1930

The Cleveland - Cliffs Iron Company

Ore Mining Department

Annual Report of Manager

For Year ended December 31,st. 1930

#2001

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THE CLEVELAND-CLIFFS IRON COMPANY

ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT
YEAR 1930

I N D E X

Continued,-

THE CLEVELAND-CLIFFS IRON COMPANY

ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT
YEAR 1930

I N D E X

Sheet #2

Continued,-

THE CLEVELAND-CLIFFS IRON COMPANY

ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT
YEAR 1930

I N D E X

Sheet #3

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THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT
CROSS INDEX BY MINES

YEAR 1930

ISHPEMING DISTRICT:	CL. SHAFT	HOLMES	MORRIS-LLOYD	TILDEN
1.-General	10	-47	75	103
2.-Production Shipments & Inventories	10-13	47-51	75-78	103-105
3.-Analysis	14	51-52	78-79	106
4. Estimate of Ore Reserves	15-16	52	79-81	106-107
5. Labor and Wages	16-17	52-55	81-83	107-108
6. Surface	17-18	55-56	84	
7. Underground and Open Pit	18-30	56-61	84-89	108-117
8. Cost of Operating	31-43	62-72	89-98	118-123
9. Explorations & Future Explorations	43-44	72-73	99	124-125
10. Taxes	44-45	73	99-100	126
11. Accidents & Personal Injury	45	73-74	101	126
12. New & Proposed Construction				126-127
13. Equipment & Proposed Equipment ..	46		101	128
14. Maintenance & Repairs			101	128-130
16. Water Supply			101	
17. Mine Location-Condition of Premises	46		102	
18. Nationality of Employees	46	74	102	130

NEGAUNEE DISTRICT:	NEGAUNEE	MAAS	ATHENS	NORTH JACKSON	SOUTH JACKSON	LUCY
1. General	131-132	164	200-201	231	232	
2. Production shipments & Inventories	132-134	164-166	201-203		232	
3. Analysis	134	167	203			
4. Estimated Ore Reserves	135	167-168	204			
5. Labor and Wages	135-137	168-169	204-205			
6. Surface	137-138	169-170	206	231		233
7. Underground	138-148	170-182	207-216			
8. Cost of Operating	148-159	182-193	216-227		232	
9. Explorations & Future Explorations	159	193	227			
10. Taxes	159	193-194	227	231	232	233
11. Accidents & Personal Injury	159-160	194	228			
12. New & Proposed Construction	160-161	195-197	228-229			
13. Equipment & Proposed Equipment ..	161-162	197	229			
14. Maintenance and Repairs	162	198	229			
15. Power	162	198	230			
17. Mine Location - Condition of Premises	162	198	230			
18. Nationality of Employees	162-163	198	230			
19. Maas Crusher		199				

THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT
CROSS INDEX BY MINES
YEAR 1930

Sheet #2

GWINN DISTRICT:	SUMMARY OF DISTRICT	STEPHENSON	PRINCETON	GARDNER MACKINAW	FRANCIS
1. General	234	241	244	247-248	277
2. Production, Shipments & Invys.		241-242	244	248-250	277
3. Analysis		242	244	251	277
4. Estimate of Ore Reserves			245	251-252	
5. Labor and Wages	234-235			252-253	
6. Surface		242	245-246	253-254	
7. Underground & Open Pit				254-263	
8. Cost of Operating		243	246	263-273	277-278
9. Explorations & Future Explorations.				273	
10. Taxes	235-237	243	246	273	278
11. Accidents & Personal Injury				274	
12. New & Proposed Construction				274	
13. Equipment & Proposed Equipment				274-275	
14. Maintenance & Repairs				275	
15. Power				275	
16. Water Supply	237				
17. Mine Location-Condition of Premises	238			275	
18. Nationality of Employees				275-276	
19. Gwinn Assn. Hotel, County Park	238-240				

OTHER MICHIGAN MINES:	REPUBLIC	SPIES VIRGIL
1. General	279	281
2. Production, Shipments & Inventories	279	281-285
3. Analysis		285
4. Estimate of Ore Reserves		285-286
5. Labor and Wages		286-288
6. Surface	279-280	288-290
7. Underground		290-295
8. Cost of Operating		295-303
9. Explorations & Future Exploration		304-305
10. Taxes	280	305-306
11. Accidents & Personal Injury		307
12. New & Proposed Construction		307
14. Maintenance & Repairs		308-310
17. Mine Location-Condition of Premises		310
18. Nationality of Employees		311

THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT
CROSS INDEX BY MINES
YEAR 1930

Sheet #3

MINNESOTA MINES:	WADE	HILL TRUMBULL	HOLMAN CLIFFS	CANISTEO CLIFFS	ALEXANDRIA
1. General	312	328	351	376	389
2. Production, Shipments & Inventories	312-313	328-330	351-353	376-378	389-390
3. Analysis	313	331	353-354	378	390-391
4. Estimate of Ore Reserves	314	332-333	354-356	378-379	391
5. Labor and Wages	314-315	333-334	356-357	379	391-392
6. Surface	316-317	334	357-358	379-381	393
7. Underground & Open Pit	317-322	334-338	358-364	381-384	393-395
8. Cost of Operating	323-324	339-341	365	384	396-397
9. Explorations & Future Explorations.		341	366	384	
10. Taxes	324	342	366-367	384	397
11. Accidents & Personal Injury	325	342-343	367-368	385-386	397-399
12. New & Proposed Construction	325	343-344	369	386-387	
13. Equipment & Proposed Equipment ...	326	344	369-370	387-388	399
14. Maintenance & Repairs	326	344-348	370-372		
15. Power	326				400
16. Water Supply	326				400
17. Mine Location-Condition of Premises	326				400
18. Nationality of Employees	327	349	372	388	400
19. Washing Plant		349-350	372-375		

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Ishpeming, Michigan
February, 5th,1931

Mr. Wm. G. Mather, President
Cleveland, Ohio

Dear Sir:-

I beg to submit the report of the operations of the Mining Department for the year 1930.

The inventories, maps and statements relative to the 1930 report have gone forward to you under separate cover.

The colored portions of the maps show the work for the year. The reports of the different mines of the Company were made by the Superintendents in charge and the Reports of the Engineering, Mechanical, Electrical, Geological, Safety and Welfare Departments by the heads of these Departments.

During the year, the Holman Brown property, which adjoins the Bingham and North Star, has been put into operation. This mine is owned by the Holman Cliffs Mining Company and operated by theCleveland-Cliffs Iron Company, it being located near the village of Taconite on the westenn end of the Mesaba.

Work has been carried on at the Canisteo Pit by the Cleveland-Cliffs Iron Company for the Canisteo-Cliffs Mining Company. The necessary approach tracks to enable us to do the preliminary stripping have been completed. A limited amount of stripping in order to make it possible to ship ore in 1931 has also been done. In addition the washing plant has been constructed and a large amount of equipment installed.

The total number of accidents in 1929 was 85 of which 63 were compensable. In 1930 the total was 82 of which 64 were compensable. The number of man shifts lost because of injuries was reduced 20% in 1930 over 1929. In 1930 the Company assumed the management of the Alexandria Mine, put the Holman Cliffs into operation and did a large amount of work at the Canisteo. The total days worked in 1929 were 651,362¾ and in 1930 767,945¼. Our safety record therefore shows an improvement in 1930. If you will refer to the report of the Safety Inspector you will see that a very marked improvement has taken place since we started our intensive safety campaign in 1926. Safety is largely a matter of education and immediate outstanding results cannot be expected as education is a slow process. We are, however, steadily progressing and the intensive work which is being carried on is bound to show good results. Mr. Conibear refers to the conspicuous records for 1930 at the Tilden, Gardner-Mackinaw, Cliffs Shaft, Holmes, Wade, General Storehouse and Cliffs Power & Light Company.

During the year we have drilled and partly stripped what is known as the East Pit at the Tilden. During 1931 the Company will be in a position to supply any demand for very low phosphorus silicious ore.

On November 1st the Holmes Mine was sold to the Oliver Iron Mining Company. At this property were many employees who had worked for a great many years at the old Lake Mine, Salisbury and Angeline. The new owner kept only one of these men and it has been necessary to take care of at our other properties 153 out of a total of 165. This has been a most difficult problem as we did not want to increase our working force. Young, single men, or men who have been in our employ for a short time have been laid off, their places being taken by the older men from the Holmes. In some

cases it has been necessary to work a part of the force at our various mines on half time. It was our duty to take care of these old employees and our reputation for fair dealings has not suffered by the policy which was followed. Unfortunately the men who have been replaced are younger and more efficient than the older men from the Holmes.

Last year I reported the inauguration of a safety bonus for bosses. This has been in force for a year, the results being most gratifying. The improvement shown in the attached statement, at five of our large soft ore mines cannot however be attributed entirely to the bonus as a part of it is due to the use of longer legs and to the more common introduction of scrapers. The figures in this statement show increased earnings per day for shift bosses and miners, increased tons per man per day stoping, and decreased labor costs.

The following statement shows a comparison of all of the Company's mines and operations for the years 1929 and 1930. In figuring the tons per man per day all of the labor of the Mining Department of the Cleveland-Cliffs Iron Company, including the Cliffs Power & Light Company, has been included. On this basis the tons per man per day show an increase of .52 in 1930 while the cost on cars shows a decrease of .099. The average rate per day shows an increase of .14 and the labor cost per ton a decrease of .061. For further details please consult the statement entitled "Comparison of Total Days Worked and Tons of Ore Mined for Years 1929 and 1930" which will be found in the body of the report.

	TONS	NUMBER OF MEN	TONS PER MAN PER DAY	COST ON CARS	AVERAGE RATE PER DAY	LABOR COST PER TON
1929	3,694,820	2,276¼	5.43	1.952	5.09	.939
1930	4,568,040	2,739½	5.95	1.852	5.23	.878
Increase	873,220	463¼	.52		.14	
Decrease				.099		.061

During the year the Cliffs Power & Light Company has extended it's power lines to the new shaft at the Greenwood Mine of the Inland Steel Company which is located to the west of Ishpeming on the south side of the formation.

It has built a new line from the sub-station at Gwinn through Munising to the quarry of the Inland Lime & Stone Company near Manistique.

It has built a short line to the Vertique Marble Company on Section 36,48-28 which is a short distance to the north of the Morris Lloyd.

It has constructed a new dam on the Au Train River which will greatly enlarge it's storage basin.

This company is expanding rapidly and each year the current sold shows an increase.

The only outstanding lease is the Empire Iron Company covering the SW¼ of Section 19,47-26. This property has been sub-let to the C. K. Quinn Company. It was idle during 1930.

Respectfully submitted,

SRE:DP

Manager

COMBINED COMPARISON OF ATHENS, MAAS, NEGAUNEE, HOLMES AND MORRIS LLOYD MINES 1930 AND 1929

	AVERAGE SHIFT BOSSES RATE				AVERAGE CONT.MINERS RATE				TONS OF ORE PER MAN PER DAY STOPING AND DEVELOPMENT			
	1930 (1)	1929	Increase	%	1930	1929	Increase	%	1930	1929	Increase	%
Athens	$5.62	5.50	$ .12	2.2	$5.87	5.60	$ .27	4.8	21.44	18.84	2.60	13.8
Maas	5.80	5.50	.30	5.4	5.95	5.45	.50	9.2	18.79	15.23	3.56	23.4
Negaunee	5.73	5.50	.23	4.2	5.81	5.63	.18	3.2	21.69	20.00	1.69	8.5
Holmes	5.83	5.50	.33	6.0	5.83	5.60	.23	4.1	11.51	10.06	1.45	14.4
Morris Lloyd	5.99	5.50	.49	8.9	5.99	5.72	.27	4.7	22.03	21.41	.62	2.9
AVERAGE	5.79	5.50	.29	5.3	5.89	5.60	.29	5.2	19.59	17.50	2.09	11.9

(Weighted Average)

	Cost per Ton for Labor Stoping and Development			
	1930	1929	Inc.or Decr.	%
Athens.....	.273	.294	.021	7.1
Maas	.317	.358	.041	11.5
Negaunee	.269	.281	.012	4.3
Holmes	.501	.512	.011	2.1
Morris Lloyd .	.271	.265	.006	2.2

(Actual Weighted Figures)

(1) Average Shift Bosses Rate is based on the average of all miners - contract and Company account. The bonus of 35¢ per day, provided there is no lost time accident, is not included in this average rate of $5.79. Their average rate is therefore $6.14.

JSM:DP

COMPARISON OF TOTAL DAYS WORK AND TONS OF ORE MINED FOR YEARS 1930 & 1929

	1929 DAYS	1930 DAYS	1929 DAYS	1930 DAYS
Stephenson (production)	792	696¾		
Princeton	362	444½		
Austin	596¼			
Miscellaneous Payroll	10,556	7,152¾		
Shops and Storehouse	17,624½	13,102¾		
Opening and Equipping Tilden	4,711½	1,756¼		
Francis	68	321½		
Negaunee Miscel. & General	8,146¼	5,095		
Athens " "	2,174¾	1,420½		
C.C.I. Co. " "	57,377¾	37,283¾		
Cliffs Power & Light Co.	12,800¼	17,964¼		
Mesaba Cliffs Iron Mng. Co.	24,190¼	19,984¾		
Republic	4,668	324½		
Reopening Wade	3,585½	1,554½		
Holman Cliffs Miscel. & General	2,008	14,087½		
Canisteo Cliffs " "	342¾	35,436		
Wade & Alexandria " "		5,316		
General Roll - Undistributed		31,859½		
TOTAL	150,003¾	193,800		
Grand Total All Operations	651,362¾	767,945½		
Net for Operating Mines	501,359	574,145¼	501,359	574,145¼
Total Tons	3,534,754	4,568,040		
Tons per Man per Day	7.05	7.96		
Increase		.91 - 12.9%		
OPEN PIT PRODUCTION - Tons				
Tilden	441,769	287,043	13,102½	5,336
Hill Trumbull	521,845	402,598	20,322½	18,139
Bingham North Star		119,349		5,835½
Holman Brown		553,699		25,917½
TOTAL	963,614	1,362,689	33,424¾	55,227¾
Open Pit Tons per Man Per Day	28.83	24.67		
Net U.G.Days			467,934¼	518,917½
Net U.G.Production	2,571,140	3,205,351		
U.G. Tons per Man per Day	5.495	6.177		
Increase		.682 - 12.4%		
% Open Pit Production to Total Production	27.26	29.83		
Increase		2.57		

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STATEMENT SHOWING COMPARATIVE COST FOR ALL EXPLOSIVES USED AT HARD ORE MINES

	1927	1928	1929	1930
Product	466,382	413,994	421,314	407,925
POWDER				
Pounds - 50%	314,961	141,390	262,100	231,600
60%	49,550	49,400	140,900	228,350
#2,#3,#4 Special.....	22,250	133,900	14,700	
E.P. 23.....		21,350	4,250	
Total Pounds.....	386,761	346,040	421,950	459,950
Total Cost.....	$ 54,763.92	$ 47,860.12	$ 55,207.66	$ 59,952.66
Fuse - Feet.....	600,440	511,350	593,500	645,990
Caps - Number.....	102,345	116,445	125,900	130,000
Cap Crimpers.....	27	24	10	1
Tamping Bags.....	3,370			
Fuse and Cap Containers.....			100	
Total Cost, Fuse, etc.....	$ 4,691.64	$ 4,243.42	$ 5,043.55	$ 5,181.52
Total Cost All Explosives...	$ 59,455.56	$ 52,103.54	$ 60,251.21	$ 65,134.18
Average Price per Lb. - Powder.	.1416	.1383	.1308	.1303
Cost per Ton - Powder.....	.1174	.1156	.1310	.1469
Cost per Ton - Fuse, etc.....	.0100	.0102	.0120	.0128
Cost per Ton All Explosives..	.1274	.1258	.1430	.1597
Pounds Powder per Ton of Ore...	.8293	.8358	1.0015	1.1275

Open pit mines not included.
The 1930 cost per ton for all explosives increased $ .0167 due to driving #3 drift - rock development at the Cliffs Shaft Mine.

JSM:DP

STATEMENT SHOWING COMPARATIVE COST FOR ALL EXPLOSIVES USED AT SOFT ORE MINES

	1927	1928	1929	1930
Product	1,835,406	1,756,236	2,149,826	2,797,426
POWDER				
Pounds - 35%				35,000
Pounds - 40%	113,075	158,650	137,066	362,247
Pounds - 50%	339,950	318,950	449,850	329,060
Pounds - 55%			21,382	4,350
Pounds - 60%	325,350	338,725	469,981	462,083
Pounds - 1X and 2X Gelamite.				249,392
Pounds - #2,#3,#4 Special...	3,250	55,600		
Total Pounds.....	781,625	871,925	1,078,279	1,442,132
Total Cost.....	$ 113,557.94	$ 123,312.40	$ 144,456.48	$185,009.94
Fuse - Feet	2,364,900	2,529,868	3,086,716	4,386,169
Caps - Number	423,907	425,099	534,829	707,928
Electric Exploders.....	15			
Fuse Cutter	178	173	31	1
Connecting Wire-pounds.....	2		18	62
Tamping Bags	112,459	118,930	93,400	58,300
Sealing Compound - Pints....			9	21
Powder Bags.....			93	121
Fuse and Cap Containers.....			81	7
Total Cost, Fuse, etc.....	$ 19,051.53	$ 20,090.82	$ 25,205.15	$ 31,976.93
Total Cost All Explosives	$ 132,609.47	$143,403.22	$169,661.63	$216,986.87
Average Price Per Lb.-Powder.	.1453	.1414	.1339	.1283
Cost per Ton - Powder.....	.0619	.0702	.0672	.0661
Cost per Ton - Fuse,Caps,etc.	.0104	.0114	.0117	.0114
Cost per Ton All Explosives	.0723	.0816	.0789	.0775
Pounds Powder per Ton of Ore.	.4259	.4964	.5015	.5155

Open pit mines not included.
The Alexandria and Wade Mines included in 1930 figures.

JSM.DP.

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

	1927	1928	1929	1930
Product	1,835,406	1,756,236	2,149,826	2,797,426
TIMBER				
Feet - 6 to 8	484,217	515,639	607,310	545,779
8 to 10	372,289	319,807	448,870	535,590
10 to 12	268,634	193,780	244,916	246,070
12 to 14	104,591	93,890	97,467	93,586
14 to 16	16,511	108	1,443	4,177
7 to 9		14,291		437,735
9 to 12				123,801
Treated Timber				7,892
Total Feet	1,246,242	1,137,515	1,400,006	1,994,630
Total Cost	$79,754.35	$ 75,578.00	$93,115.35	$142,297.16
LAGGING				
Feet - 5'	1,553,163	1,202,025	1,388,900	1,405,900
6'	173,500	95,000		1,177,382
7'	3,434,969	3,220,789	3,969,698	4,193,004
8'	1,076,343	598,784	644,744	505,618
Total Feet	6,237,975	5,116,598	6,003,342	7,281.904
Total Cost	$45,264.93	$ 37,679.62	$ 44,669.80	$54,263.34
Covering Boards - Feet	165,106	163,397	105,247	993,129
Total Cost	$ 3,649.89	$ 3,230.13	$ 1,998.12	$12,437.37
Poles - Feet	1,544,937	2,053,550	2,734,607	4,219,572
Total Cost	$21,748.28	$ 31,760.23	$ 41,178.44	$58,843.98
Wire Fencing - Rods				6,875
Total Cost				$ 5,179.00
Average Cost per Foot - Timber	.0640	.0642	.0665	.0713
Average Cost per 100 Ft.-Lagging	.7288	.7361	.744	.745
Average Cost per 100 ft.-Cover Bds	1.8472	1.977	1.898	1.252
Average Cost per 100 ft.-Poles	1.4077	1.547	1.510	1.394
Average Cost per Rod - Wire Fencing				.753
Feet of Timber per Ton of Ore	.679	.6478	.6512	.7130
Feet of Lagging per Ton of Ore	3.398	2.913	2.792	2.603
Feet of Poles per Ton of Ore	.842	1.169	1.272	1.508
Feet of Covering Boards per Ton of Ore				.355
Feet of Wire Fencing per Ton of Ore.				.121
Cost per Ton for Timber	.0434	.0430	.0433	.0508
Cost per Ton for Lagging	.0247	.0214	.0208	.0194
Cost per Ton for Poles	.0118	.0181	.0192	.0210
Cost per Ton for Covering Boards	.0017	.0018	.0009	.0044
Cost per Ton for Wire Fencing (1)				.0058
Cost per Ton for All	.0816	.0843	.0842	.0976
Total Cost for All Timber	$149,817.45	$ 148,247.98	$181,001.71	$ 273,020.85

The Alexandria and Wade Mines included in 1930 figures.
(1) Wire Fencing used for 6 months in 1930 at Athens, Maas, Negaunee and Morris Lloyd Mines. Total of 107,438 lineal feet - 885,896 tons of ore mined.

JSM.DP

STATEMENT SHOWING TOTAL COST FOR SUPPLIES CHARGED TO "COST OF ORE AT MINES".

