

**THE CLEVELAND - CLIFFS IRON CO.**  
**Ore Mining Department**  
**ANNUAL REPORT OF GENERAL MANAGER**  
**For Year Ending December 31, 1944**

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THE CLEVELAND-CLIFFS IRON COMPANY  
ORE MINING DEPARTMENT  
MANAGER'S ANNUAL REPORT  
YEAR 1944  
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28-15-1  
E. B. GREENE

Ishpeming, Michigan  
March 26, 1945



Mr. E. B. Greene, President  
Cleveland, Ohio

Dear Sir:-

The following report is a brief summary of the Mining Department operations for the year 1944. Detailed reports of the Heads of Departments, and Mine Superintendents for the Michigan Mines, Mesaba District, the Safety Department, Engineering and Geological Departments, Welfare Department and Cliffs Power & Light Company, are sent to the Cleveland office under separate cover for assembling and binding. Other yearly data and maps have already been forwarded or will be sent as soon as they have been completed.

There were several changes in the administrative staff. Mr. G. R. Jackson retired as General Superintendent on May 1st. W. W. Graff died on October 2nd. James S. Westwater was made Assistant Superintendent of the Princeton Mine with general oversight over the Gwinn District, upon Mr. Jackson's retirement. On May 1st H. O. Moulton was made Superintendent of the Tilden property in addition to his duties as Superintendent of the Maas Mine. Curtis R. Sundeen was promoted from the Engineering Department to Assistant Superintendent of the Athens Mine on September 1st. The appointment of Grover J. Holt as Chief Engineer, and Carl Brewer as Recorder, were announced by Mr. E. B. Greene late in 1944, to be effective as of January 1st 1945. J. W. Whiting retired as Chief Shipping Clerk on December 31st, to be replaced by Alex Ham.

There were several changes on the Ishpeming Hospital staff, Dr. J. D. Sarven resigned on February 15th, and Dr. H. J. Treshler joined the staff on June 1st. Dr. W. A. Corcoran elected to take up private practice on August 1st. There were 37 changes in the hospital personnel in 1944 out of a total force of 45. Georgia Holmes, Superintendent, resigned on September 25th and was replaced by Margaret B. Berg.

Because of inductions and enlistments in the armed forces, coupled with the loss of men to the more glamorous jobs on surface in war plants and shipyards, the working schedule had to be reduced at all of our soft ore properties and open pits. On July 1st, the Athens, Cambria-Jackson, Lloyd, Maas, Negaunee, Princeton, Spies Virgil and Tilden Mines went on a forty hour per week schedule, eliminating the mining of ore on the Saturday day shift. The Cliffs Shaft and the Mather Mines remained on a 48 hour per week basis with the Mather reducing to forty hours on August 1st. The Canisteo, Holman and Hill Trumbull reduced from six days to five days operation on September 1st.

Production continued to decline, the Michigan mines hoisting 3,556,824 tons of ore in 1944 compared with 3,953,526 tons in 1943. The Holman, Hill Trumbull and Canisteo produced 2,400,481 tons last year which is 141,452 tons less than the 1943 output. At most properties the decrease

E. B. GREENE

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was due to loss of manpower but in the case of the Negaunee Mine and the Spies Virgil in particular, loss of product was also caused by exhaustion and decreased ore areas available for mining.

Efficiency tended to lower, particularly in the summer and fall. Absenteeism increased. As mentioned last year, many of our miners have advanced in age to the point where they are slowing up. Replacements, when they could be secured, were largely 4-F, former service men, and older men who normally would not be employed by our industry. Another group seeking employment were those trying to get into an essential industry merely to avoid the draft. That kind of labor in particular is never efficient because those men are not interested in learning the art of mining.

In order to secure greater recovery from the crude ores on the Mesaba, and in particular to lower the silica content in the finer ores, constant experimenting was carried on at concentrators and the Hill Trumbull heavy density cone plant. We have committed ourselves to discarding the Akins classifiers at the Hill Trumbull cone plant and Stearns-Roger media concentrators will be installed. An experimental media machine gave an improved product last season. The Canisteo flow sheet will be split in 1945 by running half of the mill with Akins classifiers and the other half with Stearns-Roger concentrators. At the Holman an experimental hydro-separator captured enough commercial ore in 1944 from the tailings to warrant a larger installation in 1945, which will consist of three units, hydro-separator, hydrotator, and Dooroco sizer.

One of the most forward steps taken on the Mesaba Range was the erection and equipping of the test laboratory at the Holman property. The primary purpose of this plant is to pre-test the samples from the structure drill holes so that the electric shovels can be shifted more intelligently to load out and grade the crude that will enable the concentrator to produce the largest recovery of standard ore. We have been under the handicap of not knowing whether the ore is wash or jig until a considerable tonnage would be sent to the concentrator and the beneficiated product would run too high in silica. Three or four hours might elapse before the trouble could be corrected.

The Minerals Separation North American Corporation continued to experiment with the tailings at the Canisteo washing plant. These are being produced at no cost to us.

To indicate how the volume of employment has decreased, the following data is taken from statistical information furnished the U. S. Department of Labor:

Volume of Employment January 1, 1943	
Minnesota operations.....	575
Michigan operations.....	2846
Volume of Employment July 1st, 1943	
Minnesota operations.....	682
Michigan operations.....	3152*

\*Cambria Jackson included - excluded from January 1st figures.

Volume of Employment January 1, 1944	
Minnesota operations.....	542
Michigan operations.....	2986
Volume of Employment July 1, 1944	
Minnesota operations.....	603
Michigan operations.....	2819
Volume of Employment January 1, 1945	
Minnesota operations.....	451
Michigan operations.....	2443

The Mining Department now has 964 in the armed services, 743 from the Michigan mines and 221 from Minnesota. 73 returned veterans are currently employed by the Company.

The total ore reserves in the Michigan mines increased as a result of development and diamond drilling. Mines like the Negaunee and Virgil did not develop enough new ore to off-set the 1944 production but all of the others showed an increase, as is evident from the following figures:

Reserve tonnages as reported to the Michigan State Tax Commission

	<u>Dec. 31, 1943</u>	<u>Dec. 31, 1944</u>	<u>Increase</u>
Standard Ores	19,827,872	19,958,471	130,599
High Sulphur Ores	3,757,859	5,399,467	1,641,608
Total	23,585,731	25,357,938	1,772,207

Year end figures for the Mesaba Range Mines

Holman	10,455,599	9,584,503	- 871,096
Hill Trumbull	3,828,370	3,041,220	- 787,150
Canisteo	6,088,360	6,195,550	+ 107,190
Total	20,372,329	18,821,273	- 1,551,056

The Mesaba Range figures are those reported to the Minnesota State Tax Commission.

The Mining Department severity and frequency accident record for the past year was better than for 1943. The fatality rate in 1944 was 0.84 and in 1943 the figure was 1.11. The number of man shifts worked and the number of tons of ore mined per fatality for 1943 and 1944 were as follows:

	<u>Number of man days worked per fatality</u>	<u>Number of tons of ore mined per fatality</u>
1943	269,351	1,624,315
1944	331,090	1,995,787
Average for 14 years 1931 to 1944 inclusive	281,551	1,729,317

The accident frequency and severity rates for 1943 and 1944 for all compensable accidents follow:

	<u>Frequency</u> <u>Rate</u>	<u>Severity</u> <u>Rate</u>
1943 - C.C.I.Co.	20.30	3.986
1944 - C.C.I.Co.	15.61	3.242
1943 National ratings - all mining	45.56	8.23
1943 National ratings - metal mining	23.85	6.17
1943 National ratings - open cut mining	17.85	4.57


Considerable progress was made to eliminate the dust hazard in the Company's operations. The open pit mines, concentrators and shops were surveyed for dust exposure and the Saranac controls established for the Mesaba operations. Improved mine ventilating fans were installed at several properties and extra personnel employed to keep close control over dust hazards. All methods for eliminating dust are simple but require constant watching and supervision. The adoption of definite limits of dust particles per cubic foot, as for instance 10,000,000 in ore and not more than 5,000,000 in rock, is desirable. Our average for all of the mines the past year was only slightly above those limits but our objective in 1945 will be to get below the suggested totals.

The fire patrol inspections proved very worth while when they discovered an incipient fire in the Cambria Jackson Mine which was put out with no loss in production. The monetary loss from this fire was negligible.

Many grievances and differences of opinion between the men and our administrative staff were settled during the year. Not a single grievance got to stage 4, requiring an arbitrator or conciliator, which I believe reflects credit on both the company and the union. Every grievance was cleared through Francis Bell and John Gannon. The number of grievances formally presented over the signatures of the committees of the various locals totalled 17. 14 were settled in favor of the Company and 3 in favor of the union.

As in 1943, during the past year all of the administrative staff spent a great deal of time dealing with labor matters, grievances, wage adjustments, government regulations, rationing, priorities, deferments, etc. It is our combined great regret that more attention could not have been given to problems in connection with mining methods, mechanical and geological matters, water drainage, sampling and analysis so as to improve efficiency and lower costs.

Yours very truly



Manager

THE CLEVELAND-CLIFFS IRON COMPANY  
MINING DEPARTMENT  
COMPARATIVE FIGURES FOR 1944 AND 1943 OF THE SEVEN PRINCIPLE PRODUCING MINES

YEAR 1944

MINE	PRODUCTION	COST OF PRODUCTION		TOTAL COST	
		PER TON	AMOUNT	PER TON	AMOUNT
Athens .....	421,153	2.667	1,123,213.84	3.206	1,350,151.91
Cliffs Shaft .....	587,051	2.710	1,591,092.92	3.129	1,837,117.99
Cambria-Jackson ....	282,184	2.327	656,637.11	2.695	760,394.11
Lloyd .....	376,758	2.295	864,793.84	2.610	983,509.37
Maas .....	578,307	2.468	1,427,355.01	3.003	1,736,401.85
Negaunee .....	757,677	1.696	1,284,789.87	2.091	1,584,451.16
Princeton .....	216,512	2.448	530,099.84	3.914	847,374.43
Total .....	3,219,642	2.323	7,477,982.43	2.826	9,099,400.82

YEAR 1943

Athens .....	517,814	2.466	1,276,725.53	2.944	1,524,457.58
Cliffs Shaft .....	634,628	2.579	1,636,747.63	2.956	1,876,043.96
Cambria-Jackson ....	147,700	2.658	392,643.56	2.964	437,785.12
Lloyd .....	494,042	2.023	999,470.61	2.277	1,125,188.54
Maas .....	713,069	2.282	1,627,380.65	2.682	1,912,866.38
Negaunee .....	954,990	1.697	1,620,289.37	2.064	1,971,285.60
Princeton .....	227,185	2.521	572,792.37	3.800	863,222.57
Total .....	3,689,428	2.202	8,126,049.72	2.632	9,710,849.75

1944

Decrease in product.	469,786		
Increase in cost ...		.121	.194
Percent .....	12.7%	5.5%	7.4%

WAGES: Effective April 1, 1943 wages were increased by .05<sup>1</sup>/<sub>2</sub> per hour and was retroactive to July 13, 1942. The penalty cost on overtime decreased \$91,294.74 in 1944 due to the Soft Ore Mines going from 16 Shifts per week to 10 Shifts per week effective July 1st throughout the balance of the year.

	PENALTY COST	EFFECT ON COST OF PRODUCTION
1944 .....	\$ 232,899.17	.0666 Per Ton
1943 .....	324,193.91	.0814 " "
Decrease .....	\$ 91,294.74	.0148 Per Ton

The cost of supplies increased .0673 in 1944 compared with 1943. - .5902 in 1944 and .5229 in 1943.

The cost per ton for lumber and timber increased .0194 and electric power increased .0259 over 1943 costs.

THE CLEVELAND-CLIPPS IRON COMPANY  
MINING DEPARTMENT  
A COMPARISON OF MINING DEPARTMENT MICHIGAN ASSESSED VALUATIONS AND  
TOTAL TAXES PAID FROM YEAR 1929

YEAR	THE C.C.I.CO.	THE NEGAUNEE MINE CO.	THE ATHENS IRON MINING	THE C.P.&L.CO.	TOTAL FOUR COMPANIES	CHANGES FROM PREVIOUS YEAR
<u>ASSESSED VALUATION</u>						
1929 -	\$ 13,291,521	5,284,600	2,586,500	1,318,198	22,480,819	
1930 -	14,169,590	4,884,400	2,436,500	1,370,445	22,860,935	I 380,116
1931 -	13,867,696	4,635,700	2,536,500	1,539,428	22,579,324	I 218,389
1932 -	12,815,645	4,185,700	2,226,500	1,447,936	20,715,781	D 1,863,543
1933 -	9,850,359	3,554,400	2,036,500	1,419,565	16,860,824	D 3,654,957
1934 -	10,002,373	3,196,400	2,077,800	1,418,887	16,695,460	D 165,364
1935 -	10,062,288	3,057,770	1,929,520	1,424,711	16,474,289	D 221,171
1936 -	10,263,100	3,107,500	1,929,520	1,424,281	16,724,401	I 250,112
1937 -	11,589,306	3,350,000	2,242,900	1,442,555	18,624,761	I 1,900,360
1938 -	12,959,542	3,124,100	2,532,900	1,447,843	20,064,385	I 1,439,624
1939 -	13,090,541	3,267,300	2,683,400	1,981,982	21,023,223	I 958,838
1940 -	12,185,132	3,692,700	2,683,400	2,003,335	20,564,567	D 458,656
1941 -	11,202,237	4,644,430	2,683,400	2,004,379	20,534,446	D 30,121
1942 -	10,628,886	5,461,800	2,759,000	2,016,245	20,865,931	I 331,485
1943 -	11,936,427	5,418,800	2,785,300	2,134,715	22,275,242	I 1,409,311
1944 -	12,196,760	5,153,260	2,868,550	2,134,755	22,353,325	I 78,083
<u>TAXES PAID</u>						
1929 -	\$ 476,740.79	199,695.33	97,739.13	55,233.01	829,398.26	
1930 -	522,901.50	190,689.79	95,122.50	61,352.11	870,064.90	I 40,666.64
1931 -	507,175.34	183,218.38	100,251.06	65,344.18	855,988.96	D 14,075.95
1932 -	377,700.32	120,527.71	65,264.22	46,897.77	610,390.02	D 245,598.94
1933 -	261,765.08	99,599.60	57,065.71	36,067.26	454,497.65	D 155,892.37
1934 -	267,327.80	86,527.53	56,246.84	31,256.06	441,358.23	D 13,139.42
1935 -	279,734.41	95,226.14	60,089.81	29,817.75	464,868.11	I 23,509.88
1936 -	302,207.99	107,061.43	66,447.06	30,066.37	505,782.85	I 40,914.74
1937 -	345,790.20	120,097.50	80,366.44	30,024.80	576,278.94	I 70,496.09
1938 -	415,719.34	118,534.83	96,103.47	30,227.17	660,584.81	I 84,305.87
1939 -	415,979.65	120,806.75	99,217.45	37,997.17	674,001.02	I 13,416.21
1940 -	376,744.89	130,696.88	95,075.43	39,698.46	642,215.63	D 31,785.39
1941 -	340,282.83	156,845.98	90,003.76	39,846.19	626,978.76	D 15,236.87
1942 -	321,091.31	182,845.08	91,057.97	37,686.66	632,681.02	I 5,702.26
1943 -	380,652.40	202,371.63	107,251.69	40,623.07	730,898.79	I 98,217.77
1944 -	430,741.86	206,240.63	121,015.20	40,577.13	798,574.82	I 67,676.03

NOTES:- The Cliffs Power & Light Company - Beginning with 1939 the valuation represents a figure either determined or approved by the Michigan State Tax Commission.

The 15 Mill Tax Amendment went into effect in year 1933.

The State Sales Tax became effective July 1933.

Morris Mine taxes are paid by Inland Steel Co., beginning with 1933. The valuation and taxes for that year being \$1,005,024 and \$21,042.48, respectively.

The Negaunee Mine Co., beginning with 1940, both valuation and taxes, include new acquisitions and that part paid by The C.C.I.Co., is included in Negaunee Mine column and likewise deducted from The C.C.I.Co., valuation and taxes.

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

	1 9 4 1	1 9 4 2	1 9 4 3	1 9 4 4
PRODUCT - Tons .....	658,747	713,530	634,628	587,051
<u>POWDER</u>				
Pounds - Gelamite "2X" .....	581,050	593,600	625,100	585,750
60% Gelatine .....	3,950	55,200	11,000	
Total Pounds Powder .....	585,000	648,800	636,100	585,750
Total Cost .....	67,130.89	74,716.90	73,151.25	67,367.00
Fuse - Feet .....	1,012,600	1,144,340	1,029,300	836,561
Caps - Number .....	154,500	172,820	154,000	136,500
Duplex Shot Wire .....	21,550	30,870	48,710	26,480
Electric Caps .....	8,044	8,611	14,224	15,498
Fuse Lighters .....	49,000	53,300	47,500	35,000
Connecting Wire .....				637
Tamping Bags .....	54,800	53,500	15,000	35,000
Powder Bags .....				
Total Cost - Fuse, Caps, etc. ....	9,563.11	11,042.52	10,729.02	9,562.74
Total Cost - All Explosives .....	76,694.00	85,759.42	83,880.27	76,929.74
Average Price per pound - Powder .....	.1150	.1150	.1150	.1150
Cost per ton - Powder .....	.1019	.1047	.1152	.1148
Cost per ton - Fuse, etc. ....	.0145	.0155	.0169	.0163
Cost per Ton - All Explosives .....	.1164	.1202	.1321	.1311
Pounds Powder per ton of ore .....	.8880	.9092	1.0020	.9980

1944 Production decreased 47,577 tons or 7.5% compared with 1943.  
The average price per pound for powder was the same in the two years.  
The cost per ton for all explosives was practically the same in the two years.

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

	1941	1942	1943	1944
PRODUCT - Tons .....	3,242,771	3,494,309	3,178,907	2,700,228
<u>POWDER</u>				
Pounds - 40% .....				815
- 50% .....	5,600	7,300		
- 60% .....	29,753	59,875	58,100	74,070
- 1X and 2X Gelamite .....	1,380,103	1,514,069	1,345,292	1,093,650
Total Pounds - Powder.	1,415,456	1,573,944	1,403,392	1,168,535
Total Cost-Powder ....	\$ 162,750.17	181,126.68	161,384.48	134,423.51
Fuse - Feet .....	5,109,955	5,428,099	5,296,582	4,190,851
Caps - Number .....	726,208	769,919	726,184	599,138
Leading Wire - Feet .....	3,500	3,000	1,885	4,000
Connecting Wire - Pounds .....	106	138	65	172
Tamping Bags - Number .....	133,800	150,400	157,700	96,450
Sealing Compound - Pints .....				
Powder Bags .....	177	167	204	93
Fuse Lighters .....	134,850	140,250	137,200	121,084
Electric Exploders .....	10,876	11,895	10,716	11,619
Blasting Machines .....				
Master Fuse Lighters .....	3,416	9,450	10,441	1,548
Total Cost-Fuse, Caps, Etc.	37,824.68	41,175.44	39,381.05	31,530.09
Total Cost-All Explosives ..	200,575.32	222,302.12	200,765.53	165,953.60
Average Price Per Pound - Powder .	.1150	.1150	.1150	.1150
Cost Per Ton - Powder .....	.0502	.0518	.0508	.0498
Cost Per Ton - Fuse, Caps, Etc ...	.0117	.0118	.0124	.0117
Cost Per Ton - All Explosives	.0619	.0636	.0632	.0615
Pounds of Powder Per Ton of Ore ..	.4364	.4504	.4414	.4328

NOTE: - The mines included in above statement are, Athens, Maas, Negaunee, Lloyd Virgil, Princeton and Cambria-Jackson.  
1944 Production decreased 478,679 tons or 15% compared with 1943.  
The average price per pound for powder and cost per ton for all explosives was practically the same for the years 1943 and 1944.

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

	1941	1942	1943	1944
PRODUCT - Tons .....	3,242,771	3,494,309	3,178,907	2,700,228
<u>TIMBER</u>				
Feet - 6-8" .....	591,614	556,638	751,812	533,365
8-10" .....	396,935	367,747	311,432	266,988
10-12" .....	570,415	642,825	584,188	495,134
12-14" .....	230,706	266,819	347,562	274,828
14-16" .....	14,419	12,555	27,876	21,906
Treated Timber .....	526	4,785	741	250
Total Feet .....	1,604,615	1,851,369	2,023,611	1,592,471
Total Cost .....	\$ 127,923.50	155,394.02	199,569.46	174,030.56
<u>LAGGING</u>				
Feet - 5 .....	11,270	2,800	9,933	
7 .....	7,789,971	8,857,020	8,815,982	7,508,090
Total Feet .....	7,801,241	8,859,820	8,825,915	7,508,090
Total Cost .....	\$ 61,116.88	82,967.91	90,857.37	106,325.33
Poles - Feet .....	5,885,273	6,048,020	6,488,241	5,616,789
Poles - Cost .....	\$ 77,787.92	101,577.72	117,610.72	113,484.62
Wire Fencing - Rods .....	2,447	1,555	1,686	1,147
Wire Fencing - Cost .....	2,470.84	1,634.83	1,720.97	1,159.38
Total Cost - All Timber .....	\$ 269,298.94	341,574.48	409,758.52	394,999.89
Average Cost Per Foot - Timber .....	\$ .0797	.0839	.0986	.1093
" " " 100' - Lagging .....	.7834	.9364	1.065	1.416
" " " 100' - Poles .....	1.322	1.6795	1.812	2.020
" " " Rod - Fencing .....	1.009	1.051	1.021	1.011
Feet of Timber Per Ton of Ore .....	.495	.530	.637	.590
" " Lagging " " " " .....	2.406	2.535	2.682	2.780
" " Poles " " " " .....	1.815	1.731	2.041	2.080
" " Fencing " " " " .....	.012	.0073	.0087	.007
Cost Per Ton for Timber .....	\$ .0394	.0445	.0628	.0644
" " " " Lagging .....	.0188	.0237	.0286	.0394
" " " " Poles .....	.0240	.0291	.0370	.0420
" " " " Wire Fencing .....	.0008	.0005	.0005	.0005
Total Cost Per Ton .....	.0830	.0978	.1289	.1463

NOTE: The Mines included in above statement are, Athens, Maas, Negaunee, Lloyd, Virgil, Princeton and Cambria-Jackson.  
 1944 Production decreased 478,679 tons or 15% compared with 1943.  
 The total cost per ton for all timber in 1944 increased .0174 or 13.5% compared with 1943.  
 This is accounted for in the increase in cost of Timber, Lagging and Ples.

		AVERAGE PRICE			
		1944	1943	Increase	Percent
JSM:RN	All timber - Cost Per Foot	.1093	.0986	.0107	11
3-9-45	Lagging - Per 100 Lin Feet	1.416	1.065	.351	33
-3-	Poles - " " " "	2.020	1.812	.208	11½



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

SOFT ORE MINES

	1941		1942		1943		1944	
PRODUCT - Tons .....	3,242,771		3,494,309		3,178,907		2,700,228	
<u>CLASSIFICATION</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>
General Supplies .....	171,462.86	.0529	156,046.21	.0447	127,302.86	.0400	137,163.65	.0507
Iron and Steel .....	47,764.92	.0147	48,634.64	.0139	49,137.31	.0155	52,197.63	.0198
Machinery .....	122,755.28	.0378	88,089.44	.0253	71,498.54	.0225	61,542.27	.0228
Explosives .....	200,860.70	.0619	218,427.41	.0625	202,625.24	.0637	167,982.88	.0622
Lumber & Timber .....	296,315.16	.0914	371,563.75	.1063	447,172.36	.1407	432,768.85	.1601
Fuel .....	17,071.97	.0053	23,571.18	.0067	29,523.80	.0093	34,429.02	.0127
Electric Power .....	444,596.71	.1372	470,499.99	.1346	499,761.56	.1572	494,302.75	.1831
Miscellaneous .....	39,643.73	.0122	103,397.23	.0302	192,730.29	.0606	185,608.31	.0686
Total .....	1,340,471.33	.4134	1,482,229.85	.4242	1,619,751.96	.5095	1,565,995.36	.5800

HARD ORE MINES

	1941		1942		1943		1944	
PRODUCT - Tons .....	658,747		713,530		634,628		587,051	
<u>CLASSIFICATION</u>								
General Supplies .....	62,604.40	.095	61,270.59	.086	39,810.89	.063	40,688.16	.069
Iron & Steel .....	43,819.99	.066	43,009.66	.061	37,083.42	.058	39,443.60	.068
Machinery .....	55,561.35	.084	35,466.73	.049	24,381.96	.039	23,556.93	.040
Explosives .....	76,700.80	.117	85,759.42	.120	83,880.27	.132	76,929.74	.131
Lumber and Timber .....	11,543.83	.017	11,518.56	.017	11,464.17	.018	15,980.43	.027
Fuel .....	5,421.96	.008	5,263.55	.007	5,921.98	.009	5,988.68	.010
Electric Power .....	101,144.56	.154	104,081.28	.146	107,603.42	.170	111,649.01	.190
Miscellaneous .....	24,027.11	.037	39,067.53	.054	64,266.13	.101	60,069.89	.103
Total .....	380,824.00	.578	385,437.32	.540	374,412.24	.590	374,306.44	.638

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NOTES 1944. Soft Ore Mines production decreased 478,679<sup>tons</sup> or 15% compared with 1943.  
Hard Ore Mines production decreased 47,577 tons or 7.5% compared with 1943  
Soft Ore Mines included in statement above, Athens, Maas, Negaunee, Lloyd, Princeton, Cambria-Jackson and Spies-Virgil.

