

THE CLEVELAND-CLIFFS IRON COMPANY

Ore Mining Department

ANNUAL REPORT OF GENERAL MANAGER

For Year Ending December 31, 1952

MS 86-100  
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THE CLEVELAND-CLIFFS IRON COMPANY  
ORE MINING DEPARTMENT

Manager's Annual Report Year 1952

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GROSS INDEX BY MINES

	Athens	Cambria- Jackson	Cliffs Shaft	Humboldt	Lloyd	Maas	Morris
<u>Ishpeming, Negaunee, and Iron</u>							
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General	114-115	131	15	33-37	39	148	76
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<u>Ishpeming, Negaunee and Iron</u>							
	Mather		Ohio	Negaunee	Republic	Spies	Tilden
	"A"	"B"					
<u>River Districts:</u>							
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Equipment received & proposed new equipment	242	247	260	273	299
	Hill- Trumbull	Holman- Cliffs	Underground Sargent	Open Pit Sargent	Wanless
<u>Mesaba District:</u>					
General	274-275	288	300	307	313
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Proposed new construction	286-287	297	305	311	317
Equipment received & proposed new equipment	287	297	306	312	317

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RECEIVED  
CLIFFS IRON CO.  
CLEVELAND, OHIO

Ishpeming, Michigan  
February 23, 1953

953 FEB 25 AM 9:16

Mr. Walter A. Sterling, Vice President  
Cleveland, Ohio

Dear Sir:-

Expanding Ore Mining Department operations were interrupted by a two months' strike in June and July which prevented attaining expected new production and shipment peaks in 1952. The industry-wide strike added new wage increases to those previously committed under the job evaluation program of December 12, 1950 and by an agreement reached July 26th added a further heavy cost burden particularly on the underground mines, although a 75¢ per ton ore price increase later was secured from the same date. The disruption of operations at the height of the shipping season and consequent idle expense plus payment of retro-activity for increases prior to July 26th combined to sharply reduce earnings of the Department from the year before.

Normal production was resumed after the strike at the open pits and then stepped up to near peak until the last weeks in October to meet the heavy shipping schedule imposed after the two months loss. The return to normal at the underground mines ranged from immediate at the Cliffs Shaft to not until October at Mather Mine A Shaft and the Athens where crushing, unrelieved during the strike by drawing ore from the block caves, had damaged some producing areas.

The comparison served again to illustrate the flexibility of the open pits and their ability to absorb increased labor costs through greater productivity, thus highlighting the intended opening of the Humboldt and Republic pits to improve economic balance of the producing properties in Michigan. Recent estimates all the more confirm original indications that high grade concentrates can be produced at Republic at a cost as low or lower than similar new beneficiation projects in the Lake Superior region and the same is closely true of Humboldt. Study continued meanwhile of the problem of beneficiating the Company's huge reserves of "soft ore" jasper and in the field of fine concentrate agglomeration with progress in both being recorded by the research staff.

Total employment on the three iron ranges stayed about the same and the sale of 67 houses of the 100 constructed the year before by the Cliffs Realty Company quickly relieved the shortage in the Ishpeming-Negaunee area that had been made acute by years of expansion at the Mather Mine. Total ore reserve prospects appeared favorable considering Canadian and Venezuelan explorations, a new find on the western Mesabi and the start of the Michigan low grade program.

PRODUCTION

Production for the five year period beginning with 1948 follows:

*W*  
*TLT*

PRODUCTION (Cont.)

	<u>Michigan</u> Tons	<u>Minnesota</u> Tons	<u>Total</u> Tons
1948	4,112,679	4,595,354	8,708,033
1949	3,675,240	3,461,590	7,136,830
1950	4,246,613	4,005,229	8,251,842
1951	4,634,764	4,379,327	9,014,091
1952	3,896,955	3,584,757	7,481,712

The 1952 production by districts and grades was as follows:

MICHIGAN

Non-Bessemer Standard	3,016,474 tons
" " Special	812,700 "
Silicious	67,781 "
Total	3,896,955

MINNESOTA

Non-Bessemer	1,785,322 tons
Bessemer	1,799,435 "
Total	3,584,757 tons
Total All Ranges	7,481,712 tons

This represented a drop of 1,532,379 tons from the year before and resulted from the two months' strike.

SHIPMENTS

Shipments from the underground mines and open pits in Michigan and Minnesota in 1952 were:

Michigan Mines	3,659,778 tons
Minnesota Mines	3,850,787 "
Total	7,510,565 "
Shipments in 1951	9,070,934 "

The strike reduced shipments in 1952 and the return to the forty hour week schedule late in 1952 indicates a shipment expectation of about 8,500,000 tons in 1953.

ANALYSIS

The natural iron analyses of major grades shipped surpassed the guarantees on the Lower Lake basis although the large scale underground caving methods and decreasing grade open pit crude ores continued the problems of cargo variations and holding the line on silica content. The 1952 comparison of mine and lower lakes analyses of large grade shipments was as follows:



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ANALYSIS (Cont.)MICHIGAN

<u>Cliffs Group Regular</u>	<u>Tons</u>	<u>Iron Dried</u>	<u>Silica</u>	<u>Moist.</u>	<u>Iron Natl.</u>
Avg. Mine Analysis	431,200	57.56	10.19	11.73	50.808
Avg. Lower Lake Analysis		57.24	-	10.79	51.064
Guarantee		57.46	10.08	11.25	51.00
<u>Cliffs Group Special</u>					
Avg. Mine Analysis	1,121,873	57.35	10.30	11.38	50.824
Avg. Lower Lake Analysis		57.20	-	10.71	51.074
Guarantee		57.46	10.08	11.22	51.000

MINNESOTA

<u>Grade</u>	<u>Tons</u>	<u>Mine Iron Natl.</u>	<u>Lower Lake Iron Natl.</u>
Williamson	1,226,571	51.038	51.283
Newberry Bessemer	642,401	52.360	52.466
Saint Paul	1,110,439	48.931	49.467

Also of comparative interest is the listing of expected iron contents and the actual by mines in 1952:

<u>MICHIGAN</u>			<u>MINNESOTA</u>		
<u>Mine</u>	<u>Expected Fe.</u>	<u>Actual Fe.</u>	<u>Mine</u>	<u>Expected Fe.</u>	<u>Actual Fe.</u>
Cliffs Shaft Crushed	51.00	52.69	Canisteo	55.16	55.94
Lloyddale	58.00	57.54	Holman Cliffs	56.29	56.99
Lloyd Silica	52.50	51.01	Hill Trumbull	56.14	56.35
Maas	58.75	58.30	Hawkins	56.60	55.71
Race Course	59.00	58.55	Agnew	54.90	55.43
Mather Mine A Shaft	58.25	57.34	Sargent, Underground	55.88	55.40
Mather Mine B Shaft	58.50	57.98	" Open pit	56.45	55.22
Athens	58.50	58.79	Alworth	54.89	55.29
Cambria Jackson	58.10	58.38	Wanless	52.37	52.32
Spies	56.50	57.39			
Ohio	55.10	54.08			

COSTS

Mining costs in the 1951-1952 period advanced at a rate probably never before matched in the history of the Company. Three major factors contributing were: 1. out of line wage increases from the job evaluation added to the general increases granted late in 1950 and in July 1952 in the steel and ore industries; 2. resulting inflated supply costs; and 3. the accelerated write-off (amortization) of capital expenditures under the national defense program. Comparison of the last is difficult to show because of reduced earnings in 1952 due to the strike and the effect, therefore, on taxes complicated by write-off amounts.

COSTS (Cont.)

The comparison below then, which so well illustrates the wage impact on the underground mines, lists all costs of mining except royalties and write-off of defense facilities, and Sec. 309 and comprises the weighted average cost at seven underground mines in Michigan and five open pit mines in Minnesota:

	<u>1951</u>	<u>1952</u>	<u>Increase</u>
Cost at Mine, Michigan undergrounds	\$ 4.32	\$ 4.98	\$ .66
" " Minnesota open pits	2.64	2.93	<u>.29</u>
Lesser increase - open pits			\$ .37

The lower royalties and freights of the Michigan undergrounds assisted in maintaining the profit margin on ores worth, after July 26th, nearly \$7.00 per ton at the mine. The comparison, however, so strongly supports the decision to produce open pit beneficiated ore also in Michigan to garner all the advantages of lower labor, royalty, freight and tax costs. It is not idle to suppose the product from these pits, high in iron content, may further assist by allowing freer use of bulk underground mining methods now limited by the necessity of maintaining grade and with a possible future double cost benefit therefore.

ORE RESERVES

A rather unusual reversal of ore reserve tonnages reported to the two State Tax Commissions occurred in the 1951-1952 period as illustrated in the following table:

	<u>12-31-51</u>	<u>12-31-52</u>
Michigan	30,406,678	35,565,147
Minnesota	35,209,131	30,396,931

The additions to the Michigan reserve were mainly at Mather Mine B Shaft and inclusion for the first time of the reserve at the Bunker Hill recently developed by underground diamond drill exploration. The drop in Minnesota tonnage fortunately is only temporary for the figures do not reflect the initially successful drilling at an entirely new property on the western Mesabi at the close of the year. The search for new high grade reserves at other than operating properties in Michigan was not particularly rewarding and again served to emphasize the importance of maintaining the long range exploration program for both merchantable and beneficiable ores.

The reserves listed for Michigan do not, however, include the iron ore concentrates expected from the Ohio, Humboldt or Republic operations which, on the basis of explorations to date, somewhat exceeds the 35,565,147 developed reserve reported. The statement may therefore be well repeated that the opening of these deposits is of prime importance to future operations of the Company.

SAFETY

After the progress of recent years, it is particularly disappointing to report five fatal accidents in 1952, an increase of three from the year before. There has been no let down in our training, educational or supervisory responsibility programs but rather an emphasis of the latter by designating rotating foremen in the larger underground mines to assist and supplement the regular inspections by Safety Department personnel. There is no way of knowing, but part of the cause is believed to have resulted from unsettled conditions in the minds of employees in the period preceding the strike when four of the five fatalities occurred.

While the severity rate, therefore, rose above the average for the past five years, a further gain was made in reducing the frequency, no doubt due to the special attention given the problem by the supervisory force. The comparison of 1952 with the average for the preceding five years follows:

	<u>Frequency</u>	<u>Severity</u>
5 year average 1947-1951	41.76	3.43
Year 1952	33.72	5.02

Frequency in the above table represents the number of lost time accidents per million man hours worked, and severity the number of days lost per thousand hours worked. The charge for the fatalities was 30,000 days which was nearly double the compensable days lost due to injuries.

LABOR

After the July 26th agreement signed in Washington ending the strike in the steel and iron ore industries, there was a further period of negotiating with the union culminating finally on September 15th in the signing of a new contract based largely and once again on the dictates accepted by one or two other companies in avoiding a further strike. The cost of this default by industry was particularly burdensome to the underground mines, and left the unfortunate conclusion that through cooperation part of the wage disagreement would have ended in arbitration and an almost certain improved proportioning of wage rates and saving in ultimate cost to the companies.

The total labor force in the Lake Superior region after increasing for three straight years leveled off, actually with a small decrease in 1952 as shown in the following comparison:

	<u>Michigan</u>	<u>Minnesota</u>	<u>Total</u>
December 1949	3,062	1,206	4,268
1950	3,466	1,316	4,782
1951	3,752	1,187	4,939
1952	3,787	1,119	4,906

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The usual statements, in a more condensed form, showing the comparative statistics on taxes, labor, wages and supplies are appended hereto.

Yours very truly



General Manager

CWA:DP

GILBERT BONDI  
25% COTTON FIBRE  
U.S.A.

GILBERT BONDI  
25% COTTON FIBRE  
U.S.A.

THE CLEVELAND-CLIFFS IRON COMPANY  
MINING DEPARTMENT  
A COMPARISON OF MINING DEPARTMENT MICHIGAN ASSESSED VALUATIONS AND  
TOTAL TAXES PAID FROM YEAR 1933 TO DATE

YEAR	The C. C. I. Co.	The Negaunee Mine Co.	The Athens Iron Mining Co.	The C. P. & L. Co.	Total Four Companies	Changes from Previous Year
			Assessed Valuations			
1933	\$ 9,850,359	3,554,400	2,036,500	1,419,565	16,860,824	D 3,654,957
1934	10,002,373	3,196,400	2,077,800	1,418,887	16,695,460	D 165,364
1935	10,062,288	3,057,770	1,929,520	1,424,711	16,474,289	D 221,171
1936	10,263,100	3,107,500	1,929,520	1,424,281	16,724,401	I 250,112
1937	11,589,306	3,350,000	2,242,900	1,442,555	18,624,761	I 1,900,360
1938	12,959,542	3,124,100	2,532,900	1,447,843	20,064,385	I 1,439,624
1939	13,090,541	3,267,300	2,683,400	1,981,982	21,023,223	I 958,838
1940	12,185,132	3,692,700	2,683,400	2,003,335	20,564,567	D 458,656
1941	11,202,237	4,644,430	2,683,400	2,004,379	20,534,446	D 30,121
1942	10,628,886	5,461,800	2,759,000	2,016,245	20,865,931	I 331,485
1943	11,936,427	5,418,800	2,785,300	2,134,715	22,275,242	I 1,409,311
1944	12,326,490	5,022,010	2,868,550	2,134,755	22,351,805	I 76,563
1945	11,949,265	4,809,060	2,446,740	2,135,750	21,340,815	D 1,010,990
1946	11,423,395	4,170,610	2,327,690	2,136,050	20,957,745	D 383,070
1947	11,826,910	4,524,225	2,197,815	2,148,105	20,697,055	D 260,690
1948	11,744,905	4,710,145	2,082,815	2,157,405	20,695,270	D 1,785
1949	11,884,480	5,608,650	2,048,715	3,385,014	22,926,859	I 2,231,589
1950	12,222,610	6,767,390	2,116,750	3,401,977	24,508,727	I 1,581,868
1951	13,296,480	8,124,100	2,276,750	3,419,775	27,117,105	I 2,608,378
1952	14,195,345	10,007,000	2,365,400	3,431,618	29,999,363	I 2,882,258

	Taxes - Paid					
1933	261,765.08	99,599.60	57,065.71	36,067.26	454,067.26	D 155,892.37
1934	267,327.80	86,527.53	56,246.84	31,256.06	441,358.23	D 13,139.42
1935	279,734.41	95,226.14	60,089.81	29,817.75	464,868.11	I 23,509.88
1936	302,207.99	107,861.43	66,447.06	30,066.37	505,782.85	I 40,914.74
1937	345,790.20	120,097.50	80,366.44	30,024.80	576,278.94	I 70,496.09
1938	415,719.34	118,534.83	96,103.47	30,227.17	660,584.81	I 84,305.87
1939	415,979.65	120,806.75	99,217.45	37,997.17	674,997.17	I 13,416.21
1940	376,744.89	130,696.88	95,075.43	39,698.46	642,215.63	D 31,785.39
1941	340,282.83	156,845.98	90,003.76	39,846.19	626,978.76	D 15,236.87
1942	321,091.31	182,845.08	91,057.97	37,686.66	632,681.02	I 5,702.26
1943	380,652.40	202,371.63	107,251.69	40,623.07	730,898.79	I 98,217.77
1944	436,214.77	200,703.60	121,015.20	40,577.13	797,510.70	I 67,611.91
1945	425,599.58	191,565.47	104,255.07	40,964.14	762,384.26	D 36,126.44
1946	417,575.92	168,599.05	103,799.44	43,785.56	733,739.97	D 28,644.29
1947	438,298.87	178,769.39	98,262.27	47,743.90	763,074.43	I 29,334.46
1948	470,710.79	194,238.19	93,223.59	52,220.35	810,392.92	I 47,318.49
1949	496,219.03	229,597.68	108,352.31	92,041.23	926,204.25	I 115,811.33
1950	492,851.32	270,829.15	101,440.20	87,917.79	953,038.46	I 26,834.21
1951	526,996.81	322,304.11	104,513.09	87,884.60	1,041,698.61	I 88,660.15
1952	594,122.04	413,143.20	119,333.29	92,134.33	1,218,732.86	I 177,034.25

Note: The State Tax Commission revalued Marquette County in 1949.

STATEMENT SHOWING COMPARATIVE COST FOR ALL EXPLOSIVES

USED AT MICHIGAN HARD ORE MINES

	1949	1950	1951	1952
PRODUCT - Tons.....	492,405	641,562	700,346	548,076
<u>POWDER</u>				
Pounds - 60% Gelamite.....	200	58,950	29,700	16,400
Gel. #1.....	80,050	106,100	172,250	162,400
Hercomite 2X.....	391,300	475,400	484,800	385,750
<u>TOTAL POUNDS OF POWDER.....</u>	<u>471,550</u>	<u>640,450</u>	<u>686,750</u>	<u>564,550</u>
<u>TOTAL COST.....</u> \$	<u>68,984.15</u>	<u>97,335.14</u>	<u>112,185.28</u>	<u>93,819.78</u>
<u>TOTAL COST-FUSE, CAPS, ETC.....</u> \$	<u>12,986.35</u>	<u>22,892.15</u>	<u>33,560.09</u>	<u>30,141.33</u>
<u>AVG. PRICE PER POUND, POWDER..</u> \$	<u>.1463</u>	<u>.1520</u>	<u>.1634</u>	<u>.1662</u>
Cost per ton - Powder.....	.1401	.1517	.1602	.1712
Cost per ton - Fuse, etc.....	.0264	.0357	.0479	.0550
<u>Cost per ton, All Explosives..</u> \$	<u>.1665</u>	<u>.1874</u>	<u>.2081</u>	<u>.2262</u>
Pounds of Powder per Ton of Ore	.9576	.9983	.9806	1.03

BF:DP

STATEMENT SHOWING COMPARATIVE COSTS FOR ALL EXPLOSIVES

USED AT MICHIGAN SOFT ORE MINES

	1949	1950	1951	1952
PRODUCT - Tons.....	2,944,310	3,212,232	3,590,206	3,281,862
<u>POWDER</u>				
Pounds - 60%.....	125,272	29,575	177,095	287,092
80%.....	-	-	8,750	800
Hercomite.....	783,041	879,619	823,776	1,001,114
Gelamite.....	315,521	531,442	896,944	952,275
Herculite.....	600	-	-	-
<u>TOTAL POUNDS - POWDER</u>	<u>1,224,434</u>	<u>1,440,636</u>	<u>1,906,565</u>	<u>2,241,281</u>
<u>TOTAL COST - POWDER</u>	<u>\$ 186,034.08</u>	<u>226,692.90</u>	<u>322,570.05</u>	<u>386,337.55</u>
<u>TOTAL COST-FUSE,CAPS,ETC.</u>	<u>\$ 57,794.56</u>	<u>73,017.00</u>	<u>119,136.58</u>	<u>136,430.40</u>
<u>TOTAL COST OF ALL EXPLOSIVES</u>	<u>\$ 243,828.64</u>	<u>299,709.90</u>	<u>441,706.63</u>	<u>522,767.95</u>
<u>AVG. PRICE PER POUND-POWDER</u>	<u>\$ .1519</u>	<u>.1574</u>	<u>.1692</u>	<u>.1724</u>
Cost per ton - Powder.....\$	.0632	.0706	.0898	.1177
Cost per ton - Fuse,caps,etc.....	.0196	.0227	.0332	.0416
<u>Cost per Ton - All Explosives..\$</u>	<u>.0828</u>	<u>.0933</u>	<u>.1230</u>	<u>.1593</u>
<u>POUNDS OF POWDER PER TON OF ORE</u>	<u>.4159</u>	<u>.4485</u>	<u>.5310</u>	<u>.6829</u>

The mines included in the 1952 figures are the Athens, Cambria Jackson, Lloyd, Maas, Mather A and B Shafts, Spies.  
Average price per pound increased.

BF:DP

STATEMENT SHOWING COMPARATIVE COST FOR ALL MINE TIMBER  
USED IN MICHIGAN SOFT ORE MINES

	1949	1950	1951	1952
PRODUCTION - Tons.....	2,944,310	3,212,232	3,590,206	3,196,497
Cribbing )				43,166.22)
Stulls ).....	154,177.77	144,398.74	176,790.76	94,700.38)
Lagging.....	79,114.43	73,168.42	119,789.79	121,032.22
Poles.....	58,737.97	68,649.38	80,192.74	78,808.80
Steel & Concrete Materials...	71,629.30	62,450.35	360,695.04	351,986.18
Cost per ton - Timber.....	.0524	.0450	.0492	.0431
Lagging.....	.0269	.0228	.0334	.0378
Poles.....	.0199	.0214	.0223	.0246
Steel.....	.0243	.0194	.1005	.1101

The mines included in the 1952 figures are the Athens, Cambria-Jackson, Maas, Mather A and B Shafts, and Spies.

Lloyd Mine omitted due to E&A work done during the greater part of the year.



STATEMENT SHOWING TOTAL COST OF SUPPLIES CHARGED TO "COST OF ORE AT MINE"

MICHIGAN MINES ONLY

	1949		1950		1951		1952	
PRODUCT - Tons .....	3,436,735		4,059,413		4,527,647		3,829,938	
<u>CLASSIFICATION</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Supplies..... \$	364,110.	.106	485,743	.120	703,129	.155	765,912	.200
Iron & Steel.....	293,723	.085	360,813	.088	509,776	.113	621,973	.162
Machinery.....	328,758	.096	372,657	.092	556,466	.123	534,880	.140
Explosives.....	359,163	.105	472,169	.116	601,218	.133	569,285	.149
Lumber & Timber.....	403,698	.117	389,104	.096	465,831	.103	439,670	.115
Fuel.....	61,004	.018	70,853	.017	79,132	.017	87,349	.022
Electric Power.....	629,182	.183	850,552	.210	1,000,237	.221	902,313	.235
Miscellaneous.....	76,727	.022	104,669	.026	201,057	.044	52,064	.014
<b>TOTAL</b>	<b>2,516,365</b>	<b>.732</b>	<b>3,106,560</b>	<b>.765</b>	<b>4,116,846</b>	<b>.909</b>	<b>3,973,446</b>	<b>1.037</b>

BF:DP

THE CLEVELAND CLIFFS IRON COMPANY  
LABOR SUMMARY - ALL COMPANIES

	1949		1950		1951		1952	
PRODUCTION - Tons.....	7,134,528		8,162,064		8,888,859		7,352,149	
	<u>Days</u>	<u>Amount</u>	<u>Days</u>	<u>Amount</u>	<u>Days</u>	<u>Amount</u>	<u>Days</u>	<u>Amount</u>
Surf. & Undg.....	945,907½	\$ 11,853,530.43	1,091,495-¾	13,748,817.79	1,274,308-¾	18,813,200.37	843,430	14,692,998.09
Cost per ton.....		1.662		1.685		2.117		1.998
Supt. & Gen'l Roll....	67,265	1,001,379.19	73,665	1,138,043.30	85,354½	1,423,339.71	348,643	5,890,272.09
Cost per ton.....		.140		.139		.160		.801
GRAND TOTAL.....	1,013,172½	12,854,909.62	1,165,161-¾	14,886,861.09	1,359,663½	20,236,540.08	1,192,073	20,583,270.18
COST PER TON.....		1.802		1.824		2.277		2.799
Average Rate per Day.		12.69		12.78		14.88		17.26
Tons per Man per Day.		7.04		7.01		6.54		6.2

Note: The above is the total of all wages and salaries for employees of the Mining Department, including the Cliffs Power & Light Co. The mines were idle in 1952 from June 2 to July 26, on account of strike.

