

THE CLEVELAND-CLIFFS IRON COMPANY
ORE MINING DEPARTMENT
ANNUAL REPORT OF GENERAL MANAGER
For Year Ending December 31st, 1938

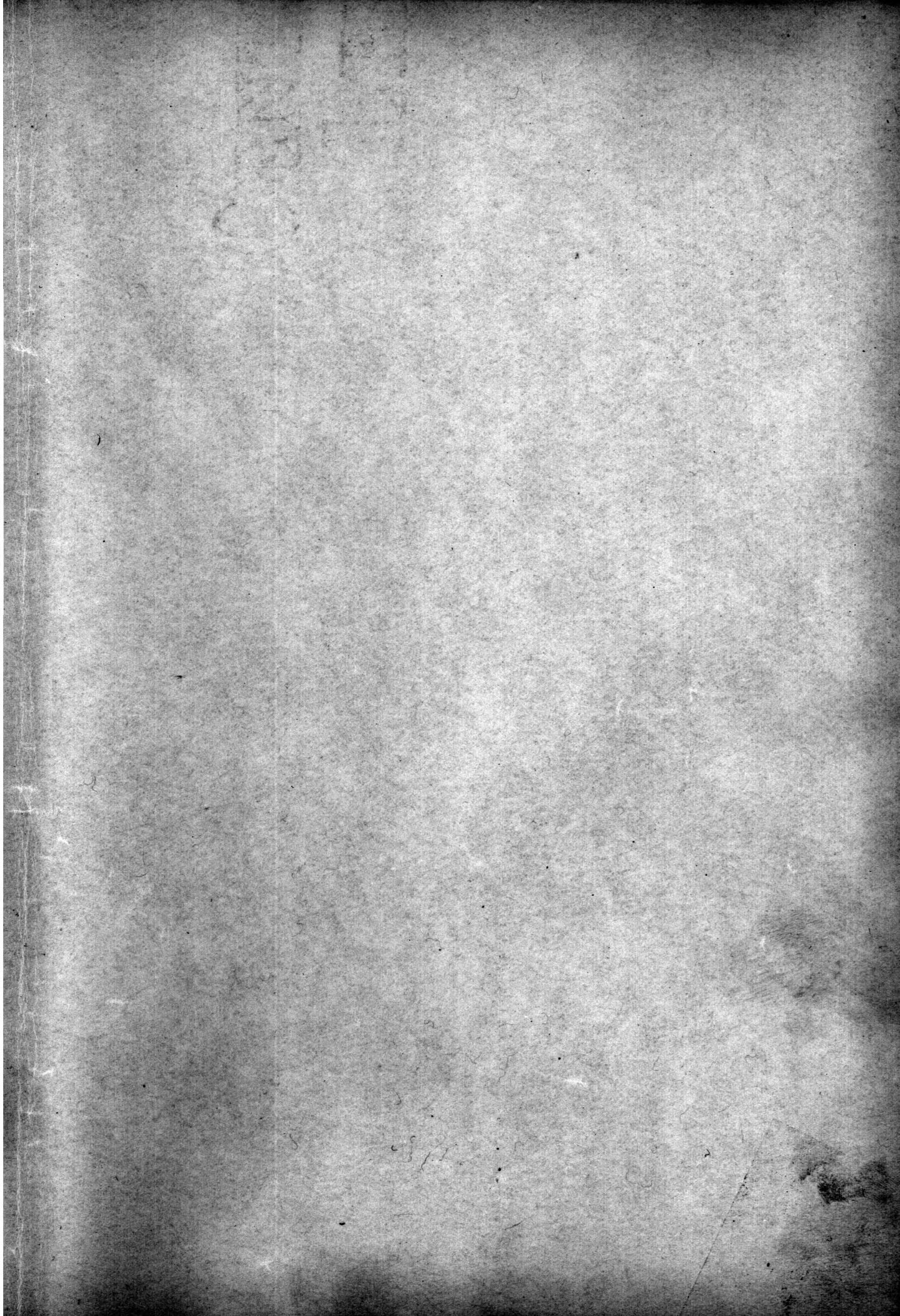
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THE CLEVELAND-CLIFFS IRON COMPANY

ORE MINING DEPARTMENT

MANAGER'S ANNUAL REPORT

YEAR 1938

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Ishpeming, Michigan
February 23, 1939

Mr. E. B. Greene, President,
1460 Union Commerce Bld.
Cleveland, Ohio

Dear Sir:-

I beg to submit the report of the operations of the Mining Department for the year 1938.

The inventories, maps, statements relative to the 1938 report will go forward under separate cover.

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

The depression started in the fall of 1937 and during 1938 the mines of the Company worked on a gradually reduced basis until the fall, when the operating schedule at all of the mines was slowly increased. It is unnecessary to recount these details as they are shown for each mine by the superintendents.

There was no new construction carried on during the year. At each property necessary maintenance work was done and all of the surface plants are in first class condition.

The wooden pipe line between the Hoist Dam and the McClure Plant has slowly deteriorated. This condition was so bad it was necessary to take some prompt action. In previous years, Mr. McClure has been very successful in putting a 6" layer of reinforced concrete around the wooden pipe line at the Carp Plant. This same general principle was used on the McClure Plant line and there is every reason to assume when the work is completed it can be considered as a permanent installation. The details are given in the report of the Mechanical Department.

Mr. Conibear gives the details relative to our safety record for 1938. It is customary, and as far as I know the usual procedure, to base these records on the days worked. Naturally if your working time is only half of normal time, your severity rate is bound to double. For the past three years, as a special incentive we have offered cash awards to employees. Each year the plan was modified. On the start the awards were given in the form of large prizes once a year. In 1937 this was reduced to quarterly awards and in 1938 the awards were given every month. The novelty has worn off and the employees have reached the point where they look on these awards as a matter of course. Those who are unlucky in the drawing complain bitterly about it. After a thorough discussion, with the Superintendents and Captains, it was decided effective December 31st, 1938, that this form of award would be abandoned. In order to try to improve the record for 1939 we are putting into force more rigid inspection and much stricter discipline. We are endeavoring to make the shift bosses assume full responsibility for the enforcement of rules, regulations and standards. It has developed that in the past this type of boss is liable not to assume responsibility himself but pass it on to their Captain. This, of course, is absolutely wrong. Capt. H. F. Rogers went into the Safety Department on December 1st and will spend his time with the Shift Bosses.

Safety bonuses for shift bosses are still in effect and we propose to penalize them for failure to enforce rules. We are hopeful good results will be obtained.

The drilling program on Section 2,47-27 has continued. Ore has been found in six drill holes. We are most enthusiastic about the possibilities of a large tonnage in the crotch between the footwall and main fault. Since completion of diamond drill hole #40, it has been determined that the dip of the fault to the south is about 60° instead of 80° as originally assumed. If this dip continues to where the fault intersects the footwall, it should very greatly increase the tonnage. This will be determined by drill holes which should be completed in the spring of 1939.

The physical underground condition of all of the mines is in first class shape, even though we have a few things which are giving us trouble and adding to the expense. In the Athens, crushing is exceedingly severe but we hope in time this unusual pressure will be relieved. In the Maas, water conditions are bad. This can only be relieved by developing deep wells from the surface. No. 1 well was most disappointing as very fine sand in the well obstructed the flow of water and rapidly cut out the pump. On the start the capacity was only about 100 gallons per minute. Recently for some unknown reason, probably the removal out of fine sand, the volume has increased to 300 gallons per minute. We are very hopeful that the well which is now being sunk at test hole #11, or well No. 2, will be a large one. The Layne Northwest Company state the formation is favorable and we are hopeful that the well will be of large capacity. From actual tests, by putting salt into test wells, we know that the surface water is flowing directly into the mine.

We have been able, at the Cliffs Shaft Mine, to continue the policy which we have followed in this property for many years, namely, not to mine more ore in any one year than could be put in sight. I am glad to report that the estimate shows that there is more ore in the mine at the end of 1938 than there was at the beginning of the year. In a hard ore mine, the monthly progress in ore headings is very slow. I am glad to report that development on the extreme west end of the 10th Level, over 4,000' west of "B" shaft, is still very favorable. Great possibilities for the extension of the life of the Cliffs Shaft exists to the west and also the extension to the east of this ore body which was found in 1938.

During the year a few men who have been connected with the Company for many years and have given most faithful and efficient service, have resigned. They were W. H. Moulton, Secretary of the Pension Department, James Moloney, Chief of Police, and Dr. V. H. Vandeventer, Chief of Staff of the Ishpeming Hospital. Mr. Moulton's duties were assumed by Mr. Walter F. Gries, he being given the title of Superintendent of the Welfare Department. No one has been appointed to Mr. Moloney's position and the watchmen at the various properties will be looked after by the Superintendents. At the end of the year, no one had been appointed in Dr. Vandeventer's place. Dr. Crane, however, is acting Chief of Staff.

During the year a movement was on foot for the installation of a sewage disposal plant costing anywhere from \$130,000 to \$150,000 for the City of Ishpeming. This project was difficult to sidetrack as the Health Department of the State of Michigan and the Conservation Department were back of it. After much

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work, we were able to convince the State and local authorities that such an expenditure of money was unnecessary. The Company pays 45% of the taxes in Ishpeming.

The people of the City of Negaunee for many years have wanted to use Teal Lake, which is their water supply, for recreational purposes. Ten or twelve years ago they spent over \$100,000 on an infiltration gallery which was unsuccessful. This could have been made a successful project but it was a political football and the money expended was thrown away, as no subsequent work was done. Encouraged by WPA authorities, the City started a movement to put in a filtration plant. At the lowest estimate this plant would have cost \$250,000 and in addition a very heavy charge yearly for operation. The project had the endorsement of every organization in the City to say nothing of the various churches. Those back of the project finally dropped it when I explained what we were trying to do with surface drainage by deep wells at the Maas Mine. The Company pays something over 80% of the taxes in Negaunee.

Respectfully submitted,



Manager

SRE:DP

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

YEAR	THE THE C.C.I.CO	THE NEGAUNEE MINE CO.	THE ATHENS I. MG. CO.	THE C.P.& L.CO & CL.EL.CO	TOTAL FOUR COMPANIES	CHANGE FROM PREV. YEAR
<u>ASSESSED VALUATION</u>						
1929	\$13,291,521	5,284,600	2,586,500	1,318,198	22,480,819	
1930	14,169,590	4,884,400	2,436,500	1,370,445	22,860,935	I 380,116
1931	13,867,696	4,635,700	2,536,500	1,539,428	22,579,324	D 281,611
1932	12,826,545	4,185,700	2,266,500	1,447,726	20,726,471	D 2,352,853
1933	9,865,714	3,554,400	2,036,500	1,419,563	16,010,987	D 4,715,484
1934	10,013,575	3,196,400	2,077,800	1,418,887	16,706,662	I 695,675
1935	10,117,036	3,057,770	1,929,520	1,424,711	16,529,037	D 177,625
1936	10,498,659	2,927,500	1,929,520	1,424,281	16,778,960	I 149,923
1937	11,671,806	3,350,000	2,242,900	1,442,555	18,707,261	I 1,928,301
1938	13,064,542	3,124,100	2,532,900	1,447,843	20,169,385	I 1,462,124
Decrease from 1931	803,154	1,511,600	3,600	91,585	2,409,939	
<u>TAXES PAID</u>						
1929	476,740.79	199,695.33	97,739.13	55,223.01	829,398.26	
1930	523,354.40	190,689.79	95,122.50	61,352.11	870,518.80	I 41,120.54
1931	507,608.51	183,218.38	100,251.06	65,344.18	856,422.13	D 14,096.67
1932	378,136.12	120,527.71	65,264.22	46,897.77	610,825.82	D 245,596.31
1933	262,194.86	99,599.60	57,065.71	36,067.26	454,927.43	D 155,898.39
1934	267,750.15	86,527.53	56,246.84	31,256.06	441,780.58	D 13,146.85
1935	286,303.64	95,226.14	60,089.81	29,817.75	471,437.34	I 29,656.76
1936	315,635.66	100,859.97	66,477.06	30,066.37	513,039.06	I 41,601.72
1937	348,808.35	120,097.50	80,366.44	30,024.80	579,297.09	I 66,258.03
1938	419,703.26	118,534.83	96,103.47	30,227.17	664,568.73	I 85,271.64
Decrease from 1931	87,905.25	64,683.55	4,147.59	35,117.01	191,853.40	

Notes: The 15 mill amendment went into effect in year 1933.

State sales tax became effective July 1st, 1933.

Morris Mine taxes were paid by Inland Steel Co. beginning with 1933. The valuation and taxes for that year being \$1,000,524 and \$20,965.81 respectively. They were paid by The C. C. I. CO. and billed Inland, and are not included in above figures.

Comparison is made with year 1931 for the reason that this was the peak year as to taxes raised, although the Mining Department showed a slight decrease from 1930 due to lower mine valuations.

H. J. A.
4-24-39

Corrected copy

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

	1935	1936	1937	1938
PRODUCT - Tons	268,921	456,760	543,567	327,162
<u>POWDER</u>				
Pounds - Gelamite "2X"	--	--	--	301,100
50% L. F.	128,750	396,000	164,650	--
60% Gelatine	145,950	58,200	397,850	44,880
Total Pounds Powder	274,700	454,200	562,500	345,980
Total Cost	32,531.91	52,098.25	68,309.67	42,926.27
Fuse - Feet	394,100	702,000	802,600	534,800
Caps - Number	75,350	114,500	138,950	81,660
Duplex Shot Wire	17,270	1,785	18,180	4,130
Connecting Wire Pounds	--	--	--	--
Delay Fuses	3,324	3,400	5,875	3,432
Fuse Lighters	21,500	29,500	24,400	27,000
Fuse Containers	--	30	6	12
Tamping Bags	--	31,000	36,000	26,350
TOTAL COST - Fuse, Caps, etc.	3,831.04	6,087.44	7,522.05	4,766.39
TOTAL COST - All Explosives	36,362.95	58,185.69	75,831.72	47,692.66
Average Price per pound - Powder .....	.117	.1147	.1214	.1241
Cost per ton - Powder .....	.1209	.1141	.1257	.1312
" " " - Fuse, etc. ....	.0143	.0133	.0138	.0146
COST PER TON - All Explosives .....	.1352	.1274	.1395	.1458
Pounds Powder per ton of ore	1.021	.9943	1.035	1.057

1938 Production decreased 216,405 tons or 40% compared with 1937.
 Average Price for Powder increased 2.2% compared with 1937.
 Cost per ton for all explosives increased 4.5% compared with 1937.

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

	1935	1936	1937	1938
PRODUCT - Tons	1,207,924	1,913,242	2,833,554	1,515,231
<u>POWDER</u>				
Pounds - 40%	--	--	--	2,000
50%	445,302	746,185	799,770	157,549
60%	86,400	78,995	77,862	18,350
1X and 2X Gelamite.....	88,535	121,345	438,300	500,048
Total Pounds - Powder.....	620,237	946,525	1,315,932	677,947
Total Cost - Powder	73,992.18	105,732.20	156,720.63	82,844.59
Fuse - Feet	1,824,134	2,976,430	4,384,364	2,341,664
Caps - Number	293,882	434,527	622,421	325,171
Loading Wire - Feet	1,000	6,000	2,760	2,500
Connecting Wire - Pounds	64	42	96	48
Tamping Bags	43,650	94,150	67,350	71,500
Sealing Compound - Pints	12	32	35	40
Powder Bags	58	74	115	101
Fuse Lighters	31,600	54,100	91,487	56,100
Electric Exploders	2,275	11,540	5,733	1,821
Blasting Machines	-	1	-	-
TOTAL COST - Fuse, Caps, etc....	14,435.57	23,872.40	33,940.53	17,152.23
Total Cost - All Explosives	88,427.75	129,604.60	190,661.16	99,996.82
Average Price per pound - Powder....	.1193	.1117	.1191	.1222
Cost per ton - Powder .....	.0613	.0553	.0553	.0547
" " " - Fuse, etc. ....	.0119	.0124	.0120	.0113
" " " - All Explosives .....	.0732	.0677	.0673	.0660
Pounds of Powder per ton of ore ....	.5135	.4947	.4644	.4474

1938 Production decreased 1,318,323 tons or 46.5% compared with 1937.
Average price for powder increased 2.6% compared with 1937.
Pounds powder per ton of ore decreased 3.7% compared with 1937.

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

	1935	1936	1937	1938
PRODUCT - Tons	1,207,924	1,913,242	2,833,554	1,515,231
<u>TIMBER</u>				
Feet 6- 8	289,951	513,514	380,876	400,543
8-10	176,298	222,488	334,236	161,523
10-12	236,489	361,061	470,071	263,466
12-14	84,977	131,705	217,676	136,375
14-16	1,232	5,147	8,225	9,891
Treated Timber	12,607	20,175	15,217	6,554
Total Feet	801,554	1,254,090	1,426,301	978,352
Total Cost	49,854.05	79,567.42	115,460.55	73,697.16
<u>LAGGING</u>				
Feet 5	31,725	58,275	11,805	17,175
7	2,827,973	4,546,086	6,091,424	3,879,041
8	--	--	--	--
Total Feet	2,859,698	4,604,361	6,103,229	3,896,216
Total Cost	20,181.79	32,044.85	49,245.57	30,933.14
Poles - Feet	2,187,074	3,376,027	4,556,540	2,377,176
Poles - Cost	24,111.30	36,353.17	61,938.50	31,980.78
WIRE FENCING - Rods	1,081	1,322	1,515	808
" " - Cost	895.13	1,137.24	1,407.60	773.86
Total Cost for all Timber	95,042.27	151,102.68	228,052.22	137,384.94
Average Cost per foot - Timber .....	.062	.0634	.0809	.0753
" " " 100' - Lagging .....	.706	.6959	.8068	.7939
" " " " - Poles	1.102	1.136	1.359	1.345
" " " Rod - Fencing .....	.828	.860	.929	.958
Feet of Timber per ton of ore .....	.664	.655	.503	.646
" " Lagging " " " "	2.367	2.407	2.154	2.571
" " Poles " " " "	1.811	1.765	1.608	1.569
" " Fencing " " " " .....	.015	.0114	.0088	.0087
Cost per ton for Timber .....	.0414	.0416	.0407	.0486
" " " " Lagging .....	.0167	.0167	.0174	.0204
" " " " Poles .....	.0199	.0200	.0219	.0211
" " " " Wire Fencing .....	.0007	.0006	.0005	.0005
Total Cost per Ton0787	.0789	.0805	.0906

1938 production decreased 1,318,323 tons or 46.5% compared with 1937,

JSM-L
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STATEMENT SHOWING TOTAL COST OF SUPPLIES CHARGED TO "COST OF ORE AT MINES"

SOFT ORE MINES

YEAR	1935		1936		1937		1938	
PRODUCT - Tons	1,207,924		1,913,242		2,833,554		1,515,231	
<u>CLASSIFICATION</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>
General Supplies	55,656.09	.0461	85,084.04	.0445	126,971.20	.048	99,037.03	.0654
Iron and Steel	22,174.50	.0184	33,498.59	.0175	55,157.59	.019	29,519.07	.0195
Machinery	55,855.54	.0462	74,403.36	.0389	106,030.76	.037	51,994.21	.0343
Explosives	89,053.60	.0737	129,741.00	.0678	188,141.92	.066	99,990.90	.0659
Lumber and Timber	108,752.97	.0900	174,127.19	.0910	261,372.47	.093	162,249.04	.1071
Fuel	14,960.77	.0124	16,653.38	.0087	19,321.20	.007	17,722.66	.0117
Electric power	255,339.52	.2114	321,282.52	.1679	394,928.05	.140	327,121.41	.2159
Miscellaneous	18,772.50	.0155	24,629.41	.0129	31,468.42	.011	21,874.88	.0144
Total	620,565.49	.5137	859,419.44	.4492	1,193,391.61	.421	809,509.20	.5342

HARD ORE MINES

YEAR	1935		1936		1937		1938	
PRODUCT - Tons	268,921		456,760		543,567		327,161	
<u>CLASSIFICATION</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>	<u>AMOUNT</u>	<u>PER TON</u>
General Supplies	26,797.41	.100	44,369.18	.097	46,825.71	.086	29,768.82	.091
Iron and Steel	16,001.23	.059	28,094.99	.062	37,544.78	.070	18,852.90	.058
Machinery	27,582.16	.102	44,140.79	.096	42,554.99	.078	25,388.84	.077
Explosives	36,362.95	.135	57,638.41	.126	75,831.72	.141	47,677.83	.146
Lumber and Timber	7,776.48	.029	13,026.30	.029	9,473.77	.017	7,647.87	.023
Fuel	4,574.29	.017	5,571.74	.012	5,649.79	.010	4,561.12	.014
Electric Power	58,550.36	.218	75,662.87	.166	88,837.43	.163	77,269.00	.236
Miscellaneous	438.49	.002	1,645.40	.003	6,908.03	.012	3,790.74	.012
Total	178,083.37	.662	270,149.68	.591	313,626.22	.577	214,957.12	.657

Soft Ore Mines production decreased 1,318,323 tons or 46.5% compared with 1937
 Hard Ore Mines Production decreased 216,405 tons or 40% compared with 1937

THE CLEVELAND-CLIFFS IRON COMPANY
MINING DEPARTMENT

LABOR SUMMARY - ALL COMPANIES

PRODUCT - Tons	1935		1936		1937		1938	
	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT	DAYS	AMOUNT
Surface	137,153 $\frac{3}{4}$	584,992.08	205,213 $\frac{1}{4}$	895,502.30	267,904 $\frac{1}{2}$	1,501,153.07	173,941 $\frac{3}{4}$	978,568.71
Cost per Ton .....		.257		.244		.295		.362
Underground	220,336 $\frac{1}{4}$	1,088,540.81	320,594 $\frac{1}{4}$	1,640,168.13	444,946 $\frac{1}{2}$	2,814,705.65	265,457 $\frac{1}{2}$	1,678,613.41
Cost per Ton .....		.479		.447		.552		.620
Superintendence and General Roll	36,482 $\frac{1}{4}$	230,965.46	42,071	269,557.92	52,940	371,604.87	51,903 $\frac{3}{4}$	371,712.80
Cost per Ton .....		.102		.073		.073		.137
Grand Total	393,972 $\frac{1}{4}$	1,904,498.35	567,878 $\frac{1}{2}$	2,805,228.35	765,791	4,687,463.59	491,303	3,028,894.92
Cost per Ton .....		.838		.764		.920		1.119
Average Rate per Day		4.83		4.94		6.12		6.17
Total Per Man Per Day		5.77		6.46		6.66		5.51

NOTE:
WAGES: The above is the total of all wages and salaries for employee's of the Mining Department, including the Cliffs Power & Light Co.

