THE CLEVELAND - CLIFFS IRON CO.

Ore Mining Department

ANNUAL REPORT OF GENERAL MANAGER

For Year Ending December 31, 1943

#2014

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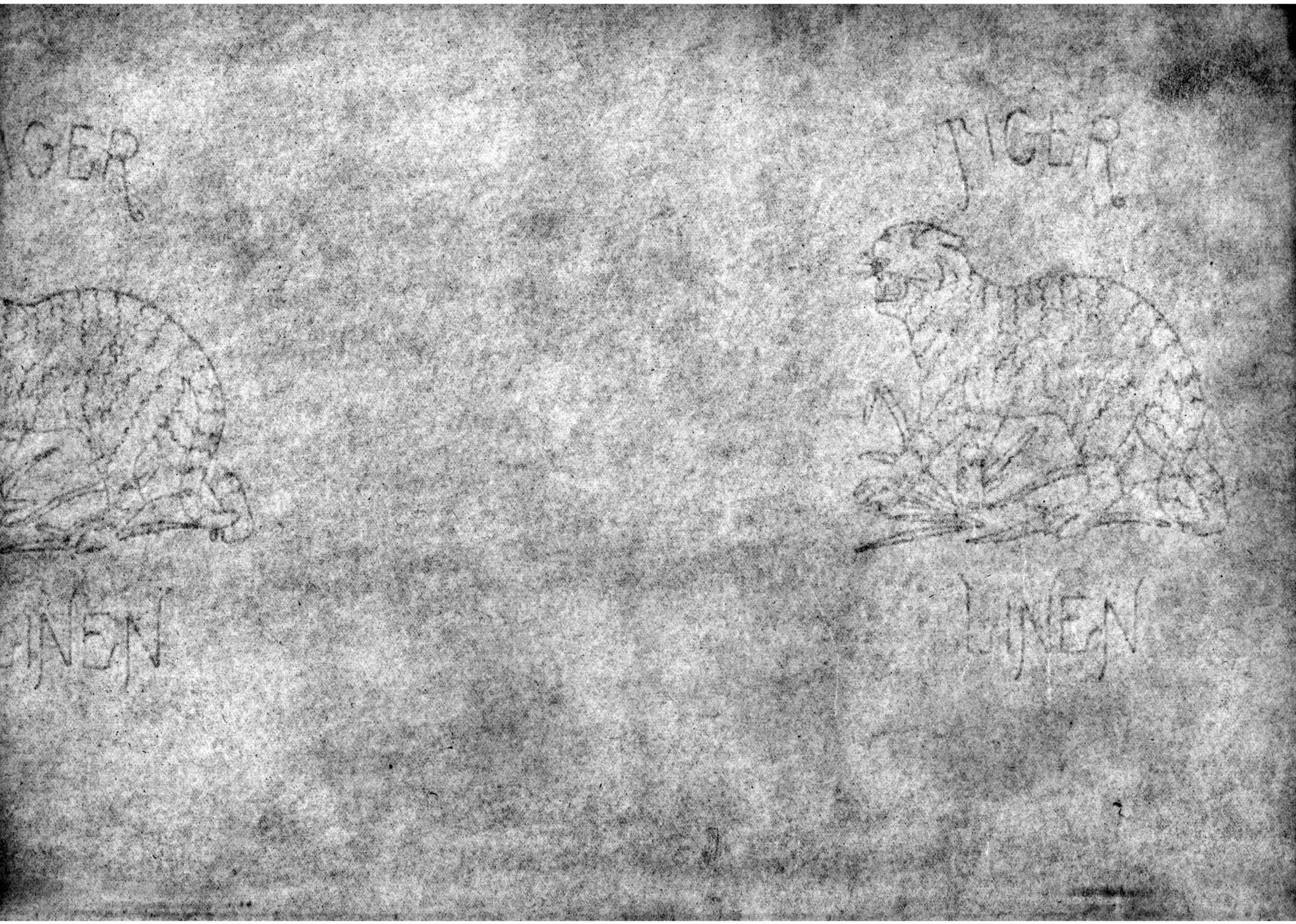
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March 6, 1944

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

Dear Sir:-

I submit herewith the Mining Department report covering operations for the year 1943. The typewritten annual reports of the various mines and departments have already been sent to the Cleveland office, preparatory to binding. Other yearly data and maps will go forward under separate cover.

There were several changes in the administrative staff when Mr. S. R. Elliott retired on July 15th. C. J. Stakel was appointed to succeed him, and C. W. Allen and W. A. Sterling were made Assistant Managers. F. J. Haller was put in charge of the Mather Mine and Onnie Marjama was promoted to Superintendent of the Lloyd and Spies Virgil properties. W. R. Atkins became Assistant Superintendent of the Athens and Negaunee Mines. On June 1st John Trosvig was placed in charge of the Cambria-Jackson Mine as Assistant Superintendent. F. C. Stanford retired as Electrical Engineer on April 30. He was succeeded by Edward D. Cory. On the Mesaba Range we added Michael Walle to the staff as Research Engineer on December 1st.

The working schedule at the principal soft ore mines on the Marquette Range was reduced on February 1st from 17 to 16 mining shifts per week. At the Cambria-Jackson property on July 6th the operating schedule was reduced from three eight hour to two eight hour mining shifts per day.

Wage and salary adjustments as a result of the War Labor Board's 5½¢ per hour directive retroactive to July 13, 1942, materially increased costs. The Cliffs Power & Light Company employees were not included in the original order but authority, after much delay, was finally secured to bring the Cliffs Power & Light Company wage schedule in line with the mines.

Agreements were signed with the United Steelworkers of America on April 12th on behalf of the Mesaba Cliffs and Canisteo Mining Companies. The Cleveland-Cliffs Iron Company, and The Negaunee Mine Company agreements were executed on April 17th and The Athens Iron Mining Company agreement was subsequently executed on the 9th of July. Although several attempts were made, the CIO did not succeed in signing up enough Cliffs Power & Light Company employees to get collective bargaining rights for that group. A great deal of time and effort was expended by the administrative staff with the Grievance Committees of the eleven locals on various matters pertaining to working conditions and wages. In each case extreme care was taken to consult attorneys both in Michigan and Minnesota, so that a uniform procedure was adopted to handle these matters. General meetings of foremen and attorneys were scheduled to outline the prerogatives of management and in some cases the union Grievance Committees were also contacted to indicate the proper routine to be followed in accordance with the signed agreement.

Several meetings were held with Tom Veach and representatives of the Union on wage inequalities in Duluth, Hibbing and Ishpeming.

A great deal of attention was also given to working up a program that dovetailed in with the Treasury Department and War Labor Board's wage stabilization regulations.

Production was slowed down for a number of reasons. Absenteeism increased, inductions and enlistments in the armed forces took a large number of our able bodied employees. The Mining Department now has 510 men in the service. Some of the larger mines, like the Maas for instance, which normally employs 525 men, have 90 former employees in uniform. Replacements had to be made from young, inexperienced boys or older men who normally would not be employed by industry. Every effort was made to rehabilitate partially disabled employees, and medical standards were lowered in an effort to reasonably comply with the regulations issued by the War Manpower Commission and the U. S. Employment Service. Careful thought was exercised, however, so as not to jeopardize our Industrial Hygiene Department program and the health standards so carefully built up since Dr. Waldie was put in charge of that Department.

Efficiency naturally suffered. Many of our miners have advanced in age to the point where they are slowing up. Restricted buying of fats due to rationing I believe has also lowered the working capacity of many of our older employees. Another reason for reduced output was the decreased ore areas in mines like the Negaunee, Lloyd and Spies Virgil. The number of mining contracts in these properties had to be decreased for the simple reason that we did not have room for more.

The fire in the Athens Mine eliminated one of the best dry working areas in the central portion of the deposit. In order to provide room for the mining contracts that had to be moved, an extensive development program had to be instituted.

At both the Cliffs Shaft and the Maas Mines the rock development program was trebled in 1943. At the Cliffs Shaft Mine drifts were driven over into the Section 10, Oliver Iron Mining Company leased area, and at the Maas the new 6th Level was opened up with all of the new drifts, with few exceptions, in rock. An unusual amount of rock development work was also accomplished at the Athens property in 1943.

The Mining Department's severity and accident frequency record for the past year was higher than 1942 but still less than half of the national average for 1942. I believe the basic reason for the poor record is the type of labor available and the heavy operating schedule. Every mine and facility has been faced with a labor shortage and absenteeism which has resulted in poor housekeeping and general let-down in morale. The heavy operating schedule has now been continued for three years and is having its inevitable effect on the men. Supervision has not relaxed, in fact is more thorough than in prior years. The quality of employees hired in the past two years is lower than heretofore because we have scraped the bottom of the labor supply barrel. Labor turn over is greater, which increases the

accident hazard. Rapid mining, due to concentration of contracts in ore areas, does not give time for the mat to settle properly in the soft ore properties, which increases the hazard from falls of ground due to the movement of the mat when mining on the next lower sublevel.

Despite the poor accident record, I believe our supervisory force is to be commended for their earnest efforts in accident prevention in trying to get production under the many difficult and trying conditions.

FREQUENCY & SEVERITY RATES

	Frequency	Severity
All mining, National rate 1942	50.56	10.52
C.C.I.Co. rate 1942	9.39	2.177
C.C.I.Co. rate 1943	20.30	3.986

FATAL ACCIDENT RECORD

Year	Number of Men Employed	Number of Fatalities	Fatality Rate
1901-1905	7,729	41	5.30
1906-1910	13,028	66	5.06
1911-1915	13,332	35	2.70
1916-1920	18,348	43	2.36
1921-1925	12,282	20	1.61
1926-1930	10,438	72*	6.90
1931-1935	5,298	11	2.05
1936-1940	12,691	12	0.94
1941	3,570	5	1.40
1942	3,562	2	0.56
1943	3,609	4	1.11

* Includes Barnes Hecker disaster.

We have continued our fire patrol inspection, which has served well, because they have discovered several small fires which were immediately put out.

Dust samples showed a favorable downward trend in 1943. Water sprays, wet drilling, water blasts and ventilating fans have all combined to reduce the dust hazard.

The War Manpower Commission made available to us three training courses, namely, welding, job instruction and job relations. Forty graduated from the first course and 75 foremen completed the other two and were certified. Of the three I regard the Job Relations course the most important. It stressed the need for patience, tact and the necessity of getting all of the facts before taking any disciplinary action.

The Local Draft Boards of the Selective Service System cooperated fully with us in granting deferments. The Appeal Board likewise lent a hand and the personnel of these Boards is to be congratulated on their broad viewpoint.

The year 1943 brought the new Spies Mine into being. There is every prospect of developing a large ore body on our fee lands and the adjoining Johnson lease. The Book Mine was opened and produced close to 290,000 tons of ore that materially increased our shipments of Cliffs Group. The Cambria-Jackson property developed twice as much standard ore as was mined in 1943. At the Cliffs Shaft we almost off-set the year's product by new discoveries. The new 8th Level Lloyd increased the life of that property by a year. The Maas Mine shows new tonnage of approximately 2,620,000 tons but unfortunately all but 400,000 tons is of high sulphur grade. We found one third of a million tons of ore in the Negaunee Mine. The combined new tonnage developed in 1943 aggregated 5,325,000 tons, or about 1,250,000 tons in excess of production.

As we look back on 1943, one salient feature looms very prominently and that is the time spent by all in an administrative capacity with labor matters, grievances, wage adjustments, rationing and priorities, etc. It is to be regretted more attention could not be devoted to our principal business, the mining of iron ore and watching costs. Finding time to actually study conditions at the mines on the job rarely proved possible. Many difficult situations were created by unreasonable union leaders. The various agencies of the Bureau of Mines, Army, F.B.I. and other federal commissions subjected the administrative personnel to multitudinous and conflicting orders with respect to the National Explosives Act, fire prevention, sabotage, etc. By and large, however, the inspectors in the main agreed that the Company was complying with the standards outlined.

I believe the Company's past policies paid dividends in 1943. My contacts with responsible union leaders and men in prominent government positions indicates that they realize the Company has always taken the broad, humanitarian viewpoint; that we have favored our employees by not taking unfair advantages in any of our dealings with them. We have in the past built up a lot of good will which will continue to react favorably in our dealings with our employees.

Yours very truly

C. W. Baker

Manager

CJS:DP

THE CLEVELAND-CLIFFS IRON COMPANY
MINE DEPARTMENT

COMPARATIVE FIGURES FOR 1943 and 1942 OF THE FIVE PRINCIPLE PRODUCING MINES

YEAR 1943

MINE	PRODUCTION	COST OF PRODUCTION PER TON	COST OF PRODUCTION AMOUNT	TOTAL COST PER TON	TOTAL COST AMOUNT
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
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
	3,314,543	2.160	7,160,613.79	2.537	8,409,842.06

YEAR 1942

Athens	681,748	1.932	1,317,083.70	2.337	1,593,467.74
Cliffs Shaft	713,530	2.225	1,587,422.91	2.540	1,812,041.13
Lloyd	568,036	1.724	979,483.43	1.984	1,127,102.54
Maas	882,399	1.854	1,636,020.54	2.263	1,997,088.79
Negaunee	1,020,950	1.476	1,633,650.25	1.936	2,142,052.17
	3,866,663	1.850	7,153,660.83	2.243	8,671,752.37

1943				
Decrease in product	552,120			
Increase in cost		.310		.294
%	14.3	16.7		13.1

WAGES:

Effective April 1st, 1943 wages were increased by .05½¢ per hour and was retroactive to July 13, 1942.

The penalty cost on overtime decreased $11,389.43 in 1943 due to the mines going on a 16 shift per week operation February 6, 1943.

	PENALTY COST		EFFECT ON COST OF PRODUCTION
1943	324,193.91		.0814
1942	335,583.34		.0745
Decrease...	11,389.43	Increase...	.0069

The cost of supplies increased .085 per ton in 1943 compared with 1942 - .5095 in 1943 and .4242 in 1942. The cost of lumber and timber increased .0344 per ton over 1942 costs.

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THE CLEVELAND-CLIFFS 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	
			ASSESSED VALUATION				
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	3,121,100	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 -							
			TAXES PAID				
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 -							

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

	1940	1941	1942	1943
PRODUCT - Tons	552,598	658,747	713,530	634,628
POWDER				
Pounds - Gelamite "2X"	478,750	581,050	593,600	625,100
60% Gelatine		3,950	55,200	11,000
Total Pounds Powder	478,750	585,000	648,800	636,100
Total Cost	$ 55,067.75	67,130.89	74,716.90	73,151.25
Fuse - Feet	771,800	1,012,600	1,144,340	1,029,300
Caps - Number	119,050	154,500	172,820	154,000
Duplex Shot Wire	6,550	21,550	30,870	48,710
Electric Caps	4,973	8,044	8,611	14,224
Fuse Lighters	27,500	49,000	53,300	47,500
Fuse Containers	5			
Tamping Bags	34,600	54,800	53,500	15,000
Powder Bags				
Total Cost - Fuse, Caps etc.	6,819.32	9,563.11	11,042.52	10,729.02
Total Cost - All Explosives	$ 61,887.07	76,694.00	85,759.42	83,880.27
Average Price per pound - Powder	.1150	.1150	.1150	.1150
Cost per ton - Powder	.0997	.1019	.1047	.1152
Cost per ton - Fuse, etc.	.0123	.0145	.0155	.0169
COST PER TON - All Explosives	.1120	.1164	.1202	.1321
Pounds Powder per ton of ore	.8664	.8880	.9092	1.002

1943 Production decreased 78,902 tons or 11.1% compared with 1942.
The average price per pound for powder was the same in the two years. The Cost per ton for all explosives increased 9.9% compared with 1942.

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

	1940	1941	1942	1943
PRODUCT - Tons	2,702,052	3,242,771	3,494,309	3,178,907
POWDER				
Pounds - 50%	9,500	5,600	--	--
- 60%	5,350	29,753	59,875	58,100
- 1 X and 2 X Gelamite	1,139,055	1,380,103	1,514,069	1,345,292
Total Pounds-Powder	1,153,905	1,415,456	1,573,944	1,403,392
Total Cost-Powder	$ 132,720.38	162,750.17	181,126.68	161,384.48
Fuse - Feet	4,187,783	5,109,955	5,428,099	5,296,582
Caps - Number	591,115	726,208	769,919	726,184
Leading Wire - Feet	2,460	3,500	3,000	1,885
Connecting Wire - Pounds	82	106	138	65
Tamping Bags - Number	99,150	133,800	150,400	157,700
Sealing Compound - Pints	72	-	-	-
Powder Bags	133	177	167	204
Fuse Lighters	106,375	134,850	140,250	137,200
Electric Exploders	3,561	10,876	11,895	10,716
Blasting Machines	1	-	-	-
Master Fuse Lighters	400	3,416	9,450	10,441
Total Cost-Fuse, Caps, Etc	$ 30,333.88	37,824.68	41,175.44	39,381.05
Total Cost-All Explosives	$ 163,054.26	200,575.32	222,302.12	200,765.53
Average Price Per Pound - Powder	$ .1150	.1150	.1150	.1150
Cost Per Ton - Powder	$ .0491	.0502	.0518	.0508
Cost Per Ton - Fuse, Caps, Etc	$ .0112	.0117	.0118	.0124
Cost Per Ton - All Explosives	$ .0603	.0619	.0636	.0632
Pounds of Powder Per Ton of Ore	.4271	.4364	.4504	.4414

NOTE:- The mines included in above statement are Athens, Maas, Negaunee, Lloyd, Virgil, Princeton, and Cambria-Jackson added in June 1943.
1943 Production decreased 315,402 tons - or 9% compared with 1942.
The average price per pound for powder and cost per ton for all explosives, was practically the same for the years 1942 and 1943.

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

	1940	1941	1942	1943
PRODUCT - Tons	2,702,052	3,242,771	3,494,309	3,178,907
TIMBER				
Feet - 6-8"	349,531	391,614	556,638	751,812
- 8-10"	378,024	396,935	367,747	311,432
- 10-12"	477,494	570,415	642,825	584,188
- 12-14"	184,574	230,706	266,819	347,562
- 14-16"	12,963	14,419	12,555	27,876
- Treated Timber	4,756	526	4,785	741
Total Feet	1,407,342	1,604,615	1,851,369	2,023,611
Total Cost	$ 110,124.43	127,923.50	155,394.02	199,569.46
LAGGING				
Feet - 5	14,125	11,270	2,800	9,933
- 7	6,348,725	7,789,971	8,857,020	8,515,982
Total Feet	6,362,850	7,801,241	8,859,820	8,525,915
Total Cost	$ 49,769.18	61,116.88	82,967.91	90,857.37
Poles - Feet	5,182,904	5,885,273	6,048,020	6,488,241
Poles - Cost	$ 68,498.05	77,787.92	101,577.72	117,610.72
Wire Fencing - Rods	2,933	2,447	1,555	1,686
Wire Fencing - Cost	$ 2,772.12	2,470.64	1,634.83	1,720.97
Total Cost - All Timber	$ 231,163.78	269,298.94	341,574.48	409,758.52
Average Cost Per Foot - Timber	$ .0782	.0797	.0839	.0986
" " " 100' - Lagging	$ .7821	.7834	.9364	1.065
" " " 100' - Poles	$ 1.322	1.322	1.6795	1.812
" " " Rod - Fencing	$ .945	1.009	1.051	1.021
Feet of Timber Per Ton of Ore	.521	.495	.530	.637
Feet of Lagging Per Ton of Ore	2.355	2.406	2.535	2.682
Feet of Poles Per Ton of Ore	1.918	1.815	1.731	2.041
Feet of Fencing Per Ton of Ore	.018	.012	.0073	.0087
Cost Per Ton for Timber	$ .0408	.0394	.0445	.0628
" " " " Lagging	$ .0184	.0188	.0237	.0286
" " " " Poles	$ .0254	.0240	.0291	.0370
" " " " Wire Fencing	$ .0010	.0008	.0005	.0005
Total Cost Per Ton	$ .0856	.0830	.0978	.1289

NOTE:

The mines included in above statement are Athens, Maas, Negaunee, Lloyd, Virgil, Princeton, and Cambria-Jackson added in June 1943

1943 Production decreased 315,402 tons - or 9% compared with 1942

The total cost per ton for all timber in 1943 increased .0311 - or 31.7% compared with 1942. This is accounted for in the increase in cost of timber - Lagging and Poles, and increase in quantity used:

	1943	Average Price 1942	Increase	Percent
All timber - Cost Per Foot -	.0986	.0839	.0147	17½
Lagging - Per 100 Lin.Feet -	1.065	.9364	.1286	13½
Poles - Per 100 Lin.Feet -	1.812	1.6795	.1325	8

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

SOFT ORE MINES

	1940		1941		1942		1943	
PRODUCT - TONS	2,702,052		3,242,771		3,494,309		3,178,907	
CLASSIFICATION	AMOUNT	per TON	AMOUNT	PER TON	AMOUNT	PER TON	AMOUNT	PER TON
General Supplies	131,271.61	.0486	171,462.86	.0529	156,046.21	.0447	127,302.86	.0400
Iron and Steel	38,676.32	.0143	47,764.92	.0147	48,634.64	.0139	49,137.31	.0155
Machinery	71,942.91	.0267	122,755.28	.0378	88,089.44	.0253	71,498.54	.0225
Explosives	163,107.72	.0603	200,860.70	.0619	218,427.41	.0625	202,625.24	.0637
Lumber and Timber	245,940.96	.0910	296,315.16	.0914	371,563.75	.1063	447,172.36	.1407
Fuel	15,414.40	.0057	17,071.97	.0053	23,571.18	.0067	29,523.80	.0093
Electric Power	403,886.97	.1495	444,596.71	.1372	470,499.99	.1346	499,761.56	.1572
Miscellaneous	26,178.38	.0097	39,643.73	.0122	105,397.23	.0302	192,730.29	.0606
Total	1,096,419.27	.4058	1,340,471.33	.4134	1,482,229.85	.4242	1,619,751.96	.5095

HARD ORE MINES

	1940		1941		1942		1943	
PRODUCT - TONS	552.598		658.747		713,530		634,628	
CLASSIFICATION	AMOUNT	PER TON	AMOUNT	PERTON	AMOUNT	PER TON	AMOUNT	PER TON
General Supplies	44,025.34	.080	62,604.40	.095	61,270.59	.086	39,810.89	.063
Iron and Steel	32,250.25	.059	43,819.99	.066	43,009.66	.061	37,083.42	.058
Machinery	41,544.87	.075	55,561.35	.084	35,466.73	.049	24,381.96	.039
Explosives	61,887.07	.112	76,700.80	.117	85,759.42	.120	83,880.27	.132
Lumber and Timber	6,662.98	.012	11,543.83	.017	11,518.56	.017	11,464.17	.018
Fuel	5,157.58	.009	5,421.96	.008	5,263.55	.007	5,921.98	.009
Electric Power	91,349.36	.165	101,144.56	.154	104,081.28	.146	107,603.42	.170
Miscellaneous	2,489.46	.004	24,027.11	.037	39,067.53	.054	64,266.13	.101
Total	285,366.91	.516	380,824.00	.578	385,437.32	.540	374,412.24	.590

NOTES 1943 Soft Ore Mines production decreased 315,402 tons or 9 % compared with 1942.
Hare Ore Mines production decreased 78,902 tons or 11 % compared with 1942.
Soft Ore Mines included in statement above, Athens, Maas, Negaunee, Lloyd, Princeton, Cambria-Jackson and Spies-Virgil.