THE CLEVELAND CLIFFS IRON COMPANY  
ORE MINING DEPARTMENT  
LABOR SUMMARY - ALL COMPANIES

PRODUCT - TONS .....	1941		1942		1943		1944	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Less: Champion Purchased Ore .....		7,172,418		7,602,068				
		<u>106,928</u>		<u>58,305</u>				
		7,065,490		7,543,763		6,524,441		5,958,102
Surface .....	308,725	\$2,040,091.32	365,987	\$2,535,635.72	399,687	\$2,993,417.97	384,372	\$2,879,649.20
Cost per Ton .....		.289		.336		.459		.483
Underground .....	548,847 3/4	\$4,083,080.09	596,685 1/2	\$4,655,973.87	614,254 3/4	\$5,069,232.61	546,173	\$4,510,435.55
Cost per Ton .....		.578		.617		.777		.757
Superintendence & General Rolls .....	56,652	\$ 444,289.71	60,632 1/2	\$ 490,346.66	61,983 1/2	\$ 525,218.87	62,007	\$ 523,995.29
Cost Per Ton .....		.063		.065		.080		.088
<b>GRAND TOTAL .....</b>	<b>914,224 3/4</b>	<b>\$6,567,461.12</b>	<b>1,023,305</b>	<b>\$7,681,936.25</b>	<b>1,075,925 1/4</b>	<b>\$8,587,869.45</b>	<b>992,552</b>	<b>7,814,080.04</b>
<b>COST PER TON .....</b>	<b>.930</b>			<b>1.018</b>		<b>1.316</b>		<b>1.328</b>
Average Rate Per Day .....		7.18		7.51		7.98		7.97
Tons Per Man Per Day (1) .....		7.72		7.37		6.06		6.00
(1) Production .....		7,172,418		7,602,068		6,524,441		5,958,102
Prior Year Stockpile Overrun .....		<u>110,093</u>		<u>72,753</u>		None		<u>29,260</u>
Total .....		7,282,511		7,674,821		6,524,441		5,987,362

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

WAGES:

Effective April 1st, 1943, a wage increase of .05½ cents per hour was granted, retroactive to July 13, 1942. Vacation pay of one week for three years service and two weeks for ten years service was paid in August 1944, but the mines continued to operate - the vacation of employees being waived.

WORKING SCHEDULE - 1944 - MICHIGAN PROPERTIES:

January 1st to June 30th, the Athens, Lloyd and Maas Mines operated 3-8 hr. shifts 5 days, and 1-8 hr. shift on Saturdays. The Mather operated on this schedule to August 1st. The Negaunee Mine operated 3-8 hr. shifts 5 days, and 1-8 hr. shift on Saturday to May 15th, when it changed to 2-8 hr. shifts 5 days and 1-8 hr. shift on Saturday to June 30th. The Cambria-Jackson, Princeton, and Spies Virgil mines operated 2-8 hr. shifts 5 days, and 1-8 hr. shift on Saturdays to June 30th. July 1st, the Athens, Cambria-Jackson, Maas, Negaunee, Princeton and Spies-Virgil mines started operating 2-8 hr. shifts 5 days per week. The Lloyd mine continued to operate 3-8 hr. shifts per day, but for only 5 days per week. The Mather went to 5- 2-8 hr. shifts per week on August 1st. The Cliffs Shaft Mine Operated 2-8 hr. shifts 6 days per week during the entire year.

MINNESOTA PROPERTIES:

Canisteo Mine - Ore Operations commenced May 22nd. working on a two 8 hour shift per day, six days per week basis to September 1st, when it went to 2-8 hr. shifts per day 5 days per week. Ore operations were discontinued October 27th. 1944. Holman-Cliffs Mine- Direct ore operations began April 19, 1944, one shift per day six days per week. Crude ore and Washing plant operations began May 15, 2 shifts per day 6 days per week and operations were curtailed to 5- 2-8 hr. shifts per week September 1st. Ore operations were discontinued Oct. 27, 1944. Hill-Trumbull Mine - Ore operations started May 8th, 1944 on a 3-8 hr. shift six days per week and continued until September 1st when it went to 5 days per week 2-8 hr. shifts basis. Ore operations were suspended Oct. 27, 1944.

COMPARISON OF TOTAL DAYS WORKED AND TONS OF ORE MINED  
FOR THE YEARS 1944 AND 1943.

	1944	1943	1944	1943
	DAYS	DAYS	DAYS	DAYS
<b>NON-PRODUCTIVE UNITS:</b>				
Mather Mine .....	47,249 $\frac{1}{2}$	33,980 $\frac{1}{2}$		
Miscellaneous Payroll .....	3,500 $\frac{3}{4}$	3,260 $\frac{3}{4}$		
Shops and Storehouse .....	4,643 $\frac{1}{2}$	4,454 $\frac{3}{4}$		
C.C.I. Co.- Miscl. and General .....	62,262 $\frac{1}{2}$	74,690 $\frac{1}{2}$		
Negaunee Mine Co.-Miscl. and General .....	2,698	2,369 $\frac{1}{4}$		
Athens Iron Mng. Co.-Miscl. and General .....	1,144	967 $\frac{1}{4}$		
Mesaba-Cliffs Mining Co. ....	50,504 $\frac{1}{2}$	49,517		
Canisteo Mining Company .....	16,401 $\frac{1}{2}$	14,406		
The Cliffs Power & Light Company .....	18,176	23,307 $\frac{1}{2}$		
General Roll - Undistributed .....	38,613 $\frac{1}{2}$	39,224		
<b>Total Deductions</b> .....	<b>245,287</b>	<b>246,177</b>		
<b>Grand Total-All Operations</b> .....	<b>992,552</b>	<b>1,075,920<math>\frac{1}{2}</math></b>	<b>747,265</b>	<b>829,743<math>\frac{1}{2}</math></b>
<b>Net Operating Mines</b> .....	<b>747,265</b>	<b>829,743<math>\frac{1}{2}</math></b>		
<b>Total Tons</b> .....	<b>5,958,102</b>	<b>6,524,441</b>		
Less: Mather-development ore .....	54,721	1,797		
<b>Total Tons</b> .....	<b>5,903,381</b>	<b>6,522,644</b>		
<b>Tons Per Man Per Day</b> .....	<b>7.90</b>	<b>7.86</b>		
<b>OPEN PIT PRODUCTION:</b>				
			<b>TONS</b>	
Tilden Mine .....	214,824	139,991	6,861	5,743 $\frac{3}{4}$
Canisteo Mine .....	567,146	585,016	20,484	22,746
Hill-Trumbull Mine .....	787,150	871,229	38,488	47,383 $\frac{1}{2}$
Holman-Cliffs Mine .....	1,046,185	1,085,689	40,885	50,837 $\frac{1}{2}$
<b>Total</b> .....	<b>2,615,305</b>	<b>2,681,925</b>	<b>106,718</b>	<b>126,710<math>\frac{3}{4}</math></b>
<b>Open Pit - Tons Per Man Per Day</b> .....	<b>24.50</b>	<b>21.16</b>		
<b>Net Days - Underground Mines</b> .....			<b>640,547</b>	<b>703,032<math>\frac{1}{2}</math></b>
<b>Net Tons - Underground Mines</b> .....	<b>3,288,076</b>	<b>3,840,819</b>		
<b>Underground Mines-Tons Per Man Per Day</b> .....	<b>5.133</b>	<b>5.465</b>		
<b>PERCENTAGE OF TOTAL PRODUCTION</b>				
	<b>1 9 4 4</b>		<b>1 9 4 3</b>	
	TONS	PERCENT	TONS	PERCENT
Underground Mines .....	3,342,797	56.40	3,842,516	58.90
Open Pits .....	2,615,305	43.90	2,681,925	41.10
<b>Total</b> .....	<b>5,958,102</b>		<b>6,524,441</b>	

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STATEMENT SHOWING PENALTY COST OF OVERTIME  
WORKED BY EMPLOYEES DURING YEAR 1944  
AND EFFECT THE PENALTY COST HAD ON THE YEAR'S PRODUCTION COST

	MICHIGAN PROPERTIES	MESABA RANGE			TOTAL
		CANISTEO	HILL TRUMBULL	HOLDMAN CLIFFS	
<u>YEAR 1944</u>					
January .....	28,201.16	1,846.19	2,298.25	4,065.87	
February .....	26,113.81	1,579.66	2,146.63	3,368.80	
March .....	25,756.30	1,341.76	2,204.44	3,426.89	
April .....	30,338.84	1,905.18	3,377.41	4,453.31	
May .....	25,787.84	1,750.70	3,450.47	3,917.44	
June .....	20,896.18	1,615.54	2,852.82	2,954.23	
July .....	14,547.47	582.54	3,428.68	3,501.94	
August .....	12,083.75	487.73	3,733.61	3,352.22	
September .....	13,426.41	1,013.17	3,384.68	2,207.53	
October .....	12,941.01	667.67	1,221.63	1,188.86	
November .....	9,971.89	335.89	201.80	296.14	
December .....	12,834.51	255.94	174.34	504.84	
Total 1944 .....	232,899.17	13,381.97	28,474.76	33,238.07	307,993.97
Total 1943 .....	324,193.91	13,993.07	38,924.98	44,255.35	421,367.31
<u>PRODUCTION</u>					
Tons - Year 1944 .....	3,496,534	567,146	787,150	1,046,185	5,897,015
Tons - Year 1943 .....	3,982,507	585,016	871,229	1,085,689	6,524,441
<u>EFFECT THE PENALTY COST HAD</u> <u>ON YEAR'S PRODUCTION COST</u>					
Increased 1944 by .....	.0666	.0236	.0362	.0318	.0522
Increased 1943 by .....	.0814	.0239	.0447	.0408	.0646

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CENTRAL ANALYTICAL LABORATORY  
STATEMENT SHOWING COST OF OPERATING AND DISTRIBUTION - YEAR 1944

C O S T	1944	1943
<u>LABOR</u>		
Chemists and Assistants .....	\$ 28,079.07	\$ 27,417.45
Helpers and Sample Buckers .....	61,939.28	64,575.98
Total Labor .....	90,018.35	91,993.43
<u>SUPPLIES AND EXPENSE</u>		
Chemicals, Etc. ....	16,187.59	20,546.40
Property Insurance .....	36.54	36.60
Personal Injury Expense .....	379.50	60.00
Unemployment Insurance Tax .....	1,176.54	1,203.07
Old Age Benefit Tax .....	904.82	924.12
Depreciation .....	815.81	854.92
Equipment Returned - Missouri Cliffs .....	-	150.00
Group Annuity .....	397.64	-
Total Supplies and Expense .....	19,898.44	23,775.11
<u>GRAND TOTAL</u> .....	109,916.79	115,768.54
<u>DISTRIBUTION OF COSTS</u>		
<u>The Cleveland-Cliffs Iron Company</u>		
Operating Accounts .....	75,417.09	82,210.35
Construction Accounts .....	2,264.50	2,725.82
Miscellaneous Delivery Accounts .....	10.62	542.63
Total .....	77,692.21	85,478.80
<u>The Negaunee Mine Company</u>		
Negaunee Mine .....	13,762.38	17,274.39
Mather Mine .....	6,039.70	659.05
Construction Accounts .....	1,518.23	699.32
Total .....	21,320.31	18,632.76
<u>The Athens Iron Mining Company</u> .....	9,328.55	9,662.14
<u>Outside Parties</u>		
Missouri Cliffs Company .....	383.17	560.59
Palmer Mining Company .....	1,168.55	1,407.25
L. S. & I. Railway Company .....	24.00	27.00
<u>GRAND TOTAL</u> .....	109,916.79	115,768.54

NOTE:- Previous to October 1, 1944, distribution of the Analytical Laboratory Costs was on a determination basis. Effective from that date the crushing and drying expense is distributed on the basis of the number of samples submitted, and the analysis expense on the basis of the factors used in determining the number of units for each class of determination.



MAY 28 1945

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CLIFFS SHAFT MINE  
ANNUAL REPORT  
YEAR 1944

1. GENERAL:

The budget estimated production for the year 1944 had been set at 611,040 tons. The mine actually produced 587,051 tons in 305 operating days. The chief factor responsible for our failure to meet the estimated production figure was the lack of sufficient manpower throughout the year. The above factor however, can not be given as the sole reason but must be qualified. In the first eight months of 1944 a very high percentage of the crews employed in the mine were engaged in direct development, that is, drifting and raising in rock and ore. This ratio was reduced considerably during the last four months of the year due to the acuteness of the manpower shortage and the high demand for ore, but the overall average was greater than at any time since 1936. In other words, since we had an average of 22.6 gangs per month working on drifts or raises, it is evident that this work must be done at the expense of production when no increase has been made in the size of the crew. In 1943 our development crews constituted 22% of the total number of mining contracts working in the mine. In 1944 this percentage was increased to 22.6% at the same time that we had a drop in total number of men and available working places.

Shipments in 1944 were 596,148 tons. Of this amount 14,192 tons was overrun estimated by the engineers in the previous years stockpile and 1,911 tons was current years stockpile overrun. The lump ore pile was completely cleaned up by the end of the season but there was approximately 48,000 tons of Cliffs Shaft crushed ore remaining in stock at that time. The small overrun tonnage developed in 1944 does not, we believe, reflect the true overrun produced during that year. Inasmuch as we had reduced our skip weight factor in December 1943 and employed this factor throughout all of 1944 we do not believe that we had only 1,911 tons of overrun from the ore stocked in 1944. This contention is borne out by the fact that pocket shipments showed overrun figures ranging up to nearly 5%. The only explanation available is that much of this overrun is in the crushed ore pile due to maladjustment in the distribution between the lump and crushed ores as employed in the daily separation. There is of course, the possibility that the previous years stockpile estimate at the close of the 1943 shipping season was in error because of the serious difficulty in determining the proper cubic feet per ton factor for the lump ore.

It is our very good fortune to include in this report the announcement that the request to the Oliver Iron Mining Company for permission to continue co-mingling Section 10 Lease ore and Bancroft Lease ore was granted. This permission has been extended for the next ten years with the proviso that on six months notice the Oliver Iron Mining Company can direct us to handle the lease ores separately. Being able to co-mingle the lease ores will obviate the expense of increasing the size of our stockpile area as well as saving development costs underground.

Principal items of new equipment purchased for the surface during 1944 consisted of one bolt cutter and one 6" pipe threading machine, both of which were installed in the machine shop. For the blacksmith shop we purchased a new riveting machine and a new portable electric grinder. For the dry house building we bought two new hot water tanks, a hot water circulating pump, and regulating equipment. All of this was used in setting up a completely new system of storing and regulating the temperature of water for showers. This was deemed necessary following three cases of scalding in the underground dry. For the hoisting equipment we had two new counterweights made, adding an extra section in both cases, in order not only to restore the original weight which we found had been reduced by wear, but also to increase the weight to the Mechanical Department's recommendations. Some new rubber-lined sheaves were also purchased. These are replacing the small diameter steel sheaves.

CLIFFS SHAFT MINE  
ANNUAL REPORT  
YEAR 1944

1. GENERAL: (Cont'd)

Replacement purchases for the surface equipment were more or less normal with the crusher building receiving the greatest amount of these purchases since the equipment there receives the greatest amount of wear. Two mantles were bought in 1944, 12 concaves, one bevel gear, and one bevel wheel. No new equipment, other than replacements, was bought for the drill shop.

Underground equipment purchased in 1944 was 3 Cleveland D-12 drifters, one Gardner-Denver drifter, 6 Ingersoll-Rand DA-35 drifters, one Ingersoll-Rand R-58 stoping machine, and 2 Ingersoll-Rand JB-4 block hole machines. Two of the Ingersoll-Rand drifters and the Gardner-Denver drifter were automatic machines used in rock and ore development work. We also purchased one 3-column Cleveland mine rig or jumbo for development drifting. To the scraper equipment we added two 25 H.P. motors and two scraper hoists. We also purchased one underground locomotive from the Negaunee Mine.

The pumping machinery deserves special discussion inasmuch as it has constituted a serious problem during the latter part of 1944. One right hand cylinder body had to be removed in one of the Prescott reciprocating pumps and during this period, while repairs were being executed, we did not have sufficient reliable pumping equipment to assure the proper safety factor. This was because the impeller unit of the centrifugal pump, which serves as a stand-by, was almost completely worn out. Because it will be necessary in the mining operations to drain the Moro Mine before we can develop much closer to that property and because we expect to encounter additional water drainage on the Section 10 property as it becomes developed, we felt that it was necessary to plan for the purchase of a new reciprocating pump that would give the mine the necessary pumping capacity to handle increased water flow. At the end of the year approval was obtained for this program and we expect to install the new pump some time in 1945.

Up until July 1, 1944 the revolving screen was equipped with three sections bored with  $1\frac{1}{2}$ " holes. On that date two sections of the screen with 2" holes were installed, leaving the upper section the only one with the  $1\frac{1}{2}$ " holes.



CLIFFS SHAFT MINE  
ANNUAL REPORT  
YEAR 1944

2. PRODUCTION,  
SHIPMENTS, &  
INVENTORIES:

a. Production by Grades:

<u>Grade</u>	<u>Tons</u>	<u>% of Total</u>
Cliffs Shaft Lump	387,430	
Cliffs Shaft Crushed	118,953	
Cliffs Shaft Run-of-Mine	<u>137</u>	
Total	506,520	86.3
Bancroft Lump	45,314	
Bancroft Crushed	15,182	
Bancroft Run-of-Mine	<u>4,246</u>	
Total	64,742	11.0
Section 10 Lump	10,379	
Section 10 Crushed	3,566	
Section 10 Run-of-Mine	<u>1,844</u>	
Total	<u>15,789</u>	<u>2.7</u>
GRAND TOTAL FEE & LEASE ORE	587,051	100.0

Production by grades for the past ten years follows:

<u>Year</u>	<u>Lump Ore</u> <u>Tons</u>	<u>Crushed Ore</u> <u>Tons</u>	<u>Run-of-Mine</u> <u>Ore - Tons</u>	<u>Total Tons</u>
1935	189,883	79,038		268,921
1936	315,731	140,650	379	456,760
1937	368,768	171,562	3,237	543,567
1938	222,672	102,361	2,128	327,161
1939	259,517	123,883	3,858	387,258
1940	371,745	177,469	3,384	552,598
1941	464,802	162,132	31,813	658,747
1942	225,759	56,510	431,261	713,530
1943	200,616	50,732	383,280	634,628
1944	443,123	137,701	6,227	587,051

The percentage of lumps and fines since 1932 is shown by the following figures:

<u>Year</u>	<u>Lump</u>		<u>Crushed</u>	
	<u>Tons</u>	<u>% of Total</u>	<u>Tons</u>	<u>% of Total</u>
1932	57,500	69.97	24,619	30.03
1933	39,101	69.89	16,838	30.11
1934	156,776	70.23	66,469	29.77
1935	189,883	70.61	79,038	29.39
1936	315,996	69.18	140,764	30.82
1937	368,768	68.24	171,562	31.76
1938	222,672	68.51	102,361	31.49
1939	259,517	67.69	123,883	32.31
1940	371,745	67.68	177,469	32.32
1941	464,802	74.14	162,132	25.86
1942	225,759	79.98	56,510	20.02
1943	200,616	79.82	50,732	20.18
1944	443,123	76.29	137,701	23.71

CLIFFS SHAFT MINE  
ANNUAL REPORT  
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2. PRODUCTION, ETC.: (Cont'd)

There was a small drop in the proportion of lump to crushed ore due to the fact that we increased the size of the holes in the screening unit on July 1st. Up to that time we had estimated 80% lump and 20% crushed ore for the screening ratio. From July 1st to August 1st, after two of the screen sections with 2" holes were installed, the estimated split was 75% lump and 25% crushed. From August 1st to November 1st we used the percentages 72% lump and 28% crushed because pocket shipments indicated the higher percentage of crushed ore would be correct. On September 24th we lowered the bottom end of the screen 8" in order to eliminate ore spillage at the top of the screen but we had no immediate check as to what effect this might have on the screening ratio. After obtaining such a check we employed the figures 74% lump and 26% crushed from November 1st to the present time.

The division of the product between fee ore and Bancroft and Section 10 Lease ore for the past ten years is shown by the table below:

<u>Year</u>	<u>Cliffs Shaft Ore (Fee)</u>	<u>% of Total</u>	<u>Bancroft Ore (Lease)</u>	<u>% of Total</u>	<u>Sec. 10 Ore (Lease)</u>	<u>% of Total</u>
1935	241,474 tons	89.8	27,447 tons	10.2		
1936	383,014 "	83.9	73,746 "	16.1		
1937	451,170 "	83.0	92,397 "	17.00		
1938	277,602 "	84.8	49,559 "	15.2		
1939	323,647 "	83.66	63,611 "	16.4		
1940	479,060 "	86.7	73,538 "	13.3		
1941	555,525 "	84.3	103,222 "	15.7		
1942	629,661 "	88.2	83,869 "	11.8		
1943	563,006 "	88.7	69,943 "	11.0	1,679 tons	0.3
1944	506,520 "	86.3	64,742 "	11.0	15,789 "	2.7

As predicted in 1943 the lease ore production has started to play a more important role. Bancroft production remained at a constant percentage as compared to 1943 and the drop of 2.4% in Cliffs Shaft fee ore production was made up by production from Section 10 Lease.

All of the ore produced to date from the Bancroft Lease since that property was acquired by the Company is shown by years in the following table:

<u>Year</u>	<u>Bancroft Ore Tons</u>
1925	15,658
1926	37,529
1927	38,372
1928	34,730
1929	65,889
1930	61,385
1931	43,303
1932	10,964
1933	7,048
1934	27,987
1935	27,447
1936	73,746
1937	92,397
1938	49,559
1939	63,611
1940	73,538
1941	103,222
1942	83,869
1943	69,943
1944	64,742
<b>Total</b>	<b>1,044,939</b>

CLIFFS SHAFT MINE  
ANNUAL REPORT  
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2. PRODUCTION, ETC.: (Cont'd)

b. Shipments:

<u>Grade</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
Cliffs Shaft Lump	224,258	193,511	417,769	177,951
Cliffs Shaft Crushed	71,021	18,022	89,043	30,182
Cliffs Shaft Mine Run	137	-	137	328,139
Bancroft Lump	28,836	17,513	46,349	12,829
Bancroft Crushed	10,771	13,313	24,084	380
Bancroft Mine Run	4,246	-	4,246	63,640
Section 10 Lump	6,998	2,544	9,542	-
Section 10 Crushed	2,573	561	3,134	-
Section 10 Mine Run	1,844	-	1,844	1,501
Total 1944	<u>350,684</u>	<u>245,464</u>	<u>596,148</u>	<u>604,622</u>
Total 1943	<u>390,313</u>	<u>214,309</u>	<u>604,622</u>	
Increase		31,155		
Decrease	39,629		8,474	

Shipments for the last ten years are tabulated below:

<u>Year</u>	<u>CLIFFS SHAFT GRADE</u>			<u>BANCROFT GRADE</u>			<u>SEC. 10 GRADE</u>			<u>Grand Total</u>
	<u>Lump</u>	<u>Crushed</u>	<u>Mine Run</u>	<u>Lump</u>	<u>Crushed</u>	<u>Mine Run</u>	<u>Lump</u>	<u>Crushed</u>	<u>Mine Run</u>	
1935	251,246	91,596		35,137	20,523					398,502
1936	304,265	153,738	165	48,565	31,716	214				538,663
1937	301,654	125,953		59,153	25,843	3,237				515,840
1938	95,983	42,240	171	19,254	3,416	1,957				163,021
1939	310,673	176,302	430	54,927	45,610	3,428				591,370
1940	358,099	179,018	55	44,913	26,477	3,329				611,891
1941	373,951	150,730	14,381	58,253	23,549	17,382				638,246
1942	230,566 <sup>o</sup>	57,985	375,540	27,086	616	55,771				747,564
1943	177,951	30,182	328,139	12,829	380	53,640			1,501	604,622
1944	417,769	89,043	137	46,349	24,084	4,246	9,542	3,134	1,844	596,148

(<sup>o</sup>) Contains 4,541 tons of Incline Pit Lump

c. Stockpile Balances:

Ore in stock as of December 31, 1944:

Cliffs Shaft Lump	32,688
Cliffs Shaft Crushed	57,673
Bancroft Lump	2,602
Bancroft Crushed	1,253
Section 10 Lump	972
Section 10 Crushed	475
Total	<u>95,663</u>

CLIFFS SHAFT MINE  
ANNUAL REPORT  
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2. PRODUCTION, ETC.: (Cont'd)

Stockpile balances at the end of the year are shown for the past ten years in the following table:

Balance in stock - Dec. 31, 1935	145,810 tons
1936	82,072 "
1937	109,799 "
1938	273,939 "
1939	76,540 "
1940	47,208 "
1941	81,533 "
1942	60,562 "
1943	90,568 "
1944	95,663 "

d. Division of Product by Levels:

<u>Level</u>	<u>"A" Shaft</u> <u>Tons</u>	<u>"B" Shaft</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
1st	5,987	37,792	43,779
2nd	8,847	12,522	21,369
3rd	17,972	32	18,004
4th	28,841	19,036	47,877
5th	9,298	21,903	31,201
6th	19,595	2,095	21,690
7th	63,386	33,681	97,067
8th	76,219	19,074	95,293
9th	46,996	20,525	67,521
10th	62,000	12,767	74,767
11th	20,688	-	20,688
12th	22,895	2,137	25,032
13th	-	5,179	5,179
14th	-	13,834	13,834
15th	210	3,540	3,750
Total	382,934	204,117	587,051
Rock			30,636
Total Ore & Rock			617,687

The ten year table below shows where the ore has been broken and the percentage from each shaft:

<u>Year</u>	<u>"A" Shaft</u>		<u>"B" Shaft</u>		<u>Total</u>
	<u>Tons</u>	<u>%</u>	<u>Tons</u>	<u>%</u>	
1935	194,847	72.3	74,074	27.7	268,921
1936	309,555	67.6	147,205	32.4	456,760
1937	358,930	66.2	184,637	33.8	543,567
1938	228,370	69.9	98,791	30.1	327,161
1939	254,133	65.5	133,125	34.5	387,258
1940	372,428	67.4	180,170	32.6	552,598
1941	408,342	62.0	250,405	38.0	658,747
1942	445,460	62.4	268,070	37.6	713,530
1943	391,455	61.6	243,173	38.4	634,628
1944	382,934	65.2	204,117	34.8	587,051

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

The percentage of ore produced from "B" shaft decreased 3.6% from the preceding year. The ten-year table above shows production from "B" shaft to have been as low as 27.7% of the total output. On the basis of the figures shown above it might be argued that "B" shaft production could be expected to maintain itself between 25% and 40% for some years to come. The figures, however, do not give the entire story. Only an intimate knowledge of the mine and its working places can give a true picture of what may be expected. The ore reserves in "B" shaft are being rapidly depleted and the truth is that there are no new areas of any great promise left to be developed, with the exception of Section 9 deposit. In this area we have planned, for the year 1945, an extensive drilling program to be conducted from the 1st level elevation. If this should prove to be disappointing the continued drop in production from "B" shaft can only be off-set by increased production from the Section 10 Lease. To keep the hoist balanced, development plans must take into consideration the necessity of transferring a large percentage of this ore to "B" shaft.