Effective March 16th 1937 there was an increase in wages of 10% per hour and the minimum wage rate was increased from \$4.00 to \$5.00 per day. This increase amounted to approximately 15.75%, and time an one half was allowed for over-time - overtime being over 40 hours a week or over 8 hours a day. These same rates were in effect during year 1938, excepting that salaries were reduced on a sliding scale April 16th, 1938, and restored effective Dec. 16th, 1938, maximum reduction being 10%.

WORKING SCHEDULE - 1938 - MICHIGAN PROPERTIES

Jan. 1st to April 16th. - All mines, excepting Cliffs Shaft, 4 days per week, Cliffs Shaft on 5 days per week,
April 16th to June 1st. - All Mines, excepting Cliffs Shaft, 3 days per week, Cliffs Shaft on 4 days per week, until May 1st. when it went to 3 days per week.
June 1st to Nov. 1st. - All mines, excepting Cliffs Shaft, 2 days per week, Cliffs Shaft on 3 day per week,
Nov. 1st to Jan. 1st.'39 - All mines, excepting Cliffs Shaft, went to 3 day per week schedule, Cliffs Shaft Mine going from a 3 to 4 day per week schedule Nov. 21st. 1938.
Gardner-Mackinaw Mine closed down June 1st. 1938.

MINNESOTA PROPERTIES:

The Canisteo pit operations for 1938 began May 25th on a 3-8 hour shift basis 4 days per week and continued so until the ore season suspended Oct. 22nd. 1938.
The Hill-Trumbull pit was idle during year 1938.
The Holman-Cliffs pit was idle during year 1938.

COMPARISON OF TOTAL DAYS WORKED AND TONS OF ORE MINED FOR THE YEAR 1938 AND 1937

	1938 DAYS	1937 DAYS	1938 DAYS	1937 DAYS
<u>NON-PRODUCTIVE UNITS</u>				
Stephenson Mine	304	325 1/2		
Princeton Mine	299 1/2	538 3/4		
Gardner-Mackinaw Mine Idle	943 3/4			
Miscellaneous Pay-roll	2,143 1/2	2,126		
Shops and Storehouse	3,526 1/2	3,725		
C.C.I.Co. Miscellaneous & General	36,029	74,908		
Negaunee Mine " "	4,271 1/2	3,687		
Athens Mine " "	1,565	5,481		
Cliffs Power & light Co.	19,530 3/4	19,201 3/4		
Mesaba Range Properties	20,599	29,374		
General Roll - Undistributed	35,654.1/2	33,935 1/4		
Spies-Virgil - Idle	-	1,965 3/4		
<hr/>				
Total Deductions	124,867	175,268		
Grand Total - All Operations	491,303	765,791		
Net for Operating Mines	366,436	590,523	366,436	590,523
Total Tons	2,705,862	5,096,705		
Tons per man per day	7.384	8.631		
<hr/>				
TONS				
<hr/>				
Open Pit Production				
Tilden Mine	85,589	305,418	4,456	9,216
Canisteo	777,881	606,041	39,558	37,309 1/2
Hill-Trumbull	-	808,125	-	27,127 3/4
<hr/>				
Total	863,470	1,719,584	44,014	73,653 1/4
Open Pit Ton per man per day	19.62	23.35		
Net Underground Days			322,422	516,869 3/4
Net Underground Production	1,842,392	3,377,121		
Underground Tons per man per day	5.714	6.534		

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STATEMENT SHOWING OVERTIME FOR YEAR 1938 AND EFFECT THE
PENALTY COST HAD ON THE YEAR'S PRODUCTION

	MICHIGAN PROPERTIES	MESABA RANGE		TOTAL
		CANISTEO	HILL TRUMBULL	
January	1,400.37	16.52	10.05	
February	1,710.07	-	-	
March	1,755.28	-	-	
April	297.76	-	-	
May	197.76	-	-	
June	93.88	-	-	
July	240.24	-	-	
August	149.21	117.71	-	
September	140.42	374.25	-	
October	352.18	150.37	43.23	
November	556.28	25.04	256.44	
December	191.61	7.00	8.46	
TOTAL	7,085.06	690.89	318.18	8,094.13
Penalty Cost of Above = 1/3 of Totals	2,361.69	230.29	106.06	2,698.04
Production-Tons-Year 1938	1,927,981	777,881	-	2,705,862
Effect the Penalty Cost had on Year's product-Cost Per Ton	.0012	.0003		.001

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CLIFFS SHAFT MINEANNUAL REPORTYEAR 19381. GENERAL:

The Cliffs Shaft Mine operated on a restricted schedule all year starting out with a 5 day per week operation, then reducing to 4 days per week on April 16th, further reducing to 3 days per week on May 1st, then back to 4 days per week beginning with November 21st.

Production exceeded shipments, the balance going into the stockpile. The amount produced just about doubled the ore shipped.

Development work was actively carried on throughout the year. Production was temporarily stopped from a number of stopes to permit following the ore up along the hanging or on the foot. During busy years like 1936 and 1937 when we are being crowded for production we can't always tie up broken ore to work upon to reach ore left in place in the back. We have to take advantage of the slack periods to catch up on this sort of mining to prevent leaving ore behind that would never be recovered.

We have endeavored to keep up the ore reserves and the tonnage in sight at the end of the year shows a small gain of 2264 tons. As a consequence we show more ore in sight than we have had in the last 17 years, or since 1920.

Very little new equipment was purchased during the year, only 9 new stoping drills and 2 new scraping units being added. We also had to purchase one new storage battery. Only one new E & A #804 was asked for and approved in 1938. This authorizes us to buy 6 new N-75 drilling machines.

The force at the mine showed little change as to the number of men employed, the total of the surface and underground crews being only two more than in 1937, but we did substitute quite a number of Gardner-Mackinaw and Lloyd Mine employees, laying off those at the Cliffs Shaft who rated at a lower figure and had less years of service.

There was some reductions in salaries to key men on April 16th which were restored on December 16th. Common labor in 1938 suffered not only a reduction in working time but also received less per day due to the elimination of the overtime rate of time and a half paid in 1937 when we were on a 6 day a week schedule.

We have always held the time and a half paid for over 8 hours a day to repairs made necessary by some emergency but in 1937 did pay for a lot of overtime because we exceeded 40 hours per week

2. PRODUCTION
SHIPMENTS &
INVENTORIES:a. Production by Grades

<u>Grade</u>	<u>Tons</u>	<u>% of Total</u>
Cliffs Shaft Lump	190,081	
" " Mine Run	171	
" " Crushed	87,350	
Total Cliffs Shaft Ore	277,602	84.8
Bancroft Lump	32,591	
" Mine Run	1,957	
" Crushed	15,011	
Total Bancroft Ore	49,559	15.2
GRAND TOTAL BOTH FEE & LEASE	327,161	100.0

CLIFFS SHAFT MINE
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Production by grades for the past ten years follows:

Year	Lump Ore	Crushed Ore	Run-of-Mine Ore	Total Tons
	Tons	Tons	Tons	
1929	295,600	125,714		421,314
1930	226,059	94,910	86,956	407,925
1931	153,717	65,113	72,227	291,057
1932	57,104	24,449	566	82,119
1933	39,101	16,838		55,939
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

The percentage of lumps and fines as shown on our yearly ore statement since 1932 follows:

Year	Lump		Crushed	
	Tons	% of	Tons	% of
		Total		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

The percentage figures for 1938 show a trend back towards a larger production of lump but unfortunately the figures do not show the full significance of the upswing. There were only two whole months, September and October, when we shipped the entire Cliffs Shaft production from the pockets and the railway car weights for those two months and portions of August and November show that we are now again producing lump at the rate of 69.5% of the total output.

The proportion of ore mined from the fee and leased portions of the mine is shown by the figures that follow:

Year	Cliffs Shaft	% of	Bancroft Ore	% of
	Ore (Fee)	Total	(Lease)	Total
1932	71,155 tons	86.6	10,964 tons	13.4
1933	48,891 "	87.4	7,048 "	12.6
1934	195,258 "	87.5	27,987 "	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

It will be noted that we drew a little more heavily on our own fee lands for production compared with 1936 and 1937. Probabilities are, however, if the gangs developing ore in the 10th level territory continue to find new ore we may hoist a larger portion of our product from the Bancroft territory in 1939.

In order to keep the tonnage of Bancroft Ore produced since the lease was signed clearly in mind, the following figures are shown:

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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
Total	586,014

b. Shipments

<u>Grade</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Last Year Tons</u>
Cliffs Shaft Lump	54,323	41,660	95,983	301,654
" " Crushed	29,793	12,447	42,240	125,953
" " Mine Run	171		171	
Bancroft Lump	10,962	8,292	19,254	59,153
" Crushed	985	2,431	3,416	25,843
" Mine Run	1,957		1,957	3,237
Total	98,191	64,830	163,021	515,840
Total Last Year	348,094	167,746	515,840	
Decr. in Shipments	249,903	102,916	352,819	

The following table shows comparative shipments for the past ten years:

Year	CLIFFS SHAFT GRADE			BANCROFT GRADE			
	Lump	Crushed	Run-of-Mine	Lump	Crushed	Run-of-Mine	Grand Total
1929	305,278	133,433	-	43,472	28,747	-	510,930
1930	126,231	30,460	73,881	27,178	4,436	13,075	275,261
1931	17,999	12,099	70,541	10,210	285	1,686	112,820
1932	25,505	3,727	574	-	-	-	29,806
1933	135,303	45,162	-	10,105	-	-	190,570
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

Shipments were the smallest since 1932.

c. Stockpile Balances

Ore in Stock as of Dec. 31, 1938, viz:

Cliffs Shaft Lump	127,928	Tons
" " Crushed	106,604	"
Bancroft Lump	19,614	"
" Crushed	19,793	"
Total	273,939	"

CLIFFS SHAFT MINE
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For comparison we show the balances on hand at the end of each year since 1931:

Balance in stock - Dec. 31, 1931	-	342,860 Tons
" - 1932	-	395,173 "
" - 1933	-	299,585 "
" - 1934	-	275,391 "
" - 1935	-	145,810 "
" - 1936	-	82,072 "
" - 1937	-	109,799 "
" - 1938	-	273,939 "

It will be noted that we are about in the same relative position as we were on Dec. 31, 1934.

d. Division of Product by Levels

<u>Level</u>	<u>"A" Shaft Tons</u>	<u>"B" Shaft Tons</u>	<u>Total Tons</u>
1st	3,615	13,277	16,892
2nd	4,166	-	4,166
3rd	16,350	4,508	20,858
4th	9,754	4,428	14,182
5th	16,879	2,353	19,232
6th	22,140	10,772	32,912
7th	44,681	9,553	54,234
8th	22,518	17,126	39,644
9th	41,576	4,684	46,260
10th	30,193	7,066	37,259
11th	16,375	-	16,375
12th	123	4,922	5,045
13th	-	4,391	4,391
14th	-	14,433	14,433
15th	-	1,278	1,278
Total	228,370	98,791	327,161
Rock			25,822
Total Ore & Rock			352,983

The figures that follow show the amount of ore actually broken and produced in each shaft since 1931:

<u>Year</u>	<u>"A" Shaft Tons</u>		<u>"B" Shaft Tons</u>		<u>Total Tons</u>
1931	193,747	66.5%	97,310	33.5%	291,057
1932	56,533	68.7%	25,586	31.3%	82,219
1933	39,816	71.3%	16,123	28.7%	55,939
1934	157,835	70.8%	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

The proportionate percentage of ore coming from the "B" Shaft area was a little less than it was in 1937. The eight year average for "B" Shaft is 30.8%.

One of the big problems in the mine is to keep both "A" Shaft and "B" Shaft skips running on a balanced schedule. The big 6-ton cars carrying the run of mine ore up the inclined trestles to the crusher are operated alternately and if we can have a load at the shaft pocket each time one of these cars is empty we are maintaining maximum production

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and reducing the peak load both on the main hoist motors and the top tram motors. Because it is evident from the foregoing table that less than one-third of the ore is actually produced in "B" Shaft, it follows that if we wish to hoist half of the daily product in "B" Shaft we must transfer some "A" Shaft ore over to "B" Shaft. While it is impossible or rather highly improbable that the division of product will be exactly 50-50 for the entire year, the following table, which by the way is a new one in the annual report, shows some months in which the product is divided almost exactly in half.

Month	<u>1938 Product as Hoisted</u>	
	<u>"A" Shaft</u>	<u>"B" Shaft</u>
	<u>Tons</u>	<u>Tons</u>
January	18,392	16,491
February	18,403	17,213
March	21,310	19,612
April	17,890	16,874
May	10,965	10,584
June	10,872	10,500
July	9,487	9,053
August	10,778	10,767
September	9,947	9,337
October	10,531	10,369
November	11,560	11,677
December	14,064	14,029
Total	167,491	159,670
	51.2%	48.8%

e. Production by Months

Month	Optg. Days	<u>Cliffs Shaft</u>			<u>Bancroft</u>			Total
		Lump	Crushed	<u>Mine</u>	Lump	Crushed	<u>Mine</u>	
				<u>Run</u>			<u>Run</u>	
January	20	19,541	9,203		4,161	1,962		34,867
February	20	20,496	9,666		3,731	1,812		35,705
March	23	24,346	11,502		3,328	1,577	204	40,957
April	19	20,003	9,413		3,379	1,591	395	34,781
May	13	12,414	5,854		2,353	1,147	102	21,870
June	14	12,920	5,822		2,207	1,030		21,979
July	12	11,177	5,153		1,729	822		18,881
August	13	13,243	5,932	114	2,153	972	53	22,467
September	12	11,681	5,585	57	1,927	736	369	20,355
October	13	14,030	5,725		1,842	768	529	22,894
November	15	14,337	6,442		2,184	1,003	305	24,271
December	17	15,893	7,053		3,597	1,591		28,134
Total	191	190,081	87,350	171	32,591	15,011	1,957	327,161

f. Ore Statement

	<u>Cliffs Shaft</u>			<u>Bancroft</u>			Total	Last Year
	Lump	Crushed	<u>Mine</u>	Lump	Crushed	<u>Mine</u>		
			<u>Run</u>			<u>Run</u>		
On Hand Jan. 1, 1938	33,830	61,494	-	6,277	8,198	-	109,799	82,072
Output for Year	190,081	87,350	171	32,591	15,011	1,957	327,161	538,406
Transfers	-	-	-	-	-	-	-	-
Overruns	-	-	-	-	-	-	-	5,161
Total	223,911	148,844	171	38,868	23,209	1,957	436,960	625,639
Shipments	95,983	42,245	171	19,254	3,416	1,957	163,021	515,840
Balance on Hand	127,928	106,604	-	19,614	19,793	-	273,939	109,799
Decrease in Output							211,245	

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g. Delays

	<u>Date</u>	<u>Hours</u>	<u>Tons</u> <u>Lost</u>	<u>Cause</u>
Jan. 3rd		4	700	Burn-out on main switchboard
" 24th		1	150	Blizzard
" 25th		8	1400	"
" 26th		12	2000	"
Aug. 22 to 24th, incl		28	4200	Vacation with pay
Oct. 17th		1	150	Sleet Storm
Nov. 7th		1	150	Shaft Pocket blocked
" 10th		1	150	Chunks in crusher
" 25th		1½	200	Top tram car trouble
" 28th		1	150	Repairing top tram car
Total - Year		58½	9250	

3. ANALYSIS

a. Average Analysis of 1938 Output

	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>
Cliffs Shaft Lump	58.81	.105	8.34
" Crushed	54.12	.106	13.76
" Run-of-Mine	62.20	.121	5.69
Bancroft Lump	60.17	.123	6.71
" Crushed	56.02	.123	11.15
" Run-of-Mine	61.97	.119	5.08

Without exception the output analysis for 1938 show improvement over 1937, the iron running higher with lower silica

b. Average Analysis on Straight Cargoes

<u>Grade</u>	<u>Mine Analysis</u>			<u>Lake Erie Analysis</u>	
	<u>Iron</u>	<u>Phos.</u>	<u>Silica</u>	<u>Iron</u>	<u>Moist.</u>
Cliffs Shaft Lump	58.07	.105	9.80	58.86	.68
" " Spec.	59.28	.107	8.20	59.51	.50

With few exceptions the average of the run-of-mine cargoes also show higher Lake Erie analysis.

c. Complete Analysis of 1938 ores shipped from Mine

<u>Grade</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Alum</u>	<u>Mang</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>
Lump Ore	59.30	.106	8.40	2.25	.40	1.15	.78	.015	1.57
Crushed Ore	53.85	.104	14.50	2.80	.50	1.30	.93	.017	1.94

d. Analysis of Ore in Stock Dec. 31, 1938

	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Cliffs Shaft Lump										
Dried	58.50	.108	8.35	.50	2.24	1.48	1.03	.015	2.16	
Natural	58.21	.107	8.31	.50	2.23	1.47	1.02	.015	2.15	.50
Cliffs Shaft Crushed										
Dried	54.30	.109	12.74	.60	2.61	1.46	1.19	.018	2.36	
Natural	53.40	.107	12.53	.59	2.57	1.44	1.17	.018	2.32	1.65
Bancroft Lump										
Dried	59.63	.120	6.79	.47	2.60	1.56	1.15	.020	2.32	
Natural	59.33	.119	6.76	.47	2.59	1.55	1.14	.020	2.31	.50
Bancroft Crushed										
Dried	55.91	.121	11.69	.43	3.06	1.40	1.11	.017	2.00	
Natural	55.24	.119	11.55	.42	3.02	1.38	1.09	.017	1.98	1.20

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e. Analysis of Ore Reserves

		<u>Run of Mine Ore</u>									
		<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist.</u>
Cliffs Shaft Ore	Dried	57.10	.109	10.13	.56	2.45	1.20	1.00	.019	1.90	
" "	Natural	55.84	.107	9.91	.55	2.40	1.17	.98	.018	1.86	2.20
Bancroft Ore	Dried	57.75	.119	9.50	.50	2.35	1.15	.95	.019	1.85	
" "	Natural	56.48	.117	9.29	.49	2.30	1.12	.93	.018	1.81	2.20

4. ESTIMATE OF
ORE RESERVES:

Assumptions: Factor used is 8, 9, and 10 cu. ft. per ton of ore
in place.
10% Deduction for Rock
10% " " loss in mining

Ore in Sight Dec. 31, 1938

<u>Level</u>	<u>Available ore in Bancroft area "A" Shaft</u>			
	<u>Developed</u>		<u>Prospective</u>	
	<u>Floors</u>	<u>Pillars</u>	<u>Breasts</u>	<u>Total</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
1st	-	1,800	-	1,800
2nd	7,400	-	-	7,400
3rd	3,300	800	-	4,100
4th	9,200	3,100	-	12,300
5th	800	-	-	800
6th	6,700	-	-	6,700
7th	2,300	-	-	2,300
8th	-	6,900	-	6,900
9th	9,200	6,000	4,000	19,200
10th	23,100	137,700	2,000	162,800
11th	80,700	-	-	80,700
12th	-	-	2,000	2,000
Total	142,700	156,300	8,000	307,000

Summary

Bancroft Ore Available	307,000 tons
Less 10% for rock and 10% for loss in mining	58,300 "
	248,700 "
Less December production	5,188 "
Net Total Available Bancroft Ore	243,512 "

<u>Level</u>	<u>Available Cliffs Shaft Ore "A" Shaft</u>			
	<u>Developed</u>		<u>Prospective</u>	
	<u>Floors</u>	<u>Pillars</u>	<u>Breasts</u>	<u>Total</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
1st	-	7,500	-	7,500
2nd	11,700	-	-	11,700
3rd	6,000	-	-	6,000
4th	-	-	6,000	6,000
5th	12,600	13,400	2,000	28,000
6th	74,200	74,200	8,000	161,700
7th	167,900	20,900	6,000	194,800
8th	140,200	29,000	6,000	175,200
9th	186,700	1,800	8,000	196,500
10th	53,000	140,500	10,000	203,500
11th	48,500	152,600	2,000	203,100
12th	70,200	75,700	2,000	147,900
15th	40,400	-	-	40,400
Total	811,400	520,900	50,000	1,382,300

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Level	Available Cliffs Shaft Ore "B" Shaft			Total Tons
	Developed		Prospective	
	Floors Tons	Pillars Tons	Breasts Tons	
1st	9,700	-	4,000	13,700
2nd	24,600	-	-	24,600
3rd	11,500	32,300	-	43,800
4th	-	-	-	-
5th	5,300	9,500	-	14,800
6th	2,000	11,900	-	13,900
7th	27,300	6,800	2,000	36,100
8th	47,600	23,100	2,000	72,700
9th	25,100	-	-	25,100
10th	27,600	-	2,000	29,600
11th	20,300	3,000	-	23,300
12th	4,600	5,500	2,000	12,100
13th	16,400	-	2,000	18,400
14th	17,700	2,000	-	19,700
15th	26,200	15,300	2,000	43,500
Total	265,900	109,400	16,000	391,300

Summary

Cliffs Shaft Available Ore "A" Shaft	1,382,300	Tons
" " " "B" "	391,300	"
Total Available Cliffs Shaft Ore	1,773,600	"
Less 10% for rock and 10% for loss in mining	337,000	"
Difference	1,436,600	"
Less December production	22,946	"
Net Total Available Cliffs Shaft Ore	1,413,654	"

Recapitulation

Cliffs Shaft Ore Available	1,413,654	Tons
Bancroft Ore	243,512	"
Grand Total Ore Available	1,657,166	"

The following tabulation shows the small increase in ore reserves for the past year:

	Jan. 1, 1938	Dec. 31, 1938
Cliffs Shaft Ore Available	1,402,852 Tons	1,413,654 Tons
Bancroft " "	252,050 "	243,512 "
Total " "	1,654,902 "	1,657,166 "
Increase for year 1938		2,264 "

The following tabulation shows how the ore reserves have varied by shafts and in the leased area for the past ten years:

Year	Net Available Ore in Sight		
	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

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The foregoing clearly shows that we have increased the ore reserves more in the Bancroft and "B" Shaft areas than we have in "A" Shaft.