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

	1940		1941		1942		1943	
			Less:		Less			
			Champion	7,172,418	Champion	7,602,068		
			Purchased Ore	106,928	Purchased Ore	58,305		
PRODUCT - TONS	5,419,185			7,065,490		7,543,763	6,524,441	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Surface	250,446-3/4	$1,441,760.22	308,725	$2,040,091.32	365,987	$2,535,635.72	399,687	$2,993,417.97
Cost Per Ton	$	.266		.289		.336		.459
Underground	409,032-3/4	$2,616,755.26	548,847-3/4	$4,083,080.09	596,685-1/2	$4,655,973.87	614,254-3/4	$5,069,232.61
Cost Per Ton	$	.483		.578		.617		.777
Superintendence & General Roll	54,911-3/4	$ 393,790.45	56,652	$ 444,289.71	60,632-1/2	$ 490,346.66	61,983-1/2	$ 525,218.87
Cost Per Ton		.073		.063		.065		.080
GRAND TOTAL	714,391-1/4	$4,452,305.93	914,224-3/4	$6,567,461.12	1,023,305	$7,681,956.25	1,075,925-1/4	$8,587,869.45
COST PER TON	$	.822		.930		1.018		1.316
Average Rate Per Day	$	6.23		7.18		7.51		7.98
Tons Per Man Per Day (1)		7.59		7.72		7.37		6.06
(1) Production		5,419,185		7,172,418		7,602,068		6,524,441
Prior Year Stockpile Overrun		162,595		110,093		72,753		None
Total		5,581,780		7,282,511		7,674,821		6,524,441

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

WAGES:

During April 1943, a wage increase of .05½ cents per hour was granted retroactive to July 13, 1942. Only that part applicable to 1943 is included in above figures.

Vacation pay of one week for three years service and two weeks for 10 years service was paid in August 1943, but the mines continued to operate - the vacation of employees being deferred.

WORKING SCHEDULE - 1943 - MICHIGAN PROPERTIES:

January 1st to 31st, the Athens, Negaunee, Maas and Lloyd mines, operated 6 days per week: 3-8 hour shifts 5 days and 2-8 hour shifts on Saturdays.

Cliffs Shaft and Princeton operated 6 days per week, 2-8 hour shifts per day. The Spies-Virgil operated 6 days per week, 2-8 hour shifts 5 days, and 1-8 hour shift on Saturdays.

Effective February 1st, the Athens, Negaunee, Maas and Lloyd mines went to 3-8 hour shifts 5 days, and 1-8 hour shift on Saturdays.

The Princeton went to 2-8 hour shifts 5 days, and 1-8 hour shift on Saturdays. The Cliffs Shaft and Spies-Virgil remained on the old schedule.

MINNESOTA PROPERTIES:

The Cahisteo ore operations began May 10, 1943 - working on a 2-8 hour shift basis, six days per week. This operation continued through September 4th, when operations were curtailed to a one shift - six days per week basis. Ore operations concluded October 31st, 1943.

The Holman-Cliffs ore operations began May 10, 1943 - working on a three 8 hour shift basis, six days per week, and continued until season closed on November 3, 1943.

The Hill-Trumbull ore operations began May 6, 1943, working on a three 8 hour shift basis, six days per week, and continued on this schedule until the season closed November 6, 1943.

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COMPARISON OF TOTAL DAYS WORKED AND TONS OR ORE MINED FOR THE YEARS 1943 AND 1942

	1943 DAYS	1942 DAYS	1943 DAYS	1942 DAYS
NON-PRODUCTIVE UNITS:				
Gardner-Mackinaw Mine	-	27 3/4		
Mather Mine	33,980 1/2	26,930 1/4		
Miscellaneous Payroll	3,260 3/4	1,849 1/4		
Shops and Storehouse	4,454 1/2	4,489 1/2		
C.C.I.Co. - Miscellaneous & General	74,690 1/4	76,607		
Negaunee Mine Co.-Miscl. and General	2,369 1/4	3,241 1/4		
Athens Iron Mng.Co. " " "	967 1/4	2,013 1/2		
Mesaba-Cliffs Mining Company	49,517	37,930		
Canisteo Mining Company	14,406	13,175 1/2		
The Cliffs Power & Light Company	23,307 1/2	23,780 1/4		
General Roll - Undistributed	39,224	39,602		
Champion Screen Plant	-	1,367 3/4		
Total Deductions	246,177	231,014		
Grand Total-All Operations	1,075,920 1/4	1,024,672 3/4		
Net Operating Mines	829,743 1/4	793,658 3/4	829,743 1/4	793,658 3/4
Total Tons	6,524,441	7,602,068		
Less: Champion Ore Shipped	-	58,305		
Total Tons	6,524,441	7,543,763		
Tons Per Man Per Day	7.86	9.51		
OPEN PIT PRODUCTION:		T O N S		
Tilden Mine	139,991	235,207	5,743 3/4	7,580 3/4
Canisteo Mine	585,016	772,659	22,746	24,135
Hill-Trumbull Mine	871,229	1,223,113	47,383 1/4	49,184 1/2
Holman-Cliffs Mine	1,085,689	1,104,945	50,837 3/4	48,237 1/2
Total	2,681,925	3,335,924	126,710 3/4	129,137 3/4
Open Pit - Tons Per Man Per Day	21.16	25.83		
Net Days - Underground Mines			703,032 1/2	664,521
Net Tons - Underground Mines	3,842,516	4,207,839		
Underground Mines-Tons Per Man Per Day.	5,465	6.332		

PERCENTAGE OF TOTAL PRODUCTION

	1943		1942	
	TONS	PERCENT	TONS	PERCENT
Underground Mines	3,842,516	58.90	4,207,839	55.35
Open Pits	2,681,925	41.10	3,335,924	43.88
Champion - Purchased Ore	- -	- -	58,305	.77
Total	6,524,441		7,602,068	

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STATEMENT SHOWING PENALTY COST OF OVERTIME WORKED BY EMPLOYEES DURING YEAR 1943 AND EFFECT THE PENALTY COST HAD ON THE YEAR'S PRODUCTION

	MICHIGAN PROPERTIES	MESABA RANGE			TOTAL
		CANISTEO	HILL TRUMBULL	HOLMAN CLIFFS	
YEAR 1943					
January	28,048.33	629.43	284.62	1,413.28	
February	21,637.74	476.80	253.83	1,064.45	
March	22,217.92	465.51	669.15	1,902.31	
April	23,527.48	386.64	1,204.52	2,136.74	
May	39,243.44	2,069.07	5,288.00	5,618.17	
June	27,920.29	1,893.16	5,644.62	4,827.48	
July	28,079.15	1,885.68	6,657.71	5,657.29	
August	28,366.41	1,797.15	5,250.85	4,671.12	
September	22,159.44	1,122.94	5,199.29	6,981.90	
October	33,591.87	1,666.23	5,057.00	5,942.61	
November	22,807.55	492.44	1,560.94	1,417.56	
December	22,129.59	1,108.02	1,854.45	2,622.44	
On Adjustment Roll Applicable to 1943	4,464.70				
Total 1943	324,193.91	13,993.07	38,924.98	44,255.35	421,367.31
Total 1942	325,581.90	7,521.00	28,104.00	25,346.26	386,553.16
On Adjustment Roll Paid in 1943-Applicable to 1942	10,001.44				10,001.44
Total 1942	335,583.34				396,554.60
PRODUCTION:					
Tons - Year 1943	3,982,507	585,016	871,229	1,085,689	6,524,441
Tons - Year 1942	4,501,351	772,659	1,223,113	1,104,945	7,602,068
EFFECT THE PENALTY COST HAD ON YEAR'S PRODUCTION COST:					
Increased 1943 By	.0814	.0239	.0447	.0408	.0646
Increased 1942 By	.0745	.0097	.0230	.0229	.0522

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CENTRAL ANALYTICAL LABORATORY

STATEMENT SHOWING COST OF OPERATING AND DISTRIBUTION BASED ON DETERMINATIONS WORKED FOR YEAR 1943

	1943		1942
COSTS			
LABOR			
Chemists and Assistants	27,417.45		24,594.30
Helpers and Sample Buckers	64,575.98		61,894.42
Total Labor	91,993.43		86,488.72
SUPPLIES AND EXPENSES			
Chemical, etc.	20,541.63		24,797.09
Property Insurance	36.60		34.98
Personal Injury Expense	60.00		58.00
Unemployment Insurance Tax	1,378.33		1,203.07
O. A. B. Tax	924.12		861.45
Depreciation	854.92		1,711.99
Bond Premium	4.77		
Sale of Equipment, Missouri Cliffs			455.00
Equipment Returned, Missouri Cliffs	150.00		
Total	23,775.11		28,386.84
Grand Total	115,768.54		114,875.56
Total Number of Determinations	303,944		309,737
Cost per Determination	.38089		.37088

DISTRIBUTION	NO. OF DETERMINATIONS	COST		% OF TOTAL LABORATORY WORK
Cliffs Shaft & Dia. Drills	47318	18,063.54		15.7
Maas & Diamond Drills	74860	28,472.27		24.6
Cambria-Jackson & Dia. Drills	13267	4,735.38		4.1
Lloyd & Diamond Drills	33531	12,846.40		11.1
Tilden & Churn Drills	9070	3,198.44		2.8
Spies-Virgil	50	20.83		
Princeton	25355	9,653.12		8.3
Uncomp. Constr. & Explorations.				
E. & A. CC 50	2040	774.40		.7
E. & A. CC 93	445	167.45		.1
E. & A. CC 94	1498	565.94		.5
E. & A. CC106	3138	1,218.03		1.1
Experiments & Investigations	13400	5,212.56		4.5
Miscellaneous Delivery				
Archibald	25	10.42		
Cambria	64	26.43		
Mary Charlotte	42	17.49		
Morris	575	219.91		.2
Missouri Cliffs	1529	560.59		.5
Wells Ore	663	252.43		.2
Negaunee Mine	45462	17,274.39		14.9
Negaunee Mine Co.				
E. & A. NM 9	1805	699.32		.6
E. & A. NM 10-13 Mather	696	250.57		.2
E. & A. NM 21	958	408.48		.4
Land Offer 2248	20	7.81		
Athens Mine	25404	9,662.14		8.3
Total Company Operations	301265	114,334.29	.37951	98.8
Accounts Receivable:				
L. S. & I.		27.00		
Volunteer Pit	2679	1,407.25		1.2
GRAND TOTAL	303944	115,768.54	.38089	100.0

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CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1943

1. GENERAL:

The Cliffs Shaft Mine worked 308 days in 1943 on a six day per week schedule. The production of the mine for this period amounted to 634,628 tons. This was 9,317 tons below the estimate and 78,902 tons below the all-time high of 1942. Several factors were responsible for the decline in production and the decrease in tons per man in 1943. Chief of these was the unavailability of easily mineable ore in 1943 as compared to 1942. The rate of depletion of developed reserves in 1942 was excessive, necessitating in 1943, a much higher than normal ratio of development work. Manpower was another factor affecting production. The acuteness of this factor lay not so much in an actual shortage of men as in the character and quality of the available men who constituted replacements. Absenteeism had some effect on production.

Shipments in 1943 totaled 604,622 tons. Stocking of ore started on November 22, 1943.

In order to compensate for the too rapid rate of depletion of good working places in 1942, a marked increase was made in 1943 in the number of crews doing development drifting or raising. In 1942 we had an average of 14.5 crews doing this kind of work. In 1943 there were 22.5 such crews. They drove 5,180 feet of rock drifts or raises in 1943 compared to 2,855 feet in 1942. Total development footage in both rock and ore was 9,239 in 1943. The utilization of a fifth of the mining crews on drifting or raising work, over half of which is in rock, is abnormal but was nevertheless, necessary. This will need to continue until the production rate is scaled down or a good sized virgin area is opened up such as may be expected on the Section 10 lease.

Equipment purchased for the surface consisted of replacements and new items. A new TD-14 International Trac Tractor with a Bucyrus Erie Bull Grader and Carco hoist was purchased and with the exception of the Carco hoist, was delivered in the Fall. This outfit serves a multitude of purposes, - trestle erection, bulldozing, snow removal, and hauling of heavy equipment.

A new method of bit sharpening was instituted at the mine in 1943, viz., hot milling. This involved the purchase of two Ingersoll-Rand oil furnaces, one Ingersoll-Rand jackmill, one Ingersoll-Rand jackpunch, and miscellaneous items of equipment and spare parts. After long delay we obtained a new Chevrolet truck to replace the rental truck which had become almost completely worn out. In the crusher building a new discharge head and gears were purchased for the revolving screen. A conveyor, idlers, and related equipment was bought to make a picking belt set-up. This awaits use in a more comprehensive plan being outlined for 1944. One new 8 ft. sheave for an outside pulley stand was obtained in 1943. Seven sets of overhead doors were bought for the steel garage. One very large overhead door was ordered for the tractor garage. The tractor will be housed in the frame building occupied by the surface boss.

Underground equipment purchased in 1943 was two Coppus 5 H.P. fans; one Chicago Pneumatic sludge pump; eleven Ingersoll-Rand DA-35 air drills, six of which were equipped for rock work with the so-called "New York State" backheads; six Cleveland D-12 air drills; three Ingersoll-Rand jackhammers; eight 25 H.P. A.C. scraper motors; two Ingersoll-Rand double drum air hoists; one 48 cell battery; two Lake Shore Engineering Company Lo-Hed, 76 cu. ft. main line cars; one electric centrifugal pump and one 8" ferro steel valve for the underground pump station, and one No. 21 Eimco loader.

CLIFFS SHAFT MINE
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1. GENERAL: (Cont'd)

A used shaker screen from the Mesabi District was tried in place of the revolving screen during the late Summer. This was done in order to clean the lump more thoroughly with the view of establishing a more thorough rock picking practice. The screen as set up proved too light for the job and it was apparent that a much more comprehensive plan must be made using properly designed equipment. Such plans are under consideration for 1944.

At the start of the 1943-1944 stocking season the revolving screen was equipped with all 1½" screen sections. In the previous season one section had 2" holes. The revolving screen frame was rebuilt when it was put back in place of the shaker screen. The rebuilt frame gives the screen a much flatter pitch with the ore consequently traveling longer in the screen. To offset this factor the 2" hole section was replaced by a 1½" section.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

A. a. Production by Grades:

Grade	Tons	% of Total
Cliffs Shaft Lump	187,467	
Cliffs Shaft Crushed	47,400	
Cliffs Shaft Run-of-Mine	328,139	
Total	563,006	88.7
Bancroft Lump	13,014	
Bancroft Crushed	3,289	
Bancroft Run-of-Mine	53,640	
Total	69,943	11.0
Section 10 Lump	135	
Section 10 Crushed	43	
Section 10 Run-of-Mine	1,501	
Total	1,679	.3
GRAND TOTAL FEE & LEASE ORE	634,628	100.0

Production by grades for the past ten years follows:

Year	Lump Ore Tons	Crushed Ore Tons	Run-of-Mine Ore - Tons	Total Tons
1934	156,776	66,469	-	223,245
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

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

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

	Lump		Crushed	
Year	Tons	% of Total	Tons	% of Total
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

The proportion of lump to crushed ore remained constant since no great change was made in the screening ratio in 1943. At the start of the screening and stocking season on November 22, 1943 the screen was pitched at a flatter angle than in 1942 but all sections were equipped with 1½" screen.

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

Year	Cliffs Shaft Ore (Fee)	% of Total	Bancroft Ore (Lease)	% of Total	Sec. 10 Ore (Lease)	% of Total
1934	195,258 tons	87.5	27,987 tons	12.5		
1935	241,474 "	89.8	27,447 "	10.2		
1936	383,014 "	83.9	73,746 "	16.1		
1937	451,170 "	83.0	92,397 "	17.0		
1938	277,602 "	84.8	49,559 "	15.2		
1939	323,647 "	83.6	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

The ratio of fee ore to Bancroft Lease ore dropped only slightly from the 1942 proportion. Lease ore production will assume a more important role in coming years as the Section 10 area is developed

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

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:

Year	Bancroft Ore Tons
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
Total	980,197

b. Shipments:

Grade	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Cliffs Shaft Lump	2,820	175,131	177,951	226,025
Cliffs Shaft Crushed	3,433	26,749	30,182	57,660
Cliffs Shaft Crushed Spec.				325
Cliffs Shaft Mine Run	328,139	-	328,139	375,540
Bancroft Lump	400	12,429	12,829	27,086
Bancroft Crushed	380	-	380	616
Bancroft Mine Run	53,640	-	63,640	55,771
Incline Lump				4,541
Section 10 Mine Run	1,501		1,501	-
Total 1943	390,313	214,309	604,622	747,564
Total 1942	466,824	280,740	747,564	
Decrease	76,511	66,431	142,942	

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2. PRODUCTION, ETC.: (Cont'd)

Shipments for the last ten years are tabulated below:

	CLIFFS SHAFT GRADE			BANCROFT GRADE			SEC.10 GRADE	
Year	Lump	Crushed	Mine Run	Lump	Crushed	Mine Run	Mine Run	Grand Total
1934	142,891	47,607		30,238	16,703			237,439
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	143381	58,253	23,549	17,382		638,246
1942	230,566°	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

(°) Contains 4,541 tons of Incline Pit Lump

Smaller shipments in 1943 are the reflection of less total production, less ore left over in stock from 1942, and 30,000 tons more ore in stock at the end of 1943 as compared to the end of 1942.

c. Stockpile Balances:

Ore in stock as of December 31, 1943:

Cliffs Shaft Lump	50,514 tons
Cliffs Shaft Crushed	27,763 "
Bancroft Lump	3,597 "
Bancroft Crushed	8,516 "
Section 10 Lump	135 "
Section 10 Crushed	43 "
Total	90,568

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

Balance in stock - Dec. 31,	1934	275,391 tons
	1935	145,810 "
	1936	82,072 "
	1937	109,799 "
	1938	273,939 "
	1939	76,540 "
	1940	47,208 "
	1941	81,533 "
	1942	60,562 "
	1943	90,568 "

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1943

2. PRODUCTION, ETC.: (Cont'd)

d. Division of Product by Levels:

Level	"A" Shaft Tons	"B" Shaft Tons	Total Tons
1st	5,969	43,646	49,615
2nd	8,255	8,200	16,455
3rd	12,447	3,781	16,228
4th	19,124	22,297	41,421
5th	19,217	1,660	20,877
6th	23,529	8,037	31,566
7th	70,880	62,382	133,262
8th	77,587	24,697	102,284
9th	67,210	36,230	103,440
10th	39,400	7,836	47,236
11th	34,401		34,401
12th	11,796	5,890	17,686
13th		5,616	5,616
14th		7,280	7,280
15th	1,640	5,621	7,261
Total	391,455	243,173	634,628
Rock			34,672
Total Ore & Rock			669,300

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

Year	"A" Shaft Tons	%	"B" Shaft Tons	%	Total
1934	157,835	71.3	65,410	29.2	223,245
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

"B" shaft produced in this year a higher proportion of the years production than in any of the last ten years. Although development has been vigorous in "B" shaft the opportunities appear much less favorable there for opening up sizeable new deposits. Therefore, the higher proportion of "B" shaft production can be interpreted as a forerunner of a time when "B" shaft shall not make such a favorable showing.

Since the product is hoisted in two shafts with the quantity from each kept as nearly balanced as possible, it is necessary to transfer some of the ore broken in "A" shaft to the "B" shaft side for hoisting. The table below is put in to show how the ore has been hoisted each month from "A" and "B" shafts:

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2. PRODUCTION, ETC.: (Cont'd)

1943 Product as Hoisted

Month	"A" Shaft Tons	"B" Shaft Tons	Total Tons
January	27,619	26,037	53,656
February	26,149	24,654	50,803
March	29,208	29,770	58,798
April	28,217	28,250	56,467
May	27,273	27,401	54,674
June	26,519	27,366	53,885
July	27,286	25,823	53,109
August	25,768	25,358	51,126
September	25,351	23,601	48,952
October	27,367	25,143	52,510
November	24,765	23,167	47,932
December	24,257	23,397	47,654
Total	319,599	309,967	629,566
% of Total	50.76	49.24	100.00

Note: Above table does not include overruns.

e. Production by Months:

		Cliffs Shaft			BANCROFT			Section 10			
Month	Optg. Days	Lump	Crushed	Mine Run	Lump	Crushed	Mine Run	Lump	Crushed	Mine Run	Total
January	25	38,156	9,525	530	2,493	629	2,184				53,517
February	24	37,222	9,283	437	1,692	414	1,798				50,846
March	27	42,290	10,613	62	3,075	781	2,319				59,140
April	26	23,683	5,939	20,642	1,781	445	4,012				56,502
May	26	1,624	514	46,518			5,921				54,577
June	26			48,483			5,967				54,450
July	26			48,084			5,858				53,942
August	26			45,223			6,687			318	52,228
September	25	2,820	1,100	39,529	400	112	5,978			330	50,269
October	26			45,944			6,451				52,659
November	25	8,940	2,230	32,165	535	140	4,359	29	8	358	48,764
December	26	32,732	8,196	522	3,038	768	2,106	106	35	231	47,734
Total	308	187,467	47,400	328,139	13,014	3,289	53,640	135	43	1,501	634,628

f. Ore Statement:

Grade	On Hand Jan. 1, 1943	Output for Year	Stockpile Overrun	Total	Shipments	Balance On Hand	Inc. or Dec. in Output
C.S.Lump	40,998	187,467		228,465	177,951	50,514	
C.S.Crushed	10,545	47,400		57,945	30,182	27,763	
C.S.Mine Run	-	328,139		328,139	328,139	-	
Ban. Lump	3,412	13,014		16,426	12,829	3,597	
Ban. Crushed	5,607	3,289		8,896	380	8,516	
Ban. Mine Run	-	53,640		53,640	53,640	-	
Sec. 10 Lump	-	135		135	-	135	
Sec. 10 Crushed	-	43		43	-	43	
Sec. 10 Mine Run	-	1,501		1,501	1,501	-	
Total 1943	60,562	634,628	-	695,190	604,622	90,568	75,584
Total 1942	81,583	710,212	16,331°	808,126	747,564	60,562	53,922

(°) Current years' stockpile overrun 3,318 tons
Prior years' stockpile overrun 13,013 "

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2. PRODUCTION, ETC.: (Cont'd)

g. Delays:

Date	Hours Lost	Tons Lost	Remarks
Jan. 12	1½	300	Wheel broke on "A" shaft skip.
20	6	1000	Picking belt trouble.
21	1	200	Picking belt trouble.
25	1½	300	Chunks on surface.
27	1	200	Chunks on surface.
28	1	200	Delay on surface.
Feb. 1	1½	300	"B" shaft hoist motor burned out.
5	½	100	"B" shaft pocket on 15th L. lost straps.
8	½	100	"A" shaft - big chunk.
10	½	100	"A" shaft - trouble on surface.
18	¾	150	"A" shaft out of ore.
19	1¾	400	"A" shaft out of ore.
23	¾	150	"A" shaft out of ore.
Mar. 2	1½	300	Delay on surface.
4	3	300	"A" shaft hoist panel wire broken.
8	½	100	Slow hoisting on surface.
10	1¼	400	Trouble - top tram motor.
17	1	200	Slow hoisting.
23	¾	100	Delay on surface.
25	2	300	Motor and cars off track on 15th L. "B" shaft.
Apr. 20	1	200	Crusher delay.
21	2½	400	Top tram motor.
22	2	300	Motor off track on 15th level.
23	1¼	150	"A" shaft out of ore.
27	1¼	150	Unable to hoist from 15th L. pocket -"A" shaft
May 6	1¼	150	Skip pit full on 15th L. "A" shaft.
19	¾	200	Broken skip roller.
24	1¼	150	Out of ore in "A" shaft.
31	2½	250	Broken gate 10th L. "A" shaft.
June 2	¾	75	Out of ore in "A" shaft.
3	3	150	"A" shaft skip pit full on overtime shift.
8	1	200	Hoist motor trouble.
9	1½	250	Cars derailed on 15th level.
11	1	200	Trouble on surface.
July	None	None	
Aug. 11	1½	300	Broken gate on 10th L. "A" shaft.
Sept. 8	6	400	"B" shaft bearer knocked out at 8th level.
22	2	250	Chunk and skip caught in pocket at 4th L. "B".
Oct. 16	2½	300	"B" shaft skip repairs.
Nov.	None	None	
Dec. 15	1½	150	Generator trouble.
16	1½	150	Repairing skip "B" shaft.
22	2½	400	Picking belt broke.
23	3	450	Top tram car off track.
29	3¼	400	Chunks in crusher.
Total 1943	73¼	10825	
Total 1942	75	8600	

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3. ANALYSIS:

a. Average Analysis of 1943 Output:

	Iron	Phos.	Silica
Cliffs Shaft Lump	59.75	.109	8.70
Cliffs Shaft Crushed	51.95	.097	18.32
Cliffs Shaft Mine Run	59.21	.098	10.02
Bancroft Lump	60.28	.127	7.81
Bancroft Crushed	54.29	.106	14.06
Bancroft Mine Run	60.78	.115	7.74
Section 10 Lump	60.39	.102	8.00
Section 10 Crushed	52.54	.098	16.45
Section 10 Mine Run	60.78	.115	7.74

The crushed ore is better for 1943 than 1942 whereas the lump ore shows a drop in iron and an increase in silica. This anomaly is perhaps the result of more rigid supervision of lump ore sampling 1943. Actually, it is probable that the total mine product in 1943 was better than in 1942 for some lean ore places that worked in the previous year were stopped in 1943. In other words the emphasis for 1943 was on maintaining a quality product.

c. Complete Analysis of 1943 Ores as Shipped From Mine:

Grade	Iron	Phos.	Sil.	Alum.	Mang.	Lime	Mag.	Sul.	Loss
Lump Ore (x)	59.80	.103	9.44	.28	1.83	.75	.63	.012	1.06
Crushed Ore (x)	52.10	.104	18.10	.43	2.55	1.10	.90	.013	1.65
C.S.Mine Run	59.20	.097	10.00	.33	1.84	.84	.65	.013	1.11
Ban.Mine Run	60.75	.107	7.83	.22	1.97	.80	.62	.012	1.00

(x) Cliffs Shaft and Bancroft combined.

d. Analysis of Ore in Stock Dec. 31, 1943:

		Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss.	Moist.
Cliffs Shaft Lump	Dried	59.85	.108	8.57	.28	1.83	.75	.63	.011	1.06	-
	Natural	59.54	.107	8.52	.28	1.82	.75	.63	.011	1.05	.52
Cliffs S. Crushed	Dried	51.84	.098	18.56	.43	2.55	1.10	.90	.012	1.65	-
	Natural	50.90	.096	18.22	.42	2.50	1.08	.88	.012	1.62	1.81
Bancroft Lump	Dried	59.74	.132	8.91	.33	2.60	1.56	1.15	.011	1.35	-
	Natural	59.50	.131	8.87	.33	2.59	1.55	1.14	.011	1.34	.40
Bancroft Crushed	Dried	53.55	.109	15.61	.43	2.80	1.42	1.01	.014	1.96	-
	Natural	52.68	.107	15.36	.42	2.75	1.40	.99	.014	1.93	1.62

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 ore are identical.