SOFT ORE MINES

YEAR	1927		1928		1929		1930	
PRODUCT	1,835,406		1,756,236		2,149,826		2,797,426	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON
General	85,520.88	.0465	92,928.84	.0529	107,893.25	.0502	131,887.31	.0471
Iron and Steel	28,956.99	.0157	31,679.66	.0180	38,877.35	.0181	50,884.74	.0182
Machinery	85,936.53	.0468	117,816.27	.0670	137,101.96	.0638	154,614.44	.0553
Explosives	151,669.06	.0826	161,089.99	.0917	177,543.73	.0826	216,842.35	.0775
Lumber and Timber	180,515.49	.0983	182,139.31	.1037	211,095.62	.0982	312,235.17	.1116
Fuel	34,728.59	.0189	30,550.11	.0174	30,389.23	.0141	32,702.59	.0117
Electric Power	361,104.77	.1967	353,365.39	.2068	434,631.89	.2021	483,576.60	.1729
Miscellaneous	56,414.20	.0307	31,071.56	.0177	33,943.70	.0158	39,195.76	.0140
TOTAL	984,846.51	.5365	1,010,641.13	.5750	1,171,476.73	.5449	1,421,938.96	.5083

HARD ORE MINES

YEAR	1927		1928		1929		1930	
PRODUCT	467,510		413,994		421,314		467,925	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON
General	29,726.59	.0635	41,435.40	.1001	43,232.11	.103	38,098.52	.093
Iron and Steel	13,079.36	.0279	16,024.76	.0387	20,364.82	.048	18,242.85	.045
Machinery	32,525.13	.0695	37,849.48	.0914	55,344.08	.132	41,954.95	.103
Explosives	74,384.99	.1591	61,290.29	.1480	60,275.62	.143	65,134.18	.160
Lumber and Timber	9,431.02	.0201	7,065.76	.0171	7,052.74	.017	12,367.87	.030
Fuel	14,371.32	.0307	12,449.56	.0301	5,422.23	.013	4,320.58	.011
Electric Power	84,106.40	.1798	80,072.05	.1936	78,560.22	.186	77,919.19	.190
Miscellaneous	8,269.92	.0176	7,364.12	.0178	5,575.37	.013	5,186.43	.013
TOTAL	266,254.73	.5694	263,551.42	.6368	275,827.19	.655	263,224.57	.645

Soft Ore Mines

The Alexandria and Wade Mines are included in 1930 figures. The decrease of $ .0366 per ton is due to the increased production.

More detail of these supply costs will be found in the analysis of cost sheets for the various mines.

Open pit mines not included.

JSM:DP

LABOR SUMMARY - ALL COMPANIES

PRODUCT	1927 3,358,640		1928 2,775,542		1929 3,534,754		1930 4,568,040	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Surface	208,281⅜	945,048.09	207,047½	946,889.42	236,998⅜	1,084,390.09	282,969½	1,330,588.07
Cost per Ton		.2813		.3441		.3067		.2912
Underground	392,984½	2,008,260.19	328,222⅜	1,670,341.35	365,484	1,856,635.99	430,126	2,256,081.04
Cost per Ton		.5979		.6017		.5254		.4939
Supt. and Gen. Roll	48,827½	403,457.86	49,295⅜	391,671.46	48,880	377,465.05	54,850	424,159.51
Cost per Ton		.1201		.1411		.1069		.0929
Grand Total	650,093½	3,356,766.14	584,565⅜	3,008,902.23	651,362⅜	3,318,491.13	767,945½	4,010,828.62
Cost per Ton		.9993		1.084		.939		.878
Average Rate per Day		5.16		5.15		5.09		5.23
Tons per Man per Day		5.166		4.75		5.43		5.95

Note:-

The above is the total of all wages and salaries for all employees of the Mining Department, including the Cliffs Power & Light Company.

Superintendent and General Roll Days and Amounts shown is all of the General Payroll except Mine Clerks and Captains which are included in Surface and Underground.

Previous years stockpile overruns not included in 1930 product.

JSM:DP

CLIFFS SHAFT MINE

ANNUAL REPORT

YEAR 1930.

1. GENERAL:

Production for 1930 was exceeded only in 1929, being the second largest total on record. Shipments, however, were only approximately half of the year previous.

Because of the slowing up of ore sales, we concentrated on development work and the year 1930 will show an exceedingly large footage of rock drifts and raises and ore drifts and raises.

The ore reserves also shows a decided increase in tonnage which means that our development work more than kept pace with the mining operations and was successful in opening up new ore lenses to take the place of the old ones.

Changes in the flow sheet of the crusher enabled us to mix the lumps and fines in the ore cars at the mine and approximately one third of the ore forwarded in 1930 was Run-of-Mine.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Grade	Product Tons
Cliffs Shaft Lump	193,005
Cliffs Shaft Crushed	79,654
Cliffs Shaft Run-of-Mine	73,881
Total Cliffs Shaft	346,540
Bancroft Lump	33,054
Bancroft Crushed	15,256
Bancroft Run-of-Mine	13,075
Total Bancroft	61,385
Grand Total Ore	407,925
Rock	35,770
Total Ore & Rock	443,695

production averaged 1383 tons per day.

The proportion of lumps, fines and run-of-mine ore was as follows:-

Lump Ore	226,059 Tons	55.5%
Fine Ore	94,910 "	23.2%
Run-of-Mine Ore	86,956 "	21.3%
Total	407,925 "	100.0%

The production each year by grades since 1926 is as follows:-

Year	Lump Ore Tons	Fine Ore Tons	Run-of-Mine Ore Tons	Total Tons
1926	240,396	99,857		340,253
1927	288,804	113,728		402,532
1928	275,018	116,844		391,862
1929	295,600	125,714		421,314
1930	226,059	94,910	86,956	407,925

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

b. Shipments:

Shipments for 1930 from pocket and stockpile totaled as viz:-

Grade	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Cliffs Shaft Lump	79,455	46,776	126,231	305,278
Cliffs Shaft Crushed	23,251	7,209	30,460	133,433
Cliffs Shaft Run-of-Mine	73,881		73,881	
Total Cliffs Shaft	176,587	53,985	230,572	438,711
Bancroft Lump	13,581	13,597	27,178	43,472
Bancroft Crushed	4,436		4,436	28,747
Bancroft Run-of-Mine	13,075		13,075	
Total Bancroft	31,092	13,597	44,689	72,219
Grand Total	207,679	67,582	275,261	510,930
Total Last Year	307,941	202,989	510,930	
Decrease in Shipments	100,262	135,407	235,669	

The table that follows shows the amount of ore shipped to the L.S. & I. and C. & N.W. Ry. Docks and the proportion that went all rail to various customers.

L.S. & I. Dock	233,357	Tons
C. & N.W. Dock	19,047	"
All Rail	22,857	"
Total	275,261	"

Shipments for the past five years follow:-

	CLIFFS SHAFT			BANCROFT			
Year	Lump Tons	Crushed Tons	Run of Mine Tons	Lump Tons	Crushed Tons	Run of Mine Tons	Total Tons
1926	235,872	89,424		22,812	9,914		358,022
1927	240,781	98,848		22,051	4,639		366,319
1928	267,291	93,078		20,049	8,315		388,733
1929	305,278	133,433		43,472	28,747		510,930
1930	126,231	30,460	73,881	27,178	4,436	13,075	275,261

c. Stockpile Inventories:

There was a considerable tonnage in stock on Dec. 31st, 1930, more ore being carried over than at any other time during the past six years.

Grade		
Cliffs Shaft Lump	85,218	Tons
Bancroft Lump	8,961	"
Total Lump	94,179	"
Cliffs Shaft Crushed	57,966	Tons
Bancroft Crushed	12,478	"
Total Crushed	70,444	"
Grand Total Ore	164,623	"

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

The amount of ore in stock for previous years was as follows:-

Ore on Hand -	Dec. 31st, 1925	-	55,063 Tons
Ore on Hand -	Dec. 31st, 1926	-	37,294 "
Ore on Hand -	Dec. 31st, 1927	-	73,507 "
Ore on Hand -	Dec. 31st, 1928	-	76,634 "
Ore on Hand -	Dec. 31st, 1929	-	31,959 "
Ore on Hand -	Dec. 31st, 1930	-	164,623 "

d. Division of Product by Levels:

Level	"A" Shaft Tons	"B" Shaft Tons	Total Tons
First	18,286	30,539	48,825
Second	12,629	1,031	13,660
Third	13,803	2,667	16,470
Fourth	758		758
Fifth	34,964		34,964
Sixth	24,945	23,828	48,773
Seventh	50,660	5,907	56,567
Eighth	24,771	24,848	49,619
Ninth		7,395	7,395
Tenth	59,520	13,208	72,728
Eleventh	17,602		17,602
Twelfth		14,345	14,345
Thirteenth		10,184	10,184
Fourteenth		16,035	16,035
Total Ore	257,938	149,987	407,925
Rock			35,770
Total Ore and Rock			443,695

e. Production by Months:

MONTH	JAN.	FEB.	MAR.	APR.	MAY	JUNE
Days	26	23	26	24	26	24
C.S. Lump	22,034	19,021	21,885	17,092	11	1,351
C.S. Crushed	9,420	8,095	9,365	7,300		579
C.S. Run-of-Mine		464	360	5,541	32,298	24,783
Bancroft Lump	4,191	3,718	4,144	3,726		382
Bancroft Crushed	1,819	1,532	1,694	1,403		163
Ban. Run-of-Mine	321	400	903	1,824	7,095	7,029
Total Ore	37,785	33,230	38,351	36,886	39,404	34,287
Rock	2,986	3,042	3,136	2,732	3,038	2,682
Grand Total	40,771	36,272	41,487	39,618	42,442	36,969

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Continued)

e. Production by Months: (Continued)

MONTH	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Days	25	25	22	27	22	25
C.S. Lump	18,233	19,258	15,816	20,938	16,874	16,488
C.S. Crushed	7,443	7,227	6,720	9,018	7,226	7,072
C.S. Run-of-Mine	725	290	1,231	511		
Bancroft Lump	4,327	4,318	2,794	3,980	2,491	2,987
Bancroft Crushed	1,792	1,814	1,068	1,774	1,102	1,284
Ban. Run-of-Mine	387	265	481	1,190	248	610
Total Ore	32,907	33,172	28,110	37,411	27,941	28,441
Rock	2,772	2,748	2,688	3,506	3,126	3,314
Grand Total	35,679	35,920	30,798	40,917	31,067	31,755

f. Ore Statement:

	MINE RUN		BANCROFT		CLIFFS SHAFT			Total Last
	Cliffs Shaft	Ban-croft	Lump	Crushed	Lump	Crushed	Total	Year
On Hand 1-1-1930			3,085	1,658	18,444	8,772	31,959	76,635
Output for Year	66,203	20,753	37,058	15,445	189,001	79,465	407,925	421,314
Stockpile Overruns								44,940
Transfers	7,678	7,678	4,004	189	4,004	189		
Total	73,881	13,075	36,139	16,914	211,449	88,426	439,884	542,889
Shipments	73,881	13,075	27,178	4,436	126,231	30,460	275,261	510,930
Balance on Hand	0	0	8,961	12,478	85,218	57,966	164,623	31,959

g. Delays:

Date	Hours	Cause	Tons Lost
Mar. 8	3¾	"A" shaft skip jammed in dump.	300
June 14	3	"A" shaft cage caught in dump.	200
Aug. 12	1	Top tram car broken down.	200
Aug. 14	4	"A" shaft skip jammed in rock dump.	400
Sept. 2	8	New hoist motors being installed.	1275
Sept. 3	8	New hoist motors being installed.	1275
Sept. 4	4	New "A" shaft motor running hot.	530
Sept. 5	1½	Chunks blocked in "A" shaft pocket.	175
Sept. 6	2	Chunks blocked in "A" shaft pocket.	220
Oct. 10	1½	Loose nut on No. 8 crusher head.	200
Oct. 14	2	"B" shaft skip jammed in pocket.	200
Oct. 16	½	"A" shaft pocket blocked.	100
Dec. 2	7	"B" shaft skip rope being replaced.	500
Dec. 5	4	Top tram cable burnt out.	500
Year	50¼		6075

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

3. ANALYSIS:

a. Average Mine Analysis on Output for Year 1930:

Grade	Iron	Phos.	Silica
Cliffs Shaft Lump	59.67	.111	6.14
Cliffs Shaft Crushed	56.38	.111	10.05
Cliffs Shaft Run-of-Mine	58.78	.112	7.51
Bancroft Lump	60.50	.108	6.00
Bancroft Crushed	57.39	.112	8.82
Bancroft Run-of-Mine	59.93	.115	6.67

c. Ores in Stock Dec. 31st, 1930:

Grade		Iron	Phos.	Silica	Moist.
Bancroft Lump	Dried	60.32	.110	6.44	
	Natural	60.02	.109	6.41	.50
Bancroft Crushed	Dried	57.49	.110	9.12	
	Natural	56.39	.108	8.94	2.00
Cliffs Shaft Lump	Dried	59.75	.109	6.71	
	Natural	59.45	.108	6.68	.50
Cliffs Shaft Crushed	Dried	56.33	.109	10.17	
	Natural	55.20	.107	9.97	2.00

d. Ores Shipped in 1930:

	Iron	Phos.	Sil.	Alum.	Mang.	Lime	Mag.	Sul.	Loss	Moist.
Bancroft Lump										
Dried	60.25	.105	6.25	2.53	.290	1.35	1.03	.016	1.60	
Natural	59.68	.104	6.19	2.51	.288	1.34	1.02	.016	1.58	.95
Bancroft Crushed										
Dried	56.60	.106	9.15	3.03	.360	1.90	1.23	.019	2.43	
Natural	55.69	.104	9.01	2.98	.355	1.87	1.21	.019	2.39	1.60
Cliffs Shaft Lump										
Dried	59.65	.108	6.80	2.45	.400	1.22	1.11	.017	1.70	
Natural	59.29	.107	6.76	2.44	.398	1.21	1.10	.017	1.69	.60
Cliffs Shaft Crushed										
Dried	57.00	.107	9.50	2.88	.430	1.35	1.26	.019	2.08	
Natural	55.66	.105	9.27	2.82	.420	1.32	1.23	.019	2.03	2.35

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

4. ESTIMATE OF ORE RESERVES:

a. Ore in Sight - Cliffs Shaft Grade:

	"A" Shaft Tons	"B" Shaft Tons	Total Tons
Pillars	1,637,500	764,300	2,401,800
Floors	1,679,600	781,700	2,461,300
Total	3,317,100	1,546,000	4,863,100
To Support Surface	1,993,700	1,230,500	3,224,200
Available Ore	1,323,400	315,500	1,638,900
Less 10% Rock and 10% Loss in Mining	251,500	59,900	311,400
Net Total	1,071,900	255,600	1,327,500

SUMMARY:

	Developed Tons	Prospective Tons	Total Tons
Available Ore	1,590,900	48,000	1,638,900
Less 10% Rock and 10% Loss in Mining	302,300	9,100	311,400
Net Available Ore	1,288,600	38,900	1,327,500

a. Developed Ore - Bancroft Grade:

	Tons
Pillars	227,100
Floors	157,200
Total	384,300
To Support Surface	163,000
Available Ore	221,300
Less 10% Rock and 10% Loss in Mining	42,100
Net Total	179,200

SUMMARY:

	Developed Tons	Prospective Tons	Total Tons
Available Ore	207,300	14,000	221,300
Less 10% Rock and 10% Loss in Mining	39,400	2,700	42,100
Net Total Available	167,900	11,300	179,200

Assumptions:- 8, 9 and 10 cu. ft. equals one ton.
10% deduction for rock.
10% deduction for loss in mining.
No Bessemer ore.

The following table gives the ore in sight on Jan. 1st; the product for the year; the balance in sight and the new ore developed during the year.

	1927	1928	1929	1930
Estimated Available Ore in Mine Jan. 1st	1,436,000	1,392,000	1,358,000	1,388,316
Production	402,532	391,862	421,314	407,925
Balance	1,033,468	1,000,138	936,686	980,391
Ore in Mine Dec. 31st	1,392,000	1,358,000	1,388,316	1,506,700
New Ore Developed	358,532	357,862	451,630	526,309

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

4. ESTIMATE OF ORE RESERVES: (Continued)

Analysis of Ore Reserves:

Run of Mine Ore:	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Ign.	Moist.
Dried	58.30	.108	6.71	.400	2.45	1.50	1.20	.018	2.25	
Natural	57.02	.106	6.56	.392	2.40	1.47	1.17	.018	2.20	2.20

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

Because of the unsettled industrial conditions there were few changes on the pay roll. However, after the Holmes Mine was purchased by the Steel Corporation, the men employed there were gradually absorbed by the other mines. Some single men were laid off whose places were taken by employees old in the service of the company. This policy, although just to the older men, hurt the efficiency of the mine to a certain extent.

b. Comparative Statement of Wages and Product:

	1930	1929	Increase	Decrease
PRODUCT	407,925	421,314		13,389
No. of Shifts & Hours	1-8	1-8		
No. of Days Operated	295	301		6
AVG. NO. OF MEN EMPLOYED:				
Surface	64	64		
Underground	241	234	7	
Total	305	298	7	

Year	Surface	Underground	Total
1927	57	220	277
1928	61	224	285
1929	64	234	298
1930	64	241	305

	1930	1929	Increase	Decrease
AVERAGE WAGES PER DAY:				
Surface	4.45	4.39	.06	
Underground	5.02	4.95	.07	
Total	4.90	4.83	.07	
WAGES PER MO. OF 25 DAYS:				
Surface	111.25	109.75	1.50	
Underground	125.50	123.75	1.75	
Total	122.50	120.75	1.75	
PRODUCT PER MAN PER DAY:				
Surface	20.08	20.67		.59
Underground	5.65	5.86		.21
Total	4.41	4.56		.15

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

5. LABOR AND WAGES: (Continued)

b. Comparative Statement of Wages and Product: (Continued)

Year	Surface	Underground	Total
1925	18.32	5.91	4.47
1926	19.37	5.91	4.53
1927	22.00	6.19	4.85
1928	20.53	5.80	4.52
1929	20.67	5.86	4.56
1930	20.08	5.65	4.41

LABOR COST PER TON:

	1930	1929	Increase	Decrease
Surface	.222	.213	.009	
Underground	.890	.843	.047	
Total	1.112	1.056	.056	
AVG. PRODUCT STOPING & TRAM'G	9.95	9.64	.31	
AVG. WAGES CONTRACT MINERS	5.43	5.35	.08	
AVG. WAGES CONTRACT LABOR	5.55	5.37	.18	

TOTAL NUMBER OF DAYS:

Surface	20,309	20,384		75
Underground	72,248½	71,838¾	409¾	
Total	92,557½	92,222¾	334¾	

AMOUNT FOR LABOR:

Surface	90,413.24	89,551.55	861.69
Underground	362,984.54	355,385.51	7,599.03
Total	453,397.78	444,937.06	8,460.72

PROPORTION OF SURFACE TO UNDERGROUND MEN:

1928 - 1 to 3.67
1929 - 1 to 3.66
1930 - 1 to 3.76

6. SURFACE:

a. Buildings and Repairs:

Dry:

A new fence was built around the dry. Several new lockers were installed and the interior painted.

Shops:

A new drill puncher and new oil furnace were installed in the drill sharpening shop. A new Marvel power driven hacksaw was purchased for the machine shop. The room housing the heating plant was gunited.

Steel Warehouse:

The portion of the steel warehouse and garage damaged by the fire of October 23rd was repaired and painted. New shelving was also put up in the main room of the warehouse for light supplies.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

6. SURFACE:
(Continued)

a. Buildings and Repairs:

Coal Dock:

The south track was repaired. New caps and stringers were installed.

Engine House:

Extensive repairs were made in the interior of the engine house. All of the old wood floor was taken up, the basement filled with rock and a new concrete floor put down. New doors were purchased and all the wood work and walls painted.

Crusher Building:

In order to make it possible to ship run-of-mine ore, the revolving screen at the base of the primary crusher was removed and a chute or slide installed. The chute was so arranged that it could be removed and the screen re-installed on short notice.

Laboratory:

The tables in the laboratory were topped with sheet lead; the hood rebuilt; the basement gunited; a new sewer line built and the interior painted.

b. Stockpiles:

Shipments from stockpile were irregular and below normal and as a result a new lump ore trestle had to be erected between the old Deer Lake branch of the C. & N.W. Ry. and the lump pile stocked last winter. The crushed ore trestle was also extended east to the end of the stocking area.

7. UNDERGROUND:

b. Development:

We concentrated on development work to a greater extent than ever before. That is apparent from the amount of drifting and raising done during the year. The footages for the past five years follow:

1930	-	10,200 Ft.
1929	-	8,525 Ft.
1928	-	6,610 Ft.
1927	-	7,368 Ft.
1926	-	5,958 Ft.

The average classification of contracts for the past year follows:-

Developing Contracts	47
Mining Known Reserves	27
Total	74

In 1929 the averages were 31 on known reserves and 37 on development work.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

Although all the gangs driving breast stopes are really developing new tonnage, I am only including under this heading the exploratory work, that is, drifts and raises being put up in new lenses on new levels or extensions on old levels.

That the development work conducted during 1930 was productive of results is proven by the fact that we developed 526,309 tons of new ore and that the reserves are now larger than at any time in the last twelve years.

Development work done in drifts and raises in detail was as follows:-

Second Level "A" Shaft:

Exploratory work in the northeast corner of the level on the Bancroft Lease discovered a nice lens of ore that undoubtedly extends down to and below the third level.

Third Level "A" Shaft:

In the South Lens the drift going south towards the boundary encountered no ore, but the raises put up to the first level proved the ore to extend halfway down from the first to the third level.

Fifth Level "A" Shaft:

The exploration drift being driven east between the old Moro Mine and old Incline Mine workings followed the hanging contact and at the end of the year was nearly breasted at the objective point; that is opposite the drill holes that show ore in the trough between the two old mines. Either raising or diamond drilling will be done in 1931 to find these ore lenses.

Sixth Level "A" Shaft:

In the northeast corner of the mine halfway between the Bancroft Lease and the old New York Mine, we did considerable exploring and found some ore, but all indications are that our work was all done close to the contact between the hanging and the ore and that the bulk of the ore lies below the floor of the sixth level. Diamond drilling on the eighth and ninth levels supported that theory.