It is also of interest to note how the available ore in the mine, although showing little variation year by year, has steadily increased by approximately 18% in the last 19 years.

Available Ore in Mine at end of each year

1938	1,657,166	Tons
1937	1,654,902	"
1936	1,592,108	"
1935	1,533,314	"
1934	1,546,917	"
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 & WAGES

a. General

The number of men employed varied but little from the previous year, the net total for 1938 being 388 compared with 386 in 1937. This is a larger crew than we had back in 1934 and 1935 and the increase is due partially to increasing the number of contracts from 70 to 90. We also put two men in each gang whereas it had been the practice in this property to generally have only one miner in a raise or drift. The extra man is a helper who is being trained to act as a miner later on. Furthermore, we have a number of old employees still on the payroll who are being kept on because of their years of service but who actually accomplish very little useful work.

The average wages both monthly and daily rate show a decrease because very little overtime was paid in 1938. There has been no change in the base rate which dates from March 16, 1937.

b. Comparative Statement of Wages and Product

	<u>1938</u>	<u>1937</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT	327,161	543,567		216,406
No. of Shifts & Hours	2 8-hr	2 8-hr		
No. of Days Operated	191	297		106
<u>AVERAGE NUMBER OF MEN EMPLOYED</u>				
Surface	92	93		1
Underground	296	293	3	
Total	388	386	2	

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AVERAGE WAGES PER DAY

	<u>1938</u>	<u>1937</u>	<u>Increase</u>	<u>Decrease</u>
Surface	5.48	5.52		.04
Underground	6.31	6.44		.13
Average	6.11	6.22		.11

WAGES PER MONTH OF 25 DAYS

Surface	137.00	138.00		1.00
Underground	157.75	161.00		3.25
Average	152.75	155.50		2.75

WAGES PER MONTH OF 22 DAYS

Surface	120.56	121.44		.88
Underground	138.82	141.68		2.86
Average	134.42	136.84		2.42

WAGES PER MONTH OF 17 DAYS

Surface	93.16	93.84		.68
Underground	107.27	109.48		2.21
Average	103.87	105.74		1.87

WAGES PER MONTH OF 13 DAYS

Surface	71.24	71.76		.52
Underground	82.03	83.72		1.69
Average	79.43	80.86		1.43

PRODUCT PER MAN PER DAY

Surface	17.72	20.72		3.00
Underground	5.68	6.54		.86
Total	4.30	4.97		.67

LABOR COST PER TON

Surface	.310	.267	.043
Underground	1.110	.985	.125
Total	1.420	1.252	.168

Following are comparative figures for the past 10 years:

<u>Year</u>	<u>Surface</u>	<u>Underground</u>	<u>Total</u>	<u>Wage</u>
	<u>Labor</u>	<u>Labor</u>	<u>Labor</u>	<u>Index</u> *
1938	.310	1.110	1.420	190.17
1937	.267	.985	1.252	184.77
1936	.214	.791	1.005	164.29
1935	.232	.809	1.041	149.79
1934	.194	.728	.922	138.05
1933	.379	.861	1.240	129.78
1932	.303	.908	1.211	132.27
1931	.232	.888	1.120	157.44
1930	.222	.890	1.112	161.70
1929	.213	.843	1.056	161.70

* Wage index compares yearly basic wage rates with those in effect June 30, 1916 which is assumed as 100.00.

It will be noted that the wages paid in 1938 are the highest in the last 10 years but are still a little below the figure of 197.87 which covers the period Feb. 1, 1920 to Feb. 1, 1921.

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	<u>1938</u>	<u>1937</u>	<u>Increase</u>	<u>Decrease</u>
Average Product Stopping and Trimming (Tons per shift)	11.16	13.88		2.72
Average Product Stopping and Trimming, including haulage crews (Tons per shift)	9.73	11.82		2.09

Decrease in tons per man due to smaller daily average hoist due to less overrun credited to monthly product during shipping season because ore was stocked each month during the year. Also due to accumulating large piles of broken ore underground which could not be hoisted as explained elsewhere in this report.

We operated all of 1938 with exactly the same number of trammers and motormen and brakemen as we had in 1937 but the motor crews could not haul the same tonnage per day because so much of the broken ore was temporarily tied up.

	<u>1938</u>	<u>1937</u>	<u>Increase</u>	<u>Decrease</u>
Average Wages - Cont. Miners	6.70	6.92		.22
" " - " Trammers	8.80	8.92		.12
" " - " Labor	6.96	7.17		.21

<u>TOTAL NUMBER OF DAYS</u>	<u>1938</u>	<u>1937</u>	<u>Increase</u>	<u>Decrease</u>
Surface	18,479 $\frac{1}{2}$	26,238 $\frac{3}{4}$		7,759 $\frac{1}{4}$
Underground	57,558 $\frac{1}{4}$	83,173 $\frac{1}{4}$		25,615
Total	76,037 $\frac{3}{4}$	109,412		33,374 $\frac{1}{4}$

AMOUNT FOR LABOR

Surface	\$101,327.52	144,953.20	43,625.68
Underground	362,975.58	535,719.13	172,743.55
Total	\$464,303.10	680,672.33	216,369.23

PROPORTION OF SURFACE TO UNDERGROUND MEN

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
1933	1 to 4.00
1932	1 to 4.60
1931	1 to 3.66
1930	1 to 3.76
1929	1 to 3.66

6. SURFACE

a. Buildings & Repairs

Shaft Houses

In both "A" and "B" Shaft houses we repaired the storage pockets under the skip dump. At "A" Shaft the main timbers were replaced, new planks and wearing plates added, but at "B" Shaft only the rails lining the bottom of the pocket needed replacement.

In "B" Shaft house at the collar of the shaft we rebuilt the gate used to cover over the shaft. The new gate was placed level with the concrete floor to eliminate the 2 foot step which we had always considered a hazard.

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Dry House

The brick wall of the East side of the washroom was repaired by building another wall on the outside, leaving an air space between the walls. The inside of the old wall used to get pretty hot when the showers were in use and when the cold weather came on, the bricks flaked off and crumbled.

Crusher Building

We have continued to try and make this building safer by building platforms to land and store repair parts. We also rebuilt the rock chute to try and prevent the discarded rock from the picking belt freezing and jamming at the turn just above the mouth of the chute.

All of the top tram cars both on the steel trestle and on the stocking trestle are now equipped with roller bearings. As a result we have decreased the grade on the crushed ore tracks from $\frac{1}{2}\%$ to less than 1%, allowing us to add at least 4 feet to the height of the stockpile.

Trestles

During 1938 we finished building up the foundation piers under the main steel trestles between the crusher building and the shaft houses. All of the corner angles are now encased in concrete far enough above the surface of the ground to prevent corrosion.

Laboratory

In the laboratory crushing room we installed a larger exhaust fan and made all of the pipe connections air tight to cut the dust count in this room down as much as possible.

We also salvaged enough linoleum floor covering from the main office to cover the floor in the main work room.

Pulley Stands

Ever since the new shaft houses were built we have had an excessive fleet angle on the "A" Shaft side of the engine house. This was not noticeable until during the big storm on January 25th we found the hoisting rope jumped two grooves on the North side of the drum. During 1938 we, therefore, corrected this trouble by moving the fixed sheave twice as far away from the engine house and rebuilding about two-thirds of all the pulley stands.

Coal Dock

An inspection of the coal dock in the Spring of 1938 revealed many of the legs, caps, and corbels, and stringers unsafe. A crew of four carpenters spent three months to make the dock safe enough to dump cars loaded with coal. The dock continues to get older each year and before long we will either have to rebuild or provide another storage place for coal.

Drainage Ditch

Because of excessive rainfall in the latter part of the year, the drainage ditch along the South side of the stockpile grounds overflowed, resulting in some of the garden plots being flooded. A crew of men were put to work in September to widen and deepen the entire ditch from where the launder from the pumps in "A" Shaft discharges the mine water to the Carp River one-quarter of a mile West of the West end of the lump stocking area.

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Fence

We started to build an 8 ft. fence along the North and East sides of the mine property. After this is finished it will be possible to keep the tourists and other sight-seers away from our shaft houses and mine buildings.

General

To save the roof as much as possible, another coating of "Save-All Roofing" compound was applied on all the roofs of all the mine buildings not covered with sheet iron or transite shingles.

Following is the data giving cost of repairs for the past five years. It will be noted that because of the "Recession" our repair bills were kept below 1935, 1936, and 1937.

	<u>1938</u>	<u>1937</u>	<u>1936</u>	<u>1935</u>	<u>1934</u>
Office & Warehouse	153.00	375.24	411.83	280.72	590.14
Shops	116.31	50.15	743.92	410.10	1.80
Shaft Houses	274.74	952.41	857.16	404.32	127.51
Engine House	184.33	823.26	1708.73	66.97	114.71
Dry Houses	839.88	2738.45	4956.23	823.32	224.16
Coal Dock & Trestle	1163.97	45.31	11.21	146.79	892.50
Crusher Building	327.04	864.60	677.10	-	-
Miscellaneous	110.60	338.38	1077.59	506.90	428.70
Total	3169.87	6187.80	10443.57	2639.12	2379.52

The two heaviest items - Coal Dock and Dry House - have been discussed and we reiterate that those repair jobs had to be undertaken to make those facilities safe.

7. UNDERGROUND

a. Development

The following tabulation shows month by month the percentage of all the underground contracts that we kept on development work. A developing gang is one drifting or raising in ore or rock or a stoping gang breasting ahead in new territory or stope raising outside the definite limits of known ore bodies. Sometimes there are two miners in a gang. If they work in separate breasts they are counted twice.

<u>Month</u>	<u>Total Number of Gangs</u>	<u>Gangs Developing</u>	<u>% Developing</u>
January	93	47	50.5
February	93	47	50.5
March	94	54	57.5
April	94	48	51.2
May	94	48	51.2
June	94	51	54.2
July	95	50	52.6
August	95	48	50.5
September	91	43	47.2
October	94	50	53.2
November	94	50	53.2
December	92	48	52.2
Monthly Average	93.6	48.7	52.0
For the Year 1937			56.5
" " " 1936			55.2

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The fact that the ore reserves were not reduced, but actually slightly increased, proves the effectiveness of the development campaign.

The actual work done by these developing contracts will now be described in detail.

"A" Shaft

3rd Level

Contract #74 employed in the North Vein between the 2nd and 4th levels all of the year continued to explore a short distance South of the South line of the Bancroft territory between the 1600 and 1800 East coordinates. What we actually found here was probably the ore shown in Diamond Drill Hole #114 drilled in 1907. The ore so far discovered has no great extent but we hoisted 2,142 tons of ore from #74 in 1938, which is that much tonnage to the good.

4th Level

In the extreme Northeast corner of the 4th Level East (in the North Vein), two miners, a double gang known as #8, continued to breast stope East. Unfortunately though we cannot find any ore below the floor of the stopes which would encourage us to drive a drift North on the main level, put up some raises, and eliminate a lot of cross hauling. Because the stope that parallels the 400 South coordinate line is actually up near the 2nd level elevation and we have to rehandle this ore three times, we brought this miner down to the 4th level and drove Southeast towards the intersection 400 South and 3400 East on the theory that another ore lens might lie under the upper ore body. Our development work in the latter part of 1938 seemed to bear out this theory and we now hope to be able to get up some new raises in ore to expedite the mining of the upper ore.

5th Level

In the Southeast corner of the Southeast Vein Contract #45 stope raised up on the foot and followed ore all the way up to above the 4th level. No work had been done in this territory for ten years and we are trying to get out all the available ore in this Southeast corner before mining the 5th level floor. After the floor is gone this territory will be isolated.

6th Level

In the West end of the Main Vein, 700 ft. due East of "A" Shaft, Contract #81 put up a stope raise, the top of which is well above the 5th level. This ore lies under the hanging to the South of the old workings on the 5th level and conditions are so favorable here for new ore that we decided late in the year to put up a second raise for a pipe and travelling road. After we hole this new raise up to the breast of the new stope we should be able to mine more efficiently because we will not have to remove pipe, ladders, tools, etc. before each blast and moreover we reduce the hazard of climbing up under possible "loose".

Over in the Bancroft area on the 2500 East coordinate line Contract #61 extended their breast stope quite a distance West of Diamond Drill Hole #387.

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In the East end of the 6th level, 1200 ft. Southwest of the Southwest corner of the old New York Mine, #67 extended their stope West under the hanging along the 400 South coordinate line. Over on the North side of the stope, the foot, which we had been following, proved to be only a false foot and turning square to the North we cut through the foot into another ore body, also a part of the North Vein.

7th Level

As we get deeper in the shaft we run into more development work. Five gangs - #16 in the North Vein, two #44 gangs in the North Vein, #57 also in the same vein, and #60 in the Southeast Vein, helped to maintain our ore reserves. Beginning over in the Northwest corner #57 breasted due East close to the South boundary of the Bancroft Lease. However, the material that #57 was developing, although satisfactory for lump ore, contained too much high silica material in the fines and #57 the last six weeks in the year was moved into old #30's stope on the 4th Level "A" Shaft North Vein where the ore is cleaner.

In the North Central part of the North Vein to the North of the main East-West fault three miners - one in #16 a short distance Southeast of the intersection 000 North and 1800 East, and a double contract - #44 - two hundred feet to the Southwest - raise stoped all year. #16 has only a limited chance of really adding to the ore reserves but #44 has a territory 1,000 ft. long along the main fault to the West that may prove to be ore bearing.

Down in the South end of the level in the West end of the Southeast Vein, Contract #60 is still extending their stope to the Northwest. The 2000 East coordinate line splits the stope and we have reasons to hope that eventually the stope may extend 200 ft. farther to the Northwest.

8th Level

Development work on the 8th level is confined to the Northeast sector. Contract #25 on the East side of the main North-South crosscut and #64 over on the West side are developing sizable ore bodies of high grade ore. Both of these gangs have a big territory to explore in. Contract #25 can go 1,000 ft. to the East before crossing the West line of the New York Mine.

9th Level

Four gangs - #35 in the North Vein, #64 and #68 also in the North Vein, and #65 in the Southeast Vein, found more than enough new ore to offset what they mined in 1938. Contracts #35 and #68 in the extreme East end of the 9th level 1200 ft. Southwest of the Southwest corner of the New York Mine are probably exploring in the same ore lens. Indications are that one gang is on the South side of the anticline while the other is on the opposite side.

Contract #64 up in the Northeast corner mining in the Easterly extension of the Bancroft ore body will eventually breast far enough to the West to connect with Contract # 70 on the Bancroft Lease.

Contract #65 in the West Central portion of the Southeast Vein continues to find enough ore in this portion of the supposedly worked out portion of the mine to produce 4,302 tons of ore in 1938.

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In the Bancroft territory #76 continues to stope raise in a fine ore body headed for the intersection 200 North and 1400 East. This gang gave us 4,504 tons of ore in 1938 and all indications are that we have not even begun to scratch this territory. In the South Central part of the lease both #10 and #84 breasted Southwest and Southeast towards the boundary line. We would not be surprised to find the ore here crossing over the line into the Cliffs Shaft Mine fee property.

10th Level

We now run into a great many developing gangs scattered throughout the Bancroft area - the North Vein East and South of the Bancroft Lease, the Main Vein, the South Lens, and the Southeast Vein.

Every pound of ore taken from the Bancroft area on the 10th level was from development work. In the Northwest corner Contract #80 after drifting West for 225 ft. in rock struck high grade ore 75 ft. East of the ore shown in Diamond Drill Hole #456. We hope now that 1939 will show up a nice lens of high grade ore in this area. There is reason for hoping also that the ore will extend quite a distance vertically above and below the 10th level.

In the Southwest corner Contract #89 put up a new raise from the 10th to the 8th level. This raise, starting a short distance West of the 1600 East coordinate line, started in ore, went into rock, and did not hit ore again until a few feet below the 8th level. The result of that development work did not throw any further light on where the ore in old #62 stope on the 8th level goes to but as we mine the floor of the old stope into the new raise we are going to get some of that information. A little further to the West of the new raise #89 also started a new stope raise that is leading us up into unknown territory.

In the South Central part of the Bancroft area Contract #84 drove a breast stope South and East near Diamond Drill Hole #439. They also put up two short raises from the back of this stope to #10's stope on the 9th level, both raises being branches of the main raise coming up from the 15th level. Late in the year #84 was moved up to the top of one of those raises on the 9th level as heretofore described.

Over near the East boundary of the lease Contract #5 raised up to the top of the ore at the 9th level elevation and then started to open up a new level right under the hanging of the lens.

In the Northeast corner of the level in the North Vein to the East of the Bancroft territory Contract #23 drifted due East for a short distance in ore. The drift then entered rock and continued in the foot for 107 ft. During the last two months of 1938 we drifted through 67 ft. of ore and it is more than probable that the ore extends 150 ft. farther East to Diamond Drill Hole #458 and some distance beyond.

Contract #82 also put up a new raise all in ore from the 10th to the 8th levels 150 ft. Northwest of the Southeast corner of the Bancroft Lease.

The sum total of all the development work done on the North side of the 10th level leads us to believe that we will continue to find much new ore not only on the leased property but also on our own fee property to the East.

In the fee area of the Cliffs Shaft property every contract employed in the North Vein, Main Vein, South Lens, and Southeast Vein, added to our ore reserves. In the North Vein #4 and #83 extended the main level drift West close and parallel to the South 200 coordinate line. The drift itself remained in the foot but the most Easterly raise, a short distance East of the 1800 East coordinate cut 48 ft. of the ore in the top of the raise before they holed to the 8th level. That means that the ore in the floor of the 8th level extends down to the 9th level. The other raise to the West with two branches is now

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up a little above the 9th level elevation with no ore in sight.

In the main Vein Contract #24 extended the former known limits of their stope both North and South between the 1600 and 1800 East coordinate lines. Going East for 500 ft. we had #7 develop some new ore clear on up through to the old 9th level floors. This gang produced only 370 tons of ore, the balance of approximately 5,500 tons being tied up. This ore will be available for shipment in 1939.

In the Southeast corner of the Main Vein #11, #26, and #50 all increased the outlines of the deposit and at the same time broke a good tonnage of high grade ore. No. 11 for instance gave us 6,486 tons and #26 5,282 tons of ore, both above the average for the mine.

In the South Lens #3 near the intersection 700 South and 1900 East pushed the ore outline farther to the North and moreover found a lot of new ore under the foot of old #55's stope. Old #55 mined down to a dike foot and later we found the dike to be only 3 or 4 ft. thick with ore underneath.

In the Southeast Vein a little Southeast of the intersection 1000 South and 2600 East Contract #55 pushed their East breast ahead and also raised up on the foot. We still have good chances of finding more ore East of the breast regardless of the fact that Diamond Drill Hole #209 70 ft. away shows no ore. The ore will probably rise up above the sill floor and go over the drill hole.

11th Level

On the 11th level four gangs - all in the Main Deposit - #7, #21, #62, and #82 - were developing all year. The first already described under the 10th level caption also increased the 11th level ore area in the North Central part of the level. Over in the Northwest corner #62 crosscutted to form a pillar and also breasted West along the 600 South coordinate. There is still more ore to be developed here because we have two diamond drill holes below the 10th level that show ore along the 1800 East line 100 ft. still farther to the West. Over in the Central portion of the level #82 started a drift going far enough to the South to avoid old #11's stope, the objective point being the ore shown in Diamond Drill Hole #331. We also have in mind that about 15 years ago in the stope above between the 9th and 10th levels the miners ran into bad "loose" and finally gave up the job of trying to make the back safe. We now expect to get a new raise up into this territory so that we will be able to travel safely by another route to mine out the ore left behind.

Over in the Northwest corner #75 finished all three branch raises from the 15th to the floors of the 11th and 12th levels and #21 started to stope around the top of one of these branches where we now know the ore to go down to the 12th level. On the latter level we have no mine workings within 300 ft. of where the raise found the ore so that eventually there will be more ore mined in new territory East of the present workings.

12th Level

On the 12th level in the Bancroft area Contract #80 ran out of the ore after stoping 70 ft. Southwest of their branch raise and then they drifted to nearly the 1800 East coordinate line in the foot. We then decided to concentrate on the 15th level because we would need another raise up from the 15th to properly mine the ore developed by #10 and #76 on the 10th level.

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15th Level

As just mentioned #10 and #76 on the 10th level have shown the possibility of a large ore body between 1600 and 2000 East and 200 and 400 North. Although Diamond Drill Hole #435 shows this ore to a depth of only 14 ft. below the 10th level, Diamond Drill Hole #438 indicates ore down to 48 ft. below the 10th. Then Diamond Drill Hole #456 runs into ore along a big fault which means that this ore could go below the 10th for quite a distance. In any event we have enough encouragement to warrant driving a drift on the 15th level from which to put up raises to tap the ore bodies just mentioned.

Contract #75 after finishing the three branch raises running from the East end of the 15th level to the main deposit on the 11th and 12th levels was moved into the Bancroft area and by the end of the year had driven 300 ft. of footwall drift. After we have gone another 200 ft. we will be in far enough to start another raise to hole in about the center of the large deposit discovered by #10 and #76 on the 10th level.

"B" Shaft

1st Level

Contract #1 600 ft. Southwest of "A" Shaft in the Southeast Vein in "B" Shaft continued to add to the ore reserves by finding some new ore on the foot above the 1st level.

