members of the Safety Department are constantly checking electrical blasting installations. The most common unsafe practice is contact of blasting wire with pipes and steel sets.

The next table gives the number of inspections by mines and number of violations. The common violation is failure to use stemming.

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TABLE XVI

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

<u>MINE</u>	<u>NO. OF INSPECTIONS</u>	<u>NO. OF VIOLATIONS REPORTED</u>
Athens	196	85
Cambria-Jackson	76	57
Cliffs Shaft	202	16
Lloyd	48	10
Maas	131	0
Mather Mine "A" Shaft	427	1
Mather Mine "B" Shaft	488	37
Negaunee Shaft*.....	15	0
Spies-Virgil	141	23
TOTALS	1,724	229

* Sinking Shaft
(Boss Always Present)

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During the year considerable time has been spent in preparing up-to-date rule books for surface and underground for underground mines and a new rule book to cover open pit and concentration plants.

A new rule book has been completed and printed for the Minnesota Mines. This covers all operations, open pit, underground and plants.

Each new employee is furnished with a rule book before starting to work. He signs a receipt for this book promising to follow the instructions. If he is transferred from underground to surface or vice versa he is then furnished the necessary rule book to keep him up to date.

The following table shows the distribution of rule books.

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TABLE XVII

RULE BOOKS DISTRIBUTED AT MICHIGAN MINES AND PLANTS

<u>Mine Or Plant</u>	<u>SURFACE</u>	<u>UNDERGROUND</u>	<u>TOTAL</u>
ATHENS _____	0	48	48
CAMBRIA-JACKSON _____	2	17	19
C. P. & L. CO. _____	6	0	6
CLIFFS SHAFT _____	2	56	58
ENGR. & GEOL. DEPTS _____	1	0	1
HUMBOLDT _____	6	0	6
LLOYD _____	1	18	19
MAAS _____	0	32	32
MATHER MINE "A" SHAFT _____	0	67	67
MATHER MINE "B" SHAFT _____	0	129	129
NEGAUNEE SHAFT _____	4	21	25
OHIO _____	9	0	9
SPIES-VIRGIL _____	0	0	0
STHSE & SHOPS _____	20	7	27
TILDEN _____	33	0	33
MISCELLANEOUS _____	0	0	0
CLIFFS SHAFT LAB. _____	5	0	5
TOTALS	89	395	484

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Inspection Reports From Mines & Plants

The following inspections are made by mine or plant supervisors or employees appointed by the Superintendent. All of these inspections are in connection with the safety of men and property. A copy of all these reports are sent to the Safety Department for checking and recording.

These inspections include:

- 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 INSPECTIONS (Six Times A Year - Each Contract)
- OLD STOPE INSPECTIONS (Cliffs Shaft Mine)
- FIRE PATROL INSPECTIONS (Underground)

Following are tables showing the kind and number of safety inspection reports made by the mine and plant foreman, which were received and checked by this department.

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Type Of Inspection	Ag-new	Ath-ens	Camb. Jack.	Cliffs Shaft	Lloyd	Maas	Mather Mine, A-Shaft	Mather Mine, B-Shaft	Neg. Shaft	Sar-gent	Spies-Virgil	Total
HOISTING ROPES	48	296	235	468	458	225	248	265	170	42	241	2696
SKIP & CAGE ROADS	52	86	141	90	26	33	35	46	21	0	48	578
LADDER ROAD	52	46	12	91	10	33	31	50	2	44	48	419
CAGE SAFETY CATCHES	12	13	8	38	21	4	11	13	6	0	16	142
SLACK ROPE ALARM	0	9	8	10	5	6	8	8	5	0	14	73
HOIST INSPECTION	0	24	13	24	36	35	27	24	20	0	22	225
FIRE EXTINGUISHER	2	2	2	2	2	2	2	2	2	2	2	22
FIRE EQUIPMENT	4	2	2	0	0	3	4	0	1	4	0	20
FIRE PREVENTION	2	27	12	18	0	20	5	12	30	12	11	149
HOIST ENGR. SPEC. REPORT	50	0	0	0	0	0	0	0	0	40	0	90
FIRE PATROL	0	18	0	4	0	0	0	0	0	0	0	22
OLD STOPES	0	0	0	24	0	0	0	0	0	0	0	24
TOTALS	222	523	433	769	558	361	371	420	257	144	402	4460