Seventh Level "A" Shaft:

Drifting from the old seventh level workings towards the No. 3 Mine workings increased the ore reserves by the discovery of two new ore lenses.

Eighth Level "A" Shaft:

The exploratory drift driven just east of the east side of the Bancroft Lease cut ore near the close of the year and drifting will be continued north to find other lenses that lie north of the fault.

In the southwest corner of the level a new lens was discovered, which extends the limits of the Southeast Vein to the west.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

b. Development: (Continued)

Ninth Level "A" Shaft:

Drifting done in the northeast end of the level did not find anything very encouraging. A small lens was discovered, which is now being followed to the east.

Tenth Level "A" Shaft:

On the Bancroft Lease we made the largest single discovery of ore and although we have proven the ore to extend 400 feet east and west, indications are that those limits will be extended considerably during the year 1931.

Eleventh Level "A" Shaft:

Three good sized ore lenses were opened up by drifting on the eleventh level.

Third Level "B" Shaft:

A long narrow lens in the North Vein was opened up during 1930. We cannot hope for any great tonnage here, but the ore will run from 12 to 20 feet wide.

Sixth Level "B" Shaft:

About 450 feet west of "B" shaft a small ore-body was discovered late in the year, which has promise of going up to the third level.

In the northwest corner of the level we are exploring the North Limb of the Iron Formation. We followed a leader of ore that varied from a few inches to 12 feet in width. No ore has ever been found out in this area and we think there are possibilities here.

Eighth Level "B" Shaft:

A drift going southeast from the extreme east workings east of "B" shaft cut the North Vein at the close of the year.

Fifteenth Level:

The drift going northeast from "B" shaft to the new Section 3 shaft site was driven 805 feet during 1930. In the latter part of the year a dam was built between the breast of this drift and the main east and west drift. The place selected for the dam was in the siderite, so that we might be able to anchor the footings in good solid material. The dam was finished in December and drifting will be resumed early in 1931.

Another drift was also driven northeast on the "A" shaft side to get under the Bancroft ore on the tenth level. This drift, most of it in the siderite foot, was within 200 feet of the objective point by the end of the year.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping:

Bancroft Vein:

First Level - "A" Shaft:

Contract No. 34 mined along the south side of the Bancroft Lease between the 600 and 900 east coordinate lines. Their south stope was advanced 60 feet east to the main north-south fault zone. The north stope swung southeast following the dike on the foot and holed into the stope along the boundary. Four stope raises were driven up on the foot to a height of 50 feet above the level to the limit of mining.

Second Level - "A" Shaft:

Contract No. 34 continued their main level drift north parallel to the 1200 east coordinate line in the hanging slates, intersecting the ore lens 280 feet north of the south boundary of the Bancroft Lease. The ore ran southwest following the hanging and during the year No. 34 mined out an area 25 feet wide and 120 feet long. At the close of the year they were very close to No. 29's raise coming up from the third level.

No. 29 cut out in their raise on a sub a short distance below the second level. This raise is located 800 feet northeast of "A" shaft. A stope was opened up to the west, following the foot on the north side and the jasper hanging on the south side. The stope, 25 feet wide, is "U" shaped and was breasted 120 feet from the raise by the end of the year.

Third Level - "A" Shaft:

Contract No. 30 started a raise from the hanging of their stope, 600 feet northeast of "A" shaft, and followed up in ore and holed on the second level under Diamond-Drill Hole No. 373. At the second level elevation a stope was started, which holed on the hanging side of old No. 34's stope just north of the boundary.

The drifts in ore that were developed last year by No. 29 and No. 30 in the area between the 1100 and 1300 east coordinate lines and running from the boundary north for 125 feet, were opened up to stoping width and some of the floors mined down to the fourth level by No. 22 contract.

Fifth Level - "A" Shaft:

No. 62 contract started an exploring drift just east of the 1000 east coordinate line on the north side of the main footwall drift. Ore was found to extend 40 feet in the crosscut and after the drift was continued northeast through 75 feet of dike footwall it was stopped.

In the southeast corner of the Bancroft Lease, Nos. 52, 61 and 66 have continued to develop a nice tonnage of new ore. An area is now opened up 170 feet wide and 130 feet north of the boundary. We are stoping 25 feet wide, leaving pillars 25 feet square. A new raise from the eighth level was holed in the northwest corner of the ore developed to date.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

Bancroft Vein:

Sixth Level "A" Shaft:

No. 54 contract took floors along the south side of the Bancroft Lease between the 2000 and 2200 east coordinate lines. No. 52, 600 feet east of No. 54, skimmed the ore off the hanging and also took up all the available bottom in the stopes.

Seventh Level "A" Shaft:

Near the west end of the Bancroft Lens, No. 16 continued their stoping raise up toward the sixth level along the south boundary line. Just east of No. 16 contract, No. 15 holed a new raise from the eighth to the seventh level between Nos. 16 and 54. The latter contract took out the pillar left on the 2000 east coordinate line.

Eighth Level "A" Shaft:

No. 10 contract drove two stopes to the east about 100 feet north of the boundary line in the south central portion of the Bancroft Lease. The stope, 400 feet west of the east boundary, was stopped because the hanging dropped down close to the level. The other breast 75 feet west of the boundary, after being stopped while No. 66 was raising, was driven through 10 feet of dike into ore again.

A raise was put up from the back of old No. 66's stope 150 feet west of the east boundary of the lease, holing to the fifth level. From the sixth to the fifth level the raise was in ore.

No. 15 started a raise near the south boundary on the 1800 east coordinate line and raised 50 feet in ore to the seventh level. This raise opens up the territory between No. 16 and No. 54 on the seventh level.

Tenth Level "A" Shaft:

No. 64 on the tenth level opened up a large ore lens in the southeast corner of the Bancroft Lease. They drifted 400 feet east and west in ore and indications are that the ore is at least 70 feet wide. This contract developed between 100,000 and 150,000 tons of new ore.

No. 7, raising from the back of No. 64's drift, is up 75 feet above the tenth level. The raise is branched and is intended to hole into the two stopes mined by No. 10 on the eighth level. The west branch is in ore.

Fifteenth Level "A" Shaft:

No. 71, on the bottom level of the mine, drove 300 feet northeast to come under No. 64's ore on the tenth level. The drift is in siderite and even though the tenth level ore may not extend down to the fifteenth level, still it is better to get under the bottom of the ore than drive long crosscuts in rock on each level.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

North Vein:

Second Level "A" Shaft:

Contract No. 30 holed their raise from the fifth level to the second level, 625 feet northwest of "A" shaft, in the extreme west end of the North Vein. Part of the floor was mined along the south side of the stope.

Fourth Level "A" Shaft:

Contract No. 30 at the fourth level elevation mined around the same raise that the second level floor pillar was scraped into.

Fifth Level "A" Shaft:

Contract No. 42 mined floors between the fifth and sixth levels 800 feet northwest of "A" shaft.

In the northeast corner of the level, Nos. 32 and 51 opened up a nice body of ore. The ore area developed here is now approximately 350 feet east and west and 200 feet north and south.

No. 32, after striking the dike foot on the north side of the ore area, raised up along this dike and found the ore pitching to the east.

Another raise was put up by No. 32 on the east side of the ore area and after punching through the jasper encountered the same ore that lies on the foot.

Sixth Level "A" Shaft:

No. 23 contract mined out all the available ore in their stope between the 2900 and 3000 east coordinates. A raise was then started from the back of the stope parallel with the 2900 coordinate line. This raise dipping to the north was carried up in the footwall to the 1065 foot elevation. At that point a branch was driven back towards the hanging to find the ore formation.

No. 28 did considerable development in the extreme northeast corner of the sixth level. Their original crosscut was driven north in the foot to find the ore shown up in Diamond-Drill Hole No. 406. The crosscut cut only two small stringers. A branch drift was then driven 100 feet to the northwest, which found several small lenses of ore, the ore being better in the floor than in the back. Another crosscut was then driven 210 feet to the northeast. This drift went through 125 feet of dike footwall and then entered the hanging slates. Two other crosscuts were then started and both hit ore. The south crosscut cut through 35 feet of ore on the floor, but the ore pinched out at the back of the level. The other crosscut also found a narrow stringer of ore. The result of this exploratory work led us to believe that the ore lay under the sixth level and a diamond-drill hole drilled on the eighth level proved that theory to be correct.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

North Vein:

Sixth Level "A" Shaft:

In the southeast corner of the level No. 8 contract worked in two places. The most westerly gang raised up from the sixth to the fourth level elevation. At a distance of 75 feet above the sixth level they struck the hanging. A stope was then opened up which at the close of the year was 110 feet long and 35 feet wide. In the east end of No. 8's stope the breast on the sill floor was continued east until the foot and hanging came together just east of the 3200 coordinate line. After penetrating 20 feet of dike a new lens was discovered, which was 110 feet long and varied from 15 feet to 60 feet in width. In the southeast corner of this latter stope No. 8 holed with No. 12, drifting northeast from the Incline shaft.

Seventh Level "A" Shaft:

There were four contracts employed in the North Vein between the sixth and seventh levels, Nos. 16, 20, 54 and 62. No. 16 advanced two stope raises between the 1600 and the 1800 east coordinate lines. The westerly raise holed to No. 20's workings, while the east raise is headed towards No. 54. The latter contract started to take down back just south of the north boundary line on the 1900 east coordinate line.

On the south side of the North Vein and close to the main east-west fault, contract No. 20 advanced their workings to the east 1000 feet northeast of "A" shaft. They also took floors on the west side of their stope near the 1800 east coordinate line.

In the extreme west end of the level, No. 62 drove their breast stope 75 feet to the east along the 200 south coordinate line.

No. 25 contract late in the year started to drift north through the foot parallel with the 2900 east coordinate line to get under the ore found in Diamond-Drill Hole No. 406 on the sixth level. The drift was driven 200 feet and was within 35 feet of the ore at the end of the year.

Main Vein:

First Level "A" Shaft:

No. 9 contract carried their raising breast stope from the north side of the Main Vein through to the south side parallel with the 600 east coordinate line.

Second Level "A" Shaft:

No. 27 mined known reserves all year 450 feet northeast of "B" shaft.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

Main Vein:

Sixth Level "A" Shaft:

In the extreme southeast corner of the sixth level and close to the bottom of the old Incline shaft, No. 12 raised from the eighth to the sixth level in ore, holing their raise near the intersection of the 600 south and 3400 east coordinate lines. They drifted southeast in ore across the line of the Incline shaft to the dike footwall. They also drifted northwest through the dike, holing to No. 8's stope. After this drift was holed they started a 25 ft. wide breast stope from the top of their raise parallel with the shaft. This stope had been advanced 60 feet by the end of the year.

Seventh Level "A" Shaft:

No. 67, 2300 feet east of "A" shaft, after drifting south through the main east and west fault, cut ore early in the year. They followed this ore south until it was cut off by jasper. After drifting east through the jasper for 40 feet another lens of magnetite was discovered, which proved to be 60 feet long and 30 feet wide, by the close of the year. The east breast was still in ore on December 31st.

Eighth Level "A" Shaft:

No. 44, after drifting southeast through dike material, encountered the ore which they followed to the east on the 500 south coordinate line. The ore lens is only 15 feet wide and their breast had been driven beyond the 3100 east coordinate line by the end of the year.

Ninth Level "A" Shaft:

Four contracts, Nos. 24, 39, 50 and 60, mined known reserves the entire year. They took out floors and backs between the ninth and tenth levels between the 1800 east and 2200 east coordinate lines.

In the east end of the level, No. 70 mined out an area between the eighth and tenth levels 2000 feet east of "A" shaft.

Tenth Level "A" Shaft:

Contract No. 21, 1400 feet east of "A" shaft, extended their stope up from the eleventh level, holing to the back of the old tenth level workings at the intersection of 500 south and 2275 east. The stope was then turned to the east, following the main level drift for a distance of 60 feet and a slice taken off the back of the old eleventh level stope.

No. 11 contract drove two inclined stopes up on the footwall between the 2400 east and 2500 east coordinate lines. The tops of these stopes reach up above the ninth level elevation.

In the northeast corner of the tenth level, No. 26 drove their breast stope west to the 2500 east coordinate line, the back of the stope holing to the ninth level floor.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

Main Vein:

Eleventh Level:

There were two contracts employed in the Main Vein along the south contact. No. 3 drove a drift in ore from the southwest corner of the eleventh level. This drift went in 60 feet to the dike. Crosscuts were then turned off on the east side of their drift. This ore is the same as that discovered in Diamond-Drill Hole No. 180, drilled down from the tenth level.

On the southeast side of the level, No. 11 opened up a nice stope 40 feet wide and 100 feet long.

South Lens:

Tenth Level "A" Shaft:

No. 7 contract, on the sub between the ninth and tenth levels, drove their north breast ahead to nearly the 600 south coordinate line. Some ore was also sliced off the east side of the stope and a hole blown through to the back of the tenth level on the 1800 east coordinate line.

No. 53 mined the floor in the stope along the north side of the South Lens, 900 feet east of "A" shaft. After taking out all the floor down to the jasper, they dropped down their raise to a short distance above the sill floor of the level and drifted south in ore to get under the south side of the South Lens.

Southeast Lens:

Fifth Level "A" Shaft:

In the west end of the Southeast Vein, No. 2 contract mined floors between the fifth level and the sub-level above.

In the extreme southeast corner of the level, No. 4 contract has drifted east about 600 feet, following the contact between the jasper and slate. The breast is headed for the ore discovered to the north of the old Moro Mine by a drill hole on the sixth level. There is also another lens of ore shown in one of the old Incline Mine diamond drill holes. Both of these lenses of ore were approximately 100 feet east of the breast of No. 4's drift at the end of the year.

Sixth Level "A" Shaft:

Two contracts, Nos. 6 and 45, mined floors in the Southeast Vein between the sixth and eighth levels.

Eighth Level "A" Shaft:

Contract No. 41 opened up a new stope in the extreme west end of the Southeast Vein. The stope ran east and west along the foot for a distance of 150 feet and a raise from the east end of the stope holed to the floor of the level above. A branch off this stope ran to the north, where it holed into the first drift driven by No. 41.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

Subs Above First Level "B" Shaft:

Main Vein:

Contracts Nos. 17 and 18 mined known reserves above the first level "B" shaft. No. 17 was employed on the east side of the 1180 foot sub-level, while No. 18 worked 400 feet southwest of "B" shaft. The latter contract continued all year to take up bottom under the jasper in their old stope. The ore under the thin shell of jasper was all high grade steel ore.

First Level "B" Shaft:

South Lens:

Nos. 1, 35 and 63 were employed in the South Lens in the southeast corner of the level. No. 1 put up a raising stope northeast towards the 1160 foot sub-level. No. 35 also raised on the foot, holing to No. 63, stoping along the boundary and along the north-south dike contact.

Third Level "B" Shaft:

North Vein:

Contract No. 72 drifted 400 feet southwest to Diamond-Drill Hole No. 106. The first 120 feet of this drift was in good ore and the balance was mixed, some days being high grade, which frequently changed to slate and dike material. When Diamond-Drill Hole No. 106 was reached a cut out was made through the dike on the south side of the drift to find the ore shown in the diamond-drill hole. This ore lens was just being developed at the close of the year.

Sixth Level "B" Shaft:

Four contracts were employed on this level during the past year, Nos. 13, 33, 37 and 40.

North Vein:

No. 37 drifted west approximately parallel to the 200 north coordinate line in the northwest corner of the sixth level. Sometimes they had a full breast of ore and other times merely a leader. As no ore has ever been developed on the north side of the "B" shaft workings opposite the Fault Vein, we are exploring to find out whether or not this area is barren.

Main Vein:

No. 13 mined floors all year 350 feet northwest of "B" shaft.

400 feet northeast of the shaft, No. 40 stoped out a small ore area from the fifth to the sixth level.

Fault Vein:

No. 33 drove a crosscut south from the main drift, 500 feet west of "B" shaft. At a point 140 feet south of the main drift, the ore was cut and a stope was then started on the west side of the crosscut. The stope was in 40 feet by the end of the year.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

Seventh Level "B" Shaft:

North Vein:

No. 36 mined floors in two places in the extreme east and west ends of the North Vein.

No. 69 also drove a crosscut from the stub end of the main drift 300 feet northwest of "B" shaft and holed into an old stope, 350 feet north of the shaft. The drift was all in ore, although some of it was a little lean. A raise put up from the eighth level proved this ore to go down 40 feet below the seventh level.

Main Vein:

No. 38 contract, 850 feet west of "B" shaft, continued their raising stope up from the ninth level, holing to the seventh level and later to the sixth level. The ore, however, pinches out at the latter elevation.

Eighth Level "B" Shaft:

North Vein:

No. 49 drove a rock drift, beginning at a point off the main east rock drift, 350 feet northwest of "B" shaft. The drift was continued northwest for a distance of 125 feet. Two raises were put up from this drift to hole under the floors of the seventh level.

In the northeast end of the level, No. 57 drove a crosscut southeast to intersect the ore lens No. 57 developed on the level above.

Ninth Level "B" Shaft:

Main Vein:

No. 19 took floors 1300 feet southwest of "B" shaft.

Tenth Level "B" Shaft:

Main Vein:

No. 56 mined floors 1500 feet southwest of "B" shaft.

Fault Vein:

No. 14 drove an ore drift from the stope in the west end of the Fault Vein over to the Main Vein. After the drift holed they stoped what good ore there was along the south side of the drift.

Twelfth Level "B" Shaft:

Main Vein:

Contracts Nos. 31 and 68 were employed along the south side of the Main Vein. The former continued stoping on the sub above the level southwest towards No. 68. The latter stoped an area on the sill floor along the 1200 west coordinate line and then raised up from the back of this stope on the foot towards No. 31.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

c. Stoping: (Continued)

Thirteenth Level "B" Shaft:

Main Vein:

Three contracts, Nos. 43, 46 and 48, worked on this level during 1930. No. 43 extended their sub-level stope west, holing into the old workings 1575 feet west of "B" shaft. No. 46 mined floors along the east side of the Main Vein workings.

Fault Vein:

No. 48 continued their raising stope up to the eleventh level elevation. Rock then came across the breast and the miners started to crosscut south about 50 feet back from the breast.

The tons per man stoping for the past few years is shown for comparison.

Year	Tons per Man Stoping
1930	23.80
1929	22.41
1928	21.10
1927	21.63
1926	20.93
1925	20.44
1924	16.30
1923	17.26
1922	16.49
1921	15.26
1920	13.95

It will be noted that 1930 shows a gratifying increase in ths tons per man stoping.

e. Drifting and Raising:

The footage of ore drifts and raises and rock drifts and raises for the past five years follows:-

Year	Rock Drifts & Raises	Ore Drifts & Raises	Total
1930	6,496'	3,704'	10,200'
1929	5,443'	3,082'	8,525'
1928	4,762'	1,848'	6,610'
1927	4,874'	2,494'	7,368'
1926	3,051'	2,907'	5,958'

It will be noted that the total footage of development drifts and raises for 1930 is far in excess of any previous year.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

7. UNDERGROUND:
(Continued)

f. Explosives, Drilling and Blasting:

Explosives Statement for 1930:

Developing Ore and Stoping:

Kind	Quantity	Average Price	Amount 1930	Amount 1929
50% L.F. Powder	222,350	.1255	27,918.13	30,102.73
60% " "	134,100	.1351	18,115.27	10,561.38
Hercomite No. 3				1,249.50
E.P. 23				541.88
Total Powder	356,450	.1291	46,033.40	42,455.49
Fuse	504,480	5.66	2,855.65	2,518.28
Caps	103,300	11.589	1,197.18	1,124.21
Crimpers	1		.71	6.62
Fuse Boxes				140.00
Total Fuse, Etc.			4,053.54	3,789.11
TOTAL EXPLOSIVES			50,086.94	46,244.60
Product			407,925	421,314
Pounds Powder per Ton of Ore			.8738	.7760
Cost per Ton for Powder			.1128	.1008
Cost per Ton for Fuse, Etc.			.0099	.0090
Cost per Ton for All Explosives			.1227	.1098

Rock Development and No. 3 Drift:

50% L.F. Powder	9,250		1,162.39	3,315.03
60% " "	94,250		12,756.87	8,812.38
Hercomite No. 3				624.76
Total Powder	103,500		13,919.26	12,752.17
Fuse	141,510		817.26	909.17
Caps	26,700		310.72	345.27
Total Fuse, Etc.			1,127.98	1,254.44
TOTAL EXPLOSIVES - ROCK DEVELOPMENT			15,047.24	14,006.61
TOTAL EXPLOSIVES USED IN MINE			65,134.18	60,251.21
Average Price per Pound for Powder			.1303	.1308

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1930	1929	Increase	Decrease
PRODUCT	407,925	421,314		13,389
Underground Costs	1.513	1.485	.028	
Surface Costs	.214	.180	.034	
General Mine Accounts	.230	.234		.004
Cost of Production	1.957	1.899	.058	
Depreciation	.052	.052		
Taxes	.359	.303	.056	
Loading & Shipping	.024	.040		.016
Total Cost at Mine	2.392	2.294	.098	

b. Detailed Cost Comparison:

ACCOUNT
EXPLORING IN MINE:

	Amount	Cost Per Ton
Year 1930	$ 11,519.05	$ .028
Year 1929	5,757.43	.014
Increase	$ 5,761.62	$ .014

2705 feet of holes drilled in 1930 compared with 3174 feet in 1929. The holes in 1930 were longer and in much harder material than those drilled in 1929. Cost per foot or per ton cannot be properly compared because during the past year part of the geological department expense was taken up in this account as well as a proportion of the diamond drill foreman's time.