Contract #17 on the 1165 ft. sub level 400 ft. Southeast of the shaft has uncovered a new ore area under the hanging that has resulted in doubling the width of the Main Deposit. We may now find the same ore to go at least 200 ft. further to the Northwest. It may seem strange that this ore was not discovered before but as has been written before a thin shell of rock mistaken for the real foot or hanging kept the new ore lens hidden for so many years.

3rd Level

In the North Vein area Northwest of "B" Shaft two gangs - #63 and #72 - spent most of the year barring. Over 4,400 tons of ore was barred down and hoisted in 1938. Contract #63 mining in the Southeast corner did also manage to extend their breast stope a little farther to the East. We have done no work on the main level for two years, but we do have a full breast of ore on the sill floor and can, when we decide, extend the ore outlines Northwesterly.

5th Level

Contract #33 500 ft. Southwest of "B" Shaft continued to raise stope on the foot. We have now just about doubled the size of the ore area and because there are no workings in the Fault Vein on either the 4th and 5th levels we hope to develop still additional ore.

6th Level

Contract #85 in the Fault Vein 700 ft. Southwest of "B" Shaft drifted through the foot and found a little ore along Diamond Drill Hole #247 but the ore was mixed, only about two-thirds of the broken material being good enough to be hoisted as ore. Late in the year this same miner was moved to the 8th level to explore for the ore shown in Diamond Drill Hole #302 on the 8th and #169 on the 7th. We have an idea that both runs in these drill holes represent the same ore lens.

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7th Level

Contract #13, 300 ft. Northwest of "B" Shaft, ran a breast stope right through the center of a large pillar 125' x 150'. The ore, however, was mixed and so to prevent contaminating the crushed ore, the miner was moved 200 ft. back from the breast to start some new raises going up to some good ore in the 6th level floors.

8th Level

Two gangs - #69 and #88 - were on the development program all year. #69 in the Main Vein put up a new raising stope on the footwall headed for the 400 South and 600 West coordinates. This gang gave us 5,486 tons despite the fact that a great deal of broken ore was tied up all year. #88 put up a new raise in the North Vein to #42 on the 6th level. The raise was put up in a narrow seam of ore and we had to swing it from side to side to avoid rock. There are six turns in it but it is always the practice in the Cliffs Shaft Mine to have at least one turn in the raise just above the chute fingers to break the fall of the material dropping down the raise. In a long straight raise, if the raise were nearly empty, a blast might and probably would tear out all the front of the chute and the stoppers or fingers.

10th Level

In the West end of the 10th level in the Section 9 Deposit we had three gangs at the end of the year - #47, #77, and #88. On the sill floor the main drift got into ore shortly after crossing the 4400 West coordinate line. We found the ore to run West for 75 ft. when it turned Northwest following a dike on the South side. On the North side jasper cut off the ore. We turned the drift about North 45° West and found mixed ore and jasper along the dike. In the meantime #88 started to raise up on the jasper and finally opened a new stope at the 9th level and then continued to raise stope Southeast. The reason for raise stoping is very simple because it was our desire to avoid the use of a scraper hoist and by going up at an angle of 40° the broken ore is mostly thrown down over the pile into the raise. This scheme also enables us to find out quickly how high the ore will continue. On the sub we are following the dike on the Southwest side. There is, however, one disadvantage in raise stoping and that is that the air and water pipes must be moved previous to each blast and to overcome this difficulty we started another raise and drift to hole into the breast of the sub stope. When the drift is holed we will have a second outlet from the stope.

Down on the sill floor we still have a breast of ore 14 ft. wide in the Southeast corner of the stope a short distance West of the 4400 West coordinate line. Back 125 ft. farther East we also drilled a hole that shows 10 ft. of 54.85% ore right in line with the probable extension of the ore body. Although the analysis of the core and sludge from the drill hole does not lend much encouragement, still we have in the past found a lot of high grade ore very close to drill holes showing low analysis.

In the area between the main vein and the fault vein #14, 1,000 ft. due West of the shaft, crosscutted North and then swung East after finally hitting high grade ore. We were very much disappointed here all year until November. The ore was mixed, most of it too poor to be hoisted, but in November the breast changed and we ran into heavy slips and blocky ground which are good signs for high grade ore.

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12th Level

Contract #86 in the Fault Vein pushed their breast straight East along the 400 South coordinate and here, despite the fact that a great deal of broken ore is tied up, we secured 3,538 tons to add to our yearly production. There is no telling how far the ore will go to the East because we are out in new territory but presumably we will eventually hole into the old stopes on the 10th level.

13th Level

On the 13th Level Contract #43 breasting along Diamond Drill Hole #314 gave us 3,050 tons with most of their broken ore left behind to work upon.

15th Level

Two gangs - #37 and #58 - did nothing but development work all year. #37 was started to find the downward extension of the ore shown up in Diamond Drill Holes #451 and #454 on the 14th level. We did find some ore on the main level and then raised up on the foot but up to the end of the year the ore discovered was not the same as that shown up in the drill holes. Probably the hanging of the new ore was the footwall of the ore found by drilling. Only further exploration will prove the accuracy of that statement.

Directly West of "B" Shaft #58 put up two branch raises to the 12th level - one for #56 and the other for #86. These raises proved the ore in the 12th level floor to go down 40 ft. below the 12th.

The table that follows shows the ore hoisted from the developing gangs just described. It must be kept in mind, of course, that some of these developing gangs were in rock all year.

"A" Shaft

Level	No.	Vein	Tons	Mine	Tally
3rd	74	North Vein	2,142		
4th	8	" "	6,116	"	"
5th	45	Southeast Vein	5,683	"	"
6th	61	Bancroft	6,775	"	"
6th	67	North	3,402	"	"
6th	81	Main	2,436	"	"
7th	16	North	3,313	"	"
7th	44	"	4,604	"	"
7th	60	Southeast	4,541	"	"
8th	25	North	7,492	"	"
8th	64	"	4,011	"	"
9th	10	Bancroft	3,082	"	"
9th	35	North	3,738	"	"
9th	64	"	4,011	"	"
9th	65	Southeast	4,302	"	"
9th	68	North	1,423	"	"
9th	76	Bancroft	4,504	"	"
9th	84	"	3,000	"	"
10th	3	South Lens	6,250	"	"
10th	5	Bancroft	2,919	"	"
10th	7	Main Vein	367	"	"
10th	11	" "	6,486	"	"
10th	12	North	483	"	"
10th	23	" "	541	"	"
10th	24	Main	3,833	"	"

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10th Level - No. 26 - Main Vein	5,282	Tons	Mine	Tally
10th " - " 50 - " "	3,901	"	"	"
10th " - " 55 - Southeast Vein	2,142	"	"	"
10th " - " 80 - Bancroft "	47	"	"	"
10th " - " 82 - " "	2,525	"	"	"
10th " - " 83 - North "	147	"	"	"
10th " - " 84 - Bancroft "	2,678	"	"	"
10th " - " 89 - " "	3,040	"	"	"
10th " - " 21 - " "	3,675	"	"	"
10th " - " 62 - " "	4,431	"	"	"
Total "A" Shaft - - - - -	123,322	"	"	"

"B" Shaft

1st Level - No. 1 - Southeast Vein	2,357	"	"
1st " - " 17 - Main Vein	5,722	"	"
3rd " - " 63 - North "	3,208	"	"
3rd " - " 72 - " "	1,218	"	"
5th " - " 33 - Fault "	2,310	"	"
6th " - " 85 - " "	1,830	"	"
7th " - " 13 - North "	2,570	"	"
7th " - " 57 - " "	3,197	"	"
8th " - " 69 - Main "	5,486	"	"
10th " - " 14 - Fault "	1,162	"	"
10th " - " 47 - Sec. 9 Deposit	1,391	"	"
10th " - " 77 - " " "	1,297	"	"
10th " - " 88 - " " "	3,208	"	"
12th " - " 56 - Fault Vein	1,173	"	"
12th " - " 86 - " "	3,538	"	"
13th " - " 43 - " "	3,019	"	"
15th " - " 37 - Main "	1,255	"	"
15th " - " 58 - Fault "	121	"	"
Total "B" Shaft - - - - -	44,062	"	"
Grand Total "A" & "B" Shaft - - -	167,384	"	"
Total Production for 1938 - - - -	320,705	"	"
% of Product secured from Development Contracts - - - - -	52.1		

Note: Above figures are mine tallies and do not include pocket overrun.

We would like to call attention to the remarkable similarity between the figures of 52.0% which represents the proportion of all the gangs for the year on development work and 52.1% which is the portion of the total product secured from these same gangs.

Following are some comparative figures for past two years:

<u>Year</u>	<u>No. of Gangs</u>	<u>Tonnage</u>	<u>Shifts</u>	<u>Tons per Gang</u>
	<u>Developing</u>	<u>Mine Tally</u>	<u>Worked</u>	<u>per Shift</u>
1938	53	167,384	8,538	19.60
1937	45	252,445	12,755	19.79

Comparisons in this case do not actually mean anything because if a larger proportion of ore is developed in drifts, raises, or narrow lenses, than in the standard 25 ft. wide breast stopes, the tons per shift will drop. However, the figures are of interest.

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b. Stopping

The following contracts spent the entire year mining floors or backs, known as developed reserves, so we call them depleting gangs.

<u>"A" Shaft</u>				
1st Level	- No. 34 - North Vein	3,549	Tons	Mine Tally
2nd "	" - " 9 - " "	4,090	"	"
2nd "	" - " 27 - Main "	5,313	"	"
2nd "	" - " 29 - Bancroft Vein	3,087	"	"
2nd "	" - " 30 - Main & Banc. Vein	7,660	"	"
4th "	" - " 22 - Bancroft Vein	1,318	"	"
5th "	" - " 2 - Southeast "	3,754	"	"
5th "	" - " 32 - North "	5,355	"	"
6th "	" - " 41 - Southeast "	3,034	"	"
6th "	" - " 54 - North "	2,420	"	"
6th "	" - " 66 - " "	7,135	"	"
7th "	" - " 6 - Southeast "	4,988	"	"
7th "	" - " 15 - North "	2,326	"	"
7th "	" - " 20 - " "	5,056	"	"
7th "	" - " 28 - " "	4,468	"	"
7th "	" - " 52 - " "	2,100	"	"
7th "	" - " 59 - Main Vein	4,615	"	"
8th "	" - " 53 - Bancroft "	5,077	"	"
8th "	" - " 78 - North "	5,470	"	"
8th "	" - " 79 - " "	5,534	"	"
9th "	" - " 70 - Bancroft "	4,142	"	"
11th "	" - " 39 - Main "	4,247	"	"
Total "A" Shaft - - - - -		100,271	"	"
<u>"B" Shaft</u>				
1st Level	- No. 18 - Main Vein	4,956	"	"
3rd "	" - " 73 - " "	2,195	"	"
4th "	" - " 71 - North "	2,152	"	"
6th "	" - " 38 - Main Vein	6,809	"	"
6th "	" - " 40 - North "	3,754	"	"
6th "	" - " 42 - " "	1,795	"	"
7th "	" - " 87 - " "	5,518	"	"
7th "	" - " 90 - " "	192	"	"
8th "	" - " 19 - Main "	1,914	"	"
8th "	" - " 36 - North "	3,704	"	"
9th "	" - " 49 - Fault "	4,599	"	"
13th "	" - " 31 - Main "	1,292	"	"
14th "	" - " 46 - " "	8,694	"	"
14th "	" - " 48 - " "	5,476	"	"
Total "B" Shaft - - - - -		53,050	"	"
Total "A" & "B" Shaft - - - - -		153,321	"	"
Total Production for 1938 - - -		320,705	"	"
% of Product hoisted from				
Depleting Gangs - - - - -		47.9		

The above again proves that less than half the product came from proven ore reserve areas.

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As long as we get about half of the total production each year from the development work we do not have to worry about reserves because we have a rule-of-thumb at this property which briefly is that a development gang always puts as much new ore in sight as they take out each year. Half the year's product mine tally was 160,357. Development gangs furnished 167,384 tons of the product, therefore, we should have increased our ore reserves by the difference between 167,384 and 160,357 tons. Actually the increase from the ore estimate was 2,264 tons.

The following table is for general information only because it does not reflect the relative efficiency of the stoping gangs in 1937 and 1938:

<u>Year</u>	<u>No. of Gangs</u>	<u>Tonnage</u>	<u>Shifts</u>	<u>Tons per Gang</u>
	<u>Stoping</u>	<u>Mine Tally</u>	<u>Worked</u>	<u>per Shift</u>
1938	37	153,321	5,494	27.91
1937	38	263,155	10,771	24.43

The above do not agree with the tons per man per day stoping as shown later in this report. The figures that follow are taken from the Labor Statement and in making up those, all gangs mining ore are included. The figures that we show under Developing and Stoping separately are really a break-down of the tons per man per day Stoping shown on the Labor Statement. However, as can be readily imagined, we get the least tonnage per day from development work. The figure of 21.55 tons per day on the Labor Statement lies between our 19.60 for Development and 27.91 for Stoping.

Tons per man per day Stoping (Labor Statement)

Year 1938	21.55
1937	22.52
1936	22.61
1935	22.98
1934	23.25
1933	18.90
1932	21.80
1931	20.55

As mentioned last year, because of the difficulty of differentiating between Developing, Stoping, Mining Floors & Backs, because so many gangs work in two or three separate places, the above tabulation includes all gangs mining ore. We always try to have a miner drill in one place while his partner is scraping from another and quite frequently the miner will drive a breast stope or raise and take some floor or back in the same month.

The reason for the lower tons per man per day Stoping is the fact, as brought out in some of the monthly reports, that we had a lot of gangs accumulating ore to enable us to reach ore left in the back of the stope. For confirmation of this statement we have added the following table:

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Contract #15	-	Accumulating ore for	7 months		
"	19	-	"	"	6 "
"	20	-	"	"	3 $\frac{1}{2}$ "
"	22	-	"	"	9 "
"	27	-	"	"	2 "
"	31	-	"	"	10 "
"	33	-	"	"	3 "
"	36	-	"	"	2 $\frac{1}{2}$ "
"	39	-	"	"	4 "
"	42	-	"	"	7 "
"	52	-	"	"	9 "
"	54	-	"	"	7 "
"	55	-	"	"	10 "
"	56	-	"	"	9 "
"	59	-	"	"	4 "
"	73	-	"	"	6 "
"	90	-	"	"	12 "

At the end of the year we estimate we had a little over 50,000 tons of broken ore in stopes, which does not include what is stored in raises. In #1 raise 15th Level "B" Shaft we probably have 1,500 to 2,000 tons. If the ore in all the storage raises is included, the 50,000 tons figure can be raised to 75,000 tons.

Following is a detailed account of the gangs mining developed reserves:

"A" Shaft

1st Level

Contract #34 just West of the Southwest line of the Bancroft Lease in the North Vein mined floors all year. The ore was scraped twice, being dropped to old #30's stope on the 4th level and then scraped into a chute so that the ore could be hoisted in "B" Shaft.

2nd Level

Contract #9, Northeast of the shaft, mined a floor Southeast of the intersection 000 North and 1000 East and then also put up a raise stope on the foot directly East of the same intersection. This part of the mine is getting pretty well worked out. A short distance Northeast of #9 Contract #30 in the Bancroft territory scrambled around and took out all the ore that could be salvaged without handling too much rock. Going still a little farther to the North #29 mined floors between the 2nd and 3rd levels.

In the Main Vein #27 in the Central portion of the vein continued to take floors between the 2nd and 3rd levels. They also raised up to the 1st level to make some ore available on the 400 East line. During the last three months we scraped 1,000 to 1,100 tons of rock off the top of an old floor that we found to be high grade ore. We can't imagine why the rock was dumped here but are now suspicious that there might be other ore floors covered with old rock piles.

200 ft. Northeast of #27 in the North Central part of the Main Vein #30 mined both old backs and floors.

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4th Level

In the Bancroft area just North of the South boundary #22 spent nine months barring to make the back safe. We finally had to change miners by switching #22 and #30 and attack the problem by putting up a new raise, making a backdoor entrance to the top of the stope. The other miner from old #30 is now rapidly getting down all the "loose".

5th Level

In the Bancroft area in the Southeast corner Contract #66 took out a small floor.

In the North Vein to the East #32 and #51 practically cleaned up all the available ore along the main foot. To the South under the hanging #32 also breasted South and took out some floor.

Over in the Northwest corner #40 mined floor and the same is true of #2 in the Central part of the Southeast Vein. The crushed ore samples from #2, however, were never very high in iron and so late in the year we moved them back into the main drift where the ore is better. All the ore in the upper part of the Southeast Vein is mixed and it is only by careful selection that we are able to mine any of it.

6th Level

Three gangs - #41, #54, and #66, depleted our ore reserves. The first named worked in the West end of the Southeast Vein, the second in the Central part of the North Vein, and the third in the Southeast corner of the Bancroft Lease.

7th Level

Six gangs - #6, #15, #20, #28, #52, and #59, all mined floors or backs. One of them - #6 - was in the Southeast Vein and all the rest except #59 mined in the North Vein. #59 was over in the East end of the Main Vein.

We did not get much production from these gangs because most of them kept accumulating their broken ore. #15, to reach their back, gave us no ore for seven months. #20 barred back and "loose" from September to December. #52 found new ore going up on the foot which was the hanging of their old stope and for nine months they climbed up over broken ore to reach the back. They tied up the main 6th level track and buried all our pipes and cables which were protected by poles and planks. #59 also did nothing but accumulate ore for the last four months of 1938.

8th Level

Only two contracts - #53 and #79, mined floors - one in the Bancroft and the other in the North Vein.

9th Level

We are now getting down into that part of "A" Shaft where nearly all the miners are developing. One gang, however, #70 in the Southeast corner of the Bancroft Vein did not increase or add to the ore outlines. #70 also drove a new travelling road to their raise about 40 ft. above the 10th level and then resumed mining floors.

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11th Level

Only one contract - #39 - mined backs between the 10th and 11th levels. As a matter of fact, this gang could be classed as a developing contract because we had always assumed the material in the back at this point to be jasper. The jasper was only a thin sheet and #39 gave us 4,247 tons of high grade ore in 1938.

"B" Shaft

Above the 1st level #18 continued throughout the entire year to scam ore in the central part of the Main Vein. This ore is found by drilling test holes in the old stopes. Nowhere, however, do we exceed the height established as a limit of mining. In fact, we keep about 100 ft. below the tops of some of the old workings.

3rd Level

About 250 ft. due West of "B" Shaft #73 mined floors and backs all year, working from the 5th up to the 3rd level. The ore on the 4th was not high grade and so we moved the miner into a better ore area on the 3rd level. This ore has to be scraped twice with two separate scraping outfits.

4th Level

Contract #71 here classified as a depleting gang actually for half of the year was opening up a new lens but most of their product of 2,152 tons came from an old floor they holed into directly North of "B" Shaft in the North Vein.

6th Level

Three gangs - #19, #38, and #42 - depleted the ore reserves, the first two in the Main Vein Southwest of the shaft and the last named in the North Vein 300 ft. North of the shaft. #42 was another one of those gangs that had trouble with "loose" and so had all their ore tied up for seven months in the shipping season. In #19 we ran into trouble with their back and it was decided to reverse the procedure and work from the top. The miner was moved from the 9th to the 6th level and instructed to blast ore from the top levels down into the floor of his old stope. We are gradually accumulating a pile of ore here and eventually will be able to bar from a pile of ore and not from long ladders.

7th Level

Of the two depleting gangs #87 and #90, the latter furnished only 192 tons of ore, which is about six days production, because they need the broken dirt pile to work upon. Both gangs are in the North Vein directly North of "B" Shaft.

8th Level

Contract #36, 900 ft. Northwest of the shaft, mined back all year. We have trouble here also with a soft hanging that slabs off and extra men are employed to pick out the rock.

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9th Level

#49 stoped from the Fault Vein over to the Main Vein, finding only a thin shell of rock along the South side of the Main Vein. There are still a lot of good chances for ore further to the Southwest and early in 1939 we will probably start to explore that area.

13th Level

#31 in the South Central part of the Main Vein mined considerable back and then raised up to the 12th level. This gang accumulated all their broken ore from February through to December.

14th Level

Two of the best producing gangs in the mine - #46 and #48 - took out floors in the Main Vein. #46 in the Northeast corner ran into some lean ore in the Fall, which, however, gave us a satisfactory lump grade, but because the crushed ore analysis were low the miner was moved over into the other end of his stope.

c. Drifting and Raising

<u>Year</u>	<u>Rock Drifts and Raises</u>	<u>Ore Drifts and Raises</u>	<u>Total</u>
1938	2,337 ft.*	1,955 ft.**	4,292 ft.
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 "
1933	615 "	372 "	987 "
1932	1,357 "	585 "	1,942 "
1931	3,577 "	3,212 "	6,789 "

* 1,674 ft. of drifts and 663 ft. of raises

** 259 " " " " 1196 " " "

In 1938 we did 40% less drifting and raising compared with 1937 but we also worked 36% fewer days so that we just about kept up the same rate of development work.