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

		Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Cliffs Shaft Ore	Dried	56.52	.108	10.89	.49	2.42	.97	.81	.018	1.21	-
	Natural	56.04	.107	10.80	.49	2.40	.96	.80	.018	1.20	.85
Bancroft Ore	Dried	57.68	.125	9.88	.50	2.35	1.13	.95	.019	1.84	-
	Natural	57.25	.124	9.81	.50	2.33	1.12	.94	.019	1.83	.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, 1943:

Available Ore in Bancroft Area "A" Shaft

	Developed		Prospective	
	Floors	Pillars	Breasts	Total
Level	Tons	Tons	Tons	Tons
2nd				
3rd	1,900	800		2,700
4th	8,200			8,200
5th	3,000		4,000	7,000
6th	7,800			7,800
7th				
8th		9,300		9,300
9th	9,800	9,500		19,300
10th	37,700	150,400		188,100
11th	90,900			90,900
12th			4,000	4,000
Total	159,300	170,000	8,000	337,300

Summary:

Bancroft Ore Available	337,300
Less December Production	5,912
Gross Tonnage as of Dec. 31, 1943	331,388
Less 10% for loss in mining	33,730
	297,658
Less 10% for rock	30,357
Net Total Bancroft Ore Available	267,301

Section 10 Lease

	Developed		Prospective	
	Floors	Pillars	Breasts	Total
Level	Tons	Tons	Tons	Tons
1st		13,900		13,900
2nd	5,600			5,600
4th			2,000	2,000
Total	5,600	13,900	2,000	21,500

Summary:

Section 10 Lease Ore Available	21,500
Less December Production	372
Gross Tonnage as of Dec. 31, 1943	21,128
Less 10% for loss in mining	2,150
	18,978
Less 10% for rock	1,935
Net Total Sec. 10 Ore Available	17,043

Net Total Bancroft and Section 10 Lease 284,344

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

Available Cliffs Shaft Ore "A" Shaft

	Developed		Prospective	
	Floors	Pillars	Breasts	Total
Level	Tons	Tons	Tons	Tons
1st		3,200	2,000	5,200
2nd	4,200			4,200
3rd			4,000	4,000
4th			6,000	6,000
5th	13,800	8,000	8,000	29,900
6th	41,300	66,300	6,000	113,600
7th	104,200	12,000	4,000	120,200
8th	90,400	3,200		93,600
9th	178,100	9,600	6,000	193,700
10th	59,700	117,400	4,000	181,100
11th	60,400	138,200		198,600
12th	63,200	86,300		149,500
15th	40,400			40,400
Total	655,700	444,300	40,000	1,140,000

Available Cliffs Shaft Ore "B" Shaft

	Developed		Prospective	
	Floors	Pillars	Breasts	Total
Level	Tons	Tons	Tons	Tons
1st	26,500	14,900	2,000	43,400
2nd	42,600			42,600
3rd	11,500	23,500	2,000	37,000
4th			4,000	4,000
5th	10,900	7,000	2,000	19,900
6th	3,300			3,300
7th	20,700	2,900	4,000	27,600
8th	31,100	5,700	4,000	40,800
9th	21,000		4,000	25,000
10th	32,000			32,000
11th	21,300	3,000		24,300
12th	4,600			4,600
13th	7,500			7,500
14th	6,900		2,000	8,900
15th	20,100	15,200	2,000	37,300
Total	260,000	72,200	26,000	358,200

Section 9 Development

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

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

Summary:

Cliffs Shaft Ore Available "A" Shaft	1,140,000
Cliffs Shaft Ore Available "B" Shaft	358,200
Cliffs Shaft Ore Available Section 9	29,700
Total	1,527,900
Less December Production	41,450
Gross Tonnage as of Dec. 31, 1943	1,486,450
Less 10% for loss in mining	152,790
	1,333,660
Less 10% for rock	137,511
Net Total Fee Ore Available	1,196,149

Recapitulation:

Net Cliffs Shaft Ore Available	1,196,149
Net Bancroft & Sec. 10 Ore Available	284,344
Grand Total	1,480,493

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

	Dec. 31, 1943	Dec. 31, 1942
Cliffs Shaft Ore Available	1,196,149 Tons	1,255,912 Tons
Bancroft & Sec. 10 Ore Available	284,344 "	257,758 "
Total	1,480,493 "	1,513,670 "
Decrease for year 1943	33,177 "	

New Ore Developed in 1943 634,628 - 33,177 = 601,451 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		
			Cliffs Shaft Ore	
Year	Sec. 10 Ore Tons	Bancroft Ore Tons	"A" Shaft Tons	"B" Shaft Tons
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

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

"A" shaft workings show a drop in reserves of 78,558 tons from the preceding year. This is partially offset by the addition of Section 10 reserves and development of more ore on the Bancroft Lease and in "B" shaft. The drop in "A" shaft reserves points out the importance of getting the Section 10 deposits developed as soon as possible. This work is being carried on rapidly.

The following table serves to emphasize the observation above for it shows that total reserves have dropped again for the fourth consecutive year. "A" and "B" shaft workings are each year more completely outlining the possible limits of ore occurrence and eventually there will come a time when development no longer has virgin ground to open up. Therefore, the acquisition of a lease to Section 10 ore can only be viewed with the utmost satisfaction.

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

1943	1,480,493 Tons
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 "

5. LABOR AND WAGES:

a. General:

The increase in the number of surface men in 1943 as compared to 1942 was due to more general repair and renovation of buildings, more trucking, and extra sampling of ore shipments. The extra sampling consisted of two more men per day in order that check samples could be made by an independent operator. Surface labor category also increased because during the stockpile shipping season two men were kept picking rock from the cars as they were loaded by the shovel. There was one more man underground during 1943 as compared to 1942.

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5. LABOR AND WAGES: (Cont'd)

b. Comparative Statement of Wages and Product:

	1943	1942	Increase	Decrease
PRODUCT	634,628	713,530		78,902
No. of Shifts & Hours	2 8-hr.	2 8-hr.		
No. of Days Operated	308	308		
Average Number of Men Employed				
Surface	112	106	6	
Underground	357	356	1	
Total	469	462	7	
Average Wages Per Day				
Surface	7.41	6.74	.67	
Underground	8.14	7.65	.49	
Total	7.97	7.45	.52	
Average Wages Per Month				
Surface	185.25	168.50	16.75	
Underground	203.50	191.25	12.25	
Total	199.25	186.25	13.00	
Product Per Man Per Day				
Surface	18.69	22.39		3.70
Underground	5.82	6.54		.72
Total	4.44	5.06		.62
Labor Cost Per Ton				
Surface	.396	.301	.095	
Underground	1.399	1.170	.229	
Total	1.795	1.471	.324	

The increase in labor cost is attributable to several factors. One was the increase made in April in wages of 5½¢ per hour. The increase was retroactive to July 1942 but of course, the 1942 proportion does not enter the labor cost figures in the table above. A second factor raising cost of labor per ton was the decline in total production. A third factor was a combination of more surface work due to extra sampling, rock picking, and crusher building revamping. The intangible decrease in efficiency of workmen who are inexperienced resulted in an appreciable rise in costs. Lastly, the increase in penalty time payments occassioned both by the general wage increase and the presidential directive order in October 1942 resulted in increased costs. The following table shows the effect on costs of the wage increase and the increase of penalty time:

1943 penalty time for time and one-half and double time	$ 78,482.52
1942 penalty time for time and one-half	72,184.00
Increase in penalty payments	6,298.52
Increased labor costs due to 5½¢ per hour wage increase	62,921.10
Total Increase	69,219.62

The penalty increase and the wage increase added $ .109 per ton to the labor cost.

Total penalty time and wage increase in 1943 amounted to $141,403.62. This cost $ .22 per ton. Penalty time alone in 1943 cost $ .123 per ton.

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5. LABOR AND WAGES: (Cont'd)

The following table shows penalty costs divided between surface and underground for the past two years:

	Surface	Underground	Total
1943	$ 21,159.13	$ 57,323.39	$ 78,482.52
1942	17,846.14	54,337.86	72,184.00
Increase	3,312.99	2,985.53	6,298.52

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

Year	Surface Labor	Underground Labor	Total Labor
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
1934	.194	.728	.922

	1943	1942	Increase	Decrease
Avg. Product Stoping & Tramming (Tons per Shift)	18.53	19.21		.68
Avg. Product Stoping & Tramming, Including Haulage Crews (Tons per Shift)	15.50	15.99		.49
Avg. Wages - Cont. Miners	8.54	8.13	.41	
Avg. Wages - Cont. Trammers	11.56	10.73	.83	
Avg. Wages - Cont. Labor	8.74	8.36	.38	
Total Number of Days				
Surface	33,945¾	31,868	2,077¾	
Underground	109,056¾	109,093½		36¾
Total	143,002½	140,961½	2,041	
Amount For Labor				
Surface	251,391.05	214,958.43	36,432.62	
Underground	888,015.93	834,681.71	53,334.22	
Total	1,139,406.98	1,049,640.14	89,766.84	

Proportion of Surface to Underground Men

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
1934	1 to 4.05

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6. SURFACE:

a. Buildings and Repairs:

The following figures show cost of repairs to mine buildings for the years 1939 - 1943:

	1943	1942	1941	1940	1939
Office & Warehouse	1611.05	1759.49	515.63	637.58	247.85
Shops	1786.50	1519.98	1075.65	111.18	219.84
Shaft House	956.90	384.67	2399.63	777.48	373.85
Engine House	1078.09	860.22	321.64	1119.47	105.71
Dry House	1125.87	3713.75	6381.12	4503.76	1554.29
Coal Dock & Trestle	821.71	96.67	331.25	307.30	855.66
Crusher Building	4390.68	2903.35	570.44	522.03	157.84
Miscellaneous	1086.06	614.12	366.24	271.41	56.46
Total	12856.86	11852.25	11961.60	8250.21	3571.50

Total costs for this heading increased $ 1,004.61 over 1942.

The office and warehouse continued to be a source of expense as we completed the renovation of the building by completing the job of covering the floor with linoleum and painting all interior walls with oil paint. The Captain's change room and wash room was also remodeled.

Shop expense was high in the jackbit grinding room due to changes in the ceiling arrangement necessitated by the change over to a hot milling system for sharpening bits. The oil furnaces used with the hot mill made it necessary to improve shop ventilation. This is not too good yet. The interiors of the machine shop, carpenter shop, and blacksmith shop, were painted during 1943. Fireproof doors were put in between the shops and old windows in partitions were bricked shut as fireproofing security measures. A brick shimney was built to replace the corroded metal stack for the machine shop building stoker. The stone exterior of the shop building and laboratory were repointed with brick cement.

The shaft house expense came partly from each shaft house. In "A" shaft the east-west timbers that support the pocket rotted to such an extent that the pocket was gradually tilting into the shaft. Two second-hand 20" I-beams were put in place of the removed timber and the pocket was repaired. In "B" shaft the timber frame that holds the hold-down sheave was replaced by steel I-beams.

The expense in the engine house is up due to painting of the interior, repairs to the roof and the installation of a shower.

No unusual expense was incurred in the dry house during 1943.

New timbers required to replace rotted structural members of the coal dock and trestle brought the expense up in this category.

Crusher building expense was about $ 1,400.00 above 1942 expense largely because of the structural steel reinforcing of the building in 1943. The stairs were all rebuilt out of steel and a new shanty was made for the operator of the crushed ore car.

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6. SURFACE: (Cont'd)

a. Buildings and Repairs: (Cont'd)

Miscellaneous building costs were up in 1943 because of the erection of a pumphouse on the shore of Lake Bancroft to house the compressor coolant pumps and the installation of new overhead doors for the garage. The old swinging doors for the garages were almost beyond repair. They had been repaired many times as a result of breakage against ice accumulations in front of the garage.

In the near future something must be done about the old boiler house roof. This building houses within itself, but under a separate roof of its own, the surface dry. The remainder of the space is used for storage of heavy equipment and parts. The roof has rotted to such an extent that only a complete renewal of plank and covering can be considered as feasible. In view of the fact that the Geological Department needs much additional space for storage of diamond drill core, we have suggested that for this purpose a second floor might be put in the boiler house and the roof repaired. The cost could be shared by both the mine and the Geological Department. The Mechanical Department has been asked to submit an estimate of the cost of such a project.

7. UNDERGROUND:

a. Development:

1. Section 10 Lease

The following discussion of actual and proposed development for Section 10 Lease is given with a sense of satisfaction because it is possible to tell of development in a new area.

Proposed development plans for Section 10 Lease are naturally subject to considerable change as information becomes available from actual development. However, from already available information such as drill holes and geologic structure of adjacent lands, a general scheme for the development of Section 10 Lease has been formulated and partly actuated. The geology of Section 10 Lease is similar to that of the Cliffs Shaft property in most respects except probably, for the location and detail of structure. In a very general way we expect to find between 800 E and 3000 E an east-west anticline immediately south of the Cliffs Shaft boundary and south of this in turn an east-west syncline. The syncline will be the westward extension down the pitch of the Moro Mine structure. West of 800 E coordinate, the information available is even less complete as to Section 10 structure. Drill hole data indicates that there will be a narrow east-west syncline immediately adjacent to the Cliffs Shaft fee lands. South of this syncline we think there are faults that bring up a block of footwall dike, siderite, and lean jasper. This idea is quite conjectural, however, and more information will be required to work out the major structures of the west side of Section 10 Lease.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

1. Section 10 Lease (Cont'd)

To facilitate structural prognosis some diamond drilling was carried out on Section 10 Lease during 1943. Drill hole No. 528 was drilled south from the end of the 3rd level drift at coordinates 1218 S - 790 E. This hole encountered siderite, dike, and soft ore jasper. It was bottomed at coordinates 1745 S - 765 E. at approximately the 4th level elevation. At the end of 1943 drill hole No. 533 was drilling toward the Section 10 Lease from coordinates 792 S - 620 E on the 3rd level. This hole will explore the area on the 3rd level Section 10 Lease 300 ft. west of hole No. 528. Both of these holes were drilled to explore for the downward extension of the Cliffs Shaft Southwest Vein which dips south into the Section 10 Lease. Six hundred to eight hundred feet west of these holes on the 1st level "B" shaft, holes Nos. 516 and 517 were drilled south from the Cliffs Shaft boundary line. The first hole dipped -37° and the second -50°. Both holes cut some ore but hole No. 517 encountered the deepest ore, viz., at the 3rd level elevation. We know, therefore, that there is some first class ore at the 3rd level elevation in the Southwest Vein's extension onto the Section 10 Lease.

The areas of known or very probable ore occurrence on Section 10 Lease are as follows: 1. The probable syncline with ore from 1st to 3rd levels in the strip 300 ft. south from the north boundary of Section 10 Lease and between coordinates 400 E - 000. 2. The anticlinal structure between 1600 E - 3000 E immediately south of the Cliffs Shaft fee property. The north limit of this anticline is the south limb of the "A" shaft syncline. Ore in this area will probably be above the 4th level. 3. The main ore bearing syncline south of the anticline named above. This structure is the westward extension of the Moro Mine structures. The known occurrences of ore in this territory range in elevation from 25 ft. above 10th level to 55 ft. above 8th level.

Development of the Section 10 Lease must be planned with regard not only to the probable location and shape of the ore bodies but also with regard to the possibilities for keeping "A" and "B" shafts supplied with equal amounts of this ore. This is so because the lease agreement calls for separate handling of Section 10 ore and because we must have "A" and "B" shafts on a balanced hoisting schedule. For the current year, by special arrangement, the Section 10 ore is handled with the Bancroft ore.

No. 1 area listed above has an east-west ore vein about 20 ft. to 30 ft. wide on the 1st level. The ore dips south. This vein was stoped westward by No. 1 contract during the latter part of 1943. The ore from this contract is now hoisted from 1st level, "B" shaft. In order to develop the downward extension of this ore there are two possible approaches. On the 3rd level "A" shaft there is a drift that extends south to coordinates 1220 S on the 800 E coordinate line. A raise from this drift taps old Cliffs Shaft workings at 1st level and below, and around coordinates 1200 S - 800 E. These workings adjoin the Section 10 Lease and ore occurs in the stope ribs along the boundary. We plan to mine this ore, scrape it into the raise to 3rd level, transfer the ore through a second raise to 5th level just west of "A" shaft, and haul the ore over to "B" shaft for hoisting. The arrangements for this have all beencompleted. The downward extension of No. 1 contract's ore vein can be reached from the 3rd level by extending the transfer drift mentioned above to the south and then west to get under the ore vein. This plan will

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

1. Section 10 Lease (Cont'd)

probably be used if there is no more ore on the west end of the Section 10 Lease than the No. 1 ore vein down to 3rd level. It calls for approximately 900 ft. of drifting and most of the raises in ore. The other way to develop the area would be to drift southeast on the 5th level "B" shaft from the drift at coordinates 600 S - 400 W. This scheme would require perhaps 1,000 ft. to 1,200 ft. of drift and raises possibly put up through rock for two levels. As an advantage, this scheme would eliminate any transfer handling of ore. In order to properly decide what plan is best for area No. 1 it will be necessary to get more positive information as to whether or not there is ore below the 3rd level elevation and above the 5th in the west part of the Section 10 Lease.

The No. 2 area or anticlinal structure adjoining the "A" shaft Southeast Vein workings was being worked during the last month of 1943. Contract No. 2 started a breast stope southeast at coordinates 1300 S - 2240 E on the 4th level. If the ore continues upward we plan to raise stope in the vein and open cross-cuts at higher levels. The ore mined will have to go down to the 8th or 10th levels. From there it can be hoisted in "A" shaft or transferred to the 15th level and brought across to "B" shaft.

The No. 3 area is being developed by drifting on both the 8th and 10th levels. Contract No. 41 started in May to drift southeast from coordinates 1160 S - 1910 E on the 8th level. At the end of the year the breast of the drift was at coordinates 1460 S - 2145 E. All of this footage was in siderite or dike, but ore should be found within the next 100 ft. to 150 ft. Contract No. 21 drifted south on the 10th level from coordinates 1000 S - 2205 E. At the end of the year the breast was at coordinates 1400 S - 2205 E. The material cut by this drift was all footwall dike and siderite. The 8th level drift should hit ore on the north limb of the syncline before the 10th level drift gets to the ore horizon. The 10th level drift probably will cross under the 8th level drift and be turned parallel to cross-cuts off the 8th level drift. Both of the drifts are manned by a two-miner crew in order to push the work and get into ore areas that can be stoped.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

2. Cliffs Shaft and Bancroft Lease

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

Month	Total Number of Gangs	Gangs Developing	% Developing
January	104	62	59.6
February	104	63	60.5
March	104	61	58.6
April	104	61	58.6
May	104	54	51.9
June	103	54	52.4
July	102	55	53.9
August	102	51	50.00
September	102	52	50.9
October	100	53	53.0
November	100	56	56.0
December	99	53	53.5
Monthly Average	102.3	56.2	54.9
Year 1942			53.5
Year 1941			61.0
Year 1940			54.5
Year 1939			53.6
Year 1938			52.0
Year 1937			56.5

The average number of gangs on development work increased slightly in 1943 as may be seen from the table. This tabulation does not give the whole story about development, however. As mentioned in the general discussion at the beginning of the report we increased the number of gangs doing raising and drifting from 14.5 in 1942 to 22.5 in 1943 and the development footage jumped from 2,855 ft. in rock in 1942 to 5,180 ft. in rock during 1943. Ore development footage in 1942 was 3,166 ft. and in 1943 it was 4,059 ft. This footage of drifts and raises was necessary to get new veins opened up for production.

In "B" shaft there were no new developments of unusual significance during 1943. The footwall deposit at the extreme west end of the Main Vein still shows some promise of ore continuing to the west but in a narrow vein. The Section 9 Exploration has had three gangs working throughout the year. Two of these were in rock all the time and one was mining ore on the 9th level elevation. The rock crews are headed for the ore horizons around 1st level where surface drilling has proven the existence of ore.