Mine Or Plant	Fire Extinguishers	Fire Prevention	Fire Equipment	Total
CANISTEO	3	11	4	18
C. P. & L. CO.	16	8	0	24
GENERAL OFFICE	1	0	0	1
HAWKINS	4	38	4	46
HIBBING OFFICE	1	0	0	1
HILL TRUMBULL	4	17	4	25
HOLMAN CLIFFS	5	20	4	29
PRINCETON	2	4	0	6
OHIO	2	0	0	2
RENTED BUILDINGS	1	0	0	1
RESEARCH LABORATORY	2	1	0	3
SARGENT OPEN PIT	0	0	4	4
STHSE. SHOPS & GARAGE	1	6	0	7
TILDEN	2	13	0	15
WANLESS	1	8	4	13
TOTALS	45	126	24	195

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TABLE XIX

TYPES AND TOTALS OF FIRE EXTINGUISHERS INSTALLED AT VARIOUS PROPERTIES

Mine Or Plant	2½ Gal. Soda-Acid	2½ Gal. Non-Freeze	2½ Gal. Foam Type	1-1½ Qt. Vaporizing	1 - 3½ Gal. Vaporizing	15 lb. Dry Powder	20 - 30 lb. Dry Powder	4 lb. Dry Powder	Automatic Carbon Dioxide	5-10-15-30 lb. Carbon Dioxide	150 lb. Dry Powder- Engine	TOTAL
AGNEW	4			3	1	1	11					20
ATHENS	8	8		24	2	4	6					52
CAMBRIA--JACKSON	10	4		9	2		11					36
CANISTEO	4	3	1	53		8	10					79
CLIFFS SHAFT	17	7	2	39	1		12					78
DIAMOND DRILLS		3		5			7	3				18
GEN. STHSE & SHOPS	14	22	1	51	3			1				92
HAWKINS	9	5		24		1	12					51
HILL TRUMBULL	4	3		29		14	16					66
HOLMAN CLIFFS	9			63		6	23					101
LLOYD	7	2	1	22	4	4	5					45
MAAS	6	1	1	25	6		7					46
MATHER MINE A SHAFT	9	6		43			47					105
MATHER MINE B SHAFT	30			39		1	34	1				105
NEGAUNEE SHAFT	7	2		12		5	4					30
SARGENT	2			13		1	2					18
SPIES--VIRGIL	5	12		23		5	6					51
TILDEN		5		39	1	3	3					51
WANLESS	1	2		13			6				1	23
MCCLURE PLANT, CP&L CO.				3	2		2					7
CARP PLANT, CP&L CO.				4	1		2			1		8
HOIST PLANT, CP&L CO.				2	2		2					6
REPUBLIC PLANT, CP&L CO.				1	1		1			1		4
ESCANABA PLANT, CP&L CO.				1	1		1			1		4
AUTRAIN PLANT, CP&L CO.				1	2		1			1		5
DIESEL PLANT, CP&L CO.			5	3							1	9
HIBBING OFFICE	4	1	1	4								10
ISHPEMING GEN. OFFICE	7			8								15
RENTED HOUSES	3			17								20
PRINCETON	1			6	1	1	1					10
GWINN SUB STATION				3								3
STEAM PLANT, CP&L CO.				2					5	12		19
RESEARCH LABORATORY	4			5			7					16
PELLETIZING PLANT				1			3					4
OHIO	6			19			8	2				35
TOTALS	171	86	12	609	30	54	250	7	5	16	2	1242

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Two hundred and twenty-nine actions were imposed during the year. The greatest number of actions was because of, losing too much time (64). Next was, sleeping on the job (53). There were twenty men disciplined for, violation of rules and twenty for, reporting to work under the influence of liquor. Eighteen men were caught smoking underground and another eighteen received penalties for insubordination. The rest are spread over many causes.

The Minnesota Mines imposed 50 penalties and Michigan Mines 179.