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d. Explosives, Drilling and Blasting:
Explosives Statement for Year 1938

Stoping and Development in Ore

	<u>Quantity</u>	<u>Average Price</u>	<u>Cost 1938</u>	<u>Cost 1937</u>
60% L. F. Gelatin	37,580	13.46	5060.60	17878.18
Gelamite #1	261,450	12.25	32026.05	41648.00
Total Powder	299,030	12.40	37086.65	59526.18
Fuse - feet	468,900	5.67	2658.51	4091.73
#6 Caps	72,160	12.18	878.69	1512.48
Electric Caps	2,192	11.58	253.79	124.58
Fuse Lighters	23,500	5.73	134.37	148.73
Wire (Shot Cord)	3,130'	11.12	34.79	45.53
Fuse Cans, etc.	12		18.87	10.36
Tamping Bags	23,000	3.25	74.52	99.82
Powder Bags (DuPont) Misc.			42.12	50.00
Total Fuse, etc.			4095.66	6083.23
Total - Stoping & Development in Ore			41182.31	65609.41

Product	327,162	543,567
Lbs. of Powder per Ton of Ore	.9140	.9050
Cost per Ton for Powder	.1134	.1095
" " " " Fuse, etc.	.0125	.0112
" " " " All Explosives	.1259	.1207

Development in Rock

60% L. F. Gelatin	7,300	13.45	981.50	281.49
Gelamite #1	39,650	12.25	4858.12	8502.00
Total Powder	46,950	12.44	5839.62	8783.49
Fuse	65,900	5.67	373.82	443.64
#6 Caps	9,500	12.18	115.63	143.48
Electric Caps	1,240	11.58	139.31	595.10
Fuse Lighters	3,500	5.73	20.31	35.31
Wire	1,000		10.08	137.02
Tamping Bags	3,350		10.55	22.13
Fuse Cans & Misc.			1.03	62.14
Total Fuse, etc.			670.73	1438.82
Total - Development in Rock			6510.35	10222.31

Feet - Rock Development	2,337	4,292
Cost per ft. - Rock Development	2.79	2.38

GRAND TOTAL - All Explosives	47692.66	75831.72
Avg. Cost per lb. for Powder	.1241	.1214

The pounds of powder per ton used in Stoping and Development in Ore indicate that we used 1% more explosives in 1938 than 1937. The increase can easily be accounted for in the loss in overrun on pocket shipments. In 1937 we had 28,535 tons of overrun and in 1938 only 6,460 tons. The first figure represents 5.2% of the total product for that year and the latter only 2% of the total product. That difference is more than enough to alter many of the comparisons made in this report.

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We did make a change in the kind of powder used. Up to November 1937 we bought 50% low freezing dynamite and 60% Gelatin. The former was issued to all stoping contracts where ventilation was good, the latter to all drifting and raising gangs. We found during 1937 that the per cent of lump dropped to 67.5% from a high of 70.7% in 1934. That was serious as it meant a possible loss of 20,000 to 25,000 tons of lump ore per year. Furthermore, there was more or less inefficiency caused underground by gangs leaving their working places after blasting block holes. Not all of the block holes can wait to be blasted during the lunch hour or at the end of the shift. We then and there decided to change the kind of powder and for three months used nothing but 60% Gelatin in all the miners contracts. That did eliminate the smoke evil and we believed increased the per cent of lump but we had no definite data to figure from because we were stocking our daily product. The cost per ton for explosives, however, jumped from an average of .111 per ton to .135. In February 1938 we switched over to Gelamite #1 which has more or less the same properties as 60% Gelatin, costs less, and leaves no bad gases in the working places. As a result of the change for those months in which we used nothing but Gelamite #1 the cost dropped to .090 per ton and during the short shipping season while loading from the pockets we found our per cent of lump had increased back up to 69.6%. In October the car weights indicated a factor of 71.0% lump. Whether the changing of the type of powder used increased the per cent of lump or whether the increase was due to the type of ore mined in 1938 is problematical. A smaller per cent of magnetite ore and slate ore and a larger proportion of steel ore could also account for the increase.

Just as a matter of interest, the following table shows how the various contracts were divided between the different types of ores in December 1937 and December 1938:

	<u>Dec. 1937</u>	<u>Dec. 1938</u>
Specular Ore Contracts	41.1 %	50.5 %
Slate " "	17.5 %	17.4 %
Steel " "	29.1 %	24.2 %
Magnetite " "	11.2 %	7.9 %
Conglomerate Ore "	1.1 %	0.0 %
	<u>100.0 %</u>	<u>100.0 %</u>

It would be a big job to work up the foregoing data for a whole year for this report but the figures indicate at least for the two months compared that we might more than probably have mined less steel ore in 1938 than in 1937 so that one could also infer that the change in the percentage of lump was due to changing the type of powder.

Following are comparative figures for the past eight years:

<u>Year</u>	<u>Lbs. Powder Per Ton of Ore</u>	<u>Cost per Ton for Powder</u>
1938	.9140	.1134
1937	.9050	.1095
1936	.8575	.0980
1935	.8387	.0982
1934	.7838	.0879
1933	.7561	.0927
1932	.7312	.0914
1931	.8512	.1080

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8. COST OF OPERATING

a. Comparative Mining Costs

	<u>1938</u>	<u>1937</u>	<u>Increase</u>	<u>Decrease</u>
PRODUCT (Tons)	327,161	543,567		216,406
Underground Costs	1.735	1.526	.209	
Surface Costs	.279	.220	.059	
General Mine Expense	.386	.262	.124	
Cost of Production	2.400	2.008	.392	
Depreciation	.003	.003		
Taxes	.431	.235	.196	
Loading & Shipping	.024	.039		.015
TOTAL COST AT MINE	2.858	2.285	.573	
No. of Days Operating	191	297		106
No. of Shifts & Hours	2 8-hr	2 8-hr		
Average Daily Product (Tons)	1,713	1,830		117

The average daily product is listed below for comparison since 1929:

<u>Year</u>	<u>Average Daily Product</u>
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 figures show a slump from the peak in 1937 and that is entirely due to our desire to get the mine in shape after two hard years. In 1936 and 1937 especially we had no time to follow up small leaders of ore and take out many backs because most of the mining in good active shipping years is confined to floors, breast stopes, and raising stopes, none of which tie up much broken ore.. We have taken advantage of the slack period to salvage ore that would otherwise be forever lost. We have put up quite a few raises in good ore areas getting ready to mine floors when the demand for ore again comes. For instance, in "A" Shaft we have a new raise for #81 - 6th Level Main Vein - also one from the 8th to the 6th Level Bancroft Vein - three from the 10th to the 8th Level North Vein - three from the 10th to 8th Level, Northeast corner of those levels - one from the 10th to 8th level Bancroft Lens - and three from the 15th to 11th and 12th Levels Main Vein. What that means is that 12 gangs could be shifted from narrow lenses or less productive places to taking out floors to boost production.

In "B" Shaft we have four new raises ready for the same purpose. It is desirable to defer mining at the tops of all these raises until there is a good steady demand for ore.

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<u>Exploring in Mine</u>			
<u>Year</u>	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>
1938	\$ 4,686.91	3,104.43	7,791.34
1937	4,575.62	8,758.89	13,334.51
Increase	111.29		
Decrease		5,654.46	5,543.17

The figures in detail follow:

	<u>1938</u>	<u>1937</u>
Labor for Diamond Drill	\$ 2,833.00	4,379.50
Proportion of D. D. Supt's Time	155.48	196.12
Carbon Loss	1,961.89	2,342.76
Pipe & Fittings	59.70	177.60
Drill Equipment & Repairs	259.18	-
" " Rental	412.50	568.75
Miscellaneous Supplies	76.15	69.59
Compressor Expense	475.00	575.00
Total Drilling Cost	6,232.90	8,309.32
Miscellaneous & Direct Charges	515.97	1,027.99
Analysis Expense	320.76	396.37
Geological Dept. Expense	2,368.16	3,600.83
GRAND TOTAL	9,437.79	13,334.51
Cost per Foot	3.825	3.445
Feet drilled for the year	1,848	2,825

Total cost for year higher by \$1,646.45 than amount shown on the 1938 cost sheet because that amount was spent exploring in #47 drift in Section 9 West of "B" Shaft and all rock drift and raise cost and all diamond drilling expense in this area is charged to capital investment and not operating expense.

Total cost per foot higher in 1938 due entirely to supply charges. Labor cost only shows a slight increase. Carbon cost much higher per foot in 1938 and rental and repair costs total most in 1938.

In order to more intelligently explain the difference in cost per foot it is necessary to know the kind of material we drill each year. The following, which is a new tabulation for this report, gives a summary of the various kinds of material cut by the drill in 1938.

Ore footage drilled	159 ft.	8.6%
Lean Ore " "	124 "	6.7
Hard Ore Jasper footage drilled	384 "	20.8
Soft " " " "	124 "	6.7
Dike " " " "	799 "	43.2
Chert " " " "	11 "	.6
Siderite " " " "	155 "	8.4
Slate " " " "	92 "	5.0
Total	1,848 "	100.0 %

The easiest and cheapest formation to drill is dike or slate and in 1937 55% of the total footage was in that material compared with 48.2% in 1938. The Jasper and Siderite formation run the unit cost up.

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Development in Rock

For purposes of comparison we give the figures for the last five years:

Year	Footage	Labor Cost		Supply Cost		Total Cost	
		Total	Per Foot	Total	Per Foot	Total	Per Foot
1938	2,337	\$27,178.28	11.63	\$ 9,267.95	3.97	\$36,446.23	15.60
1937	4,292	46,240.53	10.78	15,808.94	3.70	62,049.47	14.48
1936	4,122	29,973.19	7.27	13,826.79	3.35	43,799.98	10.62
1935	3,043	19,725.90	6.48	11,486.68	3.77	31,212.58	10.25
1934	1,932	14,556.29	7.53	7,341.89	3.80	21,898.18	11.33

To more intelligently compare the last three years we submit a break-down of the kind of rock work done the last three years:

	1938	1937	1936
Rock Raises	663'	1657'	1060'
10' x 10' Trolley Locomotive Drifts	1389'	1906'	2105'
8' x 8' Storage Battery " "	285'	729'	957'
Total	2337'	4292'	4122'

To further clarify the kind of rock work done we are showing the different kinds of material encountered:

	Material & Footage		
	Jasper or lean Ore	Dike or Slate	Total
Rock Raises	443'	220'	663'
10' x 10' Rock Drifts	198'	1191'	1389'
8' x 8' " "	86'	199'	285'
Total			2337'

The foregoing figures prove one point and that is in 1938 that we did more main level drifting - in 1938 60% and in 1937 only 44% of the total footage was main level drifts. It obviously costs more per foot to put in a full motor sized drift with trolley wire, pipe lines, tracks, ditches, etc. than it does to put up a 6' x 7' raise. In 1937 it will be noted that the footage raised was very high.

Development in Ore & Stopping

As explained in this report and in the 1937 annual report in detail, Development in Ore & Stopping are combined because of the difficulty in trying to keep these accounts separated under our peculiar operating conditions.

Following are the costs for the last three years:

Year	Labor Cost	Supply Cost	Total Cost
1938	\$ 158,962.48	62,792.63	221,755.11
1937	234,506.85	98,963.60	333,470.45
1936	151,285.89	75,334.38	226,620.27

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The details for the last two years follow:

	1938		1937	
	Total	Cost Per Ton	Total	Cost Per Ton
<u>Labor</u>				
Miners' Labor	\$ 108,892.97	.333	166,546.27	.307
Other "	50,069.51	.153	67,960.58	.125
Total "	158,962.48	.486	234,506.85	.432
<u>Supplies</u>				
General	1,066.42	.003	1,606.89	.003
Iron & Steel	9,336.15	.029	16,252.80	.030
Oil	593.47	.002	949.12	.001
Machinery	2,872.43	.009	6,866.75	.012
Explosives	41,182.31	.126	65,609.41	.121
Lumber	189.82		371.25	.001
Sundries	1,367.19	.004	2,113.37	.004
Expense Accounts	6,184.84	.019	5,194.01	.009
Total Supplies	62,792.63	.192	98,963.60	.181
 TOTAL LABOR & SUPP.	221,755.11	.678	333,470.45	.613
 Tons Hoisted	327,161		543,567	

Practically all the unit increase amounting to .065 is in the labor costs. The increase is three-fold - first, we purposely starved production to get at the ore in the backs of stopes. In other words, we broke more ore than we hoisted; second, due to restricted shipments our cost increased 3 to 4% because of loss of overrun on pocket shipments; third, the higher basic schedule of wages was in effect all of 1938, the change occurring March 16, 1937.

Timbering

Year	Total Cost	Cost per Ton
1938	\$ 10,640.09	.033
1937	12,947.52	.024
Increase		.009
Decrease	2,307.43	

95% of the timbering cost at the Cliffs Shaft property is either building or repairing underground chutes. Back in 1935 and 1936 the unit cost was on a par with 1938 because during the depression period we did as little repairing as possible and then when business conditions became better we had a big job getting the fingers, plates, doors, etc. back into first class shape. As a result of the extraordinary efforts made in 1935 and 1936 we were able to taper off in 1937. In 1938, however, because of the intensive raising campaign the previous year we found it necessary to build a lot of new chutes. The permanent chute is rarely built until the raise is finished because we have found from experience that we damage or blow out the chute while we are raising.

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Tramming

<u>Year</u>	<u>Labor</u>		<u>Supplies</u>		<u>Total</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
1938	\$127,736.29	.390	10,648.82	.033	138,385.11	.423
1937	197,949.32	.364	12,907.40	.024	210,856.72	.388
Increase		.026		.009		.035
Decrease	70,213.03		2,258.58		72,471.61	

Total cost decreased, of course, because of drop in operating schedule but unit cost increased because of lower daily average hoist.

Ventilation

<u>Year</u>	<u>Cost</u>
1938	\$ 1,127.87
1937	361.81
Increase	766.06

Our ventilation problem is very simple and so the cost is low. All the incoming air comes down the old Incline and No. 3 shafts, spreads over the 6th, 7th, 8th, 9th, and 10th levels, and eventually is discharged up both "A" and "B" Shafts. To help improve the air in our rock headings we purchased 3 new #2 $\frac{1}{2}$ "B" Anaconda Type fans, 4,000 cu. ft. capacity, made by the American Blower Company. They are powered with a 5 h.p., 1750 R.P.M., General Electric D. C. motor. We also added a number of sprays that throw a finely divided stream of water about 50 ft. for all the breast and raising stopes. Ventube for the rock drifts was also added to the ventilating equipment.

Pumping

	<u>Total</u>	<u>Cost per Ton</u>
Operating Cost as per 1938 Cost Sheet -	\$ 34,835.33	.107
Maintenance " " " " " " -	2,545.60	.008
Total	37,380.93	.115
Operating Cost as per 1937 Cost Sheet -	28,414.74	.052
Maintenance " " " " " " -	1,779.93	.003
Total	30,194.67	.055

The detailed costs for the two years follow:

	<u>1938</u>	<u>1937</u>
Maintenance	\$ 2,545.60	1,779.93
Pumpmen Labor	8,667.99	7,338.56
Other " "	2,729.89	643.97
Total Labor	11,943.48	7,982.53
Compressor Expense	600.00	600.00
Oil, Waste, & Packing	165.11	373.54
Tools	61.07	70.17
Electric Light	381.34	349.17
" Power	22,229.93	19,039.33
Total Operating Expense	23,437.45	28,414.74
" Maintenance & Operating	37,380.93	30,194.67
Gallons of water pumped	362,484,824	370,846,799
" " " " per minute	690	706

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Pumping costs for 1938 show a heavy increase but that does not mean a larger cost disbursement because most of it is in the item for Power.

Maintenance was higher because of two items - one, the building of a dam on the 6th level, and the other, cleaning out the pump discharge ditch on surface. About 15 years ago the old #3 and Incline Mine workings were holed into and the top levels drained. No attempt had been made, however, to drain the 4th, 5th, and 6th levels, in the old mines except to drill some diamond drill holes on the lower levels from the Cliffs Shaft 8th level holing into the bottom or 6th Level #3 Mine. The valves on these holes were kept open but even then when we got heavy precipitation on surface the water level would rise rapidly and if it rose to the old 3rd level it would overflow into the Incline Shaft and could get into the Cliffs Shaft Mine and tax the capacity of our pumps. If we had a power failure at that time we stood a good chance of losing our bottom level and main pump station. We, therefore, drove a drift over on the 6th level, holed into the #3 Mine, and then built a dam between the two mines. We have pipe and valves installed at the dam to enable us to draw off the water from #3 if it gets too high. That work accounts for most of the increase in the Maintenance Cost. The other item regarding the cleaning of the discharge ditch has already been described in this report.

It will be noted that there is an increase in pumpmen labor. We did not add any new pumpmen but our average wages for 1938 were higher than 1937 because of the new wage rates going into effect March 16, 1937. The real reason, however, for the increase is due to putting on pumpmen helpers when the mine is idle. We operated 106 less days in 1938 which means that the helpers could have worked 3 8-hour shifts on those 106 days or 318 shifts. Of course, if we were doing repair work on the 15th level, where the pumps are located, on one of the idle days, we did not call out the pumpman's helper.

There was a big increase in other labor also because of the cleaning of all the sumps, the big job being the main sump. About once in five years we clean the big sump. We did that job in 1927, again in 1932, and again this last year. There are four main sumps - one at the bottom of each shaft, one under the main track opposite "A" Shaft, and the other, the large one, directly under the pumphouse. We had a heavy snow-fall in the early part of 1938 and if we were to have a few successive warm days in the Spring or a quick break-up we might get beyond the capacity of our pumps despite the precautions taken to avoid such an occurrence. We knew that the big sump had a lot of mud and silt in it and so it was decided to clean it out, which was done in February and March. First we tackled the two sumps at the bottom of both shafts; then we moved to the small sump under the main line and finally took 160 skips of mud out of the big sump. All of that work had to be done on Saturdays and Sundays for which we paid time and a half.

Now we come to the only other items showing a large increase and that is power. The increase is not in the quantity of power used but in the rate paid.

Note the power consumption for light and the pumps:

<u>Year</u>	<u>K.W.Hours</u>	<u>Rate</u>	<u>Cost</u>
1938	1,348,611	.0167	\$ 22,609.47
1937	1,334,205	.0145	19,416.70
Increase	14,406	.0022	3,192.77
Increase	1.08%	15.2%	

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The following tabulation gives the gallons per minute pumped each month for the past two years:

	<u>Gallons per Minute</u>	
	<u>1938</u>	<u>1937</u>
January	624	732
February	654	736
March	621	658
April	741	656
May	750	717
June	733	754
July	729	711
August	694	712
September	694	713
October	677	698
November	697	692
December	658	686
Average for Year	<u>690</u>	<u>706</u>

Compressors, Air Pipes, & Power Drills

	<u>1938</u>		<u>1937</u>	
	<u>Total</u>	<u>Per Ton</u>	<u>Total</u>	<u>Per Ton</u>
Compr. & Air Pipes	\$33,004.48	.101	44,761.88	.082
" & Power Drills	4,441.00	.014	14,247.74	.026
Total	<u>37,445.48</u>	<u>.115</u>	<u>59,009.62</u>	<u>.108</u>

Breaking down these figures gives this picture, viz:

	<u>1938</u>	<u>1937</u>
Labor for Compressors & Air Pipes	\$ 3,557.25	5,831.87
" " " & Power Drills	334.31	3,035.84
Total Labor	<u>3,891.56</u>	<u>8,867.71</u>
Supplies for Compr. & Air Pipes	29,447.23	38,930.01
" " " & Power Drills	4,106.69	11,211.90
Total Supplies	<u>33,553.92</u>	<u>50,141.91</u>
Grand Total	<u>37,445.48</u>	<u>59,009.62</u>

The figures indicate that the labor cost in 1938 dropped off much more than the reduction in working time. The costs for 1937, however, were above normal due to the expenditure of \$2,799.28 for labor dismantling, moving, and installing the compressor brought in from the Morris Mine.

The working schedule was reduced by about one-third in 1938 and the supply cost decreased likewise by about one-third. The heaviest item for supplies for the compressors is, of course, power which aggregated \$27,883.58 or 95% of the total. The rate per K.W.H. increased just like it did for pumping - 15.2% - because when the mine goes on a reduced working schedule our power or load factor always drops. On a six-day a week operating schedule the factor varies from 55% to 61% which makes our rate for power .0136 per K.W.H. On 3 days per week the load factor drops to 27% and 28% and the rate jumps to as high as .0194 per K.W.H. That makes our power bills go up and keeps the Cliffs Power & Light Co. earnings up so that they show a drop of say only 10% below full time operation even though the mines are down to one-third or one-half of the full time operation.

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The following data is imformative:

Air & Water Pipes Installed in 1937 and 1938

	<u>1938</u>	<u>1937</u>
$\frac{1}{8}$ " Pipe	150'	-
$\frac{3}{8}$ " "	709'	898'
$\frac{1}{2}$ " "	6,738'	8,253'
1" "	5,566'	7,470'
$1\frac{1}{4}$ " "	590'	1,003'
$1\frac{1}{2}$ " "	229'	2,801'
2" "	3,978'	5,897'
3" "	100'	4,221'
4" "	-	1,014'
Total	<u>18,040'</u>	<u>31,557'</u>

In 1937 we revamped all the air and water lines on the 6th, 7th, 8th, 9th, and 10th levels, which accounts for the large consumption of 2", 3", and 4" pipes in that year.

New Drills Purchased in last two years:

	<u>1938</u>	<u>1937</u>
N-75 Ingersoll Rand Standard Drifters	9	14
D-12 Cleveland " "	0	7
J-45 Ingersoll Rand Block Holers	0	5
Total	<u>9</u>	<u>26</u>

Back Filling

<u>Year</u>	<u>Total</u>	<u>Cost per Ton</u>
1938	\$ 3,913.24	.012
1937	5,932.24	.011
Increase		.001
Decrease	2,019.00	

The decrease in total cost of one-third just about corresponds with the decreased number of days operated which should be the case because we have made no change in the size of the crew or the method of operation. This account covers the cost of loading rock, trammig it to the shaft, hoisting to the 2nd level, and then trammig and dumping and sometimes scraping it into old stopes.

Underground Superintendence

<u>Year</u>	<u>Total Cost</u>	<u>Cost per Ton</u>
1938	\$ 19,387.57	.059
1937	25,883.12	.048
Increase		.011
Decrease	6,495.55	

Several changes were made in the underground personnel. George Bredeson, "A" Shaft Mine Foreman, had to quit work in May because of physical infirmities and Matt Renowden was moved from "B" to "A" Shaft. John Freethy, formerly shift boss in the old Lake and Holmes Mines and for years on Route #1 in "A" Shaft, was promoted to Mine Foreman for "B" Shaft. John Glanville, shift boss at the Barnes-Hecker, Lloyd, and "B" Shaft on the alternate day and night shift crew, took Freethy's place. Then Ray Boase, graduate of Capt. Rogers' training school, was made a shift boss. Ed. Dawe, formerly shift boss at the Spies-Virgil, and trammer boss at the Cliffs Shaft Mine, was put in Ernest Norell's place when the latter died. The net result is that we have one less boss underground at present because the trammer boss vacancy has not been filled.