In "A" shaft the most promising new find was on the 2nd level Bancroft Lease where diamond drill hole No. 524 found five ore occurrences beyond any of our old workings. Contract No. 99 started to develop for this ore by drifting north on the 5th level and hit a new ore vein in which they have since raised toward the 2nd level ores. The area between 000 - 400 N and 3000 E to 4000 E continues to become more and more favorable for tonnage reserves.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

"A" SHAFT

1st Level

On the 1165' sub level at coordinates 1180 S - 430 E and 1160 S - 390 E contract No. 1 worked two breast stopes during the first quarter of 1943. At the location of the latter set of coordinates the stope was advanced West to connect with old 1205' sub level workings. The ore vein in this area is about 15 ft. thick and dips 30° to 50° to the South beneath a slate hanging wall. Because of this dip the South breast located by the first set of coordinates was encountering slate at progressively lower elevations with each advance. Therefore the crew was moved down in the raise at coordinates 1230 S - 470 E where they started a branch raise in ore to the Northwest to come up in the ore vein from below. Three cuts were made in this raise before it was stopped in order to use No. 1 crew for development on the 1st level where the ore vein is found on Section 10 Lease property.

In the middle of April the gang started to drift on a course slightly South of West from the old drift breast at 1250 S - 455 E. The new drift started to diagonally cross onto the Section 10 Lease from this point. For the first 30 ft. to 40 ft. the drift had only 4 ft. to 5 ft. of ore in the center with dike on the North side and slate on the South side. From then on the ore vein widened first to drift width and then to stope width or 20 ft. to 25 ft. From 1280 S - 360 E contract No. 1 stoped the ore to the West to reach coordinates 1300 S - 275 E by the end of the year. The ore vein is part of the deposit in which No. 1 worked during the first quarter of the year on the 1165' sub level. Contracts Nos. 58 and 75 have stoped throughout 1943 in the upward extension of this Southwest vein some 300 ft. West of contract No. 1. The ore is good quality and will need to be developed below the 1st level but our knowledge of available tonnage below 1st level is as yet, too scanty to decide from which level this development should proceed. It is known that ore goes to the 3rd level elevation near the Northwest corner of the Section 10 Lease as proven by diamond drill holes Nos. 516 and 517. Five hundred feet East of the drill holes the vein apparently does not come down as far as the 3rd level, because diamond drill holes Nos. 528 and 533, drilled South and Southwest respectively from Cliffs Shaft workings into the Section 10 Lease area, cut no ore. West of the Section 10 Lease corner the ore vein again starts to narrow but depth limits may be greater if the Westward pitch persists. Surface drill holes Nos. 52 and 53 South of "B" shaft on Section 9 suggest, however, that the South dip of the ore vein may be cut off by a Northwest- Southeast trending fault.

The work done by contract No.30 during 1943 was all confined to the first level, Main Vein, between coordinates 625 E and 770 E along the 200 S coordinate line. This crew advanced a breast stope East through the long axis of a 150 ft. long pillar. The stope connected at the East end with old 1st level workings and a connection was also made to old workings along the North side of the stope at coordinates 185 S - 700 E. The ore vein was limited on the North side by proximity of old workings or lean material and on the South side by a vertical dike. The back, which averaged 20 ft. in height above the 1st level floor elevation, was overlaid by flat lying slate. Very little more ore can be expected from this stope because the floor is mainly jasper.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

2nd Level

During the first eleven months of 1943 contract No. 44, in the Bancroft vein, developed a raise stope from the elevation of the 2nd level to 30 ft. above the 1st level elevation. The stope was put up to the North in a vein of good quality ore that strikes East-West and dips about 35° to the South. Dike forms the footwall and slate or dike the hanging wall of the ore. The convergence of the two rock formations up the dip brought the ore vein from a thickness of 20 ft. at the 2nd level to a thickness of 5 ft. at the breast, thereby preventing any further economical advance of the raise stope. In December the crew drifted 23 ft. West from the West rib of the stope at the 3rd level elevation. This development is exploratory to determine how far the ore will extend to the West along the strike of the vein.

3rd Level

From July to the end of the year contract No. 9, in the North Vein at coordinates 100 S - 1140 E, did development work. At the South breast and along the West rib of an old 3rd level stope this crew found ore extending ahead and up, on a jasper bench. The breast stope opened up by No. 9 gang extended South to hole near the back of an old 3rd level stope. To the West and Southwest the advance of the stope outline can still be continued at an elevation slightly above the back of the old 3rd level stopes. To the Southwest the advance will be conditioned by old rock filled workings that connect 3rd and 2nd levels. It is this rock that we have planned to eventually remove through No. 74 raise on the 5th level before No. 9 can break into the old workings. During the first seven months of the year contract No. 9 mined floors North of the development described above.

Contract No. 27 worked most of the year breast stoping at an elevation slightly below the 3rd level in the Main Vein. The stope that trends East-West was holed to the 3rd level drift at coordinates 230 S - 540 E. One cross-cut to the South holed to the former workings of No. 27 contract at 260 S - 570 E. All of this work was carried on under old workings that extend below the 2nd level and which are filled with rock to the 2nd level floor. At least 12 ft. to 15 ft. of ore arch was left in the back, however, to support the rock fill. In January and February of 1943 contract No. 27 raised from the Northeast corner of their stope to the floor of the 2nd level at coordinates 250 S - 640 E. This raise has not, as yet, been used but will be, when the 3rd level reserves of contract No. 27 are exhausted. The top of the raise is in a piece of 2nd level floor that can be mined. Adjoining pillars can also be trimmed.

Near the end of April contract No. 60 was moved to the top of a development raise at the 3rd level in the Main Vein where they started to drift South from coordinates 230 S - 1380 E. The drift, completed in July, was through dike from start to finish. It connects the working place at the top of the raise with 3rd level workings to the South and provides both access and ventilation to the place. Stoping operations were started to both East and West after the traveling road was completed. The ore vein dips 80° to the North and strikes East-West. It is about 20 ft. wide. At the end of the year the West breast was the most promising at the 3rd level elevation because the vein had a good stoping height. At the east breast an Eastward dipping rock lies over the ore vein.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

4th Level

In December of 1943 contract No. 2 moved up above their 6th level workings and South onto the Section 10 Lease. At coordinates 1305 S - 2230 E on the 4th level they mined ore by slicing off the South rib and breasting East. The ore continues East along the lease boundary and probably extends up above the 4th level on the lease property. It may even connect to the East with ore in which No. 45 contract is mining. The ore dips North on top of dike footwall and is, like most Southeast Vein ore, crossed by jasper seams. Contract No. 2 plans to cut out room for a scraper hoist on the Cliffs Shaft side of the boundary and then resume mining of Section 10 ore.

For the first quarter of 1943 No. 8 was a double contract that worked in the North Vein at the East end of the mine. One gang of the contract mined bench at 220 S - 3470 E from the beginning of the year until November, when they resumed breast stoping East in a 25 ft. thick, flat-lying, ore vein that is overlain by rock. At the end of the year the breast was at 180 S - 3520 E. The ore in this area occurs 200 ft. West of old No. 3 Mine workings. There are strong possibilities that the workings will be connected in this area within a year or two. The gang discussed above was called No. 8 throughout the year.

The other No. 8 crew was breast stoping in January at coordinates 330 S - 3520 E. This breast at an elevation of 1084' is only 30 ft. to 40 ft. West of the 2nd level workings of the No. 3 Mine and although the ore vein, which dips 45° to the South, is narrow it undoubtedly will be connected with the No. 3 Mine deposit. Because of the narrowness of the ore and the difficulty of removing the ore under the present set-up, this crew stopped stoping at the end of January and started a combination ventilation and exploration drift to the Southeast from coordinates 385 S - 3390 E. After March the number of this crew was changed to No. 81. A small amount of ore, about 20 ft., was cut by this drift near coordinates 420 S - 3500 E. To date this has not been explored for extensions. In the first part of August No. 81 completed the connection of the drift with the old Incline Mine workings and moved to the 8th level, "A" shaft.

Seven months of 1943 were spent by No. 29 contract doing development work in the Bancroft Vein. This work consisted of a short raise connection between the 4th level stope and an old sub level stope at coordinates 190 N - 1240 E, and the extension to the West of the 4th level stope to coordinates 65 N - 1060 E. The breast stope was cut off at the location given above, by dike converging from both hanging and footwall sides of the ore vein. The last part of the year contract No. 29 stoped floor from their place.

Contract No. 57 in the North Vein developed a three-breast stope at coordinates 200 S - 500 E. The ore occurs as a flat deposit lying on siderite footwall that strikes East-West and dips gently to the North. The East cross-cut is direc tly below the workings of No. 27 contract on the 3rd level. There is about 20 ft. of ground between these places. In November contract No. 27 started a drift to connect the West cross-cut of their stope with the workings near the top of their ore removal raise. This drift will eliminate two cross-hauls for the scraper operation.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

5th Level

Contract No. 12 worked all year in the Main Vein on a sub level between the 5th and 4th levels at coordinates 370 S - 1660 E and 425 S - 1480 E. As indicated by the two sets of coordinates, contract No. 12 had two breasts in which to work. Both are in the same narrow ore vein which strikesNortheast-Southwest and dips vertically. Dike bounds the ore on the South and jasper on the North. The Northeast breast has no old workings, either above or below it, nor are there any nearby old workings ahead of it. The vein is so narrow (15 ft.) and often interrupted by jasper seams, that it is doubtful if it persists far to the Northeast. The Southwest breast is just as narrow but has a cleaner, more sharply defined ore vein that occurs directly above an old 5th level stope.

In the Southeast corner of the mine about 100 ft. Northeast of the Northeast corner of the Section 10 Lease, contract No. 45 stoped floor from 6th level workings for the first five months of the year. From May to the end of the year they raise stoped from the 5th level to the Southeast, reaching an elevation above the 4th level by the years end. The ore is the upward extension of that mined in the old Southeast Vein workings. The quality of the ore is excellent. It is overlaid by slate in the hanging wall and underlaid by dike footwall. Thickness of ore is at least 20 ft. to 25 ft. Near the breast of the raise stope the hanging starts to flatten and it may cut off the ore, although we do not yet know if the footwall continues constant in its dip or whether it too flattens. Ore extends along both ribs of the stope for future operations. Opening up this new extension of the Southeast Vein suggests the possibility of finding more ore reserves in an area hitherto never developed. This is the area East of the Section 10 Lease between the Southeast Vein of the Cliffs Shaft Mine and the Moro Mine workings. The Section 10 Lease will, of course, offer possibilities for the occurrence of ore in the West extension of the horizons that are mentioned above.

Drill hole No. 502 shows a small run of ore at coordinates 160 S - 1080 E on the 4th level. Above this point on the 3rd level there is a narrow stope that has unmined floor. Extending up from this stope to the 2nd level are connecting raise stopes and on the 2nd level there is some unmined ore floor. Rock fills the stopes from the 2nd level down. In order to make available the 2nd and 3rd level ore floors and any mineable ore that might occur on the 4th level where the diamond drill cuts the run, contract No. 74 drifted 230 ft. East in the North Vein to coordinates 210 S - 1090 E and put up a raise 50 ft. West of said coordinates. The raisewas completed except for blowing through the connection to the 3rd level rock filled stope. Contract No. 74 was not filled by a crew during the last four months of the year. Pending the completion of rock transfer on the 5th level "B" shaft rock dump to make room for additional rock, the 3rd level stopes will not be emptied. As soon, however, as there is room for it the rock can be transferred and the place No. 74 prepared will be worked.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

Contract No. 76, in the Bancroft Vein above the 5th level, advanced a breast stope 50 ft. West to hole to the top of old contract No. 22 workings shown on the 4th level. They also cross-cut South at coordinates 20 N - 1360 E to connect their new stope with their own old workings. Except for the possibility of ore in the floor, No. 76 seems to have nearly exhausted the area discussed above because old workings limit the area on the West and South while slate hanging wall bounds the North and Northeast side.

In October 1943 contract No. 92 was moved to the 5th level North vein at coordinates 180 S - 1570 E. This crew breast stoped to the West and South in a vein of ore bounded on the North by a vertical dike. In November the stope holed to the top of old No. 44 raise stope shown on the 6th level map. The new operation brought more ore into sight on the South side of old No. 44 stope and at the West end of the same stope.

From May to the end of 1943, contract No. 96 drifted Southeast to connect the North Vein with the Main Vein workings. The drift is Northwest of "A" shaft. It will be used to provide a haulage to "B" shaft for ore taken through the transfer raise West of "A" shaft. The ore to be put through this raise will come partly from Cliffs Shaft workings but partly from Section 10 Lease operations on the 1st level "A" shaft.

From May through August inclusive, contract No. 99 worked 80 ft. West of "A" shaft and put up a raise from the 5th level to the 3rd level drift at coordinates 570 S - 750 E. This is the transfer raise mentioned in the discussion of contract No. 96 above. The ore could be hoisted on the 3rd level or 5th level "A" shaft but it is necessary to get some ore from Section 10 Lease over to "B" shaft in order to balance the hoist. Hoisting from "A" shaft at either of these levels requires new pocket installations and the use of the slow end-dumping cars which we are trying to eliminate entirely.

From August to the end of the year contract No. 99 worked in the Bancroft Vein. They drove a drift from coordinates 315 N to 400 N along the 1350 E coordinate line. The drift was driven in order to reach a position from which a raise could be put up to the ore discovered by diamond drill hole No. 524 on the 2nd level. Four good runs of ore were cut by this hole or a total of 137 ft. This hole, being in a new area, is the most promising find of the year. What makes it even more encouraging is the fact that No. 99 drift on the 5th level cut through 20 ft. of ore and raised 35 ft. in this ore by the end of the year. The raise extends to the West and will be branched toward the four ore runs on the 2nd level.

6th Level

At coordinates 1220 S - 1980 E contract No. 6 raised their stope Southeast from below the 6th level to hole to the 6th level floor of a small stope along the footwall of the Southeast Vein. They then opened up this connection above the 6th level and for the next four months did depleting work by mining bench from the raise stope. In November and December this crew again tried some development by cutting along the North rib of the stope at coordinates 1220 S - 2025 E. Forty feet South of this point across on the footwall side of the stope a raise was put up from the back through ore to hole to an old 5th level stope. This raise was put up with the idea of continuing up from the 5th level onto Section 10 Lease

CLIFFS SHAFT MINE
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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

property. So far the South rib of the 5th level stope has proven to be rock but no real attempt has been made to explore for an upward continuation of ore, primarily because No. 6 gang's production is needed from down below.

Contract No. 41 started a raise in January from the top of their 6th level stope at coordinates 1050 S - 1440 E. This raise was holed in the 5th level territory traveling road drift at 1040 S - 1425 E. Thirty feet below the 5th level floor, contract No. 41 drifted 50 ft. West in a narrow vein of conglomerate ore bounded by Northward dipping slate on the North and dike on the South rib. The place was abandoned when the ore vein became too narrow for drifting. The crew then started the Section 10 Lease drift on the 8th level.

Contract No. 51 stoped South and West from North Vein workings at coordinates 150 S - 2640 E. One cross-cut of the stope connected with the Main Vein workings. The west cross-cut appears to offer the best possibilities for ore extension. This cross-cut is headed through the long axis of a 300 ft. long pillar that separates the North Vein from the Main Vein workings.

One hundred feet Northeast of No. 51 contract, No. 66 breasted South in the North Vein below the 6th level and raise stoped back to the 6th level elevation with a cross-cut to the East. Part of the work done by this gang was mining floor and back.

Contract No. 67 worked in two places during the year. At coordinates 320 S - 2820 E they extended the stope outline West and North of a stope below 6th level. This place was not exhausted of ore but was only occasionally worked during the last part of the year while No. 67 contract opened up a new ore vein at coordinates 420-440 S and 2900-3000 E. This vein was found from No. 6 contract's old workings by test holes through what was thought to be the slate hanging wall of that ore body. The rock proved to be a thin dike with excellent quality ore lying South of it. This latter ore body now has a new raise and has been opened up to the East and West. The ore extended East to old workings and to the West the stope has 150 ft. of unopened ground ahead of it. Slate bounds the ore on the South side of the stope.

Contracts Nos. 94 and 98 worked in adjoining stopes during 1943. They increased the outlines and joined their stopes together on the 6th level in the Main Vein at coordinates 500 S - 1540 E. Part of the work of No. 94 gang was done just above the 7th level in this same area and consisted of enlarging the raise stope that connects the 7th level with the 6th level work. For much of 1943 both No. 94 and No. 98 contracts mined bench or floors from the stopes mentioned above.

7th Level

At coordinates 1120 S - 2180 E in the Southeast Vein, contract No. 2 put up a new raise to the 6th level in order to better facilitate the removal of the ore mined on the 6th level.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

In the Main Vein at coordinates 560 S - 3140 E contract No. 35 advanced the stope outline to the South. This work was done alternately with the mining of floor down to the 8th level elevation in an area immediately West of the development discussed above. There is no room for further development by No. 35 gang in this area and very little depleting tonnage remains in floors or backs.

Contract No. 54 alternated between development and depletion work at coordinates 130 S - 1960 E in the North Vein. They widened an old drift connecting stope areas and then mined the floor from the resulting stope. From the South rib of the stope they drifted South to the traveling way drift thereby dividing a large pillar. Contract No. 54 has ore in the back and floor of their new drift and in the back and floor of the travel way drift where they made the new connection. For the ensuing few months the gang will undoubtedly be mining floor and back in this area.

8th Level

In the North Vein at coordinates 0 S - 2960 E, contract No. 25 spent the first part of 1943 mining back from their old stope in which they have been accumulating ore for over two years. In April they raised from the back of the stope into old workings of No. 80 on the 7th level elevation. This raise was stripped to stope width before the end of the year. Contract No. 25 also put up a raise through rock from the main haulageway just outside their stope. This raise also holed to the old No. 80 workings and will make it possible to get up to the 7th level elevation for stoping when enough of the accumulated dirt of No. 25 has been scraped out. The accumulated pile is now available through two raises. In the early part of the year contract No1 78 drifted Southeast from their stope which is nearly down to the 9th level. This drift holed to one of the raises under contract No. 25 ore pile. Some of the ore from No. 25 place was run out through this raise and in the latter part of 1943 a second raise under the pile was opened when No. 92 contract was moved out of their 9th level stope thereby permitting the use of the branch that goes to No. 25 pile.

Contract No. 41 started in May to drift Southeast from the Southeast Vein at coordinates 1160 S - 1910 E. The drift is headed for the territory in the Section 10 Lease where surface drill holes indicate the presence of ore. Approximately 180 ft. of drift was driven on the Cliffs Shaft fee property before the lease boundary was reached. By the end of December, No. 41 gang had drifted a total of 387 ft., all of which was in dike and siderite. Although our knowledge of the geologic structure of Section 10 Lease is indefinite, it seems fairly certain that contract No. 41 is diagonally crossing through the footwall of an East-West striking anticline. Ore, when encountered, probably will strike nearly East-West and dip South.

For the most part of 1943 contract No. 55 mined back or floor from their 8th level stope in the Southeast Vein. In the last two months of the year, however, this gang put up a raise from coordinates 1050 S - 2670 E. to the 7th level where they started to mine 7th level stope floor.

CLIFFS SHAFT MINE
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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

Contract No. 61 continued to develop, by drift and raise, in the North Vein at the East end of the 8th level. At 80 N - 3440 E, this crew raised North and then East to the 7th level elevation where they encountered a good body of ore. They drifted due North for 75 ft. from the top of their raise and stopped when they encountered a vertical dike across the breast of the drift. The gang then was moved back to the 8th level to extend the main level drift to the Northeast from the last turn at coordinates 80 N - 3340 E. Most of this drift extension, which was about 200 ft. long, was through ore. Footwall siderite was encountered in the bottom of the drift in late November and the drift was stopped. In December No. 61 started a new raise from their drift extension to provide a traveling road up to their 7th level drift where they can now begin to stope. This is a very promising area from the standpoint of new reserves. The geologic maps indicate the possibility for ore occurrence is good all the way from the 10th level to the 6th level in this East extension of the North Vein.

At coordinates 410 S - 2950 E in the Main Vein, contract No. 81 put up a new raise into the floor of No. 67 stope on the 6th level. The raise provides a means for removal of ore broken by No. 67 gang in their recently developed ore vein. Approximately the first30 ft. of the raise was in dike and the last 50 ft. in ore.

In the first part of the year contract No. 95 did some development work in the Main Vein in the East end of the mine. At coordinates 615 S - 3080 E they advanced their stope 15 ft. to 20 ft. West and connected it to the 8th level drift by a new opening through the thin dike wall that separated the drift and stope. West and North of the coordinates given above, on the opposite side of the 8th level drift, contract No. 95 drifted North 10 ft. to 12 ft. to connect the drift with No. 35 stope and thereby provided for that contract a better traveling road and better ventilation. In order to explore the small run of ore discovered by diamond drill hole No. 514 at coordinates 360 S - 2575 E, contract No. 95 drifted South through 10 ft. of dike into this ore. The drift was continued South nearly 60 ft. and a short cross-cut was tried to the Southwest but the grade was too poor for mineable ore except for a very narrow seam adjacent to the dike.

In January contract No. 102 holed their rock drift on the 8th level Bancroft Vein to the raise at coordinates 180 N - 1430 E. From that point they drove a wide drift 100 ft. West and raise stoped 60 ft. above the level from the end of the drift. The ore vein strikes East-West and dips to the South. It is good quality ore but the vein is only about 15 ft. thick on the 8th level and less thick at the top of the raise stope. In order to explore the ground and provide both ventilation and a traveling way, contract No. 102 was moved into the raise to which they had holed their drift and which extended about 30 ft. above the 8th level. They resumed raising in the narrow ore seam and by the end of the year were slightly above the elevation of the back of their stope. We expect to continue the raise to the 5th level Bancroft workings.

CLIFFS SHAFT MINE
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YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

9th Level

In the Main Vein at the East end of the mine contracts Nos. 50 and 68 worked within 200 ft. of each other throughout 1943. Contract No. 50 at coordinates 620 S - 2830 E, stoped Northwest and then Southwest to make a second connection with the 9th level travelway drift. Following that they raise stoped to the Northeast and holed to an 8th level stope. The ore vein in which this work was done is erratically seamed with jasper but in general it strikes Northwest-Southeast and dips to the Southwest under slate hanging wall. Two hundred feet Southeast of No. 50 the crew of No. 68 stoped Southwest at an elevation below the 9th level. This work was in ore that occurs in the same general horizon as that mined by No. 50 but it does not appear that the two contracts are in the same vein.

For the first three quarters of 1943, contract No. 92 worked on the 9th level in the North Vein at coordinates 100 N - 2900 E. They drove a breast stope West and holed to the old raise that tapped their former stope on the 8th level. The breast stope extends under the floor of their old stope. At the end of September the gang was moved in order to make their raise available for removing ore from No. 25 contract. The breast of No. 92 stope is ore and the place will be continued when enough dirt has been pulled from No. 25 stope to expose the inside raise of the latter contract.

In the North Vein 400 ft. Northeast of the Southeast corner of the Bancroft Lease, contracts Nos. 64 and 91 did some development work. The breast stope of contract No. 64 was extended East about 50 ft. in a flat lying vein of ore bounded on the South side by a vertical fault that drops slate against the ore. The slate hanging wall of the stope dips very gently to the East but will undoubtedly rise again in that direction, since all of the structures pitch West in this part of the mine. A new raise was provided for No. 64 stope in the latter part of the Summer when No. 78 contract put up a branch of their raise into the floor. The development work of No. 91 contract consisted of a little breast stope at coordinates 250 N - 2700 E, a raise from 9th to 8th levels at coordinates 230 N - 2835 E, and a drift through rock to connect No. 91 stope with No. 70 stope on the Bancroft property. The drift was primarily a ventilation project but also to explore along the hanging wall contact for ore between the two stopes. Contract No. 91 spent several months mining bench and floor from their stope besides the development discussed above.