ACCOUNT
DEVELOPMENT IN ROCK:

	Amount	Cost Per Ton
Year 1930	$ 73,464.37	$ .180
Year 1929	61,220.13	.145
Increase	$ 12,244.24	$ .035

Total cost increased, but footage of raises and drifts also increased, so that the unit cost per foot shows but little change as will be noted from the following table.

	1930	1929	1928	1927
Development in Rock Feet	6496	5443	4762	4454
Cost per Foot	$ 11.31	$ 11.25	$ 11.65	$ 12.32

ACCOUNT
DEVELOPMENT IN ORE:

	Amount	Cost Per Ton
Year 1930	$ 32,471.93	$ .080
year 1929	28,405.36	.067
Increase	$ 4,066.57	$ .013

The cost for ore development increased because with the slowing up of ore shipments, we concentrated on development work.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
DEVELOPMENT IN ORE: (Continued)

The following table shows the comparison for the past three years:-

Year	Footage of Ore Drifts & Raises
1930	3,704'
1929	3,082'
1928	1,848'

Although the total cost increased 14.3% the footage went up over 20%, so that the unit cost per foot was actually decreased.

ACCOUNT
STOPING:

	Amount	Cost Per Ton
Year 1930	$ 156,385.26	$ .383
Year 1929	158,430.55	.376
Decrease	$ 2,045.29	
Increase		$ .007

This account shows a decrease because of more gangs on development work during the year.
A detail of the above costs follows:-

	1930	Cost Per Ton	1929	Cost Per Ton
Contract Labor	86,259.00	.228	92,996.11	.238
Miscellaneous Labor	13,472.06	.036	8,475.23	.022
Total Supplies	56,654.20	.150	56,959.21	.146
Total Labor & Supps.	156,385.26	.414	158,430.55	.406
General Supplies	1,868.16	.005	2,310.98	.006
Iron & Steel	5,419.04	.014	5,053.78	.013
Oil & Grease	307.46	.001	252.52	.001
Machinery Supplies	6,537.88	.017	9,531.51	.024
Explosives	39,207.96	.104	37,049.48	.095
Lumber & Timber	308.26	.001	205.12	.001
Sundries	27.49	.000	63.70	.000
Shops, Team, Etc.	2,977.95	.008	2,492.12	.006
Total	56,654.20	.150	56,959.21	.146
Tons	378,173		390,233	

It will be noted that the increase in the unit cost per ton is practically all in the caption "Miscellaneous Labor" which means that we spent more money and time picking rock out of the ore. As all the mining contracts with only one or two exceptions are equipped with scrapers, it is exceedingly difficult to pick out all the fine rock that is mixed with the ore, but before any ore is scraped in the contracts where horses of rock cut through the stopes, rock pickers are employed to clean the ore as well as possible.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT TIMBERING:

	Amount	Cost Per Ton
Year 1930	$ 14,550.86	$ .036
Year 1929	13,898.86	.033
Increase	$ 652.00	$ .003

Because of the large number of new raises put up during 1930, it was necessary to build a large number of new chutes. More safety work was done in 1930 than for years past which means that new railings, ladderways and sollars were constructed at various points in both shafts.

ACCOUNT TRAMMING:

	Amount	Cost Per Ton
Year 1930	$ 142,366.15	$ .349
Year 1929	156,577.28	.372
Decrease	$ 14,211.13	$ .023

Decreased cost due to the purchase of additional scraping units and the placing of new raises in such a location as to permit us to scrape the ore directly into raises leading to the main haulage levels, the fifth, eighth, tenth and fifteenth levels. This eliminates transfers and reduces the number of trammers employed.

ACCOUNT PUMPING:

	Amount	Cost Per Ton
Year 1930	$ 30,067.03	$ .074
Year 1929	30,709.76	.073
Decrease	$ 642.73	
Increase		$ .001

Gallons of Water Pumped in 1930 - 446,650,100.
" " " " " 1929 - 461,403,025.
" " " " " 1928 - 463,182,750.

A detail of the pumping expense for the past two years follows:-

	1930	1929
Pumpmen Labor	$ 5,134.20	$ 5,043.90
Other Labor (Cleaning Sump)	609.59	181.30
Total Labor	$ 5,743.79	$ 5,225.20
Oil, Waste and Packing	$ 259.03	$ 317.91
Tools and Miscellaneous Supplies	43.15	62.17
Electric Light	307.41	301.53
Electric Power	23,713.65	24,802.95
Total Supplies	$ 24,323.24	$ 25,484.56
Total Operating	$ 30,067.03	$ 30,709.76

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
PUMPING: (Continued)

The reduction in cost is due to less electric power used because less water was pumped in 1930 than in 1929.

ACCOUNT
COMPRESSORS AND AIR PIPES:

	Amount	Cost Per Ton
Year 1930	$ 41,013.92	$ .100
Year 1929	40,149.37	.095
Increase	$ 864.55	$ .005

Cubic feet of air compressed in 1930 - 896,693,000.
" " " " " " 1929 - 853,752,500.

The detail cost of operating the compressors for 1930 and 1929 follows:-

	1930	1929
Labor	$ 4,056.25	$ 4,050.55
Tools, Etc.	12.65	76.95
Electric Light	120.00	120.00
Electric Power	30,110.67	27,861.29
Oil, Waste & Packing	338.58	291.07
Heating Expense	450.00	414.04
Total Supplies	$ 31,031.90	$ 28,763.35
Total Labor and Supplies	$ 35,088.15	$ 32,813.90

Expense for maintaining and extending air lines shows a decided reduction over last year because the compressor expense increased $ 2274.25, but the grand total of both air pipes and compressors only went up $ 864.55. We will make an attempt to reduce the compressor expense in 1931 because the tendency at all mines is to operate the compressors more than actually necessary.

ACCOUNT
BACK FILLING:

	Amount	Cost Per Ton
Year 1930	$ 14,843.43	$ .036
Year 1929	11,449.00	.027
Increase	$ 3,394.43	$ .009

Increased because the tonnage of rock handled increased from 29,980 tons to 35,770 tons in 1930. The larger amount of rock development required the service of more trammers on the night shift, at which time the rock is hoisted in "A" shaft and dumped into the old stopes below the second level.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
UNDERGROUND SUPERINTENDENCE:

	Amount	Cost Per Ton
Year 1930	$ 19,268.30	$ .047
Year 1929	18,568.34	.044
Increase	$ 699.96	$ .003

Increased because of the safety bonus paid to the shift bosses. There is no question but what the safety record and reduction in accidents at the Cliffs Shaft Mine in 1930 has more than compensated for the increase in wages paid to the bosses.

ACCOUNT
COMPRESSORS AND POWER DRILLS:

	Amount	Cost Per Ton
Year 1930	$ 4,880.53	$ .012
Year 1929	12,861.90	.030
Decrease	$ 7,981.37	$ .018

The large reduction is due to fewer power drills purchased in 1930.

In 1929 thirty-three drifters and six Jackhammers were charged out, while in 1930 purchases were limited to eleven drifters. These machines complete with oilers cost $ 3850.00.

ACCOUNT
HAND TRAMMING EQUIPMENT:

	Amount	Cost Per Ton
Year 1930	$ 46,514.87	$ .114
Year 1929	51,494.74	.122
Decrease	$ 4,979.87	$ .008

The principal supply items making up the bulk of the total supply cost follows:-

	1930	1929
Wire Rope	$ 6,403.81	$ 5,980.68
Scraper-Hoists	9,352.87	11,481.21
Scraper Slides	1,173.93	2,570.31
Cable	995.95	1,079.37
Total	$ 17,926.56	$ 21,111.57

There was a decrease in the number of scraper-hoists and slides purchased in 1930, which accounted for 3/4 of the reduction in cost. The balance was due to better supervision of the repairs for the scraping units underground. A special foreman and crew were delegated to look after the scraper-hoists, and as a result, less repair parts were sent underground and the consumption of rope per scraper-hoist month shows a decrease.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
ELECTRIC TRAM EQUIPMENT:

	Amount	Cost Per Ton
Year 1930	$ 28,172.14	$ .069
Year 1929	34,383.21	.082
Decrease	$ 6,211.07	$ .013

The cost in detail was as follows:-

	1930	1929
Generator & Dynamo	$ 686.76	$ 921.86
Locomotives	6,452.56	9,256.46
Wiring	3,824.07	5,120.25
Main Line Tracks	9,251.70	8,428.23
Main Line Cars	7,531.26	10,614.20
Spotting Engines	425.79	42.21
Total	$ 28,172.14	$34,383.21

The largest decreases are attributed to three items, viz., Locomotives, Wiring and Main Line Cars. In 1929 a second hand locomotive was purchased from the Gwinn District for $ 1500.00. Repairs on storage batteries were much heavier in 1929 than in 1930. In 1929 610 feet of 4/0 2 conductor cable was purchased and installed. In the same year a new electric welder was charged out and over 3500 feet of new trolley wire installed. We purchased six new 76 cu. ft. underground rocker dump cars and two Granby type cars in 1929 at a cost of $ 3615.00. No new cars were put into service in 1930.

ACCOUNT
PUMPING MACHINERY:

	Amount	Cost Per Ton
Year 1930	$ 1,506.30	$ .004
Year 1929	1,592.44	.004
Decrease	$ 86.14	$ .000

Small decrease for 1930. The principal item in the cost of maintaining the pumps in first class condition is repairs to valves.

ACCOUNT
HOISTING:

	Amount	Cost Per Ton
Year 1930	$ 21,356.60	$ .055
Year 1929	20,539.85	.049
Increase	$ 816.75	$ .006

A detail account of the costs for the past two years follows:-

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
HOISTING: (Continued)

	1930	1929
Engineers Labor	$ 5,402.02	$ 5,413.33
Other Labor	600.40	589.00
Total Labor	$ 6,002.42	$ 6,002.33
Oil, Waste and Packing	$ 53.44	$ 90.18
Tools, Etc.	123.89	78.59
Electric Light	120.00	120.00
Electric Power	14,478.30	13,699.80
Heating Expense	578.55	548.95
Total Supplies	$ 15,354.18	$ 14,537.52
Total Labor and Supplies	$ 21,356.60	$ 20,539.85

It will be noted that all of the increase is in the supply account under the item "Electric Power" and that is due to the installing of 750 H.P. motors, replacing the old 500 H.P. motors. The tonnage of ore and rock hoisted for 1929 was 451,294 compared with 443,695 tons for 1930, so that there actually was not much difference in the amount of material hoisted in the shafts.

ACCOUNT
STOCKING ORE:

	Amount	Cost Per Ton
Year 1930	$ 11,051.75	$ .027
Year 1929	7,863.57	.019
Increase	$ 3,188.18	$ .008

In 1929 all the product hoisted was shipped from the pocket from April 13th to November 29th. In 1930 there was only one month, May, when all the product hoisted was shipped. Stocking ore expense was much higher for 1930 naturally because we stocked some ore eleven months of the year.

ACCOUNT
SCREENING-CRUSHING AT MINE:

	Amount	Cost Per Ton
Year 1930	$ 19,009.18	$ .045
Year 1929	15,664.61	.037
Increase	$ 3,344.57	$ .008

A detail of the cost of operating the crushing and screening plant in the crusher building located between "A" and "B" shafts follows:-

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
SCREENING-CRUSHING AT MINE: (Continued)

	1930	1929
Maintenance		
Crusher	$ 4,035.94	$ 956.46
Screens	5,067.75	4,464.07
Tram	511.52	1,250.04
Total	$ 9,615.21	$ 6,670.57
Operating		
Labor on Crusher-Screens	$ 6,143.64	$ 6,666.97
Power	1,070.04	989.96
Labor on Tram	2,180.29	1,337.11
Total Operating	$ 9,393.97	$ 8,994.04
Grand Total	$ 19,009.18	$ 15,664.61

The bulk of the increase for 1930 is in the maintenance account and consists of repairs to the crusher. We charged off the cost of a new main shaft and bevel gear at $ 1646.00 and a new cast spider worth $ 2114.77.

ACCOUNT
DRY HOUSE:

	Amount	Cost Per Ton
Year 1930	$ 7,755.70	$ .019
Year 1929	8,190.75	.019
Decrease	$ 435.05	$ .000

Decreased cost due to lower heating expense. Fuel burned in 1930 totaled 789 tons compared with 1003 tons in 1929. The dry did not get all the benefit of this reduction because part of the cost of operating the heating plant is charged to other mine buildings.

ACCOUNT
GENERAL SURFACE EXPENSE:

	Amount	Cost Per Ton
Year 1930	$ 10,793.15	$ .026
Year 1929	9,630.66	.023
Increase	$ 1,162.49	$ .003

Increase due to cleaning up the mine premises, particularly the storage yard and scrap sheds.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
HOISTING EQUIPMENT:

	Amount	Cost Per Ton
Year 1930	$ 7,629.65	$ .018
Year 1929	6,749.19	.016
Increase	$ 880.46	$ .002

In 1929 we charged out one hoisting rope, but in 1930 three were charged out. One rope was damaged by fire and another had several strands torn out. Both of these ropes had to be replaced before they were worn out.

ACCOUNT
SHAFT:

	Amount	Cost Per Ton
Year 1930	$ 2,583.10	$ .006
Year 1929	1,823.56	.005
Increase	$ 759.54	$ .001

Costs increased because in March and April 1930 the top of "A" shaft from surface to ledge was repaired by taking out the old sets and putting in new shaft timbers. The old timber was poor because of dry rot caused by heat from the old steam pipes for the old underground steam pumps. This timber has been in bad shape for years.

ACCOUNT
TOP TRAM EQUIPMENT:

	Amount	Cost Per Ton
Year 1930	$ 2,382.73	$ .006
Year 1929	1,325.91	.003
Increase	$ 1,056.82	$ .003

In 1929 only one 1500 ft. rope was charged out, but in 1930 because of the intermittent stocking most of the year one 1500 and three 750 ft. ropes were used. Rope expense alone increased $ 558.41. In 1930 we also purchased Agathon car axles and new steel rollers for the top tram. A new saddle back car was also added to our equipment in 1930.

ACCOUNT
DOCKS, TRESTLES & POCKETS:

	Amount	Cost Per Ton
Year 1930	$ 1,080.58	$ .003
Year 1929	1,789.87	.004
Decrease	$ 709.29	$ .001

Cost for 1930 was below normal. The pocket in "A" shaft house was rebuilt when the mine was idle in September at the time the new 750 H.P. motors were installed.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
MINE BUILDINGS:

	Amount	Cost Per Ton
Year 1930	$ 3,785.72	$ .009
Year 1929	2,302.87	.005
Increase	$ 1,482.85	$ .004

The detail of the above costs follows:-

	Year 1930 Labor	Supplies	Total
Warehouse	$ 25.00	$ 75.77	$ 100.77
Shops	343.20	214.02	557.22
Shaft Houses	125.61	40.50	166.11
Engine House	1076.95	722.57	1799.52
Dry House	500.66	113.87	614.53
Coal Dock	343.19		343.19
Miscellaneous Buildings	96.78	107.60	204.38
Total	$ 2511.39	$ 1274.33	$ 3785.72

	Year 1929 Labor	Supplies	Total
Office	$ 154.25	$ 65.26	$ 219.51
Warehouse	42.54	1.05	43.59
Shops	166.08	83.51	249.59
Shaft Houses	72.22	7.86	80.08
Engine House	56.30	126.59	182.89
Dry House	530.20	150.23	680.43
Miscellaneous Buildings	363.10	483.68	846.78
Total	$ 1384.69	$ 918.18	$ 2302.87

It will be noted that the increase for 1930 is due to repairs to shops and engine house. The basement which houses the heating plant for the shops was lined with 1" hemlock, covered with expanded metal and gunited to make it fire proof. The engine-house floor, as mentioned before in this report, was rebuilt. The old floor being taken out, the basement filled with rock and a new concrete floor poured.

ACCOUNT
INSURANCE:

	Amount	Cost Per Ton
Year 1930	$ 96.88	$ .000
Year 1929	116.82	.000
Decrease	$ 19.94	$ .000

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
MINING ENGINEERING:

	Amount	Cost Per Ton
Year 1930	$ 3,504.93	$ .009
Year 1929	3,066.40	.007
Increase	$ 438.53	$ .002

Increased because a larger proportion of the mining engineering department was charged to the Cliffs Shaft Mine.

ACCOUNT
MECHANICAL AND ELECTRICAL ENGINEERING:

	Amount	Cost Per Ton
Year 1930	$ 1,722.21	$ .004

This is a new account set up on the 1930 cost sheet. In 1929 this expense was a part of the Central Office charge.

ACCOUNT
ANALYSIS AND GRADING:

	Amount	Cost Per Ton
Year 1930	$ 5,143.89	$ .013
Year 1929	3,278.24	.008
Increase	$ 1,865.65	$ .005

Inasmuch as the new shipping department charge against this account in 1930 totaled $ 2740.06, the account when compared with the same items that went into it in 1929 actually shows a decrease, which means that the Cliffs Shaft Mine actually paid a smaller proportion of the laboratory expense. In 1930 a great deal of special work, such as silica sand determinations, were made in the local laboratory.

ACCOUNT
PERSONAL INJURY:

	Amount	Cost Per Ton
Year 1930	$ 20,350.37	$ .051
Year 1929	9,234.63	.022
Increase	$ 11,115.74	$ .029

This account for 1930 was not set up as it was in 1929. The cost for 1930 includes two new items, namely, Hospital Operating Loss and Compensation Department Expense. These two items totaled $ 10,820.20.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
SAFETY DEPARTMENT:

	Amount	Cost Per Ton
Year 1930	$ 1,588.93	$ .004
Year 1929	103.79	.000
Increase	$ 1,485.14	$ .004

This account now includes a part of the cost of the safety inspector's department at the Central Office. The proportion of that expense for 1930 was $ 1468.86, which amount is almost exactly the same as the increase for 1930.

ACCOUNT
TELEPHONES & SAFETY DEVICES:

	Amount	Cost Per Ton
Year 1930	$ 3,675.87	$ .010
Year 1929	5,568.38	.013
Decrease	$ 1,892.51	$ .003

The cost for 1929 was above normal due to charging off gloves, goggles and deficit on hard hats. In 1930 the employees paid for protective wearing apparel.

ACCOUNT
LOCAL AND GENERAL WELFARE:

	Amount	Cost Per Ton
Year 1930	$ 7,450.48	$ .017
Year 1929	774.11	.002
Increase	$ 6,676.37	$ .015

These charges come from the Central Office and in 1930 included a proportion of the cost of maintaining the sociological department. A large proportion of the company's annual donation to the Y.M.C.A. was also charged to this account.

ACCOUNT
SPECIAL EXPENSE, PENSIONS AND ALLOWANCES:

	Amount	Cost Per Ton
Year 1930	$ 15,490.64	$ .036
Year 1929	104.89	.000
Increase	$ 15,385.75	$ .036

This account had a different set up in 1930 and during the past year included an item of $ 12,578.49 for pensions and $ 1,740.19 for legal expenses.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

8. COST OF OPERATING: (Continued)

ACCOUNT
ISHPEMING OFFICE:

	Amount	Cost Per Ton
Year 1930	$ 20,783.25	$ .052
Year 1929	41,246.03	.098
Decrease	$ 20,462.78	$ .046

Because of the new method of dividing the old Central Office account and charging the expense to the new Mechanical and Electrical Engineering Account; to Analysis and Grading; to Safety Department Expense; to Local and General Welfare; to Personal Injury; to Exploring in Mine, etc., the Ishpeming Office Expense in 1930 naturally shows a decrease in this one account.

ACCOUNT
MINE OFFICE:

	Amount	Cost Per Ton
Year 1930	$ 13,968.24	$ .034
Year 1929	13,140.81	.032
Increase	$ 827.43	$ .002

This account in detail is as follows:-

	1930	1929
Supplies	$ 1,430.28	$ 1,860.45
Salaries	11,041.06	9,480.59
Storehouse Overhead	1,496.90	1,799.77
Total	$ 13,968.24	$ 13,140.81

The increase is all in the salary account.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

a. Diamond Drilling:

Although the diamond drill crew was employed all year, we did not drill as many holes as in former years because the holes were drilled deeper. Some of the holes went in over 600 feet in depth. The drilling in detail follows:-

Hole No. 410 - Depth 187 feet. First Level "B" Shaft. Hole cut five feet of ore. Balance was slate and quartzite.

Hole No. 411 - Depth 228 feet. Third Level "A" Shaft. Drilled through main north-south fault, but discovered no ore.

Hole No. 412 - Depth 103 feet. Tenth Level "A" Shaft. Cut 44 feet of ore and bottomed in footwall.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

9. EXPLORATIONS AND FUTURE EXPLORATIONS: (Continued)

a. Diamond Drilling: (Continued)

Hole No. 413 - Depth 137 feet. Tenth Level "A" Shaft. All in footwall.

Hole No. 414 - Depth 608 feet. Tenth Level "A" Shaft. All of the hole in the hanging. Discovered several runs of second class ore.

Hole No. 415 - Depth 330 feet. Tenth Level "A" Shaft. Cut 21 feet of high grade ore and 86 feet of second class ore. Bottomed in hanging.

Hole No. 416 - Depth 102 feet. Tenth Level "A" Shaft. Cut 10 feet of good ore. Bottomed in footwall.

Hole No. 417 - Depth 635 feet. Eighth Level "A" Shaft. A very good hole. Found five separate runs of high grade ore and 166 feet of second class ore. Stopped in the hanging.

Hole No. 418 - Depth 562 feet. Ninth Level "A" Shaft. Cut three separate runs of high grade ore, the last being 50 feet long.