BF:DP

SUMMARY OF PRODUCTION, DAYS WORKED, LABOR COST  
AND AVERAGE UNIT RATES

	MICHIGAN			MINNESOTA		
	1952	1951	1950	1952	1951	1950
<u>PRODUCTION - TONS</u>						
1. Underground Mines.....	3,829,938	4,527,647	4,059,413	346,951	527,316	538,612
2. Open Pit Mines.....	59,507	103,022	107,465	3,115,753	3,730,874	3,456,574
3. Total.....	3,889,445	4,630,669	4,166,878	3,462,704	4,258,190	3,995,186
<u>DAYS OPERATED</u>						
4. Underground Mines.....	634,958	737,114	656,074½	27,476-¾	60,272½	62,666-¾
5. Open Pit Mines.....	9,693½	4,216	4,433½	136,975½	134,141-¾	136,335½
6. Total Direct.....	644,651½	741,330	660,508	164,452½	194,414	199,002
7. Indirect.....	232,561½	252,313½	190,793	129,118	150,555	93,815½
8. Grand Total Days.....	877,212-¾	993,643½	851,301	293,570½	344,969	292,817½
<u>LABOR COST</u>						
9. Underground.....	10,966,436.83	11,065,471.71	8,367,474.68	503,738.99	980,399.77	870,586.20
10. Open Pit.....	162,224.18	60,977.83	54,530.60	2,448,862.38	2,001,014.92	1,674,314.55
11. Total Direct Cost.....	11,129,361.01	11,126,449.54	8,422,005.28	2,952,601.37	2,981,414.69	2,544,900.75
12. Indirect.....	4,007,855.88	3,594,363.19	2,373,020.70	2,157,259.41	2,244,824.73	1,288,452.06
13. Grand Total Cost.....	15,137,216.89	14,720,812.73	10,795,025.98	5,109,860.78	5,226,239.42	3,833,352.81
<u>STATISTICAL INFORMATION</u>						
<u>Tons per Man per Day</u>						
Underground.....	6.032	6.142	6.187	12.627	8.749	8.595
Open Pit.....	6.139*	24.436	24.239	22.747	27.813	25.353
Combined.....	6.033	6.246	6.308	21.056	21.903	20.076
Grand Total.....	4.434	4.660	4.895	11.795	12.344	13.644
<u>Labor Cost per Ton</u>						
Underground.....	2.863	2.444	2.061	1.452	1.859	1.616
Open Pit.....	2.738*	.592	.507	.786	.536	.484
Combined.....	2.86	2.403	2.021	.853	.700	.637
Grand Total/.....	3.892	3.241	2.591	1.476	1.227	.959
<u>Average Rate per Day</u>						
Underground.....	17.271	15.012	12.754	18.333	16.266	13.892
Open Pit.....	16.807	14.463	12.300	17.878	14.917	12.281
Combined.....	17.264	15.008	12.751	17.954	15.335	12.788
Grand Total.....	17.256	14.793	12.681	17.406	15.150	13.091

Cliffs Power & Light Co. has been excluded from above on lines 8 and 13 as follows:

Days.....	21,290½	21,051	21,043
Amount.....	336,192.51	289,487.93	258,482.30

Increase in cost per ton and average rate per day 1952 over 1951 due to wage increase.

\* Tilden - No production for 1952, days and costs included.

THE CLEVELAND CLIFFS IRON COMPANY

STATEMENT SHOWING PENALTY COST OF OVERTIME WORKED AND EFFECT ON  
PRODUCTION COSTS FOR YEAR 1952

	MICHIGAN PROPERTIES	MINNESOTA PROPERTIES	TOTAL 1952
January.....	\$ 64,012.76	19,224.13	
February.....	74,938.57	16,866.22	
March.....	91,560.17	19,946.87	
April.....	72,466.70	19,613.95	
May.....	71,435.29	37,580.51	
June.....	3,941.50	3,100.67	
July.....	6,167.74	2,915.68	
August.....	59,650.72	50,921.70	
September.....	52,707.73	44,819.04	
October.....	58,721.06	42,166.11	
November.....	58,100.18	20,367.55	
December.....	33,805.36	16,141.15	
TOTAL - YEAR 1952.....	647,507.78	293,663.58	941,171.36
TOTAL - YEAR 1951.....	884,346.86	308,311.13	1,192,657.99

PRODUCTION

Tons - Year 1952.....	3,889,445	3,462,704	7,352,149
Tons - Year 1951.....	4,630,669	4,258,190	8,888,859

Effect of penalty cost on  
year's Production cost

Increased 1952 by.....	.1665	.0848	.1280
Increased 1951 by.....	.1910	.0724	.1342

CLIFFS SHAFT MINE  
ANNUAL REPORT  
YEAR 1952

1. GENERAL

The production in 1952 was 548,076 tons and the budget estimate was 541,480 tons. The operating schedule was 3-8 hr. shifts per day with hoisting on 2-8 hr. shifts, 6 days per week to May 1st; 5½ days per week from May 1st to November 15th and 5 days per week for the balance of the year. The mine was idle 47 days on account of the industry-wide labor strike called by the United Steelworkers of America (C.I.O.) Union that began at midnight June 2nd and ended with the day shift July 28th.

The Cost of Production was \$5.185 and the total cost \$5.675 in 1952 compared with \$4.380 and \$4.774 respectively in 1951. The increases in labor and supply costs together with some loss in operating efficiency due to the emphasis on improving the quality of the lump grade accounts for the higher costs. The general attitude of the employees is also a factor that affected efficiency in that there was considerable uneasiness and anxiety experienced during the period preceding the strike.

In 1952 there was an average of 82 gangs working in the mine compared with 86 gangs in 1951. Crews employing two miners instead of a miner and a helper were increased from 61 to 69. Of the total contracts, about 11% were engaged strictly on development raising and drifting and the balance on production.

Shipments from the mine, both pocket and stockpile, totalled 531,620 tons. The current year overrun from stockpile was 3,495 tons and pocket overrun was 15,926 tons. The overrun of 19,421 tons is equivalent to 3.65% compared with 1.38% in the preceding year. The skip factor remained at 5.10 tons throughout 1951.

The product, until late in the year, was screened to -2" and yielded 73.2% lump ore and 26.8% crushed ore. On December 3rd, the screen sections were changed to permit more efficient screening of the product with the screen opening increasing from 2-inch to 2½ inch with the resultant decrease to 69.0% lump ore and 31.0% crushed ore.

Major improvements to the surface plant during 1952 consisted of enlarging the mine parking lot and extending Euclid Street westerly to a point north of the dry-house by extending the shoreline of Lake Bancroft northward with material removed from the rock pile. Painting of the bosses quarters, the fuse room and the lamp room in the Main Dryhouse was completed during the year and the painting of the Main Dry-house must be undertaken in the near future.

The major improvement underground consisted of relining "B" Shaft with steel sets and concrete from surface to a point 144 feet below surface where new bearers were installed. While the repair program was underway, a sand and water run occurred in the shaft at a point 100 feet below surface. The Intrusion-Prepakt Corporation was engaged to pump cement grout behind the timber after the break had been contained to seal off the water flowing into the shaft. This work was most successful as the incoming water was either sealed off or diverted to areas in the shaft where it was contained and diverted into a drain line.

The following shop and underground equipment was purchased in 1952 and can be classified as major improvements. The important items are listed below:

- 1 - Conveyor for rock picking and crusher feeding
- 1 - Drill Sharpener
- 1 - Threader for jackbit rods
- 1 - Air Hammer for Shops
- 1 - D-8 Tractor with blade and winch
- 2 - 3-Drum Hoists with remote controls
- 5 - Trolley Phones for underground locomotives

CLIFFS SHAFT MINE  
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2. PRODUCTIONa. Production by Grade and Months:

Month	Oprtg. Days	CLIFFS SHAFT		BANCROFT		SECTION 10		Total	Rock
		Lump	Crushed	Lump	Crushed	Lump	Crushed		
Jan.	26	31,886	11,183	3,123	1,002	6,234	2,194	55,622	3,934
Feb.	25	31,542	11,077	3,774	1,293	6,454	2,129	56,269	4,424
March	26	35,100	12,302	3,682	1,276	6,555	2,276	61,191	3,192
April	26	34,165	12,639	5,717	2,024	6,978	2,483	64,006	3,404
May	23	30,215	11,369	4,607	1,734	4,709	1,760	54,394	2,538
June	1	613	129	310	112	123	42	1,329	148
July	4	3,904	1,422	931	365	936	365	7,923	732
Aug.	23½	25,360	8,557	5,112	1,821	6,200	2,209	49,259	3,894
Sept.	23	28,875	9,349	4,523	1,738	5,031	1,927	51,443	4,086
Oct.	25	31,153	10,350	3,575	1,134	7,364	2,341	55,917	3,712
Nov.	20½	21,708	9,576	2,918	1,294	5,809	2,521	43,826	2,948
Dec.	20½	20,660	9,237	3,342	1,408	6,087	2,668	43,402	2,434
Total		295,181	107,190	41,614	15,201	62,480	22,915	544,581	35,446
Current Years									
Stkpl. Overrun		665	281	304	631	658	956	3,495	-
Total	243½	295,846	107,471	41,918	15,832	63,138	23,871	548,076	35,446

Division of Product as Hoisted between Shafts:

Year	"A" SHAFT		"B" SHAFT		Total Tons	Rock (°) Tons
	Tons	%	Tons	%		
1952	277,684	50.66	270,392	49.34	548,076	35,446
1951	340,079	48.55	360,267	51.45	700,346	37,256
1950	316,806	49.38	324,756	50.62	641,562	40,690
1949	244,409	49.60	247,996	50.40	492,405	19,122
1948	281,673	46.70	320,780	53.30	602,453	12,298

(°) All rock is hoisted through "B" Shaft

b. Shipments

	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Cliffs Shaft Lump	177,663	93,061	270,724	422,426
Cliffs Shaft Crushed	62,822	48,350	111,172	143,649
Bancroft Lump	32,836	11,483	44,319	45,037
Bancroft Crushed	10,158	5,807	15,965	16,124
Section 10 Lump	46,303	19,275	65,578	75,229
Section 10 Crushed	13,806	10,056	23,862	27,663
Total 1952	343,588	188,032	531,620	730,128
Total 1951	452,324	277,804	730,128	
Decrease	108,736	89,772	198,508	

CLIFFS SHAFT MINE  
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2. PRODUCTION: (Cont'd)

c. Ore Statement

	<u>Cliffs Shaft</u>		<u>Bancroft</u>		<u>Section 10</u>		<u>Total</u>	<u>Total Last Yr.</u>
	<u>Lump</u>	<u>Crushed</u>	<u>Lump</u>	<u>Crushed</u>	<u>Lump</u>	<u>Crushed</u>		
On Hand Jan. 1, 1952	35,597	14,711	3,818	1,638	6,623	2,776	65,163	94,808
Output for Year	295,181	107,190	41,614	15,201	62,480	22,915	544,581	688,083
Transfers	221	221	-	-	62	62	-	-
Overruns	946	-	304	631	658	956	3,495	12,263
Total	331,503	122,122	45,736	17,470	69,823	26,585	613,239	795,154
Shipments	270,504	111,393	44,319	15,965	65,640	23,800	531,621	729,991
Balance on Hand	60,999	10,729	1,417	1,505	4,183	2,785	81,618	65,163
Decrease in Output							143,502	

The table below shows a comparison of working schedules for the past five years:

<u>Year</u>	<u>Schedule</u>
1952	- 3-8 hr. shifts per day with hoisting on 2-8 hr. shifts per day, 6 days per week May 1st - November 15th; 5 days per week Nov. 15th - Dec. 31st.
1951	- 3-8 hr. shifts per day with hoisting on 2-8 hr. shifts per day, 6 days per week.
1950	- 3-8 hr. shifts per day with hoisting on 2-8 hr. shifts per day, 5 days per week January 1st - February 5th; 6 days per week February 5th - May 22nd; 5 days per week May 22nd - August 21st; 6 days per week Aug. 21st - December 31st.
1949	- 3-8 hr. shifts per day with hoisting on 2-8 hr. shifts per day, 6 days per week January 1st - July 1st; 5 days per week July 1st - Dec. 31st.
1948	- 3-8 hr. shifts per day with hoisting on 2-8 hr. shifts per day, 6 days per week.

e. Production Delays

The major delays during 1952 occurred on March 13th when the High Tram Hoist Motor burned out; on July 27th when the crusher motor short-circuited; on July 31st when the "B" Shaft skip turned over in the shaft; and finally the period August 4th through 18th when hoisting was stopped in "B" Shaft by a sand run which occurred at ledge while the shaft was being repaired.

The total estimated loss in production caused by the above delays was 12,750 tons.

CLIFFS SHAFT MINE  
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3. ANALYSIS:a. Average Mine Analysis of 1952 Output:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Cliffs Shaft Lump	59.68	.104	9.01
Cliffs Shaft Crushed	52.64	.102	17.69
Bancroft Lump	60.23	.110	8.74
Bancroft Crushed	53.52	.110	16.75
Section 10 Lump	60.23	.110	8.74
Section 10 Crushed	53.52	.110	16.75

The output analysis remained very nearly the same in 1952 as in 1951.

b. Average Analysis of Shipments for 1952:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Lump Ore (°)	59.10	.109	10.47	.31	2.01	.79	.79	.013	1.01	.33
Crushed Ore (°)	52.80	.101	18.00	.37	2.37	.81	.84	.016	1.25	2.34

(°) Cliffs Shaft, Bancroft and Section 10 are combined.

c. Average Analysis of Ore in Stock Dec. 31, 1952

		<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
C. S. Lump	Dried	58.55	.102	10.84	.31	2.01	.79	.79	.011	1.01	.33
	Natural	58.36	.102	10.80	.31	2.00	.79	.79	.011	1.01	.33
C. S. Crushed	Dried	53.67	.098	16.91	.37	2.36	.81	.84	.014	1.25	2.34
	Natural	52.41	.096	16.51	.36	2.30	.79	.82	.014	1.22	2.34
Banc., Sec. 10 Lump	Dried	59.80	.090	9.28	.31	2.01	.79	.79	.011	1.01	.33
	Natural	59.60	.090	9.25	.31	2.00	.79	.79	.011	1.01	.33
Ban. & Sec. 10 Crushed	Dried	55.66	.105	14.11	.37	2.37	.81	.84	.015	1.25	2.34
	Natural	54.36	.103	13.78	.36	2.31	.79	.82	.015	1.22	2.34

4. ESTIMATE AND ANALYSIS OF ORE RESERVES:

The reserves are estimated on the basis of the following factors:

High Grade or First Class Ore	-	8 cu. ft. per ton
Second Class Ore	-	9 cu. ft. per ton
Conglomerate and Second Class Ore	-	10 cu. ft. per ton

The increase in the estimated reserves is made up primarily of a gain in "A" Shaft Fee ore tonnage as a result of exploration drilling and development. Exploration has proven sufficient tonnage to warrant reentry into the New York Mine area on the 2nd level where some stope floors will be recovered. There is a possibility this ore body continues in a mineable thickness to lower elevations and connects with existing workings in the "A" Shaft East area. Additional tonnage was also proven by development between the 6th and 8th levels in another part of the "A" Shaft East area.



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

The following table shows a comparison of developed ore with the previous year, as reported to the State Tax Commission.

	<u>Cliffs Shaft</u>	<u>Bancroft</u>	<u>Sec. 10</u>	<u>Total Lease</u>	<u>Total Tons</u>
Estimated Reserves-Dec. 31, 1951	1,157,873	275,579	452,948	728,527	1,886,400
Less 1952 Production	403,317	57,750	87,009	144,759	548,076
Balance as of 1951 Estimate	754,556	217,829	365,939	583,768	1,338,324
Estimated Reserves-Dec. 31, 1952	1,148,347	232,093	423,414	655,507	1,803,854
New Developed Ore	393,791	14,264	57,475	71,739	465,530

Expected Average Analysis of Ore Reserves

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Natural	56.04	.107	10.80	.49	2.40	.96	.80	.018	1.20	.85

The above analysis was expected for the Cliffs Shaft, Bancroft and Section 10 ores for several years and, as such, was returned to the State Tax Commission. However, as the result of a reduction in the proportion of lean ore contracts to standard contracts and improved sampling techniques a more realistic analysis will approximate the average run-of-mine in 1952 with a 56.88% Fe and 13.70% Silica.

In 1952 a geological and engineering study of the hard ore reserves was made for the first time in many years. This estimate includes only mineable ore and is based on a recovery factor of 70%. The total reserves including proven, probable and prospective, are estimated to be 8,680,000 tons as of January 1, 1953. The reserves include first and second class ore in a ratio of approximately 80%-20% respectively. If further improvement in the quality of the lump grade is necessary, the ratio of second class ore, of course, will decrease and reduce the estimated tonnage.

Over a period of years the opinion had been formed that a "run-of-mine" analysis of approximately 56.00% Iron would produce a -2" product averaging 51.00% iron with a 20.00% silica and a plus 2" product averaging 60.00% iron with a 9.50% silica. During 1951 and 1952, exhaustive tests were run on sampling methods for hard ores and it is now recognized that on the basis of present run-of-mine analyses of 56.88% iron, the crushed product will average 55.00% iron and 15.00% silica while the lump product will average 58.50% iron with a 10.50% silica. Crushing to smaller size is partly responsible for this change and also the marked reduction in the number of contracts producing lean ores as against those producing standard grade ores. It is felt that the present 1-3/4% reduction in iron from "run-of-mine" to the crushed product and 1-3/4% increase in the lump product is far more realistic than the old differential of -5% to crushed and plus 4% to lump.

5. LABOR AND WAGES:

Labor Relations

Labor relations have been quite satisfactory during the year. A number of minor complaints were presented but in each case these were settled in Step 1 of the Grievance Procedure. There were no formal grievances submitted in 1952. Operations were suspended in June and July by the industry-wide strike and in this connection there was the usual picketing intermittently but there were no acts of violence.

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5. LABOR AND WAGES: (Cont'd)

Labor Relations (Cont'd)

In the months preceding the strike it was evident there was a feeling of uneasiness and insecurity among the men that affected the efficiency of the operation. Fortunately, from a safety standpoint, this attitude apparently had no bad effects as the frequency and severity rates at the Cliffs Shaft Mine in 1952 were lower than they have been in many years.

Employment

No. of Men Beginning of Year		487
Separations	56	
Added During Year	<u>46</u>	
Decrease in Men	10	
Total End of Year		477
Avg. Number of Men as per Labor Statement (Statistical)		460
Avg. Absenteeism (Statistical)		17

The following table shows a classification of separations in 1952:

	<u>No. of Men</u>
Military Service	11
Quit	26
Retired	7
Transfers	<u>12</u>
Total	56

As indicated above, the turnover in labor was quite large and due to the shortage of labor locally it is necessary to get replacements from a wider radius. It is becoming common practice for employees to commute to work from distances up to 65 miles. Generally, a good class of labor is being hired that formerly worked in the woods in the West end of the County and also from Baraga County.

It is interesting to note that since the five-day week began, absenteeism has begun to decline. This reduction will undoubtedly continue as the full impact of reduced earnings strikes the chronic time-loser.

During 1952, 170 employees were eligible for three weeks vacation; 160 for two weeks and 123 for one week with the remainder not eligible for vacation privileges.

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5. LABOR AND WAGES: (Cont'd)

Statement of Wages

a. Average Wages Per Day

	<u>1952</u>	<u>1951</u>
Surface	\$15.05	\$13.26
Underground	<u>17.83</u>	<u>14.90</u>
Total	\$17.25	\$14.57

Figures above for 1952 include retroactive and holiday pay.

b. Average Wages Per Month

	<u>1952</u>	<u>1951</u>
Surface	\$366.47	\$322.52
Underground	<u>434.16</u>	<u>362.42</u>
Total	\$420.00	\$354.44

The mine operated an average of 24-1/3 days per month but was idle two weeks in 1951 and eight weeks in 1952 as the result of labor strikes.

c. Tons Per Man Per Day

	<u>1952</u>	<u>1951</u>
Surface	20.04	22.31
Underground	<u>6.19</u>	<u>6.50</u>
Total	4.73	5.04

d. Labor Cost Per Ton

	<u>1952</u>	<u>1951</u>
Surface	\$ .760	\$ .607
Underground	<u>2.826</u>	<u>2.295</u>
Total	\$3.586	\$2.902

6. SURFACE

The only significant change on surface was the completion of the parking lot and Euclid Street extensions wherein the south shore of Lake Bancroft was filled with waste mine rock and road gravel was spread over the new fill. The City of Ishpeming was granted an easement for the Euclid Street extension and at their expense constructed a new access highway northward from the mine to U. S. Highway 41. Much congestion at shift changing time has been eliminated in the vicinity of the General Office by this improvement.

The mine water is being diverted into Carp River, west of "B" Shaft, as in past years. Plans are underway to construct a pond to settle the solids out of the water before it enters the river. This can be done with very little cost in the area west of "B" Shaft.

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7. UNDERGROUND

The new shaft project was approved near the end of the year and crews were organized for the necessary underground development although no new shaft development was actually begun in 1952.