In the Southeast corner of the Bancroft Lease contract No. 23 extended a breast stope West to connect their workings with the old workings of No. 53 contract. This connection was made at coordinates 30 N - 2530 E. In addition to stoping up the bottom of their main stope at coordinates 40 N - 2630 E, contract No. 23 extended this stope 40 ft. wide for 70 ft. to the North and then drifted 30 ft. further through ore and a narrow dike to hole to No. 70 stope. The ore is of good quality in all this territory and occurs in a zone 200 ft. wide that extends from 8th level down below the 10th.

CLIFFS SHAFT MINE
ANNUAL REPORT
YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

Most of the work performed by No. 70 contract during 1943 was depletion but they did drive a drift Southeast to coordinates 110 N - 2700 E. The drift was in ore all the way and started in a vein only drift wide, between two vertical dikes. The South dike diverged as the drift progressed and No. 70 crew cut a small stope in the last 30 ft. of the drift where it occurs on the Cliffs Shaft side of the boundary. Dike cuts across the breast of the drift and we have no knowledge as to the thickness of it.

Near the West end of the 9th level Bancroft Vein, contract No. 69 stoped Northeast to the 200 N coordinate line at 2080 E. This ore lies North of and beneath what was originally considered to be the North footwall of the stopes occurring South of No. 69. This ore is probably part of the same vein in which contract No. 84 was mining during the early part of 1943. The latter contract, in fact, advanced a breast stope 15 ft. West toward No. 69 in this ore vein at coordinates 160 N - 2190 E.

10th Level

With the exception of April and May, contract No. 5 spent all of the year drifting on the 10th level and raising from that level to the 8th level. The drift off the main level workings was extended 120 ft., partly to get tail room for a raise and partly to explore for the downward extension of the ore cut by diamond drill hole No. 498 on the 9th level. No ore was found by the drift but the raise put up from coordinates 380 S - 2430 E soon encountered ore and remained in ore until it holed to the 8th level at coordinates 315 S - 2420 E.

Contract No. 21 drifted due South from the Southeast Vein along the 2205 E coordinate line. By years end, the drift was on the Section 10 Lease property although it wasn't started until September. The drift has traversed dike and siderite, as was to be expected, since this is 100 ft. lower into the footwall than No. 41 drift on the 8th level. Contract No. 21 drift will have to go further South to reach the ore and hanging slate than No. 41 drift up above if our structural prognostications are correct.

Contract No. 10 in the Bancroft Vein at coordinates 0 S - 2020 E and 30 N - 1920 E, opened up two cross-cuts to their stope system. The first of these was located at the latter set of coordinates and was made early in the year. This breast stope encountered dike and the gang moved to the second place, 120 ft. East, where they breast stoped South to the dike along the East-West fault contact. An East-West cross-cut along the fault plane connected the two South projecting stopes at their South ends before the year ended.

From April through July, contract No. 28 worked in the Bancroft Vein drifting East from the North cross-cut to connect with the top of the raise put up by No. 89 contract. The drift was driven in conglomerate ore that occurs in an East-West vein dipping North at 60°. Contract No. 89 has developed this ore from 30 ft. above the 15th level to the 10th level. The vein, where opened up, is only 15 ft. to 20 ft. thick but it may extend quite a distance along the strike.

CLIFFS SHAFT MINE
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YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

In the North Vein at the East end of the mine, contract No. 32 drifted approximately 200 ft. East and made one small raise stope during the year. The drift encountered jasper at the East end but cross-cuts were made for 10 ft. on either side of the drift near the East end and no ore limits were encountered. This area is new and offers interesting possibilities for appreciable ore occurrences. To mine this territory efficiently, a raise will be necessary from the 15th level and the North Vein drift on that level is being extended out under this territory to make that possible.

During the last three quarters of 1943, contract No. 53 stoped on the 10th level in the Bancroft Vein at coordinates 40 N - 2490 E. Their stope diagonally crossed the area lying between two drifts that are at right angles to each other. The ore vein is the same ore that No. 53 worked on the 8th and 9th levels. It is also the same ore vein in which No. 10 worked, 500 ft. West of No. 53. All along the South side of the ore, dike is faulted into contact with the ore to form the South limit. Development of the downward extension of No. 53 ore requires a new raise from the 15th level and this will be started when a crew becomes available.

For a short time near the end of the year, contract No. 62 drifted in the Bancroft Vein at the extreme Northwest end of the level. The drift was to explore the hanging wall contact for possible ore occurrence and to get to a favorable position for future diamond drill explorations. No ore was found in the drift which was driven about 60 ft. Northwest.

At coordinates 135 N - 3280 E, contract No. 81 began, in October, to raise for the 8th level North Vein in the area where No. 61 contract was developing all year. The raise was in siderite at the end of the year.

11th Level

Contract No. 21 spent the first five months of 1943 developing a raise stope at the East end of the 11th level, Main Vein. The stope is two pronged. One branch put up due East encountered too much jasper and was stopped. The other branch holed to the floor of No. 68 stope shown on the 9th level. The quality of all this ore was none too good and the place was stopped in favor of the 10th level drift into Section 10 Lease.

At the opposite end of the 11th level, contract No. 24 drifted 250 ft. to 275 ft. West, Northwest, and then West again. The drift is through second class ore and was turned where it encountered siderite or dike. Further development of this area will await some diamond drilling to determine the depth of the ore and grade with depth, because a raise will not be started from the 15th level without reserves below the 11th level floor.

12th Level

In the Main Vein, 120 ft. of drift was driven by No. 99 contract. The drift is in second class ore for the most part but some first class seams are extensive enough to permit stope development in the future. No stoping is going on in this area at present because the raise that holes to the drift is being used by No. 11 contract while they put up a branch to the 11th level.

CLIFFS SHAFT MINE
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YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

In the Bancroft Vein, contract No. 89 raised from the 12th level to the 10th level and then from the 15th level to the 12th level. In addition to this they did a small amount of stoping on the 12th level. All of this work was in conglomerate ore that occurs, as mentioned under the discussion of No. 28 on the 10th level, in a 15 ft. to 20 ft. vein that strikes East-West and dips North.

15th Level

Contract No. 11 in the Main Vein, completed the raise to No. 99 territory on the 12th level and started the branch raise for the 11th level. The 11th level raise will take the ore from both 10th and 11th level bottoms near coordinates 660 S - 2500 E.

Tail room for No. 75 raise and No. 101 raise on the Bancroft property was made by No. 5 and No. 89 contracts during the year. The only other development on the 15th level "A" shaft was the drift advanced 300 ft. Northeast by No. 101 contract. This drift will make it possible to get a raise up to the ore on the 10th level being opened up by contract No. 32.

"B" SHAFT

1st Level

Contract No. 1 was discussed under the "A" shaft heading but the work of this gang actually did extend onto the "B" shaft area. Their breast stope was advanced West to coordinates 1300 S - 275 E on the Section 10 Lease.

On the 1205' sub level at coordinates 720 S - 140 E, contract No. 17 worked all year in a vein of conglomerate ore that dips to the North between slate hanging wall and a seam of slate as the footwall. In order to avoid scraping the ore uphill out of the stope over the North-dipping footwall, a raise was put up from the sub level below and the crew made cross-cuts to both East and West along the strike of the ore vein.

Only a small amount of the work of No. 18 contract on the 1220' sub level, Main Vein, could be classed as development. A breast stope was advanced West to coordinates 200 W - 950 S but the major part of the time the crew mined bench. There are possibilities for occurrence of ore between 200 W to 500 W and 800 S to 900 S on the elevation of the 1220' sub level.

In the early part of the year contract No. 49, drifting in the Main Vein on the 1st level, ran into a seam of dike dividing the already thin ore vein in which they were advancing to the Northeast. They had no good facilities for getting rid of rock and stopped the drift at coordinates 830 S - 1200 W. From the top of their raise they then drifted 110 ft. Southwest until the slate hanging wall and dike footwall pinched out the ore. A raise 30 ft. high was tried at the West end of the drift and this revealed that the slate and dike convergeup the dip as well as laterally along the strike. Contract No. 49 moved down to the 4th level elevation to mine floor for the remainder of the year.

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

On the 1165' sub level, contract No. 58 developed all year by breast stoping East to coordinates 1180 S - 110 E in the 20 ft. to 30 ft. wide, South dipping, conglomerate ore vein. This is the same ore vein in which the haulage drift is driven on the 1st level. It is also the same vein in which No. 75 contract worked all year mining floor and breast stoping to coordinates 1170 S - 165 W on the 1165' sub level. In the future, these gangs can strip the sides of their raises from the 1st level, leaving enough ground for adequate pillar support.

In the North Vein there were two gangs that worked on the 1st level during 1943, viz., No. 63 and No. 72. Part of the work of each of these contracts was depleting but both did some development work. Contract No. 63 breast stoped East to coordinates 260 S - 285 W where they holed to the top of the stopes developed by contract No. 73 in the previous year from the 3rd level. Contract No. 72 extended the outline of their stope South to coordinates 420 S - 350 W and to the West to coordinates 390 S - 390 W. The latter stope extension holed to the top of an old 2nd level stope. All of this work, by both contracts, was in the same ore vein. This ore vein was originally opened up from the sub level drift just above 3rd level where conglomerate ore was found by drifting to the ore shown in diamond drill holes Nos. 25 and 100. The ore was found to rise to the Southeast and then flatten in the area where contracts Nos. 63 and 72 mined during 1943. In this area where the hanging wall flattened, the conglomerate ore occurred under the slate but some good quality red specular and steel ore was found beneath the conglomerate ore. It is in the latter material that the gangs worked during 1943.

Contract No. 73 worked in the North Vein during the first four months of 1943. They advanced a raise stope, shown on the 3rd level map, Southwest to hole to the workings of No. 63 gang on the 1st level elevation at coordinates 300 S - 300 W. This completed the work in the North Vein for contract No. 73 and they were moved to the Southwest Vein on the 1st level to drift West for the ore cut by diamond drill hole No. 521. At years end the drift had advanced through dike and hard ore jasper to coordinates 1160 S - 380 W and a cross-cut had been turned off to the Southwest at coordinates 1200 S - 300 W. The material encountered by the cross-cut was fair quality but so narrow within jasper and dike limits that it proved to be a disappointment. A lead of ore 40 ft. to 50 ft. West of this cross-cut will be investigated in future work.

In the Main Vein, contract No. 97 drifted Southwest through jasper and some ore to connect the old 1st level drift with the Northeast extension of No. 49 contract's drift. This drift provides access to the ore vein in No. 49 area and improves the ventilation in that territory.

CLIFFS SHAFT MINE
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YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

2nd Level

At coordinates 600 S - 580 W, contract No. 40 raise stoped from the 2nd level to old sub level workings between the 2nd and 1st levels. They stripped some ore from the sides of these old stopes and also mined ore from the bench. This work was all done in an area where no ore reserves were estimated. Some additional ore remained to be mined from this territory when contract No. 40 was moved to the 4th level in July. The blasting by No. 40 crew was beginning to shake loose rock from the upper end of No. 71 contract's stope and therefore No. 40 contract was moved until contract No. 71 finishes their work in the adjacent stope.

Contract No. 71 mined floor for most of the year from the area between 2nd and 3rd levels at coordinates 520 S - 670 W. No ore reserves were estimated in this territory.

3rd Level

In the Section 9 Exploration, contract No. 47 completed the exploratory traveling road drift, in which they worked, by connecting to the raise put up by No. 103 contract at coordinates 1310 S - 4125 W. They also drove 60 ft. of exploration cross-cut following a 3 ft. seam of ore. The breast of this cross-cut was stopped at coordinates 1130 S - 4170 W where the ore pinched out. Two raises from the 9th level cut the 3rd level elevation in this territory. They are branches, from the 9th level, of the same raise that extends down to the 10th level haulage drift. One branch extends up to the North and the other is the continuation to the South of the original 10th to 9th level raise. The drift driven by contract No. 47 connects the raises on the 3rd level elevation thereby providing a traveling road to the South raise which was still being advanced at the end of the year.

Contract No. 103 started the year 1943 raising South from an elevation around 8th level. By the end of November this raise had gone through nothing but jasper to an elevation near 2nd level. At this point the raise encountered a vertical contact of much shattered dike. The raise was continued up in this material to the 1st level elevation since the known ore occurrence in diamond drill hole No. 34 is at that elevation. The raise was not steep enough to cut the 1st level or ore elevation at the location of the diamond drill hole but was about 40 ft. South of the drill hole when the proper elevation was attained. This makes no appreciable difference since some exploratory work will be necessary anyway in this area to determine geologic structure. We plan now to drift North over the raise toward diamond drill hole No. 34 and if the ore proves to be a sizeable deposit we expect to put an underground diamond drill in the area to explore surrounding territory. Should this in turn show up ore and structure relations of promise, we can plan more intelligently what additional development needs to be done.

4th Level

Contract No. 13 spent the first eight months of 1943 in the North Vein. They advanced two raise stopes, one to the Southwest and the other to the Northwest. Both stopes are almost flat enough to be better called breast stopes. Both were through second class ore and both encountered rock limits in the form of jasper in the Southwest stope and dike in the Northwest stope. This work is shown on the 4th level map between coordinates 250 S to 350 S and 300 W to 400 W.

CLIFFS SHAFT MINE
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YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

In the Main Vein at coordinates 600 S - 300 W, contract No. 33 breast stoped East through good quality, hard steel ore.

During the last six months of 1943 contract No. 40 mined floor and breast stoped Southeast at coordinates 550 S - 520 W in the Main Vein. There is ore remaining in the floor and ribs of the stope to the West of this location and this will be mined in the future. After this is exhausted the raise to the 2nd level from coordinates 450 S - 590 W can be stripped to supply additional ore.

5th Level

At an elevation nearly that of the 4th level, contract No. 93, in the North Vein, spent three months breast stoping East to coordinates 180 N - 35 E. The ore vein is conglomeratic, strikes East-West, and dips to the South. It seems to be the upward extension of the ore mined out on the 5th level for 300 ft. to the East of the point. The vein is only 15 ft. thick, however, which is a great deal less than the thickness on the 5th level.

In the first four months of 1943, contract No. 96 drifted Southeast from coordinates 350 S - 420 W in the Main Vein. The drift cut siderite and jasper for its full extent to coordinates 600 S - 390 W. The drift was driven for a double purpose. Underground drill hole No. 47 from the 3rd level shows ore on the 5th level at coordinates 500 S - 390 W. We wanted to get into this ore from the 5th level and expected the drift to cut the ore. The other reason for the drift was to make it possible to get a raise up to the 1st level that could be used as a storage raise for 1st level ore. This would eliminate 1st level hoisting from small cars and speed up the hoisting rate in "B" shaft by concentrating the ore on a better equipped level. These plans are not carried out as yet but the work is under way. If ore should be found in the West part of Section 10 Lease above the 5th level and below the 3rd, this drift would likely be extended South to Section 10 Lease.

7th Level

A small amount of development work was done by contract No. 31 in the drift leading Southeast from the North Vein workings. At coordinates 190 S - 300 E a narrow vein of ore crossed the drift. A small stope or rather a wide drift was made in this ore on either side of the old drift in order to determine if it opened up to a stoping width of any importance. A short raise from the East cross-cut was put up in ore but the ore leads directly to the floor of an old rock filled stope on the 6th level. It is doubtful if enough ore was left in the floor above to warrant drawing out the fill of rock in order to make the floor accessible.

Contract No. 36 first raised from the East end of their 8th level stope to the 6th level where they holed at coordinates 260 N - 385 W. Between the 6th and 8th levels this crew stripped their raise to stope out all the ore between the foot and hanging. The resultant stope raise is small because the ore vein was only 10 ft. to 15 ft. thick and narrowest at the top. The rock limits to the ore are all dike dipping South at an angle of about 65°. At the end of the year contract No. 36 had practically finished mining ore above the 8th level and were ready to resume mining of the floor of their 8th level stope.

CLIFFS SHAFT MINE
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YEAR 1943

7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

In the North Vein around coordinates 0 - 300 W, contract No. 87 mined back and sides of pillars throughout 1943. This work is actually at the 6th level elevation but reached from 7th level stopes. No ore was known to exist in these backs and therefore the work was classed as development.

8th Level

The only gang that did development work in the Fault Vein on the 8th level during the year was contract No. 14. This crew started on the 9th level but after holing to the 8th level stope at coordinates 800 S - 1500 W they continued to raise stope on the footwall from the extreme West end of the old Fault Vein stope. The ore is good quality and by years end contract No. 14 was near the 7th level. This ore vein lies on the footwall of the "B" shaft syncline and while all of the levels show the ore pinching out at the West end, we still have hopes of finding a lead that will open up in width to the West. Geologically, there is no evidence why this can not happen. It is with considerable interest therefore, that we are watching the development of contract No. 14.

The work of contract No. 36 was discussed under the 7th level heading where it was pointed out that they raised from the 8th to 6th levels and afterwards stripped their raise.

The Main Vein contract No. 85, stoped Northeast about fifty feet during 1943 and drifted Northwest from their stope to connect with the old stope at the foot of the ladder road to 7th level. The center of this activity was at coordinates 350 S - 550 W. The ore mined by No. 85 contract was magnetite and occurs along the footwall of the syncline. Dike and siderite bound the ore on the Southeast and jasper or lean ore limits it on the Northwest side.

9th Level

Part of the work done by No. 77 contract during 1943 was mining of floors but they also did some development work. A short raise was put up to the 8th level from the Southwest corner of No. 77 stope at coordinates 330 S - 690 W. The back of the stope in the Northwest corner was mined out high enough to break down the floor of the old rock raise from 8th level. Lastly a connection was made to the old 9th level stope at coordinates 260 S - 580 W. The future possibilities for ore extension in this area are probably to be found to the Southwest. There is some likelihood that ore will occur between No. 56 contract and No. 77 contract.

10th Level

In the North Vein, contract No. 82 drove a drift to the Northeast and put up a raise into the floor of contract No. 36 stope on the 8th level. The raise is located at coordinates 110 N - 560 W and was put up to reduce the scraping distance for ore broken by No. 36 contract. The new drift was also exploratory in order to test if any of the 8th or 9th level ore would pitch to the East and cut the 10th level elevation. No ore was encountered by the drift on the 10th level, however.

CLIFFS SHAFT MINE
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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

Contract No. 88 mined approximately 4,000 tons of good grade ore during 1943. All of this came from what might best be designated as an exploration in the Section 9 Exploration at coordinates 820 S - between 4400 W and 4530 W. All of the work was on a sub level above the 10th level. From the drift that extends out to the Southwest, the crew cross-cut both East and West to test small leads of ore that proved to be insignificant. At 4530 W they put up a small raise stope to the North in a vein of ore about 12 ft. thick that occurs between slate hanging wall and dike foot. East of this raise stope, in the same vein of ore, they put up another raise stope to the East and raised North from the North rib of this stope. From the East end of the raise stope they continued to raise East at a flat angle and started another flat cross-cut raise to the North. The vein is all narrow and dips Southwest. From past experience in the Section 9 Exploration no great optimism prevails concerning the possibility of this particular 10th level prospect becoming a big deposit. It must, however, be explored as long as the quality of the ore is high.

14th Level

Only contract No. 48 worked on the 14th level during 1943. At two places this crew breast stoped. One stope was advanced to coordinates 150 S - 1425 W and the other to coordinates 260 S - 1600 W. Both of these stopes are below the 14th level floor elevation and have a jasper back.

The following table shows the gangs that did development work during 1943. The tonnage after each is the amount broken by these crews in development and allocated to the proper level by estimate.

	Contract Number	Mine Tally Tons	Shifts Mining	Shifts Barring While Developing
"A" SHAFT				
1st Level	30	5,927	301½	
2nd "	44	3,723)		
3rd "	44	278)	294	8
	9	1,738	142	
	27	6,190	300	
	60	1,460	211	
4th Level	2	-	25	
	8	1,050 + rock	126	
	29	1,870	174	4
	57	5,155	307	1
	81	rock	239	16
5th Level	12	5,901	288	13
	45	2,903	176	
	74	21 + rock	182	11
	76	1,286	77	
	92	1,433	(281½	8)
	96	189	(304)	
	99	609	(294½)	

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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

	Contract Number	Mine Tally Tons	Shifts Mining	Shifts Barring While Developing
6th Level	6	661	(203½)	
	41	1,087	(270	14)
	51	9,866	259	
	98	898	64	6
7th Level	6	4,384	(See 6th Level)	
	54	620	(See 8th Level)	
	66	3,092	204	
	67	7,366	299	7
	94	1,607	86	
8th Level	4	6,279	232	35
	5	79	(See 9th Level)	
	25	1,922	136	
	35	2,202	149	3
	54	1,622	(118)	
	55	2,326	46	4
	61	1,990 + rock	299	
	78	1,428	111	3
	95	1,958	108	
	102	4,363	293	4
9th Level	5	331	(285)	
	23	7,147	69	5
	50	5,583	294½	7
	64	6,043	290½	5
	69	6,048	279	
	70	1,418	73	
	84	3,827	128	
	91	3,286	129½	11
	92	3,678	(See 5th Level)	
10th Level	10	7,946	271	35
	28	882	98	
	32	2,231	278	
	53	5,074	226	
	62	rock	117	
	68	1,969	98	
	104	352 + rock	108	3
11th Level	21	1,764	279	
	24	2,599	287	
12th Level	89	1,677	(268)	
	99	798	(See 5th Level)	
15th Level	5	168	(See 9th Level)	
	11	1,176	303	
	89	284	(See 12th Level)	
	101	rock	308	
Total "A" Shaft		157,764		

CLIFFS SHAFT MINE
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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

	Contract Number	Mine Tally Tons	Shifts Mining	Shifts Barring While Developing
"B" SHAFT				
1st Level	1	3,342	299½	
	17	9,145	295	9
	18	2,352	75	
	49	441	(115½	13)
	58	6,898	303	
	72	5,757	238	17
	73	199	(See 2nd Level)	
	75	1,412	77	
	97	1,557 + rock	184	5
2nd Level	40	2,182	(238	37)
	63	1,018	62	
	73	605	(228)	
3rd Level	71	3,754	150	29
4th Level	13	3,796	202	4
	33	6,463	305	3
	40	1,7799	(See 2nd Level)	
	49	535	(See 1st Level)	
5th Level	93	1,648	69	6
	96	rock	(See 5th Level "A")	
7th Level	31	2,467	155	12
	36	819	(See 8th Level)	
	87	9,337	193	114
8th Level	14	289	(See 9th Level)	
	36	2,520	(282)	
	85	3,365	242	8
9th Level	14	4,465	(282)	
	47	79 + rock	299	
	77	2,407	71	5
	82	4,152	(271)	
	103	21 + rock	286	
10th Level	82	625	(See 9th Level)	
	88	3,995	307	
	86	452	25	
14th Level	48	7,229	907	
Total "B" Shaft		95,105		
Grand Total Developing		252,869	16,350½	486

The contract sheet tonnage, which includes no overrun, equals 630,131 tons. The 252,869 tons mined by developing gangs is 40.13% of the total

CLIFFS SHAFT MINE
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7. UNDERGROUND: (Cont'd)

a. Developing: (Cont'd)

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

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

1938		320,705 Tons
1939		369,018 "
1940		525,133 "
1941		642,327 "
1942	(1)	690,266 "
1943		629,555 "
Total		3,177,015 "

(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:

1938	167,384 Tons
1939	167,936 "
1940	252,208 "
1941	281,542 "
1942	310,365 "
1943	252,869 "
Total	1,432,304 "

In the same period, depleting gangs mined 1,742,605 tons per the contract sheet tally. Contract sheet tally is 2,106 tons under the six year total mine tally. Percentages are based on contract sheet tally.