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Scrapers & Mechanical Loaders

Year	Labor Cost		Supply Cost		Total Cost	
	Total	Per Ton	Total	Per Ton	Total	Per Ton
1938	\$ 11,874.08	.036	22,347.97	.069	34,222.05	.105
1937	19,077.92	.036	38,036.46	.069	57,114.38	.105
Decrease	7,203.84		5,688.49		12,892.33	

Unit costs show no change from 1937 to 1938. Following is a detail, however, of the supplies charged out the past two years:

	1938		1937	
	Amount	Cost	Amount	Cost
3/8" Wire Rope	1,940'	\$ 164.02	2,240'	\$ 191.53
1/2" " "	5,418'	582.50	5,900'	612.82
5/8" " "	41,731'	7522.60	62,575'	11516.06
Electric Cables	2,180'	759.86	10,175'	3678.87
" Motors	3 (New)	821.04	11 (New)	3010.48
New Scraper Units	3 (New)	1650.00	8 (New)	4165.52
Gen'l Electrical Repairs & Renewals		10847.95		14861.18
Total		22347.97		38036.46

The drop in the aggregate cost for supplies is proportionately much more than the drop in production and the decrease is largely in such items as new electric cables, new motors, and new scraping units.

We continued to use "Trulay" preformed 5/8" rope and now have more comparative data on the unit cost of this rope.

Year	Product	Type of 5/8"		Cost	Unit Cost
		Rope Used	Feet		
1936	456,760 Tons	"Standard"	66,961	\$ 9120.90	.0195
1938	327,161 "	"Trulay"	41,731	7522.60	.0229

Number of large 25 h.p. units in service in 1938 was 78.

We have omitted 1937 from the tabulation because in that year we changed from "Standard" 6 x 19 rope to "Trulay" 6 x 19 and during that year we had some of both kinds of rope in use. In 1936 the consumption of rope per scraper hoist per shift was 3.83. For the last half of 1937 that figure dropped to 2.88 and for the entire year of 1938 the factor is 2.82, or a drop of about 26%. "Trulay" rope costs about 20% more but we have eliminated one source of possible accidents and infection from men handling these ropes because they do not become "porcupined".

Electric Tram Equipment

Following are comparative costs for the maintenance of electric haulage system for past two years:

	1938			1937		
	Labor	Supplies	Total	Labor	Supplies	Total
Generators & Motors	\$ 55.11	10.51	65.62	265.37	64.06	329.43
Locomotives	2021.43	2248.36	4269.79	1119.27	238.85	3501.12
Wiring	497.62	595.03	1092.65	580.35	1321.39	1901.74
Main Line Tracks	5196.45	3512.60	8709.05	8031.91	3019.44	11051.35
" " Cars	3130.26	1577.42	4707.68	6757.43	4429.31	11186.74
Spotting Engines		16.96	16.96		849.10	849.10
Total	10900.87	7960.88	18861.75	16754.33	12065.15	28819.48

No new equipment was purchased in 1938 except one battery for the General Electric locomotive on the 1st level "B" Shaft. We also borrowed or rather rented a trolley locomotive from the Gardner-Mackinaw Mine. About half the total cost was for main line tracks which are extensions to our main haulage system resulting from development work.

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Hoisting

Comparative data for 1938 and 1937 follows:

	<u>1938</u>	<u>1937</u>
Maintenance	\$ 4,210.44	\$ 6,808.97
Operating Expense:		
Engineers' Labor	8,203.99	10,307.87
Other "	1,338.99	1,479.00
Total "	<u>9,542.98</u>	<u>11,786.87</u>

Supplies

Oil, Waste & Packing	89.67	105.43
Tools	67.11	42.78
Electric Lights	191.46	131.16
" Power	12,457.97	16,107.31
Compressor Expense	300.00	260.00
Heating Expense	796.73	970.83
Total Supplies	<u>13,902.94</u>	<u>17,617.51</u>
Total Operating Expense	<u>23,445.92</u>	<u>29,404.38</u>
Total Maint. & Optg. Expense	27,656.36	36,213.35

Cost per ton produced	.085	.067
Tons Ore & Rock Hoisted	352,983	584,649
Average depth hoisted	677'	677'

Because so much of the engine house expense is fixed and does not vary regardless of the tonnage produced, the cost per ton will naturally go up as the production from the shafts drops off. That accounts for a drop of only 20% in labor costs. We have to have at least one man in the engine house all the time. When we are hoisting ore on the day shift three men are employed - one for each hoisting engine, and one compressor man. At night the force is reduced to two and on days the mine is idle only one man works. The power cost, because of the increase in the rate because of lower power factor, is comparatively high for 1938.

We put on no new hoisting ropes or cable for the counterweights, but early in 1939 we will have to buy at least two new ropes.

Stocking Ore

Total for 1938	\$ 17,586.66	Cost per Ton	.053
" " 1937	<u>15,358.16</u>	" " "	<u>.028</u>
Increase	2,228.50		.025

Total for 1938 higher for a number of reasons. In 1937 all the ore hoisted was shipped from pockets from the latter part of March to the latter part of November. In 1938 there was not a single month in which some ore was not stocked. Because of small shipments of crushed ore it was necessary to level off, grade, and plank enough stockpile area to take care of the crushed ore to be hoisted the winter of 1938-1939. Another heavy expense was the scraping of lump ore into the valley between the old piles. We decided it was cheaper and would provide more room if we scraped and heaped up the ore between the piles. We also graded and planked a new area to provide room for Bancroft Lump at the West end of the North pile.

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Screening & Crushing at Mine

	1938		1937	
	Amount	Per Ton	Amount	Per Ton
Labor	\$ 11,452.26		19,558.82	
Supplies	6,301.52		10,909.99	
Total	17,753.78	.053	30,468.81	.056

It will be noted that the heaviest reduction is in the supplies, which means that we tried to keep repairs down to a minimum and still keep the plant operating.

Dry House

Year	Total	Cost per Ton
1938	\$ 5,675.85	.017
1937	7,806.77	.014

Total expense went down in 1938 but unit cost increased for the reason that even though the mine does not operate every day we have to keep the Dry warm and clean. We try and keep the costs down by having the floor man in the engine house look after the Dry on the days the mine does not operate.

General Surface Expense

Year	Total	Cost per Ton
1938	\$ 10,293.62	.032
1937	10,596.66	.019
Increase		.013
Decrease	303.04	

Our 1938 General Surface Expense ran about \$2500 above normal for two reasons - one, the starting of the building of a new 8 ft. fence to enclose the entire property, but the main reason is the continued employment of old men who have a great many years of service but are capable of doing very little useful work. We did, however, also expend about \$400.00 extra digging out and opening up the roads after the heavy blizzard of January 25, 26, and 27th.

Shaft

Year	Amount	Per Ton
1938	\$ 1,676.84	.005
1937	2,159.01	.004

Fewer shaft repairs necessary because we needed fewer new runners because of falling off in the number of trips the skips and cages made in 1938. As a matter of fact, when we are operating full time, the expense of keeping the shaft pockets on all the levels in shape accounts for most of the cost under the caption "Shaft". The dumping of the lump ore from the motor cars into the pockets when the skip is spotted at the mouth of the chute in a short time wears out even manganese plates and the doors and slides need frequent replacement.

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Top Tram Equipment

<u>Year</u>	<u>Total Cost</u>	<u>Per Ton</u>
1938	\$ 4,761.30	.015
1937	7,467.90	.014
Increase		.001
Decrease	2,706.60	

The total cost dropped off just about the same as the drop in production, but it must be kept in mind that we stocked some ore every month in 1938 so that the wear and tear on the equipment was above normal.

We equipped the remaining cars that were not entirely rebuilt in 1937 with roller bearing wheels and axles which results in being able to cut down on the grade of the track so that we can actually stock 15,000 to 20,000 tons more ore in the crushed ore area. We also reconditioned the big lump ore stocking car replacing doors, wheels, axles, and lining plates.

Docks, Trestles, & Pockets

<u>Year</u>	<u>Total Cost</u>	<u>Per Ton</u>
1938	\$ 2,870.93	.009
1937	3,802.86	.007
Increase		.002
Decrease	931.93	

One of the heavy items of expense under this heading was the cost of repairs to both "A" and "B" Shaft pockets. "B" Shaft pocket under the dump had been rebuilt in 1933 so that we did not have the job that we had at "A" Shaft where we found all the framework around the pocket in bad shape. We did not wish to tie up operations and so did the repair work piecemeal but it is more than likely that when the mine is closed for a week to allow the men to take their vacation with pay that we will have to tear out all the old pocket and build a new one at "A" Shaft.

General Mine Expenses

Because most of the items under this heading are charges from the Central or Cleveland offices we are not attempting to explain them in detail.

	<u>1938</u>	<u>1937</u>
Mining Engineering	\$ 3,769.93	4,931.33
Mechanical & Electrical Eng.	2,138.64	1,743.20
Analysis & Grading	11,396.69	14,553.01
Safety Department	2,276.50	2,229.75
Telephone & Safety Devices	3,941.06	5,105.51
Local & General Welfare	7,459.07	6,255.00
Spec. Exp., Pensions & Allows.	9,924.89	9,437.13
Ishpeming Office	20,868.83	21,531.00
Mine Office	20,761.74	21,163.16
Insurance	- 309.21	4,990.58
Personal Injury	18,854.99	21,023.30
Social Security Taxes	20,201.56	20,633.37
Employees Vacation Pay	5,183.12	8,496.08
Total General Mine Expenses	126,467.81	142,092.42
Cost per Ton	.386	.262

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It might be well to explain that we supplied about 150 men with the new safety goggles, hoping thereby to eliminate most of the eye injuries. As will be explained later, we have actually cut that hazard materially judging from the accident reports that come to the office.

9. EXPLORATIONS

Following are the holes drilled during the year:

D. D. Hole #	Total Depth	Ore Found
456	422'	33'
" 457	352'	-
" 458	256'	66'
" 459	330'	64'
" 460	127'	-
" 461	220'	6'
" 462	275'	-
	<u>1982'</u>	<u>169'</u>

Note: Under Exploring in Mine we show 1848 ft. of drilling done which included 159 ft. of ore. Both sets of figures are correct because the difference is the amount of footage drilled on Section 9 to the West. All exploratory work done on Section 9 is supposed to be charged to capital account. The year's drilling did show up two new ore bodies - one on the Bancroft Lease in the Northwest corner of the 10th Level, and the other in the North Vein to the East of the Bancroft area also on the 10th level. Both are favorably located geologically and will probably add to our ore reserves in the years to come.

10. TAXES

Comparative data for 1938 and 1937 follows:

	1938		1937	
	Valuation	Taxes	Valuation	Taxes
Realty	\$ 2,560,000	92637.44	2,510,000	85452.45
Minerals under NW $\frac{1}{4}$ Sec. 9-47-27	100,000	3618.65	100,000	3404.48
Personal	690,000	24968.68	600,000	20426.90
Lot 2, Sec. 3-47-27 (Bancroft)	450,000	16283.93	450,000	15320.16
SE $\frac{1}{4}$ of NE $\frac{1}{4}$ Sec. 9-47-27 (Barnum)	52,000	1881.70	52,000	1770.33
Lot 174, Nelson Addition	100	3.62	100	3.41
South 35.91 ft. of Lot 179	50	1.81	50	1.70
Total	<u>3,852,150</u>	<u>139395.83</u>	<u>3,712,150</u>	<u>126379.43</u>
Collection Fees		1393.96		1263.79
GRAND TOTAL		<u>140789.79</u>		<u>127643.22</u>
Taxes per ton produced		.4303		.2348
" " " shipped		.8636		.2474

Valuations and taxes for the past few years are shown for comparison:

Year	Taxes	Valuation
1938	\$ 140,789.79	3,852,150
1937	127,643.22	3,712,150
1936	110,614.68	3,232,150
1935	101,853.17	3,202,110
1934	99,486.51	3,119,110
1933	99,072.28	3,160,110
1932	123,114.90	3,640,130
1931	159,547.60	4,000,150
1930	146,588.82	3,725,150

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The rate for 1938 was \$36.1865 compared with \$34.0444 in 1937. The increase is due to the City and not County government because the County rate dropped from \$8.4185 in 1937 to \$8.2525 in 1938. The increase can be readily seen from the comparison shown, viz:

	1938		1937	
	Amount	Rate	Amount	Rate
Valuation	\$ 10,541,910.00		10,627,920.00	
<u>Funds</u>				
County Tax	65,886.94	6.2500	69,081.48	6.5000
County Road Tax	20,029.63	1.9000	17,429.79	1.6400
County Debt Service Tax	1,080.31	0.1025	2,959.93	0.2785
City Contingent Tax	55,400.00	5.2552	44,400.00	4.1776
City Debt Service Tax	8,170.00	0.7750	16,235.00	1.5276
Streets and Highway Tax	79,000.00	7.4939	79,700.00	7.4990
Fire Fund Tax	34,400.00	3.2632	10,400.00	0.9786
Library Tax	10,200.00	0.9676	9,700.00	0.9126
Water Tax	700.00	0.0663	6,000.00	0.5645
Sewer Tax	3,500.00	0.3320	4,100.00	0.3857
Cemetery Tax	9,200.00	0.8727	5,100.00	0.4798
School Tax	71,157.89	6.7500	71,844.74	6.7600
School Debt Service Tax	22,750.00	2.1581	24,875.00	2.3405
Rejected County Tax	56.32		(
Rejected City and School Tax	180.83		(51.65	
TOTAL	381,711.92	36.1865	361,877.59	34.0444

11. ACCIDENTS
AND
PERSONAL
INJURIES

The following figures give a five-year history of the safety record at the Cliffs Shaft Mine:

	1938	1937	1936	1935	1934
Number of No-Time Lost Accidents	64	101	62	49	51
Compensable or Fatal Accidents	11	10	3	7	9
Number of Man Shifts Worked	76,038	109,412	93,937	59,597	45,910

Our record at the mine was marred by two fatal accidents - one a trade risk and the other occurring two days before Christmas was preventable. The fatality caused by a fall of rock was fortunate in a way because the man's partner could easily have also been caught. No one could be blamed, however, as the underground bosses were taking unusual precautions in this particular place even to the extent of cutting out a shelf or platform for the men to work upon.

The other fatality, however, should not have occurred because the unfortunate employee, a motorman, not only did not have his locomotive controls in the off position but he elected to choose a narrow place to work when there was plenty of room on the opposite side of the train.

An analysis of the other nine compensable accidents shows that six of them were preventable while the other three were strains or sprains where we have to more or less take a man's word for it because there are no outward signs of injury.

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The 64 slight accidents occurred when the men were on the following routine:

Hurt about hands, body, feet (not eyes) while barring "loose"	8
" " " " " " " drilling	6
" " " " " " " sledging	1
Eye Injuries - 10 in the first 6 months, 5 in the last 6 months, of which 3 were on the cage	15
Hurt while shovelling or lifting chunks	3
Loading ore at chutes	3
Scraping Ore	4
Sprains or Strains	4
Slipped on tracks, planks, ore or rock piles, walks, etc.	10
Hurt moving equipment	2
Cutting or splicing rope	1
Repairing Cars	1
Hurt cleaning raise	1
Miscellaneous	5
Total	<u>64</u>

The tabulation shows that after we introduced the safety glass goggles that the frequency of eye accidents dropped.

12. NEW
CONSTRUCTION
OR EQUIPMENT

E. & A. #708

Under the authority granted by this E & A we purchased a new battery for the 1st Level "B" Shaft General Electric locomotive transferred to the Cliffs Shaft Mine from the old Republic Mine.

E. & A. #804

This covers six new N-75 drill machines and four of these have been purchased.

14. MAINTENANCE
AND REPAIRS:

Dwellings

The detail of the expense control for all the company's rented houses in the Ishpeming District for 1938 follows:

	<u>Rented Buildings</u>			<u>Loc. Expense</u> <u>Cleaning, etc.</u>	<u>Grand</u> <u>Total</u>
	<u>Labor</u>	<u>Supplies</u>	<u>Total</u>		
Hard Ore Location	1534.85	1611.16	3146.01	3.79	3149.80
Barnum "	728.13	537.40	1265.53	11.46	1276.99
Angeline "	45.31	84.20	129.51	116.88	246.39
Salisbury "	4.14	12.43	16.57	169.39	185.96
Second Addition	29.67	805.06	834.73	121.59	956.32
Outhwaite Purchase	125.05	102.10	227.15	-	227.15
Hyde Purchase No. 1	12.22	4.01	16.23	-	16.23
" " " 2	208.50	282.45	490.95	-	490.95
Smith Purchase	125.19	64.86	190.05	-	190.05
Nelson "	107.94	142.99	250.93	-	250.93
Total	2921.00	3646.66	6567.66	423.11	6990.77

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The figures for the last few years follow:

Total for 1938	\$ 6,990.77
" " 1937	15,588.69
" " 1936	13,305.82
" " 1935	21,497.81

We sold no houses in 1938.

15. POWER

We purchased 4,609,711 k.w.h. from the Cliffs Power & Light Co. in 1938 at the rate of .01677 per k.w.h.

<u>Year</u>	<u>K. W. H.</u>	<u>Cost</u>	<u>Rate per K.W.H.</u>
1938	4,609,711	\$ 77,269.00	.01677
1937	6,104,385	88,837.43	.01455
1936	5,415,857	75,662.87	.01397
1935	3,710,853	59,791.67	.01611

Following is a detail of where the current was used:

	<u>K. W. H.</u>	<u>Cost</u>
Tramming	257,385	\$ 4,315.07
Pumping	1,348,611	22,609.47
Hoisting	754,799	12,654.20
Stocking Ore	14,814	248.36
Crushing Ore	123,812	2,075.70
Dry House Expense	16,489	276.44
Surface	16,206	271.69
Telephones & Safety Appliances	50,098	839.91
Mine Office	6,348	106.43
Machine Shop	1,973	33.07
Carpenter Shop	1,491	25.00
Drill & Bit Shop	28,181	472.46
Heating Plant	7,596	127.36
Compressors	1,663,969	27,883.58
Electric Haulage	317,939	5,330.26
Total	4,609,711	77,269.00

Comparative data for 1938 and 1937 shows where we used more or less current and just how much the difference is.

		<u>1938</u>	<u>1937</u>	<u>% Decrease</u>	
Production (tons)		327,161	543,567	39.8	
Tramming	K.W.H.	257,385	365,670	29.6	
Pumping	"	1,348,611	1,334,205	1.1	Increase
Hoisting	"	754,799	1,115,515	32.3	
Stocking Ore	"	14,814	8,465	75.0	Increase
Crushing "	"	123,812	191,025	35.2	
Dry House	"	16,489	18,210	9.4	
Surface	"	16,206	15,825	2.4	Increase
Telephones & Safety App."	"	50,098	64,825	22.7	
Mine Office	"	6,348	6,455	1.7	
Machine & Carpenter Shop"	"	3,464	5,050	31.0	
Drill & Bit Shop	"	28,181	31,315	10.0	
Heating Plant	"	7,596	9,400	19.2	
Compressors	"	1,663,969	2,499,150	33.4	
Electric Haulage	"	317,939	438,585	27.5	
Total	"	4,609,711	6,104,385	24.5	

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The pumping load is directly dependent on the amount of water handled and the proportion pumped by the centrifugal pump. The centrifugal unit is not as efficient as the two "Prescotts".

Stocking Ore shows an increase due to scraping ore into the valley between the two large lump ore piles.

Surface lighting went up after we installed three additional flood lights.

18. NATIONALITY
OF
EMPLOYEES:

	<u>American</u> <u>Born</u>	<u>Foreign</u> <u>Born</u>	<u>Total</u>
English	61	31	92
Finnish	66	81	147
Swedish	36	21	57
Italian	12	14	26
French	32	5	37
Norwegian	12	6	18
Irish	7	2	9
German	2	-	2
Total	228	160	388

Comparison for 1938 and 1937 and 1936 follows:

	<u>1938</u>		<u>1937</u>		<u>1936</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
English	92	23.8	104	26.3	98	26.2
Finnish	147	37.9	148	37.5	135	36.0
Swedish	57	14.7	59	14.9	64	17.1
Italian	26	6.7	22	5.6	16	4.3
French	37	9.5	30	7.6	32	8.5
Norwegian	18	4.6	18	4.5	14	3.7
Irish	9	2.3	10	2.5	10	2.7
German	2	0.5	3	0.7	4	1.1
Scotch	-	-	1	0.4	1	0.4
Total	388	100.0	395	100.0	374	100.0

It is evident that the % of English employed has dropped with the Italians and French increasing. The Finns remain approximately the same.

LLOYD MINE
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1. GENERAL

The production of 272,992 tons was approximately one-half that of the record year of 1937. Shipments showed an even greater decline at 112,191 tons compared to 644,395 tons in 1937. The working schedule was reduced to keep pace with the declining steel production rate from 3 mining crews working 4 days per week in January to a minimum of 2 crews working 2 days per week from June through October. The trend reversed at the end of October with a return to the 3 day schedule, and the welcome announcement was made at the close of the year that this is to be increased to 4 days per week starting Jan. 9, 1939. Thus the outlook at the end of 1938 appears better than that of last year when the huge shipments and sudden drop in steel production resulted in a surplus of ore at the lower lakes.

The working force averaged approximately 265 men during the first 5 months. This number was reduced to 190 men on June 1st when production curtailment necessitated laying off the third shift. The reduction was accomplished in the fairest possible way by taking into account the service record and number of dependents of every employee.

The lease and management agreement with the Republic Steel Corporation continued in effect. Under these provisions production was split into 189,000 tons for the Republic account and 83,992 tons for the Cliffs account. Republic however, elected to ship no ore in 1938 so the 112,191 tons forwarded was all Cliffs ore.