The new ore estimate, in addition to outlining the available reserves for the new shaft, served as a guide for exploration drilling and aided considerably the planning of development during the year. Work was begun at the close of the year in attempting to set up an overall plan of development and mining based on the new ore estimate and subsequent exploration results. Such a plan should minimize the amount of development necessary because the drifts and raises can be more favorably located.

Many of the haulage drifts are in ore and, as a result, mining of inlying areas is continuously being tied up by tramming operations. There is a choice of (1) driving by-pass haulage drifts and mining out the area or (2) moving the contracts that become tied up by main level haulage to outlying areas. Generally, the latter practice has been followed and the shift from "A" Shaft to outlying areas is well illustrated by the following table:

Distribution of Stopping Contracts

<u>Map Area</u>	<u>January 1952</u>			<u>December 1952</u>			<u>% Cont. Shift Distribution</u>	
	<u>No. of Conts.</u>	<u>No. of Dbl. Shift Conts.</u>	<u>Total</u>	<u>No. of Conts.</u>	<u>No. of Dbl. Shift Conts.</u>	<u>Total</u>	<u>Jan.</u>	<u>Dec.</u>
"A" Shaft	27	3	30	22	3	25	33.0	28.7
"B" Shaft	25	1	26	23	3	26	28.5	29.9
Banc. & "A" Shaft Northeast	14	0	14	12	1	13	15.4	14.9
Section 10 & Moro	10	6	16	10	7	17	17.6	19.6
"A" Shaft East	<u>4</u>	<u>1</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>6</u>	<u>5.5</u>	<u>6.9</u>
Total	80	11	91	73	14	87	100.0	100.0

Several trends are significant. First, the number of stopping contracts was decreased appreciably due to the necessity of improving lump grade. To partially offset the resulting decrease in production there has been a gradual increase in the number of two-shift contracts. As this trend continues, ventilation becomes more of a problem and tends to limit the number of two-shift contracts.

Secondly, there has been a relative shift of personnel from "A" Shaft to the Section 10 and "A" Shaft East areas. This trend will undoubtedly continue and increase in magnitude as more and more of the inlying contracts become tied up by ore haulage drifts. The practice, as mentioned above, has been to move these inlying contracts to outlying areas in an overall program of depletion and retreating towards shaft. The necessity of driving by-pass drifts should be minimized by this practice.

A. Mining Areas

The mine is logically split into mapping areas in which "A" and "B" Shaft map units represent the inlying areas in which a large proportion of the contracts are mining in old stopes. Bancroft and "A" Shaft Northeast, "A" Shaft East and the Section 10 Lease and Moro Mine represent the outlying or fringe areas which must be depleted prior to the inlying areas for orderly mining.

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7. UNDERGROUND: (Cont'd)

1. "B" Shaft - (West of 400 E)

Development in "B" Shaft was minor for the year but did include a by-pass drift to facilitate mining above 1st level.

A decrease from 25 to 23 stoping contracts in "B" Shaft was caused by grade difficulties. Nearly 75% of these contracts are now above 5th level and 8 of these are the direct result of the short-range diamond drill program begun in 1949. Planking over rock fill and mining of old stope backs have continued favorably in two contracts.

The "B" Shaft ore reserve picture was brightened somewhat when underground hole #792 encountered a favorable run of first class ore in a structure that may extend from plus 1028 up to the mining limit. The bulk of the first class ore reserves continues to be above 1st level and the mining limit of plus 1230.

2. "A" Shaft - (400 E - 2800 E, between the Bancroft & Section 10 Leases)

"A" Shaft development was confined to extending the 15th level towards the Moro Mine, a 10th level by-pass drift and raises from 15th level to two contracts mining below 10th level.

The number of stoping contracts decreased due to the necessary maintenance of present ore haulage drifts, grade problems and depletion. Some pillar extraction was conducted where conditions permitted it but the rate of production in this phase of mining is not entirely satisfactory. Other methods of pillar recovery are being studied with the idea of developing a more efficient practice.

Reserves in "A" Shaft are dispersed and, in part, tied up by tramming operations. It is significant that two contracts are now mining in areas proven by drilling earlier in the year.

3. Bancroft and "A" Shaft Northeast

The only development in this portion of the mine consisted of the re-location of #16 Contract from 9th to 10th levels, Bancroft and raising from 12th level to the new location.

A decrease of two contracts in this area was due to depletion. The number of contracts that can be maintained in this area is limited, in part, by ore haulage drifts, particularly 10th level.

Reserves are largely concentrated between 9th and 11th levels. In the northeast area, drilling has shown a large lean conglomerate ore structure running continuously from 12th level up through 7th level. Possibly, from 7th level to the mining limit we may prove first class ore in this structure.

4. Section 10 Lease and the Moro Area

Drifting and raising from 10th level, Moro, to an ore area on 8th level, Moro, constituted the development in this area for the year.

The mining continues to be concentrated on 5th level and 8th level. Although the number of contracts did not increase, the proportion of two-shift to one-shift contracts did.

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7. UNDERGROUND: (Cont'd)

4. Section 10 Lease and the Moro Area (Cont'd)

Since the reserves in this part of the mine amount to about 30% of the total, a gradual increase in production from this area is expected. The limiting factor at the present time is the ventilation of such a concentrated area of open-stope mining. Much of the reserves above 5th level are now mined out and the major portion of the reserves lie in a continuous ore area extending from 5th to 9th levels.

5. "A" Shaft East - (East of 2800 E and extending from the north boundary of Section 10 to 1200 S)

Development was stimulated by the favorable results of the exploration drilling program in this area. Two drifts were extended and four raises were driven in 1952. Two of these reentered old stoping areas in the No. 3 Mine.

The number of contracts mining in this area increased by 2 over 1951 and can be expected to continue to increase. Exploration proved at least 6 places for contracts in which two are already occupied.

The known reserves at the end of the year represented the largest percentage increase in any area in the mine. Emphasis on mining in this area will continue to increase as we attempt to deplete the outlying areas before re-treating towards shaft. Thus, the New York Mine if it is to be reentered will have to be reentered in the near future.

B. Exploration

During the year the short-range underground diamond drilling program continued with three rigs drilling 8,978 feet of hole in 88 holes or an average hole depth of slightly in excess of 100 feet. The planning of the program was largely guided this year by the New Shaft ore estimate and confined to "A" Shaft above 5th level, the Bancroft Lease, the "A" Shaft East area and "B" Shaft.

The table below summarizes the material encountered:

<u>Hole Numbers</u>	<u>Type</u>	<u>Feet</u>	<u>Percent</u>
<u>Series</u>	Ore	1,423	15.8
#745	Lean & 2nd Class Ore	1,398	15.6
to	Iron Formation	1,031	11.5
#832	Intrusive	2,680	29.8
	Argillite & Quartzite	<u>2,446</u>	<u>27.3</u>
	Total	8,978	100.0

Drilling in the "A" Shaft East area and "A" Shaft above 5th level may be considered nearly complete at the present time. Significant tonnage additions were proven in the "A" Shaft East area, the Bancroft Lease and the upper levels of "B" Shaft North. An indication of the importance of this program is readily recognized by the fact that four contracts are mining in areas which were proven by drilling earlier in the year.

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7. UNDERGROUND: (Cont'd)

B. Exploration (Cont'd)

Surface drilling for hard ore in areas immediately available to Cliffs Shaft should be included in an overall summary of exploration.

Surface drilling in Section 9, 47-27 proved the presence of a considerable body of second class and lean conglomerate ore in the vicinity of the Robbins Flooring Mill and an additional tonnage of second class ore in an anticlinal structure trending northwest of "B" Shaft far west workings. Hole #66, also in Section 9, showed no encouragement to the west of our present contracts in "B" Shaft.

Two holes in Section 3, 47-27 served to aid the planning of development now well under way in the "A" Shaft east area.

Drilling in Sections 5 and 8 was discontinued when the structures encountered were not as had been anticipated. The surface exploration for extensions of hard ore, which might be above present mine elevations, can be considered complete except for inlying areas. No significant tonnages of first class ore have been realized to date.

C. New Equipment

A program of gradual replacement of the two-drum type hoists with three-drum hoists has been started. The latter type hoist is more adaptable to the open stopping method in that it will minimize cross hauling, it is speedier and can be moved and shifted in less time.

Considerable testing and experimenting ~~has~~ been done with smaller drill machines in the very hard ore contracts. Results indicate the 2 $\frac{1}{2}$ " piston machine with 1-3/8" carbide bit is a better combination than the 2-5/8" piston machine with 1-5/8" carbide bit in very hard ore. A program following the above changes has been started in selected contracts.

D. Explosives

Powder consumption per ton of ore increased slightly compared to 1951 due to more ore development. The average price of Hercomite 2X increased from \$15.98 to \$16.35 while Gelamite increased from \$16.70 to \$17.01 and Gelatin - 60% increased from \$18.72 to \$19.10. The overall explosives costs are summarized in the statement that follows:

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7. UNDERGROUND: (Cont'd)D. Explosives (Cont'd)Statement of Explosives Used:

<u>STOPING AND DEVELOPMENT IN ORE</u>	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1952</u>	<u>Amount 1951</u>
Hercomite No. 2X - Cwt.	343,450	16.35	\$ 56,150.49	\$ 69,240.00
Gelamite No. 1 - Cwt.	161,500	17.01	27,467.30	28,894.14
Gelatin 60% - Cwt.	8,300	19.10	1,585.70	3,097.89
Powder - Total	513,250	16.60	\$ 85,203.49	\$101,232.03
<u>Blasting Supplies</u>				
Fuse - Per M Ft.	369,938	9.40 M	3,478.42	5,487.69
No. 6 Caps	52,828	1.57 C	829.40	1,474.55
No. 6 Electric Caps	84,128	21.24 C	17,865.03	17,108.18
Fuse Lighters - 7"	13,975	9.07 M	126.75	292.50
Shot Firing Cord - Ft.	16,100	25.97 M	418.08	239.69
Tamping Shells	17,414	6.97 M	121.41	104.50
Tamping Plugs	5,000	44.28 M	221.42	-
Connecting Wire - Lbs.	2,626	1.00	2,626.00	2,132.28
Miscellaneous			1,197.53	1,031.07
Total Blasting Supplies			26,884.04	27,870.46
TOTAL STOPING & DEVELOPING IN ORE			\$112,087.53	\$129,102.49
<u>Product - Tons</u>			548,076	700,346
<u>Lbs. Powder Per Ton Ore</u>			.936	.886
<u>Cost Per Ton For Powder</u>			.155	.145
<u>Cost Per Ton For Fuse, etc.</u>			.049	.039
<u>Cost Per Ton, All Explosives</u>			.204	.184
<u>DEVELOPMENT IN ROCK</u>				
Hercomite 2X - Cwt.	42,300	16.33	\$ 6,906.63	\$ 8,272.00
Gelamite No. 1 - Cwt.	900	17.06	153.55	210.38
Gelatin 60% - Cwt.	8,100	19.21	1,556.11	2,470.87
Total Powder	51,300	16.80	\$ 8,616.29	\$ 10,953.25
<u>Blasting Supplies</u>				
Fuse - Ft.	2,880	9.64 M	27.77	73.38
No. 6 Caps	395	1.57 C	6.19	177.67
No. 6 Electric Caps	13,727	19.56 C	2,684.69	4,491.61
Fuse Lighters - 7"	1,500	7.83 M	11.75	67.50
Shot Firing Cord (No. 18) Ft.	1,150	23.53 M	27.06	63.42
Tamping Shells			26.55	41.74
Tamping Plugs	750	3.47 C	26.03	-
Connecting Wire - Lbs.	372	1.00	372.00	620.03
Miscellaneous			75.25	154.28
Total Blasting Supplies			3,257.29	5,689.63
TOTAL ROCK DEVELOPMENT			\$ 11,873.58	\$ 16,642.88
Feet Rock Development			3,475	3,968
Cost Per Foot, Rock Development			3.417	4.194
GRAND TOTAL ALL EXPLOSIVES			\$123,961.11	\$145,745.47
AVERAGE COST PER POUND FOR POWDER			.1661	.1633



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7. UNDERGROUND: (Cont'd)

E. Carset Bits

Since tungsten carbide bits were introduced into Cliffs Shaft, a footage record per bit has been kept for the purpose of determining the performance of various type bits and a comparison of costs. The following table shows the pertinent data:

<u>Description</u>	<u>Quantity</u>	<u>Price</u>	<u>Amount</u> <u>1952</u>	<u>Amount</u> <u>1951</u>
Ingersoll-Rand, Series 115 - 1-5/8"	3,388	12.23	\$41,435.24	\$56,768.09
" " " 113 - 1-3/8"	96	11.50	1,104.00	575.00
Timken, Series 115 - 1-5/8"	50	9.45	472.50	-
Rockbits, " 115 - 1-5/8" & 1-9/16"	256	12.05	3,084.80	5,038.17
Haynes, Series 113 - 1-3/8"				224.00
Total	3,790	12.162	\$46,096.54	\$62,605.26
Production - Tons			548,076	700,346
Cost Per Ton Ore			.084	.089
Feet Drilled - Rock & Ore			562,995	761,672
Average Feet Drilled Per Bit			149	152
Cost Per Foot of Hole			.082	.082

The tabulation above shows that bit performance in 1952 was substantially the same as in 1951.

F. Pumping

There has been no changes in the pumping equipment on the 15th level. The pumping log shows a decrease in mine water from 809 g.p.m. in 1951 to 776 g.p.m. in 1952

8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING

Comparative Mining Costs:

<u>Product</u>	<u>1952</u>		<u>1951</u>	
	<u>Amount</u>	<u>Cost/Ton</u>	<u>Amount</u>	<u>Cost/Ton</u>
	548,076		700,346	
Underground Costs	\$2,034,347.29	3.711	\$2,298,664.63	3.282
Surface Costs	359,350.31	.655	322,215.80	.460
General Mine Expense	449,076.50	.819	446,325.37	.638
Cost of Production	2,842,774.10	5.185	3,067,205.80	4.380
Depreciation	34,563.00	.063	28,276.00	.040
Taxes	181,120.19	.330	184,571.35	.263
Loading & Shipping	53,252.24	.097	63,632.71	.091
Total Cost at Mine	\$3,111,709.53	5.675	\$3,343,685.86	4.774
Budget: Estimated Cost Per Ton		5.762		4.800
Number of Shifts and Hours	2-8 hr.		2-8 hr.	
Number of Days Operated	243½		292	
Average Daily Product	2,251 tons		2,398 tons	

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8. COST OF OPERATING: (Cont'd)Detailed Cost Comparison

	<u>Total 1952</u>		<u>Total 1951</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
<u>Underground Costs</u>				
Exploring in Mine	38,672.63	.071	33,506.61	.048
Wage Adjustment	154,552.88	.282	88,475.49	.126
Development in Rock	100,295.00	.184	125,047.42	.179
Stoping & Dev. in Ore	1,065,853.00	1.943	1,216,669.89	1.737
Timbering	54,975.36	.100	63,555.43	.091
Tramming	242,233.34	.442	273,313.75	.390
Ventilation	3,721.83	.007	15,830.40	.023
Pumping	36,796.62	.067	42,186.12	.060
Compressors & Air Pipes	73,904.95	.135	84,978.46	.121
Underground Superintendence	106,677.24	.194	89,502.80	.128
Compressors & Power Drills	29,897.34	.054	22,632.88	.032
Scrapers & Mech. Loaders	119,713.90	.218	137,164.75	.196
Tramming Equipment	62,790.55	.115	101,086.18	.144
Pumping Machinery	4,057.33	.007	4,714.45	.007
Total Underground Costs	2,034,347.29	3.711	2,298,664.63	3.282
<u>Surface Costs</u>				
Hoisting	53,414.75	.097	57,591.02	.082
Stocking Ore	35,193.03	.064	41,058.60	.059
Screening-Crushing at Mine	72,588.95	.133	84,578.75	.121
Dry House	18,408.05	.034	20,507.78	.029
General Surface Expense	33,035.65	.060	37,135.65	.053
Maint. Hoisting Equipment	25,174.89	.046	21,183.47	.030
Shaft	68,470.14	.125	12,194.52	.017
Top Tram Equipment	13,043.76	.023	11,571.93	.017
Docks, Trestles & Pockets	23,780.57	.043	19,822.43	.028
Mine Buildings	16,240.52	.030	16,571.65	.024
Total Surface Costs	359,350.31	.655	322,215.80	.460
<u>General Mine Expenses</u>				
Geological	8,466.23	.015	7,196.47	.010
Mining Engineering	21,253.06	.039	16,811.57	.024
Mechanical & Elect. Engr.	11,443.34	.023	7,823.14	.011
Analysis & Grading	63,748.27	.116	58,931.95	.084
Safety & Personnel Departments	5,818.37	.011	5,509.68	.008
Telephones & Safety Devices	23,570.75	.043	16,484.14	.024
Local & General Welfare	5,619.34	.010	6,426.54	.009
Special Exp.-Pensions & Allow.	16,364.69	.030	10,804.76	.015
Ishpeming Office	49,447.65	.090	52,406.80	.075
Mine Office	65,470.23	.118	52,702.90	.075
Insurance	34,962.02	.064	35,796.91	.051
Personal Injury	21,671.58	.040	42,495.24	.061
Social Security Taxes	42,595.48	.078	44,266.98	.063
Employees Vacation Pay	75,239.62	.136	79,490.60	.115
Research Laboratory	3,405.87	.006	9,177.69	.013
Total General Mine Expenses	449,076.50	.819	446,325.37	.638
COST OF PRODUCTION	2,842,774.10	5.185	3,067,205.80	4.380

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8. COST OF OPERATING: (Cont'd)

Detailed Cost Comparison (Cont'd)

The Cost of Production increased \$.805 per ton compared with 1951. Labor costs increased an average of 16.3% while Supply costs increased an average of 16.5%. An explanation of accounts that show a significant change compared with 1951 is given below. Idle expense, due to the strike, amounted to \$122,906.03.

Exploring in Mine

Three diamond drill rigs were operated throughout 1952 whereas only in the latter part of 1951 was the number of rigs increased from two to three.

Maintenance of Present Plant

There still continues to be a considerable expense for maintenance of the present plant. Several accounts increased abnormally the past year. Those in question are discussed below:

Shaft

In 1952 it was necessary to make major repairs in "B" Shaft due to rotting of the old timber above ledge. Steel sets were installed from shaft collar to a depth of 140' and a concrete lining was placed on three sides of the shaft in this section. Cement grout was also pumped outside the old timber to seal off the excessive flow of water.

Hoisting Equipment

A serious crack in the concrete foundation under the "A" Shaft skip hoist developed and to prevent further damage the surface material under the foundation was solidified by grouting under pressure.

Docks, Trestles & Pockets

Major repairs were made to the crusher building. To maintain this structure in operating condition a large number of old structural steel members were reinforced and also replaced. A new pan feeder was also installed, replacing one that was worn out.

Telephones & Safety Devices

The purchase of 5 new radio-telephones and the placement of self-rescuers throughout the mine, as part of the over-all safety program, increased this account for the year.

Expenditure & Authorization Summary

E. & A. No. CC-416 - Converting Hoist Motors to D. C. Drive

Work was stopped on this project late in 1951 pending a decision on the New Shaft. No additional expenditure was made in 1952 due to approval of E. & A. No. CC-560, covering the New Shaft. The unexpended balance amounted to \$58,114.34 for this E. & A.

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8. COST OF OPERATING: (Cont'd)Detailed Cost Comparison (Cont'd)Expenditure & Authorization Summary (Cont'd)E. & A. No. CC-431 - New Top Tram Hoist

The equipment procured under this E. & A. was completed at a cost of \$16,936.84.

E. & A. No. CC-448 - New 60" Pan Feeder Conveyor

The installation of this equipment was completed and the account closed. Total cost was \$7,991.00.

E. & A. No. CC-464 - Shop Equipment

One I.R.-54 Drill Sharpener, a Toledo Threader and a Pneumatic Forging Hammer were all received and installed at a cost of \$9,522.45.

E. & A. No. CC-481 - D-8 Caterpillar Tractor

During the year, the D-8 Caterpillar Tractor-bulldozer was received and the total cost was \$23,964.54.

E. & A. No. CC-499 - Burroughs Payroll Machine

The payroll machine was purchased for the mine office at a cost of \$4,926.75.

E. & A. No. CC-560 - New Shaft Project

This project was approved in December, 1952 in the amount of \$2,114,900.00 for sinking and equipping the new shaft. In 1952, \$1,251.35 was charged to this project.

9. TAXES

Comparative data for 1952 and 1951 is shown below:

	<u>1 9 5 2</u>		<u>1 9 5 1</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty	3,230,000	120,640.50	2,285,000	85,928.80
Personal	601,100	22,451.08	801,100	30,125.85
Lot 2, Sec. 3, 47-27-Bancroft	800,000	29,880.00	775,000	29,144.34
Lot 174, Nelson's Addition	100	3.74	100	3.76
S. 35.91' of Lot 179	50	1.87	50	1.88
3½ of NW¼ of Sec. 10, 47-27	1,100,000	41,085.00	1,200,000	45,126.72
Total Cliffs Shaft Mine	5,731,250	214,062.19°	5,061,250	190,331.35
Taxes per ton produced-Less Idle Exp.		.330		.263
Taxes per ton shipped " " "		.341		.253

(°) Taxes charged to Idle Expense \$32,942.00 included above.

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10. ACCIDENTS AND PERSONAL INJURY

Eleven compensable and 18 non-compensable injuries occurred in 1952 for a total time lost of 384 days. This record of 29 accidents compares favorably with the 52 incurred during 1951 and gave Cliffs Shaft the best accident record during 1952 among the Company's underground mines.

Comparison of Frequency and Severity in 1951 and 1952 is as follows:

<u>Year</u>	<u>Frequency</u>	<u>Severity</u>
1951	47.40	1.574
1952	36.04	.984

Frequency Rate - Number of accidents for every 1,000,000 man hours

Severity Rate - Number of days lost per 1,000 man hours

A summary of the compensable accidents is listed below:

#1285 - Albert Carriere - Miner - January 30, 1952 - chunk squeezed finger against drill machine - laceration and simple fracture of right ring finger - lost time, 26 days.

#1286 - Arthur Hytinen - Miner - January 30, 1952 - while breaking chunk, a piece hit him above right eye - abrasion of cornea and contusion of eyeball - lost time, 25 days.