10. TAXES:

Taxes paid by the Cliffs Shaft Mine for the past two years follow:-

	1930		1929	
	Valuation	Taxes	Valuation	Taxes
Realty	$ 3,085,000	$ 120,196.23	$ 2,708,000	$ 101,711.48
Personal	550,000	21,428.83	562,000	21,108.51
Lot 2, Section 3	90,000	3,506.54	90,000	3,380.37
Lot 174, Nelson Addition	100	3.90	100	3.76
South 35.91 Ft. of Lot 179	50	1.95	50	1.88
Total	$ 3,725,150	$ 145,137.45	$ 3,360,150	$ 126,206.00
Collection Fees		1,451.37		1,262.06
Grand Total Taxes		$ 146,588.82		$ 127,468.06
Taxes per Ton Produced		$ .359		$ .302
Taxes per Ton Shipped		.533		.249

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

10. TAXES:
(Continued)

Taxes levied by City of Ishpeming for corporate purposes:

	1930	1929	1928
State Tax	$ 47,494.76	$ 48,603.56	$ 37,572.17
County Tax	99,351.40	85,896.38	74,037.10
County Road Tax	34,871.38	36,811.32	37,415.81
Highway Fund Tax	60,000.00	55,000.00	58,000.00
Library Fund Tax	12,000.00	12,000.00	10,500.00
Fire Fund Tax	12,000.00	10,000.00	10,000.00
School Tax	145,000.00	145,000.00	140,000.00
One Mill Tax	12,690.99	12,755.76	13,601.62
Sewer Fund Tax	2,000.00	4,000.00	3,500.00
Cemetery Fund Tax	4,000.00	4,000.00	4,000.00
City Tax	65,000.00	65,000.00	61,000.00
Rejected Tax	48.51	34.68	14.99
Total Tax	$ 494,457.04	$ 479,101.70	$ 449,641.69

The city budget actually shows an increase of only $ 2949.16 and as the state tax and county road tax are less for 1930, the bulk of the increase is in county taxes. This is due to the operation and maintenance of the Morgan Heights Tuberculosis Sanitorium and the increase in the budget of the County Poor Commission.

11. ACCIDENTS AND PERSONAL INJURY:

The Cliffs Shaft Mine improved its safety record as will be noted from the following tables:-

1927 - 10.4 Days Lost per 1000 Days Worked.
1928 - 9.9 " " " " " " .
1929 - 6.9 " " " " " " .
1930 - 2.8 " " " " " " .
(11 Mos.)

The number of accidents for the past three years follows:-

	1930	1929	1928
No Lost Time Accidents	61	62	45
Compensable Accidents	2	17	20
Lost Time, But No Compensation Paid	1	8	9

It will be seen that the record for a hard ore mine is unusually good.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1930.

13. NEW EQUIPMENT:

a. Scraper-Slides:

Two more portable scraper-slides were added to the underground equipment.

b. Scraper-Hoists:

We added eight new 25 H.P. scraping units in 1930. Three 15 H.P. standard scraper-hoists were also transferred from the Holmes to the Cliffs Shaft Mine.

c. Drill Shop:

In the drill sharpening shop a new oil forge and new punch were added. Also a new "Marvel" cut off saw.

d. Drills:

Eight new Ingersoll-Rand N75 drilling machines, 2 D9 Clevelands and one Chicago Pneumatic CP6 Drills were purchased in 1930.

17. CONDITION OF PREMISES:

Repairs to the company dwellings in the City of Ishpeming were made to a larger extent than for some years past.

An inspection of the houses found many of the roofs leaking and new roofs were put on nearly all of the company's houses occupied by the officials, doctors and employees in the engineering and auditing departments. A great many of the homes occupied by miners and surface hands were also repaired.

In the Barnum Location new cement walks were laid, roofs repaired or rebuilt and some work done on the interiors.

In the location north of Lake Bancroft sidings were renailed and repaired, chimneys rebuilt and interiors redecorated and some plastering done.

18. NATIONALITY OF EMPLOYEES:

Americans	37
English	45
French	22
Finnish	93
Scandanavians	87
German	4
Italian	23
Irish	10
Total	321

HOLMES MINE

ANNUAL REPORT

YEAR 1930

1. GENERAL

The Holmes Mine was operated for ten months only during 1930 on a six days a week schedule, single shift, until November 1st, when the Mine was taken over by the Oliver Iron Mining Company. Conditions in the mine were most favorable and the costs and results generally showed a steady improvement throughout the year. There was very little new development except on the 125 foot sub-level, halfway between the fourth and fifth levels. The work on this elevation showed this to be the bottom of the ore body.

The diamond drill campaign started in 1929 to determine if there was any ore faulted below the fifth level was resumed on June 21st. A high grade hard ore was encountered at 491 feet below the fifth level. The ore was just reached at the time the deal with the Oliver Iron Mining Company was closed and drilling was ordered stopped immediately. It is questionable on account of the width of the lens and depth whether it can ever be mined at a profit. Additional drilling will be necessary to determine this fact.

The Holmes Mine was formally taken over by the Oliver Iron Mining Company on November 1st. The entire crew was kept at work by the Oliver except for the two policemen and gradually laid off until at the end of the year they still had thirty-one of our crew in their employ. They purchased our entire supply of lumber, timber and coal and a large part of our general warehouse supplies. All the supplies that the Oliver did not purchase and could be used at our other properties were either sold direct to the mines or to the General Storehouse. Our final inventory adjustment showed only a loss of $875.53.

2. PRODUCTION. SHIPMENTS & INVENTORIES

a. Production by Grades for 1930

Grade	Tons	Per Cent
Holmes Lump	25,166	12.51
Holmes Crushed	45,526	22.63
Junction Bessemer	20,734	10.31
Junction	109,727	54.55
Total	201,153	
Rock	11,036	
Total	212,189	

HOLMES MINE
ANNUAL REPORT
YEAR 1930

2. PRODUCTION. SHIPMENTS & INVENTORIES (Continued)

Statement Showing Production by Years and Total Tonnage Mined During the Operation of the Holmes Mine.

Year	Holmes Bess. Lump	Holmes Lump	Holmes Bess. Crushed	Holmes Crushed	Junction Bessemer	Junction Non-Bessemer	Holmes Ore Mined Thru "16"	Total
1914)							8,316	8,316
1915)							11,640	11,640
1916)							796	796
1917	11,923		32,936	673	3,576	19,665		
1918	27,045		53,407	17,989	1,878	21,017		121,336
1919	420		59,899	35,944	889	35,979		133,131
1920			76,977	21,738	15,229	117,863		231,807
1921			52,041	7,813	24,636	93,510		178,000
1922			64,734	7,910	39,618	105,804		218,066
1923			53,662	19,544	47,933	155,533		276,672
1924			28,340	18,292	37,948	69,720		154,300
1925		7,349	30,339	45,191	20,396	85,225		188,500
1926		16,249	24,264	36,286	44,526	70,033		191,358
1927		25,083		38,718	44,332	68,361		176,494
1928		24,281	9,075	33,220	41,378	75,833		183,787
1929		25,073		44,871	46,223	112,398		228,565
1930		25,166		45,526	20,734	109,727		201,153
Total	39,388	123,201	485,674	373,715	389,296	1,140,668	20,752	2,572,694

b. Shipments.

Grade	Tons
Holmes Lump	27,673
Holmes Crushed	48,391
Junction Bessemer	26,334
Junction	119,561
Total	221,959

Shipments for 1930 as compared with previous years.

Grade	1930	1929	1928	1927
Holmes Bessemer			19,811	26,173
Holmes Lump	27,673	38,150	18,923	17,580
Holmes Crushed	48,391	57,345	37,437	25,836
Junction Bessemer	26,334	46,020	43,960	47,666
Junction	119,561	211,907	61,156	51,269
Total	221,959	353,422	181,287	168,524

HOLMES MINE
ANNUAL REPORT
YEAR 1930

2. PRODUCTION SHIPMENTS & INVENTORIES (Continued)

Shipments from Pocket and Stockpile for 1930 follows:

Grade	Pocket Tons	Stockpile Tons	Total Tons	Last Year Total Tons
Holmes Lump	11,966	15,707	27,673	38,150
Holmes Crushed	24,832	23,559	48,391	57,345
Junction Crushed	9,006	17,328	26,334	46,020
Junction	58,534	61,027	119,561	211,907
Total	104,338	117,621	221,959	353,422
Total Last Year	132,472	220,950	353,422	
Decrease in Shipments	28,134	103,329	131,463	

Shipments to dock began on April 25th and continued throughout the season until November 1st, when the mine passed into the hands of the Oliver Iron Mining Company, at which time all stockpile ore was cleaned up.

The total tonnage shipped during 1930 shows a large decrease due to the small amount carried over in stockpiles from the previous year. Although our production for the 10 months of 1930 was larger than that for the year 1929, still the tons shipped from pocket shows a decrease. This is explained by our having to stockpile at times during the shipping season due to the slow movement of the ore.

The Destination of the Ores forwarded in 1930 was as follows:

L. S. & I. Dock.....	199,972
C. & N. W. Dock.....	15,876
All Rail.....	6,111
Total	221,959

c. Stockpile Inventories (None)

The following table gives the balances on hand for previous years:

Year 1925	304,330 tons
Year 1926	135,193 tons
Year 1927	143,163 tons
Year 1928	145,663 tons
Year 1929	20,806 tons
Year 1930	None

d. Division of Product by Levels

Third Level	16,089
Fourth Level	183,729
Fifth Level	1,335
Total	201,153

HOLMES MINE
ANNUAL REPORT
YEAR 1930

2. PRODUCTION SHIPMENTS & INVENTORIES (Continued)

e. Production by Months

Month	Days	Holmes Lump Tons	Holmes Crushed Tons	Junction Bessemer Tons	Junction Tons	Total Tons	Rock Tons
Jan.	26	2460	3047	2396	8321	16224	1756
Feb.	23	2319	2699	2388	6768	14174	1440
March	26	2567	3030	2912	8288	16797	1384
April	24	2613	3167	1873	9697	17350	788
May	26	2974	3403	1741	10774	18892	768
June	24	2441	3936	2071	11248	19696	1076
July	25	2596	4707	1890	11060	20253	1364
August	26	2541	5672	2338	11988	22539	644
Sept.	24	2461	5657	1195	9847	19160	336
Oct.	27	2719	5805	--	14413	22937	1480
Total	251	25691	41123	18804	102404	188022	11036
Stockpile overruns			3878	2544	6709	13131	
Transfers		525	525	614	614		
Year	251	25166	45526	20734	109727	201153	11036

The production for the 251 days operation in 1930 exceeded that for 291 days in 1929 by 2,292 tons, and compares with our estimate of 200,000 tons for the twelve months. The average daily production of 745 tons was the highest secured from the Holmes Mine on a single shift and compares with 682 tons per day in 1929.

Although the Hard Ore stope at the west end and above the 240 foot sub-level was exhausted during May, we were able to even increase our hard ore tonnage by a careful separation of the hard specular hematite seams encountered in the soft ore areas. The lump grade showed a slight increase over the past three years and the crushed grade 36% increase over the past two years. Our monthly production showed a steady increase from 16,224 tons in January to 22,937 in October.

f. Ore Statement

	Holmes Lump Tons	Holmes Crushed Tons	Junction Bessemer Tons	Junction Tons	Total Tons	Total Last Year
On Hand Jan.1	2507	2865	5600	9834	20806	145663
Output for Yr.	25691	41123	18804	102404	188022	198861
Stkple Overruns		3878	2544	6709	13131	29704
Transfers	525	525	614	614		
Total	27673	48391	26334	119561	221959	374228
Shipments	27673	48391	26334	119561	221959	353422
Balance on Hand	-	-	-	-	-	20806

HOLMES MINE
ANNUAL REPORT
YEAR 1930

2. PRODUCTION SHIPMENTS & INVENTORIES (Continued)

1928 - 1-8 Hr. Shift 5 Days per Week January 1st - December 31st
1929 - 1-8 Hr. Shift 5 Days per Week January 1st - April 13th
1929 - 1-8 Hr. Shift 6 Days per Week April 13th - December 31st
1930 - 1-8 Hr. Shift 6 Days per Week to November 1st when the Mine was taken over by the Oliver Iron Mining Company.

g. Delays - Mechanical

Date	Hours	Tons Lost	Cause
January 31st	2½	230	Compressor down on account of exciter.
August 19th	2½	100	Trouble with one of the fourth level locomotives.

h. Delays - From Lack of Current

Date	Hours	Tons Lost	Cause
March 24th	1	60	No current
May 6th	2	134	No current

3. ANALYSIS

a. Average Mine Analysis on Output for Year.

Grade	Iron	Phosphorus	Silica
Holmes Lump	61.89	.059	6.77
Holmes Crushed	61.04	.068	6.30
Junction Bessemer	63.25	.034	4.05
Junction	58.72	.085	6.44

Average Analysis on Ores Shipped in 1930

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist
Holmes Lump										
Dried	62.10	.056	6.35	.070	2.56	.35	.43	.023	.95	
Natural	61.32	.055	6.27	.069	2.52	.35	.42	.023	.94	1.25
Holmes Crushed										
Dried	60.90	.071	6.25	.100	3.37	.33	.39	.055	1.85	
Natural	57.65	.067	5.92	.095	3.19	.31	.37	.052	1.75	5.33
Junction Bess.										
Dried	63.65	.035	3.70	.090	2.54	.30	.32	.014	1.65	
Natural	57.92	.032	3.37	.082	2.31	.27	.29	.013	1.50	9.00
Junction										
Dried	58.70	.087	6.20	.220	3.39	.34	.39	.025	5.40	
Natural	53.18	.079	5.62	.199	3.07	.31	.35	.023	4.89	9.40

HOLMES MINE
ANNUAL REPORT
YEAR 1930

3. ANALYSIS (Continued)

b. Average Analysis on Straight Cargoes

	Mine			Lake Erie	
Grade	Iron	Phos.	Sil.	Iron	Moisture
Holmes Crushed	61.36	.067	5.99	61.75	5.33
Holmes Lump	63.40	.045	5.43	62.90	.64

4. ESTIMATE OF ORE RESERVES

No estimate was made as this property was sold to the Oliver Iron Mining Company as of November 1st, 1930.

5. LABOR & WAGES

a. Comments

Labor conditions, as far as supply was concerned, was very satisfactory throughout the year. There has been a very small labor turn over at the Holmes Mine in the past few years. Out of a total of 161 men employed we only had 19 men with less than 5 years of service.

The tons per man and cost per ton for 1930 show a decided improvement over past years. This is explained by the use of more scrapers and general improved mining conditions due to better covering down.

There were 161 men, excluding the Mining Captain and clerks, carried on the Holmes Mine payroll when the mine was turned over to the Oliver Company. They had laid off 130 men by the first of the year, leaving 31 of our men still in their employ.

The following is a distribution of the men up to the end of the year:

Mine	Number of Men
Cliffs Shaft	17
Morris Lloyd	23
Athens, Maas and Negaunee	33
Tilden	3
Inland Steel Company (Greenwood Mine)	23
Total given employment	99

Given employment at other mines	99
Recommended for Pension or donation	6
Promised summer work	2
Trying to find work for	8
Laid off account short service	15
Still at Holmes Mine for Oliver Co.	31
Total as per payroll	161

HOLMES MINE
ANNUAL REPORT
YEAR 1930

5. LABOR & WAGES (Continued)

b. Comparative Statement of Wages and Product

	1930	1929	Increase	Decrease
Production	201,153	198,861	2,292	
No. of Shifts and Hours	1-8	1-8		
AVERAGE NUMBER OF MEN WORKING				
Surface	42	43		1
Underground	118	115	3	
Total	160	158	2	

Year	Surface	Underground	Total
1926	45	106	151
1927	45	112	157
1928	46	120	166
1929	43	115	158
1930	42	118	160

Increase of 2 Men for 1930

AVERAGE WAGES PER DAY	1930	1929	Increase	Decrease
Surface	4.44	4.42	.02	
Underground	5.39	5.26	.13	
Total	5.12	5.02	.10	

Year	Surface	Underground	Total
1926	4.41	5.31	5.04
1927	4.37	5.39	5.09
1928	4.40	5.39	5.10
1929	4.42	5.26	5.02
1930	4.41	5.39	5.12

There is an increase in the Average Daily Wage of $ .02 per Day for Surface Labor and the Average Underground Rate increased $ .13 per Day in 1930 as compared with 1929.

WAGES PER MONTH OF 25 DAYS	1930	1929	Increase	Decrease
Surface	111.00	110.50	.50	
Underground	134.75	131.50	3.25	
Total	128.00	125.50	2.50	

HOLMES MINE
ANNUAL REPORT
YEAR 1930

5. LABOR & WAGES (Continued)

b. Comparative Statement of Wages and Product

PRODUCT PER MAN PER DAY	1930	1929	Increase	Decrease
Surface	17.33	15.00	2.33	
Underground	6.70	5.89	.81	
Total	4.81	4.23	.58	

Year	Surface	Underground	Total
1927	14.06	5.99	4.20
1928	13.07	5.36	3.80
1929	15.00	5.89	4.23
1930	17.33	6.70	4.81

The year 1930 shows a marked improvement over the last three years and is the biggest tons per man attained during the operation of the Holmes Mine.

	1930	1929	Increase	Decrease
LABOR COST PER TON				
Surface	.256	.295		.039
Underground	.804	.892		.088
Total	1.060	1.187		.127

Year	Surface	Underground	Total
1926	.300	.851	1.151
1927	.311	.900	1.211
1928	.336	1.007	1.343
1929	.295	.892	1.187
1930	.256	.804	1.060

	1930	1929	Increase	Decrease
Average Product Stoping and Tramming	9.93	9.19	.74	
Average wages contract Miners	5.81	5.55	.26	
TOTAL NUMBER OF DAYS				
Surface	11606	13255¾		1649¾
Underground	29988½	33709¼		3720¾
Total	41594½	46965		5370½

The Decrease in 1930 is due to the Oliver Iron Mining Company taking over the Mine on November 1st.

	1930	1929	Increase	Decrease
AMOUNT FOR LABOR				
Surface	51539.37	58643.80		7104.43
Underground	161824.31	177476.18		15651.87
Total	213363.68	236119.98		22756.30

HOLMES MINE
ANNUAL REPORT
YEAR 1930

5. LABOR & WAGES (Continued)

PROPORTION SURFACE TO UNDERGROUND MEN

1924	-	1 to 2.23
1925	-	1 to 2.30
1926	-	1 to 2.36
1927	-	1 to 2.49
1928	-	1 to 2.60
1929	-	1 to 2.67
1930	-	1 to 2.80

6. SURFACE

a. Buildings, Repairs

1. Building, Mine
Only minor repairs were made to the mine buildings during 1930. The shovel crew was used from time to time during the summer when not loading, making changes in the piping system from the heating plant in the Dry House to the Engine House and Office, They also installed some new drainage pipes from the dry.

2. Buildings, Location
An inspection of the Angeline and Salisbury Location houses was made in July and it was found that most of the houses were badly in need of reapirs. While only the most necessary repairs were made, such as plastering, roofs, sills, porches, etc., a total of $3,067.68 was expended. As the work was not started until the middle of August and we only employed a few men taken from the Tilden and Holmes Mines, all the houses were not gone over. This work will be completed during 1931, besides giving the tenants kalsomine and paint for inside cleaning.

b. Stockpiles
Stockpile loading was intermittent throughout the season due to the slow movement of ore to lower lake ports. The sale of the Holmes Mine to the Oliver Iron Mining Company was made with the condition that all stockpile ore be cleaned up and trestles erected so they could start dumping November 1st. The shovel was moved into the Holmes Crushed pile on October 17th to clean up the remaining tonnage, which was done in 4 days. Loading out of the balance of the Junction pile was started on October 21st and completed on the 30th.

The carpenters put up the Junction Bessemer trestle and 5 bents on the Holmes trestle during September. They were given extra help and followed up the loading as closely as possible during October and were in shape for the Oliver on November 1st. The trestles were erected with our labor and they paid for all new material charged against these trestles.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

6 SURFACE
(Continued)

The Junction Bessemer pile showed an overrun of 2,544 tons, the Junction 6,709 tons and the Holmes Crushed 3,878 tons. The Holmes Lump grade did not show an overrun, which is explained by the fact that the division between the Lump and Crushed grades is only an estimate.

d. Subsidence
The ground in the vicinity of the Southwest corner of the Holmes property continued to settle. This settlement caused cracks to develop to the Northeast extending across the swamp south of the road to the rock pile. There was no change in conditions underground.

The railroad companies are maintaining their tracks without difficulty.

7. UNDERGROUND

a. Shaft Sinking
There has been no shaft sinking during the past year.

b. Development
Third Level:
The west footwall drift was taking considerable weight from the turn for several hundred feet to the west. It kept one crew of timbermen employed continuously in order to keep it open for tramming timber. In fact, it was necessary to transfer the timber to smaller trucks and tram on a narrow gauge track. The latter part of April a new drift was driven further back in the rock. It was started 200 ft. back of the turn of the old drift and holed 50 ft. west of Raise No. 315. We felt this drift was justified as it would be necessary when the 30,000 tons of ore above this west drift was mined.

Fourth Level:
In order to provide more raises for the sub-levels above the Fourth Level to facilitate the mining of ore with scrapers, a drift was driven northeasterly between Raises Nos. 419 and 421. This drift was driven 110 ft. in ore to the foot rock. Several raises were put up from this drift to the Third Level.

125' Sub-Level:
Contracts Nos. 13 and 37 were engaged in development drifting on this elevation until about the middle of April. From information secured from the cross sections, the main east footwall and hanging deposits do not go below the 125 foot elevation. No. 13 proved the hanging wall deposit to be only 20 to 25 feet wide south of Raise No.501 at this elevation and the footwall lens in the back of the north, east and west cross-cuts.