The table below shows how the product was hoisted from "A" and "B" shafts during 1944. Obviously a large percentage of the ore produced in "A" shaft had to be transferred to "B" shaft for hoisting.

<u>Month</u>	<u>1944 Product as Hoisted</u>		<u>Total Tons</u>
	<u>"A" Shaft Tons</u>	<u>"B" Shaft Tons</u>	
January	24,075	22,831	46,906
February	23,709	23,077	46,786
March	26,860	26,055	52,915
April	24,458	24,044	48,502
May	25,584	25,391	50,975
June	24,221	24,692	48,913
July	21,974	21,518	43,492
August	25,322	27,384	52,706
September	21,652	23,082	44,734
October	23,395	23,785	47,180
November	22,045	21,594	43,639
December	21,133	21,990	43,123
Total	284,428	285,443	569,871
% of Total	49.91	50.09	100.00

Note: Above table does not include overruns.

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

e. Production by Months:

Month	Optg. Days	CLIFFS SHAFT			BANCROFT			SECTION 10			Total
		Lump	Crushed	Mine Run	Lump	Crushed	Mine Run	Lump	Crushed	Mine Run	
Jan.	25	32,975	8,259	48	3,232	806	1,328	180	60	171	47,059
Feb.	25	32,747	8,104	89	3,243	902	940	365	107	390	46,887
March	27	36,461	9,131		3,687	936	1,041	932	229	585	53,002
April	25	33,983	8,852		3,051	819	946	861	220	704	49,436
May	26	36,060	9,060		5,497	1,464	9	1,111	290	6	53,467
June	26	33,810	10,083		4,376	1,472		1,303	454		51,498
July	24	28,101	10,702		3,863	1,610		1,195	503		45,974
Aug.	27	35,087	13,197		3,588	1,705		835	402		54,814
Sept.	25	29,362	10,835		4,386	1,333		1,070	348		47,334
Oct.	26	32,577	11,466		3,398	1,259		546	196		49,442
Nov.	25	28,600	9,684		3,681	1,762		773	357		44,857
Dec.	24	27,667	9,580		3,312	1,114		1,208	400		43,281
Total	305	387,430	118,953	137	45,314	15,182	4,246	10,379	3,566	1,844	587,051

f. Ore Statement:

Grade	On Hand	Output	Stockpile	Total	Shipments	Balance	Inc. or Dec.
	Jan. 1, 1944	for Year					
C.S.Lump	50,514	387,430	12,513	450,457	417,769	32,688	
C.S.Crushed	27,763	118,953		146,716	89,043	57,673	
C.S.Mine Run	-	137		137	137	-	
Banc. Lump	3,597	44,158	1,196	48,951	46,349	2,602	
Banc. Crushed	8,516	14,691	2,130	25,337	24,084	1,253	
Banc. Mine Run	-	4,246		4,246	4,246	-	
Sec. 10 Lump	135	10,205	174	10,514	9,542	972	
Sec. 10 Crushed	43	3,476	90	3,609	3,134	475	
Sec. 10 Mine Run	-	1,844		1,844	1,844	-	
Total 1944	90,568	585,140	16,103 <sup>o</sup>	691,811	596,148	95,663	49,488
Total 1943	60,562	634,628	-	695,190	604,622	90,568	75,584

(<sup>o</sup>) Current years' stockpile overrun 1,911 tons  
 Prior years' stockpile overrun 14,192 "  
 16,103 "

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

g. Delays:

<u>Date</u>	<u>Hours Lost</u>	<u>Tons Lost</u>	<u>Remarks</u>
Jan. 21	2	200	Chunks in pocket and crusher.
Feb. 2	1	250	Top tram car wheel broke.
8	$\frac{3}{4}$	100	"A" shaft cage caught.
23	$\frac{3}{4}$	100	Broken skip wheel.
Mar. 1	$\frac{1}{2}$	75	Chunks in crusher.
2	1	200	Starter switch burned out in crusher.
7	$\frac{1}{2}$	75	Crusher motor.
9	$\frac{1}{2}$	50	Chunks in "A" shaft.
10	1	200	Top tram car off track.
30	2	350	Chunks and "B" shaft sheave liners loose.
Apr. 7	$\frac{3}{4}$	100	Tram car off track.
12	1	100	Top tram motor trouble.
19	$\frac{3}{4}$	100	Chunks on surface.
May 8	1	100	Chute blocked on surface.
13	$1\frac{1}{4}$	150	Trouble on surface.
24	$1\frac{1}{4}$	50	Fixing transformer on surface.
June 15	$6\frac{1}{2}$	1,200	Crusher head broke.
16	2	300	Repairing crusher and picking belt.
22	1	200	Repairing crusher.
20	$\frac{3}{4}$	75	Broken skip wheel - "A" shaft.
29	$\frac{1}{2}$	50	Chunks - "B" shaft.
July 7	1	100	Large chunks.
26	1	75	Skip turned over.
28	5	1,000	No overtime hoist due to lack of ore.
Aug.	None	None	
Sept. 1	5	500	"A" shaft hoist burned out.
5	2	200	Crusher motor.
6	-	400	General delay - shortage of ore.
14	2	150	Picking belt broke.
15	-	300	General delay - no ore.
26	3	200	"A" shaft overwind stuck.
28	1	100	Chunks "A" shaft.
Oct. 3	$1\frac{3}{4}$	100	Trouble with track - "B" shaft.
19	$1\frac{3}{4}$	300	Motor burned out on 8th level "A" shaft.
20	$1\frac{3}{4}$	300	" " " " " " " "
27	$2\frac{1}{4}$	500	Top tram motor control burned out.
Nov. 7	$1\frac{1}{2}$	200	Top tram out of order.
8	$1\frac{1}{2}$	100	"A" shaft hoist out of order.
15	5	500	Primary leads on "A" shaft skip motor burned.
30	$1\frac{1}{2}$	150	"B" shaft skip pulled upside down.
30	2	300	Trouble with crusher.
Dec. 14	$1\frac{1}{4}$	100	Tram car off track.
16	1	150	Trouble with crusher.
20	$\frac{3}{4}$	75	8th level pocket jammed.
22	1	100	"B" shaft - skip wheel broken.
30	8	1,200	Mine idle due to crusher repairs.
Total 1944	<u>78<math>\frac{1}{4}</math></u>	<u>11,325</u>	
Total 1943	73 $\frac{1}{4}$	10,825	

CLIFFS SHAFT MINE  
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3. ANALYSIS:

a. Average Analysis of 1944 Output:

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Cliffs Shaft Lump	60.02	.105	7.20
Cliffs Shaft Crushed	52.52	.108	16.58
Cliffs Shaft Mine Run	59.90	.121	7.64
Bancroft Lump	61.01	.116	7.19
Bancroft Crushed	53.68	.121	14.68
Bancroft Mine Run	60.94	.112	7.00
Section 10 Lump	61.01	.116	7.19
Section 10 Crushed	53.68	.121	14.68
Section 10 Mine Run	60.94	.112	7.00

Continued emphasis was placed on the quality of ore produced during 1944 with the result that all of the grades show an improvement with the exception of the Bancroft Crushed. In this one grade the difference between 1944 and 1943 analyses is so small that it cannot reflect any basic change either in quality of ore mined or in method of sampling.

c. Complete Analysis of 1944 Ores as Shipped From Mine:

<u>Grade</u>		<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Lump Ore	(x)	60.35	.112	7.74	.50	2.18	.96	.60	.011	1.25
Crushed Ore	(x)	52.90	.113	16.45	.41	2.98	1.10	.95	.012	1.70
Mine Run Ore	(x)	60.80	.115	7.12	.26	2.35	1.23	.40	.013	1.15
Ford Lump (Maas Crusher)		59.30	.100	9.50	.35	2.08	.89	.85	.012	1.00

(x) Cliffs Shaft & Bancroft combined

d. Analysis of Ore in Stock Dec. 31, 1944:

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Cliffs Shaft Lump Dried	60.30	.106	7.84	.51	2.24	1.02	.60	.011	1.26	-
Natural	59.99	.105	7.80	.50	2.23	1.01	.60	.011	1.25	.51
Cliffs S. Crushed Dried	53.13	.106	17.65	.42	3.04	1.12	.98	.012	1.73	-
Natural	52.15	.104	17.32	.41	2.98	1.10	.95	.012	1.70	1.88
Bancroft Lump Dried	60.41	.109	7.37	.34	2.60	1.46	1.07	.012	1.36	-
Natural	60.12	.108	7.33	.34	2.59	1.45	1.06	.012	1.35	.49
Bancroft Crushed Dried	54.60	.116	15.37	.44	2.95	1.45	1.03	.015	2.00	-
Natural	53.60	.114	15.09	.43	2.90	1.42	1.01	.015	1.96	1.86

Section 10 ore, by agreement with the Oliver Iron Mining Company, is comingled with the Bancroft ore and consequently the analyses of Section 10 and Bancroft are identical.

e. Analysis of Ore Reserves: (Run-of-Mine Ore)

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Cliffs Shaft Ore Dried	57.10	.107	10.69	.47	2.36	1.21	1.00	.019	1.89	-
Natural	56.62	.106	10.60	.47	2.34	1.20	.99	.019	1.87	.85
Bancroft & Sec. Dried	57.99	.131	9.70	.45	2.35	1.15	.95	.019	1.75	-
10 Ore Natural	57.56	.130	9.63	.45	2.33	1.14	.94	.019	1.74	.75



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4. ESTIMATE  
OF ORE  
RESERVES:

Assumptions: Factor used is 8,9, and 10 cu. ft. per ton of ore in place.  
The factor 9 is most commonly used.  
10% deduction for rock.  
10% deduction for loss in mining.

Ore in Sight December 31, 1944:

Level	Available Ore in Bancroft Area "A" Shaft			Total Tons
	Developed		Prospective	
	Floors Tons	Pillars Tons	Breasts Tons	
2nd			2,000	2,000
3rd		800		800
4th	7,100			7,100
6th	7,800			7,800
8th		9,300		9,300
9th	9,800	9,500		19,300
10th	35,100	132,400		167,500
11th	121,000		2,000	123,000
12th		2,900	2,000	4,900
Total	180,800	154,900	6,000	341,700

Summary:

Bancroft Ore Available	341,700
Less December Production	<u>4,426</u>
Gross Tonnage as of Dec. 31, 1944	337,274
Less 10% for loss in mining	<u>34,170</u>
	303,104
Less 10% for rock	<u>30,753</u>
Net Total Bancroft Ore Available	272,351

Level	Section 10 Lease			Total Tons
	Developed		Prospective	
	Floors Tons	Pillars Tons	Breasts Tons	
1st		10,600	3,000	13,600
2nd	4,200		4,000	8,200
8th		56,700		56,700
9th	56,700			56,700
Total	60,900	67,300	7,000	135,200

Summary:

Section 10 Lease Ore Available	135,200
Less December Production	<u>1,608</u>
Gross Tonnage as of Dec. 31, 1944	133,592
Less 10% for loss in mining	<u>13,520</u>
	120,072
Less 10% for rock	<u>12,168</u>
Net Total Sec. 10 Ore Available	107,904
Net Total Bancroft and Section 10 Lease	380,255

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

Available Cliffs Shaft Ore "A" Shaft

<u>Level</u>	<u>Developed</u>		<u>Prospective</u>	<u>Total</u> <u>Tons</u>
	<u>Floors</u>	<u>Pillars</u>	<u>Breasts</u>	
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	
1st		3,200		3,200
2nd	5,800			5,800
3rd	1,100		6,000	7,100
4th	600		8,000	8,600
5th	13,800	3,700	6,000	23,500
6th	37,400	68,000	2,000	107,400
7th	98,700	10,500	8,000	117,200
8th	70,500	3,200	2,000	75,700
9th	152,400	9,700	2,000	164,100
10th	48,000	115,200	4,000	167,200
11th	67,200	133,400	2,000	202,600
12th	57,300	85,200		142,500
15th	35,700			35,700
Total	588,500	432,100	40,000	1,060,600

Available Cliffs Shaft Ore "B" Shaft

<u>Level</u>	<u>Developed</u>		<u>Prospective</u>	<u>Total</u> <u>Tons</u>
	<u>Floors</u>	<u>Pillars</u>	<u>Breasts</u>	
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	
1st	33,900	14,900	3,000	51,800
2nd	44,000			44,000
3rd	2,200	23,500	2,000	27,700
4th			6,000	6,000
5th	20,500		4,000	24,500
6th	3,300		2,000	5,300
7th	15,100	2,900		18,000
8th	31,900	5,700	8,000	45,600
9th	19,900		4,000	23,900
10th	34,200			34,200
11th	21,300	3,000		24,300
12th	4,600			4,600
13th	7,500			7,500
14th	6,900		4,000	10,900
15th	20,000	15,200		35,200
Total	265,300	65,200	33,000	363,500

Section 9 Development

<u>Level</u>	<u>Developed</u>		<u>Prospective</u>	<u>Total</u> <u>Tons</u>
	<u>Floors</u>	<u>Pillars</u>	<u>Breasts</u>	
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	
9th		11,600	2,000	13,600
10th	2,900	13,200		16,100
Total	2,900	24,800	2,000	29,700

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

Summary:

Cliffs Shaft Ore Available "A" Shaft	1,060,600
Cliffs Shaft Ore Available "B" Shaft	363,500
Cliffs Shaft Ore Available Section 9	29,700
Total	1,453,800
Less December Production	37,247
Gross Tonnage as of Dec. 31, 1944	1,416,553
Less 10% for loss in mining	145,380
	1,271,173
Less 10% for rock	130,842
Net Total Fee Ore Available	1,140,331

Recapitulation:

Net Cliffs Shaft Ore Available	1,140,331
Net Bancroft Ore Available	272,351
Net Section 10 Ore Available	135,200
Grand Total	1,547,882

Ore reserves for the past two years are shown for comparison:

	<u>Dec. 31, 1944</u>	<u>Dec. 31, 1943</u>
Cliffs Shaft Ore Available	1,140,331 Tons	1,196,149 Tons
Bancroft & Sec. 10 Ore Available	407,551 "	284,344 "
Total	1,547,882 "	1,480,493 "
Increase for year 1944	67,389 "	

New Ore Developed in 1944      587,051 & 67,389 = 654,440 Tons

The following figures show how the ore reserves have varied from year to year in each of "A" and "B" shafts beginning with 1929:

Net Available Ore in Sight

<u>Year</u>	<u>Sec. 10 Ore</u> <u>Tons</u>	<u>Bancroft Ore</u> <u>Tons</u>	<u>Cliffs Shaft Ore</u>	
			<u>"A" Shaft</u> <u>Tons</u>	<u>"B" Shaft</u> <u>Tons</u>
1929		100,764	1,029,413	258,139
1930		179,200	1,071,900	255,600
1931		182,600	1,099,778	255,922
1932		210,864	1,055,384	245,483
1933		198,916	995,211	227,565
1934		204,730	1,091,100	251,087
1935		210,429	1,090,540	232,345
1936		246,659	1,055,621	289,828
1937		252,050	1,099,090	303,762
1938		243,512	1,105,663	307,991
1939		246,726	1,139,349	283,644
1940		231,402	1,105,158	288,482
1941		232,298	1,047,360	288,650
1942		257,758	977,345	278,567
1943	17,043	267,301	898,787	297,362
1944	107,904	272,351	835,803	331,824

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

"A" shaft fee workings show a decrease in reserves of 62,984 tons from the preceding year. "B" shaft workings on the other hand, have increased their reserve tonnage by 34,462 tons. Due to the fact that Section 10 Lease exploration and development work encountered considerable ore, the reserves of this lease increased a total of 90,861 tons which more than offsets the decrease from the "A" shaft fee workings.

Considerable satisfaction was expressed last year over the acquisition of the Section 10 Lease as an addition to the Cliffs Shaft Mine. The current years estimate figures bear out our predictions of the past two or three years that ore reserves would continue to drop in the Cliffs Shaft Mine unless some new virgin territory could be added to augment the reserves. From the resume' in the paragraph immediately above it is obvious that the "A" shaft fee workings continue to be depleted faster than new ore can be put in sight and the only reason that the overall reserves show an increase for 1944 is that a large body of ore has been found on the Section 10 Lease.

From the following table it may be seen that the acquisition of the Section 10 Lease has brought about an increase of the ore reserves of the Cliffs Shaft mine for the first time since 1939.

Total Ore Available in Mine at the End of Each Year:

1944	1,547,882	Tons
1943	1,480,493	"
1942	1,513,670	"
1941	1,568,308	"
1940	1,625,042	"
1939	1,669,719	"
1938	1,657,166	"
1937	1,654,902	"
1936	1,592,108	"
1935	1,533,314	"
1934	1,546,917	"
1933	1,421,692	"
1932	1,511,731	"
1931	1,541,050	"
1930	1,506,700	"
1929	1,388,216	"
1928	1,358,000	"
1927	1,392,000	"
1926	1,436,000	"
1925	1,444,000	"
1924	1,453,000	"
1923	1,361,000	"
1922	1,364,000	"
1921	1,386,000	"
1920	1,404,000	"

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5. LABOR  
AND  
WAGES:

a. General:

There was very little change in the average number of men employed either on surface or underground during the year 1944 as compared to 1943. The annual figures however, do not tell all the story because our greatest loss of manpower occurred in the last four months of 1944 and to date this decrease has not been offset by new hirings. The manpower loss occurred principally in the underground categories of miners' helpers, motormen, and brakemen. In the category of miners there has been little change throughout the year although manpower shortage in the other classifications has forced us to double up some miners because helpers were not available.

b. Comparative Statement of Wages and Product:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	587,051	634,628		47,577
No. of Shifts & Hours	2 8-hr.	2 8-hr.		
No. of Days Operated	305	308		3
<u>Average Number of Men Employed</u>				
Surface	110	112		2
Underground	<u>353</u>	<u>357</u>		<u>4</u>
Total	463	469		6
<u>Average Wages Per Day</u>				
Surface	7.24	7.41		.17
Underground	<u>7.96</u>	<u>8.14</u>		<u>.18</u>
Total	7.76	7.97		.21
<u>Average Wages Per Month</u>				
Surface	181.00	185.25		4.25
Underground	<u>199.00</u>	<u>203.50</u>		<u>4.50</u>
Total	194.00	199.25		5.25
<u>Product Per Man Per Day</u>				
Surface	17.62	18.69		1.07
Underground	<u>5.67</u>	<u>5.82</u>		<u>.15</u>
Total	4.29	4.44		.15
<u>Labor Cost Per Ton</u>				
Surface	.405	.396	.009	
Underground	<u>1.404</u>	<u>1.399</u>	<u>.005</u>	
Total	1.809	1.795	.014	

Total increase of labor cost in 1944 over 1943 was \$.014 per ton. This is attributable to a reduction in the tons per man per day. Total drop in tons per man per day over 1943 was .015 as can be seen from the table above. There are two factors responsible for the decrease in efficiency in the mine during 1944. One of these is the lack of sufficient manpower to permit efficient distribution of crews throughout the mine and the other is the reduction in number of readily available ore reserves. The latter factor may seem paradoxical when considered in connection with the overall increase in ore reserves. It can be explained however, by the fact that we felt it necessary to carry a high proportion of our development crews on development work throughout 1944. The exploration and development performed by these crews did put in sight a sizeable addition to our reserves but these reserves are not, as yet, readily available as floors or backs of stopes from which ore may easily be won.

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5. LABOR  
AND  
WAGES: (Cont'd)

From the table below it may be seen that penalty costs decreased over \$10,000.00 in 1944. There were 149,628 penalty hours worked in 1944 or a decrease of 26,494 hours over 1943. As much as possible in 1944, the extra jobs that involve double penalty time, that is Sunday work, were kept down to a minimum or the work was scheduled on Saturday midnight shift when possible. This resulted in some decrease in the total penalty time. In addition to this, the average days worked per man in 1944 was 295 compared to 305 in 1943. This decrease was a result of absenteeism which naturally influenced the amount of penalty time in a forty-eight hour working schedule.

	<u>Surface</u>	<u>Underground</u>	<u>Total</u>
1944	\$ 15,392.77	\$ 53,041.99	\$ 68,434.76
1943	<u>21,159.13</u>	<u>57,323.39</u>	<u>78,482.52</u>
Decrease	5,766.36	4,281.40	10,047.76

Surface and underground labor costs per ton for the past ten years are as follows:

<u>Year</u>	<u>Surface</u> <u>Labor</u>	<u>Underground</u> <u>Labor</u>	<u>Total</u> <u>Labor</u>	
1944	.405	1.404	1.809	
1943	.396	1.399	1.795	
1942	.301	1.170	1.471	
1941	.297	1.173	1.470	
1940	.241	.936	1.177	
1939	.253	1.033	1.286	
1938	.310	1.110	1.420	
1937	.267	.985	1.252	
1936	.214	.791	1.005	
1935	.232	.809	1.041	

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
Avg. Product Stopping & Trimming (Tons per Shift)	19.49	18.53	.96	
Avg. Product Stopping & Trimming, Including Haulage Crews (Tons per Shift)	16.10	15.50	.60	
Avg. Wages - Cont. Miners	8.68	8.54	.14	
Avg. Wages - Cont. Trammers	12.53	11.56	.97	
Avg. Wages - Cont. Labor	8.87	8.74	.13	

<u>Total Number of Days</u>				
Surface	33,306 <sup>1</sup> / <sub>4</sub>	33,945 <sup>3</sup> / <sub>4</sub>		639 <sup>1</sup> / <sub>2</sub>
Underground	<u>103,541</u>	<u>109,056<sup>3</sup>/<sub>4</sub></u>		<u>5,155<sup>3</sup>/<sub>4</sub></u>
Total	<u>136,847<sup>1</sup>/<sub>4</sub></u>	<u>143,002<sup>3</sup>/<sub>4</sub></u>		<u>6,155<sup>1</sup>/<sub>2</sub></u>

<u>Amount For Labor</u>				
Surface	238,097.00	251,391.05		13,294.05
Underground	<u>824,157.02</u>	<u>888,015.93</u>		<u>63,858.91</u>
Total	<u>1,062,254.02</u>	<u>1,139,406.98</u>		<u>77,152.96</u>

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5. LABOR  
AND  
WAGES: (Cont'd)

Proportion of Surface to Underground Men

1944	1 to 3.20
1943	1 to 3.19
1942	1 to 3.36
1941	1 to 3.32
1940	1 to 3.43
1939	1 to 3.73
1938	1 to 3.22
1937	1 to 3.15
1936	1 to 3.28
1935	1 to 3.72

6. Surface:

a. Buildings and Repairs:

The following figures show cost of repairs to mine buildings for the years 1940 - 1944:

	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
Office & Warehouse	1200.83	1611.05	1759.49	515.63	637.58
Shops	719.73	1786.50	1519.98	1075.65	111.18
Shaft House	822.60	956.90	384.67	2399.63	777.48
Engine House	553.86	1078.09	860.22	321.64	1119.47
Dry House	2597.53	1125.87	3713.75	6381.12	4503.76
Coal Dock & Trestle	258.24	821.71	96.67	331.25	307.30
Crusher Building	628.19	4390.68	2903.35	570.44	522.03
Miscellaneous	<u>3997.94</u>	<u>1086.06</u>	<u>614.12</u>	<u>366.24</u>	<u>271.41</u>
Total	10778.92	12856.86	11852.25	11961.60	8250.21

Total cost for buildings and their repairs decreased \$2,077.94 as compared with 1943.