#1287 - Kenneth Champion - Motorman - March 12, 1952 - while loading car, a chip flew and struck him in the left eye - dirt in left eye - lost time, 31 days.

#1288 - Salvatore Bertuccio - Trammer - April 15, 1952 - while loading, a chunk rolled over top of car hitting his right foot - fractured four toes - lost time, 92 days.

#1289 - George White - Scraper Operator - September 18, 1952 - while on his way from dry to "A" Shaft, he tripped over the Shop-cart draw-handle - laceration of left knee over patilla - lost time, 9 days.

#1290 - Paul Wuorenmaa - Brakeman - September 26, 1952 - while dumping rock cars his finger got caught under the rocker - cut near first joint - lost time, 31 days.

#1291 - Raymond G. Maki - Brakeman - October 9, 1952 - while caving ore pile into scraper trough a rail, buried in pile, shifted suddenly and struck him in the back and side - fractured ribs - lost time, 33 days.

#1292 - Walter Mannikko - Brakeman - November 7, 1952 - while stepping over two connecting drawheads between two cars, he fell - moderate contusions of left lower anterior chest wall - lost time, 8 days.

#1293 - John H. Bess - Timberman - December 10, 1952 - while lowering plank down raise, plank slipped off rope striking his left foot - contusions of left foot - lost time, 39 days.

#1294 - Francis Niemi - Laborer - December 16, 1952 - while loading plank, he stumbled when heaving plank on truck and crushed thumb between two planks - smashed tip of thumb on left hand - lost time, 24 days.

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10. ACCIDENTS AND PERSONAL INJURY: (Cont'd)

#1295 - Peter Filizetti - Brakeman - December 16, 1952 - while loading ore from chute a chunk rolled off car, striking his left foot - fracture of left big toe and 2nd toe - lost time, 17 days.

11. POWER:

The power cost for 1952 compares favorably with the cost in 1951:

	<u>1952</u>	<u>1951</u>
K. W. H.	7,731,256	9,486,529
Average Cost Per K.W.H.	.016489	.015892
K.W.H. Per Ton	.141	.135
Cost Per Ton	.232	.215

The decrease in total consumption of K.W.H. is due to the idle period and the shorter working schedule. The energy rates were the same as the previous year; however, fluctuations of consumption in the demand period and in the use of fuel-driven generators resulted in a slight increase in the average cost per K.W.H.

Determination of the cost per period results from the total K.W.H. used and is calculated under the following schedule:

A. Energy Charges

1. \$.041 per K.W.H. for the first 72 KWH per KW of demand, demand being determined as the lowest of the average KW supplied during the three 15-minute periods of maximum use during the billing period.
2. \$.0096 per KWH for all additional KWH.

B. Fuel Adjustment

A rate calculated as \$.00018 per KWH for each one-cent above \$.29 is the cost per million British Thermal Units of Fuel applied to that portion of the total mine KWH which, on a Cliffs Power & Light percentage basis, was produced by fuel or purchased from other companies during the period.

During the year there was no delay of a prolonged nature due to power failure which interfered with production.

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1. General

Beginning of construction of the Humboldt Mill became a reality in February with selection of O. W. Walvoord of Denver, Colorado as designer and builder.

A temporary office was set up in Ishpeming to house their Design and Purchasing Departments, but expansion of the force soon required them to move to Negaunee where larger and more suitable quarters were available.

During the development of the general arrangements and flow sheet some field work was done in the mill area in removal of the merchantable timber and clearing of the immediate mill site. Preliminary plans for the shop and office building were also developed at this time, and field work was started by the C. C. I. Company's Engineering Department.

The strike of the C. I. O. Steelworkers which lasted from June 2nd to July 28th had no effect on the work of the O. W. Walvoord Company, and the few items of equipment which were received by the Humboldt Mining Company during this period were unloaded by company employees without difficulty although no scheduled work was carried on.

A temporary field office was established for Humboldt Mining Company headquarters. Several small sheds for parts and tool storage, and a temporary ramp for truck servicing were built.

The working force of the Humboldt Mining Company was built up from a nucleus transferred from the Ohio Mine and at the year's end totaled 24 men.

At the end of the year the O. W. Walvoord Company force totaled 115 men including the Design Department, and is under the direction of their key supervisors from the Denver district.

Work was on a six day per week schedule until November 10th when a five day per week program was adopted by the Humboldt Mining Company. The O. W. Walvoord Company continued on a two shift per day and six day per week basis to take advantage of mild weather prevailing throughout the early winter.

A contract was let by the Cliffs Power & Light Company to the A. E. G. Electric Company for the construction of approximately 4,000' of 30 K. V. transmission line from a switching station near U. S. 41 to the mill site. This was completed and a temporary sub-station was set up during June.

A. Lindberg & Sons, Inc., under contract to the L. S. & I. Railroad Company, completed the rough grading of the railroad to the end of the proposed tail track. One track was laid to a point about 400' east of the mill and is in use as a service track. Rough grading of the mill repair bay track is also completed except for breaks in the fill section to allow traffic into the crushing area.

A contract for the relocation of Highway U. S. 41 was let by the Michigan State Highway Department. Grading was completed and paving, also scheduled for completion in 1952, would have been completed but was delayed due to non-delivery of cement, therefore making it impossible to abandon U. S. 41 in the pit area as originally planned. Paving will be completed as soon as weather conditions permit in 1953.

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1. General (Cont'd.)

Location of boundary lines and monument markers was carried on during the strike period while engineering crews were available from the underground mines. The regular engineering crew has made surveys of the general mill area, tailings disposal boundaries, miscellaneous roads, pipelines, pole lines, etc., and established the permanent base lines and original cross-sections of the pit.

2. General Surface

On resumption of work following the strike, earth moving equipment was checked and readied for operation.

First use of stripped material from the pit was in building up road grades to the mill site and the general area.

Through Mr. W. J. Williams of Ishpeming a contract was let for all necessary clearing and brush removal. This included complete clearing of the pit area south of U. S. 41 and east of Co. Rd. 601, mill stocking area, power line right of ways to the pit and Lake Lory, shop, office and warehouse area and dike lines. No clearing will be done within the tailings pond area other than cutting of the merchantable timber.

In the warehouse area immediately to the west of the shop and office building it was necessary to excavate the muck to a depth of 24' and back-fill with stripping from the pit area. This was completed in October after 33,320 cu. yds. of muck had been moved to a waste dump south of the tail track.

All houses and buildings within the area which were scheduled to be moved were at their new locations by the end of October.

Work on the dike and Lake Lory road has progressed as far as possible without a decision from the Oliver Iron Mining Company as to whether one forty of land will be available for tailings pond use.

Pole line construction was done under contract by the A. E. G. Electric Company. By December they had completed the lines to the pit limit and to a point near Lake Lory for pump house service. Both of these lines will be completed when final locations of service sub-stations are made.

The permanent sub-station for the Humboldt Mining Company distribution has been located and the rock drilled and blasted but not removed.

3. Office and Shop Building

This building was designed by Mr. Carl Benson of the Cleveland-Cliffs Iron Company.

It is of fireproof type construction with reinforced concrete footings and foundations, steel frame, and "sandwich" type cover on both walls and roof, consisting of two layers of corrugated metal enclosing fiber glass insulation. The extreme west end is supported on piling where direct bearing on soil was not sufficient to carry the load.



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3. Office and Shop Building (Cont'd.)

The west 120' of this 78' x 180' building will house the service and repair shop, welding shop, greasing service, oil storage, steam cleaner, electric shop and warehouse. The east 60', which is partitioned off by an 8" brick firewall, will have on the ground floor the dry facilities, foreman's office and locker room, warehouse office and boiler room. The second floor at this end is divided into a reception hall, general office, superintendent's office, engineer's map room, vault, storage space and a warehouse mezzanine.

Bids were taken for the furnishing and erection of the building as one item and the piling, footings, foundations and interior finishing as another. Klippen and Holm, low bidders on the second item, moved to the site on September 22nd and started excavation. This was completed and erection of the building started in November by the Arrowhead Steel Buildings, Inc. of Duluth, low bidder on this item. As of December 31st all structural steel had been placed and corrugated steel sheeting work was underway.

Plumbing and heating will be installed by the Cleveland-Cliffs Iron Company's Mechanical Department and electrical work by the Humboldt Mining Company.

Some of the smaller shop equipment and tools have been purchased or are on order, with those adaptable to construction work now in use.

4. Concentrating Plant - Crushing Section

The coarse crushing plant is designed for a capacity of 720 long tons per hour. The primary unit consists of an Allis-Chalmers 48-74 Gyratory Crusher with an open side setting of 6½ to 8". It is to be located on a side hill which allows both the building and crusher foundations to be seated on solid rock by making a bench cut.

Excavation started in September together with rock excavation for the haul road adjacent to the north. Initial blasts in the crusher area disclosed unsatisfactory conditions due to sand seams and additional depth will be necessary for a solid footing.

Secondary and tertiary crushing equipment will be housed in a separate building. Secondary crushing will be accomplished by a 7' super heavy duty Symons crusher; tertiary crushing will be done with a 5-84 Allis Chalmers Hydrocone. The same footing conditions may be expected in this area as were encountered in the primary crushing section.

5. Concentrating Plant - Concentrator Section

The mill building site has the same side hill conditions as the two crusher buildings. Actual excavation to ledge and load tests of the soil by the Raymond Concrete Pile Company determined the location of the mill. Excavation of rock permits a "one floor operation" which allows the heavy grinding machinery foundations to be placed on solid rock.

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5. Concentrating Plant - Concentrator Section (Cont'd.)

The mill building will be of reinforced concrete footings and foundations with a structural steel frame. Covering will be of the "sandwich" type with fiber glass batt insulation between two corrugated metal sheets. Heating will be provided by the plant housed in the shop and office building. All construction will be of fire resistant type.

Grading and excavation of the site began in May and was about completed in July. Considerable work was also done on the rock face to the north of the proposed location of the fine ore bins as a safety measure to eliminate the necessity of blasting or removing loose rock after mill building erection.

Concrete work began in August with the pouring of the filter bay footings and the first machinery foundations were started in November. At the end of the year 1400 cu. yds. of concrete had been poured. Concrete is mixed at the job site in a one cubic yard mixer and delivered to the forms in two yard batches by a dumpcrete truck. Actual placing of concrete is accomplished by using concrete buckets and a crane. A steam heating plant heats aggregates and water for winter work.

Structural steel, scheduled for delivery on October 15th, was delayed for approximately 60 days. By December approximately 50% of the steel had been received.

6. Open Pit

Equipment for mining began arriving in May when a P & H 1500 shovel, four 22 ton Euclid trucks and a TD 24 International Harvester tractor and dozer were received. The P & H shovel, normally rated as a 5 cu. yd. machine is equipped with a 4 cu. yd. bucket. The 36 TD Euclid trucks have 300 h.p. Cummins diesel engines, heated bodies and are equipped with Allison torque converters.

Assembly and testing of the P & H shovel was completed on August 20th after termination of the strike and it was moved into the stripping area while completing hot testing of the machine.

Stripping began at the top most point in the pit and was hauled to road and ramp locations and into the warehouse area where muck excavation was in progress using the 54-B Bucyrus-Erie with drag-line equipment. Two additional trucks were rented from the Tilden Mine to augment the hauling units. After completion of the warehouse area backfill the bulk of the stripping was used for haulroad fill to the primary crusher which is approximately 65' above the normal ground elevation. At the end of December, 133,700 cu. yds. had been removed from the area at a cost of \$0.3471 per cu. yd. A pump was installed at the Baron shaft in an effort to lower the water table which was causing difficulty in the lower elevations of the stripping area. Another difficulty encountered was some surface boulders requiring blasting.

The surface of the ore is extremely irregular and varying in elevation and it will be necessary to clean it up to a greater extent than that possible with the present shovel equipment in order to prevent a heavy dilution of mill feed.

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6. Open Pit (Cont'd.)

Three drill machines were tested in actual drilling operations in the pit. As a result the Jet Piercing Rig of the Linde Air Products Company was selected as the unit to do the primary drilling.

Further tests of equipment will be made for secondary drilling. These will be of a more portable type in order to reach the difficult locations necessary in the development of the pit during the first few years of operation.

A 22-B Bucyrus-Erie Crane was purchased in August and for a short time worked ahead of the stripping shovel in cleaning up surface trash. It was then moved to the mill area where it has been in continual use by O. W. Walvoord in mill construction.

7. Labor and Wages

Though the Humboldt Mining Company, as a unit, is unorganized by Labor, many of the men are members of the C. I. O. at properties from which they were transferred. No attempt was made at regularly scheduled work during the period of the strike from June 2nd to July 28th.

Some attempt was made at organizing employees of O. W. Walvoord, Inc., but to date this has been unsuccessful.

Number of days operated		120
Average number of men working		16 $\frac{3}{4}$
Total Hours (Mine Payroll)		14,957 $\frac{3}{4}$
Average Wage (Mine Payroll Rate)		1.951
Amount paid for labor:		
Mine Payroll	29,190.90	
Office	4,140.43	
Other Mines	7,257.90	
Total		40,589.23
Average wage per hour		2.035

Monthly Schedule

	<u>No. Men</u>	<u>No. Days Worked</u>	<u>Men Absent</u>
May	Ohio Mine Roll		
June	Ohio Mine Roll		
July	Ohio Mine Roll		
August	10	26	-
September	15	25	-
October	17	27	-
November	20	21	-
December	22	21	-

At the end of the year the O. W. Walvoord Company was carrying 115 men on their payroll with about 100 of them on field construction work and the remainder on design and procurement at the Negaunee office.

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8. Accidents

Three accidents were reported during the year, none compensable or resulting in lost time.

<u>No.</u>	<u>Type</u>	<u>Time Lost</u>
1	Arc Burn	-
2	Cut	-
3	Cut	-

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1. GENERAL

The production at the Lloyd Mine for the year was 85,365 tons, of which 30% was Lloyddale grade and 70% Silica grade. The mine was in actual productive operation 6 months, developing 4 months, and closed by a strike 2 months. The average working schedule during the year was 5-2/3 days per week, 3 shifts per day until November 17th, at which time it was reduced to 5 days per week.

Early in the year after it was decided to continue operations, work was started on the 10th Level development program, and included cutting out a new winze engine house, moving the winze hoist back 55 feet, sinking the winze shaft an additional 150 feet, and developing the 10th Level. At the close of the year most of this work was accomplished and drifting towards the orebody had started, with the main drift being advanced 92 feet from the end of the plat towards the orebody. During the shaft-sinking period it was necessary to stop all mining operations above the 9th Level, until enough room had been cut out on the 10th Level plat to provide shaft clearance. The small ore reserves above the 8th Level were intended to allow the production of ore during most of the development; however, the ore was exhausted by March and all repairs and maintenance work were charged to the capital account.

In addition to the production loss caused by the shutdown for the shaft-sinking period, there was a 2-month delay in the actual sinking operations caused by a strike of the United Steelworkers, C. I. O. This nation-wide strike occurred at the height of the shipping season and caused a large decrease in the amount of ore being shipped from the stockpile.

Because the 10th Level is being developed at, or very near, the bottom of the ore trough, there are no favorable indications of any more ore in this general area, thus no program of exploration is planned for the future.

2. PRODUCTION

a. Production by Grade and Months

Month	Days	Lloyddale	Lloyd Silica	Total	Rock	Tons per
		Tons	Tons		Tons	Man per
						Day
January	24-2/3	6,756	15,050	21,806	1,269	5.65
February	23-2/3	6,254	14,171	20,425	1,045	6.20
March	24-1/3	1,435	2,890	4,325	1,365	2.02
April	24-2/3	16	2,133	2,149	2,582	8.12
May	-	-	65	65	1,535	-
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	8	444	380	824	850	3.15
October	27	4,899	7,145	12,044	886	4.26
November	22	2,843	8,091	10,934	1,794	4.43
December	22	1,749	10,346	12,095	2,901	4.85
Total	176-1/3	24,396	60,271	84,667	14,227	4.83
Overrun		698	-	698		
Grand Total	176-1/3	25,094	60,271	85,365	14,227	4.83

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2. PRODUCTION

b. Shipments

Total shipments declined from the previous year, due to the strike during the shipping season and the reduced production of Lloydale grade. Shipments of Silica grade were adversely affected by the similarity of grade produced by the Ohio Mine.

<u>Year</u>	<u>Lloydale</u>	<u>Lloyd Silica</u>	<u>Lloyd Special</u>	<u>Total</u>
1952	38,218	32,902	-	71,120
1951	131,954	101,190	-	233,144

c. Ore Statement

	<u>Lloydale Tons</u>	<u>Lloyd Silica Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
On hand Jan. 1, 1952	18,666	131,240	149,906	123,968
Output for Year	24,396	60,271	84,667	256,954
Overrun	698	-	698	2,128
Total	43,760	191,511	235,271	383,050
Shipments	38,218	32,902	71,120	233,144
Balance on Hand	5,542	158,609	164,151	149,906
Decrease in Output			172,287	
Decrease in Shipments			162,024	
Increase in Ore on Hand			14,245	

The operating schedule for the past two years follows:

- 1952 - Hoisting and mining operations 3 8-hour shifts per day, 5-2/3 days per week Jan. 1 to Nov. 17. Effective Nov. 17, 5 days per week.
- 1951 - Hoisting and mining operations 3 8-hour shifts per day, 6 days per week, Jan. 1 to April 1. Effective April 1, 5-2/3 days per week.

d. Division of Product by Levels

<u>Level</u>	<u>Lloydale</u>	<u>Lloyd Silica</u>	<u>Total</u>
8th	4,706	7,245	11,951
9th	20,388	53,026	73,414
Total	25,094	60,271	85,365

The reserves in the small deposit above the 8th Level were depleted in March.

e. Production Delays

On June 2, 1952, the U. S. W. - C. I. O. called a strike in a dispute over the union shop and other provisions of the new contract. The strike was settled July 26 and the men returned to work on July 28. The strike set the 10th Level development program back 2 months and caused an estimated loss in production for the year of 20,000 tons.

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3. ANALYSISa. Average Mine Analysis on Output

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>	<u>Sil.</u>
Lloyddale	25,094	57.50	.159	.139	8.74
Lloyd Silica	60,271	50.97	.136	.054	18.97

b. Average Analysis of Shipments

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Lloyddale	38,218	58.30	.180	7.51	.27	2.42	.83	.67	.130	4.32
Lloyd Silica	32,902	51.70	.130	19.50	.22	2.25	.49	.57	.046	2.77

c. Average Analysis of Ore in Stock Dec. 31, 1952

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Lloyddale Dried	5,542	57.49	.122	8.39	.27	2.42	.83	.67	.143	4.32	
Lloyddale Natural		50.50	.107	7.37	.24	2.13	.73	.59	.126	3.80	12.15
Lloyd Silica Dried	158,609	51.68	.131	18.91	.22	2.25	.49	.57	.047	3.07	
Lloyd Silica Natural		45.52	.115	16.66	.19	1.98	.43	.50	.041	2.70	11.91

d. Analysis of Straight Cargo Shipments

There were no straight cargo shipments during 1952.

4. ESTIMATE AND ANALYSIS OF ORE RESERVES

The estimated reserves are almost totally limited to the ore above the 10th Level, with only a small amount of ore left above the 9th Level. This ore consists of small pillars that are left between and above the old mined areas, and will be exhausted by the middle of 1953. The bulk of the tonnage above the 10th Level is high-sulphur ore and the analysis cannot be accurately determined until development in the ore gets underway. The possibility of any increase in reserves is nil due to the fact that the 10th Level lies at or near the bottom of the ore trough in this area, and there are no other areas that present favorable structures for exploration.

Comparison of Production to Reserves

Reserves on Jan. 1, 1952	406,594
Production Jan. 1 to Dec. 31, 1952	<u>85,365</u>
Balance	321,229
Reserves as of Dec. 31, 1952	349,540
New Ore Developed	28,311

Developed Ore

The following is an estimate of ore reserves as of Dec. 31, 1952 using a factor of 12 cubic feet per ton:

	<u>Standard</u>	<u>Sulphurous</u>	<u>Total</u>
	<u>Ore</u>	<u>Ore</u>	
Total Gross as of Aug. 31, 1952	110,921	288,496	399,417
Less Production Aug. 31 to Dec. 31, 1952	<u>4,968</u>	<u>4,967</u>	<u>9,935</u>
Total Gross as of Dec. 31, 1952	105,953	283,529	389,482
Less 10% for Mining Loss and Rock	<u>11,092</u>	<u>28,850</u>	<u>39,942</u>
Net Total as of Dec. 31, 1952	94,861	254,679	349,540

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4. ESTIMATE AND ANALYSIS OF ORE RESERVES (CONT'D)

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Lloydale Dried	59.02	.174	8.10	.30	2.40	.66	.48	.356	3.00	
Lloydale Natural	51.35	.151	7.05	.26	2.09	.57	.42	.310	2.61	13.00

5. LABOR AND WAGES

Labor Relations

Membership in the Union at the close of the year was 96.7% of the eligible employees, an increase of 5.5% over the previous year. The turnover in labor was quite large, due in part to the transferring of men to other properties during the development period in March. A total of 48 men were transferred to other properties and, when mining was resumed above the 9th Level in October, a total of 24 men returned. Employee relations have been quite satisfactory during the year although there have been some minor complaints; however, these were settled locally and there have been no formal grievances received.

Employment

	<u>1952</u>	<u>1951</u>
Number of Men Beginning of Year	162	159
Added During Year	36	35
Separations	61	32
Total End of Year	137	162
Avg. No. of Men as per Dec. Labor Statement	112	147

Two men quit to work elsewhere, 49 men were transferred to other properties, 2 men entered the armed services, 2 were retired, 4 died, and 2 were laid off. Twelve men were hired and 24 men transferred from other properties.

Statement of Wages

Inasmuch as the mine operated on E. & A. No. CC-505 for the major part of the year, a comparison would not have any great significance.

The job classification program went into effect on July 26, following the strike. There were a number of complaints due to comparatively low rates of pay in jobs, but after the men realized that it was a part of the union agreement and could not be changed, they appeared to be satisfied.

The company account miners' rate was increased to \$2.02 per hour and on Sept. 1 a new incentive pay schedule became effective. It was well received and by the end of the year the average miner was making \$18.86 per day, or 16.7% above the company account rate of \$2.02 per hour, or \$16.16 per day. It is my belief that the rates have resulted in an increase in production, particularly in view of the reduced working schedule of a straight 40-hour week.