On the west side of this sub-level, No. 37 only developed a narrow strip of ore along the foot, while the cross-cut south of Raise No. 502 proved the hanging wall lense to pinch out at this elevation.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

7. UNDERGROUND
(Continued)

Contract No. 37 also did some development drifting 25 ft. above. At this elevation a small lenticular ore body was developed about 140 feet long by 40 feet at the widest point. This ore was all rather high in sulphur.

c. Stoping

The number of contracts employed during 1930 were the same as in 1929, namely 39. An average of fifteen contracts were employed mining hard ore, and twenty-three soft ore. Of the soft ore gangs, five to six were mining Junction Bessemer. The Bessemer grade was found mostly in the hard specular ore. About the middle of the summer it was decided to discontinue hoisting a Bessemer grade unless it came from the strictly soft ore areas. This increased the number of hard ore contracts at times to over twenty.

310' Sub-Level:

Only a small tonnage was mined from this Sub-level just north of No.315 Raise. This ore was taken out from a small sub-stope opened up above the Third Level and north of the footwall drift. This was the top-most ore mined during the year.

300' Sub-Level:

Mining at this elevation was confined to the two pillars of soft ore immediately north of the point where the footwall drifts branch from the cross-cut from the Shaft.

Third Level:

The stoping of the hard ore vein at the extreme Northwest corner of the Third Level was continued, working eastward. All of the hard ore was mined along the hanging south of the dike dividing it from the soft ore to the north.

All of the soft ore pillars in the vicinity of the junction of the East and West footwall drifts were mined.

The mining on the Third Level this year has exhausted all the ore, except a triangular shaped pillar on the northwest side, which is being left in place to support the main lines of the Chicago & North Western and the Duluth South Shore & Atlantic Railways.

280' Sub-Level:

The shrinkage stope being worked from the west end of the 240 foot sub-level reached this elevation early in the year. The hard ore vein to the east was sliced out for a distances of 200 feet and was within a short distance of holing into the shrinkage stope when operations were stopped in this territory by the Oliver.

In the soft ore area a pillar 25' x 115' was mined South of No. 417 raise, and one 90' x 185' from Raises Nos. 423,426 and 428. At the time the

HOLMES MINE
ANNUAL REPORT
YEAR 1930

7. UNDERGROUND

mine was taken over by the Oliver, we were extending the mining limit to the northwest from Raises Nos. 419 and 421.

270' Sub-Level:
The hard ore at the Northwest corner of this sub-level was mined in the shrinkage stope above the 240 foot sub. Development from No. 417 Raise south toward the hanging proved to be all rock for a distance of 40 ft. Additional development was done from the 240' sub to the south and a raise put up along the hanging showing ore at this elevation. The main dike flattening out and cutting off the ore from above.

A triangular pillar of hard ore was also mined along the hanging in the vicinity of co-ordinates south 10,000 and 22,600 west. The soft ore mined from this elevation came from the area just northeast of the dike separating the hard ore described above from the hematite.

260' Sub-Level:
A small tonnage of hard ore was secured from the shrinkage stope at the northwest corner besides that mined from the hanging deposit south of the 10,000 south co-ordinate and 100 ft. either side of 22,600 west. This latter pillar is triangular shaped, the foot dike and hanging jasper coming together to the west.

The soft ore mined on this elevation lay to the north of south 10,000 co-ordinate and between 22,400 and 22,600 west. The west portion of this pillar was the hard blue specular ore and hoisted as hard ore.

250' Sub-Level:
A development drift was driven at this elevation from a raise put up from the 240' Sub-drift off of 417 Raise. It was this work that proved up the ore south of the main dike on the subs below the 280' elevation.

About an equal tonnage of hard and soft ore was mined from this Sub-Level. The hard ore was secured from the south side of the main dike while the soft ore came from the north side, of the area north of the raise connecting the Holmes Mine with Section 16 of the Oliver Iron Mining Company.

240' Sub-Level:
Several development drifts were driven on this sub to make new timber roads and for additional exploration. Practically all of the ore mined was hard ore and came from the southeast end of the ore body.

The shrinkage stope above this elevation at the northwest corner was worked through to the Third Level and all the ore drawn out by the end of October when the mine was turned over to the Oliver Company.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

7. UNDERGROUND
(Continued)

230' Sub-Level:
Mining during 1930 was confined to mining the hard ore along the south boundary, and the soft ore along the footwall in the southeast corner of the mine.

After the sale of the mine was made about the middle of October, all mining below this elevation was stopped as rapidly as places could be squared up and small pillars left mined out.

220', 210' and 200' Sub-Levels:
The ore mined from these sub-levels was along the south boundary at the southeast corner of the mine and was about equally divided as between hard and soft ore. The contracts working on this elevation were the first ones stopped by the Oliver Company.

Fourth Level:
On October 14th we started to extend the east footwall drift southeast toward the Section 16 line. It was part of the agreement between the two companies that this drift be pushed ahead by the Cleveland-Cliffs Iron Company as rapidly as possible. We worked this drift two shifts, making a cut a shift, mucking the rock and timbering. This cycle of operation was completed each shift regardless of whether it took eight hours or over. This drift was extended a total of 114 feet from October 14th to the end of the month.

At the same time the Oliver started a drift from Section 16 side toward the Holmes. They worked three 8 hour shifts but as we showed better progress with our working schedule, they changed to ours on November 1st.

The tons per man per day stoping for the five years is as follows:

Year	Tons per Man Per Day
1930	12.11
1929	10.30
1928	10.31
1927	9.95
1926	11.46

d. Timbering
The use of a larger amount of smaller timber in 1930 explaines the decreased average cost per foot. The total amount is less as the mine was only operated 10 months in 1930 compared to a year in 1929. We changed our method of covering down from placing lagging across several poles to covering solid with poles spiked to three cross poles. This increased the poles used in 1930 to almost double that for 1929.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

7. UNDERGROUND

d. Timbering
Statement of Timber Used.

Kind	Lineal Feet	Average Price	Amount 1930	Amount 1929
6" to 8" Timber	36,666	.0455	1688.43	2870.08
8" to 10" Timber	90,782	.0660	5995.99	4985.41
10" to 12" Timber	18,727	.0885	1657.74	3771.40
12" to 14" Timber	4,164	.1111	465.80	1434.63
10" Treated Timber	281	.301	84.75	648.13
12" Treated Timber	353	.301	106.34	993.66
Total Timber 1930	150,973	.0660	9979.05	
Total Timber 1929	187,178	.0786		14703.31
		Per 100'		
5' Lagging - 806 Cords	685,100	.776	5319.79	5950.73
1 Inch covering Boards	35,087	2.335	819.52	834.89
Total Lagging, etc.,	720,187	.852	6139.31	6785.62
Tamarack Poles	463,942	1.429	6629.77	3355.56
Total Lagging, Poles, etc., 1930	1,184,129	1.078	12769.08	
Total Lagging, Poles, etc., 1929	1,054,946	.960		10141.18
Total All Timber 1930 and 1929			22748.13	24844.49

PRODUCT	201,153	198,861
Feet of Timber per Ton of Ore	.750	.941
Feet of Lagging per Ton of Ore	3.405	3.941
Feet of Lagging per Foot of Timber	4.537	4.187
Cost per Ton for Timber	.0496	.0739
Cost per Ton for Lagging	.0305	.0299
Cost per Ton for Poles	.0329	.0169
Cost per Ton for All Timber	.1130	.1207
Feet Board Measure	227,756	338,459
Feet Board Measure per Ton of Ore	1.132	1.702

e. Drifting and Raising
The following table shows the amount of Rock and Ore Drifting and Raising done the past five years:

Year	Rock Drifting Feet	Rock Raising Feet	Ore Drifting Feet	Ore Raising Feet	Total Feet
1930	870	84	704	467	2125
1929	1250	275	622	839	2986
1928	2816	37	324	468	3645
1927	585	137	175	731	1628
1926	1330	254	314	457	2355

HOLMES MINE
ANNUAL REPORT
YEAR 1930

7. UNDERGROUND
(Continued)

During 1930 we did a very small amount of main level drifting and only put up a few new raises from the Fourth Level. Most of the drifting was done in connection with stoping operations on the sub-levels. In 1929 the Fifth Level cross-cuts were extended and some rock drifting done on the Fourth Level in order to get a drift out in the hanging to provide a diamond drill station.

f. Explosives, Drilling and Blasting
Statement of Explosives Used during Year 1930

Developing Ore and Stoping Kind		Quantity	Average Price	Amount 1930	Amount 1929
50% Powder L. F. Standard		6100	11.01	771.76	3235.53
60% Powder L. F. Standard		86063	13.56	11670.96	9580.67
60% Powder Amm.Gelatin		8050	14.12	1136.21	1148.07
Total Powder		100213	13.55	13578.93	13964.27
Eagle Brand Fuse	Per C	347946	.5775	2009.39	2142.37
No.6 Blasting Caps	Per M	69740	1.1578	786.60	898.18
Tamping Bags	Per M	13000	1.98	25.85	20.50
Prop: Cost Californian Crimp					17.00
Powder Bags		52	1.268	65.97	46.25
Fuse & Cap Containers		7	2.83	19.84	53.20
Straps for Containers				11.20	
Cap Crimpers					5.85
Total Fuse, Caps, etc.,				2918.85	3183.35
Total All Explosives				16947.78	17147.62
PRODUCT				201,153	198,861
Pounds Powder per Ton of Ore				.498	.518
Cost per Ton for Powder				.067	.070
Cost per Ton for Fuse, Caps, etc.,				.014	.016
Cost per Ton for all Explosives				.081	.086
Development in Rock					
60% Powder L. F. Standard		3250	13.65	443.87	570.63
60% Powder Amm:Gelatin		3820	14.12	539.18	1041.85
Total Powder		7070	13.90	983.05	1612.48
Eagle Brand Fuse	Per C	17517	.5775	101.16	147.58
No.6 Blasting Caps	Per M	4140	1.1578	47.93	83.42
Cap Crimpers					2.25
Prop: Cost Californian Crimp:					5.00
Powder Bags		2	1.25	2.50	
Total Fuse, Caps, etc.,				151.59	237.41
Total All Explosives				1134.64	1849.89
Electric Tram Plant 1 Powder Bag				1.25	
Dry House Expense. 1 Cap Crimper				1.08	
TOTAL EXPLOSIVES AS PER COST SHEET				17634.75	19035.91

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING

a. Comparative Mining Costs

	1930	1929	Increase	Decrease
PRODUCTION	201,153	201,021	132	
Underground Costs	1.303	1.459		.156
Surface Costs	.206	.225		.019
General Mine Accounts	.254	.283		.029
Cost of Production	1.763	1.967		.204
Plant & Equipment	.121	.138		.017
Development	.079	.090		.011
Movable Equipment	.002	.002		
Taxes	.154	.189		.035
Cost on Stockpile	2.119	2.386		.267
Loading & Shipping	.058	.085		.027
Supply Inventory	.004	-	.004	
Cost on Cars	2.181	2.471		.290
Rail Freight	.640	.640		
Lake Freight	.760	.760		
Cargo Insurance & Anal.	.010	.010		
Shrinkage	.028	.031		.003
Total Cost Lower Lake Ports	3.619	3.912		.293
Number of Days Operating	251	292		41
Number of Shifts & Hours	1-8	1-8		
Average Daily Product	745	682		
Cost of Production				
Labor	1.060	1.187		.127
Supplies	.703	.780		.077
	1.763	1.967		.204

Budget - Estimated Cost At Mine	2.534
Actual Cost at Mine	2.181
Difference	.353

b. Detailed Cost Comparison

ACCOUNT
EXPLORING IN MINE

	Amount	Per Ton
Year 1930	4074.75	.020
Year 1929	3633.71	.018
Increase	441.00	.002

In 1930, 816 feet were drilled at a cost of $3.67 per foot, compared with 1190 feet in 1929 at a cost of $2.34. The increased cost for the 1930

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued).

drilling is explained as follows: The hole drilled was an "A" size hole and water under great pressure was encountered near the bottom of the hole which added materially to the cost.

ACCOUNT
DEVELOPMENT IN ROCK

	Amount	Per Ton
Year 1930	$ 7300.98	$ .036
Year 1929	$ 12387.29	.062
Decrease	$ 5086.31	$ .026

In 1930, 954' of rock drifting was done at a cost of $7.65 per foot, compared with 1525' in 1929 at $8.12.

ACCOUNT
DEVELOPMENT IN ORE

	Amount	Per Ton
Year 1930	$ 8780.98	$ .044
Year 1929	12127.36	.062
Decrease	$ 3346.38	$ .018

The decrease is due to less ore development in the 10 months of 1930 than the year 1929. In 1930 we drove 704' Ore Drift and 467' Ore Raise at a cost of $7.50 per foot while in 1929 we drove 622' Ore Drift and 839' Ore Raise at a cost of $8.30.

ACCOUNT
STOPING

	Amount	Per Ton
Year 1930	$ 118032.74	$ .587
Year 1929	129339.62	.650
Decrease	$ 11306.88	$ .063

The 1930 cost is for only 10 months compared with a full year in 1929. The decrease in unit cost is due to increased efficiency by using more scrapers. The tons per man stoping was 12.11 in 1930 and 10.30 in 1929.

ACCOUNT
TIMBERING

	Amount	Per Ton
Year 1930	$ 54883.00	$ .273
Year 1929	58334.15	.293
Decrease	$ 3451.15	$ .020

More small timber was used in 1930 than 1929 reducing the average cost per foot, further the stull timber used per ton of ore was .75 ft. compared with .941 feet the previous year. The unit cost showed a corresponding decrease as the tonnage mined in 10 months of 1930 was greater than that for the year 1929.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
TRAMMING

		Amount		Per Ton
Year 1930	$	17511.95	$	.087
Year 1929		19975.04		.100
Decrease	$	2463.09	$	.013

The decrease is entirely in labor as 1930 cost is for 10 months and 1929 for 12 months. The current charge was practically the same for each year as practically the same tonnage handled in 10 months of 1930 as was during the year 1929.

ACCOUNT
VENTILATION

		Amount		Per Ton
Year 1930	$	104.47	$	.001
Year 1929		399.44		.002
Decrease	$	294.97	$	.001

Only minor repairs made during 1930.

ACCOUNT
PUMPING

		Amount		Per Ton
Year 1930	$	10749.96	$	.053
Year 1929		11818.11		.059
Decrease	$	1068.15	$	.006

Water Pumped in 1930	-	97,639,162 gallons
Water Pumped in 1929	-	108,313,916 gallons
Water Pumped in 1928	-	82,552,319 gallons
Water Pumped in 1927	-	82,829,187 gallons
Water Pumped in 1926	- -	83,223,451 gallons
Water Pumped in 1925	-	56,915,287 gallons

Increase in quantity of water pumped was offset by increased production. Additional water from diamond drill holes and surface due to the settlement of ground south of the Holmes Mine.

ACCOUNT
COMPRESSORS & AIR PIPES

		Amount		Per Ton
Year 1930	$	15,130.94	$	.075
Year 1931		15,696.93		.079
Decrease	$	565.99	$	.004

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

Costs in detail were as follows:

YEAR 1930

	Labor	Supplies	Total
Compressors	$ 522.03	$ 11,722.00	$ 12,244.03
Air Pipes	1,783.06	1,103.85	2,886.91
Total	$ 2,305.09	$ 12,825.85	$ 15,130.94

YEAR 1929

Compressors	$ 675.43	$ 12,174.58	$ 12,850.01
Air Pipes	1,835.99	1,010.93	2,846.92
Total	$ 2,511.42	$ 13,185.51	$ 15,696.93

Compared with ten months of 1929 this account would show an increase due to more piping and operating more air scraper hoists, further the compressor was operated double shift during October on account of rock drifting for the Oliver.

ACCOUNT
BACK FILLING

	Amount	Per Ton
Year 1930	$ 184.00	$ .001
Year 1929	418.60	.002
Decrease	$ 234.60	$ .001

The charge in 1929 was heavy because of breaking rock filling over the hard ore stopes.

ACCOUNT
UNDERGROUND SUPERINTENDENCE

	Amount	Per Ton
Year 1930	$ 8,293.65	$ .041
Year 1929	9,210.91	.046
Decrease	$ 917.26	$ .005

This decrease is explained by the 10 months operation in 1930 compared with 12 months in 1929.

ACCOUNT
COMPRESSORS & POWER DRILLS

	Amount	Per Ton
Year 1930	$ 4,225.41	$ .021
Year 1929	3,016.61	.016
Increase	$ 1,208.80	$ .005

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
COMPRESSORS & POWER DRILLS (Continued)

	YEAR 1930		
	LABOR	SUPPLIES	TOTAL
Compressors	$ 258.88	$ 107.40	$ 366.28
Power Drills		3,859.13	3,859.13
Total	$ 258.88	$3,966.53	$ 4,225.41
	YEAR 1929		
Compressors	$ 241.84	$ 50.52	$ 292.36
Power Drills		2,724.25	2,724.25
Total	$ 241.84	$2,774.77	$ 3,016.61

In 1930 we purchased eighteen RB12 Jackhammer drilling machines at a cost of $3,060.00 and one L74 Drifter at a cost of $338.43 and Line Oilers for all drill machines at a cost of $508.50, while in 1929 we only purchased eleven new drills.

ACCOUNT
HAND TRAMMING EQUIPMENT

	Amount	Per Ton
Year 1930	$ 7,011.71	$ .035
Year 1929	9,381.68	.047
Decrease	$ 2,369.97	$ .012

The detailed cost follows:

	YEAR 1930		
	Labor	Supplies	Total
Cars	$ 496.95	$ 199.44	$ 696.39
Scrapers	2,858.59	2,511.50	5,370.09
Tracks	784.52	160.71	945.23
Total	$ 4,140.06	$ 2,871.65	$7,011.71
	YEAR 1929		
Cars	$ 746.85	$ 515.90	$1,262.75
Scrapers	2,394.31	4,944.59	7,338.90
Tracks	675.89	104.14	780.03
Total	$ 3,817.05	$ 5,564.63	$9,381.68

In Use	1929	1930
Scrapers	16	17
Timber Hoists	17	17
Cars	20	20

The total amount shows a decrease for 1930 account of the 10 months operation. More money was spent on underground tracks. The largest decrease was in scraper supplies as four new hoists were purchased in 1929.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
ELECTRIC TRAM EQUIPMENT

	Amount	Per Ton
Year 1930	$ 5,051.86	$ .025
Year 1929	5,560.81	.029
Decrease	$ 508.95	$ .004

Detailed cost of Electric Haulage Equipment:

YEAR 1930

	Labor	Supplies	Total
Generator Motor	$ 1.50	$ 22.15	$ 23.65
Locomotives	696.53	550.96	1,247.49
Wiring	1,045.40	546.75	1,592.15
Main Line Tracks	1,023.04	143.18	1,166.22
Main Line Cars	691.57	330.78	1,022.35
Total	$ 3,458.04	$ 1,593.82	$5,051.86

YEAR 1929

Generator & Motor	-	-	-
Locomotives	$ 829.54	$ 754.29	$1,583.83
Wiring	765.23	254.78	1,020.01
Main Line Tracks	1,531.22	266.30	1,797.52
Main Line Cars	758.86	400.59	1,159.45
Total	$ 3,884.85	$ 1,675.96	$5,560.81

The decrease for this account due to a 10 months operation was partly offset by the cost of installing new trolley wire throughout the Fourth Level on account of the scraper hoist load.

ACCOUNT
PUMPING MACHINERY

	Amount	Per Ton
Year 1930	$ 669.00	$ .004
Year 1929	2,026.40	.010
Decrease	$ 1,357.40	$ .006

Practically all of the charge for 1930 was for Repairs to Fourth Level Pump.

ACCOUNT
HOISTING

	Amount	Per Ton
Year 1930	$ 13,584.87	$ .068
Year 1929	13,864.80	.070
Decrease	$ 279.93	$ .002

Night shift part of October and overtime hoisting on account of increased production offset part of decrease on account of 10 months operation.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
STOCKING ORE

	Amount	Per Ton
Year 1930	$ 7,347.23	$ .037
Year 1929	8,265.55	.042
Decrease	$ 918.32	$ .005

Decrease is practically all on cost of erection of trestles.

ACCOUNT
SCREENING - CRUSHING AT MINE

	Amount	Per Ton
Year 1930	$ 3,291.31	$ .016
Year 1929	3,312.14	.017
Decrease	$ 20.83	.001

The tonnage handled was the same both years but the increased maintenance expense offset the less labor for the 10 months.

ACCOUNT
DRY HOUSE

	Amount	Per Ton
Year 1930	$ 5,228.00	$ .026
Year 1929	5,622.95	.028
Decrease	$ 349.95	$ .002

The decrease in labor was partly offset by having to charge out more coal during 1930 on account of shortage shown by engineer's estimate.

ACCOUNT
GENERAL SURFACE EXPENSE

	Amount	Per Ton
Year 1930	$ 6,028.80	$ .030
Year 1929	6,591.24	.033
Decrease	$ 562.44	$ .003

Additional labor was employed during October to clean up the mine premises before turning over the property to the Oliver.

ACCOUNT
HOISTING EQUIPMENT

	Amount	Per Ton
Year 1930	$ 3,256.99	$ .016
Year 1929	3,777.05	.019
Decrease	$ 520.06	$ .003

The new hoisting cable installed in June at a cost of $634.00 and new skips put on during the summer.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
SHAFT

	Amount	Per Ton
Year 1930	$ 793.60	$ .004
Year 1929	846.44	.004
Decrease	$ 52.84	$ .000

Repairs about the same for both years.

ACCOUNT
TOP TRAM EQUIPMENT

	Amount	Per Ton
Year 1930	$ 763.29	$ .004
Year 1929	1,136.87	.006
Decrease	$ 373.58	$ .002

The mine was turned over to the Oliver on November 1st the time of year when most repairs are made to the top tram equipment.