Office and warehouse expense decreased in 1944 but was high in comparison with years previous to 1942. We made the old furnace room available for storage by cutting a new stairway and door between this room and the back room of the warehouse. We also remodeled the piping in connection with the hot water heating system in the office basement.

The greater proportion of the shop expense was incurred in December when we put a concrete floor in the blacksmith shop and welding room. All of the other shop buildings had only minor repairs during the year.

Aside from routine necessary replacements of floors and stairways that had become decayed, the shaft houses had only one extraordinary item of expense in 1944. We cut a trench longitudinally through the floor of the door-way in "B" shaft house and lined this with concrete in order to provide a means of bringing 12' sheaves in or out of the shaft house. The old method was to hoist the sheaves through one of the second story windows on the east side of the shaft house. The new transformer pole put up by the Cliffs Power & Light Company blocked this window of the shaft house and made it necessary to provide a new opening through which to take the sheaves.

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6. SURFACE: (Cont'd)

a. Buildings and Repairs: (Cont'd)

Dry house expense increased \$1,471.66 in 1944 as compared to 1943. The additional expense came as a result of the remodeling of our hot water system. We had had three cases of scalding in the main underground dry in the year preceding our improvements. In order to prevent a possible serious injury from this cause, additional tank capacity was provided for the system with thermostatic controls to keep the maximum water temperature under scalding heat.

Miscellaneous mine buildings cost us nearly \$3,000.00 more in 1944 than in 1943. Over \$2,000.00 of this expense can be attributed to the steel warehouse as a result of rebuilding the garage unit in that building. Among the other buildings the main expenses were incurred in remodeling the old surface dry for a tractor garage, tearing down the old smoke stack on the boiler house, and repairing the old smoke house for a general storage building.

7. UNDERGROUND:

a. Development:

1. Section 10 Lease:

Exploration and development of the Section 10 Lease was carried on at a steady pace throughout 1944. In the area south of the main "A" shaft workings there were at least two gangs of miners doing development work throughout the entire year and for the first three-quarters of the year both of these crews were made up of two miners each. Two diamond drills also operated in this territory for the last four months of the year, exploring for the extension of the Section 10 ore body both along the strike and in vertical section, up the dip. The total amount of development carried on in the Section 10 Lease might have been even greater except for the fact that a heavy flow of water (approximately 200 g.p.m.) was encountered in August by the 8th level drifting crew when they had reach a position about 300 ft. northeast of the nearest Moro Mine workings. We deemed it unsafe to continue mining any closer to the old Moro Mine inasmuch as we believe those workings are full of water. Therefore an arbitrary mining limit was established that would keep us at least 300 ft. away from the Moro Mine which, to some extent, brought about a curtailment of drifting operations on the 8th and 10th levels.

In order to get a free hand in the development of the Section 10 Lease without the Moro Mine water hazard it will be necessary to drain the old workings. The present pumping capacity of the Cliffs Shaft Mine equipment is not sufficient to handle the water that the mine is now making together with the addition of drainage from the Moro Mine. Therefore it was recommended that a new reciprocating pump be purchased as soon as possible. Approval has been obtained for the purchase and we have made plans for the drainage of the Moro Mine which will be put in operation some time in 1945. We estimate that the Moro Mine contains approximately 75,000,000 to 80,000,000 gallons of water. It will take at least eight months to a year to complete the drainage of the Moro Mine workings down to the elevation of the 10th level Cliffs Shaft.



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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

1. Section 10 Lease: (Cont'd)

A good share of the diamond drilling done by the two drill crews in the mine in 1944 was on the Section 10 Lease. This work was done to gain a better knowledge of the shape and extent of the ore bodies on the Section 10 Lease. The development work and this exploration have confirmed most of our predictions made in 1943 as to the general geologic structure and occurrence of ore bodies on the lease property. Drill hole No. 533, located on the 3rd level at coordinates 792 S - 620 E was completed by drilling from 578 ft. at the beginning of the year to a total depth of 622 ft. All of the material encountered in this hole on the Section 10 Lease was sideritic chert and dike. Hole No. 533 established the fact that at the 4th level elevation in the area around the 400 E coordinate line the footwall has been either folded up or faulted up. The only possibility for finding ore in the northwest corner of the Section 10 Lease will be between the 4th and 1st level elevations. To test this possibility holes Nos. 536, 538, and 539 were drilled on the 1st level from coordinates 1243 S - 609 E. From the map it can be seen that this location is near the 600 E coordinate line just north of the Section 10 Lease boundary. The holes passed onto the Section 10 Lease after the first 20 ft. or 30 ft. of drilling. The first two holes dipped 50° and 30° respectively to the south. Hole No. 538, with the 30° dip, encountered 23 ft. of ore but all of this ore was on the Cliffs Shaft side of the boundary. Hole No. 539 was drilled horizontally due south to a depth of 709 ft. Again some ore was encountered between 3 ft. and 13 ft. followed by slate and graywacke to a depth of 170 ft. The fact that hole No. 539 encountered slate and graywacke proved the prediction made in last years report that there was a synclinal structure between the 3rd and 1st levels in the strip 300 ft. south from the north boundary of Section 10 Lease between coordinates 0 - 600 E. The fact that no ore was discovered in these holes on the Section 10 Lease does not rule out the possibility that there is ore underneath the slate hanging wall material below the 1st level elevation but above the footwall material cut by drill hole No. 533. This possibility has not yet been tested.

In order to block out the extent and shape of the biggest known body of ore on the Section 10 Lease, several holes were drilled south from the Cliffs Shaft workings into Section 10 Lease. The ore body in question was cut by the main Section 10 development drift on the 8th level between coordinates 1500 S to 1700 S and 2150 E to 2400 E. The first hole, No. 547, was drilled south approximately on the 1275 E coordinate line. Its total depth was 406 ft. and it extended horizontally 240 ft. south of the north limit of the Section 10 Lease. No first class ore was discovered in this hole. On the contrary all of the material penetrated was footwall dike, siderite, and soft ore jasper. The other two holes drilled on the 8th level elevation, namely, Nos. 548 and 550, did encounter ore which apparently is the westward extension of the ore body as cut by the drift development. Both of these holes were drilled horizontally south between the drift development and hole No. 547. From the location of the ore penetrated it seems apparent that the ore body on the 8th level elevation is at least 800 ft. long with a width of 140 ft. at the east end and width of nearly 30 ft. at the west end in hole No. 550. The rest of the drilling on Section 10 Lease consisted of holes Nos. 549, 551, and 552. These holes were drilled on the 5th and 6th levels in an attempt to determine the upward extent of the ore body as outlined on the 8th level. Hole No. 549 cut 53 ft. of

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

1. Section 10 Lease: (Cont'd)

first class ore, hole No. 551 cut 106 ft. of first class ore, both of these runs occurring on the 5th level elevation. No first class ore was found in hole No. 552 which was drilled on the 6th level 50 ft. east of hole No. 547 on the 8th level. We had predicted that the main Section 10 ore body would occur in a syncline pitching to the west and constituting the westward extension of the Moro Mine syncline. The ore encountered in the drilling and development strikes northwest-southeast and dips south under the slate hanging wall. It is, therefore, located in the north limb of a synclinal structure or the south limb of the anticlinal structure that straddles the Section 10 Lease-Cliffs Shaft boundary line. We do not have any information about the geological structure in the position where the south limb of our prognosticated syncline should be. The drilling did show, in addition to the discovery of the ore, that there is a northwest-southeast fault which is nearly parallel to the ore bearing synclinal limb. This fault dips north and has brought the footwall material up on the south side thereby truncating the ore body on the 8th level elevations. The magnitude of throw of this fault is not known. It may be possible that the area south of our present exploration will carry the truncated ore body under a normal slate contact at a higher elevation, unless the throw has been great enough to have carried this up beyond the present erosional surface.

We believe it worth while to repeat in this report the enumeration of the areas of known or probable ore occurrences in the Section 10 Lease as first designated in last years report. No. 1: The syncline with ore from 1st to 3rd levels in the strip 300 ft. south from the north boundary of Section 10 Lease between coordinates 0 - 600 E. No. 2: The anticlinal structure between 1600 E and 3000 E immediately south of the Cliffs Shaft fee property. The north limb of this anticline is the south limb of the "A" shaft syncline. No. 3: The main ore bearing syncline south of the anticline named in No. 2. This structure is the westward extension of the Moro Mine syncline. No. 1 area was developed to some extent during 1944 by two mining crews, namely, contract No. 1 and contract No. 58. Both of these crews worked in a vein of ore that strikes east and west and dips to the south. The strike is somewhat irregular so that in some places the vein is on Section 10 Lease and in other places on the Cliffs Shaft property. We know from drilling done in 1943 that this ore vein extends down to the 3rd level elevation at the west boundary of the Section 10 Lease. As mentioned under the discussion of 1944 drilling, we know that there is no ore at the 3rd level elevation 400 ft. east of the west boundary. We also know from hole No. 539 on the 1st level that there is no ore on that elevation south of the slate contact. It seems very possible that this slate contact is produced by a fault which may be the westward extension of the fault discovered in the main Section 10 structure. In the future, contract No. 58 will develop and mine the ore vein in this No. 1 area by cross-cuts to the south and breast stopes to the west along the strike of the ore vein. This work will be limited however, in the depth to which it can be extended and complete development of the ore vein between the 1st and 3rd levels will require a drift on either the 3rd or 5th level elevation with raises put up to the ore vein. If there is no ore below the 3rd level elevation in the western part of the Section 10 Lease, then the best method of getting at the ore in this No. 1 area would be to drive a drift west from the "A" shaft drift that ends at coordinates 1220 S - 800 E. On the other hand, if there is a possibility of ore occurrence below the

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

1. Section 10 Lease: (Cont'd)

3rd level, or if the old Barnum Mine should have additional ore reserves above the 5th level Cliffs Shaft elevation, then it might be more advantageous to extend south the "B" shaft drift whose breast is now located at coordinates 615 S - 400 W. Contract No. 1 mined some ore on the Section 10 Lease in this same ore vein at coordinates 1260 S - 270 E on the 1165' sub-level during 1944.

The No. 2 area anticlinal structure adjoining the "A" shaft workings was developed by contract No. 2 and contract No. 96. At coordinates 1340 S - 2250 E these gangs raised from the Cliffs Shaft territory on the 4th level elevation south across the Section 10 boundary to the 1st level elevation. Both of these raises were put up in ore which occurs in a vein striking east-west and dipping to the north. A small stope was opened up on the 1st level elevation from which we plan to drift east and west. Due to the great demand for ore in the latter part of the year, the two contract miners were combined into one contract and moved to the 3rd level elevation at the mouth of the most easterly raise where they have started a raise stope to the southeast. This type of development will provide additional production at the same time as it explores the extension of the ore vein. At the 1st level elevation the ore vein is bounded on the south side by a nearly vertical slate contact which strikes east and west. This must be a fault contact and suggests the possibility that there will be ore somewhere below this elevation in the area to the south where the normal iron formation and slate contact occurs.

The No. 3 area is the north limb of the so-called main Section 10 syncline. As mentioned under the discussion on drilling, the ore vein has been blocked out between the 5th and 8th levels between coordinates 1600 E and 2400 E. Contract No. 41 did all of the drifting on the 8th level in this area during 1944. The main drift extends southeast and forks about 50 ft. from the breast. Two other cross-cuts, one to the east and the other due south, were also driven by this crew. The one to the east is along the north contact of the ore body with the footwall siderite. The one to the south crosses the ore body into the dike brought up by the main fault. Contract No. 80 also worked in this area in 1944. They put up two raises, one to the south and one to the west near the north edge of the ore body and connected these two raises on the 7th level elevation with a drift. This gang is ready, in 1945, to begin stoping operations on the 7th level. On the 10th level contract 21, which was a double mining crew, drifted 490 ft. south along the 2200 E coordinate line to the 1800 S coordinate line. Near the breast of the drift they drove a small cross-cut to the southeast which will be used as a diamond drill station from which we shall bore holes for the drainage of the Moro Mine. This crew also put up a raise between their 10th level drift and the 8th level drift. This raise encountered ore 15 ft. below the 8th level elevation.

In the immediate future we plan to do most of our development work on the Section 10 Lease on the 8th level or above. We expect to drive a drift west from the present Section 10 8th level drift. This drift will be

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

1. Section 10 Lease: (Cont'd)

driven in the ore and extend west to 1600 E coordinate line. From this drift raises will be put up to the north. It is also important that work be started on the 5th level elevation to provide some means of access to the Section 10 ore body outlined by drilling on that level. The cheapest way to accomplish this would be to strip our present 5th level "A" shaft drift into the southeast vein and drive an extension due south onto the Section 10 Lease. Any ore tributary to such a drift could then be hauled by "A" shaft and hoisted in "B" shaft.

2. Cliffs Shaft and Bancroft Lease

The table below gives the number and percentages by months of developing gangs in the mine:

<u>Month</u>	<u>Total Number of Gangs</u>	<u>Gangs Developing</u>	<u>% Developing</u>
January	100	55	55
February	100	53	53
March	100	56	56
April	100	50	50
May	99	53	53.5
June	99	51	51.5
July	96	45	46.8
August	96	48	50.0
September	94	43	45.7
October	94	43	45.7
November	91	41	45.0
December	89	38	42.6
Monthly Average	96.5	48.1	49.8
Year 1943			54.9
Year 1942			53.5
Year 1941			61.0
Year 1940			54.5
Year 1939			53.6
Year 1938			52.0

From the table it may be seen that the average number of gangs on development work decreased sharply in 1944 as compared with 1943. This is not strictly an accurate presentation in that during the latter part of the year as many as five of the mining gangs in any one month employed two miners. Most of these double crews were doing development work but they were listed as single gangs in the tabulation above. The rock development footage decreased from 1,581 ft. in 1943 to 1,314 ft. in 1944. Ore development footage increased from 4,059 ft. in 1943 to 4,108 ft. in 1944. It is still desirable to continue a high ratio of development, that is, drifts and raises, in order to once more restore the percentage of developed floors and backs that existed in 1939 and 1940.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft & Bancroft Lease: (Cont'd)

In "A" shaft the preliminary drifting and raising preparatory to mining the ore discovered by drill hole No. 524 on the 2nd level Bancroft Lease was completed in 1944. This area promises to yield a large tonnage of reserves. In the extreme east end of the "A" shaft deposit on the 4th level elevation, contract No. 8 developed by drifting, an extension to the ore body between their former workings and the old No. 3 Mine. This area awaits additional development by new raises. In the area between coordinates 0 - 400 N and 300 E to 3600 E between the 10th and 6th levels, contracts Nos. 32, 41, 61, 81, and 101, have developed by drifts, raises, and breast stopes, ore deposits that occur in the same geological horizon and they may be more or less continuous. This is probably the most promising new area in "A" shaft.

As far as "B" shaft is concerned, development during 1944 disclosed no new ore bodies of any great importance. The known limits of already exposed ore veins were extended, particularly the southwest ore vein on the 1st level elevation where contract 73 drifted west to coordinates 560 W. In the Main Vein contract No. 14 found a narrow vein of ore as an extension to the southwest by raising from the 9th level elevation to the 5th level elevation. Geologically speaking, continued exploration to the west along the main vein structure is desirable.

"A" SHAFT

1st Level

In the Main Vein, contract No. 30 spent the latter part of the year doing development work in an area about 400 ft. Northwest of "A" shaft. They advanced a breast stope south to coordinates 325 S - 520 E. The ore vein in this part of the mine has a gentle dip to the south. Contract No. 30 mined the ore in the back to the slate hanging wall contact and advanced the breast to where this slate contact dipped down across the breast of the stope. In the old stope area east of this location there is 5 ft. to 8 ft. of floor which can be mined without endangering the back of the 2nd level workings beneath this area. Other cross-cuts will be advanced south from the old workings as the floor elevation is lowered to the east.

In August, contract No. 18 started a small breast stope to the west at an elevation about 25 ft. above the 1st level in the Southwest Vein. By the end of December this stope had progressed to coordinates 1210 S - 420 E. At that point the ore vein was so thin that further progress became uneconomical. In the future this crew will breast stope to the east of their raise in the same vein of ore. These workings are in a vein of conglomerate ore which seems to be a part of the main Southwest Vein that strikes east and west and dips south. The ore is overlaid by slate hanging wall and is bounded on the footwall side by dike that has apparently been faulted up against the ore.

Approximately 400 ft. east of No. 18 contract's workings, contract No. 58 spent the last eleven months of the year breast stoping south on the Section 10 Lease property and west and north on the Cliffs Shaft fee lands.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

These workings are near the eastern end of the Southwest Vein where the vein and associated formations have been folded into an eastward plunging anticline that has resulted in the formation of a much thicker body of ore in this area. In the area where 58 worked the ore does strike east and west and dips to the south but as yet contract No. 58 has not mined all the ore to the hanging wall contact.

2nd Level

There were two gangs that worked on the Bancroft Lease doing development work in 1944. Contract No. 44 breast stoped to the west to coordinates 180 N - 990 E. This stope was advanced as a cross-cut from the west rib of the raise stope which contract No. 44 had previously put up between the 3rd and 2nd levels. It was stoped because the ore vein pinched out between the slate hanging wall and the dike footwall where they converged along the strike. Contract No. 44 also did some work at a lower elevation near the 3rd level where they drove a small stope west, parallel with the 2nd level workings. This too had to be stoped because of convergence of the foot and hanging wall. The other Bancroft crew, No. 99, put up a raise from the 5th level Bancroft drift at coordinates 400 N - 1350 E to the 2nd level at coordinates 400 N - 1260 E. This raise will be used to remove the ore which we expect to mine on the 2nd level elevation and above and which was discovered originally by diamond drill hole No. 524. Before mining operations could be actually started in the ore however, it was necessary to have another connection to the top of the raise on the 2nd level and contract 99 provided this in the past year by drifting southwest to connect with old workings at coordinates 280 N - 1210 E.

The only other work done on 2nd level "A" shaft was on the Section 10 Lease at coordinates 1340 S - 2250 E. At this point contracts Nos. 2 and 96 put up two raises from old Cliffs Shaft workings on the 3rd level elevation and cut out a small stope. They also drove a short drift to the Northeast across the ore vein into jasper and lean ore. It is our belief that the ore vein strikes east and west in this area parallel to the **strike** of the Southeast Vein on the Cliffs Shaft fee lands. Because the raises went up in ore to the south it is also our belief that the ore vein dips to the north. On the 2nd level elevation the south rib of the workings is slate hanging wall material exposed along a vertical east-west contact. This must be a fault contact with the ground to the south in the down-faulted block. There should be at least a possibility of ore occurrence in this south block beneath the normal slate-iron formation contact.

3rd Level

At an elevation above the 3rd level, contract No. 9 in the North Vein, stoped west on a slightly rising incline to a position located at coordinates 70 S - 1090 E. They also drove one cross-cut to the north that connected with an old raise stope between the 2nd and 3rd levels. The **only** limiting formation to the ore in this stope so far encountered, has been jasper which occurs in both the back and floor. Contract No. 9 will continue to raise stope to the west and may be able to connect with the 2nd level workings that occur about 50 ft. ahead of the present breast.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

In the Main Vein, contract No. 12 worked from February to the end of the year raising between the back of the 4th level and the floor of an old sub level about 10 ft. above the 3rd level elevation. They put up two raises into this sub level, one at coordinates 440 S - 1400 E, and the other at 430 S - 1425 E. During the latter part of the year this crew mined some of the ore available around the top of the easternmost raise in the old sub level. While this work might be classed as depleting in character, no ore reserves have been estimated in this territory and therefore it is all included in the development category. Contract No. 12 will have an opportunity in the future to mine additional floor in the old sub level by advancing to the east. It is also possible that new ore reserves will be discovered by this gang in the area east of their present location because the geologic maps indicate that no ore vein has been developed immediately adjacent to the hanging wall slate. This slate contact does not follow the outline of the old workings and two old diamond drill holes, namely, Nos. 114 and 190, show the existence of some ore adjacent to the slate near coordinates 420 S - 1600-1700 E.

Three hundred feet northwest of "A" shaft in the Main Vein, contract 27 spent the first part of the year mining floor which is included in the depleting category. During the latter part of the year however, this gang advanced a breast stope east at an elevation about 12 ft. below the 3rd level floor. This stope reached coordinates 270 S - 690 E. From the map it may be seen that the stope is partially under the old 3rd level workings which have been filled with rock to the 2nd level elevation. This discovery of good quality ore below and just north of the old 3rd level workings suggests the possibility that there are unmined reserves in the floors of the rock filled stopes. This possibility can be tested by diamond drilling. If ore is discovered to exist in these floors, it will be necessary to transfer the rock fill to some other mined out stopes either on the 3rd level or on the 5th level.

From January through May, contract No. 60 was engaged in driving a breast stope west in the North Vein to coordinates 230 S - 1280 E. The ore in this vein was approximately 25 ft. wide and dipped about 40° to the north between slate hanging wall and dike footwall. The strike of the footwall was slightly more north of west than that of the hanging wall and therefore the westward advance of the stoping operation was ultimately halted by the convergence of these two rocks.

The work of No. 2 contract and No. 96 contract on the 3rd level elevation has been discussed both in the Section 10 development and in the 2nd level development operations.

4th Level

At the extreme east end of the mine on the 4th level elevation, contract No. 8 developed by breast stoping and drifting, the nearly horizontal vein of ore that occurs in the northeast part of this area. In all this crew advanced a drift nearly 100 ft. east to coordinates 190 S - 3630 E.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

Ore occurs on both sides of this drift as well as in the floor and back. There is also ore remaining to be developed at the breast of the drift. The only reason that the drift was stopped was because of a very unsatisfactory scraping arrangement in the working place. Plans have been made and are partly consummated to provide a new raise for this territory from the 8th level. Once the raise has been completed to the 4th level elevation, additional development work as well as stope mining will be carried on in this area.

Part of the development work performed by No. 12 contract as discussed on the 3rd level, consisted of mining some back and raising from the back of a 4th level stope at coordinates 425 S - 1420 E.

Five hundred feet northwest of "A" shaft in the North Vein, contract No. 57 drifted southeast 100 ft. through rock to provide a straight scraper haul for the removal of ore from their stoping operation. This work was done in the early part of the year. The latter part of the year the gang raise stoped to the west in a vein of magnetite ore that is bounded by dike in the hanging wall and sideritic chert in the footwall. By the end of the year it appeared that all of the available ore had been mined from the westward or upper end of the raise stope and the crew moved down to the 4th level elevation to start a breast stope to the south.

Contract No. 45 raise stoped south to coordinates 1240 S - 2740 E in the Southeast Vein. They enlarged the upper end of this raise stope to more or less circular shape by stripping ore from the ribs. They also mined floor or bench from their raise stope in order to provide more head room since the ore vein was becoming flatter in its dip underneath the northward dipping slate hanging wall. From the experience gained in other operations at this elevation and west of the present location, it is possible to predict that contract 45 will encounter steeply dipping dike or slate which has been faulted against the ore vein.

5th Level

On the Bancroft Lease the work of contract No. 99 was discussed under the 2nd level heading.

Contract No. 45 also did some work on the 5th level elevation as well as on the 4th level. In the latter part of the year they started a second raise stope to the southeast. By the end of the year this had progressed to coordinates 1160 S - 2790 E. It is in the same ore vein as the first raise stope and shows promise of continuing up to the same elevation. Since there is ore on the east rib and west rib of this second stope, it is likely that cross-cuts can be connected with the first stope and new ground developed on the east side by breast stoping or drifting.

In the first month of 1944 contract No. 12 completed a development job on the 5th level elevation where they had been breast stoping to the west in a narrow vein of ore bounded on the north by jasper and on the south by vertical dike. This gang had apparently exhausted all the possibilities for ore occurrence on the 5th level elevation before they moved up to the 4th and 3rd levels.



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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

Early in 1944 contract No. 92 stoped south to coordinates 200 S - 1560 E where they holed to old No. 44 stope which had been put up in the North Vein from the 7th to the 5th level elevation. Contract No. 92 discovered that there was additional ore in old No. 44 stope both on the south rib and in the floor, which they mined during the remainder of the year.