6. SURFACE

Buildings

There were four additions to surface buildings erected during the year. A 24' x 26' section was added to the truck garage to serve as a tractor garage. A 10' x 10' addition was attached to the blacksmith shop to be used for the welding area. A 28' x 30' section was erected to the west of the shops to house an overhead dolly and to



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6. SURFACE (CONT'D)  
Buildings (Cont'd)

serve as a car repair shed. A 14' x 24' section was added to the steel storage shed to be used for tool storage. Only normal repairs were required to keep the existing buildings in good condition.

Water Supply

In order to provide an adequate water supply for fire protection and dry house facilities, the old local water supply system from the Lloyd 2nd Level and the Morris Mine deep-well pumps has been discontinued. Water is now supplied by the Ishpeming Township and City of Ishpeming water systems. A 4" water line 1460' long was installed to bypass the old water tank and to connect the two properties with the city system. Half of the cost of installation was met by the Inland Steel Company.

Stocking Grounds

After the Lloydale pile and a part of the Silica pile were loaded out, two new trestles were erected east of the shaft. Due to a proposed large increase in the cost of using a spotting engine for stockpile loading in 1953, extensive grading of the stockpile area was done. This grading, along with some additional track, should provide gravity feed of cars to the shovel during future shipping seasons. In order to provide room for the rock from the 10th Level development, it was necessary to erect a new rock trestle to the southwest of the shaft. This trestle extends to the caved area and the rock will be dumped into the cave.

7. UNDERGROUND

a. Shaft Sinking

As a part of the 10th Level development program under E. & A. No. CC-505, the winze shaft was deepened an additional 154' below the 9th Level elevation. The winze shaft has three compartments: a cage compartment, a counterweight compartment, and a ladder-and-pipe compartment. Sinking was started early in April and, because of the strike, the shaft was not finished until the middle of August.

b. Development

The small amount of ore that was above the 8th Level Exploratory Drift on the south was completely mined out early in the year. It had been hoped that this area would last throughout the sinking period to help carry the overhead charges. However, the ore pinched out rapidly, and this area was exhausted just prior to the start of the sinking operation in April.

In order to decrease the fleet angle on the winze hoist for the additional depth of shaft, it was necessary to cut out a new hoist room and move the winze hoist back 55'. Hold-down sheaves were installed on the old hoist foundation. While this work was being done the hoist and motor were found to require major repairs, and some delay in the schedule resulted.

On the 8th Level, a new sump cutout and an automatic pumping system were installed. The old sump, immediately under the 8th Level plat, was then cleaned out, and work was started on converting this excavation into a storage trench.

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7. UNDERGROUND (CONT'D)

b. Development (Cont'd)

With the exception of the shaft sinking, etc., there was no other ore or rock development. The orebody on the 9th Level was well defined, and the big problem was to keep the production as high as possible during the 10th Level development period.

c. Timbering

There was less timber used than last year due to a reduction in the number of mining areas, and also because of the reduced mining program in effect during the year. Due to a slabbing condition in the 9th Level main drift, a number of steel sets were installed to hold back the sides. Steel sets are being used when timbering is required on main levels in preference to timber, because of the ease in handling, strength, and the longer life it has over timber.

Explosives

	Quantity	Average	Amount
	Lbs.	Price	1952
Gelamite 1-X 60%	18,595	.1711	3,180.91
Gelatin 60% Extra	1,300	.1915	248.97
Gelatin Hi-Pressure 60% 5x5	5,000	.2233	1,116.25
Hercomite X	250	.1585	39.63
Total Powder	25,145	.1824	4,585.76
Fuse, Caps, Etc.	76,936	.0118	904.21
Total Expense, Development & Mining			5,489.97
Product - Tons		85,365	
Lbs. Powder per Ton of Ore		.295	
Cost per Ton for Powder		.054	
Cost per Ton for Fuse, Caps, Etc.		.010	
Cost per Ton for All Explosives		.064	
Gelamite 1-X 60%	16,955	.1686	2,858.95
Gelatin 60% Extra	6,150	.1915	1,177.72
Total Powder	23,105	.1747	4,036.67
Fuse, Caps, Etc.	47,114	.0234	1,103.70
Total Expense, E.&A.No.CC-505			5,140.37
Grand Total Explosives Used in Mine			10,630.34
Average Price per Pound for Powder			.1787

Note: The above figures have not been compared with the previous year, 1951, due to the fact that the mining program in 1952 was almost entirely the recovering of small pillars between old workings or drifts. A total cost of explosives under E. & A. No. CC-505 is listed above, and again cannot be compared with a similar operation in 1951.

d. Pumping

During the year work was started on a project to convert the mine pumping system to a completely automatic operation, with the 8th Level pumping station being converted during the year. When this project is complete, there will be three automatic pumping stations operating in relays (10th Level to the 8th Level, 8th Level to the 5th Level, and 5th Level to the surface). During 1952, an average of 266.4 G. P. M. were pumped from the mine into the Carp River.

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8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING

a. Comparative Mining Costs

	<u>1952</u>	<u>1951</u>
Product - Tons	85,365	259,082
Underground Costs	3.095	2.496
Surface Costs	.906	.499
General Mine Expenses	<u>.975</u>	<u>.615</u>
Cost of Production	4.976	3.610
Depreciation	.367	.222
Taxes	.061	.037
Loading and Shipping	<u>.079</u>	<u>.086</u>
Total Cost at Mine	5.483	3.955
Budget Estimated at Mine	4.458	4.039
No. of Shifts and Hours	7, 1-8 Hr. 29, 2-8 Hr. <u>148, 3-8 Hr.</u>	15, 1-8 Hr. 57, 2-8 Hr. <u>235, 3-8 Hr.</u>
Total Operating Days	169	278
Average Daily Product	462	932

Proportion of Labor and Supplies

	<u>1952</u>	<u>Percent</u>
Labor	357,309.33	69
Supplies	<u>160,276.84</u>	<u>31</u>
Total	517,586.17	100

b. Detailed Cost Comparison

	<u>1952</u>		<u>1951</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
Additional Wage Adjustment	13,689.09	.160	28,273.72	.109
1. Exploring in Mine	1,906.72	.022	12,565.00	.048
2. Sinking in Shaft	-	-	-	-
3. Development in Rock	3,805.89	.045	5,440.53	.021
4. Development in Ore	18,179.91	.213	61,726.48	.239
5. Stopping	76,724.28	.899	189,149.57	.731
6. Timbering	25,145.23	.295	48,978.99	.189
7. Tramming	52,554.49	.616	154,096.31	.595
8. Ventilation	2,600.88	.030	3,996.83	.015
9. Pumping	13,932.66	.163	37,153.18	.143
10. Compressors and Air Pipes	10,539.85	.123	23,159.17	.089
11. Back Filling	-	-	-	-
12. Underground Superintendence	13,205.57	.155	21,140.51	.082
13. Cave-in or Fire in Mine	-	-	-	-
14. Maint.:Compressors&Power Drills	660.50	.008	5,913.66	.023
15. Scrapers & Mech.Loaders	10,266.30	.120	23,538.64	.091
16. Tramming Equipment	13,432.73	.157	20,768.69	.080
17. Pumping Machinery	7,569.87	.089	10,746.51	.041
Total Underground Costs	264,213.97	3.095	646,647.79	2.496

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8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING (CONT'D)

b. Detailed Cost Comparison (Cont'd)

	1952		1951	
	Amount	Per Ton	Amount	Per Ton
18. Hoisting	21,752.39	.255	43,769.18	.169
19. Stocking Ore	15,636.32	.183	23,726.14	.091
20. Screening - Crushing at Mine	16.95	-	326.55	.001
21. Dry House	6,847.43	.080	16,826.17	.065
22. General Surface Expense	11,234.05	.132	20,342.22	.079
23. Maint.:Hoisting Equipment	11,577.21	.136	12,999.05	.050
24. Shaft	1,880.68	.022	3,295.36	.013
25. Top Tram Equipment	2,326.74	.027	2,809.70	.011
26. Docks,Trestles & Pockets	3,381.72	.040	2,970.14	.011
27. Mine Buildings	<u>2,662.70</u>	<u>.031</u>	<u>2,251.50</u>	<u>.009</u>
<b>Total Surface Costs</b>	<b>77,316.19</b>	<b>.906</b>	<b>129,316.01</b>	<b>.499</b>
28. Geological	630.21	.007	885.80	.003
29. Mining Engineering	3,744.97	.044	5,460.60	.021
30. Mechanical & Electrical Engineering	1,386.81	.016	2,042.74	.008
31. Analysis and Grading	8,702.46	.102	22,391.36	.086
32. Safety Department	818.63	.010	2,322.88	.009
33. Telephones and Safety Devices	3,510.00	.041	3,378.65	.013
34. Local and General Welfare	1,079.89	.013	2,116.50	.008
35. Special Exp.-Pensions & Allowances	3,695.89	.043	3,556.15	.014
36. Ishpeming Office	8,479.82	.099	17,250.49	.067
37. Mine Office	13,323.58	.156	22,119.38	.085
38. Insurance	4,344.67	.051	12,778.19	.049
39. Personal Injury	6,128.79	.072	23,412.14	.091
40. Social Security Taxes	8,447.73	.099	14,672.69	.057
41. Employees Vacation Pay	18,593.44	.218	22,661.64	.088
42. Research Laboratory	<u>377.28</u>	<u>.004</u>	<u>4,145.91</u>	<u>.016</u>
<b>Total General Mine Expenses</b>	<b>83,264.17</b>	<b>.975</b>	<b>159,195.12</b>	<b>.615</b>
<b>Cost of Production</b>	<b>424,794.33</b>	<b>4.976</b>	<b>935,158.92</b>	<b>3.610</b>
43. General Supplies	12,155.76	.142	24,459.85	.094
44. Iron and Steel	4,513.55	.053	8,495.21	.033
45. Oils and Greases	872.57	.010	2,505.01	.010
46. Machinery Supplies	10,855.63	.127	22,050.82	.085
47. Explosives	5,311.85	.062	20,974.52	.081
48. Lumber and Timber	8,852.83	.104	16,808.60	.065
49. Fuel	2,966.56	.035	4,297.98	.017
50. Electric Power	22,764.77	.267	56,575.13	.218
51. Sundries	<u>8,244.73</u>	<u>.096</u>	<u>14,542.64</u>	<u>.056</u>
<b>Total Supplies</b>	<b>76,538.25</b>	<b>.896</b>	<b>170,709.76</b>	<b>.659</b>

The following is the maintenance expense during the idle period on account of the strike:

Labor	37,974.64
Supplies	<u>11,516.89</u>
<b>Total</b>	<b>49,491.53</b>

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8. COST OF OPENING, EQUIPPING, DEVELOPING AND OPERATING (CONT'D)

b. Detailed Cost Comparison (Cont'd)

In a comparison of costs, it will be noted that, with but very few exceptions, there has been increases in all items over the year 1951. These increases are all due to the substantial decrease in production and the increase in wages.

There were decreases in cost in the following items, which by their very nature would be less because of the reduced production and the exhaustion of available ore. These are: 4. Development in Ore, 14. Maintenance, Compressors and Power Drills, and 20. Screening - Crushing at Mine.

E. & A. No. CC-505

In January 1952, work was started to develop the 10th Level under E. & A. No. CC-505 with the original estimate indicating a capital outlay of \$236,200.00, but due to a number of plant and equipment changes together with the fact that the reserves to be mined during development were quickly exhausted, this estimate was overexpended.

Until November 1951, when the decision was made to develop the 10th Level, plans had been made to abandon the property early in 1952. As a result of the decision to continue operations, it was necessary to make some improvements in the existing plant and to recondition most of the mining equipment. As the development program progressed during the year, several improvements were made both on surface and underground that will effect a more economical operation in the future. These changes were not included in the original estimate for the development program.

Detailed Statement of Expenditures, E.&A.No.CC-505

<u>Item</u>	<u>Authorized</u>	<u>Expended</u>	<u>Unexpended</u>
General Mine Expense	43,000.00	134,188.97	91,188.97
8th Lev. Eng. House & Rock Drifting	5,250.00	5,914.79	664.79
8th Lev. Trench Development	-	6,700.46	6,700.46
Hoist Foundation & Installation	7,300.00	14,035.91	6,735.91
Sinking Winze	60,000.00	80,981.84	20,981.84
10th Level Drifting	89,750.00	39,848.16	49,901.84
10th Level Pump Valves	-	619.00	619.00
Sump and Pumps	4,000.00	3,697.42	302.58
Surface Water Supply Line	-	1,624.16	1,624.16
8th Level Sump	-	12,453.46	12,453.46
Equipment	26,900.00	15,583.41	11,316.59
Ad Valorem Taxes	-	4,920.00	4,920.00
Warehouse Overhead	-	3,491.71	3,491.71
Additional Wage Adjustment	-	15,794.15	15,794.15
Laboratory Expense	-	1,195.23	1,195.23
Social Security Taxes	-	5,788.07	5,788.07
<b>Total</b>	<b>236,200.00</b>	<b>346,836.74</b>	<b>110,636.74</b>
Charged to Inland Steel Company (Surface Water Supply)			1,206.61
<b>Total</b>	<b>236,200.00</b>	<b>346,836.74</b>	<b>109,430.13</b>

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9. TAXES

The following shows a comparison of the taxes paid in 1952 and 1951 in Ishpeming Township:

	<u>1952</u>		<u>1951</u>		
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>	
<u>Lloyd and Section 6</u>					
SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 6, 47-27, 40 Acres)					
N $\frac{1}{2}$ of SW $\frac{1}{4}$ of Sec. 6, 47-27, 81.67 " )	100,000	2,100.00	100,000	2,030.59	
N $\frac{1}{2}$ of SE $\frac{1}{4}$ of Sec. 6, 47-27, 80 " )					
Personal, Ore in Stk., Supplies & Eq't.	<u>365,000</u>	<u>7,665.00</u>	<u>370,000</u>	<u>7,513.18</u>	
Total by State Tax Commission	465,000	9,765.00	470,000	9,543.77	
Collection Fee		97.65		95.44	
Total	<u>465,000</u>	<u>9,862.65</u>	<u>470,000</u>	<u>9,639.21</u>	
<u>C.-C.I.Co. Misc. Lands</u>					
S $\frac{1}{2}$ of NE $\frac{1}{4}$ of Sec. 6, 47-27, 80 Acres	550	11.54	550	11.16	
SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 6, 47-27, Exc. R/W, 41.08A.	550	11.55	550	11.16	
S $\frac{1}{2}$ of SW $\frac{1}{4}$ of Sec. 6, 47-27, 81.26 Acres	900	18.90	900	18.28	
SW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 6, 47-27	550	11.55	550	11.17	
SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 6, 47-27	600	12.60	600	12.18	
NE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 19, 48-27	<u>135</u>	<u>2.84</u>	-	-	
Total	3,285	68.98	3,150	63.95	
Collection Fee		.69		.64	
Total Lloyd Mine	<u>468,285</u>	<u>9,932.32</u>	<u>473,150</u>	<u>9,703.80</u>	
<u>West Ishpeming</u>					
Lot 4 Block 2	75	1.60	75	1.53	
<u>North Lake Location</u>					
Building on Sec. 6, 47-27	<u>1,000</u>	<u>21.21</u>	<u>10,075</u>	<u>206.63</u>	
Total Ishpeming Township	469,360	9,955.13	483,300	9,911.96	
Rate	2.100		2.03059		
	<u>1952</u>	<u>1951</u>	<u>1950</u>	<u>1949</u>	<u>1948</u>
Taxes per Ton Produced	.117	.037	.034	.031	.117
Taxes per Ton Shipped	.140	.042	.041	.044	.070

10. ACCIDENTS AND PERSONAL INJURY

According to the 1952 Safety Department statistics, the Lloyd Mine was third in position ratings for all of the Company underground mines. This is a great improvement over 1951. There were four compensable accidents in 1952, as compared with eight compensable accidents and one fatality in 1951. The total man-days worked decreased from 44,296 in 1951 to 30,443 in 1952. The man-days lost due to all accidents were 230. The following table shows a comparison of the severity and frequency rates:

<u>Year</u>	<u>Frequency Rate</u>	<u>Severity Rate</u>
1952	41.09	0.945
1951	47.97	18.480

Frequency rate - Number of accidents per 1,000,000 man-hours.  
Severity rate - Number of days lost per 1,000 man-hours.

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10. ACCIDENTS AND PERSONAL INJURY (CONT'D)

The accidents are listed in detail as follows:

Accident No. 913-B, February 5, 1952, Vincenzo Elvetici, Surface Laborer. Hurt back while unloading lagging. Recurrence of an old injury. Low back pain. Strain in lumbar-sacral region. Time lost - 19 days.

Accident No. 914, April 18, 1952, Glen Robar, Company Account Miner. While standing on the pocket platform, a scraper being pulled into the pocket struck one of the platform planks which broke off and struck injured across the legs. Fractured tibia and fibula of left leg. Time lost - 77 days.

Accident No. 915, May 20, 1952, Gerald Revello, Shaft Miner. While guiding clam into bottom of shaft, clam struck injured on toe of right foot. Fracture proximal phalanx of right second toe. Time lost - 46 days.

Accident No. 916, September 15, 1952, Hjalmer Ryttilahti, Company Account Miner. Injured was standing on a shaft timber, assisting a crew in placing the bonnet on the winze cage. While hoisting the bonnet in place the clevis straightened out, permitting the bonnet to fall. Bonnet struck injured across the forehead. Severe laceration of forehead and left temple. Time lost - 9 days.

11. POWER

A fixed minimum charge of \$.041 per kwh is charged for the first 44,928 kwh to provide facilities to meet a maximum demand load at any time. A charge of \$.0096 per kwh is made for any power consumed over the minimum rate. To the above charges, an additional charge is made based on the cost of operating the steam and diesel plants, which is listed as a fuel adjustment.

The following is a comparison of the power cost:

<u>Year</u>	<u>K.W.H.</u>	<u>Cost</u>	<u>Rate</u>
1952	2,193,600	\$39,257.74	.01790
1951	3,519,600	\$57,504.42	.01634

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1. GENERAL:

The production for the year 1952 was 1,015,204 tons and the shipments for the year were 824,351 tons. This production was achieved in spite of an eight week strike during June and July. 1952 was the fifth consecutive year that the mine produced over a million tons. The decrease in production from the previous year was 141,809 tons. This decrease can be attributed to a loss of production caused by the above mentioned strike. The mine operated on a 5-2/3 day per week schedule through May 31st. A schedule of 5-1/2 days per week was in effect between June 1st and September 30th and normal operations were confined to 5-1/3 days per week between October 1st and December 31st.

Mining operations continued on the 3rd, 5th, 6th and 7th Levels. There was a decrease in production on all levels except the 7th Level. A substantial increase in production was made on the 7th Level which is the only level with adequate reserves. Development was continued with all possible speed on this level and production from it should hit its peak during 1953. Production by levels for the year was as follows: 3rd Level - 150,801 tons or approximately 15% of the total for the mine, 5th Level - 99,113 tons or approximately 10% of the total for the mine, 6th Level - 447,591 tons or approximately 44% of the total product and the 7th Level - 307,580 tons or approximately 31% of the total product from the mine.

Experiments were continued with the circular steel supports for the transfer drifts. A few minor changes were made in design and in the installation of these supports, but on the whole, they have proved to be a vast improvement over previous designs.

Shaft sinking was completed to an elevation of -1484 during the year. Skip pit development and the excavation for the trench and pockets on the 8 $\frac{1}{2}$  and 9 $\frac{1}{2}$  Level elevation, together with the initial cut-out at the 8th and 9th Level elevation were nearing completion at the end of the year. The pentice will be removed early in 1953.

There were no major operating delays during the year, with the exception of the strike period from June 2nd to July 28th.

Shipments from pocket and stockpile were started early in April and were continued through the 25th of November.



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2. PRODUCTION:a. Production by Grade and Months:

<u>Grade:</u>	<u>Product</u>	<u>Stockpile Overrun</u>	<u>Total</u>	<u>1951 Total</u>
Mather	<u>706,357</u>	<u>10,119</u>		
Mather Special	<u>298,728</u>	<u>-</u>		
Total	<u>1,005,085</u>	<u>10,119</u>	1,015,204	1,157,013
Rock			112,486	170,467

<u>Months:</u>	<u>Ore</u>	<u>Rock</u>
January	92,874	18,293
February	90,901	22,781
March	100,597	14,553
April	105,714	11,121
May	110,947	8,767
June	2,966	231
July	11,521	1,100
August	86,432	8,877
September	91,341	7,557
October	117,692	7,513
November	103,212	3,454
December	<u>101,007</u>	<u>8,239</u>
Total	<u>1,015,204*</u>	<u>112,486</u>

\* Total includes 10,119 tons, current year stockpile overrun pro-rated monthly.

b. Shipments:

	<u>Pocket</u>	<u>Stockpile</u>	<u>Total</u>	<u>1951 Total</u>	<u>Decrease</u>
Mather	<u>395,065</u>	<u>278,268</u>	<u>673,333</u>		
Mather Special	<u>45,411</u>	<u>105,607</u>	<u>151,018</u>		
Total	<u>440,476</u>	<u>383,875</u>	<u>824,351</u>	1,160,192	335,841

The center and south stockpiles were loaded out by the end of the shipping season. These piles developed an overrun of 10,119 tons. The north pile was not entirely cleaned up this year.