ACCOUNT
DOCKS, TRESTLES & POCKETS

	Amount	Per Ton
Year 1930	$ 196.76	$ .001
Year 1929	468.59	.002
Decrease	$ 271.83	$ .001

Very few repairs made to the shaft house pockets or permanent trestles in 1930.

ACCOUNT
MINE BUILDINGS

	Amount	Per Ton
Year 1930	$ 873.29	$ .004
Year 1929	1,289.37	.006
Decrease	$ 416.08	$ .002

The detailed cost was as follows:

	Year 1929	Year 1930
Office	36.72	29.02
Warehouse	27.31	.71
Shops	59.75	20.19
Shaft House	177.36	29.23
Engine House	164.72	26.54
Boiler House	1.14	-
Dry House	516.97	363.57
Coal Dock	15.92	12.19
Miscellaneous	240.65	291.30
Fire Protection	48.83	100.54
Total	1,289.37	873.29

The roofs of all the buildings were given a coat of tar in 1929, besides all the steps in the shaft house were repaired and improvements made to the dry house, explaining the decreased cost for 1930.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
INSURANCE

	Amount	Per Ton
Year 1930	$ 72.80	$ .000
Year 1929	90.67	.000
Decrease	$ 17.87	$ .000

The 1930 insurance is for 10 months.

ACCOUNT
ENGINEERING

	Amount	Per Ton
Year 1930	$ 1,646.38	$ .008
Year 1929	1,682.99	.008
Decrease	$ 36.61	$ .000

Small decrease as considerable engineering required in connection with sale of the mine.

ACCOUNT
MECHANICAL & ELECTRICAL ENGINEERING

	Amount	Per Ton
Year 1930	$ 664.41	$ .003
Year 1929	1,256.97	.006
Decrease	$ 592.56	$ .003

Less Mechanical and Electrical engineering supervision required in 1930.

ACCOUNT
ANALYSIS

	Amount	Per Ton
Year 1930	$ 6,836.71	$ .034
Year 1929	7,940.74	.040
Decrease	$ 1,104.03	$ .006

1930 charges for 10 months only.

ACCOUNT
PERSONAL INJURY EXPENSE

	Amount	Per Ton
Year 1930	$ 9,706.64	$ .048
Year 1929	11,637.66	.058
Decrease	$ 1,931.02	$ .010

2% of payroll charged to this account each month.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
SAFETY DEPARTMENT EXPENSE

	Amount	Per Ton
Year 1930	$ 889.67	$ .004
Year 1929	2,360.32	.012
Decrease	$1,470.65	$ .008

In 1929 a proportion of the Safety Picnic of $1270.05 was charged to this account.

ACCOUNT
TELEPHONES & SAFETY DEVICES

	Amount	Per Ton
Year 1930	$ 909.96	$ .005
Year 1929	920.65	.005
Decrease	$ 10.69	$ .000

Small decrease.

ACCOUNT
LOCAL & GENERAL WELFARE

	Amount	Per Ton
Year 1930	$ 3,435.00	$ .017
Year 1929	3,302.71	.016
Increase	$ 132.29	$ .001

This is a Central Office Charge.

ACCOUNT
SPECIAL EXPENSE PENSIONS AND ALLOWANCES

	Amount	Per Ton
Year 1930	$ 6,864.55	$ .034
Year 1929	7,038.07	.035
Decrease	$ 173.52	$ .001

Small difference.

ACCOUNT
ISHPEMING OFFICE

	Amount	Per Ton
Year 1930	$ 9,954.00	$ .050
Year 1929	11,705.61	.058
Decrease	$ 1,751.61	$ .008

Decrease due to 10 months operation in 1930.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

8. COST OF OPERATING (Continued)

ACCOUNT
MINE OFFICE

	Amount	Per Ton
Year 1930	$10,192.31	$ .051
Year 1929	8,996.17	.045
Increase	$ 1,196.14	$ .006

The 1930 charge to this account is for the entire year and includes charges from the Ishpeming Office.

9. EXPLORATIONS

The diamond drilling program outlined in 1929 was completed in part during 1930. The Oliver Company asked that the drilling be stopped as soon as the sale was closed the middle of October.

The Fourth Level cross-cut that was driven Southwest out into the hanging, disclosed the existence of a fault. The drilling from the end of this drift was to determine if there was any ore faulted below the Fifth Level. The drill holes put down in 1929 proved that there is a mineralized formation below the Fifth Level.

Drill Hole No. 32 started on September 19, 1929 from the end of the Fourth Level cross-cut and was drilled S40° 53' West with a dip of -81°. This hole cut 10 feet of hard ore from 420' to 430' striking dike at 515'. It was stopped at 549' on January 21st, 1930. The ore in this hole is approximately 265' below the Fifth Level elevation and 60' north of the South boundary line between the Holmes and Section 16.

The drilling was temporarily stopped, the machine and crew being transferred to the Morris Lloyd Mine as their work was more rushing than at the Holmes.

Diamond drill Hole No. 33 was started on June 21st, and drilled from the same location as Holes Nos. 30,31 and 32. It was drilled S87° West with a dip of -68°. As this hole was to be drilled to considerable depth an "A" hole was put down. The iron formation was encountered at 553' and cut a hard ore seam of 24½' between 664' and 688½'. This ore is 491' below the Fifth Level. A large flow of water was encountered at a depth of 659'. From this depth on the water pressure in the hole was so great that it was with difficulty that the rods were put down the hole and the water forced down the rods. A high pressure pump was installed but progress was slow. The ore was cut just about the time the Oliver closed the deal for the Holmes Mine and on account of the difficulty of drilling it was stopped at a depth of 706'. The ore in this hole is located 60' East of the West line and 124' North of the South boundary.

HOLMES MINE
ANNUAL REPORT
YEAR 1930

9. EXPLORATIONS
(Continued)

This Hole No. 33 proves that this ore lens widens at depth. The horizontal distance between the ore in Holes Nos. 32 and 33 is about 200', and the vertical distance 226'. Additional drilling will be necessary to prove the merchantability of this ore.

10. TAXES

The taxes assessed to the Holmes Mine for 1930 compared with 1929 follows:

	1930		1929	
	Valuation	Taxes	Valuation	Taxes
Realty SW¼ of SE¼ Section 9	$ 660,000	$ 25,714.59	$ 566,000	$ 21,258.74
Personal	290,000	11,298.84	434,000	16,300.88
Total	$ 950,000	$ 37,013.43	$1,000,000	$ 37,559.62
Collection Fees		370.14		375.60
Total HolmesMine		$ 37,383.57		$ 37,935.22

The Holmes Mine was taken over by the Oliver Iron Mining Company as of November 1st, 1930. Part of the agreement covering the sale requires them to pay one fourth of the 1930 realty taxes. The apportionment is as follows:

	Valuation	Taxes
The C.C.I.Co. 3/4 of Realty	$ 495,000	$ 19,478.81
The C.C.I.Co. All of Personal	290,000	11,411.83
The C.C.I.Co. Opt. Holmes	$ 785,000	$ 30,890.64
The O.I.M.Co. 1/4 of Realty	165,000	6,492.93
Total Holmes Mine	$ 950,000	$ 37,383.57

11. ACCIDENTS &
PERSONAL INJURY

There were three accidents at the Holmes Mine during 1930 compared with 8 in 1929 and 5 in 1928. All three were of a serious nature requiring compensation payments. The total for 1930 was $1,090.00. A short description follows:

Report No. 414 Date: January 28,1930, 10:00 A.M.
Name: Glen Nelson
Cause: This man hooked a defective Block into chain to use as a Snatch Block. When Scraper started to operate hook on Block straightened out, Block flew back and struk him on right hand and left knee.
Nature of Injury: Laceration right middle finger. Fracture left Patella.
Time Lost: 44½ days Compensation Paid: $135.00

HOLMES MINE
ANNUAL REPORT
YEAR 1930

11. ACCIDENTS & PERSONAL INJURY (Continued)

Report No. 415 — Date: April 5, 1930, 3:00 P.M.
Name: Joe Trudell
Cause: Barring down dirt from chute. Chunk struck end of bar, knocked bar out of his hands, bar fell and struck him on head back of right ear.
Nature of Injury: Fracture of skull.
Time Lost: 220 Days

Compensation Paid:	$626.40
Medical Attention:	217.75
Total	$844.15

Report No.416 — Date: Jul7 30,1930, 10:30 A.M.
Name: Frank Suomi
Cause: Suomi was drilling back of stope when drill broke causing machine to swing around and fall striking him on right foot.
Nature of Injury: Fracture of 1st Metatarsal of right foot.
Time Lost: 37 days — Compensation Paid: $111.00

	1930	1929
No Disability Accidents	30	1

18. NATIONALITY OF EMPLOYEES

English	68
Finnish	42
Swedish	27
Norwegian	5
German	1
Italian	1
French	22
Irish	1
Austrian	1
Total	168

MORRIS-LLOYD MINE

ANNUAL REPORT

YEAR 1930

1. GENERAL

Production for 1930 exceeds that of 1929 despite the fact that the mine went on a 5 day a week schedule on July 16. The tons per man per day in 1930 was also the best ever attained.

Ore reserves were again materially added to because the new 6th level Morris Mine, driven over into the Section Six Territory found ore and the new 8th level, Morris Mine also cut considerable ore on Chase Lease No. 9.

There was a change in the mine personnel, Captain Joseph Thomas, taking Captain William Naults place on March 1st.

Every effort was made to improve the safety record. Standard methods of operating and maintaining the haulage system, handling explosives, general mining methods etc., were put into effect. Frequent meetings of all the bosses, superintendents and mine inspector were held for an interchange of ideas and stressing the importance of enforcing compliance with the standards.

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES

a. Production by Grades

The ore produced in 1930 was as follows:

Grade	Tons
Morris	197,768
Morris Manganese	15,124
Morrisville	49,113
Lloyd	52,502
Lloyddale	139,574
Lloyd Silica	11,290
Total	465,371

Production by grades for previous years follows:

Year	Morris	Manganese	Silica	Lloyd	Lloyddale	Total
1925	100,568		59,945	105,316		265,829
1926	110,863	3,436	53,088	49,678	73,097	290,162
1927	173,118	1,357	33,871	58,251	60,217	326,814
1928	134,455	33,347	49,745	32,161	106,447	356,164
1929	196,072	11,310	55,275	59,560	113,213	435,430
1930	197,768	15,124	60,403	52,502	139,574	465,371

b. Shipments

Shipments for 1930 show a large decrease over the previous year. This is evident from the following table:

Grades	Pocket	Stockpile	Total	Total Last Year
Lloyd	24,403	4,406	28,809	179,191
Lloyddale	28,242	21,883	50,125	101,459
Lloyd Silica	11,220		11,220	20,642
Morris	99,548	76,520	176,068	242,740
Morrisville	16,161	2,284	18,445	72,236
Morris Manganese	15,124		15,124	21,966
Total	194,698	105,093	299,791	638,234
Total Last Year	280,931	357,303	638,234	
Decrease	86,233	252,210	338,443	

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES (Continued)

b. Shipments: Continued-

1928	1-8 Hr. Shift 5 days per week.	Jan. 1 to Dec. 31.
1929	1-8 Hr. Shift 5 days per week.	Jan. 1 to April 11.
1929	1-8 Hr. Shift 6 days per week.	April 11 to Dec. 31.
1930	1-8 Hr. Shift 6 days per week.	Jan. 1 to July 16.
1930	1-8 Hr. Shift 5 days per week.	July 16 to Dec. 31.

The tonnage shipped for the past 5 years follows:

Grades	1926	1927	1928	1929	1930
Morris	86,413	148,118	193,093	242,740	176,068
Morris Manganese	3,259	86	22,849	21,966	15,124
Morrisville	12,372	15,790	2,391	72,236	18,445
Lloyd	33,948	58,615	66,440	179,191	28,809
Lloyddale	67,119	53,641	83,736	101,459	50,125
Lloyd Silica	21,664	21,038	24,675	20,642	11,220
Total	224,775	297,288	393,184	638,234	299,791

The ores shipped to the docks and charcoal furnaces follows:

Destination	Tons
L. S. & I. Dock	218,882
Charcoal Furnaces	80,909
Total	299,791

c. Stockpile Balances:

The following are the various grades stocked at the mine on Dec. 31, for the past 6 years;

Year	Morris	Mang.	Morrisville	Lloyd	Lloyddale	Lloyd Silica	Total
1925	164,842		15,579	154,733		14,538	349,872
1926	194,820		34,783	164,763	6,354	14,538	415,259
1927	219,820	1,271	31,786	164,399	12,930	14,579	444,785
1928	167,324	10,656	53,282	124,844	35,939	15,680	407,765
1929	120,656		15,679	5,253	47,693	15,680	204,961
1930	142,356		46,347	28,946	137,142	15,750	370,541

e. Production by Months

Month	Days	Morris	Mang.	M.Ville	Lloyd	Lloyddale	Lloyd Silica	Total	Rock
January	26	18,656		4,072	5,026	9,351	345	37,450	1,452
February	23	15,710	285	4,768	2,039	10,631	552	33,985	147
March	26	18,357	803	3,114	2,562	12,651	1,110	38,597	4,119
April	24	16,077	842	3,727	3,051	12,104	505	36,306	2,436
May	26	17,561	1,324	5,896	4,421	11,848	1,042	42,092	2,334
June	24	19,804	889	3,740	5,201	9,163	941	39,738	1,890
July	23	18,503	1,550	3,962	5,747	12,664		42,426	2,436
August	21	18,186	1,354	4,438	2,544	15,351		41,873	1,071
Sept.	22	13,455	1,454	7,545	1,449	15,535	614	40,052	1,320
October	22½	14,714	1,310	7,600	7,570	11,148	327	42,669	3,060
Nov.	20	13,676	1,587	3,065	5,776	8,626	99	32,829	2,652
Dec.	23	12,808	4,011	3,270	7,057	10,104	104	37,354	2,967
Total	280½	197,550	15,409	54,508	52,536	139,176	6,192	465,371	25,884

MORRIS-LLOYD MINE

ANNUAL REPORT

YEAR 1930

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES (Continued)

f. Production from Chase Leases by Months:

Leases	No. 9	No. 24	No. 25	No. 26	No. 27 & 28	Total
Minimum Yearly Tonnages Required	10,000	15,000	15,000	15,000	22,500	77,500
January	17,214					17,214
February	16,795					16,795
March	16,851					16,851
April	15,282					15,282
May	19,156					19,156
June	19,449					19,449
July	19,652					19,652
August	17,392					17,392
September	16,473					16,473
October	19,113					19,113
November	12,739					12,739
December	16,072					16,072
Totals	206,188					206,188

Production from Leases by Years:

The table that follows shows production from each lease for past few years:

Lease No.	9	24	25	26	27	28	Totals
Minimums	10,000	15,000	15,000	15,000	15,000	7,500	77,500
Year							
1925	72,244	29,526	10,367	2,425			119,562
1926	53,102	47,876	14,604	303			115,885
1927	88,956	48,931	10,040	952			148,879
1928	119,115	20,090					148,205
1929	197,284	8,787					206,071
1930	206,188						206,188

Total Royalties accrued and production from Leases:

No. of Lease	Accrued To Dec. 31, 1930	Mined To Dec. 31, 1930	Balance
9	222,283	1,410,854	1,188,571
24	316,088	231,935	84,153
25	316,088	51,246	264,842
26	306,713	9,043	297,670
27	284,213	178	284,035
28	142,107	0	142,107
Totals	1,587,492	1,703,256	115,764

Table showing balance due on accrued royalties for leases Nos. 9 to 28 inclusive, for past six years:

Year	Tons Accrued	Tons Mined	Balance
1925	1,199,992	878,028	321,964
1926	1,277,492	993,913	283,579
1927	1,354,992	1,142,792	212,200
1928	1,432,492	1,290,997	141,495
1929	1,509,992	1,497,068	12,924
1930	1,587,492	1,703,256	115,764

MORRIS-LLOYD MINE

ANNUAL REPORT

YEAR 1930

2. PRODUCTION, SHIPMENTS & STOCKPILE BALANCES (Continued)

g. Ore Statement:

	Lloyd	Lloyd Dale	Lloyd Silica	Morris	Morris Ville	Hi-Mang	Total	Total Last Year
On Hand Jan.1-30	5,253	47,693	15,680	120,656	15,679		204,961	407,765
Output for Year	52,443	139,176	5,639	197,507	55,197	1540	9465,371	435,430
Transferred	59	398	5,651	261	6,084	285		
Total	57,755	187,267	26,970	318,424	64,792	15,124	670,332	843,195
Shipments	28,809	50,125	11,220	176,068	18,445	15124	299,791	638,234
Balance in Stock	28,946	137,142	15,750	142,356	46,347	0	370,541	204,961
Increase in Output							29,941	
Increase in Ore on Hand							165,580	

h. Delays:

No delays were reported during the year 1930.

3. ANALYSIS

Average Mine Analysis on Output for Year 1930.

Grade	Iron	Phos.	Silica
Lloyd Mine			
Lloyd	59.46	.121	6.12
Lloyddale	57.81	.168	7.42
Lloyd Silica	51.69	.080	17.39
Morris Mine			
Morris	58.97	.063	8.50
Morris Manganese	60.59	.065	6.99
Morrisville	51.75	.064	18.00

Average Analysis on Straight Cargoes for Year 1930.

	Mine Analysis		Lake Erie Analysis	
	Iron	Phos.	Iron	Moisture
Morris Ore	59.14	.068	58.67	9.92

Average Mine Analysis for 1930:
Ores Stocked:

Grade		Iron	Phos.	Silica	Moisture
Morris	Dried	58.80	.066	8.99	
	Natural	52.48	.060	8.02	10.75
Morrisville	Dried	52.00	.067	18.42	
	Natural	46.57	.060	16.49	10.50
Lloyd	Dried	59.10	.125	6.68	
	Natural	52.45	.111	5.93	11.25
Lloyddale	Dried	58.10	.187	7.08	
	Natural	51.56	.166	6.28	11.25

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

3. ANALYSIS

Average Mine Analysis for 1930 (Continued)
Ores Shipped

Grade		Iron	Phos.	Silica	Moisture
Morris	Dried	59.15	.066	8.30	
	Natural	52.80	.059	7.41	10.75
Morrisville	Dried	51.60	.068	18.49	
	Natural	46.18	.061	16.55	10.50
Morris Mang.	Dried	60.80	.053	6.66	
	Natural	54.42	.047	5.96	10.50
Lloyd	Dried	59.50	.108	6.04	
	Natural	52.81	.096	5.36	11.25
Lloyddale	Dried	57.95	.165	7.68	
	Natural	51.43	.146	6.82	11.25
Lloyd Silica	Dried	51.85	.105	16.57	
	Natural	46.15	.094	14.69	11.00

4. ESTIMATE OF ORE RESERVES

Assumption:

12 Cu. Ft. equals one ton
10% deduction for rock
10% deduction for loss in mining.

Ore in Sight as of December 31st, 1930.

MORRIS MINE

Location of Ore	Morris Bessemer Ore.	Morris Ore	Total Tons
Above 7th level, C.C.I.Co. lands,	23,748	151,372	175,120
" " " Chase Lease No. 9	10,990	240,068	251,058
" " " " " No.24		18,011	18,011
" " " " " No.25		22,937	22,937
" " " " " No.26		9,687	9,687
" 8th level, C.C.I.Co. lands,	101,888	298,072	399,960
" " " Chase Lease No. 9	242,380	752,449	994,829
" " " " " No.24		18,394	18,394
" " " " " No.25		10,336	10,336
" " " " " No.26		16,453	16,453
Below 8th level, C.C.I.Co. lands,	16,221	41,070	57,291
" " " Chase Lease No. 9	76,570	229,712	306,282
Total ore in Morris Mine,	471,797	1,808,561	2,280,358

LLOYD MINE

Location of Ore	Lloyd Ore	Lloyddale Ore	Total Tons
Above 3rd level,	25,873		25,873
Above 4th level,	9,353		9,353
Total ore in Lloyd Mine	35,226		35,226

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

4. ESTIMATE OF ORE RESERVES

Ore in Sight as of December 31st, 1930. (Continued)

LLOYD MINE EAST

Location of Ore.	Lloyd Ore	Lloyddale Ore.	Total Tons
Above 3rd Main Sub,	4,565	33,237	37,802
Above 4th Main Sub,	3,290	73,265	76,555
Between 3rd level and 4th Main sub,		93,032	93,032
Above 4th level,	7,179	485,835	493,014
Below 4th level,		221,484	221,484
Above 6th level,		58,219	58,219
Below 6th level,		58,219	58,219
Total ore in Lloyd Mine East,	15,034	1,023,291	1,038,325

SUMMARY OF TOTAL ORE

Mine	Bessemer	Morris	Lloyd	Lloyddale	Total Tons
Morris Mine,	471,797	1,808,561			2,280,358
Lloyd Mine,			35,226		35,226
Lloyd Mine East,			15,034	1,023,291	1,038,325
Total Ore	471,797	1,808,561	50,260	1,023,291	3,353,909

	Tons.
Total ore in Chase Lease No. 9,	1,552,169
Total ore in Chase Lease No. 24,	36,405
Total ore in Chase Lease No. 25,	33,273
Total ore in Chase Lease No. 26,	26,140
Total ore in all leases	1,647,987
Total ore in C.C.I.Co. lands,	1,705,922
Total ore in Morris-Lloyd Mine,	3,353,909

Analysis of Ore in Stock on December 31st, 1930:

Grade	Iron	Phos	Sil.	Mang	Alum	Lime	Mag	Sil	Loss	Moisture
Morris	52.43	.067	7.23	.45	2.28	.73	.26	.012	2.57	10.75
Lloyd	52.29	.112	5.64	.22	2.03	1.05	.34	.011	4.08	11.25
Lloyddale	51.72	.155	6.10	.22	2.35	1.12	.39	.010	4.46	11.25
Morrisville	46.33	.055	16.66	.40	2.45	.88	.33	.010	2.31	10.50
Lloyd Silica	46.81	.073	13.43	.20	2.46	.97	.32	.011	4.04	11.00

NOTE:- The Above are all Natural Analysis.