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TABLE XX

CAUSES AND NUMBER OF DISCIPLINARY ACTIONS

Mine Or Plant	Excessive Absenteeism Due To Alcoholism	Reporting To Work Under The Influence of Liquor	Becoming Under Influence Of Liquor On Job.	Violation Of Rules	Violation Of "No Smoking" Rule	Losing Too Much Time	Leaving Job Without Authority	Insubordination	Sleeping On The Job	Horse-Play	Carelessness In Performing Work	Fighting Underground	Loafing At Work	Stealing Company Property	Unauthorized Removal Of Bulletin Board Material	TOTAL
ATHENS			1	1	7			1	7						1	18
CAMBERIA-JACKSON				1	1			1								3
CLIFFS SHAFT	4	5		4	5			1	1		1	1				22
CANISTEO						4					1					5
CHEMICAL LABORATORY																0
DIAMOND DRILLS																0
GENERAL STHSE																0
GENERAL SHOPS																0
HAWKINS		4		4		5	1	1	2		3					20
HILL TRUMBULL		2				8			1					1		12
HOLMAN CLIFFS		1		2		3					1					7
HUMBOLDT																0
LLOYD						4					1	1		1		7
MAAS				1	2	7	2	1	1							14
MATHER MINE "A" SHAFT	2	3		7		12	2	4	31		2		1	1		65
MATHER MINE "B" SHAFT	1	3		6	10	4	3	8	10	1	1			1		48
NEGAUNEE SHAFT						2										2
OHIO																0
PELLETIZING PLANT																0
SARGENT		2				1		1								4
SPIES-VIRGIL																0
WANLESS						1					1					2
TOTALS	7	20	1	20	18	64	8	18	53	1	11	1	2	4	1	229

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This committee, composed of Superintendents, Management, Heads Of Departments and their assistants, meets once each month unless there is some pressing need for more meetings. The chairman is the Senior Superintendent. Purpose of the committee is to classify all accidents, place responsibility, attempt to foresee and prevent accidents, make rules and safe practice regulations and investigate serious and fatal injuries.

A brief resume of discussions and decisions follows:

JANUARY 16 - All fires occurring at properties must be reported to Safety Department.

Discussion on use and location of Self-Rescuers, All-Service Gas Masks and Flame Safety Lamps in underground mines.

Discussion on use of Karbaloy Fire Extinguishers. They are best on rubber fires and very effective on rubbish and oil fires.

Different types of Dust Respirators discussed. Three types in general use, Dustfoe 55, R-2000 and R-5050.

MARCH 9 - Safety rules for "Open Pit and Concentrating Plants" discussed. Rules for the Mesaba Range are nearly complete but a different set will be required for Michigan. Safety Department will make up a rough draft.

Hospital care for injured employees discussed.

APRIL 20 - Scraper hoist electrical switches at Cliffs Shaft Mine - concussion from blasting can close switches. Either a new type of switch should be used or plug-in on hoist should be pulled before blasting.

Open mills in caving method of mining cause of many accidents. All underground superintendents instructed by manager that responsibility is on the superintendent to see that job is properly done.

Manager instructed committee members to give more detailed accident reports.

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APRIL 20 - Safety record awards discussed but no decision made. All committee members asked to submit ideas for future consideration.

Self-Rescuers are placed in all mines. Each man has a Rescuer. A few extras kept stored for foremen, visitors or guests. A method of inspection was discussed and metal seals were suggested for all boxes used for storage.

Tentative plans made for Mine Rescue Training.

Plans for showing the safety movie "Motorman And Brakeman" were made.

New type of safety gate for double cribbed raises was discussed. Advantages - fabrication in shops, light weight, stronger, easy installation.

New pipe stage supports for raises.

MAY 11 - Hazards in heavy duty truck tires - Mesaba Range method of repairing and inflation of tires discussed. Prints of safety devices used on Mesaba Range will be sent to users of heavy duty trucks.

Accident statistics for all properties reviewed.

Annual meeting of Lake Superior Mines Safety Council discussed - Superintendents and Heads Of Departments will pick men to attend.

JUNE 23 - Practical method of handling steel discussed and Mr. Schaal will investigate methods used.

Failure on part of supervisors to insist on employees closing safety gates in raises and delay in repairing damaged gates have caused many accidents and near accidents. Superintendents to check and discuss subject with supervisors.

Organized new Safety Foremans meeting to be held each month. Chairman will be the Safety Director. Each meeting to be called before regular Central Safety Meeting.

Discussion on safe position for underground motor-man on locomotives - There was disagreement on

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