Mining operations were continued in the East Lloyd deposit in three areas, and a fourth was nearing the production stage at the end of the year. The first was at the east end of the orebody above the 4th Level and the second in the center of the orebody below this level. The third was the sub level stoping area at the west end of the deposit above the 5th Level, and the fourth was the stope development above the west end of the new 6th Level. The larger share of production again resulted from top slicing operations in the center of the orebody, and here also the proportion of the Lloydale grade was highest. The analysis of ore was practically unchanged from that of last year except for a small increase in the iron content of the Lloydale grade.

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1. GENERAL (Cont)

The mine was in excellent physical shape at the end of the year for the slower working scheule had little or no effect on the maintenance of underground openings. New construction and equipment purchases were limited, but operating repairs kept everything in order for expansion and improved efficiency when the opportunity arises.

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

<u>Grade</u>	<u>Tons</u>
Lloyddale	210,829
Lloyd Silica	62,163
Total	272,992

This product compared with the record total of 545,274 tons in 1937. The proportion of silica grade was again reduced from 26.5% in 1937 to 22.8% in 1938. No Lloyd grade ore was produced in 1938, the lower phosphorus material from the west end being included in the Lloyddale grade.

b. Shipments

<u>Grade</u>	<u>Pocket Tons</u>	<u>Stockpile Tons</u>	<u>Total Tons</u>	<u>Total Last Year</u>
Lloyddale	53,932	30,347	84,279	446,384
Lloyd Silica	15,908	12,004	27,912	146,822
" " #1				4,910
Morris				46,279
Total	69,840	42,351	112,191	644,395
Total Last Year	327,104	317,291	644,395	
Decrease	257,264	274,940	532,204	

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

Year 1934	99,023
1935	180,208
1936	353,106
1937	644,395
1938	112,191

The continuous increase up to 1937 may be noted. Also, that production exceeded shipments in 1938 by 160,801 tons.

LLOYD MINE
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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

c. Stockpile Inventories

<u>Grade</u>	<u>Tons</u>
Lloyddale	185,543
Lloyd Silica	84,304
Total	269,847

This stockpile balance is 160,801 tons above that of last year.

d. Division of Product by Levels

The ore produced above various levels was as follows:

	<u>Lloyddale</u> <u>Tons</u>	<u>Lloyd Silica</u> <u>Tons</u>	<u>Total</u> <u>Tons</u>
Third Level			
Fourth Level	50,815	11,494	62,309
Fifth "	158,215	44,305	202,520
Sixth "	1,799	6,364	8,163
Total	210,829	62,163	272,992

Production from the 4th and 5th Levels was roughly proportionate to that of the year before. The third Level production of 1937 was replaced by the new 6th Level ore from development starting in April.

e. Production by Months

<u>Month</u>	<u>Days</u>	<u>Lloyd</u>		<u>Total</u> <u>Ore</u>	<u>Rock</u> <u>Tons</u>	<u>Tons per</u> <u>Man per</u> <u>Day</u>
		<u>Lloyddale</u> <u>Tons</u>	<u>Silica</u> <u>Tons</u>			
January	23	22,876	6,538	29,414	2,772	6.73
February	23	26,630	7,041	33,671	2,673	7.49
March	27	27,883	7,314	35,197	3,225	7.12
April	23	23,787	6,886	30,673	1,578	7.38
May	22	20,216	7,891	28,107	702	7.49
June	18	10,673	2,855	13,528	318	6.72
July	16	10,169	4,077	14,246	279	7.74
August	17	10,351	2,970	13,301	552	7.29
September	17	11,251	3,518	14,769	321	7.73
October	17	10,299	4,537	14,836	621	7.59
November	18	19,298	4,380	23,678	462	8.47
December	20	17,416	4,156	21,572	369	7.38
	241	210,829	62,163	272,992	13,872	7.38

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

f. Ore Statement

	Lloyd Lloyddale Tons	Lloyd Silica Tons	Total Tons	Total Last Year
On Hand Jan. 1, 1938	58,993	50,053	109,046	195,486
Output for Year	210,829	62,163	272,992	545,274
Overruns				12,681
Total	269,822	112,216	382,038	753,441
Shipments	84,279	27,912	112,191	144,395
Balance on Hand	185,543	84,304	269,847	109,046
Decrease in Output			272,282	
Increase in Ore on Hand			160,801	

The operating schedule for the past five years follows:

- 1934 - 3-8 hr. shifts six days per week Jan. 1 to Apr. 3.
 1-8 hr. shifts 3 days per week Apr. 3 to Sept. 1.
 1-8 hr. Shifts 2 days per week Sept. 1. to Dec. 31st.
- 1935 - 1-8 hr. shifts 2 days per week Jan. 1. to Feb. 11.
 1-8 hr. shifts 3 days per week Feb. 11 to Dec. 31.
- 1936 - 1-8 hr. shifts 3 days per week Jan. 1 to Feb. 1.
 1-8 hr. shifts 4 days per week Feb. 1 to May 1.
 2-8 hr. shifts $5\frac{1}{2}$ days per week May 1 to Dec. 7.
 3-8 hr. shifts 5 days per week Dec. 7 to Dec. 31.
- 1937 - 3-8 hr. shifts 5 days per week Jan. 1 to Apr. 17.
 3-8 hr. shifts $5\frac{1}{3}$ days per week Apr. to Oct. 2.
 3-8 hr. shifts 5 days per week Oct. 2 to Dec. 6.
 2-8 hr. shifts 6 days per week Dec. 6 to Dec. 31.
- 1938 - 2-8 hr. shifts 6 days per week Jan. 1 to Apr. 16.
 2-8 hr. shifts $4\frac{1}{2}$ days (3 crews) per week Apr. 16 to 6/1
 1-8 hr. shifts 4 days (2 crews) per week June 1 to Oct. 31.
 1-8 hr. shifts $5\frac{1}{2}$ days per week Oct. 31 to Dec. 31.

g. Delays

There were 3 delays in 1938 compared to none in 1937 under the near capacity production schedule. The first of these was the most serious and was caused by the heavy snowstorm of Jan. 25-27. The time loss was $2\frac{1}{2}$ days, and the production loss 3300 tons. The second was $\frac{1}{2}$ day delay, and loss of 350 tons, on Mar. 19th due to a broken surface water line which cut off the cooling water supply for the compressor.

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2. PRODUCTION
SHIPMENTS &
INVENTORIES (Cont.)

g. Delays (Cont.)

The third was a 1/2 day delay, and loss of 400 tons, on June 22nd when the skip hoist armored cable burned out at the electrical control panel.

3. ANALYSIS

a. Average Mine Analysis on Output

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Silica</u>
Lloyddale	210,829	58.74	.152	6.68
Lloyd Silica	62,163	52.93	.136	14.81

The one slight change in the output analysis was the increase in the iron content of the Lloyddale grade from 58.50 in 1937 to 58.74 in 1938. The inclusion of the Lloyd grade ore from the west end stopes above the 5th Level again served to keep the phosphorus in the Lloyddale grade near .150.

There were no straight cargoes forwarded from the mine in 1938 so the output analysis is the only one given.

b. Analysis of Ore in Stock Dec. 31, 1938

<u>Grade</u>	<u>Tons</u>	<u>Iron</u>	<u>Phos</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist</u>
Lloyddale Dried	185,543	58.72	.153	6.98	.24	2.51	.80	.27	.10	4.70	
Nat'l		52.43	.137	6.23	.21	2.24	.71	.24	.009	4.20	10.75
Lloyd Sil. Dried	84,304	52.55	.130	17.94	.22	2.62	.75	.38	.011	3.99	
Nat'l		46.84	.116	14.19	.20	2.34	.67	.34	.010	3.56	10.90

c. Complete Analysis of Ores Shipped in 1938

Lloyddale	58.50	.156	6.65	.23	2.67	.60	.40	.010	5.10
Lloyd Silica	51.60	.126	16.85	.21	3.25	.64	.45	.011	4.18

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3. ANALYSIS (Cont.)

e. Estimated Analysis of Ore Reserves

The estimated analysis of the Lloyd and Lloydale grade reserves is the same as the previous year, and is shown in the following table:

	<u>Grade</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sil.</u>	<u>Mang.</u>	<u>Alum.</u>	<u>Lime</u>	<u>Mag.</u>	<u>Sul.</u>	<u>Loss</u>	<u>Moist</u>
Lloyd Dried		58.98	.127	6.68	.25	2.29	1.18	.38	.012	4.81	
Nat'l		52.45	.111	5.93	.22	2.04	1.05	.34	.011	4.08	11.25
Lloydale Dried		58.25	.187	7.08	.25	2.65	1.26	.44	.011	5.02	
Nat'l		51.56	.166	6.28	.22	2.35	1.12	.39	.010	4.46	11.25

4. ESTIMATE OF
ORE RESERVES

Assumption: 12 cu. ft. equals 1 ton
 10% deduction for rock
 10% deduction for loss in mining

Developed Ore Dec. 31, 1938

LLOYD EAST DEPOSIT

	<u>Lloyd Ore</u>	<u>Lloydale Ore</u>	<u>Total Ore</u>
	<u>Tons</u>	<u>Tons</u>	<u>Tons</u>
Fourth Level and Above	0	103,658	103,658
Fourth Level to 5th Level	0	418,625	418,625
Fifth Level to Seventh Level	324,514	973,540	1,298,054
Total Ore Above 7th Level	324,514	1,495,823	1,820,337
Ore below 7th Level	70,538	211,612	282,150
Total Reserve Lloyd Mine East	395,052	1,707,435	2,102,487

LLOYD DEPOSIT

Ore Above 3rd Level	8,351	0	8,351
Ore Below 3rd Level	7,552	0	7,552
Total Reserve Lloyd Deposit	15,903	0	15,903

TOTAL RESERVE LLOYD MINE 410,955 1,707,435 2,118,390

The following table shows the development of standard ore reserves during the past three years:

	<u>1936</u>	<u>1937</u>	<u>1938</u>	
Ore in Mine Jan. 1st.	2,771,174	2,675,686	2,308,802	2,308,802
Production	260,577	400,394	272,992	210,829
Balance	2,510,597	2,276,292	2,035,810	2,097,973
Ore in Mine Dec. 31st.	2,676,686	2,308,802	2,118,390	2,118,390
New Ore Developed	166,089	32,510	82,580	204,17

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5. LABOR
AND
WAGES

a. General

Labor conditions throughout the year were satisfactory. Membership in the Marquette Range Industrial Union however dwindled to a small percentage of the employees at the end of the year. The cause seemed to be apathy or an apparent lack of interest which had reached the high point at the extremely successful Union picnic at Champion Beach on July 9th. The few meetings held with the representatives at the mine were pleasant in every respect and ended with immediate adjustment of the small complaints or grievances made.

There was a continuation of the over-supply of all classes of labor. The reduction of the working force on June 1st of nearly 90 men resulted in the loss of some excellent young miners, and it is hoped that at some future time the majority of these men will have the opportunity of returning to work for the Company. The absence of complaints from the men laid off showed that they understood the necessity of the reduction, and the fairness of the rating system based on service records and the number of dependents.

The increased wage schedule which became effective Mar. 16, 1937, and the payment of rate and a half for more than 8 hours per day or 40 hours per week remained unchanged. This schedule kept daily wages at a level well above that enjoyed in previous years, and once again, because it was in effect the full year, increased the labor proportion of the cost of production.

b. Comparative Statement of Wages & Product

	<u>1938</u>	<u>1937</u>	<u>Incr.</u>	<u>Decr.</u>
<u>PRODUCT</u>	272,992	545,274		
No. Shifts & Hours				
Jan. 1 to Dec. 4		3-8 Hr.		
Dec. 4 to Dec. 31		2-8 Hr.		
Jan. 1 to June 1	2-8 Hr.			
June 1 to Dec. 31	1-8 Hr.			
<u>AVG. NO MEN WORKING</u>				
Surface	48	52		4
Underground	150	211		61
Total	198	263		65

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5. LABOR
AND
WAGES (Cont.)

b. Comparative Statement of Wages & Product

<u>AVG. WAGES PER DAY</u>	<u>1938</u>	<u>1937</u>	<u>Incr.</u>	<u>Decr.</u>
Surface	5.59	5.44	.15	
Underground	6.42	6.30	.12	
Total	6.21	6.20	.01	

Average wages per day Surface and Underground respectively were 1933-3.84 and 4.29; 1934-4.18 and 5.00; 1935-4.19 and 4.98; 1936-4.30 and 5.25; 1937-5.44 and 6.30

WAGES PER MONTH OF 25 DAYS

Surface	139.75	136.00	3.75	
Underground	160.50	159.75	.75	
Total	155.25	155.00	.25	

WAGES PER MONTH OF 22 DAYS

Surface	122.98	119.68	3.30	
Underground	141.24	140.58	.66	
Total	136.62	136.40	.22	

WAGES PER MONTH OF 18 DAYS

Surface	100.62	97.92	2.70	
Underground	115.56	115.02	.54	
Total	111.78	111.60	.18	

WAGES PER MONTH OF 12 DAYS

Surface	78.08	65.28		
Underground	77.04	75.60		
Total	74.52	74.40		

PRODUCT PER MAN PER DAY

Surface	29.53	36.75		7.22
Underground	9.84	9.51	.33	
Total	7.38	7.55		.17

LABOR COST PER TON

Surface	.189	.148	.041	
Underground	.652	.673		.021
Total	.841	.821	.021	

AVG. PRODUCT STOPING

29.76 25.74

AVG. WAGES CONTRACT MINERS

7.15 7.13

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5. LABOR
AND
WAGES (Cont.)

b. Comparative Statement of Wages & Product (Cont.)

	<u>1938</u>	<u>1937</u>	<u>Incr.</u>	<u>Decr.</u>
<u>TOTAL NO. OF DAYS</u>				
Surface	9,243 $\frac{3}{4}$	14,837 $\frac{1}{4}$		5,593 $\frac{1}{2}$
Underground	27,733 $\frac{3}{4}$	57,351 $\frac{1}{2}$		29,617 $\frac{1}{2}$
Total	36,977 $\frac{3}{8}$	72,188 $\frac{3}{8}$		35,211
<u>AMOUNT FOR LABOR</u>				
Surface	51,667.46	80,643.16		28,975.70
Underground	177,974.70	366,735.07		188,760.37
Total	229,642.16	447,378.23		217,736.07

PROPORTION SURFACE TO UNDERGROUND MEN

1934	1 to 2.88
1935	1 to 3.29
1936	1 to 3.33
1937	1 to 4.06
1938	1 to 3.13

6. SURFACE

a. Buildings

The six new fireproof buildings that were erected in 1937, and the renovation of others during that year, eliminated the need for new construction and repairs in 1938. The only improvements that were made outside of ordinary maintenance were the fitting of additional lockers, bins, and shelves for orderly storage of materials in the office warehouse. A few shelves, racks and a locker were also built in the storage shed south of the shafthouse for the same purpose, and in November a sectional storm shed was added to the north entrance of the dry house.

The Section Six brick dry house was partially dismantled during the summer by employees who desired the materials. The woodwork in this building was badly rotted, but the remaining pipe, fittings, etc. were salvaged for use elsewhere in the mine. The heating boiler was transferred to the Maas Mine in November. The windows and door of the Section Six engine house were covered with steel plate to prevent repetitions of the theft of small electrical parts from the interior.

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6. SURFACE (Cont.)

b. Stocking Grounds

The average production of the past several seasons has taxed the capacity of the stockpile grounds and made necessary the scraping of ore between the piles in the Spring months. To save this expense in the future, a new area was prepared at small cost on the south side of the pocket tracks east of the shaft. The timber was cleared by employees who were glad to get the wood, and the stripping was done in June under contract with Lindberg Bro's at a cost of \$375.48. After grading and levelling, pine slabs were laid to form a collar, and a trestle of 21 bents was erected in October. The capacity of the new area is over 60,000 tons and the average distance from the shaft is less than the northeast trestle. Stockpiling from this new trestle was underway in December and the top tram system was altered so that 8 tons instead of 4 are dumped on each trip. This was done by attaching a second car at a distance of 18' from the first and elevating the track under the shaft dumping pocket so that one car is started on the downgrade. The 50 H.P. tram motor was tested to see that it was not overloaded, and the wear on the endless rope and the rest of the system is less because only one-half the usual number of trips is required.

The 42,351 tons that were loaded by shovel were taken from the north side of the stockpile grounds. These trestles were then repaired and strengthened and this space, together with the partially filled southwest trestle and the new one, provide ample capacity although there were nearly 250,000 tons in stock at the start of the season.

c. Roads

The gravel which was placed on the mine roads and parking areas in 1937 was an improvement which was particularly appreciated in the Spring of 1938. Ditches and culverts were inspected and cleaned in October to maintain the drainage which has eliminated the muddy roads of past years.

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7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking in 1938.

b. Development

The most important development was the advancement of the new 6th Level drift from a point in the footwall 550' southeast of the shaft into the orebody to a total distance of 1900' from the shaft. Two short crosscuts were also turned off in the hanging wall jasper and lean ore, but the advance of the main drift in November and December was in Ore. At the end of the year development of the first sub level stope above this level was underway, and early in 1939 a traveling and ventilation raise will be put through to the 5th Level so that regular mining operations may be started. The rock drifting at this elevation in 1938, all of which was full size, amounted to 1413', and in addition there was 231' of drift advanced in ore.

The larger share of development, as was the case in 1937, was within the limits of the orebody above the 5th Level in the opening of sub level stopes. Three of these, No. 8 above the 4th Level, and Number 7 and 14 above the 5th Level were responsible for all but a few feet of the total of 5228' of small ore drift and raise development. Three short double compartment ore raises, and several hundred feet of full size timbered ore drifts, for the transfer or scraper headings under the stopes, were also necessary to continue production from this source.

Rock development, outside of the new 6th Level drift, was held to a minimum as the figures show. The only work of importance was the permanent ventilation and traveling raise from the 5th to the 4th Levels which was started in October. The raise is in the slate footwall at the east end of the 5th Level and its minimum diameter is 6' in order to take care of the ventilation needs of the future. The total height at the year end was 114' and this is about one-half the distance on the 50° incline to the 4th Level.

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7. UNDERGROUND (Cont.)

b. Development (Cont.)

The total number of contracts working underground in 1938 averaged 18. Approximately 5 of these were maintained on development, the proportion in some months being a little higher. The development footage driven by these 5 contracts amounted to a total of 7936'.

c. Stoping

Stoping operations in 1938 were continued by 3 contracts above the east end of the 4th Level, and by an average of 10 contracts above the 5th Level. The latter were divided into 2 sub level stoping contracts at the east and west ends, with 8 top slicing contracts mining from 3 raise series between. The stope at the east end of the orebody (in the narrow part of the ore trough) was No. 7, and the one at the northwest end was No. 14. The vertical extent of the 5th Level stope mining was from the 4th Level down to the 640' sub level, and of the top slicing from the 725' sub level down to the 690' sub level.

The following is a detailed review of the year's mining operations:

Subs Above the 4th Level

1020, 1005, 980, 970, 940, 925, 910 and 890' Sub Levels

At the beginning of the year, Nos. 8 and 18 contracts were developing in advance of stoping on the south footwall at the east end of the Lloyd orebody. This area comprised ore between 2 dikes averaging about 30' in width. The above mentioned development was carried to the 1020' sub where it was stopped due to the appearance of caved material in the back, the result of mining done several years ago. Transfer drifts were then driven on the 890' sub, both to the east and west, and additional sub development completed preparatory to stoping. No. 8 contract commenced mining on the various sub levels, retreating toward the traveling road in a westerly direction. On completion of this work, operations were started at the west end of the area, and the stope likewise brought back to the traveling raise with an average mined width of approximately 25'. Due to the soft dike, on both the north and south sides of the stope, it was necessary to leave approximately 5' of ore in place to minimize dilution while mining was in progress.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Late in June it was necessary to leave a 10' pillar on the west side and again resume stoping due to the caving of the back and south side. The entire operation was completed early in August after a considerable tonnage of ore had been produced at a comparatively low cost. No. 8 contract then returned to top slicing along the north side of the old transfer drift, and in December completed a slice to the west along the north footwall at a distance of 52' from No. 486 raise.

No. 1 contract completed top slicing operations at the east end of the deposit late in January and dropped to the next lower sub to cut out No. 487 raise.

870' Sub Level

No. 1 contract mined at this elevation during the larger part of the year. The area proved to be somewhat smaller than that on the 890' sub due to a jasper intrusion on the northeast side. The extreme width measured approximately 70' north and south between the jasper on the north and the dike on the south footwall.

860' Sub Level

Early in September No. 1 contract dropped to this elevation and first drifted west to the mining limit where a ventilation raise was connected to No. 8 contract on the 890' sub. It was necessary to maintain an opening for forced ventilation by fans during the entire year in this warm upper section of the mine. In December No. 1 contract completed a slice to the east along the north footwall at a distance of 81' and then started a second slice to the southeast.

830' Sub Level

No. 2 contract completed stoping operations in a small area south of their regular slicing territory in January. This small stope was carried up to the 870' sub in a small area bounded on the north by old stopes and on the south by the footwall dike. The average width was slightly over 20'. Regular slicing operations to the mining limit on the east and the old workings on the west were started in February, and completed at this elevation in November.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

825' Sub Level

No. 2 contract cut out No. 485 raise at this elevation early in November and the first slices were toward the old workings on the west side, both north and south of the old original traveling road which connected a series of raises at this elevation. In December two slices had been mined, one a distance of 72' from the raise and the second intersecting the old workings at a distance of 61'.

4th Level

During the year only two areas were mined at this elevation. At the east end No. 7 contract completed mining a small pillar between their former stoping area and Nos. 11 and 12 slicing territory. The removal of this pillar completed mining on the 4th Level for a distance of approximately 800' along the strike of the orebody. The other area was the top of No. 14 stope at the northwest end which had been developed early in the year by Nos. 6 and 14 contracts. Since this stope originated on the 625' sub level and extends to a total height of over 125', it will be mentioned more in detail on the 625' sub level, or transfer sub, where the ore is drawn from the stope.

725' Sub Level

As in the case of the east end of the orebody on the 4th Level, several small pillars were undercut by No. 7 contract preparatory to opening a new stope on a lower sub level. In the southwest portion of the top slicing area, contracts 9, 17, and 19 completed mining at this elevation east and west of the 540 series of raises. A mining limit was located 22' north of No. 543 raise to set the dividing line between No. 14 stope and the slicing area mined by No. 9 contract.