Analysis of Ore Reserves

Grade	Iron	Phos	Sil.	Mang	Alum	Lime	Mag	Sil	Loss	Moisture
Morris Bess	51.59	.042	6.50	1.00	2.50	.75	.25	.012	3.00	11.25
Morris	52.48	.059	8.02	0.45	2.28	.73	.26	.012	2.57	10.75
Lloyd	52.45	.111	5.93	0.22	2.04	1.05	.34	.011	4.08	11.25
Lloyddale	51.56	.166	6.28	0.22	2.35	1.12	.39	.010	4.46	11.25

NOTE:- The Above are all Natural Analysis.

MORRIS-LLOYD MINE

ANNUAL REPORT

YEAR 1930

4. ESTIMATE OF ORE RESERVES

Estimate tonnage of Ore underground as reported to the State Tax Commission:

Bessemer Grade	Morris Shaft	Lloyd & Lloyd East	Total
Morris Bessemer	471,797		471,797
Non-Bessemer Grades			
Morris	1,808,561		1,808,561
Lloyd		50,260	50,260
Lloyddale		1,023,291	1,023,291
Total	2,280,358	1,073,551	3,353,909

Ore reserves as shown by following table which shows the new ore developed during the year:

	1926	1927	1928	1929	1930
Ore in Mine Jan.1.	3,325,341	2,891,893	2,612,722	2,335,103	3,063,817
Production	290,162	326,814	356,164	435,430	465,371
Balance	3,035,179	2,565,079	2,256,558	1,899,673	2,598,446
Ore in Mine Dec.31.	2,891,893	2,612,722	2,335,103	3,063,817	3,353,909
New Ore Developed.	143,286	47,643	78,545	1,164,144	755,463

1,873941

5. LABOR AND WAGES

a. General

Labor conditions were very satisfactory during 1930. Labor turnover was nil, because of the number of men constantly seeking employment.

b. Comparative Statements:

Product Shifts & Hours:

	1930	1929	Increase	Decrease
Product	465,371	435,430	29,941	
No. of Shifts & Hours	1-8 Hr	1-8 Hr		

AVERAGE NUMBER OF MEN EMPLOYED

Year	Surface	Underground	Total
1921	46	203	249
1922	48	162	210
1923	44	156	200
1924	44	144	188
1925	45	145	190
1926	45	149	194
1927	50	178	228
1928	52	173	225
1929	55	176	231
1930	56½	192½	249

	1930	1929	Increase	Decrease
Surface	56½	55	1½	
Underground	192½	176	16½	
Total	249	231	18	

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

5. LABOR AND WAGES
(Continued)

AVERAGE WAGES PER DAY

	1930	1929	Increase	Decrease
Surface	4.35	4.35		
Underground	5.27	5.08	0.19	
Total	5.06	4.90	0.16	

Year	Surface	Underground	Total
1922	3.72	4.19	4.08
1923	4.12	4.65	4.53
1924	4.29	4.94	4.78
1925	4.34	5.02	4.86
1926	4.32	5.02	4.85
1927	4.33	5.14	4.94
1928	4.34	5.09	4.90
1929	4.35	5.08	4.90
1930	4.35	5.27	5.06

WAGES PER MONTH OF 25 DAYS

	1930	1929	Increase	Decrease
Surface	108.75	108.75		
Underground	131.75	127.00	4.75	
Total	126 .50	122.50	4.00	

PRODUCT PER MAN PER DAY

	1930	1929	Increase	Decrease
Surface	27.65	25.53	2.12	
Underground	8.52	8.22	.30	
Total	6.54	6.22	.32	

Year	Surface	Underground	Total
1920	17.67	4.33	3.48
1921	18.78	4.22	3.44
1922	17.40	5.33	4.08
1923	18.47	5.58	4.28
1924	19.08	6.42	4.80
1925	20.45	6.85	5.13
1926	21.42	6.97	5.26
1927	20.93	6.61	5.02
1928	23.09	7.59	5.71
1929	25.53	8.22	6.22
1930	27.65	8.52	6.54

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

5. LABOR AND WAGES
(Continued)

LABOR COST PER TON

	1930	1929	Increase	Decrease
Surface	.157	.171		.014
Underground	.619	.618	.001	
Total	.776	.789		.013

Year	Surface	Underground	Total
1920	.307	1.482	1.791
1921	.242	1.248	1.490
1922	.214	.786	1.000
1923	.223	.834	1.057
1924	.225	.770	.995
1925	.212	.733	.945
1926	.201	.721	.922
1927	.207	.777	.984
1928	.188	.671	.859
1929	.171	.618	.789
1930	.157	.619	.776

	1930	1929	Inc.	Dec.
Average product Stoping & Tramming.	15.93	15.20	0.73	
Average wages of contract miners.	6.03	5.67	0.36	

TOTAL NUMBER OF DAYS

	1930	1929	Inc.	Dec.
Surface	16,833	17,054¾		221¾
Underground	54,572¼	52,977¼	1,595	
Total	71,405¼	70,032	1,373¼	

AMOUNT FOR LABOR

	1930	1929	Increase	Decrease
Surface	$73,267.74	$74,228.13		$960.39
Underground	287,801.84	269,122.98	$18,678.86	
Total	361,069.58	343,351.11	17,718.47	

PROPORTION SURFACE TO UNDERGROUND MEN

1924	1	to	3.27
1925	1	to	3.22
1926	1	to	3.31
1927	1	to	3.56
1928	1	to	3.33
1929	1	to	3.20
1930	1	to	3.41

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

6. SURFACE

a. Buildings

The old garage having been destroyed by fire in March, a new garage and addition to the steel warehouse was built during the year. A contract was let to the Truscon Steel Company for an addition 16 x 20 and a 34 x 36 foot garage. E & A No. 603 covered the cost and erection of this building.

The section six dry was closed down and all the lockers moved to the Morris shaft dry, which all the men were using in the latter part of the year.

The interior of the Lloyd Mine Engine house was cleaned up and painted.

7. UNDERGROUND

b. Development

LLOYD MINE EAST

One of the most important development projects under taken in the North Lake District for years was driving the sixth level Morris Mine drift over into the Lloyd Mine East territory. The drift was located in the slate foot-wall with the exception of a length of approximately 200 feet in high grade ore.

The new drift 400 feet below the present bottom or 4th level in the East end of the mine runs about 800 feet south of the Lloyd Shaft, and was breasted in slate 2000 feet East of this shaft. A Diamond Drill was drilled south from the end of the drift on the 2500 East coordinate line and this hole cut about 80 feet of ore. There are also three old drill holes Nos. 37, 61, and 64, drilled from surface that show ore below and west of the ore areas on the present 4th level Lloyd Mine East. One of these holes No. 64 cuts the same ore that we found in the new 6th level drift. An aggresive development campaign planned for 1931 will outline the ore area on the new 6th level. If the tonnage developed is large enough the Lloyd Shaft should be deepened 400 feet to the new level and probably two intermediate levels driven 133 feet apart.

MORRIS MINE

The new 8th level added considerably to our ore reserves. The ore area of the main deposit totalled 92,500 square feet on the 7th level and this was increased to 107,675 square feet on the 8th level.

On the plus 30 foot sub level No. 15 contract drove a 400 foot drift connecting all the 8th level raises.

On the 000 foot sub level the width of the main ore body was tested and we found in addition another ore body north of the main deposit. Raises put up in this new find traced the ore to the 7th level where another cross cut proved its position between the main deposit and No. 61 deposit. We know the new find is at least 200 feet high and its width on the 00 sub is 95 feet. The length is undetermined, but it is at least 400 feet long from the information shown in the drill holes on the 8th level.

On the minus 90 foot sub level four cross cuts were driven from as many raises which developed the main ore for a length of 1000 feet and an average width of 80 feet.

On the main 8th level the footwall drift was extended in slate and Jasper across Chase Lease No. 9 and into Chase Lease No. 24 territory. We know the drift near the boundary between Chase Leases Nos. 9 and 24 is close to the ore, because a cut out for a diamond drill hole station on the 2700 west coordinate line encountered the ore.

The main drift along the south side of Chase Lease No. 9, was driven 600 feet west in ore. An intermediate cross cut parallel with the 3500 south coordinate line also showed up 300 feet of ore.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

7. UNDERGROUND

b. Development (Continued)

MORRIS MINE

Another main level drift was driven through the main dike and then the drift swung south west parallel with the dike for 350 feet all in ore.

There is no question, but what the new 8th level will eventually show a total ore area much in excess of any level ever opened up in the North Lake District.

c. Stoping

LLOYD MINE EAST

Third Main Sub Level

In the top of the main deposit in the extreme east end of the mine three subs were worked out by contracts No. 10 and 17 namely, the 1240, 1250 and 1225 foot sub levels. As this area is getting narrower it was decided to sub stope the ore between the 1210 and the 1100 foot elevations. With this in mind a drift was driven east from No. 50 raise on the latter elevation to the crotch between the Jasper foot and the dike hanging.

In No. 12 deposit No. 1 and 3 contract mined out the 1225, the 1210 and the 1200 foot sub levels along the south side of the old workings into No.12 branch raise. Some mining was also done on the 1150 foot sub level in main No. 12 raise.

Fourth Level.

In the main deposit between the 3rd and 4th levels the ore body was mined at various elevations along the hanging, the gangs lowest down being at the west end and the gangs higher up further east.

In the east central part of the deposit the ore was stoped out from foot to hanging between the 900 foot and the 850 foot elevations by No. 9 and 19 contracts.

In the north west limb along the foot the ore was stoped by No. 103 contract from the 890 to the 830 foot sub levels.

In the extreme south east corner the balance of the ore left above the 870 foot sub level was mined up to the 3rd level.

In the west central portion of the main deposit a sub level was mined out at the 830 foot elevation right under the jasper hanging. Lower down to the west under the hanging the 775 and 765 foot sub levels were mined.

In the extreme south west corner contracts No. 3 and 46 stoped out all the ore from the 3rd level to the 830 foot sub level. A new drift was also driven on the 775 foot sub level and new raises put up to the 830 foot elevation with the intention of sub level stoping the ore along the south west side as close to the 4th level as possible.

MORRIS MINE

Sixth Level

A little ore left above the 6th level on the footwall on the east end of Chase Lease No. 9 was mined.

Seventh Level

In the north east corner of the level on the footwall side contracts No. 36 and 64 mined out the 320, 310 and 300 foot sub levels. The latter contract also explored this same ore body at the 210 foot elevation.

On the east side of Chase Lease No. 9 considerable tonnage was mined. Contract No. 33 extended the known limits of No. 61 deposit by outlining an area 225 feet long and about 50 feet wide, south east of their old workings.

In the central part of Chase Lease No. 9 in No. 61 deposit contract No. 62 sliced out the 220, 210, 200 foot sub levels and connected the raises at the 190 foot elevation. East of No. 62 contract No. 33 stoped out the ore pillar left between the 6th level and the 230 foot sub level. North of the Jasper separating No. 62 from No. 65 the latter contract sub stoped an ore body from the hanging down to the 160 foot elevation.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

7. UNDERGROUND

b. Development

MORRIS MINE

Seventh Level (Continued)

In the main or No. 33 deposit contract No. 63 mining just east of Chase Lease No. 9, sliced out four sub levels to the 210 foot elevation.

In the south east corner of Chase Lease No. 9 contracts No. 30 and 39 sliced out three sub levels.

In the south end of the main deposit four contracts Nos. 32, 71, 90 and 92 mined the ore down to the floor of the 7th level.

STOPING TONS PER MAN:

Year	Tons Per Man Stoping
1920	9.27
1921	10.20
1922	13.82
1923	15.54
1924	15.67
1925	17.10
1926	17.33
1927	17.46
1928	20.26
1929	23.29
1930	23.75

Although it is very difficult to further increase the efficiency of the miners, because the mine was 100% mechanized even in 1928 still we made some progress. We hope that the adoption of 9 foot legs and caps for sub level sets will show some further increase in efficiency in 1931.

The following table shows the scraper hoists in service for the past four years.

	1927	1928	1929	1930
Lake Shore Hoists			1	
Sullivan Air Hoists	11	12	12	12
Sullivan Electric Hoists	8	14	18	21
Ingersoll-Rand Air Hoists	5	5	5	5
Ingersoll- Rand Electric Hoists				3
Waugh Electric Hoists	7	7	7	7
Total	31	38	43	48

d. TIMBERING

The amount and cost for timber increased in 1930. Most of the increase was confined to the 8" to 10" size used on sub levels. That is due to the fact that a larger proportion of the ore was mined by the sub level slicing method and a smaller amount came from the sub level stopes.

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

7. UNDERGROUND

d. TIMBERING (Continued)

The timber statement which follows shows the various quantities of timber used during 1930.

	Lineal Feet	Avg. Price Per Foot	Amount 1930	Amount 1929
6" to 8" Timber	93,275	.042	3,896.47	3,083.06
8" to 10" Timber	102,640	.068	7,022.19	5,242.24
10" to 12" Timber	39,001	.091	3,552.40	3,164.06
12" to 14" Timber	9,945	.101	1,002.38	887.51
Treated Timber	3,301	.445	1,468.73	1,545.41
Total Timber 1930	248,170	.068	16,942.17	13,922.28
Total Timber 1929	206.670	.067	13,922.28	
		Per 100 ft.		
5' Lagging - 785 Cords	667,250	.769	5,133.24	4,274.89
7' Lagging	1,225	.650	7.96	
8' Lagging	505,618	.808	4,088.34	5,077.98
Total Lagging	1,174,093	.786	9,229.54	9,352.87
3½' Poles	470,901	1.45	6,852.70	6,609.88
Wire Fencing ÷ 1250 Rods	20,625	4.31	889.88	
Total Poles & Fencing	491,525	1.58	7,742.58	6,609.88
Total Lagging Poles & Fencing 1930	1,665,618	1.02	16,972.12	15,962.75
Total Lagging & Poles 1929	1,677,873	.952	15,962.75	

Product	465,371	435,430
Feet of timber per ton of ore	.533	.474
Feet of Lagging per ton of ore	2.522	2.79
Feet of Lagging Per Foot of Timber	4.731	5.86
Cost Per Ton for Timber	.0364	.0320
Cost Per Ton for Lagging	.0199	.0215
Cost Per Ton for Poles & Fencing	.0166	.0152
Cost Per Ton for All Timber	.0729	.0687
Equivalent of Stull Timber to Board Measure	400,357	341,196
Feet of Board Measure Per Ton of Ore	.860	.783

			Cost per Ton.
Cost of Timber, Lagging, Poles & Fencing	1930	33,914.29	.0729
	1929	29,885.03	.0687
	1928	27,690.94	.0777
	1927	27,993.33	.0857
	1926	21,787.65	.0752
	1925	17,701.50	.0666
	1924	16,664.69	.0676
	1923	15,207.16	.0585

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

7. UNDERGROUND

e. DRIFTING AND RAISING

Year	Total Footage	Ore Drifting	Ore Raising	Rock Drifting	Rock Raising
1924	3,107	1,945	803		359
1925	4,896	2,794	1,288	390	424
1926	5,350	2,249	1,703	868	530
1927	4,845	2,210	2,232	9	394
1928	6,296	3,211	2,778	237	70
1929	13,836	7,096	4,463	2,242	35
1930	8,780	3,646	2,073	3,061	

Although the table would indicate that less development work was done in 1930 than in 1929, actually the reverse is true. The facts are that in 1930 no footage was reported as development work unless the drifts were driven in new ore bodies whereas in previous years all ore drifts, except those on the regular mining sub levels, were included in ore development.

f. STATEMENT OF EXPLOSIVES USES:

BREAKING ORE & ROCK DEVELOPING 1930.

KIND	QUANTITY	AVERAGE PRICE	AMOUNT 1930	AMOUNT 1929
Breaking Ore				
40% Powder	1,000	12.00	120.00	
60% Powder	92,450	14.25	13,174.13	27,991.18
Gelamite Powder 1x & 2x.	107,150	12.85	13,768.34	
Total Powder	200,600	13.50	27,062.47	27,991.18
Fuse	594,599	5.83	3,462.55	3,430.72
Blasting Caps	106,344	11.62	1,234.69	1,309.25
Tamping Bags	25,000	19.10	47.75	81.75
Hand Crimpers				2.41
Cap Sealing Compound	7		4.20	1.20
Total Fuse, Caps, Etc.,			4,749.19	4,825.33
Total Explosives			31,811.66	32,816.51
Product			465,371	435,430
Pounds Powder Per Ton of Ore			.431	.451
Cost Per Ton for Powder			.058	.064
Cost Per Ton for Fuse Caps, Etc.,			.010	.011
Cost Per Ton for All Explosives			.068	.075
Development in Rock				
60% Powder	22,700	14.25	3,234.75	5,500.52
Gelamite Powder 1x	32,192	12.80	4,120.24	
Total Powder	54,892	13.40	7,354.99	5,500.52
Fuse	98,749	5.92	584.49	458.20
Blasting Caps	14,505	11.60	168.23	138.10
Connecting Wire				1.38
Cap Sealing Compound	1		.60	4.04
Total Fuse, Caps, Etc.,			753.32	601.72
Total Explosives			8,108.31	6,102.24

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

. UNDERGROUND

f. STATEMENT OF EXPLOSIVES USED
BREAKING ORE & ROCK DEVELOPING 1930: (Continued)

Rock Drifting	3061 Ft.	
Cost Per Foot for Powder	2.403	
Cost Per Foot for Fuse, Caps, Etc.,	.246	
Cost Per Foot for All Explosives	2.649	
Grand Total Explosives Used in Mine	39,919.97	38,918.75
Average Price Per Pound for Powder	.1249	.1425

We have again decreased the amount and cost per ton for powder as shown by the following summary, viz:-

	Pounds Powder Per Ton of Ore	Cost Per Ton For All Explosives
Year 1927	.500	.0890
Year 1928	.473	.0847
Year 1929	.451	.0750
Year 1930	.431	.0680

The reasen for this is due to changing the kind of powder during the last half of 1930. For the first six months 60% Gelatine Powder was used and for the last six months Gelamite 1x and 2x powder was used. The following table clearly shows the saving per ton.

	Kind of Powder	Cost of Powder	Tons Broken	Lbs Per Ton	Cost Per Ton
First 6 Months	60% Gelatine	14,346.76	228,168	.444	.063
Last 6 Months	1x&2x Gelamite	12,595.71	237,203	.415	.053

. COST OF OPERATING

a. The total cost at the mine for the past few years follows. It is not possible to compare the cost of production as in previous years because a change in the make up of the cost sheet now throws such expenses as Ishpeming Hospital operating loss, Central Office Expense, Mechanical Dep't Expense, etc., into the cost of production for 1930 whereas those items previously were only included in the total cost at the Mine.

Cost At Mine

Year	Production	Daily Product	Total Cost.
1930	465,371	1,659	1.870
1929	435,430	1,501	1.881
1928	356,164	1,362	2.029
1927	326,814	1,224	2.269

MORRIS LLOYD MINE

ANNUAL REPORT

YEAR 1930

8. COST OF OPERATING (Continued)

Comparative Mining Costs	1930	1929	Inc.	Dec.
Product	465,371	435,430	29,941	
Underground Costs	1.122	1.095	.027	
Surface Costs	.169	.158	.011	
General Mine Expenses	.195	.219		.025
Cost of Production	1.485	1.472	.013	
Depreciation	.220	.219	.002	
Taxes	.140	.135	.005	
Loading And Shipping	.025	.055		
Total Cost At Mine	1.870	1.881		.011
No. of Days Operating	280½	290		9½
No. of Shifts & Hours	1-8 Hr.	1-8 Hr.		
Average Daily Product	1,659	1.501	158	

Detailed Cost Comparison

Exploring in Mine

	Amount	Cost Per Ton
Year 1930	6,852.51	.015
Year 1929	0.00	.000
Increase	6,852.51	.015

No. exploring was done with the diamond drill in 1929. Cost for 1930 includes a portion of the Ishpeming Office Geological Department Expense, also a part of the Hard Ore Shop diamond setter's salary, a portion of the diamond drill foremans time as well as the cost of operating the drill at the mine.

Development in Rock

	Amount	Cost Per Ton
Year 1930	33,887.28	.073
Year 1929	23,652.62	.054
Increase	10,234.66	.019

Rock drifting in 1930 totalled 3251 feet compared with 2029 in 1929. The cost per foot for 1930 was $10.42 while in 1929 the figure was higher. In 1928 rock drifting cost more per unit than in 1929.

Year 1930	Cost Per Foot	$10.42
Year 1929	Cost Per Foot	11.66
Year 1928	Cost Per Foot	12.81

As more rock drifting was done in 1930 than for some years past, we were better organized and if we had not experimented with the scraper slide in the 6th level, Morris Shaft drift, I feel confident that we would have shown a still lower cost per foot.

Development in Ore

Year 1930	32,267.77	.069
Year 1929	27,277.19	.063
Increase	4,990.58	.006

As the cost sheet does not show the realcost per ton of ore broken in Devel. work, the following table is added:-

		Tons Broken Dev. Ore	Cost Per Ton
Year 1930	32,267.77	38,634	.831
1929	27,277.19	32,705	.834

It Will be noted that there is actually a small decrease in the cost per ton for ore broken in development work.