In the Main Vein 100 ft. northwest of "A" shaft, contract No. 96 completed their drift connection between "B" shaft workings and the old drift that runs north toward the Bancroft Lease just west of "A" shaft. The new drift is a short-cut and was driven in preference to stripping the drift which runs due north. Ore from No. 58 contract is transferred on the 3rd level through a raise that opens to the 5th level due west of "A" shaft and is then trammed to "B" shaft through the drift that was completed by No. 96 contract.

Drill hole No. 533 on the 3rd level cut approximately 50 ft. of first class ore at coordinates 800 S - 620 E. This ore is in an area of old 3rd level workings which we believe will contain ore reserves in both the floor and back. In order to get at this ore and make it available for hoisting, we felt it necessary to put up a raise from the 5th level "A" shaft. This in turn required 200 ft. of drift to reach a point from which a raise could hit the 3rd level stopes. Contract No. 104 drove that drift between June and October. The breast of the completed drift is at coordinates 760 S - 700 E. It is actually an extension of the tail track at the bottom of the transfer raise between the 5th and 3rd levels. Sixty feet of first class ore was encountered in the drift after the gang had first gone through 28 ft. of dike. The rest of the material encountered was all cherty black jasper.

6th Level

Contract No. 51 worked all year in the Main Vein, breast stoping and cross-cutting in a flat-lying body of ore that occurs in a large pillar 200 ft. wide and 200 ft. long. The first breast stope reached coordinates 240 S - 2610 E and was connected to previous workings by a cross-cut to the north. The most northerly breast stope was advanced to coordinates 160 S - 2560 E. Additional cross-cuts can be made to the south as well as additional advances of the breast in the northernmost stope. Approximately 150 ft. northeast of the area in which 51 contract worked, contract No. 66 connected two of their south cross-cuts by stoping the intervening ground along the 100 S, east-west coordinate line.

At coordinates 230 S - 2870 E, contract No. 67 opened up an east-west breast stope by advancing west through a vein of ore that dips south underneath slate hanging wall. Ultimately No. 67 contract may expect to advance another 100 ft. to the northwest before they will encounter some of their old workings.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

7th Level

The only development work on the 7th level in the Main ore vein during 1944 was performed by No. 94 contract when they put up a raise from the 7th level to the floor of No. 98 stope on the 6th level. This raise holed at coordinates 490 S - 1625 E.

The only other development work that was done on the 7th level during the year was done by No. 61 contract in the North Vein at coordinates 150 N - 3500 E. In the first month of the year this gang put up a raise from the 8th level to the north end of the 7th level drift which provided a dirt road separate from their previous development raise into this area. In the latter part of the year contract No. 61 breast stoped to the west and east through good quality ore that strikes east and west and dips north underneath slate hanging wall. This crew also made a raise connection from the 7th level to an old 6th level drift in order to improve the ventilation and also to explore the formation above the 7th level for ore occurrence.

8th Level

In the first five months of the past year, contract No. 4 mined sides of pillars and backs of stopes in an area located in the Main Vein at coordinates 790 S - 1500 E. Ordinarily this work would be classed as depleting but the rediscovery of ore reserves in this part of the mine where no estimate of any such reserves has been maintained, has lead us to discuss the work done by contract No. 4 as development.

On the Section 10 Lease the work of contracts Nos. 21,41, and 80, is discussed under the heading "Development - Section 10 Lease." In the last four months of the year when contract No. 41 was forced out of the 8th level Section 10 drift because of the large flow of water, they were moved to the east end of the mine where at coordinates 160 S - 3170 E they started a drift to the east. This drift was driven about 250 ft. east to coordinates 130 S - 3410 E. All of the material penetrated was foot-wall siderite and soft ore jasper. From this drift it is expected that we will put up a raise to the southeast to contract No. 8 on the 4th level. After completing this drift contract No. 41 was moved approximately 500 ft. farther northeast where they advanced the dead end main 8th level drift to the northeast. This latter drift had been stopped in jasper the last time it had been worked. Contract No. 41 encountered ore after the first blast in the resumed advance. At the end of the year the breast had been pushed to coordinates 270 N - 3490 E.

In the same territory where contract No. 41 worked in the last part of the year, contract No. 61 put up a raise from the 8th level to the 7th level elevation to hole to their workings on the latter elevation. This raise was completed in January at coordinates 210 N - 3440 E.

Another gang that worked in the North vein territory near Nos. 41 and 61 contracts in 1944 was contract No. 81. This crew started a raise from the 10th level and brought it up to the 9th level elevation where they forked the raise, advancing one branch up to the main 8th level drift at

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

coordinates 120 N - 3340 E, and the other branch above the 8th level elevation to coordinates 170 N - 3230 E. The latter branch had not holed to any older workings by the end of the year but will be put up to the workings on the 7th level and from there to the 6th level where good ore was cut by diamond drill hole No. 406. Around the 8th level elevation the raise branch put up to the northwest by No. 81 contract encountered and passed through a vein of high grade ore. This find, together with the ore in No. 61 stope and the ore cut by No. 41 drift, has opened up a relatively virgin territory with excellent prospects for considerable reserves. We believe the ore vein or veins, will strike east and west and dip to the north under slate hanging wall. There are good possibilities that ore deposits will occur in the vertical interval between the 10th level and 6th level and along the zone between 0 and 300 N coordinate and between 3200 E and 3700 E.

Contract No. 91 did both depleting and development work in the North Vein during 1944. For the development they put up a raise from the southwest corner of their 8th level stope to an elevation about 30 ft. above the 8th level and drifted east through ore to coordinates 140 N - 2840 E. At that point the breast in the drift is 30 ft. directly above an old 8th level stope. Before the end of the year the development was curtailed and No. 91 contract was moved back to the 9th level elevation in order to get more product by stoping floor. Additional development work will, of course, be carried on in the ore vein penetrated by the raise and drift.

A small amount of development work was done on the Bancroft Lease area from the 8th level. Contract No. 102 completed a raise connection from the 8th to the 5th level at coordinates 190 N - 1325 E. The raise penetrated nothing but dike although we had expected to encounter at least some conglomerate ore which we could develop and stope. At the present time of course, the raise provides ventilation for the 5th level Bancroft territory and the west end of the 8th level Bancroft territory. It is our belief that there are some ore reserves yet to be mined in the territory where contract No. 102 put up their raise but the curtailment of the development program has temporarily halted any further search for this ore.

9th Level

Nearly at opposite ends of the Bancroft deposit on the 9th level, contracts Nos. 23 and 69 worked in 1944 at mining floors and a small amount of development stoping. Contract No. 23 at the east end increased the size of their stope by mining ore from the west and north ribs of their north cross-cut. This is in the area at coordinates 115 N - 2580 E. At the western end of the deposit, contract No. 69 stoped east to connect with the breast stope being advanced west by No. 84 contract as shown on the 10th level. The ore vein in which this crew worked strikes east and west and is bounded on the north side at least in local patches by what we believe to be slate hanging wall. On the south side some dike occurs as an irregular bunch dipping to the north. This is the ore vein that was discovered by No. 84 contract two or three years ago after drilling through a 15 ft. southward dipping dike that was thought to constitute the main north footwall of the Bancroft deposit in this particular territory.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

At the extreme eastern end of the North Vein contract No. 64 spent the entire year drifting and exploring for the extension of their ore body to the east. A short cross-cut was driven north to coordinates 255 N - 2990 E. They also drifted due east to coordinates 220 N - 3100 E following a narrow irregular vein of ore that seems to be bounded on both the north and south by slate formation. The south contact, along the south rib of the drift and the stope to the west, has been produced by faulting that has dropped the slate formation down along the ore horizon. Other faults dipping to the north and very irregular in their pattern have cut the ore body and hanging wall into slices with more slate than ore in the drifts driven on the 9th level. We may have been too high up near the slate contact to discover a clean breast of ore. Further development work will be carried on in this area because it is our firm belief that there are at least narrow ore veins to be found east of the present workings.

In the Main Vein, contract No. 5 completed a raise between the 10th level and 8th level at coordinates 290 S - 2400 E. This raise had passed through a vein of ore on the 9th level elevation and during the remainder of 1944 contract No. 5 stoped in this ore vein both to the west and to the east. The widest portion of the vein was on the east side of the raise but even this pinched out between dike footwall and dike hanging wall about 70 ft. or 75 ft. east of the raise. On the west side the ore also pinched out but much closer to the raise. A drift connection to old 9th level workings was made on the west side however, but goes through the intervening rock.

Approximately 600 ft. east of "A" shaft where the 9th level drift has been opened out into a stope in the first ore vein encountered east of the shaft, contract No. 46 widened the old stope workings on both the north and south sides at coordinates 620 S - 1350 E. This work was done preliminary to mining of back from the old 9th level area. We also expect to mine floor from this stope.

In the Main Vein at the east end of the mine, two contracts worked on development during 1944. Contract No. 50 breast stoped and then raise stoped to the 8th level at coordinates 530 S - 2870 E. They also advanced a short cross-cut east along the 600 S coordinate line. During the last part of the year this crew completed the mining of all the reserves in their stope by mining the bench and floor down to jasper and dike contacts. About 300 ft. southeast of contract No. 50, No. 68 contract raise stoped to the northeast and holed to the rib of old raise stopes that connect the 9th and 8th levels.

10th Level

There were four crews that did development work on the Bancroft Lease in 1944. Contract No. 10 at the west end of the main ore area cross-cut east with a breast stope to connect the south ends of their two parallel stopes at coordinates 0 - 2000 E. They also increased the outline of their easternmost stope in the northeast corner by mining back to hole to 9th level

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

workings. The only ore reserves that we know exist in this territory are in the floor and back of this area. Because of a dangerous condition in the back of 9th level stopes overlying No. 10 stope, the back of No. 10 stope which is actually a floor pillar will not be mined until all the other work has been completed in the area. Four hundred feet east of No. 10 contract No. 53 crew breast stoped to the west underneath their old 9th level east-west stope. This gang has also left a floor pillar between their 9th level and 10th level workings. In the future, contract No. 53 will be able to cross-cut both north and south from the breast stope that they advanced in 1944 and there are ore reserves which can be breast stoped east of the drift which enters their territory. North of this area contract No. 70 spent the major part of the year doing depleting work by mining the floor of a large east-west stope but they did do some development work in the last month of the year. This consisted of driving a drift 35 ft. or 40 ft. south through a pillar that is 120 ft. long by 50 ft. wide. The breast of the drift, when stopped at the end of the year, was located at coordinates 60 N - 2435 E. The fourth gang that worked on the Bancroft Vein was contract No. 84 which we mentioned under the discussion of No. 69 contract on the 9th level. At coordinates 160 N - 2160 E contract No. 84 holed their breast stope to No. 69 workings. During the latter part of the year No. 84 contract mined floor from their stope and we expect that ore reserves of this nature may exist down to the 11th level elevation in the area located by coordinates 220 S - 2200 E.

In the northeast part of the mine three crews operated during 1944. Contract No. 32 developed a system of northeast and northwest trending drifts near coordinates 350 N - 3450 E. The cross-cuts that were put into the northwest encountered dike after crossing a vein of ore that is approximately 40 ft. to 50 ft. wide. To the northeast, contract No. 32 encountered jasper and lean ore which evidently is part of the footwall formation. Geologically the ore vein opened up by contract No. 32 is the eastward extension of the 10th level Bancroft hanging wall ore vein where the structure folds around to the northeast at the east end of a westward pitching syncline. Faulting has cut this syncline along the south side of the ore vein and from all indications this fault has dropped the south block so that slate limits the ore on the south side in the form of a wedge. In an attempt to follow the ore vein up the dip, contract No. 32 raised in ore to an elevation slightly above the 9th level where the vein was pinched out between siderite in the footwall and slate in the hanging wall. Contract No. 101 also put up a raise from this area to 300 N - 3460 E on the 9th level elevation. All of the latter raise has been in ore except for the last 5 ft. or 10 ft. where hard ore jasper was encountered. In spite of the fact that neither of the raises were able to get much above the 9th level elevation, it is our belief that ore will be existant between the 9th and 8th levels in this general area. We know that there is ore on the 8th level where contracts Nos. 41 and 61 worked in the North Vein and it should extend down to the 10th level although perhaps offset by complex faulting.

From coordinates 140 N - 3280 E, contract No. 81, which was discussed under the 8th level heading put up a raise to the 8th level elevation.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

After nearly a year of depleting work in the so-called south lens, contract No. 3 resumed development in 1944 by advancing a breast stope to the east at an elevation about 30 ft. below the 10th level. Up to the end of the year the stope had been advanced to coordinates 765 S - 2040 E with the ore limited on only the south rib where northward dipping dike parallels the stope advance.

Three gangs developed ore reserves in the Main Vein during 1944. The easternmost of these, contract No. 26, spent the first part of the year mining floor from old workings but in the last month this crew started a raise stope to the south which was advanced to coordinates 600 S - 2660 E. The ore mined from this raise stope is jaspery but since we are headed toward the slate hanging wall contact, we expect the grade to improve as we approach the contact. Six hundred feet west of this point contract No. 39 breast stoped to the west at an elevation slightly below the 10th level. They finally connected this breast stope to old workings at coordinates 570 S - 1970 E. They also drove a stope cross-cut south to coordinates 620 S - 2010 E. In the latter part of the year No. 39 contract spent much of their time mining bench and floor from these two new areas. About 600 ft. west of the shaft in the main 10th level haulage drift, contract No. 61 put up a raise during February and March to the floor of an old stope on the 9th level. This stope is the one in which contract No. 46 worked during the latter part of the year as mentioned under the 9th level heading.

The work of contract No. 21 which was a double crew, was discussed under the heading of Section 10 development since that is the area in which they operated during 1944. Inasmuch as it effects the whole mine, some mention should be made here of the plan we expect to follow in draining the Moro Mine from the drift that No. 21 contract drove south to coordinates 1800 S - 2250 E. Almost all of the material encountered in this drift was either dike or siderite except for a small amount of jasper near the south breast. There is no mining therefore, that can be started on this elevation in the workings so far opened up. We do expect to find ore at the 10th level elevation closer to the Moro Mine but any further advance in that direction is deemed unwise until the water level in the Moro Mine has been brought down to an elevation comparable with our 10th level Cliffs Shaft workings. Once we have obtained the necessary additional pumping capacity, we expect to drill one or more three-inch diamond drill holes southeast from the breast of No. 21 drift into the stopes on the Moro Mine 12th level. These drill holes are aimed for a target that is 170 ft. wide with workings extending through plenty of vertical interval so that deviations in the dip and course of the drill holes cannot possibly be great enough to result in failure to penetrate the Moro Mine workings. Total length of the drill holes will be approximately 470 ft.

As a part of our scheme for draining the Moro Mine, we have made plans to divert the drainage from the Section 10 property and the Moro Mine to the east end of the 10th level rather than out to the shaft along the present

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

drainage course. This scheme involves the reversal of gradient on a drift on the 10th level between coordinates 880 S - 2070 E and 900 S - 2500 E. At the spot located by the second set of coordinates a short drift connection will be made to a raise leading down through the 11th level to the 12th level drift at coordinates 920 S - 2610 E. This 12th level drift will be blocked by a concrete dam at the end where it opens out onto the 12th level stopes. This footwall drift will be used as a storage sump and the water will be piped through the dam under head, down a raise to the 15th level, and out to the new pump house at "A" shaft. A considerable saving will be executed by connecting this pipe line to the suction of the pump thereby reducing, by 150 ft., the head that it is necessary to pump the water. It is also expected that in the future, after the 11th level stope and drift can be employed as additional storage capacity, that additional savings in electric power costs may be made by pumping on off-peak periods.

11th Level

As far as the Bancroft deposit is concerned, contract No. 62 opened up a brand new level during 1944 by cutting out stopes on the 11th level elevation from two raises that connect the 10th and 15th levels. The westernmost stope is located at coordinates 230 N - 2180 E. The crew started by stoping conglomerate ore around the raise and then drifted south through a seam of slate and encountered a second conglomerate ore vein that dips north similar to the first one. Neither of these ore veins contained much first class ore nor were they wide enough to be considered suitable for good stoping operations. Because the demand for product was very high, we did not keep contract No. 62 working in this most westerly stope area after the ore veins had been proven to be disappointing in quality and size. More work however, will be done in this area before it is given up as devoid of mineable ore. In the latter part of the year contract No. 62 cut out their second stope at coordinates 260 N - 2600 E. From all appearances this is in the same ore horizon as the western stope but the ore is of first class quality and is at least 30 ft. wide as it dips steeply to the north. Contract No. 62 will continue to breast stope to the east and will probably put up raise stopes to the 10th level leaving the proper pillar interval as they progress to the east.

Contract No. 104 raised from the 11th level to the 10th level at coordinates 625 S - 1740 E. This is a raise that will be used to transfer ore from No. 59 contract now mining floor above the 8th level.

12th Level

One contract did development work in 1944 on the 12th level elevation. This was No. 89 contract which worked on the Bancroft Lease. They advanced two breast stopes, one to the east and one to the west to coordinates 400 N - 1920 E and 370 N - 2060 E respectively. The ore vein in which these stopes were driven strikes nearly east and west and dips steeply to the north under slate hanging wall. It is bounded on the south side by dike. When this ore vein was originally discovered, we thought that it would possibly extend down nearly to the 15th level but the 1944 development indicates that the dike footwall converges on the hanging wall contact down the dip.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

15th Level

Contract No. 11 completed a raise to the 11th level in No. 83 stope at coordinates 640 S - 2520 E. This raise was put up to provide a means of getting the ore out from contract No. 83.

In the Bancroft Vein contract No. 82 had, by the end of 1944, put up a raise to within 40 ft. of the 10th level in No. 53 stope. This raise will make available ore in No. 53 stope on the 10th level and also the ore in the downward extension of No. 53 vein which we know from drilling, extends to the 11th level elevation.

Contract No. 101 continued to drift on the 15th level during January through May and extended their northeast drift to coordinates 490 N - 3360 E. This drift cut siderite and jasper. It has been driven in order to reach a point from which we can put up a raise to an area on the 10th level where contracts Nos. 32 and 101 have developed ore reserves.

"B" SHAFT

1st Level and Subs Above the 1st Level

On the 1220' sub level contract No. 18 breast stoped west to coordinates 920 S - 225 W in the early part of 1944. This stope encountered jasper that dips down across the breast of the stope to the west. This crew completed their work on the 1220' sub level in March by mining all the ore bench, thereby depleting all the known reserves on that elevation in their territory. They were then moved to the 1st level in the Section 10 Lease where they put up a raise to the 1165' sub level stope at coordinates 1225 S - 250 E. The raise was in the vein of conglomerate ore which is part of the Southwest Vein in this area. After the raise was completed, contract No. 18 was moved to the "A" shaft territory and contract No. 1 started to breast stope due east from near the top end of the raise along the boundary line of the Section 10--Cliffs Shaft areas.

On the 1205' sub level at coordinates 730 S - 200 E, contract No. 17 breast stoped east to connect with a north cross-cut made in some of their previous stoping operations. The ore vein in this area dips north underneath slate hanging wall at an angle of approximately 30°. Having mined all the ore conveniently accessible at the coordinates mentioned above, contract No. 17 moved about 150 ft. to the west and started a new breast stope to the west in the same vein of ore. It is expected that these latter workings will eventually connect to stopes on the 1145' sub level which are located down the dip of the ore vein to the northeast.

In addition to the work done by No. 18 contract and No. 1 contract on the 1165' sub level, two other gangs did development work in the Southwest Vein during 1944. Contract No. 58 started the year by advancing a breast stope to the east through the conglomeritic Southwest Vein and continued until the first part of February when the breast had reached a point located at coordinates 1200 S - 110 E. At the same time contract



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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

No. 75 had worked on the west end of the same vein where they breast stoped to the west to coordinates 1150 S - 220 W. This crew also raise stoped to the 1205' sub level in the same southward dipping ore body. In the period from February until August, contract No. 75 alternated between the location discussed immediately above and the east breast stope which No. 58 contract had left when they moved down to the Southwest Vein in the "A" shaft territory on the 1st level. After August, contract No. 85 was moved to the 1165' sub level to take over the stoping operation at the east end of the Southwest Vein on that elevation. By the end of the year this crew had advanced the stope to coordinates 1210 S - 200 E.

The work of contract No. 1 in the Southwest Vein on the Section 10 Lease has been discussed previously in this report.

At the extreme west end of the Southwest Vein on the 1st level elevation, contract No. 73 explored by drifting for the westward extension of the Southwest Vein. Diamond drill hole No. 521 had cut about 20 ft. of first class ore which we believe was the Southwest Vein and contract No. 73 continued to develop the area between coordinates 325 W and 550 W in their search for ore of stopeable dimensions. At coordinates 1230 S - 425 W, the drift which was headed south at this point passed from dike into a vein of ore 20 ft. wide. This vein had a strike east and west and dipped to the south beneath slate hanging wall. Contract 73 followed the vein to coordinates 1260 S - 550 W by the end of the year. At that point the dike footwall and slate hanging wall were so close together that it was impossible to develop a full sized drift in the ore vein. On the theory that the ore vein might increase in thickness up the dip, contract No. 73 started a raise in December at coordinates 1225 S - 510 W.

In the North Vein, contract No. 63 mined floor in the early part of the year until they broke through into the back of a 2nd level stope at coordinates 360 S - 290 W. Ore was discovered in the back of the old 2nd level stope as a result of this operation and for the rest of the year contract No. 63 mined back from the stope in an advance to the east. Approximately 100 ft. west of this North Vein operation, contract No. 72 was also doing development work and depleting work during the year. The development work consisted of a breast stope which they advanced to the south in a flat lying vein of conglomerate ore and red specular hematite. The position of the breast at the end of the year was located at coordinates 450 S - 370 W.

From January to June contract No. 103 raised from the 3rd level elevation to the 1st level elevation and drove 80 ft. of drift to the north from the top of this raise to coordinates 1300 S - 4140 W. All of this work was in the Section 9 Exploration area. Surface diamond drill hole No. 34 indicated the existance of first class ore on the 1st level elevation at the point located by the coordinates given above. The raise and drift was put in , in order to reach this ore in the diamond drill hole with a view to exploring and developing mineable reserves. From the 3rd level to 2nd level the raise was in jasper and from there to the 1st level it was in

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

soft dike. This same dike was the material encountered in the drift until the ore itself was entered at coordinates 1330 S. Only a small amount of stoping was done in the ore due to the fact that it seemed to be encompassed on all sides and in the back by rock which is either dike or slate. Because the raise is a long one coming all the way from the 10th level, it is difficult to alternately handle rock and ore and keep the rock from contaminating the product. Consequently it was decided the most feasible method to explore this 1st level area was by diamond drilling prior to any additional development work. This program is ready to start early in 1945.

2nd Level

The only development work performed on the 2nd level was done by contract No. 96 where it holed a raise at coordinates 580 S - 340 W. This raise was put up from the 5th level, first to contract No. 33's stope on the 4th level, then from the back of this stope to the 3rd level and from the back of 3rd level stopes to the 2nd level. This raise was put up in order to provide a means of transferring ore from 1st level mining operations to the 5th level which is equipped with the 76 cu. ft. tram cars. While such a transfer increases the depth from which the ore must be hoisted, it speeds up the hoisting operation because it eliminates the necessity of dumping two cars to fill the skip as is required at the 1st level shaft pocket.

3rd Level

The work of contracts Nos. 96 and 103 which shows on the 3rd level maps has already been discussed above.

4th Level

The bulk of the work done by No. 13 contract in the North Vein during 1944 should be classed as depleting in character since they mined floor during most of the year. They did however, extend a raise stope to the west to coordinates 360 S - 440 W. This was merely an extension to the west of the breast stope which they had put into this territory in the previous year. The ore from this operation is second class in quality and by the end of 1944 the material at the breast had become so lean that further advance in that direction was discontinued. About 300 ft. south-east of contract No. 13 there is a vein of steel ore which was developed by contract No. 33. Their work consisted of the advance of a breast stope to the northeast to coordinates 540 S - 240 W. On the south side the ore vein is adjacent to sideritic footwall material while on the north side jasper seems to be the limiting feature. There is some possibility that this jasper could be a seam with another ore vein on the other side of it.

Contract No. 71 put in the bulk of their time during the past year depleting ore reserves by mining floor in an area located at coordinates 425 S - 640 W. At this same location however, they did put up a raise into 3rd level workings and inasmuch as no ore reserves had been estimated in this particular spot, perhaps all of the work might be put in the development category.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

5th Level

At the beginning of the year contract No. 14 was busy continuing their raise which they had started on the 9th level in the Fault Vein ore body. They continued at this work until September, progressing through old stopes on the 7th level and on up to the 5th level elevation at coordinates 870 S - 1540 W. At this location the ore vein which they had been following was pinched down between dike footwall and jasper hanging to a thickness of about 4 ft. discouraging any further advance of the raise. This work has developed some ore, albeit thin, 200 ft. west of the most westerly workings on the 5th level. It has always been our contention that the area to the west of the present limits of the Fault Vein and Main Vein ore bodies should be explored. We know that the formation exists along this extension and the fact that we are limited on all levels by lean or jaspery material does not preclude the possibility that good ore may have been concentrated in this horizon farther to the west. It is an area which is difficult to explore by any other means than by drifting or raising since there are no workings from which drilling can attack the area.