Developing gangs have mined 45.11% of the ore in the last six years. Total ore available at the close of the year has dropped during that period 174,409 tons. This drop is greater that that for the preceding six year period and our steadily decreasing available ore reserves since 1939 indicates that, except for the new lease addition, the possibilities for developing new bodies of available ore are going to be steadily decreasing in spite of increasing development work. As mentioned in previous reports, the possible ore bearing horizons are becoming well defined and once there are no longer any new areas to explore the percentage of development crews will drop. Furthermore, a greater number of these will be on rock work trying to open up the smaller veins.

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:

Year	Avg. No. of Gangs on Ore Development	Tonnage Mine Tally	Shifts Worked	Tons Per Gang Per Shift
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
1938	53.0	167,384	8,538	19.60

CLIFFS SHAFT MINE
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7. UNDERGROUND: (Cont'd)

a. Development: (Cont'd)

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

The drop in tons per gang per shift is partly due to the fact that the additional shifts of seven more gangs doing rock work in 1943 than in 1942 decreased the ore tonnage. As in 1942 the barring shifts put in while doing development work are all included in the total shifts above.

b. Stoping:

	Contract Number	Location by Coordinates at Approx. Center of Operations	Character of Work
"A" SHAFT			
2nd Level	34	30 S - 870 E	Mining back
3rd Level	9	40 S - 1160 E	" floor
4th Level	8	200 S - 3480 E	" "
	22	100 S - 1250 E	" "
	29	150 N - 1230 E	" "
5th Level	76	30 N - 1350 E	" bench
	81	380 S - 1470 E	Old pile of broken ore
6th Level	45	1150 S - 2700 E	Mining floor
	51	170 S - 2625 E	" bench
	98	480 S - 1570 E	" "
7th Level	2	1140 S - 2140 E	" floor
	6	1200 S - 1970 E	" "
	15	230 S - 2885 E	" "
	16	170 S - 1710 E	" "
	20	150 S - 2140 E	" "
	28	570 S - 3215 E	" "
	52	250 S - 2290 E	" bench
	66	100 S - 2670 E	" " & back
	80	220 S - 2980 E	" floor
	94	530 S - 1470 E	" "
8th Level	25	0 - 2960 E	" back
	35	530 S - 3060 E	" floor
	54	140 S - 1960 E	" "
	55	1060 S - 2650 E	" " & back
	59	450 S - 1800 E	" floor
	60	1070 S - 1880 E	" "
	78	150 N - 3000 E	" "
	79	180 S - 2050 E	" "
	95	330 S - 2550 E	" "
9th Level	23	80 N - 2620 E	" "
	53	30 N - 2400 E	" " & back
	65	1030 S - 2235 E	" bench
	70	110 N - 2390 E	" floor
	84	20 N - 2315 E	" "
	91	200 N - 2800 E	" "
10th Level	3	730 S - 1670 E	" "
	26	650 S - 2690 E	" "
	62	600 S - 2530 E	" "
	68	720 S - 3000 E	" "
	69	45 N - 2030 E	" "

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7. UNDERGROUND: (Cont'd)

b. Stoping: (Cont'd)

	Contract Number	Location by Coordinates at Approx. Center of Operations	Character of Work
11th Level	7	550 S - 2200 E	Mining floor
	21	640 S - 2910 E	" bench
	39	580 S - 2085 E	" "
12th Level	83	600 S - 2600 E	" floor
"B" SHAFT			
1st Level	18	930 S - 180 W	Mining bench
	72	400 S - 350 W	" "
	73	310 S - 290 W	" " & back
	75	1160 S - 140 W	" floor
2nd Level	63	300 S - 330 W	" "
4th Level	13	300 S - 350 W	" bench & back
	40	550 S - 550 W	" floor
	49	830 S - 1360 W	" bench
	71	490 S - 690 W	" floor
6th Level	38	650 S - 1170 W	" bench
	31	35 N - 180 E	" "
	38	750 S - 1170 W	" "
	42	100 S - 30 W	" floor
	90	0 - 90 W	" "
	93	50 S - 375 E	" "
	100	620 S - 1120 W	" "
8th Level	19	670 S - 1060 W	" "
	36	170 N - 500 W	" bench
	42	100 S - 30 W	" "
	85	340 S - 550 W	" "
9th Level	46	700 S - 1390 W	" floor
	56	430 S - 740 W	" "
	77	300 S - 630 W	" "
10th Level	14	400 S - 800 W	" bench
	46	650 S - 1400 W	" back
12th Level	86	480 S - 1200 W	" floor
13th Level	43	450 S - 1440 W	" "
15th Level	37	0 - 1520 W	" bench

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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:

	Contract Number	Mine Tally Tons	Shifts Mining	Shifts Barring While Depleting
"A" SHAFT				
2nd Level	34	4,473	239½	16
3rd Level	9	2,693	152	
4th Level	8	4,436	195	4
	22	5,103	287	11
	29	1,375	115	10
5th Level	76	4,833	210½	
	81	1,906	-	
6th Level	45	3,145	128	
	51	1,038	49	
	98	6,667	221	3
7th Level	2	7,906	278	4
	6	3,061	103	
	15	5,912	298	
	16	5,187	276	19
	20	9,293	273	33
	28	1,491	76	
	52	6,909	201	80
	66	2,552	99	
	80	5,906	303	5
	94	5,092	202	
8th Level	25	5,229	34	101
	35	2,203	149	3
	54	3,685	177	
	55	12,791	253	
	59	9,345	278	30
	60	1,412	76	
	78	4,946	180	
	79	9,991	221	86
	95	3,266	155	6
9th Level	23	3,245	226	2
	53	391	34	40
	65	8,852	283	4
	70	6,195	222	1
	84	5,455	155½	24
	91	5,235	140	
10th Level	3	5,678	294	
	26	5,350	241	19
	62	4,494	155	
	68	4,331	197½	
	69	814	25	
11th Level	7	17,252	304½	3
	21	716	78	
	39	11,826	260	45
12th Level	83	9,237	299	
Total "A" Shaft		230,917		

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7. UNDERGROUND: (Cont'd)

b. Stoping: (Cont'd)

	Contract Number	Mine Tally Tons	Shifts Mining	Shifts Barring While Depleting
"B" SHAFT				
1st Level	18	4,365	224	
	72	1,782	49	
	73	1,278	37	9
	75	4,809	230	
2nd Level	63	4,337	213	27
4th Level	13	1,265	63	39
	40	404	25	1
	49	6,616	146	6
	71	1,281	97	27
6th Level	38	7,980	(See 7th Level)	
7th Level	31	2,058	100½	
	38	12,044	(308)	
	42	5,011	(299	6)
	90	6,707	305	
	93	13,769	201	29
	100	9,728	264	38
8th Level	19	15,319	291	13
	36	693	26	
	42	1,286	(See 7th Level)	
	85	1,050	52	
9th Level	46	4,074	(See 10th Level)	
	56	10,380	270	33
	77	6,400	229½	
10th Level	14	709	25	
	46	6,447	(306)	
12th Level	86	5,396	263½	13
13th Level	43	5,576	300	2
15th Level	37	5,581	289½	9
Total "B" Shaft		146,345		
Grand Total Depleting		377,262	12,768½	801

The mine tally from the contract sheets totals 630,131 tons of which the depleting gangs broke 59.87%.

The following table gives a six year comparison:

Year	Avg. No. of Gangs Stoping	Tonnage Mine Tally	Shifts Worked	Tons Per Gang Per Shift
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
1938	37	153,321	5,494	27.91

Some broken ore remained in stopes underground at the end of the year but probably not to the extent in 1942.

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7. UNDERGROUND: (Cont'd)

c. Drifting and Raising:

Year	Rock Drifts and Raises	Ore Drifts and Raises	Total
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'
1934	2,061'	1,109'	3,170'

d. Explosives, Drilling and Blasting:

The pounds of powder used per ton of ore increased 0.0272 pounds per ton in 1943 over 1942. It must be remembered however, that in the year 1942 the mine received credit for over 13,000 tons of stockpile overrun whereas during 1943 the stockpile was not cleaned out and no overrun was credited to the production. It is also true that in 1943 there were more small working places in the mine where ore burden per pound of powder is lower. The overall cost per ton for all explosives was practically the same in 1943 as in 1942.

Explosives cost per foot of development in rock shows a marked decrease in 1943 compared to 1942. The cost in 1942 was over that for any of the immediately preceding years and the conclusion was that that was due to use of 60% L.F. Gelatin powder for nearly half of all development powder. In 1942 we used 19.91 pounds of powder per foot of development. In 1941, when hardly any gelatin dynamite was used, the consumption per foot of development was 16.97 pounds. In 1943 we stopped using any gelatin dynamite after the first quarter of the year and the results at the end of the year show 17.8 pounds of powder per foot of drift. Total cost per foot of development for all explosives dropped from $ 2.883 in 1942 to $ 2.471 in 1943.

The higher direct cost when using gelatin dynamite is not necessarily indicative of higher overall cost of development but breakage results from Gelamite dynamite seem to compare favorably with results from gelatin powder.

The following table gives kinds and percentages of ore broken during the years 1943 and 1942:

	1942	1943
Specular Ore	50.91%	53.7%
Slate Ore	15.19	11.5
Steel Ore	27.04	23.3
Magnetite Ore	6.86	7.6
Conglomerate Ore	-	3.6
	100.0%	100.0%

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7. UNDERGROUND: (Cont'd)

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

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

	Quantity	Average Price	Amount 1943	Amount 1942
Gelamite No. 1 - lbs.	539,800	11.50	62,076.75	64,835.65
60% Gelatin, L.F. - lbs.	4,050	11.50	465.75	3,323.50
Total Powder	543,850	11.50	62,542.50	68,159.15
Fuse - ft.	968,600	5.75 M	5,569.40	6,166.09
No. 6 Caps	145,930	12.28 M	1,792.99	2,004.71
Electric Caps	4,622	10.71 C	495.21	581.20
Fuse Ltrs. & Master Ltrs.	41,550	6.73 M	279.35	350.72
No. 18 Shot Wire - ft.	13,640	16.35 M	223.02	304.51
Tamping Bags	13,050	4.95 M	64.51	230.60
Miscellaneous			116.03	194.73
Total Fuse, Etc.			8,540.51	9,832.56
Total All Explosives			71,083.01	77,991.71
Product - tons			634,628	713,530
Lbs. Powder Per Ton Ore			.8568	.8296
Cost Per Ton For Powder			.0985	.0955
Cost Per Ton For Fuse, Etc.			.0135	.0138
Cost Per Ton For All Explosives			.1120	.1093
(Development in Rock)				
Gelamite No. 1 - lbs.	85,300	11.50	9,809.50	3,533.25
60% Gelatin, L.F. - lbs.	6,950	11.50	799.25	3,024.50
Total Powder	92,250	11.50	10,608.75	6,557.75
Fuse - ft.	60,700	5.75 M	349.02	461.71
No. 6 Caps	8,070	12.20 M	98.42	155.68
Electric Caps	9,602	11.04 C	1,060.22	369.36
Fuse Lighters	5,950	7.91 M	47.12	23.02
No. 18 Shot Wire - ft.	35,070	16.46 M	577.29	174.57
Tamping Bags	1,950	4.94 M	9.64	25.62
Miscellaneous			46.80	-
Total Fuse, Etc.			2,188.51	1,209.96
Total All Explosives			12,797.26	7,767.71
Feet Rock Development			5,180	2,695
Cost Per Ft. Rock Development			2.471	2.883
GRAND TOTAL ALL EXPLOSIVES			83,880.27	85,759.42
AVERAGE COST PER LB. FOR POWDER			.115	.115

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8. COST OF OPERATING:

a. Comparative Mining Costs:

	1943	1942	Increase	Decrease
PRODUCT - Tons	634,628	713,530		78,902
Underground Costs	1.954	1.671	.283	
Surface Costs	.306	.274	.032	
General Mine Expense	.319	.280	.039	
Cost of Production	2.579	2.225	.354	
Depreciation	.042	.041	.001	
Taxes	.263	.201	.062	
Loading and Shipping	.072	.073		.001
TOTAL COST AT MINE	2.956	2.540	.416	
No. of Days Operating	308	308		
No. of Shifts and Hours	2 8hr.	2 8-hr.		
Average Daily Product - Tons	2,060	2,360		300

The average daily product since 1929 is tabulated below:

Year	Average Daily Product
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
1929	1,400

The sharp drop in the daily hoist reflects labor turnover, lack of developed working places, and a general let down in the spirit of the men.

Exploring in Mine

Year	Labor	Supplies	Total
1943	$ 15,588.33	$ 7,776.60	$ 23,364.93
1942	9,652.56	9,069.01	18,721.57
Increase	5,935.77		4,643.36
Decrease		1,292.41	

The increase in the cost of exploring in the mine is due to the use of two drills for the entire year. The detail below shows a comparison of costs.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Exploring in Mine (Cont'd)

	1943	1942
Labor for Undg. Drilling	$ 12,598.47	$ 6,725.82
Prop. of D.D. Supt.'s Time	314.69	296.34
Carbon Loss	3,675.50	2,699.48
Pipe and Fittings	475.30	248.94
Drill Equipment and Repairs	123.23	84.06
Rental of Drill Equipment	1,405.75	671.25
Miscellaneous Supplies	216.04	262.05
Compressor Expense	1,200.30	650.00
Fuel and Trucking		3.63
Credit on Bortz Bits	70.99	
Adjustment of Selling Price of Carbon		1,633.16
Total	19,938.29	13,274.73
Geological Expense for Drill	670.19	427.83
Analysis Expense	754.10	673.25
Total Underground Drilling Cost	21,362.58	14,375.81
Gopher Drill Expense		2,916.67
Geological Dept. Exp. for Mine Mapping	2,002.35	1,429.09
Total as Per Cost Sheet	23,364.93	18,721.57
Feet drilled underground with carbon	6,784	3,333
Cost Per Foot " " "	3.141 (x)	4.310

(x) Cost per ft. in 1943 = $21,362.58 - $50.75 ÷ 6,784'.
The $50.75 is carbon and rental charges incurred in December 1942 and charged in March 1943.

To E. & A. No. CC-93 was charged in 1943 the sum of $10,942.33 for 1,477 ft. of surface drilling in Section 9 - 47 - 27. The total expended under the E. & A. to date is $22,645.59

The following breakdown comparison explains the decrease in cost of drilling in 1943:

	1942		1943	
Ore	247'	6.7%	407'	6.0%
Dike	1,447'	39.0%	3,573'	52.7%
Slate	46'	1.2%	791'	11.6%
Cong. & Lean Ore	304'	8.2%	333'	4.9%
Quartzite	165'	4.5%	833'	12.3%
Siderite	446'	12.0%	343'	5.1%
Jasper	1,051'	28.4%	504'	7.4%
Total	3,706'	100.0%	6,784'	100.0%

The decrease in proportion of hard materials, viz., siderite, jasper, and quartzite, reduced the 1943 cost. The use of two drills has also reduced the cost per foot for fixed charges.

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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:

		Labor Cost		Supply Cost		Total Cost	
Year	Footage	Total	Per Ft.	Total	Per Ft.	Total	Per Ft.
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
1939	2,130	23,585.00	11.07	8,091.96	3.80	31,676.96	14.87

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

	1943	1942	1941	1940	1939
Rock Raises	1124'	1152'	993'	176'	318'
10' x 10' Main Haulage Drifts	2855'	1140'	631'	1303'	1104'
8' x 8' Main Haulage Drifts	1201'	563'	572'	277'	708'
Total	5180'	2855'	2196'	1756'	2130'

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 Lean Ore	Siderite	Dike or Slate	Total
Rock Raises	360'	427'	337'	1124'
10' x 10' Rock Drifts	383'	878'	1594'	2855'
8' x 8' Rock Drifts	481'	40'	680'	1201'
Total	1224'	1345'	2611'	5180'

The unit cost per foot shows an increase in the labor item of $ 1.76. This is due to the increase in wages of 5½¢ per hour. Supply cost per foot is down $ 0.21 largely due to the exclusive use of gelamite powder after March of 1943.

Development in Ore and Stoping

The difficulty of separating, for cost purposes, the ore development mining gangs and stoping 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
1943	404,058.50	114,680.55	518,739.05
1942	377,773.15	128,565.26	506,338.41

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

The detailed cost for the two years follows:

	1943		1942	
Labor	Total	Cost Per Ton	Total	Cost Per Ton
Miners' Labor	230,465.71	.363	239,858.31	.336
Other Labor	173,592.79	.274	137,914.84	.193
Total	404,058.50	.637	377,773.15	.529
Supplies				
General	2,074.41	.003	2,899.30	.004
Iron and Steel	20,536.89	.033	24,891.66	.035
Oils	969.43	.001	966.60	.001
Machinery	2,981.09	.005	2,556.57	.004
Explosives	71,115.90	.112	77,991.71	.110
Lumber	108.86	-	51.42	-
Sundries & Clearing Acct.	16,977.15	.027	19,205.17	.027
Total	114,680.55	.181	128,565.26	.181
Total Labor & Supplies	518,739.05	.818	506,338.41	.710
Tons Hoisted	634,628		713,530	

The total cost in 1943 was up $12,400.64 over 1942 and unit cost per ton increased $ 0.108. Supply costs in 1943 were the same per unit ton as in 1942 and excluding the increase resulting from the wage increase, miners' labor was only $ .007 per ton higher in 1943 than in 1942. There were 27,088½ shifts of miners' labor in 1943. Approximately 48¢ per shift is the average increase resulting from the 5½¢ per hour increase on a six day week. Total additional cost of wage increase in this item is approximately $13,002.00 or a unit cost increase of $ 0.0204 per ton. Miners' labor increased $ .027 per ton. The entire increase in total unit cost comes from the item "Other Labor" which went up a total of $35,678.15 over 1942. Approximately 7% or $12,150.00 of this is due to the wage increase leaving $23,528.00 of higher cost. The difference is due to increase of number of shifts of scraper operators and miners' helpers. The increase of time in this category was brought about by the increase in number of shifts credited to helping miners at the same time shifts credited to scraping ore were reduced, by the increase in development in ore, by the poorer quality of men, and by the penalty involved in the wage agreement that men started on high pay shifts must be carried through on this rate.

Timbering

Year	Total Cost	Cost Per Ton
1943	23,847.23	.038
1942	17,765.14	.025
1941	20,725.94	.032

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

	1943		1942		1941	
	Total	Per Ton	Total	Per Ton	Total	Per Ton
Labor	13,869.30	.022	9,709.54	.014	12,584.62	.020
Supplies	9,977.93	.016	8,055.60	.011	8,141.32	.012
Total						

The timber crew was the same size in 1943 as in 1942. A comparison of the two years is not possible however, because the distribution of timbermen's time in 1942 was, for a period, different than either 1941 or 1943. It is more reasonable therefore, to compare 1943 with 1941. Of the $13,869.30 of timbering labor charges in 1943, about $970.00 is increase in wages in 1943. On an equal wage scale, the labor for 1943 would be only about $300.00 higher than 1941 in spite of the fact that in 1943 there was nearly one more man than in 1941. Supply costs increased in 1943 too as a result of more chute building and repairs throughout the mine.

Tramming

	Labor		Supplies		Total	
Year	Total	Per Ton	Total	Per Ton	Total	Per Ton
1943	306,638.31	.483	17,575.26	.028	324,213.57	.511
1942	323,050.72	.453	17,730.08	.025	340,780.80	.478
Increase		.030		.003		.033
Decrease	16,412.41		154.82		16,577.23	

The decrease in tramming labor cost is explained by the reduction in shifts in this category that were charged to helping miners which appears under stoping charges. Tramming labor includes motormen, brakesmen, trammers, skip tenders, and a part of the time of the miners' helpers and scraper operators. Starting in January of 1944, we are putting all of the time of scraper operators and miners' helpers in the stoping account since all of the work of getting the ore into the chute is logically a stoping charge.

Ventilation

Year	Total Cost	Cost Per Ton
1943	1577.26	.002
1942	811.76	.001
Increase	765.50	.001

Increase is due to the purchase of two TM-6 Coppus fans.

Pumping	1943		1942	
	Total	Per Ton	Total	Per Ton
Operating Cost	33,559.44	.053	28,897.53	.041
Maintenance Cost	2,560.59	.004	2,119.17	.003
Total	36,120.03	.057	31,016.70	.044

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

The detailed cost for the two years follows:

	1943	1942
Maintenance	2,560.59	2,119.17
Pumpmen Labor	9,405.47	9,015.83
Other Labor	2,545.57	647.32
Total Labor	11,951.04	9,663.15
Compressor Expense	600.00	600.00
Oil, Waste, & Packing	376.24	305.20
Tools, Etc.	269.65	103.49
Electric Light	380.90	412.20
Electric Power	20,009.37	17,844.79
Total Operating Expense	33,559.44	28,897.53
Total Maintenance and Operating	36,120.03	31,016.70
Gallons of Water Pumped	371,349,134	339,185,356
Gallons of Water Pumped Per Minute	710	642

During 1943 there was an increase of 32,163,778 gallons of water or 68 gallons per minute pumped. This resulted in a power increase of $2,164.58. Increase over 1942 for cleaning sumps amounts to $1,481.98. Increase for repairs is for repairing main pump electric cable and an 8" valve for pumps costing $270.00. All other items, except electric light, show an increase due to increased pumping, wage increase, and changes in the pump house to conform to fire and safety regulations recommended by the Bureau of Mines inspectors.

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

Month	1943	1942	1941	1940	1939
January	613	624	668	637	627
February	603	612	653	637	620
March	644	613	630	630	615
April	720	652	637	621	677
May	762	662	653	692	786
June	838	663	661	742	809
July	861	657	658	739	799
August	798	642	642	741	751
September	731	633	634	720	732
October	686	676	675	721	668
November	688	653	697	673	621
December	674	631	662	673	613
Average For Year	710	642	654	689	691

CLIFFS SHAFT MINE
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YEAR 1943

8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Compressors, Air Pipes, & Power Drills

	1943		1942	
	Total	Per Ton	Total	Per Ton
Compr. & Air Pipes	52,042.51	.082	47,306.54	.066
Compr. & Power Drills	9,172.44	.014	5,340.37	.008
Total	61,214.95	.096	52,646.91	.074

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

	1943	1942
Labor		
Compressors & Air Pipes	6,567.41	5,290.68
Compressors & Power Drills	578.39	851.80
Total Labor	7,145.80	6,142.48
Supplies		
Compressors & Air Pipes	45,475.10	42,015.86
Compressors & Power Drills	8,594.05	4,488.57
Total Supplies	54,069.15	46,504.43
Grand Total Labor & Supplies	61,214.95	52,646.91
Increase in Labor - 1943	1,003.32	
Increase in Supplies - 1943	7,564.72	
Total Increase - 1943	8,568.04	
Increase in Cost Per Ton	.022	

The operating cost of this account shows an increase of $4,735.97. This is chiefly due to an increase of $4,331.38 for power cost which in turn is due to the increase in development in rock and ore for the year necessitating extra ventilation which, to a large extent, came from compressed air.

Maintenance shows an increase of $3,832.07 which is made up by $453.00 for a set of valves for compressors, and the purchase of eleven drills over that of 1942. The cost for new drills in 1943 amounted to $7,890.27 and in 1942 $3,820.22. New drills purchased in the last few years indicate a predominance of Ingersoll-Rand equipment.

	1943	1942	1941	1940	1939
N-75 Ingersoll-Rand Drifters					1
DA-35 " " "	11	5	7	10	15
D-12 Cleveland Drifters	6	2	2	4	2
Gardner-Denver Drifters	-	2	-	-	1
J-45 Ingersoll-Rand Blockholers	-	-	2	-	-
S-49 " " "	-	-	-	-	4
JB-4 " " "	3	-	3	-	-
Total	20	9	14	14	23

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Back Filling

Year	Total	Cost Per Ton
1943	1,350.99	.002
1942	3,012.89	.004
Decrease	1,661.90	.002

The decrease in this account is due to less repairs to rock dumps during the year 1943 and to new rock dumps that cut down the amount of scraping required. During the year 34,672 tons of rock were dumped in the old stopes as compared with 23,758 tons in 1942.