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2. PRODUCTION: (Continued)

c. Ore Statement:

	<u>Mather</u>	<u>Mather Special</u>	<u>Total</u>	<u>1951 Total</u>
On Hand January 1, 1952	121,361	-	121,361	124,540
Output for Year	826,609	178,476	1,005,085	1,140,386
Transfers	120,252	120,252	-	-
Overruns	10,119	-	10,119	16,627
Total	837,837	298,728	1,136,565	1,281,553
Shipments	673,333	151,018	824,351	1,160,192
Balance on Hand	164,504	147,710	312,214	121,361
Decrease in Output			135,301	96,326
Decrease in Ore on Hand				3,179
Increase in Ore on Hand			190,853	

Working Schedule:

- 1952 - 3-8 hr. shifts, 5-2/3 days per week, Jan. 1st to May 31st.  
           3-8 hr. shifts, 5-1/2 days per week, June 1st to Sept. 30th.  
           3-8 hr. shifts, 5-1/3\* days per week, Oct. 1st to Dec. 31st.  
           (Excluding small production crew, Saturday, afternoon shift.)
- 1951 - 3-8 hr. shifts, 6 days per week, Jan. 1st to Mar. 31st.  
           3-8 hr. shifts, 5-2/3 days per week, April 1st to Dec. 31st.
- 1950 - 3-8 hr. shifts, 5 days per week, Jan. 1st to Aug. 20th.  
           3-8 hr. shifts, 6 days per week, Aug. 21st to Dec. 31st.
- 1949 - 3-8 hr. shifts, 6 days per week, Jan. 1st to June 26th.  
           3-8 hr. shifts, 5 days per week, June 27th to Sept. 30th.  
           Idle account of strike, Oct. 1st to Nov. 13th.  
           3-8 hr. shifts, 5 days per week, Nov. 14th to Dec. 31st.
- 1948 - 2-8 hr. shifts,\* 6 days per week, Jan. 1st to Dec. 31st.  
           (Practically a three shift operation by the end of the year.)

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2. PRODUCTION: (Continued)d. Division of Product by Levels and Months:

<u>Months</u>	<u>Third</u> <u>(1750')</u> <u>Level</u>	<u>Fifth</u> <u>(2050')</u> <u>Level</u>	<u>Sixth</u> <u>(2200')</u> <u>Level</u>	<u>Seventh</u> <u>(2400')</u> <u>Level</u>	<u>Total</u>	<u>Rock</u>
January	14,712	11,953	59,766	5,517	91,948	18,293
February	11,699	11,699	59,397	7,200	89,995	22,781
March	15,935	15,935	40,834	26,890	99,594	14,553
April	16,746	17,792	35,585	34,538	104,661	11,121
May	13,181	14,280	51,625	30,755	109,841	8,767
June	294	411	1,497	734	2,936	231
July	1,483	1,141	5,702	3,080	11,406	1,100
August	14,547	6,846	38,507	25,671	85,571	8,877
September	16,278	9,043	32,284	32,826	90,431	7,557
October	18,643	6,991	46,608	44,277	116,519	7,513
November	13,283	1,022	36,786	51,092	102,183	3,454
December	14,000	2,000	39,000	45,000	100,000	8,239
	150,801	99,113	447,591	307,580	1,005,085	112,486

Current Year Stockpile Overrun

10,119  
1,015,204

e. Production Delays:

The steel strike, which began June 2 and continued until the men returned to work on July 28, caused a delay of 43-1/3 days. This resulted in a loss in production of approximately 200,000 tons. Another month of operation was needed before production came back to normal, resulting in a loss of approximately 15,000 tons. There were two mechanical delays of 8 hours each. These delays occurred when it became necessary to shorten the skip ropes due to an excessive number of broken wires.

3. ANALYSIS:a. Average Mine Analysis on Output:

<u>Grade</u>	<u>Iron</u>	<u>IR. NATL.</u>	<u>Phos.</u>	<u>Silica</u>	<u>Sulphur</u>	<u>TONS</u>
Mather	57.38	50.787	.104	10.30	.130	716,476
Mather Special	57.18	50.627	.105	9.65	.210	298,728
		50.740				1,015,204

The average iron analysis was below that of the previous year, while the silica and sulphur analysis was higher than the previous year. This lowering of the iron content and the increase in the silica content is attributable to extensive mining in areas where reserves are nearly depleted, thus dilution from old caving areas results.

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3. ANALYSIS:  
(Continued)

b. Average Analysis of Shipments:

<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Sulphur</u>	<u>Lime</u>	<u>Mag.</u>	<u>Loss</u>	<u>Moist.</u>
Mather	57.20	.106	10.50	.31	3.21	.120	.66	.73	2.28	11.49
Mather Special	57.00	.104	10.24	.30	3.15	.300	.87	.63	2.49	11.46

c. Average Analysis of Ore in Stock: (Natural)

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Mang.</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Mather	164,504	50.88	.084	9.24	.27	2.84	.67	.65	.127	1.72	11.49
Mather Special	147,710	50.58	.094	8.80	.27	2.79	.77	.56	.211	2.20	11.46

4. ESTIMATE AND  
ANALYSIS OF  
ORE RESERVES:

Ore reserves for all areas of the mine in Section 2, 47-27 above the 7th Level elevation total roughly 2,467,000 tons. In addition, approximately 364,000 tons in Section 1, 47-27 are included in the Mather Mine "A" Shaft estimate as turned in to the Michigan State Tax Commission as of December 31, 1952. Ore reserves below the 7th Level total roughly 1,694,452 tons as shown by Diamond Drilling and 326,000 tons by Underground Development.

This estimate indicates a gross loss of 226,081 tons as compared with a gross loss of 2,880,895 tons in 1951.

Net Total December 31, 1951	5,728,378
Net Total December 31, 1952	<u>4,487,093</u>
Net Loss in Reserves	<b>1,241,285</b>
1952 Production	<u>1,015,204</u>
Gross Loss in Reserves	<b>226,081</b>

Expected Average Natural Analysis of Ore Reserves

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Mather - Surface Diamond Drilling...	1,694,452	53.15	.122	5.08	0.25	2.62	0.58	0.60	.014	1.97	12.50
Mather - Underground Development.....	<u>2,792,641</u>	51.50	.100	8.15	0.20	2.45	1.00	0.50	.110	2.25	11.85
	4,487,093										

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4. ESTIMATE AND  
ANALYSIS OF  
ORE RESERVES:  
(Continued)

A new ore reserve is indicated above the #7 Cross-cut on the 5th Level, extending from the -340' elevation upward to approximately the 2nd Level elevation. An accurate estimate of tonnage in this area is impossible at this time, but preliminary exploration indicates approximately 400,000 tons.

The gross loss in reserves of 226,081 tons is accounted for mainly by two factors. First, the decrease in the surface drill hole estimate of 567,631 tons by inclusion of all reserves above the 7th Level in the estimate by underground development could not be off-set by a comparable increase in the underground development estimate. In fact, this estimate fell short by roughly 200,000 tons. Second, some small ore pillars were deleted from the estimate because they were inaccessible for mining.

The tonnage and analysis figures shown in the preceding table are the same as the figures that are turned in to the Michigan State Tax Commission.

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5. LABOR AND WAGES:a. Employment:

There was a net gain of 24 men for the year with 172 additions and 148 separations. Of the additions, 158 were new men and 14 were transfers from other mines. Of the separations, 103 quit, 5 retired, 22 joined the Armed Forces, 4 were discharged, 10 were transferred to other mines, 2 were fatal accidents and 2 died.

Number of Men 1/1/52.....	724
Added to Roll During the Year.....	<u>172</u>
Total.....	896
Separations.....	<u>148</u>
Total on Payroll 12/31/52.....	748
Average Number of Men as per December Labor Statement.....	609

b. Statement of Wages:

<u>Average Wages Per Day:</u>	<u>1952</u>	<u>1951</u>
Surface	\$16.13	\$13.86
Underground	<u>17.97</u>	<u>15.65</u>
Total	\$17.58	\$15.29
 <u>Average Wages Per Month (20<math>\frac{1}{2}</math> Days*):</u>		<u>(23 Days)</u>
Surface	\$326.63	\$318.78
Underground	<u>363.89</u>	<u>359.95</u>
Total	\$356.00	\$351.67
 <u>Tons Per Man Per Day:</u>		
Surface	31.93	31.86
Underground	<u>8.53</u>	<u>7.96</u>
Total	6.73	6.37
 <u>Labor Cost Per Ton:</u>		
Surface	\$ .505	\$ .435
Underground	<u>2.107</u>	<u>1.965</u>
Total	\$2.612	\$2.400

c. Labor Relations:

Labor relations were satisfactory during the year. There were no formal grievances presented by the union and all incidents or misunderstandings were disposed of at informal discussion sessions with the local grievance committee. The strike, which began on June 2nd and lasted until July 28th, was in conjunction with the general strike throughout the steel industry. This work stoppage was unpopular with a large number of the employees who did not hesitate to express their feelings about it upon their return to work. The union was in complete control of the men throughout the strike, however, and, although there were rumors of back to work movements, none developed during the course of the strike. Due to the feeling of insecurity during the impending steel strike, production fell off and the accident rate increased.

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\* The decrease in the average number of days worked per month is due to the number of working days lost during the strike.

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5. LABOR AND WAGES:  
(Continued)

c. Labor Relations:  
(Continued)

The man power situation was less favorable than in previous years. There was a general shortage of men and this was especially so in the skilled miner class. Some workers were attracted to the area with the easing of the housing situation due to the advent of the Cliffs 8th Addition. The demand for labor, however, continued to climb, due to the increased labor force necessary at the Mather Mine "B" Shaft together with the opening of the Jones & Laughlin Iron Company's Tracy Mine and the pit operations on the west end of the range.

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6. SURFACE:

Buildings:

Building maintenance was of a routine nature during the year and consisted mainly of painting the warehouse, first aid room and captain's dry.

Several new structures were erected during the year the largest of which was a 24' x 100' steel storage building located in the east timber yard. An 18' x 56' rope and cable storage building, located north of the shaft, was completed, crane rails and supporting steel structure leading from the shaft were extended to connect with those in the building to facilitate the handling of rope and cable reels. A 24' x 50' addition was made to the larry car barn to provide more space for the repair of cars.

Headframe and Trestles:

The equipment in the headframe operated throughout the year without any serious delays. Portions of the north, south and center trestle were painted, as was the interior of the headframe, from the sheave deck to the crusher deck elevation.

Stocking:

Stocking with old and new style larry cars continued with very few delays. Several changes had to be made on the new style cars before satisfactory performance was obtained. The major changes on the cars were: (1) addition of hydraulic cylinders to the car doors; (Before installing these cylinders, the last chunks in the car would wedge between the door and car body, preventing the door locking catches to close. With the cylinders in place, the door is held open until all material is discharged from the car.) (2) constructing the inside ends of the car vertical instead of sloping, to prevent the build-up of ore at these points and extending the height of the car to compensate for the volume lost at the ends of the car; (3) door catches were altered and adjusted so the catch held more securely. One car has been altered and has been operating successfully throughout the winter. The second new style car is nearly complete and the third car is unchanged. All three old style cars are in fair operating condition.

Roads:

A road connecting the Mather A and B Shafts was planned and surveyed and a portion of the road was completed. The purpose of this road is to provide a route for transferring equipment and materials between the two shafts without utilizing public roads.

Hoisting Ropes:

Six-hundred feet of rope were removed on July 28, 1952 from the south skip because of several broken wires in one strand and also because of considerable loss in diameter. Samples of this section were then sent to the Bethlehem rope division for testing. The rope report indicated considerable loss of strength and lubrication in this section and as a consequence, the remaining 3,300' of rope was removed from service on November 2, 1952 after hoisting 1,168,983 tons of ore and rock.



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6. SURFACE: (Continued)

Hoisting Ropes: (Continued)

Five-hundred feet of rope were cut from the north skip rope on September 3, 1952 due to a damaged section approximately 400' from the skip. The remainder of this rope was removed on December 14, 1952 because of insufficient length to reach the bottom of the extended shaft, after hoisting 939,539 tons of ore and rock and operating for one year and two months on the cage.

Batching Plant:

All footings and concrete work for a 120 yd. capacity transit-mix type cement batching plant were completed during 1952. This unit was delivered to the property and will be erected over the upper timber tunnel approximately 40' from the shaft. Concrete from this plant will be blown through a 6" pipe down the shaft by means of a pneumatic placer located in the upper tunnel.

Underground Lamps:

Six-hundred and fifty new Edison model R-4 electric cap lamps were purchased and will be placed in service soon after the first of the year.

Surface Drainage and Subsidence:

At Subsidence Hole #65, microseismic studies have been continued with a geophone. During the year, some experimentation was carried on with several types of geophones in an effort to obtain better results. Improvements on the equipment have resulted in more satisfactory performance. Readings on the tape recorder indicate that some rock noise is present, thus indicating some movement. The rate of caving has not been determined and it is unlikely that caving has, as yet, reached the bottom of D.D.H. #65.

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7. UNDERGROUND:

Shaft Sinking:

Shaft sinking was completed to an elevation of -1484 during the year. This elevation is 539' below the 7th Level elevation of -945 and is 444' below the first bearer set beneath the pentice. Bad ground conditions hampered the sinking project throughout the entire operation. A more or less vertical shear plane, striking roughly east and west, caused either the north or south wall of the shaft to have a tendency to peel throughout the entire excavation. Shaft steel was kept as close as was practical behind the actual sinking and almost every set had to be concreted.

The initial opening for the 8th Level was cut at an elevation of -1127 and the initial opening for the 9th Level was cut at an elevation of -1350. As plans call for hoisting from intermediate levels below the main level, the 8½ Level was cut at an elevation of -1197 and the 9½ Level was cut at an elevation of -1407. Pockets and storage trenches will be located on the intermediate levels.

Preparations for the removal of the pentice will be completed shortly after the first of the year and shaft work will be completed early in 1953.

General:

Block caving and sub-level radial stoping were the mining methods used. A new method of under-cutting was developed for the block caving areas. This under-cutting is done from inside the circular steel sets in the transfer drifts. Under-cutting is started from the main dirt raise, retreating toward the center or end of the transfer drift, thus making it possible to continue the under-cut without delay while scraping is going on. Long hole drilling in a radial pattern, vertically above the transfer drift, eliminates the development of an under-cut drift above the transfer elevation. The development of mill raises is much easier under this new system, as they have to go only from 12 to 15 feet to reach the broken ground above the transfer. The miners are able to work under cover at all times and are not exposed to unsupported ground. This method has proven faster than the old method.

Experiments with new rotary drills, using sectional auger steel and various types of bits were continued in cooperation with the Gardner-Denver Company and the Chicago Pneumatic Tool Company. Drilling speeds and ease of operation were much improved during these experiments. Rotary drilling, used in conjunction with the under-cut method discussed above, has proved very satisfactory and is a fast and economical method where ground conditions will permit the use of auger drills.

3rd Level:

Production from the 3rd Level totaled 150,801 tons. This tonnage came from the areas above the #1 and #4 Cross-cuts. The #1 Cross-cut produced approximately 60,000 tons and the #4 Cross-cut produced approximately 91,000 tons.

Reserves above the #1 Cross-cut were substantially depleted during the year and mining operations in this area will be completed early in 1953.

Reserves above the #4 Cross-cut were supplemented by approximately 75,000 tons discovered by an exploration campaign consisting of Underground Diamond Drill Holes #93, #94, #96, #98, #101 and #133. Mining operations will continue in this area during most of 1953.

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7. UNDERGROUND: (Continued)

3rd Level: (Continued)

During the latter part of the year, work was started on extending the 3rd Level main drift from a point east of the #5 Cross-cut, approximately 1,400' to the southeast. This drift will bring the 3rd Level to the vicinity of the ore body that was explored from the -340' elevation above the #7 Cross-cut on the 5th Level. Exploration for ore reserves above the #7 Cross-cut above the 5th Level was conducted by raising and drifting to the -340' elevation. Underground Diamond Drill Holes #111, #118, #125, #128 and #141 continued the exploration above the -340' elevation. This drilling proved a substantial ore reserve above the 3rd Level elevation. The problems of ventilation and supply to this height above the 5th Level thus dictated the decision to extend the 3rd Level.

5th Level:

Production on this level totaled 99,113 tons and came from the interbedded ore body above the #1 Cross-cut and from the main ore body above the #7 Cross-cut. The interbedded ore body produced approximately 40,000 tons and the main ore body produced approximately 60,000 tons. Developed reserves in the interbedded ore area above the 5th Level were depleted during the year. Due to the high cost of mining in the interbedded ore, no further development is anticipated for this area in the immediate future.

Reserves in the old stoping area above the #7 Cross-cut were nearing exhaustion at the end of the year. Mining in this area will be completed early in 1953.

6th Level:

The 6th Level continued as the largest producer, but suffered a substantial decrease over the previous year due to inadequate reserves. Production on this level totaled 447,591 tons, coming from six areas. The area above the #2 Cross-cut produced approximately 30,500 tons. The area above the #3 Cross-cut produced approximately 70,000 tons. Ore reserves in these two areas were entirely depleted during the year. The area above the #4 Cross-cut produced approximately 87,000 tons, the area above the #7 Cross-cut produced approximately 160,000 tons and the area over the #9 Cross-cut produced approximately 46,000 tons. Mining in the interbedded ore area above the 6th Level produced approximately 54,000 tons. Developed reserves in the interbedded ore area above the 6th Level were nearing depletion at the end of the year. The high cost of production here, as in the interbedded ore area above the 5th Level, is the reason why no further development is planned for this area in the immediate future. Production on the 6th Level will suffer a further decrease in the coming year.

7th Level:

The 7th Level conveyor belt went into operation early in 1952 and nearly all of the production from this level during the year was conveyed to the shaft over the belt.

Production on the 7th Level totaled 307,580 tons. This production came from caving areas above the #2, #4 and #5 Cross-cuts in addition to a large block cave north of the footwall drift.

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7. UNDERGROUND: (Continued)

7th Level: (Continued)

The area over the #2 Cross-cut produced approximately 101,000 tons, the area above the #4 Cross-cut produced approximately 25,000 tons, the area above the #5 Cross-cut produced approximately 45,000 tons and the north block produced approximately 136,000 tons.

Operations on the 7th Level were greatly expanded during the year. The foot-wall drift was extended approximately 650' east of the crusher installation. The #4 and #5 Cross-cuts were developed and work on the #1 Cross-cut was well along at the end of the year.

Exploration was continued on the 7th Level with eighteen diamond drill holes completed during the year. A drilling campaign, west of the #2 Cross-cut, consisted of Underground Holes #92, #100, #107 and #119. This drilling disclosed a complex structure and sufficient ore concentration to warrant the development of the #1 Cross-cut. Exploration in this area was continuing at the end of the year with indications that the ore concentration would continue west of the #1 Cross-cut.

Exploration east of the Mather Fault indicates a substantial amount of ore concentration in the structure between the fault and the footwall. Exploration was being continued to the east at the end of the year.

Main Level Development:

The following table of main level development includes drifting on the 3rd and 7th Levels:

	<u>Timbered Ore Drift</u>	<u>Timbered Rock Drift</u>	<u>Naked Rock Drift</u>	<u>Total</u>
NM-81 7th Level	496'	1,654'*	290'	2,440'
NM-81 3rd Level	-	73'	163'	236'
NM-60 7th Level	86'	110'	-	196'
	<u>582'</u>	<u>1,837'</u>	<u>453'</u>	<u>2,872'</u>

\* 120' stripping

Track Cleaner:

Operation of a track cleaner, manufactured by the American Mine Door Company, has proved successful in the removal of mud from underground haulage-ways. This machine is equipped with an adjustable digging plate that loosens material from between the rails down to tie elevation and is also equipped with wing plows and plow extensions that push the material to be cleaned from the outside of the rails to the center of the track and into the path of a feeder conveyor. The full width of the drift can be cleaned to tie elevation, as the plows are independently adjustable both laterally and vertically. The feeder conveyor, located over and in advance of the digger plate, moves the material from between the tracks over the digger plate and to a boom conveyor, which carries the material upward and backward to where it drops into a 100 cu. ft. Lohed car. An operating crew of 3 men on the track cleaner, cleans an average of 300' of drift and removes approximately 8 cars of material in an 8-hour shift, whereas, 8 to 10 men would be required to hand muck a similar portion of track.

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7. UNDERGROUND: (Continued)

Eimco Conveyor Units:

One of two Eimco auxiliary conveyors was placed in operation during the year for a drifting operation on the 3rd Level. This unit mounts on a modified steel timber truck and is loaded by a Model 21 Eimco Rockershovel.

Conway Loader:

The conveyor section on a Model 125 Conway loader was removed and completely rebuilt in Mather "A"'s shops. Several changes and improvements were made to decrease breakdowns and to improve conveyor belt life. Most important of the changes were: (1) removal of steel rub strips used to support the belt and installing flat belt idlers, (2) eliminating clip fastened herring bone belt with a thinner (3/4") vulcanized belt, (3) placing impact idlers at the loading point to reduce cutting of the belt, (4) adding skirt boarding and an efficient scraper to clean the belt, thus, eliminating the chance for dirt to accumulate and damage the driving equipment. Operation of this loader has been very good since these changes were made and it is planned to alter two remaining Conway loaders at the first convenience.

Radio Communication:

Radio equipment manufactured by the Mine Safety Appliance Company was installed for communication between the enginehouse and the man cage. In addition, radios were installed at each end of the conveyor belt system on the 7th Level and at the skip tenders station on the 7th Level. Four of the haulage locomotives were equipped with radios, set on the same frequency as that used between the two ends of the conveyor belt, thus a dispatcher, located at the loading end of the belt, had complete control of the tramping operation on the 7th Level. The equipment is composed of a microphone, a loud speaker and a transmitter-receiver located at each station. The radios are powered by 115 volts AC for the fixed installations and 144 volts DC for operation from haulage locomotives. In normal operations, the rapid communication through the dispatcher to the locomotive mounted units, assists in efficient organization for tramping ore and in handling supplies. This rapid communication will also be of tremendous value in emergency cases. Additional benefits will undoubtedly become apparent as the use of radio communication throughout the mine becomes more complete.

Statement of Timber Used:

The use of circular and arch steel sets for support in transfer and undercutting drifts has completely replaced wood sets at the Mather Mine "A" Shaft. The reasons why steel is preferred to wood timber sets are the greater speed and ease of installation of steel as compared with wood, together with the greater strength attained from steel. Maintenance in the block caving areas has been reduced considerably from that necessary when these areas were supported by wood timber.