In the North Vein, contract No. 93 breast stoped in the first part of 1944 to coordinates 180 N - 35 E at an elevation about 30 ft. above the 5th level. The ore vein at the breast was pinched out between slate hanging wall and dike footwall that strikes northwest-southeast. During the last part of the year contract No. 93 mined the reserves which they had developed in the back and floor of this breast stope.

The work of No. 96 contract, shown on the 5th level, was discussed under the 2nd level heading.

6th Level

As we mentioned above, contract No. 14 raised through the 6th level elevation up to a point above the 5th level elevation. On the 6th level this gang cut out from their raise and drifted slightly south of east for a distance of about 60 ft. in order to connect to the west end of the old 6th level drift. This work was done in order to improve the traveling road into the area.

7th Level

Again contract No. 14 is mentioned since they holed to the 7th level stope near the extreme west end of the Fault Vein. On this elevation considerable ore reserves were found by No. 14 contract to exist in the hanging wall of the old workings. Two hundred fifty feet east of the above mentioned area, contract No. 38 stoped the north rib of old Fault Vein workings nearly doubling the total width of the mined ore vein.

In the North Vein, contract No. 87 located at coordinates 10 N - 390 W, mined back and sides of pillars in an area where no ore reserves had been estimated.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

8th Level

Contract No. 19 spent a portion of the year breast stoping in the Main Vein where they extended the breast of old workings northeast to coordinates 500 S - 1140 W. They had been mining floors from the old stope and found that the ore vein could be followed for about 30 ft. to the northeast before it pinched out between slate hanging and either dike or slate on the footwall. Some 600 ft. nearer the shaft in the Main Vein, contract No. 85 breast stoped northeast to coordinates 320 S - 490 W. The ore vein in this area was bounded on the south side by siderite and dike which swings abruptly north across the breast of the stope as located by the coordinates. The north rib of the stope is made up of jasper which meets the footwall material thereby effectively blocking any further advance. Some ore does remain in the floor of this area and it will be mined in the future by additional development work, perhaps from the 9th or 10th levels in the form of a raise which is required before the ore can be readily extracted.

In the North Vein contract No. 36 did development work on both the 8th and 9th levels in the same ore vein. On the 8th level they advanced a small breast stope to the east to coordinates 190 N - 450 W where the ore vein pinched out between two dikes. Following this the crew dropped down in their raise to the 9th level elevation and drifted both east and west. The drifts are about equal in length, extending out from the raise slightly over 70 ft. A raise connection to the 8th level stope was put up at the east end of the east drift and more floor was mined through this raise connection. Generally speaking, the results of all of the development by No. 36 contract in this stope have been disappointing in the past year. We had hoped that a good sized stope could be developed on the 9th level elevation but the ore vein gets narrow down the dip due to convergence of rock in the foot and hanging walls.

The latter part of the year contract No. 90 breast stoped east in a narrow vein of ore that strikes east and west. By the end of the year this stope had broken through to the 8th level drift at coordinates 30 N - 40 E. The ore vein crosses the drift and it may be possible for No. 90 contract to continue finding ore reserves with additional advance of the breast stope on the opposite side of the 8th level drift.

9th Level

The work of No. 36 contract was discussed in conjunction with the work they did on the 8th level elevation.

The only other development work done on the 9th level was performed in the Section 9 Exploration area where three contracts spent all or part of 1944. Contract No. 47 put up a raise from the northeast corner of their stope which lies at an elevation about 15 ft. above the 9th level floor. This raise was used as a traveling road to get at the ore in the floor of an old raise stope which connects to the same stope from which the raise

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a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

was started. All the ore was mined from the floor of the old raise stope and some exploratory work was done up near the 5th and 4th level elevations in an attempt to discover a vein of ore that might lead east to the 3rd level drift that runs north and south along the 4100 W coordinate line. No very promising leads were found and the gang was moved to the 1st level "B" shaft territory where they continued operations as contract No. 73. Contract No. 88 continued to develop a 20 ft. thick vein of ore that strikes northwest-southeast and dips about 30° to the southwest. This development work consisted of inclined drifts and cross-cuts driven to produce a rectangular pattern of workings. The main scraper drift was extended northeast up the dip of the ore vein and the cross-cuts were put in northwest parallel to the strike of the ore vein. At the end of the year this crew still had the ore vein going up to the northeast in variable thicknesses of from 10 ft. to 25 ft. Contract No. 103 spent July to October cutting out head room on the top of one of the raises between the 10th and 9th levels in order that a tigger hoist might be installed to handle the diamond drill equipment which we expect to take up to the 1st level elevation. It will be necessary to transfer this material on the 9th level from one raise into the long raise that goes on up to the 1st level elevation. Contract No. 103 put up a small branch raise into the long raise from the 9th level drift so that the diamond drill material can be safely transferred to the skip road bucket.

10th Level

At coordinates 700 S - 1420 W, contract No. 14 spent the last three months of the year cutting out a stope to the south from the south side of the raise that connects 9th and 10th levels. About 70 ft. west of this point contract No. 46 put up a new raise between the 10th and 9th levels to serve as a traveling road and they also put a branch from this raise up to the north looking for the upward extension of the 10th level ore vein. This proved to be a disappointment because the slate or dike hanging wall of the 10th level ore vein was encountered but there was no ore adjacent to it.

12th Level

Inasmuch as contracts Nos. 31 and 40 worked in the same territory doing the same kind of work, they will be discussed together under this heading although their work encompassed a vertical interval of about 100 ft. Both of these crews started to raise from the top of the man-way raise that parallels No. 1 storage raise between the 15th level and an elevation 65 ft. above that level. Contract No. 40 raised to the south while contract No. 31 raised to the northwest. The former was headed for the floor in the No. 1 stope area on the 10th level. When completed this raise will make it possible for us to mine the ore below the 10th level elevation. Contract No. 31 put their raise up to the 12th level elevation and drifted northwest toward the ore shown in drill hole No. 265. Manpower shortage and curtailment of the development program brought about the stoppage of No. 31 contract's work in this area when they had reached coordinates 110 S - 940 W. Up to that time they had encountered no ore of first class quality. Contract No. 40 was allowed to continue raising to the end of the year at which time they were also near the 12th level elevation.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

13th Level

Contract No. 43 did what might be considered a small amount of development work when they stripped the thin dike footwall from the south side of a stope located at coordinates 450 S - 1430 W in order to expose a vein of merchantable ore lying beneath the dike. They completed the mining of that ore vein before the end of the year. Contract No. 86, 200 ft. east of No. 43 contract, put up a new branch from their ore raise to the 12th level elevation and stopped south to coordinates 480 S - 1240 W on the 13th level. Before the end of the year contract No. 86 had exhausted all the ore on the 13th level elevation in this stope.

14th Level

Two gangs did development work on this level during 1944. Contract No. 48 stoped north and east in a cross-cut to connect their old workings to another old stope at coordinates 170 S - 1390 W. They also connected their two east-west stopes in the middle by a cross-cut at coordinates 320 S - 1560 W. In addition to this work contract No. 48 mined some ore from the floor of their workings. Contract No. 37 moved into this area in October in order to mine floor and also to start a breast stope east at coordinates 220 S - 1430 W. Peculiarly enough, all of this ore occurs on an elevation about 25 ft. below the 14th level while diamond drill hole on the 14th level indicates nothing but jasper, which acts, of course, as the hanging of 14th level stopes.

15th Level

The development raises of Nos. 31 and 40 contracts have been discussed under the 12th level heading. Seven hundred feet west of these two raises, contract No. 37 spent the first part of the year depleting ore from a stope at coordinates 0 - 1450 W and it also advanced one short breast stope south from the south rib of their previous workings to coordinates 10 S - 1560 W. At the time they were moved away from this area it was felt that we had exhausted most of the possibilities on the 15th level with the exception of ore that remains to be mined in the back at coordinates 15 S - 1600 W.

2. Cliffs Shaft, Bancroft and Section 10 Lease:

The following table shows the gangs that did development work during 1944. The tonnage after each is the amount broken by these crews in development and allocated to the proper level by estimate.

<u>"A" SHAFT</u>	<u>Contract Number</u>	<u>Mine Tally</u>		<u>Shifts Mining</u>	<u>Shifts Barring While Developing</u>
		<u>Ore</u>	<u>Rock</u>		
1st Level	30	1,499		70	8
2nd "	2	1,265		82	
	96	97		26	
	99	923	1,060	197	6
3rd "	9	4,360	8	253	19
	12	3,606		206	11
	27	3,932		224	
	44	786		50	
	60	2,285		119	

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7. UNDERGROUND: (Cont'd)a. Development: (Cont'd)2. Cliffs Shaft, Bancroft and Section 10 Lease: (Cont'd)

	<u>Contract Number</u>	<u>Mine Tally</u>		<u>Shifts Mining</u>	<u>Shifts Barring While Developing</u>
		<u>Ore</u>	<u>Rock</u>		
4th Level	2	2,499		250	
	8	1,816	4	163	2
	12	260	88	35	17
	45	6,584		232	36
	57	4,055	624	303½	
5th "	96	184		47	
	12	352		24	
	92	913		46	
	96		70	25	
	99	459	124	74	
6th "	104	469	576	198	
	51	9,205		305	
	66	811		50	
7th "	102		356	43	
	61	3,330	204	224½	
	66	2,305	4	102	2
	67	8,272	20	288	17
	80	337		38	12
8th "	94	71		45	5
	4	2,050		69	20
	5	10	80	25	
	41	4,422	5,950	536	8
	61		264	25	
	80	1,744	72	163	
	91	1,239		141	4
9th "	102	342		45	
	5	2,535	216	257	
	23	1,193		25	
	26	377		24	
	46	2,004		49	
	50	2,935	348	125	
	64	2,152	136	254	17
	69	2,509		123	4
10th "	101		200	49	
	3	2,519	8	148	
	10	1,652		66	13
	21	632	3,448	575	16
	32	1,933	124	237	
	53	5,243		295	7
	61	133	404	50	
	68	3,040		220½	4
	70	240		24	
	81	2,147	576	300	
	84	1,555	16	73	4
11th "	101	428		113	
	24	82		11	
	39	1,056		42	
	62	3,376	396	279	
	104	128	104	66	

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft, Bancroft and Section 10 Lease: (Cont'd)

	<u>Contract Number</u>	<u>Mine Tally</u>		<u>Shifts Mining</u>	<u>Shifts Barring While Developing</u>
		<u>Ore</u>	<u>Rock</u>		
12th Level	89	5,605	92	174	23
15th "	11	112	250	149½	
	82	92	1,526	272	7
	101		1,006	138½	
Total "A" Shaft		114,160	18,354	8,863½	262
<u>"B" SHAFT</u>					
1st Level	1	4,679	110	320	
	17	8,695	2	299½	
	18	2,560	8	267	
	58	7,806	8	212½	12
	73	1,739	480	249	
	75	5,270	20	306	1
	85	1,135		94	
	103	179	880	146	
2nd "	63	3,142		111	61
	72	4,837		169	34
3rd "	96	31	200	29	3
4th "	13	1,178		81	13
	33	5,205	268	302	
	71	813		63	15
5th "	93	704		37	26
	96		600	76	
6th "	14	2,040		149	
7th "	14	-	126	77	
	38	6,242		128	
	87	9,792		291	12
8th "	19	1,005		48	
	36	347		52	
	85	1,306		74½	
	90	3,626		168	4
9th "	36	2,779	56	149	3
	47	1,844	242	163	
	88	4,478	300	294	6
	103	214	344	91	
10th "	14	2,981		74	
	46	1,484		153	
12th "	31	41	376	94	
	40	56	208	67½	
	86	1,984	856	144	25
13th "	31		142	26	
	40	46	148	97½	
	43	1,122		52	
14th	37	219	60	12	10
	40		70	19	
	48	2,815		127	
15th "	31	10	496	99½	
	37	362		24	
Total "B" Shaft		92,766	6,000	5,436	225
Grand Total Developing		206,926	24,354	14,299½	487



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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease: (Cont'd)

The contract sheet tonnage, which includes no overrun, equals 571,576 tons. The 206,926 tons mined by developing gangs is 36.2% of the total.

The following table gives the mine tally production totals without overrun for the past six years:

1939	369,018 Tons
1940	525,133 "
1941	642,327 "
1942	(1) 690,266 "
1943	629,555 "
1944	<u>569,871 "</u>
Total	3,426,181 "

(1) Actual tally is 694,807 tons which includes 4,541 tons of Incline Lump.

Developing gangs have mined the following tonnages during the past six years:

1939	167,936 Tons
1940	252,208 "
1941	281,542 "
1942	310,365 "
1943	252,869 "
1944	<u>206,926 "</u>
Total	1,471,846 "

In the six years 1939 to 1944 inclusive, depleting gangs mined 1,953,934 tons per the contract sheet tally or 57.1% of the total of 3,425,780 tons. Total mine tally for the same period is 3,426,181 tons without overrun.

The following table gives the average number of development gangs, the tonnage mined by them, the shifts involved and the tons per gang per shift for the past six years:

<u>Year</u>	<u>Avg. No. of Gangs on Ore Development</u>	<u>Tonnage Mine Tally</u>	<u>Shifts Worked</u>	<u>Tons Per Gang Per Shift</u>
1944	48.1	206,926	14,786½	13.99
1943	56.2	252,869	16,836½	15.02
1942	55.4	310,365	16,946½	18.31
1941	61.0	281,542	12,611	22.32
1940	50.0	252,208	11,345	22.23
1939	48.0	167,936	9,098	18.46

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7. UNDERGROUND: (Cont'd)

b. Stoping:

<u>"A" SHAFT</u>	<u>Contract Number</u>	<u>Location by Coordinates at Approx. Center of Operations</u>	<u>Character of Work</u>
1st Level	30	230 S - 550 E	Mining floors & ribs
	58	1230 S - 730 E	Mining floors
2nd Level	34	40 S - 800 E	Mining floors & backs
3rd Level	27	240 S - 600 E	Mining floors
	44	110 N - 1000 E	Mining floors & stope
4th Level	60	230 S - 1380 E	Mining floors
	12	425 S - 1420 E	Mining back
	22	110 S - 1260 E	Mining floor
	29	100 N - 1175 E	" "
	45	1240 S - 2740 E	" "
5th Level	76	140 S - 1340 E	" "
	92	225 S - 1570 E	" "
6th Level	6	1200 S - 1970 E	" "
	20	200 S - 2200 E	" "
	54	170 S - 1950 E	" "
	66	90 S - 2730 E	" "
		& 110 S - 2610 E	" "
	98	480 S - 1570 E	" "
7th Level	15	270 S - 2900 E	" "
	16	150 S - 1780 E	" "
	20	170 S - 2225 E	" "
	52	260 S - 2310 E	" "
	54	170 S - 1960 E	" "
	59	510 S - 1720 E	" "
	94	540 S - 1550 E	" "
8th Level	95	320 S - 2640 E	" "
	4	830 S - 1540 E	Mining back
	35	570 S - 3100 E	Mining back & pillar
	55	1050 S - 2600 E	Mining floor
	78	0 - 3060 E	" "
	79	160 S - 2080 E	" "
	91	200 N - 2800 E	" "
9th Level	95	340 S - 2580 E	" "
	102	200 N - 1340 E	Mining bench
	23	90 N - 2610 E	Mining floor
	46	620 S - 1350 E	Mining back
	50	530 S - 2870 E	Mining floor
	55	1050 S - 2650 E	Mining rib & floor
	65	1030 S - 2220 E	Mining floor
	68	760 S - 3040 E	" "
	69	160 N - 2110 E	" "
10th Level	78	150 N - 2970 E	" "
	91	240 N - 2700 E	" "
	3	750 S - 1640 E	" "
	10	30 N - 2040 E	Mining back & floor
	26	650 S - 2670 E	Mining floor
	39	570 S - 2000 E	" "
70	120 N - 2450 E	" "	
84	110 N - 2280 E	" "	
89	390 N - 1940 E	" "	

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7. UNDERGROUND: (Cont'd)b. Stoping: (Cont'd)

<u>"A" SHAFT</u>	<u>Contract Number</u>	<u>Location by Coordinates at Approx. Center of Operations</u>	<u>Character of Work</u>
11th Level	7	600 S - 2200 E	Mining floor
	83	560 S - 2570 E	" "
12th Level	24	630 S - 2200 E	" "
	89	380 N - 2000 E	Mining back
 <u>"B" SHAFT</u>			
1st Level	63	380 S - 300 W	Mining floor
	73	430 S - 375 W	" "
(1165' sub- level)	75	1150 S - 175 W	Mining back
3rd Level	71	500 S - 680 W	Mining floor of stope connecting 3rd and 4th (listed as 4th product)
4th Level	13	310 S - 360 W	Mining floor
	40	550 S - 590 W	" "
	71	420 S - 650 W	" "
5th Level	49	840 S - 1325 W	" "
	93	170 N - 25 E	Mining back
6th Level	38	750 S - 1140 W	Mining floor
7th Level	42	90 S - 0	" "
	100	640 S - 1130 W	" "
8th Level	19	550 S - 1180 W	" "
	36	200 N - 450 W	Mining back
	85	330 S - 510 W	Mining floor
	90	0 - 100 W	" "
9th Level	36	160 N - 550 W	" "
	56	440 S - 825 W	" "
	77	260 S - 590 W	Mining floor & back
10th Level	46	690 S - 1460 W	Mining back
	56	420 S - 770 W	Mining floor
12th Level	86	400 S - 1220 W	" "
13th Level	43	440 S - 1440 W	" "
14th Level	37	190 S - 1440 W	" "
	43	430 S - 1450 W	" "
	48	320 S - 1600 W	" "
15th Level	37	0 - 1450 W	" "

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7. UNDERGROUND: (Cont'd)

b. Stoping: (Cont'd)

The table below shows the ore broken by the stoping gangs mining developed reserves:

<u>"A" SHAFT</u>	<u>Contract Number</u>	<u>Mine Tally</u>		<u>Shifts Mining</u>	<u>Shifts Barring While Depleting</u>
		<u>Ore</u>	<u>Rock</u>		
1st Level	30	4,330	12	211	4
2nd "	34	6,329	476	308	17
3rd "	27	1,749		77	
	44	780	4	46	4
4th "	22	5,539		300	8
	29	2,269	78	254	29
	45	1,229		43	
	60	3,646		169	
5th "	76	6,860	24	285½	7
6th "	54	3,152		109	12
	92	5,911		207	37
7th "	6	10,083		303½	
	15	9,052	56	296	7
	16	3,488		298½	
	20	857	14	33	17
	54	2,652	4	153	
	66	3,570		143	
	80	2,810	32	78	
	94	6,283		249	
	98	8,604		287½	
8th "	4	1,163		14	3
	20	5,681	72	235	21
	25	12,245	14	43	21
	35	4,519		247	31
	52	8,155	168	266	3
	55	8,242	120	167	67
	59	7,548		268	36
	65	2,820		99	
	79	9,027		255	9
	95	5,003	128	116	2
	102		28	12	
9th "	31			40	26
	46	1,948		67	4
	50	3,057	8	141	
	55	4,123		100	
	65	4,151		198½	
	69	4,264	244	175	
	78	7,599	110	297	8
	91	2,575	12	74	8
	95	4,335		133½	
10th "	3	2,137	100	109	9
	10	7,400	4	161	67
	23	9,318		267	12
	26	5,115	12	281	
	68	1,033		51	
	70	7,640	16	267	8
	84	5,860	44	222	6
	89	933	28	75	
	91	1,408	80	45	

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7. UNDERGROUND: (Cont'd)b. Stoping: (Cont'd)

	<u>Contract Number</u>	<u>Mine Tally</u>		<u>Shifts Mining</u>	<u>Shifts Barring While Depleting</u>
		<u>Ore</u>	<u>Rock</u>		
<u>"A" SHAFT</u>					
11th Level	7	10,154		304½	
	39	5,347		221	6
12th "	24	8,522		272½	
	83	6,992		322½	14
	89	1,173		26	
Total "A" Shaft		258,680	1,888	9,423½	503
<u>"B" SHAFT</u>					
1st Level	58	3,478		75	
	75	1,255		47	2
2nd "	63	1,584	24	57	63
	72	2,629		86	16
4th "	13	4,845		193	15
	40	1,520		80	17
	71	4,973		206	14
5th "	38	1,969		52	2
	49	13,339	48	300	
	93	5,314	12	187	12
7th "	38	5,205		126½	1
	42	6,033		291	12
	100	5,521	48	172	114½
8th "	19	8,718	648	235	19
	36	102		24	
	85	1,216	6	62	
	90	2,252		107	6
9th "	36	1,566	4	76	
	56	1,859		70	
	77	7,242		274	26
10th "	46			25	
	56	7,966	32	225	3
13th "	43	2,290	520	121	
	86	1,584	268	102	16
14th "	37	1,663		45	
	43	2,968	56	113	5
	48	5,804		171	4
15th "	37	3,075	474	170½	17
Total "B" Shaft		105,970	2,140	3,693	364½
Grand Total Depleting		364,650	4,028	13,116½	867½

The mine tally from the contract sheets was 571,576 tons of which the depleting gangs broke 63.8%.

The following table gives a six year comparison:

<u>Year</u>	<u>Avg. No. of Gangs Stopping</u>	<u>Tonnage Mine Tally</u>	<u>Shifts Worked</u>	<u>Tons Per Gang Per Shift</u>
1944	48.4	364,650	13,984	26.07
1943	46	377,262	13,569½	27.80
1942	48	379,801	14,250	26.65
1941	40	357,135	13,961	25.58
1940	43	275,004	9,739	28.23
1939	41	200,082	7,514	26.63

Very little broken ore remained in stopes at the end of the year.

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7. UNDERGROUND: (Cont'd)

c. Drifting and Raising:

<u>Year</u>	<u>Rock Drifts and Raises</u>	<u>Ore Drifts and Raises</u>	<u>Total</u>
1944	3,814'	4,108'	7,922'
1943	5,180'	4,059'	9,239'
1942	2,855'	3,166'	6,021'
1941	2,196'	3,411'	5,607'
1940	1,756'	3,242'	4,998'
1939	2,130'	2,270'	4,400'
1938	2,337'	1,955'	4,292'
1937	4,292'	2,895'	7,187'
1936	4,122'	2,724'	6,846'
1935	3,043'	2,646'	5,689'

d. Explosives, Drilling and Blasting:

The pounds of powder used per ton of ore increased .0190 lbs. per ton in 1944 over 1943. This is only a very slight difference and a portion of it could be accounted for by the miners carrying over a little larger inventory at the end of the year. It is also true that very little stockpile overrun was credited to the mine in 1944 and it is our belief that much of the overrun that should have been in the lump ore pile is actually in the crushed ore pile which was not shipped. This overrun would reduce the pounds of powder per ton of ore. The number of small working places increased slightly in 1944. Ore burden in the small places is less per pound of powder.

The overall cost per ton for explosives was practically the same in 1944 as in 1943.

The following table is self-explanatory.

<u>Year</u>	<u>Pounds of Powder Per Foot of Rock Development</u>	
1941	16.97	Gelamite
1942	19.91	( $\frac{1}{2}$ Gelamite & $\frac{1}{2}$ Gelatin)
1943	17.8	Gelamite
1944	18.7	Gelamite

Explosives cost per foot of development in rock is \$2.617 per ft. which is also the average of the two years 1943 and 1942.

The table below gives kinds and percentages of ore broken during 1943 and 1944.