Underground Superintendence

Year	Total	Cost Per Ton
1943	38,001.21	.060
1942	35,765.97	.050
Increase	2,235.24	.010

Increase in wages accounts for practically all of the increase in this account. There was no change in the number of shift bosses during the year.

Scrapers & Mechanical Loaders

	Labor		Supplies		Total Cost	
Year	Total	Per Ton	Total	Per Ton	Total	Per Ton
1943	22,879.42	.036	39,944.26	.063	62,823.68	.099
1942	25,544.46	.036	48,502.92	.068	74,047.38	.103

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

	1943		1942	
	Amount	Cost	Amount	Cost
3/8" Wire Rope	1,915'	151.05	4,175'	440.51
1/2" Wire Rope	14,385'	1772.41	10,050'	1215.64
5/8" Wire Rope	83,032'	14693.88	102,819'	17928.55
No. 6 Electric Cable	4,452'	1466.37	4,940'	1814.29
25 H.P. Electric Motors	8	1985.60	4	1029.08
New Scraper Slides (Not Compl)	-	-	3	841.79
Scraper Hoists	4	2216.00	6	3322.33
Utility Air Hoists	2	2524.00	-	-
Scraper Blocks	168	3669.83	91	1929.40
Gen.Electrical Repairs & Renew.		34344.54		45525.79
Total		62823.68		74047.38

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

This account shows a net decrease of $11,223.70. The principle items in the table above will account for the decreases and increases as follows:

Decreases		
3/8" Wire Rope	$ 289.46	
5/8" Wire Rope	3,234.67	
No. 6 Cable	347.92	
New Scraper Slides	841.79	
Scraper Hoists	1,106.33	
General Repairs	11,181.25	
Total Decreases		$ 17,001.42
Increases		
1/2" Wire Rope	$ 556.77	
Scraper Blocks(Impr.Type)	1,740.43	
2 Utility Hoists	2,524.00	
4 - 25 H.P. Motors	956.52	
Total Increases		$ 5,777.72
Net Decrease		$ 11,223.70

The general maintenance of this account shows a decrease over 1942 which is principally due to the decrease in product for the year and to the fact that the maximum expansion in equipment had occurred in 1942, thereby making less load on all machines in 1943 with its reduced tonnage. The increase in scraper blocks is due to greater breakage because of inferior castings being supplied during the war emergency. More home made blocks will have to be used in the coming year to fill the needs and these may prove better in some instances.

The tonnage and unit cost for the past six years are compared below:

Year	Product	Type of 5/8" Rope Used	Purchased	Cost	Unit Cost	Feet Per Ton Ore
1943	634,628	"Trulay"	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
1939	387,258	"	39,630'	6,901.39	.0178	.102
1938	327,161	"	41,731'	7,522.60	.0229	.127

Unit cost of 5/8" scraper rope per ton of ore showed a drop for the second consecutive year indicating that rope life efficiency was good. More development in ore in 1943 also reduced the amount of rope used per ton of ore to a small extent.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Electric Tram Equipment

	1943			1942		
	Labor	Supplies	Total	Labor	Supplies	Total
Generators		326.83	326.83			
Locomotives	5525.38	6174.97	11700.35	6346.00	6780.95	13126.95
Wiring	996.90	1941.21	2938.11	1069.61	1853.56	2923.17
Tracks	9590.09	2641.97	12232.06	7827.43	3231.43	11058.86
Cars	5704.75	5647.71	11352.46	6377.80	4052.46	10430.26
Spotting Engine		14.88	14.88		91.77	91.77
Total	21817.12	16747.57	38564.69	21620.84	16010.17	37631.01

The above table shows that the cost for 1943 and 1942 are about the same for the two years. A new set of stator coils and brushes were purchased for the 100 K.W. generator and installed at a cost of $326.83. Four armatures for the locomotives were repaired at the General Shops. A new 48 cell battery for the 2nd level "A" shaft motor was purchased at a cost of $1071.90. Only two rectifier tubes for charging stations were replaced in 1943 compared to thirteen tubes in 1942.

The item of "Tracks" shows an increase over 1942. In 1943 3,404 ft. of new tracks was laid as compared with 1,307 ft. in 1942.

Depreciation of 18 new cars at $250.80 per month continued through the full year. This will account for the increase in supplies in the car account. General repairs to motor cars shows a decrease of $673.05.

Hoisting

Comparative data for 1943 and 1942 is shown below:

	1943	1942
Maintenance	10,460.58	12,823.93
Operating Expense:		
Engineers' Labor	17,877.90	16,372.58
Other Labor	2,218.95	1,772.87
Total	20,096.85	18,145.45
Supplies		
Oil, Waste, and Packing	190.35	164.63
Tools and Misc. Supplies	196.18	195.20
Electric Light	638.73	643.15
Electric Power	18,481.66	21,184.96
Compressor Expense	480.00	480.00
Heating Expense	908.06	766.30
Total Supplies	20,894.98	23,434.24
Total Operating Expense	40,991.83	41,579.69
Total Maint. & Operating Expense	51,452.41	54,403.62
Cost Per Ton Produced	.082	.076
Tons Ore and Rock Hoisted	669,300	737,288
Average Depth Hoisted	747'	730'

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Maintenance cost of hoisting equipment was $2,363.35 less in 1943 than in 1942. The higher cost of 1942 was the result of two new sheaves, a new sheave stand, part of the charges on the new "A" shaft cage and skip unit, and many minor repairs. In 1943 we charged out, as in former years, two new ropes at a cost of $1,358.53, a new 8 ft. sheave for "B" shaft at a cost of $702.93, repaired hoist brakes at a cost of $403.62, and installed a new steel support for hold down sheave in "B" shaft. We also purchased $259.34 worth of structural aluminum to start rebuilding the old "A" shaft cage and skip unit. The net result of this maintenance in 1943 was, as shown above, considerably less than in 1942.

Labor cost of operating increased $1,951.40 in 1943 as a result of the increase in wages. Supply cost decreased sharply, however, primarily from lower power cost as a result of less tonnage. Total operating expense was therefore, $587.86 less in 1943 than in 1942.

Stocking Ore

Year	Total Cost	Cost Per Ton
1943	28,326.87	.045
1942	22,405.31	.031
Increase	5,921.56	.014

The increase in this category was the result of increased wages plus a greatly intensified program of rock picking from the stockpiles.

Screening & Crushing at Mine

	1943		1942	
	Amount	Per Ton	Amount	Per Ton
Labor	35,476.70	.056	29,443.50	.041
Supplies	15,538.91	.024	13,846.48	.020
Total	51,015.61	.080	43,289.98	.061
Increase	7,725.63	.019		

Increase in this account was principally due to an attempt to change the screening equipment. Because of the demand for ore and the sale of almost all of the product as mine run grade, the analyses have suffered in the past three years. A better rock picking system would do much to improve the grade. The Mechanical Department felt that with some second hand equipment from the Mesabi Range and some new equipment, we could have a shaker type screen and a long picking belt. This equipment was secured and part of it installed after a great deal of troublesome changes in the crusher building. The second hand shaker screen was too light for the job and had to be removed. Since the rest of the method depends on the screen, no more work was done in 1943 on the plan, except that more comprehensive plans were started. The labor and supply cost of the work done in 1943 was $4,144.00.

Other items of cost normal to our present method of screening and crushing were $1,131.04 for a new pan conveyor, $1,529.52 for repair of two old pan conveyors, $259.03 for belt, $326.03 for wearing plates in crusher, $743.69 for new head and gears for revolving screen and $274.91 for one set of screen sections.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Dry House Expense

	1943		1942	
	Amount	Per Ton	Amount	Per Ton
Labor	8,410.12		7,565.43	
Supplies	4,866.14		4,443.03	
Total	13,276.26	.020	12,008.46	.017

The increase in this account is due to the colder and longer winter of 1942-43. In 1943 669 tons of coal were usedas compared with 514 tons in 1942. This, together with the increase in wages, will account for the total increase of $1,267.80.

General Surface Expense

Year	Total	Cost Per Ton
1943	20,143.29	.032
1942	18,594.67	.026
Increase	1,548.62	.006

Grading and landscaping grounds near the shops and engine house was continued in 1943. A dry rock wall was constructed to keep the hill opposite the garage from washing down. A rock gutter was made along the steep road between shops and "A" shaft house. This work raised labor cost appreciably. Another factor effecting labor cost was extra snow removal in the Spring of 1943. Together with the increase in wages, these items account for the increase in 1943 cost.

Shaft

Year	Total	Cost Per Ton
1943	7,140.82	.011
1942	4,536.78	.006
Increase	2,604.04	.005

Repairs to shaft pockets at several levels during the year accounts for this increase over 1942.

Top Tram Equipment

Year	Total	Cost Per Ton
1943	4,776.38	.008
1942	5,833.31	.008
Decrease	1,056.91	-

A decrease of 3,000 ft. of 3/4" rope for the high tram is noted in the costs of 1943. This is due partly to decrease in production but principally to better care of the guides and rollers which carry the rope for this equipment and to more careful starting and stopping by the operator of the cars. Two top tram cars were repaired at the General Shops in 1943.

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8. COST OF OPERATING: (Cont'd)

a. Comparative Mining Costs: (Cont'd)

Docks, Trestles, and Pockets

Year	Total	Cost Per Ton
1943	5,220.26	.008
1942	22,710.03	.032
Decrease	17,489.77	.024

The large cost in 1942 was incurred through E. & A. No. CC-95 covering Worden-Allen Company's stiffening of the top tram trestle at a cost of $16,764.07. Costs in 1943 are similar to 1941 costs. The only extraordinary expense incurred in 1943 was from replacing wooden sleepers on the top tram.

General Mine Expenses

	1943	1942
Mining Engineering	5,301.22	5,452.30
Mechanical & Electrical Engr.	2,928.34	2,705.55
Analysis and Grading	31,339.33	27,914.54
Safety Department	3,061.73	2,898.05
Telephone & Safety Devices	6,024.38	5,675.53
Local & General Welfare	6,599.08	6,623.97
Spec.Expense, Pensions, & Allow.	12,065.96	19,090.18
Ishpeming Office	27,407.52	25,616.47
Mine Office	27,410.34	25,719.12
Insurance	6,842.90	6,383.57
Personal Injury	19,475.15	16,828.79
Social Security Taxes	25,781.98	26,979.56
Employees' Vacation Pay	28,415.73	27,575.92
Total Gen. Mine Expenses	202,653.56	199,463.55
Cost Per Ton	.319	.280

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 furnishes cost data for this item.

Analysis and Grading under General Mine Expenses shows an increase of $3,424.79. This is partly due to putting on an extra sampler during the shipping season to make sure that check samples would be entirely independent. The increase is also due to the increase in wages.

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9. EXPLORATIONS:

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

	Total Depth	Feet of Ore
D. D. Hole No. 299	261'	No ore
515	92'	No ore
516	132'	54'
517	131'	69'
518	478'	19'
519	169'	9'
520	218'	No ore
521	211'	19'
522	715'	No ore
523	352'	No ore
524	372'	134'
525	401'	4'
526'	401'	17'
527	564'	24½'
528	527'	No ore
529	211'	No ore
530	82'	3'
531	46'	No ore
532	283'	No ore
533	578'	49'
534	555'	5'
Total	6,779'	406½'

There were two machines drilling underground throughout the year. Of all the footage drilled the ore constitutes 6%.

On the 2nd level "A" shaft in the Bancroft Vein, three holes were drilled horizontally to the Northeast, North and Northwest. These holes are 523, 524, and 526 respectively. No ore was found in the first hole, 134 ft. of ore was found in the second hole and 17 ft. of ore was cut by the 3rd hole. The 134 ft. of ore cut in hole No. 524 occurs in five separate deposits with dike separating the ore occurrences. These ore deposits are all North of any 2nd level workings and even though the probability is sound that the drill hole was to some extent paralleling the structure, the discovery remains an important one. Development was started in 1943 on the 5th level Bancroft to get a raise up to the drill hole ore. Some ore was discovered by the development drift and the raise extends up in this ore. It is possible that ore veins will be found to connect the 5th and 2nd levels.

Holes 528 and 533 were drilled horizontally, due South and S 10° W respectively, from old workings on the 3rd level South of "A" shaft. Both holes were drilled to explore for the downward extension of the ore vein mined up to the Section 10 Lease boundary line in previous years. This ore vein was not found at the elevation of the 3rd level although 49 ft. of ore was cut by hole 533 from 0 to 49 ft. in the hole. Hole 528 penetrated dike, siderite and jasper to a total depth of 527 ft. Hole 533, after passing through the ore, which is adjacent to the old Cliffs Shaft workings, passed through dike, siderite and jasper to a depth of 578 ft. at the end of the year.

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9. EXPLORATIONS: (Cont'd)

On the 8th level "A" shaft East, hole No. 515 was drilled 92 ft. horizontally South to explore the horizon adjacent to the hanging wall slate contact for ore. The occurrence of ore in a vein 100 ft. wide 200 ft. West of the hole gave the suggestion that ore might exist in the formation at the location of the hole. No ore was found, however.

Drill hole No. 520 on the 10th level Bancroft Vein explored the area West of old 76 stope and found no ore.

Hole No. 534 on the 11th level, drilled Southwest from the Westernmost stope encountered 5 ft. of first class ore and some lean ore. The hole was drilled to determine the quality and width of the material through which the West drift passes. The best material was a 25 ft. run of lean ore with an average iron content of 54.32.

Four holes, Nos. 516, 517, 519, and 521, were drilled in the Southwest Vein South of "B" shaft. The first two holes were drilled Southwest and inclined -37° and -50° respectively. The collars of these holes were on the North boundary of the Section 10 Lease about 40 ft. East of the Northwest corner. Both holes were drilled to determine the depth to which the Southwest Vein might extend on the Section 10 Lease. Hole No. 516 encountered 54 ft. of ore and hole No. 517 penetrated 69 ft. of ore. One good run of ore was found as low as 3rd level elevation. Hole No. 519 was drilled North, at a dip of -38° from 1205 S - 189 W, in order to test the footwall area North of the Southwest Vein. The 9 ft. of ore cut by this hole occurs at the collar. Hole No. 521 was drilled West from the end of the Southwest Vein drift and this hole discovered a 19 ft. ore seam. The ore undoubtedly occurs in the continuation of the Southwest Vein structure.

One hundred feet Southwest of "B" shaft on the 3rd level, diamond drill hole No. 531 was drilled vertically to test for ore in the floor of the stope. No ore was found to exist in the floor where the hole was drilled.

Some lean and second class ore, but no mineable first class ore, was found in diamond drill holes Nos. 529 and 530, drilled into the floor of the 8th level stope at coordinates 48 S - 380 E. Drill hole No. 532 was drilled Southeast from coordinates 93 S - 130 E on the 8th level to test for the possible downward continuation to the 8th level of the narrow ore vein shown at coordinates 190 S - 300 E on the 7th level. This hole cut nothing but dike and siderite.

On the 10th level "B" shaft, diamond drill hole No. 299 was deepened from 307 ft. to 763 ft. in slate and quartzite. This hole extends Northwest from coordinates 88 S - 808 W. It was deepened in an attempt to get through the hanging wall material and explore for hard ore under the contact of the Goodrich formation along the North limb of the "B" shaft syncline. The hole wandered off course and dip and failed to reach any contact within the depth limits of our drill machine.

From the 10th level drift leading to the Section 9 Exploration, four holes were drilled during 1943 to explore the area North of this drift. It was desirable to not only look for ore in this area but also to learn something about the structure so as to be able to plan further explorations. Fourteen feet of first class ore was cut by hole No. 518 between dike footwall and Goodrich slate at coordinates 440S - 2530 W. This was encouraging but no further ore was found except for 24½ ft. in hole No. 527 at coordinates 830 S - 2510 W. We do not have enough information to explain the structure of this area but we did learn that there are some seemingly anomalous formation relationships that may, on further study, give a tip as to favorable ground for prospecting.

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9. EXPLORATIONS: (Cont'd)

At the beginning of the year one surface hole was being continued from a depth of 865 ft. This hole, No. 57, is located on the NW¼ of the SW¼ of Section 9, 47-27. It was completed in August 1943 at a depth of 2,310 ft. The material cut by the hole was quartzite, slate, conglomerate, lean ore, and an occassional dike down to 1,958 ft. From 1,958 ft. to 1,992 ft. there was first class ore in the hole. Footwall siderite and greenstone constituted the materials below the ore to the bottom of the hole. This drilling was done under E. & A. No. CC-93. The program was stopped, at least temporarily, in order to make drill crews and equipment available for more pressing needs. It should be resumed as soon as possible because "B" shaft reserves are being depleted with little new area to develop in their place. The discovery of 34 ft. of hard ore in hole No. 57 gives encouragement for additional exploration which may be able to find ore under the Goodrich formation at higher elevations. From a practical standpoint, it isn't possible to develop any new hard ore finds from the present mine workings if they occur below +450' sea level datum, unless such ore deposits contain large enough tonnages to warrant additional shaft sinking.

10. TAXES

Comparative data for 1943 and 1942 follows:

	1943		1942	
	Valuation	Taxes	Valuation	Taxes
Realty	2,400,000	81,582.24	2,200,000	76,217.46
Minerals Under NW¼ of Sec. 9-47-27	250,000	8,498.15	320,000	11,086.18
Personal	811,100	27,571.40	881,100	30,525.09
Lot 2, Sec. 3-47-27 (Bancroft)	755,000	25,664.41	640,000	22,172.35
SE¼ of NE¼ of Sec. 9-47-27 (Barnum)	52,000	1,767.62	52,000	1,801.50
Lot 174, Nelson Addition	100	3.40	100	3.46
South 35.91 ft. of Lot 179	50	1.70	50	1.73
Total	4,268,250	145,088.92	4,093,250	141,807.77
Collection Fees		1,450.89		1,418.08
Grand Total		146,539.81		143,225.85
Taxes per ton produced		.2309		.2007
Taxes per ton shipped		.2424		.1916

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

Year	Taxes	Valuation	Tax Rate
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
1934	99,486.51	3,119,110	31.63

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10. TAXES: (Cont'd)

Taxes and valuation increased in 1943 as compared to 1942 even though the tax rate has decreased for the third consecutive year. It is interesting to note that the tax rate for 1943 is the lowest since 1936, and also that, with the exception of the year 1940, valuation and taxes have shown a steady rise during the past ten years.

City of Ishpeming Tax Levy

	1943		1942	
	Amount	Rate	Amount	Rate
Valuation	11,761,795.00		11,495,051.00	
Tax Levy by Funds				
County Tax	65,866.05	5.6000	64,372.29	5.0000
County Road Tax	23,523.59	2.0000	22,990.10	2.4000
City Contingent Tax	72,500.00	6.1640	69,000.00	6.0470
City Debt & Service Tax	7,200.00	.6122	7,510.00	.6582
Street & Highway Tax	85,000.00	7.2268	86,000.00	7.5368
Fire Fund Tax	19,500.00	1.6579	22,000.00	1.9280
Library Tax	11,750.00	.9990	11,490.00	1.0069
Sewer Tax	5,000.00	.4251	-	-
Water Tax	-	-	-	-
Cemetary Tax	10,500.00	.8927	17,000.00	1,4898
School Tax	87,037.28	7.4000	85,063.38	7.4547
School Debt Service Tax	11,937.50	1.0149	12,812.50	1.1229
Total Taxes	399,814.42	33.9926	398,238.27	34.6443

11. ACCIDENTS AND PERSONAL INJURY:

The accident record for the past five years follows:

	1943	1942	1941	1940	1939
Number of No-Time Lost Accidents	101	103	93	89	62
Compensable or Fatal Accidents	21	5	9	2	4
Number of Man Shifts Worked	153125½	140962	133427	105437	80860

The following table gives a detail of the accident record for 1943:

Days of Labor	153,125½
Hours of Labor	1,225,004
Tons of Ore Mined	634,628
Lost Time Accidents	20
Days Lost	7,470
Fatalities	1
Frequency Rate	17.14
Severity Rate	6.098

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 1942 or authorized during 1943:

E. & A. No. CC-93

This E. & A. was authorized in 1942 and drilling began in March of that year in the NW¼ of SW¼ 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 $22,645.59 at the end of 1943 leaving about $7,500.00 of the original authorization unexpended.

E. & A. No. CC-100

This E. & A. covered the purchase of a new 650 g.p.m. centrifugal Gould pump with 250 H.P. motor attached. This replaced a similar pump which had become worn out and removed in the latter part of 1942. The pump is used as an auxiliary pump in case of breakdown of the main pumps. Cost of the pump installed was $4,576.02.

E. & A. No. CC-109

This E. & A. was authorized in 1942 but was not put into operation until the early part of this year. It covered the purchase of a Jackmill and two oil heating furnaces for sharpening jackbits. Up until the early part of this year the jackbits were all sharpened by ordinary emery grinding wheels in the cold state. The present method is a new departure in sharpening bits at the Cliffs Shaft Mine. Total cost of the new equipment was $3,963.97. The cost exceeded the E. & A. estimate because one more oil furnace was purchased than the estimate contained and installation costs proved very high.

E. & A. No. CC-110

This E. & A. covered the purchase of a new Model UCAB 1942 Chevrolet truck used for hauling samples to Central Laboratory. The cost was $1,488.31.

E. & A. No. CC-118

This E. & A. covered the purchase of two "Lohed" tram cars for underground use. Cost of the two cars was $1,850.00.

E. & A. No. CC-121

This E. & A. covered the purchase of one 1½ ton hydraulic dump Chevrolet truck at a cost of $1,968.91, to be used by the Cliffs Shaft Mine. This truck eliminates the need of hiring trucks. The truck which we had hired from Ronald Thomas was almost completely worn out and therefore no longer available even if desired.

E. & A. No. CC-125

This E. & A. covers the purchase of one Model 21 Eimco Findley Loader costing $3,840.00 and one Model D-6 Caterpillar tractor costing $7,125.00. The loader was purchased to facilitate the loading of rock in various rock drifts.

The Caterpillar tractor was purchased to erect trestles for stocking, to remove snow around the mine property, to bulldoze on the stockpile, and to grade and fill when such work is needed. The tractor furnished was a TD-14 International Trac Tractor rather than the D-6 Caterpillar authorized in the E. & A.

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14. MAINTENANCE AND REPAIRS:

Dwellings

	Rented Buildings			Loc. Expense	Grand
	Labor	Supplies	Total	Cleaning,Etc.	Total
Hard Ore Location	1,948.87	802.42	2,751.29		2,751.29
Barnum Location	5,071.97	3,106.51	8,178.48		8,178.48
Angeline Location		2.00	2.00	60.00	62.00
Salisbury Location	171.49	23.95	195.44	1,173.93	1,369.37
Second Addition	422.42	167.04	589.46	53.20	642.66
Outhwaite Purchase	547.10	519.98	1,067.08		1,067.08
Hyde Purchase No. 1	80.54	44.15	124.69		124.69
Hyde Purchase No. 2	1,527.63	644.87	2,172.50		2,172.50
Smith Purchase	658.75	211.19	869.94		869.94
Nelson Purchase	72.98	17.95	90.93		90.93
Berg Purchase	178.25	99.52	277.77		277.77
Ramsdell Purchase	272.03	127.69	399.72		399.72
Grand Total	10,952.03	5,767.27	16,719.30	1,287.13	18,006.43

Comparative figures for the past six years follow:

Total for Year	1943	-	$ 18,006.43
"	1942	-	7,708.55
"	1941	-	7,208.75
"	1940	-	6,140.09
"	1939	-	9,430.70
"	1938	-	6,990.77

The cost of repairs and maintenance of dwellings in 1943 was $10,297.88 higher than in 1942. As in all costs involving labor, the wage increase was responsible for part of the rise in cost. By far the greater part of the increase, however, was due to increased repairs to houses. Changes in responsibilities of personell within the mining staff and moves attendant upon these changes greatly increased the renovating program.