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7. UNDERGROUND: (Continued)Statement of Timber Used - All Operations

	<u>AVE. PRICE</u> <u>PER FOOT</u>	<u>AMOUNT</u> <u>1952</u>	<u>AMOUNT</u> <u>1951</u>
Cribbing	.10185	\$ 12,815.24	\$ 13,494.58
Stulls	.30151	4,110.84	35,171.72
Total	<u>.12137</u>	<u>\$ 16,926.08</u>	
Total 1951	.17399		\$ 48,666.30
	<u>Per 100'</u>		
Lagging	2.1121	\$ 27,793.29	\$ 31,215.02
Poles	4.2307	31,839.46	24,559.00
Slabs	1.5000	716.10	1,132.50
Total	<u>2.9109</u>	<u>\$ 60,348.85</u>	
Total 1951	2.1409		\$ 56,906.52
	<u>Per Foot</u>		
"H" Beams	.78487	\$ 45,676.66	\$ 56,253.27
"I" Beams	1.19754	5,267.99	3,138.99
Angle Iron	.05121	6,186.86	7,465.27
Misc. (Bolts, Plates, etc.)	-	5,620.46	8,671.58
Total		<u>\$ 62,751.97</u>	
Total 1951			\$ 75,529.11
Arched "H" Beams	1.9112	\$ 27,267.12	\$ 57,066.73
Circular "H" Beams	1.7723	106,140.15	32,016.95
"H" Beams	.9393	54,921.40	45,687.96
Misc. (Bolts, etc.)	-	4,725.40	4,733.87
Total		<u>\$193,054.07</u>	
Total 1951			\$139,505.51
Steel Hat Sections	.42024	\$ 11,568.57	\$ 13,135.52
Total	<u>.42024</u>	<u>\$ 11,568.57</u>	
Total 1951	.37892		\$ 13,135.52
Minecrete Poles	.24563	\$ 280.02	\$ 1,317.70
Minecrete Blocks	-	106.78	266.10
Total		<u>\$ 386.80</u>	
Total 1951			\$ 1,583.80
"H" Beams	.77018	\$ 367.38	-
Angle Iron	.55292	330.76	-
Flat Mild Steel	.49963	3,422.43	-
Misc. (Bolts, etc.)	-	54.40	-
Total		<u>\$ 4,174.97</u>	
Total 1951			-
GRAND TOTAL INCLUDING STEEL & CONCRETE		\$349,211.31	\$335,326.76

Mather "A" 1952

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7. UNDERGROUND: (Continued)

Explosives:

The average price paid for explosives during the year increased 2½% from \$16.67 to \$17.10 per hundredweight. The use of Hercomite #2x, 1¼" x 8" for developing operations and Hercomite #2 - 2" x 24" for block cave under-cutting and stoping was continued. The use of 1¾" x 16" Gelamite - 2 was introduced for block cave under-cutting where broken ground above the transfers made charging with 2" powder difficult. The high pressure 60% Gelatin 5" x 5" cartridge was used exclusively for mill raise blasting in the caving and stoping operations.

The following table is a record of all explosives and supplies used on all operations during the year:

Record of Explosives - All Operations

	<u>AVERAGE PRICE</u>	<u>AMOUNT 1952</u>	<u>AMOUNT 1951</u>
Hercomite	16.319 cwt	\$ 87,337.69	\$102,119.04
60% HP Gelatin	22.424 cwt	15,215.02	15,961.00
60% Gelatin Extra	18.867 cwt	7,364.99	3,712.54
Gelamite	16.995 cwt	16,787.60	14,924.33
Total	17.102 cwt	\$126,705.30	
Total 1951	16.679 cwt		\$136,716.91
Misc. Blasting Supplies (Fuse, Caps, Bags, etc.)	-	\$ 55,701.72	\$ 49,884.30
Total		\$55,701.72	
Total 1951			\$ 49,884.30
GRAND TOTAL		\$182,407.02	\$186,601.21

Pumping:

Pumping of underground water was continued on the 960' Level, 3rd Level and 6th Level throughout the year. Water pumped on the 960' Level decreased from an average of 24 gpm in 1951 to 10 gpm in 1952. Pumping increased on the 3rd Level from an average of 52 gpm in 1951 to 80 gpm in 1952 as a result of pumping a quantity of the Cambria-Jackson water from their 8th Level. The volume of water pumped by the 6th Level pumps decreased from an average of 430 gpm for 1951 to 383 gpm in 1952. All Mather Mine "B" Shafts water is transferred by the 6th Level ditch to Mather "A"'s pumphouse and is then pumped to the surface.

Mine discharge water is carried through a 16" pipe line and then by ditch to the Carp River, approximately two miles towards the west.

8. COST OF OPENING, EQUIPPING AND DEVELOPING:

TOTAL EXPENDITURES TO DECEMBER 31, 1952

	E&A REFERENCE	TOTAL AUTHORIZED	GROSS EXPENDITURES	CREDITS A/C ORE MINED IN DEVELOPMENT	NET EXPENDITURES	UNEXPENDED BALANCE	1952 EXPENDITURES
<b>1. BUILDINGS AND EQUIPMENT:</b>							
a. Main buildings.....	(10-10&19) (10-10&19A)	280,000.00	279,990.27	-	279,990.27	9.73	-
b. Change house & Shop equip.....	10-26	60,000.00	60,000.00	-	60,000.00	-	-
c. Initial shop equipment.....	(10-4/10-4A)	5,732.73	5,732.73	-	5,732.73	-	-
d. One 35 ton overhead crane.....	(10-9/10-9A)	8,894.94	8,894.94	-	8,894.94	-	-
e. Temporary equipment.....	10-18	15,000.00	14,079.62	-	14,079.62	920.38	-
f. Erecting & equipping storage building.....	31	20,900.00	20,900.00	-	20,900.00	-	-
g. Compressor plant.....	10-23/47	137,203.07	137,203.07	-	137,203.07	-	-
h. Hot milling equipment.....	43	2,871.20	2,871.20	-	2,871.20	-	-
i. Steam boiler & heating equip...	52	58,958.60	58,958.60	-	58,958.60	-	-
j. Concrete plant.....	83	20,000.00	15,740.23	-	15,740.23	4,259.77	15,740.23
<b>TOTAL BUILDING AND EQUIPMENT.....</b>		<b>609,560.54</b>	<b>604,370.66</b>	<b>-</b>	<b>604,370.66</b>	<b>5,189.88</b>	<b>15,740.23</b>
<b>2. SURFACE:</b>							
<b>a. Equipment:</b>							
1. Temporary surface plant....	10-3	31,130.00	26,506.28	-	26,506.28	4,623.72	-
2. Truck and tractor.....	10-1	18,575.00	18,289.42	-	18,289.42	285.58	-
3. Electric shovel.....	18	85,000.00	85,000.00	-	85,000.00	-	-
4. Top tram equipment.....	(10-24/10-24A/70)	171,000.00	167,636.22	-	167,636.22	3,363.78	-
5. Timber tunnel, tracks, pumphouse & sump.....	(10-20/10-20A)	58,000.00	57,867.78	-	57,867.78	132.22	-
6. Timber tunnel & Yards.....	29/29-1	124,800.00	122,522.95	-	122,522.95	2,277.05	-
7. Mechanical additions - headframe.....	32	27,500.00	27,500.00	-	27,500.00	-	-
8. Crawler crane.....	51	12,000.00	12,000.00	-	12,000.00	-	-
9. F. W. D. truck.....	53	7,500.00	7,497.72	-	7,497.72	2.28	-
10. Spare armature for hoist motors and generator.....	49	14,747.00	14,747.00	-	14,747.00	-	-
11. Crawler mounted crane.....	58	12,500.00	12,524.01	-	12,524.01	24.01	-
12. International 4-ton truck..	64	6,000.00	6,381.41	-	6,381.41	381.41	-
13. Willys 3/4-ton truck.....	67	2,100.00	2,114.84	-	2,114.84	14.84	-
14. Euclid 20-ton truck-used...	68	6,342.08	6,342.08	-	6,342.08	-	-
15. Caterpillar Model D8 tractor	78	17,804.66	17,841.26	-	17,841.26	36.60	-
16. F. W. D. truck.....	80	7,665.96	9,665.96	-	9,665.96	2,000.00	-
<b>Total.....</b>		<b>602,664.70</b>	<b>594,436.93</b>	<b>-</b>	<b>594,436.93</b>	<b>8,227.77</b>	<b>-</b>
<b>b. General:</b>							
1. Diamond drilling.....	9	81,000.00	80,965.78	-	80,965.78	34.22	-
2. Moving two houses.....	10-2	3,458.00	3,458.00	-	3,458.00	-	-
3. Drainage well.....	10-11/56	36,896.00	28,852.93	-	28,852.93	8,043.07	-
4. Road bldg., paving parking lot, etc.....	25	23,760.00	23,736.73	-	23,736.73	23.27	-
5. Surface test hole.....	61	80,000.00	75,643.53	-	75,643.53	4,356.47	1,909.66
6. Mine payroll machine.....	75	5,024.40	5,166.60	-	5,166.60	142.20	-
7. Diamond drilling.....	77	50,000.00	13,279.51	-	13,279.51	36,720.49	12,985.41
8. Diamond drill equipment....	84	20,000.00	15,265.45	-	15,265.45	4,734.55	15,265.45
9. 1/2 cost of road between Mather A & B Shafts.....	85	10,000.00	2,891.13	-	2,891.13	7,108.87	2,891.13
10. 4 dwellings-Cliffs Realty..	86	54,750.00	54,750.00	-	54,750.00	-	54,750.00
<b>Total.....</b>		<b>364,888.40</b>	<b>304,009.66</b>	<b>-</b>	<b>304,009.66</b>	<b>60,878.74</b>	<b>87,801.65</b>
<b>TOTAL SURFACE.....</b>		<b>967,553.10</b>	<b>898,446.59</b>	<b>-</b>	<b>898,446.59</b>	<b>69,106.51</b>	<b>103,541.88</b>
<b>3. SHAFT, HEADFRAME AND TRESTLE:</b>							
a. Sinking in sand.....	10-15/10-15A	16,302.44	16,302.44	-	16,302.44	-	-
b. Sinking in rock (2,870').....	10-16/10-16A	440,000.00	435,677.44	2,559.15	433,118.29	6,881.71	-



## 8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Continued)

TOTAL EXPENDITURES TO DECEMBER 31, 1952

	F&A REFERENCE	TOTAL AUTHORIZED	GROSS EXPENDITURES	CREDITS A/C ORE MINED IN DEVELOPMENT	NET EXPENDITURES	UNEXPENDED BALANCE	1952 EXPENDITURES
<b>3. SHAFT, HEADFRAME AND TRESTLE: (Continued)</b>							
c. Shaft sets (2,870').....	10-5/10-5A	160,975.45	159,754.21	-	159,754.21	1,221.24	-
d. Headframe foundation & ore trestle.....	10-21/10-21A	78,000.00	77,417.73	-	77,417.73	582.27	-
e. Headframe & trestle.....	10-7/10-7A	186,028.83	186,028.83	-	186,028.83	-	-
f. Extensions to permanent stockpile trestles.....	36/42/42-1/66	370,152.48	335,010.90	-	335,010.90	35,141.58	4,532.72
g. Headframe & powerhouse equip..	10-22/10-22A	225,000.00	224,451.51	-	224,451.51	548.49	-
h. Electric equipment for cage & skip hoists.....	10-8	221,783.00	221,783.00	-	221,783.00	-	-
i. 1 cage hoist, 1 skip hoist....	10-6	143,000.00	143,000.00	-	143,000.00	-	-
j. Elevator for headframe.....	10-12/10-12A	4,853.00	4,853.00	-	4,853.00	-	-
k. Spare double deck cage.....	37	7,000.00	3,134.75	-	3,134.75	3,865.25	-
l. Pinion brake for cage hoists..	45	4,000.00	4,000.00	-	4,000.00	-	-
m. Crushing & screening plant in headframe.....	72	75,000.00	76,219.00	-	76,219.00	1,219.00	-
o. Bottom dump skips.....	76	40,000.00	40,000.00	-	40,000.00	-	-
<b>TOTAL SHAFT, HEADFRAME AND TRESTLE</b>		<b>1,972,095.20</b>	<b>1,927,632.81</b>	<b>2,559.15</b>	<b>1,925,073.66</b>	<b>47,021.54</b>	<b>4,532.72</b>
<b>4. UNDERGROUND:</b>							
<b>a. Plant:</b>							
1. Pumping-3rd Level.....	10-25/10-25A	55,000.00	53,738.88	-	53,738.88	1,261.12	-
2. Pumping plant-6th Level.....	39	227,823.06	227,823.06	-	227,823.06	-	-
<b>Total.....</b>		<b>282,823.06</b>	<b>281,561.94</b>	<b>-</b>	<b>281,561.94</b>	<b>1,261.12</b>	<b>-</b>
<b>b. Equipment:</b>							
1. Mining equipment.....	19	44,550.00	44,550.00	-	44,550.00	-	-
2. Mining equipment.....	28	51,700.00	51,700.00	-	51,700.00	-	-
3. Mining equipment.....	40	61,710.00	61,710.00	-	61,710.00	-	-
4. Mining equipment.....	41	28,050.00	28,050.00	-	28,050.00	-	-
5. Mining equipment.....	55	23,870.00	23,870.00	-	23,870.00	-	-
6. Mining equipment.....	62	30,000.00	29,596.10	-	29,596.10	403.90	-
7. Mining equipment.....	65	60,000.00	60,000.00	-	60,000.00	-	-
8. Haulage equipment.....	10-29/10-29A	110,000.00	110,000.00	-	110,000.00	-	-
9. Haulage equipment.....	23	90,420.00	89,732.02	-	89,732.02	687.98	-
10. Haulage equipment.....	46	84,755.00	84,755.00	-	84,755.00	-	-
11. Haulage equipment.....	59	46,000.00	45,616.42	-	45,616.42	383.58	1,243.54
12. Haulage equipment.....	82	24,480.00	23,522.39	-	23,522.39	957.61	23,522.39
13. Underground sub-stations....	38	14,300.00	14,300.00	-	14,300.00	-	-
14. Main ventilating fan.....	48	24,200.00	17,536.23	-	17,536.23	6,663.77	-
15. Twelve scraper hoists.....	50	33,000.00	32,980.80	-	32,980.80	19.20	-
16. Scraper hoist.....	54	49,500.00	49,500.00	-	49,500.00	-	-
17. Mining equipment.....	78	40,000.00	38,682.45	-	38,682.45	1,317.55	24,285.63
18. Electric cap lamps.....	88	22,000.00	23,642.42	-	23,642.42	1,642.42	23,642.42
<b>Total.....</b>		<b>838,535.00</b>	<b>829,743.83</b>	<b>-</b>	<b>829,743.83</b>	<b>8,791.17</b>	<b>72,693.98</b>
<b>c. Development:</b>							
1. Main level development.....	10-28/10-28A/26 26A/27-27A/57/63	704,460.00	483,859.69	-	483,859.69	220,600.31	118,083.73
Drifting.....	10-27/24/26-26A 27B-27-27A/33/60 71/74/27C	2,000,911.20	1,962,079.07	80,404.67	1,881,674.40	119,236.80	150,618.82
Ventilation & 2nd outlet.....	26-26A/27-27A	53,900.00	40,955.57	-	40,955.57	12,944.43	-
Excavation & hoist installation.....	57/63/74	54,300.00	8,566.73	-	8,566.73	45,733.27	1,815.71

8. COST OF OPENING, EQUIPPING AND DEVELOPING: (Continued)

		TOTAL EXPENDITURES TO DECEMBER 31, 1952						
		TOTAL AUTHORIZED	GROSS EXPENDITURES	CREDITS A/C		NET EXPENDITURES	UNEXPENDED BALANCE	1952 EXPENDITURES
				ORE MINED IN DEVELOPMENT				
4.	E&A REFERENCE							
c. <u>DEVELOPMENT:</u> (Continued)								
	Preparation of skip pit.....	57/63/74	56,400.00	42,671.92	-	42,671.92	13,728.08	26,629.48
	290 winze.....	57/63/74	30,085.00	39,565.14	-	39,565.14	9,480.14	777.13
	Shaft sinking.....	57/63/74	479,525.00	498,833.60	-	498,833.60	19,308.60	119,212.89
	Loading & discharge ends.....	71	100,000.00	76,318.43	-	76,318.43	23,681.57	13,171.10
	2500' conveyor system.....	71	200,000.00	156,471.81	-	156,471.81	43,528.19	9,823.77
	Pan, screen, crusher.....	71	50,000.00	49,131.81	-	49,131.81	868.19	6,197.90
	Ventilation connection - 1,000' @ \$25.00.....	71	25,000.00	19,249.32	-	19,249.32	5,750.68	59.00
	2. Development & mining above levels.....	24/26-26A/27C-27A 34)	203,728.80	194,487.12	49,921.83	144,565.29	59,163.51	-
	3. Underground exploration.....	21/87	245,000.00	78,504.61	-	78,504.61	166,495.39	43,665.99
	Total.....		4,203,310.00	3,650,694.82	130,326.50	3,520,368.32	682,941.68	490,055.52
	d. Dewatering hematite workings..	30	66,000.00	64,232.28	-	64,232.28	1,767.72	-
	TOTAL UNDERGROUND.....		5,390,668.06	4,826,232.87	130,326.50	4,695,906.37	694,761.69	562,749.50
	GRAND TOTAL BEFORE CONTINGENCIES..		8,939,876.90	8,256,682.93	132,885.65	8,123,797.28	816,079.62	670,824.10
	Plus 10% for contingencies.....		228,217.26	-	-	-	228,217.26	-
	GRAND TOTAL INCLUDING CONTINGENCIES		9,168,094.16	8,256,682.93	132,885.65	8,123,797.28	1,044,296.88	670,824.10
	General expense.....	10-13	-	271,716.98	-	271,716.98	-	1952 expense
	Maintenance.....	10-14	-	37,050.73	-	37,050.73	-	taken up in
	Building Roads & Landscaping.....	10-17	-	9,455.40	-	9,455.40	-	"Cost of Operating"
	Total to Negaunee Mine Company Idle Expense.....		-	318,223.11	-	318,223.11	-	
	TOTAL.....		9,168,094.16	8,574,906.04	132,885.65	8,442,020.39	1,044,296.88	670,824.10

MATHER MINE "A" SHAFT  
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8. COST OF OPENING,  
EQUIPPING AND DEVELOPING: (Continued)

Capital account expenditures for the year amounted to \$670,824.10, which brought the total at the end of the year to \$8,123,797.28. This total figure does not include an additional \$318,223.11 charged in a prior year to Negaunee Mine Company "Idle Expense". The inclusion of this amount brings the grand total to date to \$8,442,020.39. "General Expense" and "Maintenance" for the past eight years have been charged into "Operating".

Total Charge-Offs	\$856,752.16
Total Capital Account Charges as Above	<u>670,824.10</u>
Actual Net Decrease in Capital Account	<b>\$185,928.06</b>

Shaft sinking, skip pit development, main level development and underground exploration accounted for approximately 73% of the capital account expenditures for the year, or approximately \$490,000. Underground equipment accounted for 10.9% or approximately \$72,700, surface projects accounted for 15.4%, or approximately \$103,500 and extensions to permanent stocking trestles accounted for 00.7% or approximately \$4,500 of the capital account expenditures for the year.

The average cost per foot of main level drifting was \$65.05 for the year. Main level development costs varied considerably and especially on the 7th Level where heavy ground was encountered frequently and spiling ahead and the installation of lining sets for added support were often necessary.

MATHER MINE "A" SHAFT  
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8. COST OF OPENING, EQUIPPING,  
DEVELOPING AND OPERATING: (Continued)

Comparative Mining Costs:

Mining costs increased \$.58 per ton over that of the previous year. An increase in the cost of labor and supplies is largely responsible for the various increases listed below. Underground costs increased \$.285 per ton, surface costs increased \$.077 per ton, the general mine expense increased \$.082 per ton and an increase in over-all depreciation accounted for an increase of \$.117 per ton. Taxes increased \$.026 per ton and the cost of loading and shipping decreased \$.007 per ton.