715' Sub Level

Early in December 1937, Nos. 11 and 12 contracts started mining at this elevation on the 520' raise series. After driving a connection between the two raises, the first slice was to the east along the north footwall to connect with a small ventilation raise which opened on the 4th Level. Nos. 13, 16 and 10 contracts also started slicing operations between their east and west limits early in January. Late in March, the last remaining pillars were mined and these three contracts cut out the 530 raise series on the 700' sub. In the southwest slicing area contracts 9, 17, and 19 completed mining operations in June and also dropped to the 700' sub.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

The greatest area covered by top slicing operations in the central portion of the orebody was at this elevation in 1938.

700' Sub Level

Nos. 11 and 12 contracts had almost completed mining their area west of No. 7 stope by the end of the year. No. 11 contract regularly maintained a connection to the 4th Level raise for ventilation during the entire year. In December Nos. 11 and 12 contracts were slicing on the west side of their respective raises, No. 11 completing 2 slices, while No. 12 completed several more at the west extremity of their territory. Stoping operations were completed by No. 7 contract during November, the last pillar being mined on the east side of No. 522 raise. This limited the slicing area of No. 12 contract to the west side until the slope of the raise carries it farther west at lower elevations.

Mining operations were completed along the central series of raises by Nos. 13, 16 and 10 contracts in July. Then in October Nos. 9, 17, and 19 contracts cut out the No. 540 series at this elevation. The mining area west of these raises was somewhat larger than that on the sub above due to the retreating jasper hanging wall. No. 9 contract in December completed a slice at the mining limit east of No. 543 raise, while No. 17 contract completed a second slice east of No. 544 raise. No. 19 contract mined under the jasper hanging wall on the west side of No. 544 raise, extending their territory into the leaner material bordering the east side of the old No. 3 stope.

690' Sub Level

After completing the connection between the 3 raises of the central series, No. 13 contract drifted to the bottom of the single compartment cribbed ventilation raise to the 4th Level. This raise was maintained during the entire year to provide adequate ventilation for the workings on each sub level. In order to retard the advance of these 3 contracts and allow Nos. 11 and 12 contracts to reach the same elevation, the mining limit between the 520 and 530 raise series was temporarily extended 10' farther east.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

No. 13 contract in December continued slicing operations toward the mining limit on the east side of No. 531 raise after driving a traveling and ventilation connection to No. 14 stope on the west side of the raise. No. 16 contract completed a slice on the east side of No. 532 raise, while No. 10 contract continued mining southwest of No. 533 raise along the south footwall.

This elevation was the lowest one on which top slicing operations were carried on in the central portion of the orebody in 1938.

675, 650, 640, and 625' Sub Levels

Mining at these elevations was by sub level stoping at the east and west ends of the orebody. No. 7 stope was opened early in 1937 on the first sub below the 4th Level in the narrow part of the orebody near the junction of the north and south footwalls. The stope was completed in November 1938, after mining a length of nearly 400' under the old top slicing territory. The vertical extent of the stope was from the transfer sub on the 625' sub level to the floor of the top slicing operations which had been halted at the back of the 4th Level. The area was developed from inclined transfer drifts in the bottom of the trough east of No. 511 raise, and later by a third transfer drift east of No. 532 raise. Development above this transfer was completed in March in the wider section of the orebody east of the limit set to protect Nos; 521 and 522 raises. Because of the increased width and the inclusion of several small dikes, particular care had to be taken in the westerly retreat of stoping operations to prevent contamination by premature caving of the back and side walls. A temporary 15' pillar was left in place at the east end of No. 522 transfer, and after mining operations had been completed on the west side, the pillar was undercut and caved. The maximum mining width was 60' at the 690' elevation. Late in November, after all minable ore was broken, No. 7 contract was transferred from this area. A considerable tonnage of broken ore will be drawn off at the transfer elevation when No. 12 contract completes top slicing operations on the 700' sub.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Stoping operations at the west end of the orebody above the 5th Level were in 3 separate areas. Mining operations were discontinued in No. 3 stope on the south side early in the year. Development above the east transfer was unsuccessful in extending the limits of ore of Lloyddale grade. During January and February, however, a small stope extension from the 650' sub to the 700' sub levels was mined by No 3 contract. Next a small area bordering the southeast side of the old No. 5 stope was developed by Nos. 3 and 18 contracts. Here again lean ore caused cessation of operations after a small stope 15' x 25' in area had been mined. This mass of lean ore will form a boundary between the old stopes and the top slicing operations of Nos. 17 and 19 contracts on sub levels from the 700 to the 625' or lower. The average iron content of the area is about 50%, and the phosphorus .200 to .300 %.

No. 18 contract cut out No. 541 raise at the 625' elevation in April. A transfer was then driven west below, and on the north side, of the old No. 14 stope transfer. The wedge shaped section of ore between No. 14 stope and the north footwall was developed and mined by No. 18 contract during the next few months. The maximum height was about 40' and the average width about 25'. Contamination by caved material from the north footwall caused abandonment soon after, but the transfer drift is still intact and a large quantity of silica grade material was left in place in the mills.

During this time development of the new No. 14 stope had been underway by Nos. 6 and 14 contracts. The so called new stope was above the easterly extension of the transfer drift between Nos. 530 and 540 crosscuts. The proposed stoping area was bounded on the south and east sides by limits set to protect the top slicing territory of Nos. 9 and 13 contracts. A 15' pillar of lean material was left in place at the west end, and stoping operations were started by No. 14 contract in April.

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7. UNDERGROUND (Cont.)

c. Stoping (Cont.)

Within a few months the stope was extended to the 4th Level elevation and during the remainder of the year the product of this stope increased month by month. The structure of the ore allowed efficient blasting methods, and during the latter part of 1938 a production rate in excess of 100 tons per man per day was maintained. To date a total of 39,000 tons have been mined, but in November pressure along the south side necessitated the leaving of a larger pillar with a consequent reduction of the length of the stoping face. During December, No. 14 contract mined on sub levels from the 675' to the 4th Level, the advance averaging approximately 15' to the east. Nos. 3 and 18 contracts, on completion of the small stopes previously described, started top slicing operations at the west end of the orebody under the caved Nos. 3 and 5 stopes. Two double compartment raises were extended from No. 550 crosscut to the 625' sub level, and mining in each case was started on the west or hanging wall side of the raise. Lean ore and jasper was encountered by No. 18 contract, so mining was transferred to the east side. By December the 5th slice was underway in this direction. No. 5 contract completed 4 slices on the west side, all of which intersected the jasper hanging wall. In December this contract started the third slice toward the south footwall. A small amount of ore is being left in the back above this area, and a heavy covering of poles is being laid on the floor of each slice in order to secure a good mat in the shortest possible time.

This area under the jasper hanging wall will be the first to be developed for top slicing from the new 6th Level. Mining operations on the next lower sub will necessitate the ore being scraped into cars because of the short distance above the 5th Level. Development of the 6th Level main drift has been planned so that the next crosscut, and the advance of the first double compartment mining raises will enter this territory from below.

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7. UNDERGROUND (Cont.)

d. Timbering

The total timbering cost was about in proportion to the reduced working schedule. The slightly higher cost per ton resulted from the regular maintenance charges on a reduced tonnage, and was also due to the fact that a slightly lower proportion of the product was from sub level stopping operations. The consumption of cribbing timber in the 6" to 8" size remained at a relatively low level because of the small amount of new raising. The amount of lagging used increased proportionately per ton, and per ft. of stull timber, and the number of $3\frac{1}{2}$ " poles decreased. The comparative statement follows:

Statement Showing Timber Used for Year 1938

	Lineal Feet	Avg. Price Per Foot	Amount 1938	Amount 1937
6" to 8" Cribbing Timber	15,495	.036	554.53	1,113.98
8" to 10" Stull Timber	46,549	.068	3,178.72	4,234.45
10" to 12" " "	27,319	.097	2,637.90	5,842.85
12" to 14" " "	12,411	.134	1,658.79	3,071.65
Total Timber 1938	101,774	.079	8,029.94	14,262.93
Total Timber 1937	182,518	.078	14,262.93	

Per 100 Ft.

7 ft. Lagging	601,026	.784	4,714.31	6,329.22
Maple Covering Boards				378.00
$3\frac{1}{2}$ " Poles	228,681	1.26	2,887.60	7,598.48
Wire Fencing	2,970	5.71	169.64	236.34
Total Poles, etc.	231,651	1.32	3,057.24	8,212.82
Total Lagging, Poles and Fencing, 1938	832,677	.93	7,771.55	14,542.04
Total Lagging, Poles and Fencing-1937	1,365,980	1.06	14,542.04	

	1938	1937
Product - Tons	272,992	545,274
Feet of Timber per ton of ore	.373	.335
Feet of Lagging per ton of ore	2.202	1.401
Feet of Lagging per foot of timber	5.905	4.186
Cost per ton for timber	.029	.026
Cost per ton for Lagging	.0173	.0117
Cost per ton for Poles, Fencing, etc.	.0112	.0151
Cost per ton for all timber	.0579	.0528
Equivalent Stull timber to board measure	200,652	380,965
Feet of Board Measure per ton of ore	.735	.699

LLOYD MINE
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7. UNDERGROUND (Cont.)

d. Timbering (Cont.)

	<u>Year</u>	<u>Cost Per Ton</u>	<u>Amount</u>
Cost of timber, lagging, poles, fencing	1938	.0579	15,801.49
	1937	.0528	28,804.97
	1936	.0596	21,719.68
	1935	.0515	11,432.19
	1934	.0409	5,028.24

e. Drifting and Raising

The reduced amount of development in 1938 was about in proportion to the difference in working schedules. The footage in 1938 was notable for the small amount of raise work, and the increased rock drift footage. This was due to the 6th Level drift development, and the completion in 1937 of the mining raises above the 5th Level. The following table gives the 2 year comparison:

	<u>Ore Drift</u>	<u>Rock Drift</u>	<u>Total Drift</u>	<u>Ore Raise</u>	<u>Rock Raise</u>	<u>Total Raise</u>	<u>Grand Total</u>
1938	4105	1513	5618	2154	164	2318	7936
1937	6771	1176	7947	4711	209	4920	12867
Decrease	2666	337	2329	2557	45	2602	4931

If the small untimbered raise and drift development in advance of sub level stoping operations is eliminated from the above table, the full size development may be shown as follows:

	<u>Ore Drift</u>	<u>Rock Drift</u>	<u>Total Drift</u>	<u>Ore Raise</u>	<u>Rock Raise</u>	<u>Total Raise</u>	<u>Grand Total</u>
1938	934	1453	2387	97	118	215	2602
1937	1168	1141	2309	153	0	153	2462
Increase			78			62	140

f. Explosives, Drilling & Blasting

The blasting cost in 1938 compared favorably with that of 1937. Shortly after the first of the year the use of Gelamite #1 powder was standardized for stoping and development work. The later familiarity with the breaking strength of this one grade held consumption at about the same level as last year, or about 2 tons of ore per lb. of powder. The cost of powder in the 6th Level rock drift E & A No. 752 was reduced from 1.95 per foot in 1937 to 1.81 in 1938.

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7. UNDERGROUND (Cont.)

f. Explosives, Drilling & Blasting

The experimental use of master fuse cartridges in lighting 5 or 6 holes from one pilot fuse demonstrated their practicability, and they are expected to replace electric blasting and add to safety by increased use in 1939.

The explosives statements are shown under three headings as follows:

<u>BREAKING ORE</u>	Quantity Lbs	Average Price	Amount 1938	Amount 1937
Gelamite Powder #1	134,964	12.25	16,533.08	3,227.89
Gelamite Powder #2	4,300	12.25	526.75	26,867.73
Hercomite #3				489.12
Gelatin - 60%				1,796.52
Total Powder	139,264	12.25	17,059.83	32,381.26
Fuse - Feet	455,365	5.43	2,471.01	5,204.89
No. 6 Blasting Cap	59,341	12.20	723.96	1,625.98
Tamping Bags	8,500	2.00	17.00	8.00
Electric Exploders				74.38
Fuse Lighters	12,300	6.96	85.58	139.56
Total Fuse, Caps, etc.			3,297.55	7,052.81
Total Explosives, Breaking Ore			20,357.38	39,434.07
Product - Tons			272,992	545,274
Lbs Powder per ton of Ore			.510	.495
Cost per ton for powder			.062	.059
Cost per ton for Fuse, Caps, etc.			.012	.013
Cost per ton all explosives			.075	.072
<u>DEVELOPMENT IN ROCK (Excluding 6th Level Drift E&A #752)</u>				
Gelamite Powder #2	200	12.25	24.50	112.40
Gelatin - 60%				13.62
Gelamite Powder #1	1,875	12.25	229.71	6.12
Total Powder	2,075	12.25	254.21	132.14
Fuse - Feet	7,174	5.27	37.78	25.26
No. 6 Blasting Caps	919	12.20	11.22	7.13
Total Fuse, Caps, etc.	8,093		49.00	32.39
Total all explosives, Development Work			303.21	164.53
Rock Drifting - Feet			257	317
Cost per foot for powder			.989	.417
Cost per foot for fuse, Caps, etc.			.191	.102
Cost per Foot All Explosives			1.180	.519

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7. UNDERGROUND (Cont.)

f. Explosives, Drilling & Blasting (Cont.)

	Amount <u>1938</u>	Amount <u>1937</u>
Grand total Explosives used in Mine	20,660.59	39,598.60
Cost per ton all Explosives used	.076	.073
Average price per pound for Powder	.1225	.1199

Statement of explosives used for E & A No. 752

	Quantity Lbs.	Average Price	Amount <u>1938</u>	Amount <u>1937</u>
Gelamite Powder #1	17,961	12.25	2,200.25	324.63
Gelatin - 60%				1,365.00
Total Powder	17,961	12.25	2,200.25	1,689.63
Fuse - Feet	49,950	5.55	277.20	167.91
No.6 Blasting Caps	6,151	12.20	75.04	46.56
Electric Exploders				3.04
Safety Fuse lighters	500	6.72	3.38	
Tamping Bags	500	2.00	1.00	
Total Fuse, Caps, etc.			356.62	217.51
Total All Explosives			2,556.87	1,907.14
Rock Drifting - Feet			1413	980
Cost per foot for powder			1.557	1.725
Cost per foot for caps, fuse, etc.			.252	.221
Cost per foot all explosives			1.810	1.946

g. Ventilation

The volume of air circulated through the mine by the natural ventilation system varied from 8000 cu. ft. per minute on warm summer days, to 24,000 cu. ft. per minute during the colder weather. The three working places above the 4th Level were ventilated by 2 blower fans in series, the 5th Level contracts received fresh air direct from the Lloyd shaft which then exhausted above to the 4th Level and Section 6 shaft, and the development of the 6th Level was adequately ventilated by means of a fan and water curtain. Ventilation of all regular mining places was maintained throughout the year so that blasting could be done at any time during the shift without undue delay or interference with other contracts. The attention given this problem was well repaid by the time saved by each contract in their daily mining cycle.

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7. UNDERGROUND (Cont.)

g. Ventilation(Cont.)

The smaller volume of air on the warmer days was not always sufficient to accomplish this purpose, and the purchase of a 5' diameter fan designed for the mine circuit is intended in the Spring of 1939.

The problem of ice in the downcast Lloyd hoisting shaft was definitely solved by the combination of the skip road heater and the Section 6 shaft reversing fan. The heater, which is attached to the stoker fired headframe steam boiler, kept the shaft free of ice in all but the coldest weather, and the reversing fan which forced the warm mine air back up the shaft on the night repair shift or week ends effectively took care of the remainder.

8. COST OF OPERATING

a. Comparative Mining Costs

	<u>1938</u>	<u>1937</u>	<u>Incr.</u>	<u>Decr.</u>
Product, Tons	272,992	545,274		272,282
Underground Costs	1.005	.955	.050	
Surface Costs	.196	.140	.056	
General Mine Expense	.257	.177	.080	
Cost of Production	1.458	1.272	.186	
Depreciation	.047	.033	.014	
Taxes	.198	.059	.139	
Loading and Shipping	.016	.048		.032
Total Cost at Mine	1.719	1.412	.307	
Budget Estimate Cost at Mine	1.707	1.410	.297	
Number of Operating Days	241	284		
Number of Shifts & Hours	116 - 1-8 Hr.	18, 1-8 Hr.		
	123 - 2-8 Hr.	19, 2-8 Hr.		
	2 - 3-8 hr.	247, 3-8 hr.		
Average Daily Product	1,133	1,920		787

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8. COST OF
OPERATING (Cont.)

	<u>1938</u>		<u>1937</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
1. Exploring in Mine	213.03	.001	170.67	.000
3. Development in Rock	1,857.21	.007	669.75	.001
4. Development in Ore	23,743.13	.087	44,247.25	.082
5. Stopping	99,742.90	.365	209,183.51	.384
6. Timbering	68,462.21	.251	121,680.25	.223
7. Trimming	29,383.68	.108	60,134.06	.110
8. Ventilation	592.29	.002	1,678.45	.003
9. Pumping	11,267.02	.041	13,697.99	.025
10. Com. And Air Pipes	16,369.57	.060	25,923.37	.048
12. Udg. Superintendence	10,858.62	.040	16,288.66	.030
14. Maint. of Comp. & Power Drills	690.78	.002	1,627.07	.003
15. Scrapers & Mech. Loaders	4,569.65	.017	12,034.46	.022
16. Electric Tram Equipment	5,701.27	.021	11,898.23	.022
17. Pumping Machinery	911.32	.003	2,970.42	.005
Total Underground Costs	274,362.68	1.005	520,864.64	.955
18. Hoisting	18,139.88	.067	26,324.30	.048
19. Stocking Ore	8,970.69	.033	7,490.93	.014
20. Crushing at Mine	1,358.18	.005	1,655.65	.003
21. Dry House	4,936.40	.018	7,376.84	.014
22. General Surface Expense	5,784.70	.021	7,868.03	.014
23. Maint. Hoisting Eqpt.	3,913.66	.014	7,034.21	.013
24. Shaft	1,050.00	.004	5,154.15	.009
25. Top Tram Equipment	2,971.82	.011	4,088.94	.007
26. Docks, Trestles & Pkts.	5,741.83	.021	5,698.42	.011
27. Mine Buildings	523.21	.002	3,732.71	.007
Total Surface Costs	53,390.37	.196	76,424.18	.140
Vacation Expense	2,601.39	.010	4,787.91	.009
28. Insurance	161.27	.001	3,435.96	.006
29. Mining Engineering	2,459.52	.009	2,373.79	.004
30. Mechanical & Elect. Eng.	1,689.71	.006	1,547.65	.003
31. Analysis & Grading	6,093.99	.022	13,006.71	.024
32. Personal Injury	9,543.41	.035	14,587.58	.027
33. Safety Dept.	1,328.19	.005	1,582.41	.003
34. Telephone & Safety Dev.	1,438.36	.005	1,820.75	.003
35. Local & General Welfare	6,389.84	.024	5,917.74	.011
36. Spec. Exp. Pensions & Allow.	5,032.83	.018	5,673.93	.011
37. Ishpeming Office	10,367.38	.038	14,439.00	.026
38. Social Security Taxes	10,430.71	.038	13,752.87	.025
39. Mine Office	12,614.15	.046	13,494.07	.025
Total General Mine Expense	70,150.75	.257	96,420.37	.177
Cost of Production	397,903.80	1.458	693,709.19	1.272
40. Taxes	53,882.69	.198	32,159.69	.059
Total Cost	451,786.49	1.656	725,868.88	1.331

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8. COST OF
OPERATING (Cont.)

	<u>1938</u>		<u>1937</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
41. General Supplies	25,289.81	.093	37,457.56	.069
42. Iron And Steel	3,910.65	.015	8,403.92	.015
43. Oil and Grease	1,177.60	.004	1,422.88	.003
44. Machinery Supplies	5,854.48	.021	18,603.77	.034
45. Explosives	20,660.59	.076	41,775.12	.077
46. Lumber and Timber	19,700.94	.072	36,441.75	.067
47. Fuel	2,100.99	.008	1,884.70	.003
48. Electric Power	29,590.36	.108	40,563.25	.074
49. Sundries	2,247.12	.008	5,225.75	.010
50. Other Mines & Accounts	252.41	.001	135.27	.000
Supply Inv. Adj.			11.68	
Total Per Cost Sheet	110,280.13	.404	191,655.11	.352

The explanation of the detailed accounts that follow includes only the comparison of the extraordinary or varying costs which are of interest:

3. Development in Rock

This account in 1937 showed a credit because of the transfer of the 6th Level rock drift development charges to E&A #752. The operating expense in 1938 was largely for the 5th to 4th Level permanent traveling and ventilation raise.

The 6th Level rock drift advance was 550' in 1937 and 1431' in 1938. The cost per foot was reduced considerably, from \$16.85 to \$13.52 respectively, and the largest monthly advance was 275' in March.

5. Stopping

Although production was but half that of the previous year the direct mining cost was lowered in 1938. The tons per man, or mining efficiency increased, for in spite of higher supply costs and an increased average miners rate (because of the increased efficiency) the stopping cost was down from .408 to .398. This cost excludes the ore from development, and the detailed comparison is shown in the following table:

	<u>1938</u>		<u>1937</u>	
	<u>Amount</u>	<u>Per Ton</u>	<u>Amount</u>	<u>Per Ton</u>
General Supplies	5,576.10	.022	10,446.90	.020
Iron & Steel	1,621.94	.006	2,319.28	.005
Oils & Greases	277.55	.001	281.67	.000
Machy. Supplies	937.18	.004	2,041.42	.004
Explosives	15,774.36	.063	30,479.10	.060
Lumber & Timber	98.21	.001	16.81	.000
Electric Power	296.91	.001	393.18	.001
Sundries	340.91	.001	589.02	.001
Expense Accts.	99.11	.001	184.24	.000
Total Supplies	25,022.27	.100	46,751.62	.091