15. POWER:

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

Year	K. W. H.	Cost	Rate Per K.W.H.
1943	7,431,998	107603.42	.0144783
1942	7,093,627	104081.28	.0146725
1941	6,981,570	101144.56	.0144874
1940	6,078,269	91349.36	.0150529
1939	4,876,747	79652.95	.01633

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15. POWER: (Cont'd)

The detail of distribution of power at the mine follows:

	K. W. H.	Cost
Tramming	587,056	8,499.63
Pumping	1,406,406	20,362.51
Hoisting	1,319,234	19,100.39
Stocking Ore	19,349	280.14
Crushing Ore	242,797	3,515.30
Dry House Expense	80,088	1,159.55
Surface	20,950	303.33
Telephone & Safety Devises	71,235	1,031.37
Mine Office	12,031	174.19
Machine & Carpenter Shops	5,866	84.93
Drill & Jackbit Shops	60,814	880.49
Heating Plant	9,609	139.12
Compressors	3,061,202	44,321.30
Electric Haulage	522,276	7,561.72
Ventilation	13,085	189.45
Total	7,431,998	107,603.42
Incline Pit	-	-

Comparative data for 1943 and 1942 follows:

	1943	1942	Difference	Inc.%	Dec.%
Production - tons	634,628	713,530	78,902		10.9
	K.W.H.	K.W.H.			
Tramming	587,056	560,560	26,496	.47	
Pumping	1,406,406	1,242,169	164,237	1.32	
Hoisting	1,319,234	1,487,689	168,455		1.13
Stocking Ore	19,349	11,973	7,376	61.6	
Crushing Ore	242,797	269,034	26,237		9.75
Dry House	80,088	62,532	17,556	28.07	
Surface	20,950	29,503	8,553		28.99
Tel. & Safety Devices	71,235	65,237	5,998	9.19	
Mine Office	12,031	9,629	2,402	24.94	
Mach. & Carp. Shops	5,866	5,587	279	4.99	
Drill & Jackbit Shops	60,814	73,874	13,060		17.68
Heating Plant	9,609	9,442	167	1.76	
Compressors	3,061,202	2,725,501	335,701	12.32	
Electric Haulage	522,276	516,711	5,565	1.07	
Ventilation	13,085	15,028	1,943		12.93
Incline Pit	-	9,160	9,160		100.0
Total	7,431,998	7,093,627	338,371	4.77	

The cost for power for 1943 compares quite favorably with 1942 except the cost for pumping explained previously under that caption and the cost of operating compressor also explained previously under the caption of Compressors and Air Pipes. Both of these are up in 1943 because of more water in the first case and because of more compressed air being used to ventilate the expanded development program in the second case.

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18. NATIONALITY OF EMPLOYEES

The following table shows the various nationality groups employed at the mine as of December 31, 1943:

	American Born	Foreign Born	Total
English	100	24	124
Finnish	107	75	182
Swedish	52	9	61
Italian	23	13	36
French	43	2	45
Norwegian	19	3	22
Irish	7	-	7
German	6	-	6
Austrian	2	-	2
Russian	1	-	1
Total	360	126	486

Comparison for 1943, 1942, and 1941 follows:

	1943		1942		1941	
	Number	% of Total	Number	% of Total	Number	% of Total
English	124	25.5	124	25.73	107	24.3
Finnish	182	37.4	178	36.93	183	39.4
Swedish	61	12.5	63	13.07	61	13.1
Italian	36	7.4	38	7.88	38	8.2
French	45	9.3	46	9.54	37	7.9
Norwegian	22	4.5	22	4.56	21	4.5
Irish	7	1.5	4	.83	6	1.3
German	6	1.5	5	1.04	4	.9
Austrian	2	.4	1	.21	2	.4
Polish	-	-	1	.21	-	-
Russian	1	-	-	-	-	-
Total	486	100.0	482	100.00	465	100.0

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1. General

The production in 1943 was 494,042 tons as compared with 568,036 tons in 1942, and indications at the end of the year point to a continuation of a decline in production in 1944 due to a gradual reduction in the extent of ore body as mining progressed to lower elevations. The mine operated on a three-shift per day basis, excepting Saturdays, for the entire year, and the monthly production ranged from a high of 48,769 tons in March to a low of 35,525 tons in November.

A program of exploration diamond drilling was carried on during a large part of the year in an effort to disclose additional reserves, but the overall results from this program were disappointing. In drilling from the 7th Level near the west boundary across a known geological trough structure seme ore of high sulphure content was encountered at a depth of more than 200' below the new bottom level and the balance of the drilling in this area disclosed only insignificant runs of lean ore. Also exploration drilling on a sub-level above the 7th Level failed to disclose any new ore extensions. However an important development occurred on the new 8th Level where the drift to the East disclosed a favorable extension of main Lloyd East deposit to a vertical depth below that which was previously known. Based on available geological information it was assumed that the 8th Level would be at the bottom of the ore body, but the main level heading encountered the lower extension of the main ore-body upon reaching a distance of approximately 1550' from the shaft and by the end of the year the drift had advanced about 330' in ore along the strike of the formation. Preliminary exploration completed by the end of the year has disclosed only a narrow width to the ore body at this elevation but the fact that a definite vertical extension of the main deposit occurs to this depth naturally discloses a very favorable increase in the Lloyd Mine reserves.

Total shipments from the stockpile and pocket were 572,511 tons as compared with 580,857 tons in the previous year. The ratio of Lloyddale grade shipped to the total was approximately 51% as compared with 63% in 1942 due to about 80,000 tons less of this grade produced in 1943. The ratio of shipments of silicous grade to the total increased from 37% in 1942 to 49% in 1943. At the close of the shipping season the Lloyddale stockpile reserves were practically exhausted and there was a stockpile inventory at the end of the year of 29,404 tons of Lloyddale grade and 90,483 tons of Silicous grade.

During January month the working schedule was 3-8 hr. shifts five days per week and 2-8 hr. shifts on the sixth day or Saturday. Effective February 1st, the schedule was reduced to 3-8 hour shifts five days per week and 1-8 hour shift on the sixth day and with the exception of observing four designated holidays, the latter working schedule of sixteen shifts per week on production was maintained for the balance of the year.

On April 1, a general wage increase of 5⅓¢ per hour went into effect, and the retroactive feature of the raise to July 13, 1942, necessitated payment of back wages commencing from the latter date. Rate and one half was paid for work in excess of 8 hours in one day or 40 hours per week, and in

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1. General (Cont.)

accordance with the accepted interpretation of the "President's Directive Order" rate and one half was paid for hours worked on designated holidays and double time for any work on the 7th consecutive day.

Mining operations were confined entirely to the Lloyd East deposit and by the end of the year mining had been completed above the 6th Level and has reached a top elevation of one sub-level below the 6th Level. The major portion of the product was obtained from slicing and several stoping areas between the 6th and 7th Levels. Development of the 8th Level under E. & A. CC-86 was continued throughout the year and this work consisted of the main part of the development program. As mentioned previously, ore was encountered in this development but the product from this source was relatively small. By the end of the year two raises had been completed from the 8th to 7th levels and others were underway so that uninterupted production could be maintained from the most westerly mining areas in the orebody where operations were approaching the 7th Level elevation. Development of new areas for mining from the 8th Level is limited to a relatively small portion of the most westerly part of the orebody adjacent to the North footwall and development of this area for mining was being rushed late in the year. The average analysis of the Lloyddale grade product for the year showed an increase in iron content from 58.85 to 59.18 in 1943, however, it has become apparent that a slight increase in the moisture content of the ore is occurring as mining progresses to lower elevations.

2. PRODUCTION SHIPMENTS & INVENTORIES

a. Production By Grades

Grade	Tons
Lloyddale	288,412
Lloyd Silica	205,630
Total	494,042

This production compares with 568,036 tons produced in 1942, or a decrease of 73,994 tons. The percentage of Silica grade produced was increased from 35.2% in 1942 to 41.6% in 1943. The highest monthly production was 48,769 tons in March and the low was November with 35,525 tons.

b. Shipments

Grade	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Lloyddale	177,057	112,200	289,257	366,505
Lloyd Silica	122,519	160,735	283,254	214,352
Total	299,576	272,935	572,511	580,857
Total Last Year	327,958	252,899	580,857	
Increase and Decrease	28,382	20,036	8,346	

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2. PRODUCTION SHIPMENTS & INVENTORIES (Cont.)

b. Shipments (Cont.)

Total shipments exceeded production in 1943 by 78,469 tons and this difference represents a large increase as compared with 1942. There was a large decrease in Lloyddale grade shipments compared with the previous year, due to approximately 80,000 tons less of this grade produced in 1943. Silicous grade shipments increased 68,902 tons as compared with 1942 and the stockpile inventory of this grade at the end of the year was 90,483 tons.

The following table shows the total shipments during the past six years:

year -	1938	112,191
	1939	477,848
	1940	510,592
	1941	457,923
	1942	580,857
	1943	572,511

c. Stockpile Inventories

Grade	Tons
Lloyddale	29,404
Lloyd Silica	90,483
Total	119,887

The stockpile balance at the end of the year is 78,469 tons lower than last year, with a large decrease in the Silica grade inventory and only a slightly smaller Lloyddale grade balance.

d. Division of Product by Levels

The ore produced above various levels was as follows:

	Lloyddale Tons	Lloyd Silica Tons	Total Tons	
Sixth Level	25,430	29,462	54,892	Completed
Seventh Level	252,429	174,624	427,053	in 1943
Eight Level	10,553	1,544	12,097	
Total	288,412	205,630	494,042	

Production above the 6th Level was completed early in the year and for the first time the bulk of the product was obtained from above the 7th Level. As indicated from the above figures, during a large part of the year, the entire product was being obtained from above this level and for some time in the future the 7th Level will continue as the larger producer. During the latter half of the year the new 8th Level provided some of the product which was obtained mostly from the development program including the ore-drifting and raising.

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2. PRODUCTION SHIPMENTS & INVENTORIES (Cont.)

e. Production by Months

Month	Days	Lloyddale Ore Tons	Lloyd Silica Tons	Total Ore Tons	Rock Tons	Tons Per Man Per Day
January	22-2/3	26,134	15,538	41,672	3,393	5.69
February	21-1/3	24,855	13,280	38,135	3,715	5.43
March	24-1/3	25,792	22,977	48,769	4,049	6.03
April	23-1/3	24,497	20,347	44,844	3,340	5.86
May	22-1/3	27,648	16,074	43,722	5,543	5.85
June	23-1/3	25,078	17,283	42,361	3,636	5.73
July	22-2/3	22,599	18,494	41,093	4,259	5.42
August	23-1/3	19,701	19,563	39,264	3,433	5.78
September	22-1/3	21,915	17,730	39,645	1,143	5.57
October	22-2/3	23,631	14,683	38,314	1,195	5.60
November	22-1/3	22,376	13,149	35,525	1,931	5.48
December	22-2/3	22,660	16,512	39,172	2,522	6.06
Total	273-1/3	286,886	205,630	492,516	38,159	5.58
Current Year Stockpile Over-run -		1,526		1,526		
		288,412		494,042		

f. Ore Statement

	Lloyddale Tons	Lloyd Silica Tons	Total Tons	Total Last Year
On Hand January 1, 1943	30,249	168,107	198,356	211,177
Output for Year	286,689	205,828	492,516	566,336
Transfers	197	197		
Over-runs	1,526		1,526	1,700
Total	318,661	373,737	696,398	779,213
Shipments	289,257	283,254	572,511	580,857
Balance on Hand	29,404	90,483	119,887	198,356

Decrease in Output	73,820
Decrease in Shipments	8,346
Decrease in Ore on Hand	78,469

The operating schedule for the past five years follows:

1939 - 1-8 hr. shift 5-1/2 days per week Jan. 1 to Jan. 9, 2 crews
2-8 hr. shifts 4 days per week Jan. 9 to June 12, 2 crews
1-8 hr. shift 5-1/2 days per week June 12 to Sept. 11, 2 crews

1940 - 2-8 hr. shifts 5 days per week Jan. 1 to July 15, 2 crews
Since July 15, gradually increased to 3-8 hr. shifts, 3 crews
This third shift brought to full strength by Dec. 31

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

f. Ore Statement (Cont.)
The operating schedule for the past five years follows:(Cont.)

1941 - 3-8 hr. shifts 5 days per week Jan. 1 to Jan 24, 3 crews
3-8 hr. shifts 5-1/2 days per week Jan. 25 to Aug. 31, 3 crews
3-8 hr. shifts 5-2/3 days per week Sept. 1 to Dec. 31, 3 crews

1942 - 3-8 hr. shifts 5-2/3 days per week Jan. 1 to Dec. 31, 3 crews

1943 - 3-8 hr. shifts 5-2/3 days per week Jan 1 to Feb. 1, 1943
3-8 hr. shifts 5-1/3 days per week Feb. 1 to Dec. 31, 1943

g. Delays

There was a total of four delays to hoisting during the year that resulted in some loss in product. Several minor delays also occurred but it was possible in the latter cases to make up for the loss in product on the following shifts.

On the day shift, June 19, a delay of 2 hours occurred to hoisting due to a bad derailment of a motor train on the 7th Level main line. Hoisting was resumed after completion of repairs to the track and the loss in product on account of this delay was estimated at 200 tons.

During a portion of the afternoon and midnight shifts on June 25, a breakdown at a chute in the main tramming drift occurred, caused by excessively wet ore. Tramming and hoisting was delayed for a total of 6 hours and the loss in product was estimated at 400 tons.

On August 18, during the day shift the South skip rope which had been in service for about 9 months developed a bad section and necessitated removal. A delay to hoisting of 7 hours occurred while a new rope was installed and the estimated loss in product on this account was 550 tons.

During the Saturday afternoon repair work on September 4, a break occurred and was discovered in the 6" pinion gear shaft on the skip hoist. A spare shaft of approximately the same size was obtained from the General Shops and was machined and fitted to replace the broken shaft. By working continuously over the Labor Day weekend, repairs were completed in time for start of operations on the day shift September 7, and no delay to hoisting occurred.

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3. ANALYSIS

a. Average Mine Analysis on Output

Grade	Tons	Iron	Phos.	Silica
Lloyddale	288,412	59.18	.144	8.62
Lloyd Silica	205,630	52.69	.112	18.28

There were no straight cargoes of mine shipments during 1943.

b. Analysis of Ore in Stock Dec. 31, 1943

Grade		Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Lloyddale	Dried	29,404	59.71	.148	8.10	.22	2.09	.73	.32	.010	2.70	
"	Nat.		53.14	.132	7.21	.20	1.86	.64	.28	.009	2.38	11.01
Lloyd Sil.	Dried	90,483	53.13	.109	16.79	.21	2.26	.57	.26	.010	2.73	
" "	Nat.		47.40	.097	14.98	.19	2.02	.51	.23	.009	2.44	10.78

c. Complete Analysis of Ores Shipped

Grade	Tons	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss
Lloyddale	289,257	58.95	.137	9.19	.22	2.09	.73	.32	.010	2.70
Lloyd Silica	283,254	52.55	.108	18.43	.21	2.26	.57	.26	.010	2.73

4. ESTIMATE OF ORE RESERVES

a. Developed Ore

The following is the estimate of ore reserves made November 30, 1943 using a factor of 12 cubic feet per ton.

	Lloyd East Deposit
Between 6th and 7th Levels	428,266
" 7th and 8th Levels	456,758
Below 8th Level	16,000
Gross Tons Nov. 30, 1943	901,024
Less 10% for Loss in Mining	90,102
Total	810,922
Less 10% for Rock	81,092
Total	729,830
Less December 1943 Production	22,660
Total Developed Reserves	707,170 Tons

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4. ESTIMATE OF ORE RESERVES

a. Developed Ore. Continued

The following table shows a comparison of the developed, or the decrease of standard grade ore reserves during the past three years.

	1941	1942	1943
Reserves on January 1st	1,548,559	1,242,580	662,641
Production	388,111	368,050	288,412
Balance	1,160,448	874,530	374,229
Reserves on December 31st	1,242,580	662,641	707,170
New Ore Developed	82,132	211,889	332,941

As previously mentioned development on the 8th Level disclosed a vertical extension of the Lloyd East deposit below a depth that had been determined from available geological information. By the end of the year the main drift had advanced more than 300 feet in ore along the strike of the formation and this information in addition to some prelimmary exploration has disclosed an ore area on the 8th Level which is 145 feet below the 7th Level and accounts for the large tonnage of newly developed ore in 1943. Due to converging of the North and South footwalls as mining progresses to lower elevations and the dip of the transverse fault which defines the Westerly limit of the ore body the lateral extent of the ore body continues to steadily decrease in size and the developed ore in 1943 is represented mainly in a downward vertical extension of the deposit. Between the 6th and 7th Levels where the bulk of the product in 1943 was obtained diamond drilling was done during the year to outline more completely on ore area and this work in conjunction with minor extension under the hanging jasper disclosed by mining accounted for development of a portion of the additional new ore. As indicated above the Lloyd mine reserves were increased by 332,941 tons in excess of the remainder after deducting 1943 production from the reserves as of January 1st 1943.

b. Estimated Analysis of Ore Reserves

Grade	Iron	Phos.	Sil.	Mang	Alum	Lime	Mag.	Sul.	Loss	Moist.
Lloyddale Dried	58.70	.144	9.00	.22	2.08	.73	.32	.010	2.70	
Lloyddale Nat.	51.80	.127	7.94	.19	1.84	.64	.28	.009	2.38	11.75

The above analyiss of ore reserves applies to Lloyddale grade only as the Lloyd Silica reserves are not estimated.

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5. WAGES & LABOR, Continued

b. Comparative Statement of Wages & Product

	1 9 4 3	1 9 4 2	Incr.	Decr.
PRODUCT	494,042	568,036		73,994
No. of Shifts & Hours				
Jan. 1 to Jan. 31	3-8 hr. (5 2/3 days per week)			
Feb. 1 to Dec. 31	3-8 hr. (5 1-3 days per week)			
Jan. 1 to Dec. 31		3-8 hr. (5 2/3 days per week)		

AVERAGE NO. OF MEN WORKING

Surface	71	62	9
Underground	242	242	
Total	313	304	9

AVERAGES WAGES PER DAY

Surface	$ 7.15	$ 6.74	$ .41
Underground	8.10	7.85	.25
Total	7.88	7.62	.26

The following table shows a comparison of the average wages per day for surface and Underground for the past five years.

YEAR	SURFACE	UNDERGROUND
1939	$ 5.64	$ 6.50
1940	5.72	6.54
1941	6.51	7.42
1942	6.74	7.85
1943	7.15	8.10

WAGES PER MONTH OF 24 DAYS	1943	1942	Incr.	Decr.
Surface	171.60	161.76	9.84	
Underground	194.40	188.40	6.00	
Total	189.12	182.88	6.24	

WAGES PER MONTH OF 22 DAYS

Surface	157.30	148.28	9.02
Underground	178.20	172.70	5.50
Total	173.36	167.64	5.72

WAGES PER MONTH OF 18 DAYS

Surface	128.70	212.32	7.38
Underground	145.80	141.30	4.50
Total	141.84	137.16	4.68

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5. LABOR AND WAGES

a. General

Since the majority of the employees chose by election, in December 1942 the United Steelworkers of America, C. I. O., as their collective bargaining agency, there has been a decided change in the attitude of the men and in relations with them. A contract between the company and the Union was put into effect April 17, 1943 and problems relating to labor relationships are handled through a Grievance Committee. A number of meeting following requests for them were held with the Grievance Committee during the year for the purpose of presenting complaints, and when just and reasonable complaints were brought up relations were pleasent and satisfactory adjustment made. However, there were cases when unreasonable complaints or requests were presented and these were mostly of a nature not pertaining to working conditions or covered by agreements in the contract and naturally adjustment of cases of this kind were not made to their satisfaction. It appears that hope for improvement in relations in the future depends largely upon the type of men that will be selected as officers of the union and its representatives.

There was a total of 313 men on thepayroll at the end ofthe year as compared with 331 men a year ago. Altogether there was a labor turn over of 81 men who left our employ and 63 employees hired resulting in a net decrease of 18 men on the mine payroll.

Loss of employees into the armed services by drafting and enlistments was less than the previous year due to occupational deferments being granted to draft-eligible employees, either by the Local Draft Board or the Regional Appeal Board. Early in the year, only those employees in the more important job classification and those classified as skilled labor, were being granted deferments, but later in the year, as the shortage of labor became more acute, deferment requests were made for mostly all employees within the draft age, regardless of job classification. The result was a marked reduction in the number of employees drafted during the latter half of the year, as deferments were granted when requested for mostly all employees, excepting the very youngest and those who had worked only a relatively short time. Early in 1944 announcement was made by the Selective Service that effective February 1st no occupational deferment would be granted to employees between the ages of 18 and 22 years, and unless some exception to this will be made in case of employees in the Iron mining industry it is expected that a rather large group of young men will be called during the first half of the coming year as their present deferments expire.

During the year a total of 24 employees entered the armed service, 16 were drafted and 8 quit to enlist. A total of 30 quit to seek work elsewhere, this group being attracted particularly to the larger cities where higher wages are paid in some defense plants. No release from there employment at the mine was granted men who quit to seek work elsewhere, but this did not discourage those who had become stirred up by rumor of the possibility of receiving higher wages. There were 14 men tranferred to other mines of the company and 5 discharged for various reasons. Two employees were retired and 2 surface employees were laid off at the close of the shipping season.

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5. LABOR & WAGES, CONTINUED

b. Comparative Statement of Wages & Product (Continued)

WAGES PER MONTH OF 12 DAYS	1943	1942	Incr.	Decr.
Surface	85.80	80.88	4.92	
Underground	97.20	94.20	3.00	
Total	94.56	91.44	3.12	
PRODUCT PER MAN PER DAY				
Surface	34.32	31.21		6.89
Underground	7.24	8.39		1.15
Total	5.58	6.45		.87
LABOR COST PER TON				
Surface	.276	.226	.050	
Underground	1.083	1.032	.051	
Total	1.359	1.258	.101	
AVERAGE PRODUCT STOPING	19.66	23.86	4.20	
AVERAGE WAGES CONTRACT MINERS	8.66	8.46	.20	
TOTAL NO. OF DAYS				
Surface	20,315¾	18,198¾	2,117	
Underground	68,224	69,857¾		1,633¾
Total	88,539¾	88,056½	483¼	
AMOUNT OF LABOR				
Surface	145,242.31	122,668.93	22,573.38	
Underground	552,345.62	548,457.50	3,888.12	
Total	697,587.93	671,126.43	26,461.50	

PROPORTION SURFACE TO UNDERGROUND MEN

1938 - 1 to 3.13
1939 - 1 to 3.66
1940 - 1 to 3.61
1941 - 1 to 4.25
1942 - 1 to 3.90
1943 - 1 to 3.40

The increase in the average daily and monthly wages and the increase in the lagor cost pet ton was due to the general wage increase of five an one half cents per hour and a minimum of ten dollars per month increase for salaried employees. The general wage increase was effective April 1, 1943, and retroactive as of July 13, 1942 with payments of back wages commencing from the latter date.