	<u>1952</u>	<u>1951</u>
Product	1,015,204	1,157,013
Underground Costs	3.288	3.003
Surface Costs	.375	.298
General Mine Expense	<u>.655</u>	<u>.573</u>
Cost of Production	4.318	3.874
Depreciation: Plant and Equipment	.172	.183
Development after 12/31/44	.151	.189
Pre-Production Development	.023	.023
Movable Equipment	.008	.007
Amort. of Defense Facilities	.086	.043
Allowance under Section 309	.404	.282
Taxes	.218	.192
Loading and Shipping	<u>.040</u>	<u>.047</u>
Total Cost at Mine	5.420	4.840
Budget - Estimated Cost Per Ton	5.234	4.227
Number of Shifts and Hours	243, 3-8 hr.	278, 3-8 hr.
Total 8 hr. Operating Shifts	729	834
Number of Operating Days	243, 3-8 hr.	278, 3-8 hr.
Average Daily Product	4,178	4,162

Proportion of Labor and Supplies

Labor	\$2,856,329.57	2.814/ton	52%
Supplies	<u>\$2,646,393.58</u>	<u>2.606/ton</u>	<u>48%</u>
Total Cost at Mine	\$5,502,723.15	5.420/ton	100%

MATHER MINE "A" SHAFT  
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8. COST OF OPENING,  
EQUIPPING, DEVELOPING  
AND OPERATING:  
(Continued)

<u>Detailed Cost Comparison:</u>	<u>1952</u>		<u>1951</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
Exploring in Mine	28,191.27	.028	37,643.63	.033
Est. Wage Adjustment	235,444.01	.232	126,842.90	.110
Development in Rock	241,764.27	.238	410,233.19	.355
Development in Ore	88,138.40	.087	18,743.73	.016
Stoping	1,115,791.35	1.099	1,146,024.14	.991
Timbering	732,404.72	.721	837,727.73	.724
Tramming	317,932.45	.313	306,644.96	.265
Ventilation	18,246.01	.018	33,033.86	.029
Pumping	32,690.54	.032	40,774.63	.035
Compressors and Air Pipes	79,375.83	.078	93,475.39	.081
Underground Superintendence	157,202.59	.155	143,586.23	.124
Maintenance:				
Compressors and Power Drills	27,127.79	.027	9,767.08	.008
Scrapers & Mechanical Loaders	180,509.64	.178	197,048.80	.170
Tramming Equipment	61,502.90	.061	49,782.47	.043
Pumping Machinery	21,382.36	.021	22,059.99	.019
Total Underground Costs	3,337,704.13	3.288	3,473,508.43	3.003
Hoisting	123,312.18	.121	129,015.86	.112
Stocking Ore	46,897.44	.046	49,099.95	.042
Screening-Crushing at Mine	24,100.61	.024	17,707.16	.015
Dry House	45,566.29	.045	45,472.71	.039
General Surface Expense	29,783.95	.030	29,971.57	.026
Maintenance:				
Hoisting Equipment	54,137.92	.053	20,154.64	.018
Shaft	7,461.74	.007	10,771.48	.009
Top Tram Equipment	20,307.98	.020	21,316.87	.018
Docks, Trestles & Pockets	9,875.08	.010	7,875.37	.007
Mine Buildings	19,556.13	.019	13,857.87	.012
Total Surface Costs	380,999.32	.375	345,243.48	.298
Geological	5,904.31	.006	7,945.91	.007
Mining Engineering	36,755.50	.036	40,712.13	.035
Mechanical & Electrical Engineering	21,231.18	.021	13,331.04	.012
Analysis and Grading	65,169.13	.064	71,405.38	.062
Safety & Personnel Department	7,664.42	.008	8,226.90	.007
Telephones & Safety Devices	43,399.39	.043	43,504.54	.038
Local & General Welfare	8,614.30	.008	9,698.28	.008
Sp. Expense, Pensions & Allowances	22,284.61	.022	16,433.26	.014
Ishpeming Office	67,666.03	.067	69,833.67	.060
Mine Office	102,659.91	.101	110,193.00	.095
Insurance	57,734.02	.056	54,368.08	.047
Personal Injury	64,768.77	.064	50,968.00	.044
Social Security Taxes	66,201.69	.065	67,172.35	.058
Employees Vacation Pay	95,121.04	.094	99,223.28	.086
Total General Mine Expense	665,174.30	.655	663,015.82	.573
 COST OF PRODUCTION	 4,383,877.75	 4.318	 4,481,767.73	 3.874

MATHER MINE "A" SHAFT  
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8. COST OF OPENING,  
EQUIPPING, DEVELOPING  
AND OPERATING:

Detailed Cost Comparison: (Idle Expense Due to Strike)

	<u>Amount</u>
Exploring in Mine	367.87
Est. Wage Adjustment	1,279.99
Timbering	2,011.56
Tramming	75.76
Ventilation	568.82
Pumping	5,586.06
Compressors and Air Pipes	3,537.67
Underground Superintendence	26,392.34
Maintenance:	
Scrapers and Mechanical Loaders	1,163.79
Tramming Equipment	1,596.00
Pumping Machinery	1,658.99
Total Underground Costs	44,238.85
Hoisting	4,474.73
Screening-Crushing at Mine	302.52
Dry House	3,858.32
General Surface Expense	3,454.98
Maintenance:	
Hoisting Equipment	613.85
Total Surface Costs	12,704.40
Geological	1,080.09
Mining Engineering	3,790.24
Mechanical and Electrical Engineering	3,586.42
Analysis and Grading	5,332.32
Safety and Personnel Departments	1,749.00
Telephones and Safety Devices	1,057.40
Local and General Welfare	1,516.00
Special Expense, Pensions and Allowances	4,583.00
Ishpeming Office	20,060.00
Mine Office	9,683.59
Insurance	10,662.71
Personal Injury	2,232.36
Social Security Taxes	962.35
Employees Vacation Pay	14,392.00
Total General Mine Expense	80,687.48
TOTAL COST AS ABOVE	137,630.73
Depreciation - Movable Equipment	1,787.00
Proportion of Taxes	39,639.00
Total Depreciation and Taxes	41,426.00
TOTAL IDLE EXPENSE	179,056.73

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9. TAXES:

Taxes for the year at the Mather Mine "A" Shaft totaled \$261,474.28. A slightly lower tax rate was more than off-set by an increase of \$900,000.00 in the assessed valuation set for Section 2, 47-27 by Mr. Pardee, the state mine appraiser.

	1952			1951		
	VALUATION	RATE	TAXES	VALUATION	RATE	TAXES
Section 2, 47-27 Except the N 600' NE of NE and the Rights of Way						
Real	\$6,025,000		\$225,033.75	\$5,115,000		\$192,352.64
Personal	975,000		36,416.25	985,000		37,041.52
Total	\$7,000,000	\$37.3500	\$261,450.00	\$6,100,000	\$37.6056	\$229,394.16
Coll. Fee	-	-	-	-	-	-
Total	\$7,000,000	\$37.3500	\$261,450.00	\$6,100,000	\$37.6056	\$229,394.16
Mather Mine Pipe Line, parcel in Section 3, 47-27						
	\$ 650	\$37.3500	\$ 24.28	\$ 650	\$37.6056	\$ 24.44
Total Mather Mine "A" Shaft (Sec. 2, City of Ishpeming)						
	\$7,000,650	\$37.3500	\$261,474.28	\$6,100,650	\$37.6056	\$229,418.60

	1952		
	TAXES	PER TON PRODUCED	PER TON SHIPPED
Operating	\$221,835.28	\$0.218	\$0.269
Idle Expense	39,639.00	0.040	0.048
Total	\$261,474.28	\$0.258	\$0.317

  

	1951		
	TAXES	PER TON PRODUCED	PER TON SHIPPED
Operating	\$222,578.60	\$0.192	\$0.192
Idle Expense	6,840.00	0.006	0.006
Total	\$229,418.60	\$0.198	\$0.198

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10. ACCIDENTS  
AND  
PERSONAL  
INJURY

There were 36 compensable injuries during the year, which occasioned lost time of 2,828 days and two fatalities, which added 12,000 days lost time, for a total of 14,828. There were also 38 non-compensable accidents, which added 98 days lost time, for a grand total of 14,926. This resulted in a severity rate of 10.952 days lost per thousand man hours and a frequency rate of 55.80 injuries per million man hours, compared with Company averages for underground mines of 6.050 and 45.08. The total hours worked were 1,361,937 as compared with 1,587,986 last year, a decrease of approximately 2%. The following is a brief summary of the compensable accidents:

<u>DATE</u>	<u>NAME</u>	<u>NATURE OF INJURY</u>
12-21-51	Frank Hissala	Celulitis - left thumb.
12-29-51	Carl Simi	Severe contusion, right leg, probable rupture of thigh muscle.
1-10-52	Frank Valela	Broken left arm.
1-14-52	Leslie Abramson	Bruise on right side of costal region.
1-15-52	Alfred Hyde	Rupture of stomach.
2-1-52	David Lentz	Burn and bruise on right foot.
2-8-52	Albert Prin	Contusion of right hip.
2-20-52	Fred Langlois	Amputation of middle finger, right hand.
2-27-52	Albert Williams	Fracture of right leg.
3-6-52	Paul Holappa	Fracture of facial bones.
3-12-52	Albert Carlson	Puncture wound, bottom of left foot.
3-22-52	Robert Lind	Fractured left thumb.
3-28-52	George Sahi	Lacerations, abrasions of right fingers, fracture distal phalanx, index finger.
3-31-52	Onnie Leppaniemi	Contusion and bruising with abrasions, upper right arm.
4-1-52	Vito Roti	Fatally injured.
4-11-52	Graham Hopper	Puncture wound, sole of left foot.
4-16-52	William Maki	Contusion, left thumb, fracture distal phalanx.
4-16-52	Leo Johns	Multiple fracture of right ankle.
4-17-52	Clyde Bengston	Contusion, hematoma, left thigh.
4-27-52	Joseph Levandoski	Laceration of tongue, bruises chest, back, neck.
5-6-52	Salvatore Tasson	Bruises on right side. Herniatomy.
5-13-52	Arthur Seablom	Deep lacerations with destruction of skin, right thigh, abrasions, left thigh.
5-17-52	Arvo Sippola	Severe laceration left forehead, abrasions right fore nose, lips, chin. Fracture, left central incision, upper.
8-19-52	Oiva Hakala	Pneumonitis of left lung.
8-27-52	Charles Bjerne	Infection on hands.
8-28-52	Richard LaMere	Muscle strain, right shoulder region.
8-29-52	Edward Besonen	Fracture of lower end of left tibia.
9-9-52	James Gillespie	Traumatic amputation distal phalanx, right little finger, re-amputated to include distal end of middle phalanx.
9-11-52	Ernest Yenore	Laceration, ring finger, left hand.
9-29-52	Robert Burkman	Laceration, right index finger, partial avulsion of nail.
10-8-52	Leonard Franklin	Contusion swelling, extravasation of blood, both sides, left foot.
10-13-52	Arvo Sippola	Fatally injured.
10-23-52	John Coskie	Fracture, left external maleolus, dislocation of foot.
11-4-52	Graham Hopper	Fracture, dislocation, cervical spine.
11-6-52	Albert Bussone	Bruises on left leg and right hip.
11-10-52	Robert Asikainen	Fracture, simple, left fibula, upper third.
11-22-52	Benjamin Grenier	Fracture, tarsal bones and first metatarsal, dislocation tarsal bones.
12-4-52	Laurie Johnson	Fracture 8, 9, 10 ribs on right side.



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11. POWER:

The total consumption of electric power was 14,534,000 kilowatt hours. This is approximately 1,679,000 kilowatt hours less than the consumption for the previous year. An average rate of .0159 per kilowatt hour was based on an average maximum monthly demand of 3,120 kilowatts. A rate of \$.041 per kilowatt hour for the first 72 kilowatt hour per kilowatt of demand and \$.0096 per kilowatt hour for all additional kilowatt hours, was the formula used to compute the power cost. A small fuel adjustment is added to the computed cost.

	<u>CONSUMPTION</u> <u>K. W. HOURS</u>	<u>AVERAGE</u> <u>MAX. DEMAND</u>	<u>AVERAGE</u> <u>DEM. FACTOR</u>	<u>COST OF</u> <u>CURRENT</u>	<u>AVE PRICE</u> <u>PER K.W.H.</u>
1952	14,534,000	3,120 K.W.	54%	\$230,920.07	\$.0159
1951	16,213,000	3,130	60	248,362.70	.0153
1950	15,053,000	3,100	56	235,302.80	.0156
1949	11,384,000	2,460	53.5	171,034.60	.0150
1948	11,217,000	2,355	54	155,508.80	.0139
1947	10,059,000	2,160	53	140,078.60	.0139

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1953 SEP 16 AM 9:23

1. GENERAL:

The production for the year was 287,080 tons compared with 363,521 tons in 1951. Production from Fee Lands was 71,450 tons or 24.9% of total production. The large decrease in production is due to the industry-wide strike in June and July and the reduction in the working schedule from 6 days to 5 days per week on November 15th. Less favorable mining conditions and lower efficiency is also reflected in the reduction in the average tons per man per day from 7.03 in the previous year to 5.98 in 1952.

Total shipments kept pace with production and totaled 294,569 tons. At the end of the year there was a stockpile balance of 34,328 tons.

There was no exploration drilling done in 1952 but as a result of development and mining, a substantial tonnage was added to the estimated reserves. The engineers estimate of 3,953,987 tons shows a net gain of 237,352 tons in reserves after deducting the 1952 production from the 1951 estimate. The bulk of this added tonnage was on Chase Lease #9 with 23,181 tons on Fee Lands.

Deep well surface pumping has been continued and at the end of the year five were operating and three were down for repairs. Seven wells were in operation at the end of 1951. Surface well pumping averaged 1173 g.p.m. compared with 1315 g.p.m. in 1951. Underground pumping increased from 1589 g.p.m. in the previous year to 1658 g.p.m. in 1952.

The significant new development underground was the starting of the 10th level development. The preliminary work comprised sinking a winze from the 9th to 10th levels and drifting to the shaft site. A raise was completed from the 10th level to the bottom of the shaft at the skip pit level and this will be followed by stripping to shaft size. Development will be concentrated on the 10th level program in 1953.

2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:

a. Production

	<u>Grade</u>	<u>Tons</u>
1952	Morris	287,080
1951	"	363,521

The 1952 production came from fee and leased lands in the following proportions:

	<u>Fee</u>	<u>Leased</u>	<u>Total</u>
Production	71,450 tons	215,630 tons	287,080 tons
Percentage	24.9%	75.1%	100.0%
Percentage 1951	26.0%	74.0%	100.0%

A summary of the total production, fee and lease, since the Inland Steel Company took over the Morris Mine lease is listed below:

	<u>Tons</u>	<u>Percent</u>
Lease Ore Production 1933-1952	4,435,694	74.7
Fee Ore Production 1933-1952	1,505,726	25.3
Total	5,941,420	100.0

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2. PRODUCTION,  
SHIPMENTS &  
INVENTORIES:  
(Continued)

b. Shipments

<u>Grade</u> Morris	<u>Pocket</u> 170,885	<u>Stockpile</u> 123,684	<u>Total</u> 294,569
<u>Grade</u> Morris	<u>Fee</u> 72,493	<u>Lease</u> 222,076	<u>Total</u> 294,569

The following table shows the shipments for the past five years:

<u>Year</u>	<u>Total</u>
1952	294,569
1951	353,704
1950	307,357
1949	256,749
1948	347,134

Total shipments since Inland acquired lease in 1933 - 5,907,091 tons.

c. Ore in Stock December 31, 1952

<u>Grade</u> Morris	<u>Tons</u> 34,328
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d. Production by Months

<u>Month</u>	<u>Days Worked</u>	<u>Average No. of Men</u>	<u>Tons Per Man Per Day</u>	<u>Production</u>
January	26	188	6.25	28,440
February	22	190	5.51	23,892
March	26	197	5.21	24,904
April	26	207	5.50	27,221
May	26	210	5.30	25,923
June (strike)	1	-	1.75	1,070
July (strike)	4	193	3.56	3,968
August	26	188	5.71	27,823
September	25	207	6.69	31,977
October	27	209	6.90	36,024
November	21	203	7.86	30,050
December	21	208	6.28	25,788
<hr/>				
Total	251	196	5.98	287,080
Total 1951	300½	180	7.03	363,521

e. Working Schedule

The mine operated 2-8 hour shifts per day 6 days per week, January 1st to November 15th; effective November 15th the schedule was reduced from 6 to 5 days per week.

f. Delays

There were no significant delays to operation excepting the period the mine was idle due to the strike.

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3. ANALYSIS:

a. Shipments

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Sul.</u>	<u>Moist.</u>
Morris	294,569							
Dried		55.70	.075	13.46	.52	2.77	.047	11.35
Natural		54.95	.074	13.28	.51	2.73	.046	11.35

b. Ore in Stock December 31, 1952 (Natural)

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Moist.</u>
Morris	34,328	49.09	.073	12.45	.49	2.41	11.25

c. Ore Reserves - Expected Natural Analysis

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Sul.</u>	<u>Moist.</u>
Morris	3,497,487	49.26	.075	11.75	.47	2.86	.015	12.00
Hi-Sul	488,477	50.00	.094	10.00	.40	2.26	.398	11.00

4. ESTIMATE OF ORE RESERVES:

Development and mining added 237,352 tons to the engineers estimate of reserves after allowance for ore mined in 1952. This compares with an increase of 398,843 tons in 1951. Chase Lease #9 again showed the greatest gain with 186,107 tons due to development work increasing the ore outlines, particularly in Deposits #33 and #75C.

	<u>Estimate</u> <u>10-1-51</u>	<u>Production</u> <u>10-1-51 to</u> <u>10-1-52</u>	<u>Estimate</u> <u>Deducting</u> <u>Product</u>	<u>Actual</u> <u>Estimate</u> <u>10- 1-52</u>	<u>Incr. or Decr.</u> <u>From</u> <u>1951 Estimate</u>
Chase Lease #26	26,140	-	26,140	26,140	-
Chase Lease #25	33,273	-	33,273	33,273	-
Chase Lease #24	180,017	8,956	171,061	174,855	3,794
Chase Lease #24 Hi-Sul.	455,343	35,167	420,176	444,446	24,270
Chase Lease #9	2,228,174	167,574	2,060,600	2,246,707	186,107
Total Chase Leases	2,922,947	211,697	2,711,250	2,925,421	214,171
CCI Lands	1,042,517	67,189	975,328	993,348	18,020
CCI Lands Hi-Sul.	39,521	9,464	30,057	35,218	5,161
Total CCI Lands	1,082,038	76,653	1,005,385	1,028,566	23,181
GRAND TOTAL	4,004,985	288,350	3,716,635	3,953,987	237,352

5. LABOR & WAGES:

The labor force was increased from an average of 180 men the previous year to 196 men in 1952. The increase is due chiefly to the 10th level development program.

Effective July 26th the new labor rates based on job evaluation were put into effect including the 12½¢ per hour increase in base rate.

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6. SURFACE:

Work was completed enlarging and refinishing the surface dry. The heating plant boiler was recovered and the boiler room was painted. The parking lot was enlarged and facilities provided for connecting block heater leads to cars for easier winter starting.

The coal loading ramp at the ventilation shaft was rebuilt.

Surface Pumping

The water pumped from surface wells averaged 1173 g.p.m. compared with 1315 g.p.m. in 1951. The following table shows a comparison of the volume of water pumped from the various wells at the end of the year and a year ago.

<u>Well No.</u>	<u>G.P.M.</u> <u>Dec. 1952</u>	<u>G.P.M.</u> <u>Dec. 1951</u>
1	Down	170
2	Down	Down
3	86	124
3A	452	439
5	135	167
8	275	275
9	72	45
10	Down	383
	<u>1020</u>	<u>1603</u>

Recapitulation of Surface Pumping for 1952:

	<u>Average</u> <u>G.P.M.</u>	<u>Drop in Test</u> <u>Holes Feet</u>
January	1598	0.1
February	1134	1.1
March	1130	0.2
April	1163	1.6
May	1124	0.1
June	1040	0.4
July	1205	0.1
August	1050	0.4
September	1090	0.1
October	1108	0.3
November	1414	0.7
December	1020	0.1
Average 1952	1173	0.17
Total 1952		2.00
Average 1951	1315	0.01
Total 1951		0.16

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6. SURFACE:  
(Continued)

Surface Pumping (Continued)

The average drop in the water level in the surface material above ledge since pumping started in 1937 to December 12, 1952 is shown in the table below:

<u>Test Hole</u>	<u>Drop 8-25-37 to 12-12-52</u>	<u>Depth Remaining To Ledge</u>
501	80.9	12.6
503	93.8	106.1
504	58.0	90.8
505	86.3	44.8
506	58.1	29.1
509	101.5	88.2
510	30.8	92.2
511	34.1	120.0
512	53.9	107.2
514	25.8	101.1
515	16.6	112.0
517	24.5	87.6
518	54.0	55.6
519	58.5	100.2
524	32.2	67.5
526	14.9	99.1
527	47.4	27.6
531	1.0	75.7
533	11.3	120.8
534	1.7	95.7
Total	881.9	1633.9
Average	44.0	81.6

Operating expense for surface drainage amounted to \$14,467.00 compared with \$19,137.00 in 1951. The cost per ton was \$0.05 and \$.054 respectively.

7. UNDERGROUND:

a. Pumping

The upward trend in the amount of underground water has continued, the average for the year being 1658 g.p.m. compared with 1589 g.p.m. in the previous year. The peak volume was reached in May when an average of 1696 g.p.m. was pumped.

A comparison of mine water pumped over a 6-year period is shown below:

<u>Year</u>	<u>4th</u>	<u>6th</u>	<u>7th</u>	<u>8th</u>	<u>9th</u>	<u>Total</u>
1952	94.6	27.1	69.2	495.8	971.4	1658.1
1951	107.8	36.3	67.4	431.5	945.8	1588.8
1950	86.6	30.5	94.3	379.0	751.7	1342.1
1949	95.0	24.5	88.6	316.4	667.8	1192.3
1948	140.5	25.1	122.2	274.3	514.5	1076.6
1947	149.9	34.7	144.7	287.3	352.8	969.4

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7. UNDERGROUND:  
(Continued)

a. Pumping (Continued)

Installation was completed of the two automatically operated 1200 g.p.m. pumps on the 9th and 4th levels. The operation of the pumps is synchronized to relay the water from the 9th level to 4th level and from the latter level to surface. This new pumping system is operating very satisfactorily and will affect savings in pumping labor costs.

The underground pumping costs for 1952 amounted to \$162,557.00 and represents a substantial increase over last year. The automatically operated pumps were in operation only during the last two months of the year so this had very little effect on reducing pumping labor costs.

The following table shows a comparison of pumping costs for the last six years:

<u>Year</u>	<u>Surface</u>	<u>Underground</u>	<u>Total</u>	<u>Cost Per Ton</u>
1952	\$14,467	\$162,557	\$177,024	\$.62
1951	19,137	155,184	174,321	.493
1950	18,954	111,232	130,186	.423
1949	14,733	93,782	108,515	.423
1948	19,137	73,168	92,305	.265
1947	16,612	65,862	82,474	.308

b. Development

The major development was the sinking of the winze from 9th to 10th levels and drifting to the shaft site, preliminary to deepening the hoisting shaft 200' and developing the 10th level. Work will be concentrated on this program in 1953 so mining can continue uninterrupted to lower elevations as ore areas above the 9th level are depleted.

Chase Lease #24

An average of two contracts were mining on this lease during the year. Contract #10 was the most productive and continued stoping operations between the 8th and 9th levels in Deposit #79. Development and mining has outlined 24,270 tons of additional reserves in this deposit. Contract #4, by stoping, mined a small tonnage in Deposit #33 between the 8th and 9th levels.

Fee Lands

An average of four contracts continued operations on the Fee Lands. Contracts #6, #24 and #30 continued stoping operations and development in Deposit #84 between the 8th and 9th levels. Late in the year, Contract #30 completed mining in this area and was transferred to an area in Chase Lease #9 on the 8th level. Very little additional reserves were outlined in this deposit by the development and mining. In Deposit #87 to the west, caving operations were continued and the new ore outlines show a net gain of 10,940 tons in reserves between the 7th and 8th levels.

In the Hi-Sulphur Deposit #84B, a small tonnage was mined and a net gain of 5,161 tons in reserves was proven.

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7. UNDERGROUND:  
(Continued)

b. Development (Continued)

Chase Lease #9

The bulk of the production was mined from this lease and an average of ten contracts were mining in this area during the year. The most significant new development in Chase Lease #9 is the starting of the development for a block-caving operation in Deposit #33 above the 9th level. A major breakdown on the 9th level delayed the start of this work but drifting got underway late in the year for the cross-haul and transfer drifts. Two parallel transfer drifts will be driven following up the dip of the footwall and a block of ore extending to a mined area near the 8th level elevation will be recovered by caving.

Development in Deposit #33, between the 8th and 9th levels, has proven 119,333 tons of new ore and this represents the most significant addition to the reserves.

Deposit #33 has continued to be the major producer in this lease with Deposits #75C and #76 ranking next in order of production. Sub-level caving has continued to be employed in most of the areas and sub-level stoping to a smaller extent.