	<u>1943</u>	<u>1944</u>
Specular Ore	53.7	53.4
Slate Ore	11.5	12.9
Steel Ore	23.3	21.1
Magnetite Ore	7.6	6.6
Conglomerate Ore	3.6	6.0
	<u>100.0%</u>	<u>100.0%</u>

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7. UNDERGROUND: (Cont'd)

d. Explosives, Drilling and Blasting: (Cont'd)

Statement of Explosives Used: (Stoping and Development in Ore)

	<u>Quantity</u>	<u>Average Price</u>	<u>Amount 1944</u>	<u>Amount 1943</u>
Gelamite No. 1 - Lbs.	514,150	11.50	59133.00	62076.75
60% Gelatin, L.F. - Lbs.				465.75
Total Powder	514,150	11.50	59133.00	62542.50
Fuse - Ft.	815,261	5.75 M	4682.16	5569.40
No. 6 Caps	132,935	12.20 M	1622.01	1792.99
Electric Caps	6,284	11.28 C	709.17	495.21
Fuse Lighters	31,800	6.75 M	214.63	279.35
No. 18 Shot Wire - Ft.	9,130	16.21 M	148.02	223.02
Tamping Bags	31,500	4.67 M	147.25	64.51
Connecting Wire - Lbs.	259½	.575	149.32	
Miscellaneous			143.44	116.03
Total Fuse, Etc.			7816.00	8540.51
Total Stopping & Dev. in Ore			66949.00	71083.01
Product - Tons			587,051	634,628
Lbs. Powder Per Ton Ore			.8758	.8568
Cost Per Ton For Powder			.1007	.0985
Cost Per Ton For Fuse, Etc.			.0152	.0135
Cost Per Ton For All Explosives			.1159	.1120

(Development in Rock)

Gelamite No. 1 - Lbs.	71,600	11.50	8234.00	9809.50
60% Gelatin, L.F. - Lbs.				799.25
Total Powder	71,600	11.50	8234.00	10608.75
Fuse - Ft.	21,300	5.73 M	121.90	349.02
No. 6 Caps	3,565	12.20 M	43.48	98.42
Electric Caps	9,214	11.22 C	1033.81	1060.22
Fuse Lighters	3,200	6.76 M	21.62	47.12
No. 18 Shot Wire - Ft.	17,350	16.15 M	280.14	577.29
Tamping Bags	3,500	4.75 M	16.64	9.64
Connecting Wire - Lbs.	377½	.59	224.12	
Miscellaneous			5.03	46.80
Total Fuse, Etc.			1746.74	2188.51
Total Rock Development			9980.74	12797.26
Feet Rock Development			3814	5180
Cost Per Ft. Rock Development			2.617	2.471
GRAND TOTAL ALL EXPLOSIVES			76929.74	83880.27
AVERAGE COST PER LB. FOR POWDER			.115	.115

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a. Detailed Cost Comparison  
Details of Accounts

	1944				1943			
	Labor		Supplies		Labor		Supplies	
	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
<u>Underground Costs</u>								
Exploring in Mine	14694.95	.025	5751.87	.010	15588.33	.024	7776.60	.013
Development in Rock	76810.49	.131	16081.03	.027	90353.18	.142	19488.14	.031
Development in Ore	65611.64	.112	16023.55	.027	47204.82	.074	17021.86	.027
Stopping	486420.22	.831	106786.06	.180	356853.68	.562	97658.69	.155
Timbering	16804.64	.029	10721.29	.018	13869.30	.022	9977.93	.016
Tramming	123955.04	.212	5541.17	.009	306638.31	.483	17575.26	.028
Ventilation	94.63	-	236.25	-	383.73	-	1193.53	.002
Pumping	10980.00	.019	24160.36	.041	11951.04	.019	21608.40	.034
Comp. & Air Pipes	6159.67	.010	49445.55	.085	6567.41	.010	45475.10	.072
Back Filling	-	-	112.18	-	1325.86	.002	25.13	-
Underground Suptce.	39988.33	.068	123.65	-	37891.38	.060	109.83	-
Cave-In	-	-	-	-	-	-	226.40	-
Comp. & Power Drills	811.56	.001	8828.09	.015	578.39	.001	8594.05	.013
Scrapers & Mech. Loaders	24398.11	.042	42991.82	.072	22879.42	.036	39944.26	.063
Elec. Tram Equipment	21999.22	.038	16825.26	.029	21817.12	.034	16747.57	.027
Pumping Machinery	1790.05	.003	1821.18	.003	1509.38	.002	1051.21	.002
Total Undg. Costs	890518.55	1.521	305449.31	.516	935411.35	1.474	304473.96	.480
<u>Surface Costs</u>								
Hoisting	19060.87	.033	19764.00	.034	20096.85	.031	20894.98	.034
Stocking Ore	28282.51	.048	7266.19	.012	24954.00	.039	3372.87	.006
Screening, Crushing at Mine	31556.63	.054	12791.43	.022	35476.70	.056	15538.91	.024
Dry House	8642.39	.015	5379.71	.009	8410.12	.013	4866.14	.007
General Surface	18048.90	.030	2095.15	.004	17388.26	.027	2755.03	.005
Hoisting Equipment	6902.08	.012	4228.01	.007	4580.03	.007	5880.55	.010
Shaft	4794.36	.009	1448.36	.002	6590.84	.010	549.98	.001
Top Tram Equipment	2096.35	.004	2728.43	.005	2023.48	.003	2752.90	.005
Docks, Trestles & Pkts.	2332.87	.004	2552.22	.004	2702.72	.004	2517.54	.004
Mine Buildings	7483.60	.013	3295.32	.006	9129.97	.014	3726.89	.006
Total Surface Costs	129200.56	.220	61548.82	.105	131352.97	.207	62855.79	.099
<u>General Mine Expenses</u>								
Social Security Taxes	-	-	24568.17	.041	-	-	25781.98	.041
Insurance	-	-	8824.71	.015	-	-	6842.90	.011
Mining Engineering	5601.76	.010	1221.59	.002	4212.04	.007	1089.18	.001
Mech. & Elec. Engr.	1856.04	.003	542.70	-	2322.34	.004	606.00	.001
Analysis & Grading	21452.99	.037	7469.42	.013	23191.34	.037	8147.99	.012
Personal Injury	-	-	21764.04	.037	-	-	19475.15	.032
Safety Department	98.18	-	2893.47	.005	80.48	-	2981.25	.005
Tel. & Safety Devices	1730.80	.003	4789.47	.008	1336.15	.002	4688.23	.008
Local & Gen. Welfare	-	-	5626.23	.010	-	-	6599.08	.010
Spec. Exp. Pens. & All.	1970.00	.003	10252.39	.018	705.00	.001	11360.96	.018
Ishpeming Office	-	-	29000.45	.050	-	-	27407.52	.043
Employees Vacation Pay	28998.81	.050	-	-	28415.73	.045	-	-
Mine Office	21223.11	.036	4491.35	.008	23312.82	.037	4097.42	.006
Total Gen. Mine Exp.	82931.69	.141	121443.99	.207	83575.90	.132	119077.66	.187
Cost of Production	1102650.80	1.882	488442.12	.828	1150340.22	1.813	486407.41	.766
Taxes	-	-	181682.98	.310	-	-	167310.99	.263
Total Cost	1102650.80	1.882	670125.10	1.138	1150340.22	1.813	653718.40	1.029
	62.2%		37.8%		63.7%		36.3%	



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8. COST OF OPERATING:

a. Comparative Mining Costs:

	<u>1944</u>	<u>1943</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT - Tons	587,051	634,628		47,577
Underground Costs	2.037	1.954	.083	
Surface Costs	.325	.306	.019	
General Mine Expense	.348	.319	.029	
Cost of Production	2.710	2.579	.131	
Depreciation	.023	.042		.019
Taxes	.310	.263	.047	
Loading and Shipping	.086	.072	.014	
TOTAL COST AT MINE	3.129	2.956	.173	
No. of Days Operating	305	308		3
No. of Shifts and Hours	2 8-hr.	2 8-hr.		
Average Daily Product - Tons	1,925	2,060		135

The average daily product since 1930 is tabulated below:

<u>Year</u>	<u>Average Daily Product</u>
1944	1,925
1943	2,060
1942	2,360
1941	2,181
1940	2,109
1939	1,844
1938	1,713
1937	1,830
1936	1,698
1935	1,610
1934	1,595
1933	1,331
1932	1,368
1931	1,448
1930	1,383

The drop in daily hoist is a continuation of conditions that prevailed in 1943. Chief reasons for continued decline in product were inadequate manpower and the necessity of keeping much manpower on development to replace places that had been worked out because of too rapid rate of depletion in war years.

Exploring in Mine

<u>Year</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1944	\$ 14,694.95	5,751.87	\$ 20,446.82
1943	15,588.33	7,776.60	23,364.93
Decrease	893.38	2,024.73	2,918.11

The decrease in cost in 1944 is partly due to credit adjustments and partly to less footage drilled in 1944. The detail on next page shows a comparison of costs.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Exploring in Mines (Cont'd)

	<u>1944</u>	<u>1943</u>
Labor for Undg. Drilling	\$ 11,425.44	\$ 12,598.47
Prop. of D.D. Supt.'s Time	258.18	314.69
Carbon Loss	2,813.71	3,675.50
Pipe and Fittings	260.28	475.30
Drill Equipment and Repairs	585.79	123.23
Rental of Drill Equipment	1,287.50	1,405.75
Miscellaneous Supplies	201.79	216.04
Compressor Expense	1,200.00	1,200.30
Credit on Bortz Bits	299.96	70.99
Adjustment of Selling Price of Carbon	<u>1,084.15</u>	
Total	16,648.58	19,938.29
Geological Expense for Drill	689.34	670.19
Analysis Expense	743.85	754.10
Total Underground Drilling Cost	18,081.77	21,362.58
Geological Dept. Exp. for Mine Mapping	<u>2,365.05</u>	<u>2,002.35</u>
Total as Per Cost Sheet	20,446.82	23,364.93
Feet drilled underground with carbon	5,816	6,784
Cost Per Foot	3.108	3.141 (x)

(x) Cost per ft. in 1943 = \$21,362.58 ÷ 6,784' = \$3.141.

The \$50.75 is carbon and rental charges incurred in December 1942 and charged in March 1943.

Two drills were used underground throughout 1944 as in 1943. Total footage was 5816 ft. in 1944 compared to 6784 ft. in 1943. The cost per foot decreased .033 per ft. in 1944 compared to 1943 in spite of decreased footage, but the two credit items on bortz bits and adjustment of selling price of carbon account for a reduction in overall per ft. cost of .238. Without the credit items the cost per foot would have been .205 higher in 1944 than in 1943 which would be expected from a consideration of the following table. This table comparison shows that the proportion of hard materials, viz., siderite, jasper, and quartzite was 32.3% in 1944 and only 24.8% in 1943.

	<u>1943</u>		<u>1944</u>	
Ore	407'	6.0%	422½'	7.2%
Dike	3,573'	52.7%	2,838½'	48.8%
Slate	791'	11.6%	471'	8.1%
Cong. & Lean Ore	333'	4.9%	206'	3.6%
Quartzite	833'	12.3%	-	-
Siderite	343'	5.1%	789'	13.6%
Jasper	504'	7.4%	<u>1,089'</u>	<u>18.7%</u>
Total	<u>6,784'</u>	100.0%	5,816'	100.0%

E. & A. No. CC-93 was credited in 1944 with \$633.68 as an adjustment on carbon inventory. No work was done on the drilling program in Section 9 - 47 - 27, which was authorized under this E. & A., because crews were unavailable. Total expended to date under the E. & A. is \$22,011.91, which leaves \$7,988.09 unexpended.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Development in Rock

Comparative costs for the past five years are shown below:

Year	Footage	Labor Cost		Supply Cost		Total Cost	
		Total	Per Ft.	Total	Per Ft.	Total	Per Ft.
1944	3,814	76,810.49	20.14	16,081.03	4.21	92,891.52	25.35
1943	5,180	90,353.18	17.44	19,488.14	3.76	109,841.32	21.20
1942	2,855	44,755.36	15.68	11,351.66	3.97	56,107.02	19.65
1941	2,196	33,351.58	15.19	8,005.31	3.64	41,356.89	18.83
1940	1,756	24,084.21	13.71	6,559.87	3.74	30,644.08	17.45

The unit cost per foot is related to the size and proportions of different sizes of development openings as indicated in the following table:

	1944	1943	1942	1941	1940
Rock Raises	1678'	1124'	1152'	993'	176'
10' x 10' Main Haulage Drifts	1533'	2855'	1140'	631'	1303'
8' x 8' Main Haulage Drifts	603'	1201'	563'	572'	277'
Total	3814'	5180'	2855'	2196'	1756'

The data in the next table is also explanatory of unit cost per foot, because the type of material has a very pronounced effect on rate of progress of development and therefore cost.

	Jasper or <u>Lean Ore</u>	<u>Siderite</u>	Dike or <u>Slate</u>	<u>Total</u>
Rock Raises	328'	510'	840'	1678'
10' x 10' Rock Drifts	498'	578'	457'	1533'
8' x 8' Rock Drifts	119'	19'	465'	603'
Total	945'	1107'	1762'	3814'

The unit cost per foot shows a decided increase in both labor and supply cost. This is due to the fact that the nite shift work of transferring rock from old stopes where ore was discovered to exist in the floors, was all charged to development in rock. There were two stopes employing motor and scraping crews throughout much of the year, where this transfer was being carried out.

Development in Ore and Stopping

The difficulty of separating, for cost purposes, the ore development mining gangs and stopping gangs is responsible for the combination of the two accounts. Cost sheet developing gangs are mainly drifting and raising crews, whereas some breast stopes are classed, for description purposes, as development work when advancing into new territory.

Comparative costs for the last two years follows:

Year	Labor Cost	Supply Cost	Total Cost
1944	555,621.27	119,220.20	674,841.47
1943	404,058.50	114,680.55	518,739.05

CLIFFS SHAFT MINE  
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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

The detailed cost for the two years follows:

	<u>1944</u>		<u>1943</u>	
	<u>Total</u>	<u>Cost Per Ton</u>	<u>Total</u>	<u>Cost Per Ton</u>
<u>Labor</u>				
Miner's Labor	223,382.09	.381	230,465.71	.363
Other Labor	332,239.18	.566	173,592.79	.274
Total	555,621.27	.947	404,058.50	.637
<u>Supplies</u>				
General	2,020.94	.003	2,074.41	.003
Iron and Steel	20,543.24	.035	20,536.89	.033
Oils	851.98	.001	969.43	.001
Machinery	2,192.27	.003	2,981.09	.005
Explosives	66,939.84	.114	71,115.90	.112
Lumber	38.19	-	108.86	-
Sundries & Clearing Acct.	20,220.40	.0344	16,977.15	.027
Electric Power	6,413.34	.011	-	-
Total	119,220.20	.202	114,680.55	.181
Total Labor & Supplies	674,841.47	1.149	518,739.05	.818
Tons Hoisted	587,051		634,628	

Beginning January 1944 it was decided to include in this account the cost of scraping ore from the stope into the raises which deliver the ore to the main levels. This was done to show a better comparison cost for stoping with the other mines. This cost was formerly charged to tramping. The cost per ton for stoping shows an increase of .31 in labor and .021 in supplies or a total increase of .331 per ton. The cost for tramping shows a total decrease of .291 per ton. The balance of the increase of .04 per ton is due to several causes. The overrun in the lump stockpile did not equal the expected tonnage of overrun and as explained before this may be in the crushed ore pile which was not shipped.

The average daily output was 1,925 tons in 1944 as compared with 2,060 tons in 1943 which is partly a reflection of less efficient manpower.

Timbering

<u>Year</u>	<u>Total Cost</u>	<u>Cost Per Ton</u>
1944	27,525.93	.047
1943	23,847.23	.038
1942	17,765.14	.025

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

	<u>1944</u>		<u>1943</u>		<u>1942</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
Labor	16,804.64	.029	13,869.30	.022	9,709.54	.014
Supplies	10,721.29	.018	9,977.93	.016	8,055.60	.011
Total	27,525.93	.047	23,847.23	.038	17,765.14	.025

The timbermen's time is usually split between building and repairing chutes and ladderways and repairing shaft and shaft pockets. The shaft account is nearly \$900.00 less in 1944 than in 1943 while the timbering account above increased nearly \$3,700.00. The increase is due to the fact that in 1944 more chutes and ladderroads had to be built and repaired. Part of the demand for new chutes was a hangover from the previous year when many new raises were put up in the greatly increased development program. On top of this, of course, the development was kept at a high level in 1944 as well, so that the timbermen were busy throughout the year trying to supply new chutes.

Tramming

<u>Year</u>	<u>Labor</u>		<u>Supplies</u>		<u>Total</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
1944	120,365.63	.205	9,130.58	.015	129,496.21	.220
1943	306,638.31	.483	17,575.26	.028	324,213.57	.511
Decrease	186,272.68	.278	8,444.68	.013	194,717.36	.291

This decrease is explained under the caption "Development and Stopping". The decrease is actually an accounting shift of time to the stopping account.

Ventilation

<u>Year</u>	<u>Total Cost</u>	<u>Cost Per Ton</u>
1944	330.88	.001
1943	1577.26	.002
Decrease	1246.38	.001

Two Coppus fans purchased in 1943 account for decrease in 1944.

Pumping

	<u>1944</u>		<u>1943</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
Operating Cost	35,140.36	.060	33,559.44	.053
Maintenance Cost	3,611.23	.006	2,560.59	.004
Total	38,751.59	.066	36,120.03	.057

CLIFFS SHAFT MINE  
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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

The detailed cost for the two years follows:

	<u>1944</u>	<u>1943</u>
Maintenance	3,611.23	2,560.59
Pumpmen Labor	8,544.47	9,405.47
Other Labor	2,435.53	2,545.57
Total Labor	10,980.00	11,951.04
Compressor Expense	600.00	600.00
Oil, Waste, & Packing	241.01	376.24
Tools, Etc.	22.88	269.65
Electric Light	394.51	380.90
Electric Power	22,838.05	20,009.37
Total Operating Expense	35,140.36	33,559.44
Total Maintenance and Operating	38,751.59	36,120.03
Gallons of Water Pumped	438,361,410	371,349,134
Gallons of Water Pumped Per Minute	851	710

During 1944 there was an increase of 67,012,276 gallons of water or 141 gallons per minute pumped. Power cost increased \$2,828.68. Increase in the gallons of water pumped is due to the extra flow of water that occurred as mining developed the Section 10 territory, the new lease from the Oliver Iron Mining Company.

Pumpmen Helpers were cut out in July 1943, which resulted in a saving over 1943 of approximately \$900.00 in labor. Cost for cleaning sumps is about the same as for 1943.

The maintenance cost for pumps was higher due to repairs to the new 600 gallon centrifugal pump installed in 1943, a new extra heavy gate valve costing \$301.28 and a new water cylinder costing \$492.00.

The average number of gallons of water pumped per minute for each month during the last five years is given in the table below:

<u>Month</u>	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
January	663	613	624	668	637
February	694	603	612	653	637
March	750	644	613	630	630
April	751	720	652	637	621
May	815	762	662	653	692
June	829	838	663	661	742
July	840	861	657	658	739
August	882	798	642	642	741
September	995	731	633	634	720
October	998	686	676	675	721
November	962	688	653	697	673
December	1033	674	631	662	673
Average For Year	851	710	642	654	689

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Compressors, Air Pipes, & Power Drills

	<u>1944</u>		<u>1943</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
Compr. & Air Pipes	55,605.22	.095	52,042.51	.082
Compr. & Power Drills	9,639.65	.016	9,172.44	.014
Total	<u>65,244.87</u>	<u>.111</u>	<u>61,214.95</u>	<u>.096</u>

The cost figures shown above can be divided between labor and supplies as follows:

<u>Labor</u>	<u>1944</u>	<u>1943</u>
Compressors & Air Pipes	6,159.67	6,567.41
Compressors & Power Drills	811.56	578.39
Total Labor	<u>6,971.23</u>	<u>7,145.80</u>

<u>Supplies</u>	<u>1944</u>	<u>1943</u>
Compressors & Air Pipes	49,445.55	45,475.10
Compressors & Power Drills	8,828.09	8,594.05
Total Supplies	<u>58,273.64</u>	<u>54,069.15</u>

Grand Total Labor & Supplies	65,244.87	61,214.95
Decrease in Labor - 1944	174.57	
Increase in Supplies - 1944	<u>4,204.49</u>	
Total Increase - 1944	<u>4,029.92</u>	
Increase in Cost Per Ton		.015

The operating cost of the account shows an increase of \$3,562.71. This increase is made up chiefly of \$2,479.76 for power and 704 ft. of 6" Vitaulic pipe costing \$514.62 and 275 ft. of 4" Vitaulic pipe costing \$112.48. The increase for power is due to extensive development work where more air for ventilation is needed. The Vitaulic pipe was installed in Section 10 territory or the new Oliver Mining Company lease.

During 1944, 13 new drills were purchased costing \$5,548.44 as detailed in the following table. Major items for repairing the compressors were \$915.40 for cylinder valves, 1 bushing for cylinders at \$275.00, Rod Crank pins for \$150.

A new Mine Rig for driving main drifts costing \$2,025.44 was also purchased in 1944.

	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
R-58 Stopping Machine	1				
DA-35 Ingersoll-Rand Drifters	6	11	5	7	10
D-12 Cleveland Drifters	3	6	2	2	4
Gardner-Denver Drifters	1	-	2	-	-
J-45 Ingersoll-Rand Blockholers	-	-	-	2	-
JB-4 " " " "	2	3	-	3	-
Total	<u>13</u>	<u>20</u>	<u>9</u>	<u>14</u>	<u>14</u>

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Back Filling

<u>Year</u>	<u>Total</u>	<u>Cost Per Ton</u>
1944	112.18	-
1943	1,350.99	.002
Decrease	1,238.81	.002

30,636 tons of rock were dumped in the old stopes in 1944 as compared with 34,672 tons in 1943.

The cost for delivering this rock to the old stopes is absorbed in the rock development costs. The small tonnage of rock picked from the ore development and stoping contracts was charged to stoping costs.

Underground Superintendence

<u>Year</u>	<u>Total</u>	<u>Cost Per Ton</u>
1944	40,111.98	.068
1943	38,001.21	.060
Increase	2,110.77	.008

Another shift boss was added to the underground crew in March 1944. The territory to the west of "B" shaft was getting too spread out to receive proper supervision. This will account for the increase of \$2,110.77 in this account.

Scrapers & Mechanical Loaders

<u>Year</u>	<u>Labor</u>		<u>Supplies</u>		<u>Total Cost</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
1944	24,398.11	.042	42,991.82	.073	67,389.93	.115
1943	22,879.42	.036	39,944.26	.063	62,823.68	.099

The following table gives a detail of the major items making up the cost in the last two years:

	<u>1944</u>		<u>1943</u>	
	<u>Amount</u>	<u>Cost</u>	<u>Amount</u>	<u>Cost</u>
3/8" Wire Rope	1,407 <sup>1</sup>	193.62	1,915 <sup>1</sup>	151.05
1/2" Wire Rope	11,520 <sup>1</sup>	1302.91	14,385 <sup>1</sup>	1772.41
5/8" Wire Rope	103,746 <sup>1</sup>	17760.31	83,032 <sup>1</sup>	14693.88
No. 4 Electric Cable	2,570 <sup>1</sup>	932.77	-	-
No. 6 Electric Cable	3,484 <sup>1</sup>	1297.97	4,452 <sup>1</sup>	1466.37
25 H.P. Electric Motors	2	496.40	8	1985.60
New Scraper Slides	3	1957.76	-	-
Scraper Hoists	2	1205.84	4	2216.00
Utility Air Hoists	-	-	2	2524.00
Scraper Blocks	156	3816.69	168	3669.83
Gen. Electrical Repairs & Renew.		38425.66		34344.54
Total		67389.93		62823.68



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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

This account shows a net increase of \$4,566.25. The principle items in the table above will account for the decreases and increases as follows:

<u>Decreases</u>			
1/2" Wire Rope	\$	469.50	
No. 6 Cable		168.40	
6 - 25 H.P. Motors		1,489.20	
2 - Scraper Hoists		1,010.16	
2 - Utility Hoists		<u>2,524.00</u>	
Total Decreases			\$ 5,661.26
<u>Increases</u>			
5/8" Wire Rope	\$	3,066.43	
3 - Scraper Slides		1,957.76	
Scraper Blocks		146.86	
No. 4 Cable		932.77	
General Repairs		<u>4,081.12</u>	
Total Increases			<u>\$10,184.94</u>
Net Increase			\$ 4,523.68

The two major items in this increase are for wire rope and general repairs to scraper equipment. It appears quite evident that during the war emergency the material is not holding up as well as in previous years. This also appears to be true in the manganese steel which is used in scraper blades, side plates and shoes.

The tonnage and unit cost for the past five years for 5/8" Wire Rope are compared below:

<u>Year</u>	<u>Product</u>	<u>Type of 5/8"</u> <u>Rope Used</u>	<u>Purchased</u>	<u>Cost</u>	<u>Unit</u> <u>Cost</u>	<u>Feet Per</u> <u>Ton Ore</u>
1944	587,051	"Trulay"	103,746'	17,760.31	.0303	.177
1943	634,530	"	83,032'	14,693.88	.0231	.131
1942	713,530	"	102,819'	17,928.55	.0251	.144
1941	658,747	"	108,698'	18,582.14	.0282	.165
1940	552,598	"	74,990'	12,887.14	.0232	.136

Unit cost and feet of rope per ton of ore both show an increase that may reflect inferior war material.

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8. COST OF OPERATING (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Electric Tram Equipment

	<u>1944</u>			<u>1943</u>		
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
Generators				-	326.83	326.83
Locomotives	5858.12	6509.38	12367.50	5525.38	6174.97	11700.35
Wiring	985.08	758.71	1743.79	996.90	1941.21	2938.11
Tracks	8737.51	4089.02	12826.53	9590.09	2641.97	12232.06
Cars	6418.51	5332.54	11751.05	5704.75	5647.71	11352.46
Spotting Engine	-	135.61	135.61	-	14.88	14.88
Total	21999.22	16825.26	38824.48	21817.12	16747.57	38564.69

The over-all cost for this account is about the same as for 1943. Principle items charged to Locomotives is one new controller costing \$245.00, one Exide 25 cell battery for \$495.00 and 1 - 48 cell Exide battery for \$1,199.70. Two armatures were rewound at the General Shops. Only one rectifier tube was purchased for charging Battery locomotives. 119,426# of 40# rail costing \$2,521.25 was used in 1944 as compared with 34,780# costing \$763.13 used in 1943. 2,850 ft. of new tracks for development work were laid in 1944 as compared with 1,468 ft. of track in 1943.

Depreciation of \$250.80 per month for 18 new cars purchased in 1942 continued throughout the year. There was no purchase of new cars during the year, the cost for this account, less the depreciation, is for repairs which compares favorably with 1943.

Hoisting

Comparative data for 1944 and 1943 is shown below:

	<u>1944</u>	<u>1943</u>
Maintenance	11,130.09	10,460.58
Operating Expense:		
Engineers' Labor	17,060.02	17,877.90
Other Labor	2,000.85	2,218.95
Total	19,060.87	20,096.85
<u>Supplies</u>		
Oil, Waste, and Packing	200.86	190.35
Tools and Misc. Supplies	192.42	196.18
Electric Light	680.99	638.73
Electric Power	17,374.20	18,481.66
Compressor Expense	480.00	480.00
Heating Expense	835.53	908.06
Total Supplies	19,764.00	20,894.98
Total Operating Expense	38,824.87	40,991.83
Total Maint. & Operating Expense	49,954.96	51,452.41
Cost Per Ton Produced	.085	.082
Tons Ore and Rock Hoisted	617,687	669,300
Average Depth Hoisted	740'	747'

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Maintenance cost for hoisting equipment increased \$669.51 over 1943. During this year two new counterweights were built in the General Shops costing \$880.54 each and the spare cage and skip was also rebuilt in the General Shops costing \$3,077.06. A new four foot sheave was installed at the "B" shaft costing \$299.45 also 4 rubber lined Idler sheaves were installed at a cost of \$184.84.

The operating cost of this account compares favorably with the cost for 1943 allowing for the decrease in production this year.

Stocking Ore

<u>Year</u>	<u>Total Cost</u>	<u>Cost Per Ton</u>
1944	35,548.70	.061
1943	28,326.87	.045
Increase	7,221.83	.016

Increase in this account is due to new material for replacing worn out trestle timber. Material alone increased \$2,651.50 over the year 1943. In addition to this, the labor of replacing large areas of stock-pile sollar was charged to stocking ore. Together these items account for the increase.

Screening & Crushing at Mine

	<u>1944</u>		<u>1943</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
Labor	31,556.63	.054	35,476.70	.056
Supplies	12,791.43	.022	15,538.91	.024
Total	44,348.06	.076	51,015.61	.080
Decrease	6,667.55	.004		

This account shows a decrease of \$6,667.55 and is more in line with the cost for 1942. In 1943 an attempt was made to improve this equipment to facilitate the picking of the rock from the ore before entering the crusher. Plans did not work effectively and the idea was dropped for the time. Due to these charges made in 1943 the cost showed an increase for that year.

A number of large items were purchased for the crusher and installed in 1944, namely:

- 1 Crusher Head \$ 729.60
- 1 Bevel Gear 358.80
- 12 Concaves 520.20
- 1 Bevel Wheel 119.60
- 1 Mantle 713.00
- 8 Screen Sections 573.05
- 119 Manganese Straps 1860.92

The lower half of the Crusher Bowl was changed during the last two days of the year.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Dry House Expense

	<u>1944</u>		<u>1943</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
Labor	8,642.39		8,410.12	
Supplies	5,379.71		4,866.14	
Total	14,022.10	.024	13,276.26	.020

The increase in this account amounts to \$745.84. In 1944, 615 tons of coal were used in the Main heating plant as compared with 669 tons in 1943. The increase in price for coal in 1944 more than offsets the decrease in tonnage due to a milder winter.

General Surface Expense

<u>Year</u>	<u>Total</u>	<u>Cost Per Ton</u>
1944	20,144.05	.034
1943	20,143.29	.032
Increase	.76	.002

Costs for the two years are about the same for each year. As in 1943 considerable landscaping was done on slope between the office and Engine House. Additional parking space was made north of the Dry House.

Shaft

<u>Year</u>	<u>Total</u>	<u>Cost Per Ton</u>
1944	6,242.72	.011
1943	7,140.82	.011
Decrease	898.10	-

This account shows a decrease for this year. This yearly cost more nearly represents the normal cost for maintaining the shaft and pockets. Material is on hand for a large repair job in both "A" and "B" shafts. We expect to use this in retimbering "A" shaft between the 8th and 9th levels and "B" shaft between the 8th and 10th levels. The continued demand for lump ore may make it necessary to postpone the work until 1946.

Top Tram Equipment

<u>Year</u>	<u>Total</u>	<u>Cost Per Ton</u>
1944	4,824.78	.008
1943	4,776.38	.008
Increase	58.40	-

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Docks, Trestles, and Pockets

<u>Year</u>	<u>Total</u>	<u>Cost Per Ton</u>
1944	4,885.09	.008
1943	5,220.26	.008
Decrease	335.17	-

This account would have been much higher in 1944 than in 1943 except that the labor of replacing large areas of stockpile collar plank was charged into the stocking ore account.

General Mine Expenses

	<u>1944</u>	<u>1943</u>
Mining Engineering	6,823.35	5,301.22
Mechanical & Electrical Engr.	2,398.74	2,928.34
Analysis and Grading	28,922.41	31,339.33
Safety Department	2,991.65	3,061.73
Telephone & Safety Devices	6,520.27	6,024.38
Local & General Welfare	5,626.23	6,599.08
Spec. Expense, Pensions, & Allow.	12,222.39	12,065.96
Ishpeming Office	29,000.45	27,407.52
Mine Office	25,714.46	27,410.34
Insurance	8,824.71	6,842.90
Personal Injury	21,764.04	19,475.15
Social Security Taxes	24,568.17	25,781.98
Employees' Vacation Pay	28,998.81	28,415.73
Total Gen. Mine Expenses	204,375.68	202,653.56
Cost Per Ton	.348	.319

Total charges in the detail above are furnished by the Ishpeming Central Office and the Cleveland Office with the exception of the item Telephone and Safety Devices. The Mine Office furnished the cost data for this item.

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9. EXPLORATIONS:

Diamond drill holes drilled underground during the year were as follows:

D. D. Hole No.	<u>Total Depth</u>	<u>Feet of Ore</u>
533	71'	No Ore
534	28'	No Ore
535	214'	105½'
536	151'	3'
537	206'	No Ore
538	100'	23'
539	709'	10'
540	278'	No Ore
541	230'	No Ore
542	202'	No Ore
543	400'	No Ore
544	502'	No Ore
545	303'	No Ore
546	190'	18'
547	406'	13'
548	514'	56'
549	401'	67'
550	375'	25'
551	298'	102'
552	238'	No Ore
Total	<u>5,816'</u>	<u>422½'</u>

We continued to use two diamond drill machines in the mine throughout the year 1944. Of all the footage drilled the ore constitutes 7%.

On the 1st level "A" shaft at coordinates 1243 S - 609 E., three holes were drilled south at angles of -50°, -30° and 0°. These holes were 536, 538 and 539 respectively. A small amount of ore was cut in each of these holes starting at the collar and extending to a maximum of 25' in the case of hole number 538. This was in the ore which we knew existed in the east-west striking vein that parallels the Section 10 Lease boundary. At depth, none of the three holes encountered ore. Hole No. 539 was drilled south to a total depth of 709' and penetrated nothing but footwall material after the first 176' of drilling. At that point the hole passed from slate into footwall material at a contact that we believe was produced by a fault. The purpose of drilling hole No. 539 was to establish whether or not the west end of the Section 10 Lease bore promise of ore occurrence. From the results we believe the possibilities are poor for hard ore occurrence on this part of the lease area. The fault seems to have brought up the footwall material in much of this territory.

On the 3rd level "A" shaft at coordinates 795 S - 621 E., hole No. 533 was completed in the first part of the year by drilling to a depth of 622'. This hole was part of the campaign to search for ore on the west end of the Section 10 Lease area. No ore was found in this area.

Holes No. 549 and 551 were drilled horizontally due south on the 5th level from coordinates 1240 S - 1782 E and 1265 S - 1991 E respectively. Both holes were drilled in search of Section 10 Lease ore. Hole No. 549 cut 67' of first class ore and hole No. 551 cut 102' of the same kind of material. The ore is evidently in the same southward dipping vein which we believe extends to the 8th level and below.

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9. EXPLORATIONS: (Cont'd)

On the 6th level we also looked for Section 10 Lease ore but at a location west of the 5th level holes. The coordinates of horizontal hole No. 552 are 1155 S - 1339 E. No ore was found in this hole.

The exploration program for Section 10 Lease also involved the drilling of three holes on the 8th level "A" shaft. Hole No. 547 was horizontal and due south from coordinates 1105 S - 1281 E. Only 13' of first class ore was cut by this hole and all of that was on Cliffs Shaft territory. Hole No. 550, about three hundred feet farther east, did cut 25' of first class ore on the Section 10 Lease and hole No. 548, still another 200' farther east, cut 56' of first class ore. From the information the drilling on Section 10 Lease has given us, we can now plan our development of that area with care.

One hole was drilled on the 9th level Bancroft territory. This was No. 535 drilled at -34° on a course S. - 22° W. from the coordinates 149 N and 2519 E. The hole was put down in order to find out how far the ore body would extend below the 10th level. Altogether, the hole cut 105' of first class ore and established the fact that ore can be expected on the elevation of the 11th level. On the strength of that we planned and started a raise from the 15th level.

Hole No. 537 was drilled horizontally S. -17° W from coordinates 772 S - 2948 E in the east end of the 10th level. No ore was found. At the opposite or west end of the Bancroft deposit we drilled three barren holes namely 540, 541 and 542. We were looking for ore but also for the structural information that would establish whether or not this area to the west and north of present workings had any future promise. From the drilling, we believe the workings are at their limit in this direction.

On the 12th level hole No. 543 was drilled horizontally N. -23° E from coordinates 885 S - 2563 E in order to test for possible occurrence of ore droppers from the 11th level ore bodies. All of the ground cut was footwall material without any ore.

Two holes, Nos. 545 and 546, were drilled horizontally N. from coordinates 481 N - 3301 E and 303 N - 2928 E. No ore was cut by No. 545 which was in footwall material but two small runs of first class ore were cut by hole No. 546. Both holes were drilled in order to find out if there was ore underlying hanging slate that could be followed with a raise to the 10th level. The ore in No. 546 perhaps would lead to the 10th level although it does not occur under slate hanging wall material on the 15th level.

Only one hole was drilled on "B" shaft territory during 1944. This was not because we had no need for drilling there but the exploration in a hurry of the Section 10 Lease ore body was deemed more important. The first level was the place where hole No. 544 was drilled horizontally south from coordinates 806 S - 1023 W. While no ore was found, the hole did find hanging wall material at a depth of 408'. Adjacent to and just north of this was a zone of hard ore jasper. The fact that there was no ore at the hanging wall contact where penetrated by the hole does not preclude the possibility of ore deposition either laterally or up or down the dip of the contact. Therefore, it may be advisable to extend Contract 73 drift west along the slate hanging wall contact to explore for such an occurrence.

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9. EXPLORATIONS:

No surface drilling was carried on in 1944 in connection with the Cliffs Shaft Mine. There is in E. & A. No. CC-93 nearly \$8,000 of unexpended funds. As soon as drilling equipment and crews can be made available, the surface drilling campaign on Section 9 should be resumed.

10. TAXES

Comparative data for 1944 and 1943 follows:

	<u>1 9 4 4</u>		<u>1 9 4 3</u>	
	<u>Valuation</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Taxes</u>
Realty	2,680,000	96,451.32	2,400,000	81,582.24
Minerals Under NW $\frac{1}{4}$ of Sec. 9-47-27	175,000	6,298.13	250,000	8,498.15
Personal	786,100	28,291.19	811,100	27,571.40
Lot 2, Sec. 3-47-27 (Bancroft)	750,000	26,991.97	755,000	25,664.41
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Sec. 9-47-27 (Barnum)	52,000	1,871.44	52,000	1,767.62
Lot 174, Nelson Addition	100	3.60	100	3.40
South 35.91 ft. of Lot 179	50	1.80	50	1.70
Total	<u>4,443,250</u>	<u>159,909.45</u>	<u>4,268,250</u>	<u>145,088.92</u>
Collection Fees		Col. fee discontinued#		<u>1,450.89</u>
Grand Total				<u>146,539.81</u>
Taxes per ton produced		.2724		.2309
Taxes per ton shipped		.2682		.2424

Valuations and taxes for the past ten years are shown below:

<u>Year</u>	<u>Taxes</u>	<u>Valuation</u>	<u>Tax Rate</u>
1944	159,909.45	4,443,250	35.9893
1943	146,539.81	4,268,250	33.9926
1942	143,225.85	4,093,250	34.6443
1941	144,195.60	4,042,150	35.3198
1940	137,284.25	3,982,150	34.4748
1939	141,248.04	4,007,150	34.8999
1938	140,789.79	3,852,150	36.1865
1937	127,643.22	3,712,150	34.0444
1936	110,614.68	3,232,150	33.8861
1935	101,853.17	3,202,110	31.49

Valuations and taxes continued to rise and the tax rate also jumped two dollars per thousand of valuation.

Note: City of Ishpeming has discontinued charging one percent Collection fee commencing in 1944.



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10. TAXES: (Cont'd)

City of Ishpeming Tax Levy

Valuation	<u>1944</u>		<u>1943</u>	
	<u>Amount</u>	<u>Rate</u>	<u>Amount</u>	<u>Rate</u>
	11,883,020.00		11,761,795.00	
<u>Tax Levy by Funds</u>				
County Tax	66,544.91	5.6134	65,866.05	5.6000
County Road Tax	23,766.04	2.0048	23,523.59	2.0000
City Contingent Tax			72,500.00	6.1640
City Debt & Serv. Tax			7,200.00	.6122
Street & Highway Tax			85,000.00	7.2268
Fire Fund Tax			19,500.00	1.6579
Library Tax			11,750.00	.9990
Sewer Tax			5,000.00	.4251
Water Tax			-	-
Cemetery Tax			10,500.00	.8927
School Tax	87,824.93	7.400	87,037.28	7.4000
School Debt Serv. Tax	11,512.50	.9711	11,937.50	1.0149
Gen'l Optg. Debt Ser.	177,820.80	15.000	-	-
Capital Improvement	59,273.60	5.000	-	-
Total Taxes	426,642.78	35.9893	399,814.42	33.9926

11. ACCIDENTS  
AND  
PERSONAL  
INJURY:

The accident record for the past five years follows:

	<u>1944</u>	<u>1943</u>	<u>1942</u>	<u>1941</u>	<u>1940</u>
Number of No-Time Lost Accidents	90	101	103	93	89
Compensable or Fatal Accidents	15	21	5	9	2
Number of Man Shifts Worked	137909 $\frac{3}{4}$	153125 $\frac{1}{2}$	140962	133427	105437

The following table gives a detail of the accident record for 1944:

Days of Labor	137,909 $\frac{3}{4}$
Hours of Labor	1,103,278
Tons of Ore Mined	587,051
Lost Time Accidents	15
Days Lost	724
Fatalities	-
Frequency Rate	13.60
Severity Rate	0.66

Frequency Rate - Number of accidents for every 1,000,000 man hours.  
Fatalities 6,000 days.

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

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12. NEW  
CONSTRUCTION  
ORE EQUIPMENT:

The following E. & A.'s were continued from 1943 or authorized during 1944:

E. & A. No. CC-93

This E. & A. was authorized in 1942 and drilling began in March of that year in the NW $\frac{1}{4}$  of SW $\frac{1}{4}$  of Section 9-47-27. Drilling was stopped in August of 1943 in order to use the equipment and men for more urgent needs. Total cost of this E. & A. was \$22,011.91 at the end of 1944 leaving about \$8,000 of the original authorization unexpended. There was no work done under the E. & A. in 1944 but an adjustment on the carbon inventory selling price raised the amount of unexpended funds.

E. & A. No. CC-136

This E. & A. covers the purchase of one Bolt Cutter and one Pipe Cutter and threader installed during the year 1944. The cost of the Bolt Cutter is \$887.23 and the cost of the Pipe Cutter is \$2,297.22. Both of these machines are replacements of worn out equipment.

E. & A. No. CC-140

This E. & A. was authorized in December 1944 for \$35,002.00 and covers the purchase of a 1,000 gal. per minute - Plunger Pump to be installed on the 15th level to handle additional water anticipated because of the opening of the Section 10 area - Oliver Iron Mining Company Lease. A new Pump House will be cut adjacent to the present Pump House. Work was started on this in January 1945.

14. MAINTENANCE  
AND REPAIRS:

Dwellings

	<u>Rented Buildings</u>			<u>Loc. Expense</u> <u>Cleaning, Etc.</u>	<u>Grand</u> <u>Total</u>
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>		
Hard Ore Location	3,289.09	721.39	4,010.48		4,010.48
Barnum Location	707.83	490.78	1,198.61	13.50	1,212.11
Angeline Location	95.31	39.81	135.12	25.59	160.71
Salisbury Location	40.94		40.94	312.59	353.53
Second Addition	92.56	41.50	134.06		134.06
Outhwaite Purchase	432.14	155.71	587.85		587.85
Hyde Purchase No. 1	136.42	21.00	157.42		157.42
Hyde Purchase No. 2	2,280.74	2,144.98	4,425.72		4,425.72
Smith Purchase	176.81	49.93	226.74		226.74
Nelson Purchase	636.36	176.49	812.85		812.85
Berg Purchase	320.08	162.21	482.29		482.29
Ramsdell Purchase	41.50	166.32	207.82		207.82
Grand Total	8,249.78	4,170.12	12,419.90	351.68	12,771.58

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14. MAINTENANCE  
AND REPAIRS: (Cont'd)

Comparative figures for the past six years follow:

Total for Year 1944	-	\$12,771.58
" 1943	-	18,006.43
" 1942	-	7,708.55
" 1941	-	7,208.75
" 1940	-	6,140.09
" 1939	-	9,430.70

Repairs continued high mainly as a result of the continuation of the program of renovation, attendant upon the moves of personnel within the mining staff.

15. POWER:

The following five year comparison shows power consumption, cost and rate per K.W.H.:

<u>Year</u>	<u>K. W. H.</u>	<u>Cost</u>	<u>Rate Per K.W.H.</u>
1944	7,800,360	111,649.01	.014313
1943	7,431,998	107,603.42	.0144783
1942	7,093,627	104,081.28	.0146725
1941	6,981,570	101,144.56	.0144874
1940	6,078,269	91,349.36	.0150529

The detail of distribution of power at the mine follows:

	<u>K. W. H.</u>	<u>Cost</u>
Tramming	573,219	7,533.60
Pumping	1,577,132	23,232.56
Hoisting	1,261,561	18,055.19
Stocking Ore	34,200	505.49
Crushing Ore	210,000	3,004.88
Dry House Expense	90,949	1,300.88
Surface	29,732	423.49
Telephone & Safety Devices	81,909	1,171.94
Mine Office	11,465	164.18
Machine & Carpenter Shops	5,575	76.92
Drill & Jackbit Shops	52,281	748.29
Heating Plant	10,532	150.82
Compressors	3,269,205	46,801.06
Electric Haulage	580,600	8,307.87
Ventilation	12,000	171.84
<b>Total</b>	<u>7,800,360</u>	<u>111,649.01</u>
Incline Pit	-	-

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15. POWER: (Cont'd)

Comparative data for 1944 and 1943 follows:

	<u>1944</u>	<u>1943</u>	<u>Difference</u>	<u>Inc.%</u>	<u>Dec.%</u>
	<u>K.W.H.</u>	<u>K.W.H.</u>			
Production - tons	587,051	634,628	47,577		8.10
Tramming	573,219	587,056	13,857		2.36
Pumping	1,577,132	1,406,406	170,726	12.14	
Hoisting	1,261,561	1,319,234	57,673		4.37
Stocking Ore	34,200	19,349	14,851	76.8	
Crushing Ore	210,000	242,797	32,797		13.5
Dry House	90,949	80,088	10,861	13.6	
Surface	29,732	20,950	8,782	41.9	
Telephone & Safety Devices	81,909	71,235	10,674	15.0	
Mine Office	11,465	12,031	566		4.7
Mach. & Carp. Shops	5,575	5,866	291		5.0
Drill & Jackbit Shops	52,281	60,814	8,533		14.0
Heating Plant	10,532	9,609	923		9.6
Compressors	3,269,205	3,061,202	208,003	6.8	
Electric Haulage	580,600	522,276	58,324		11.1
Ventilation	12,000	13,085	1,085		8.3
Total	<u>7,800,360</u>	<u>7,431,998</u>	<u>368,362</u>	<u>4.96</u>	

Cost for Power for 1944 compares favorably with 1943 except for Pumping and Compressors accounts which is explained under these captions in the report.

18. NATIONALITY  
OF  
EMPLOYEES

The following table shows the various nationality groups employed at the mine as of December 31, 1944:

	<u>American</u>	<u>Foreign</u>	<u>Total</u>
	<u>Born</u>	<u>Born</u>	
English	82	20	102
Finnish	79	60	139
Swedish	45	10	55
Italian	17	17	34
French	38	-	38
Norwegian	20	2	22
Irish	12	-	12
German	7	-	7
Austrian	1	-	1
Polish	1	-	1
Slovanian	1	-	1
Total	<u>303</u>	<u>109</u>	<u>412</u>

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18. NATIONALITY  
OF  
EMPLOYEES

(Cont'd)

Comparison for 1944, 1943, and 1942 follows:

	<u>1 9 4 4</u>		<u>1 9 4 3</u>		<u>1 9 4 2</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
English	102	24.7	124	25.5	124	25.73
Finnish	139	34.0	182	37.4	178	36.93
Swedish	55	13.3	61	12.5	63	13.07
Italian	34	8.2	36	7.4	38	7.88
French	38	9.2	45	9.3	46	9.54
Norwegian	22	5.0	22	4.5	22	4.56
Irish	12	3.0	7	1.5	4	.83
German	7	2.0	6	1.5	5	1.04
Austrian	1	0.2	2	0.4	1	0.21
Polish	1	0.2	-	-	1	0.21
Russian	-	-	1	-	-	-
Slovanian	1	0.2	-	-	-	-
Total	<u>412</u>	<u>100.0</u>	<u>486</u>	<u>100.0</u>	<u>482</u>	<u>100.00</u>

LLOYD MINE  
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1. General

The production in 1944 was 376,863 tons as compared with 494,042 tons in 1943. All indications point to a continuation of a decline in production in 1945 due to the continued reduction in the size of the orebody as mining progresses to lower elevations. Another factor that has affected production adversely during the year is the loss of a large number of employees into the armed services and also quitting. The decrease in the labor force made it necessary to reduce the operating schedule late in the year, starting on October 30th, from three hoisting shifts per day to a two hoisting shift per day schedule with a small crew employed on production on the third shift.

A program of exploration diamond drilling has been continued throughout the year in an effort to disclose additional reserves to supplement the rapidly depleting Lloyd orebody. The over-all results from this program have been disappointing, but it is planned to continue the drilling program in the coming year with the hope that some additional reserves may still be disclosed. Several holes were drilled below the 8th Level disclosing an extension of the known ore at one point to a distance of 165' below the bottom level, proving up a substantial increase in the Lloyd mine reserves. The main 8th Level drift to the East advanced in ore along the strike an additional distance of more than 400', but subsequent development and exploration has disclosed a narrow width averaging only about 40'. The major portion of the drilling program has been confined to the 8th Level where in addition to the holes drilled below the level a number of horizontal holes have been drilled to the South and Southeast from the main haulage drift. In spite of the large amount of exploration drilling that has failed to prove any significant ore in this latter area, it still offers the most favorable possibility for disclosing additional reserves as available geological information indicates the existence of several trough structures formed by faulting and dikes in this area. By the end of the year drill holes into the area to the Southeast had encountered only insignificant runs of standard grade ore. One incline hole drilled to the South encountered a run of Hi-Sulphur ore at a depth of 190' to 260' vertically below the bottom level. In addition to the drilling on the 8th Level, two holes were drilled on the 7th Level to the South of the main haulage drift. Both of these holes were relatively short and were drilled mainly for additional information about the geological structure for subsequent drilling. It becomes apparent from the results of the drilling program that has been carried on during the past several years that the possibility of discovering an important amount of additional ore is becoming very slight. But discovery of a sufficient quantity of standard grade ore that warrants the development for mining justifies the continuance of the drilling program. Substantial runs of ore of Hi-Sulphur content have been encountered at depths ranging from 190' to 270' vertically below the bottom level in two holes, one of which was drilled in the previous year. To definitely determine if additional reserves of standard grade ore exists below the Hi-Sulphur ore additional deep hole drilling below the bottom level must be done. It is planned to drift into one of the areas to the South from the 8th Level to further explore a small standard grade ore area encountered in one of the drill holes and from this new development a more favorable location will be provided for further exploration drilling below the 8th Level.

Total shipments during the year from the stockpiles and pockets were 277,049 tons, as compared with 572,511 tons in the previous year.